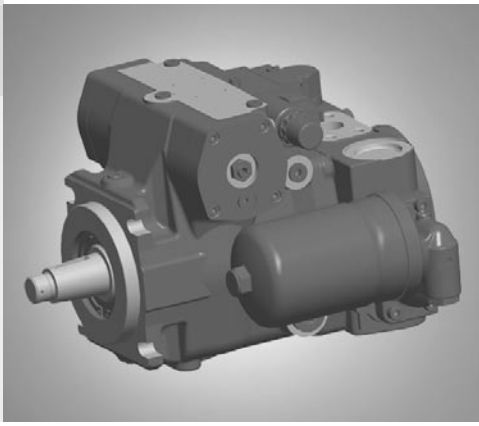
Rexroth
Bosch Group

Axial Piston Variable Pump A4VTG

RA 92013-A/07.09 1/24

Data sheet



Series 33
Sizes NG71, 90
Nominal pressure 5800 psi (400 bar)
Maximum pressure 6500 psi (450 bar)
Closed circuit
For the drum drive in mobile concrete mixers

Contents

Features

- Variable axial piston pump of swashplate design for hydrostatic drives in closed circuit
- The flow is proportional to the drive speed and displacement.
- The flow increases as the angle of the swashplate is adjusted from zero to its maximum value.
- Flow direction changes smoothly when the swashplate is moved through the neutral position.
- Two pressure-relief valves are provided on the high pressure ports to protect the hydrostatic transmission (pump and motor) from overload.
- The high-pressure relief valves also function as boost valves.
- The integrated boost pump acts as a feed pump and control pressure supply.
- The maximum boost pressure is limited by a built-in boost pressure-relief valve.
- Tapered shaft option for direct drive shaft yoke installation.

Ordering code for standard program

A4VT	G					/	33	A		N	C4	M9		F		A	F	
01	02	03	04	05	06		07	08	09	10	11	12	13	14	15	16	17	18

Axial piston unit

01	Swashplate design, variable, nominal pressure 5800 psi (400 bar), maximum pressure 6500 psi (450 bar), mobile concrete mixers	**A4VT**

Operation mode

02	Pump, closed circuit	**G**

Size

03	Displacement $V_{g\,max}$	in cm^3	**071**	**090**
		in in^3/rev	**4.33**	**5.49**

Control device		**071**	**090**	
04	Proportional control hydraulic, mechanical servo, hexagon shaft with lever to the rear	●	●	**HW1**[1]
	Proportional control electric, with emergency actuation and spring return, U = 12 V DC	●	●	**EP3**

Connector for solenoids[2]		**071**	**090**	
05	Without	●	●	**0**
	DEUTSCH - molded connector, 2-pin – without suppressor diode	●	●	**P**

Auxiliary functions		**071**	**090**	
06	Without	●	●	**0**
	With mechanical stroke limiter, externally adjustable	●	●	**M**
	With ports X_3, X_4 for stroking chamber pressure	●	●	**T**
	With mechanical stroke limiter and ports X_3, X_4	●	●	**B**

Series

07	Series 3, Index 3	**33**

Version of port and fixing threads

08	ANSI (USA)	**A**

Direction of rotation

09	Viewed from drive shaft	clockwise	**R**
		counter-clockwise	**L**

Seals

10	NBR (nitrile-caoutchouc), shaft seal ring in FKM (fluor-caoutchouc)	**N**

Mounting flange

11	SAE J744, 127-4	**C4**

Drive shaft		**071**	**090**	
12	Tapered shaft	●	●	**M9**

Service line ports			**071**	**090**	
13	SAE flange ports A and B opposite at top/at bottom	Suction port S at bottom	❍	❍	**3**
		Suction port S at top	●	●	**4**

● = Available ❍ = On request – = Not available

1) Mounting position of the lever not specified on delivery, to be aligned by the customer

2) Connectors for other electric components can deviate.

Ordering code for standard program

A4VT	G					/	33	A		N	C4	M9		F		A	F	
01	02	03	04	05	06		07	08	09	10	11	12	13	14	15	16	17	18

Boost pump

14	With integrated boost pump	**F**

Through drive

	Flange SAE J744			Coupling for splined shaft[3]					
		Mounting variant							
15	Diameter	Symbol	Designation	Diameter	Designation		**071**	**090**	
	Without						●	●	**0000**
	82-2	֍	A3	5/8 in 9T 16/32DP	S2		●	●	**A3S2**
	101-2	֍	B3	7/8 in 13T 16/32DP	S4		●	●	**B3S4**

High-pressure valves

16	With high-pressure relief valve, direct controlled	**A**

Filtration boost circuit

17	Filtration in the boost pump pressure line, filter mounted, with cold start valve	**F**

Standard / special version

18	Standard version		**-0**
		combined with attachment part or attachment pump	**-K**
	Special version		**-S**
		combined with attachment part or attachment pump	**-T**

Note
Short designation X refers to a special version not covered by the ordering code.

● = Available ❍ = On request – = Not available

3) Splined shaft coupler acc. to ANSI B92.1a-1976 (splined shafts assigned acc. to SAE J744 see page 14)

Technical data

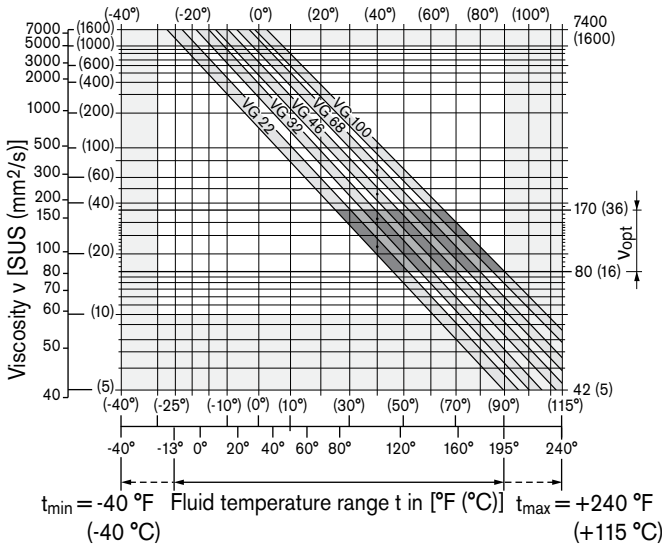
Hydraulic fluid

Before starting project planning, please refer to our data sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable hydraulic fluids) for detailed information regarding the choice of hydraulic fluids and application conditions.

The variable pump A4VTG is not suitable for operation with HFA, HFB and HFC. If HFD or environmentally acceptable hydraulic fluids are being used, the limitations regarding technical data and seals must be observed.
Please contact us.

When ordering, indicate the hydraulic fluid that is to be used.

Selection diagram



Details regarding the choice of hydraulic fluid

The correct choice of hydraulic fluid requires knowledge of the operating temperature in relation to the ambient temperature: in a closed circuit the circuit temperature.

The hydraulic fluid should be chosen so that the operating viscosity in the operating temperature range is within the optimum range (ν_{opt}), see shaded area of the selection diagram. We recommended that the higher viscosity class be selected in each case.

Example: At an ambient temperature of X °F (X °C), an operating temperature of 140 °F (60 °C) is set in the circuit. In the optimum operating viscosity range (ν_{opt} shaded area), this corresponds to the viscosity classes VG 46 or VG 68; to be selected: VG 68.

Note
The case drain temperature, which is affected by pressure and speed, is always higher than the circuit temperature. At no point of the component may the temperature be higher than 240 °F (115 °C), however. The temperature difference specified below is to be taken into account when determining the viscosity in the bearing.

If the above conditions cannot be maintained due to extreme operating parameters, please contact us.

Viscosity and temperature

	Viscosity [SUS (mm²/s)]	Temperature	Comment
Storage		$T_{min} \geq$ -58 °F (-50 °C) T_{opt} = +41 °F to +68 °F (+5 °C to +20 °C)	up to 12 months with standard factory preservation up to 24 months with long-term factory preservation
(Cold) start-up[1]	ν_{max} = 7400 (1600)	$T_{St} \geq$ -40 °F (-40 °C)	t ≤ 3 min, without load (p ≤ 725 psi (50 bar)), n ≤ 1000 rpm
Permissible temperature difference		ΔT ≤ 45 °F (25 °C)	between axial piston unit and hydraulic fluid
Warm-up phase	ν < 7400 to 1850 (1600 to 400)	T = -40 °F to -13 °F (-40 °C to -25 °C)	at p_{nom}, 0.5 • n_{nom} and t ≤ 15 min
Operating phase			
Temperature difference		ΔT = approx. 9 °F (5 °C)	The temperature of the hydraulic fluid in the bearing is (depending on pressure and speed) approx. 9 °F (5 °C) higher than that of the case drain fluid at port T.
Continuous operation	ν = 1850 to 60 (400 to 10) ν_{opt} = 80 to 170 (16 to 36)	T = -13 °F to +195 °F (-25 °C to +90 °C)	no restriction within the permissible data
Short-term operation	ν_{min} = < 60 to 42 (10 to 5)	T_{max} = +240 °F (+115 °C)	t < 3 min, p < 0.3 • p_{nom}
Shaft seal ring FKM[1]		T ≤ +240 °F (+115 °C)	see page 7

1) At temperatures below -13 °F (-25 °C), an NBR shaft seal ring is required (permissible temperature range: -40 °F to +195 °F (-40 °C to +90 °C)).

Technical data

Filtration of the hydraulic fluid

Filtration improves the cleanliness level of the hydraulic fluid, which, in turn, increases the service life of the axial piston unit.

To ensure the functional reliability of the axial piston unit, a gravimetric evaluation is necessary for the hydraulic fluid to determine the amount of contamination by solid matter and to determine the cleanliness level according to ISO 4406. A cleanliness level of at least 20/18/15 is to be maintained.

Depending on the system and the application, for the A4VTG, we recommend

Filter cartridges $\beta_{20} \geq 100$.

With an increasing differential pressure at the filter cartridges, the β-value must not deteriorate.

At very high hydraulic fluid temperatures 195 °F to maximum 240 °F (90 °C to maximum 115 °C), a cleanliness level of at least 19/17/14 according to ISO 4406 is necessary.

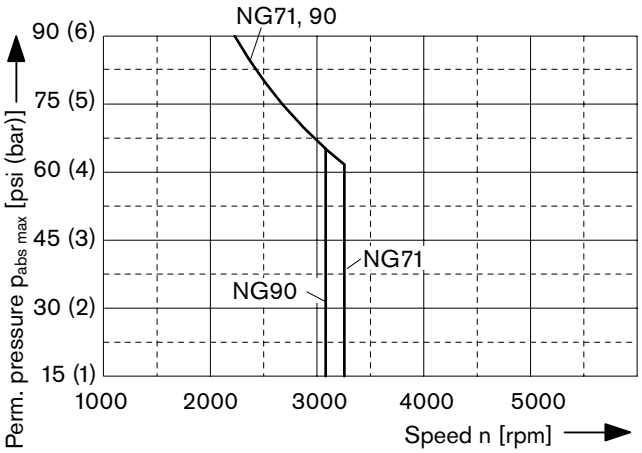
If the above classes cannot be achieved, please contact us.
For notes on filtration types, see page 16.

Shaft seal ring

Permissible pressure loading

The service life of the shaft seal ring is affected by the speed of the pump and the case drain pressure. It is recommended that the average, continuous case drain pressure 45 psi (3 bar) absolute at operating temperature not be exceeded (maximum permissible case drain pressure 90 psi (6 bar) absolute at reduced speed, see diagram). Short-term ($t < 0.1$ s) pressure spikes of up to 145 psi (10 bar) absolute are permitted. The service life of the shaft seal ring decreases with an increase in the frequency of pressure spikes.

The case pressure must be equal to or greater than the external pressure on the shaft seal ring.



Temperature range

The FKM shaft seal ring may be used for case drain temperatures from -13 °F to +240 °F (-25 °C to +115 °C).

Note
For application cases below -13 °F (-25 °C), an NBR shaft seal ring is necessary (permissible temperature range: -40 °F to +195 °F (-40 °C to +90 °C)).
State NBR shaft seal ring in plain text when ordering.
Please contact us.

Technical data

Operating pressure range

Pressure at service line port A or B

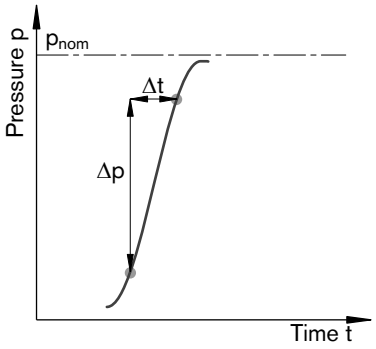
Nominal pressure p_{nom} _____ 5800 psi (400 bar) absolute

Maximum pressure p_{max} _____ 6500 psi (450 bar) absolute
Single operating period _____ 10 s
Total operating period _____ 300 h

Minimum pressure (high-pressure side) __ 365 psi (25 bar)

Minimum pressure (inlet) _____ 145 psi (10 bar)
(boost pressure setting must be higher depending on system)

Rate of pressure change $R_{A\ max}$ __ 130000 psi/s (9000 bar/s)



Boost pump

Pressure at suction port S
Duration $p_{S\ min}$ ($\nu \leq 140$ SUS) _____ ≥ 12 psi absolute
($(\nu \leq 30$ mm²/s) _____ ≥ 0.8 bar absolute)
at cold starts, short-term ($t < 3$ min) ≥ 7.5 psi (0.5 bar) absolute
Maximum $p_{S\ max}$ _____ ≤ 75 psi (5 bar) absolute

Standard adjustment boost pressure p_{Sp}
(at n = 1500 rpm) _____ 320 psi (22 bar)

Nominal pressure $p_{Sp\ nom}$ _____ 435 psi (30 bar)
Maximum pressure $p_{Sp\ max}$ _____ 580 psi (40 bar)

Control pressure
To ensure the function of the control, the following control pressure is required depending on the speed and operating pressure (measurement point, port P_S):

For controls EP and HW
Minimum control pressure
$p_{St\ min}$ (at n = 1500 rpm) _____ 320 psi (22 bar)

Definition

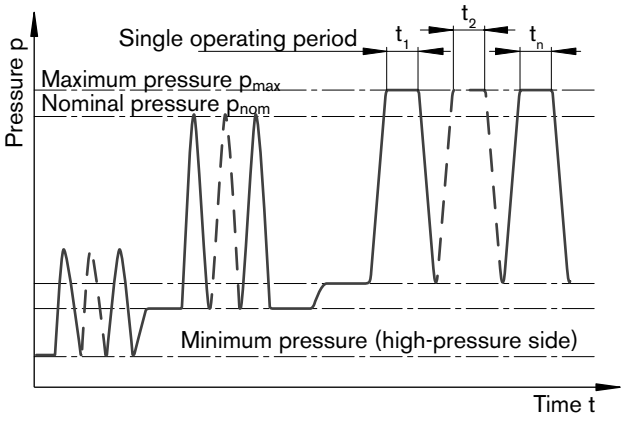
Nominal pressure p_{nom}
The nominal pressure corresponds to the maximum design pressure.

Maximum pressure p_{max}
The maximum pressure corresponds to the maximum operating pressure within the single operating period. The sum of the single operating period must not exceed the total operating period.

Minimum pressure (high-pressure side)
Minimum pressure on the high-pressure side (A or B) that is required in order to prevent damage to the axial piston unit.

Minimum pressure (inlet)
Minimum pressure in inlet (A or B) that is required in order to prevent damage to the axial piston unit.

Rate of pressure change R_A
Maximum permissible rate of pressure build-up and pressure reduction during a pressure change over the entire pressure range.



Total operating period = $t_1 + t_2 + ... + t_n$

Technical data

Table of values (theoretical values, without efficiency levels and tolerances; values rounded)

Size			NG		71	90
Displacement	variable pump		$V_{g\ max}$	in^3	4.33	5.49
				cm^3	71	90
	boost pump (at p = 290 psi (20 bar))		$V_{g\ Sp}$	in^3	1.25	1.65
				cm^3	20.5	27
Speed	at $V_{g\ max}$		n_{nom}	rpm	3300	3050
	minimum		n_{min}	rpm	500	500
Flow	at n_{nom} and $V_{g\ max}$		$q_{v\ max}$	gpm	62	72
				l/min	234	275
Power[1]	at n_{nom}, $V_{g\ max}$ and	Δp = 5800 psi	P_{max}	hp	210	244
		Δp = 400 bar	P_{max}	kW	156	183
Torque[1]	at $V_{g\ max}$ and	Δp = 5800 psi	T_{max}	lb-ft	333	422
		Δp = 400 bar	T_{max}	Nm	452	573
		Δp = 1450 psi	T	lb-ft	83	106
		Δp = 100 bar	T	Nm	113	143
Rotary stiffness	drive shaft M9		c	lb-ft/rad	On request	
				Nm/rad		
Moment of inertia for rotary group			J_{GR}	$lb\text{-}ft^2$	0.2302	0.3536
				kgm^2	0.0097	0.0149
Maximum angular acceleration[2]			α	rad/s^2	21000	18000
Filling capacity			V	gal	0.34	0.32
				L	1.3	1.2
Mass approx. (without through drive)			m	lbs	112	117
				kg	51	53

1) Without boost pump

2) The area of validity lies between the minimum required and maximum permissible speed.
It applies for external stimuli (e. g. engine 2 to 8 times rotary frequency, cardan shaft twice the rotary frequency).
The limit value applies for a single pump only.
The load capacity of the connection parts must be considered.

Note

Operation above the maximum values or below the minimum values may result in a loss of function, a reduced service life or in the destruction of the axial piston unit. We recommend testing the loads by means of experiment or calculation / simulation and comparison with the permissible values.

Determining the size

Flow $q_v = \frac{V_g \cdot n \cdot \eta_v}{231}$ [gpm] $\left(\frac{V_g \cdot n \cdot \eta_v}{1000} \text{ [l/min]} \right)$

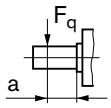
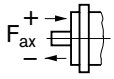
Torque $T = \frac{V_g \cdot \Delta p}{24 \cdot \pi \cdot \eta_{mh}}$ [lb-ft] $\left(\frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} \text{ [Nm]} \right)$

Power $P = \frac{2\pi \cdot T \cdot n}{33000} = \frac{q_v \cdot \Delta p}{1714 \cdot \eta_t}$ [hp] $\left(\frac{2\pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t} \text{ [kW]} \right)$

V_g = Displacement per revolution in in^3 (cm^3)
Δp = Differential pressure in psi (bar)
n = Speed in rpm
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Technical data

Permissible radial and axial loading on drive shaft

Size		NG		71	90
Drive shaft			in		
Radial force maximum at distance a (from shaft collar)		$F_{q\,max}$	lb	On request	
			N		
		a	in		
			mm		
Axial force maximum		$+F_{ax\,max}$	lb	954	973
			N	4242	4330
		$-F_{ax\,max}$	lb	620	600
			N	2758	2670

Note

Special requirements apply in the case of belt drives. Please contact us.

Force-transfer direction of the permissible axial force:

+ $F_{ax\,max}$ = Increase in service life of bearings

− $F_{ax\,max}$ = Reduction in service life of bearings (avoid)

Permissible input and through-drive torques

Size		NG		71	90
Torque at $V_{g\,max}$ and $\Delta p = 5800$ psi (400 bar)[1]		T_{max}	lb-ft	333	422
			Nm	452	573
Input torque at drive shaft, maximum[2]	**M9**	$T_{E\,max}$	lb-ft	On request	
			Nm		
Maximum through-drive torque		$T_{D\,max}$	lb-ft	487	606
			Nm	660	822

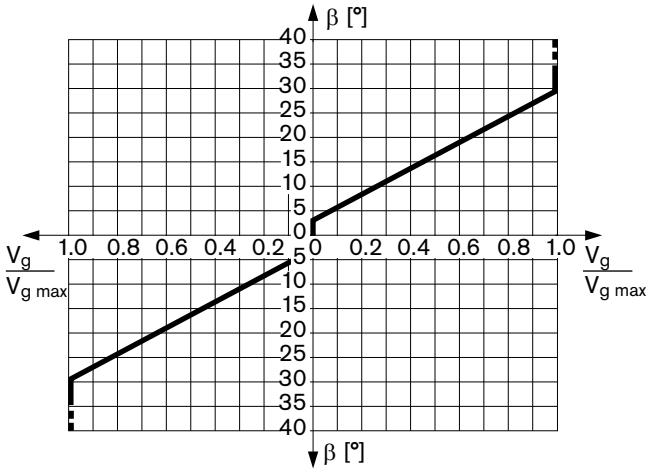
1) Efficiency not considered

2) For drive shafts with no radial force

HW – Proportional control hydraulic, mechanical servo

The output flow of the pump can be steplessly varied in the range between 0 to 100 %, proportional to the rotation of the control lever between 0° and ±29°.

A feedback lever connected to the stroke piston maintains the pump flow for any given position of the control lever between 0° and 29°.



Swivel angle β at the control lever for deflection:

Start of control at $\beta = 3°$

End of control at $\beta = 29°$ (maximum displacement $V_{g\,max}$)

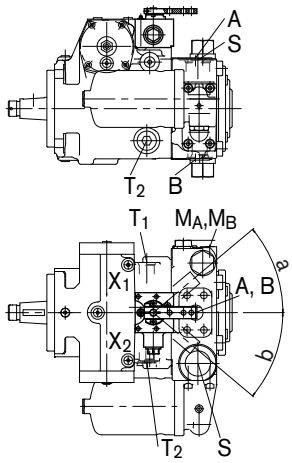
Mechanical stop for β: ±40°

The maximum required torque at the lever is 15 lb-in (170 Ncm). To prevent damage to the HW control unit, a positive mechanical stop must be provided for the HW control lever.

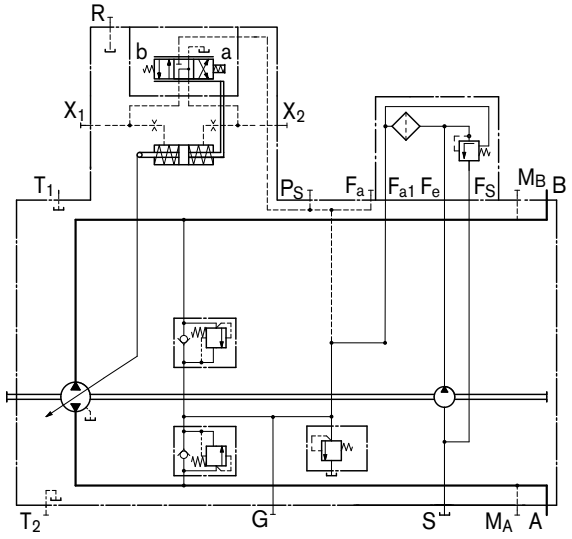
Note
Spring centering enables the pump, depending on pressure and speed, to move automatically to the neutral position ($V_g = 0$) as soon as there is no longer any torque on the control lever of the HW control unit (regardless of deflection angle).

Assignment
Direction of rotation - Control - Flow direction

		Lever direction	Control pressure	Flow direction	Operating pressure
Direction of rotation	cw	a	X_2	B to A	M_A
		b	X_1	A to B	M_B
	ccw	a	X_2	A to B	M_B
		b	X_1	B to A	M_A



Circuit diagram

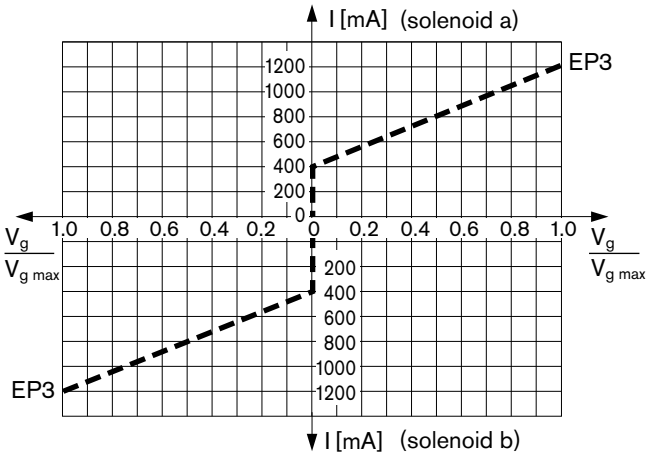


EP – Proportional control electric

The output flow of the pump can be steplessly varied in the range between 0 to 100 %, proportional to the electrical current supplied to solenoid a or b.

The electrical energy is converted into a force acting on the control piston. This control piston then directs control hydraulic fluid into and out of the stroke cylinder to adjust pump displacement as required.

A feedback lever connected to the stroke piston maintains the pump flow for any given current within the control range.



Technical data, solenoid	EP3
Voltage	12 V (±20 %)
Start of control at $V_{g\,0}$	400 mA
End of control at $V_{g\,max}$	1200 mA
Limiting current	1.54 A
Nominal resistance at 68 °F (20 °C)	5.5 Ω
Dither frequency	100 Hz
Actuated time	100 %
Type of protection see connector design page 20	

Note

The solenoid is executed generally with manual, override button and spring return (see page 20).

The following electronic controllers and amplifiers are available for controlling the proportional solenoids:

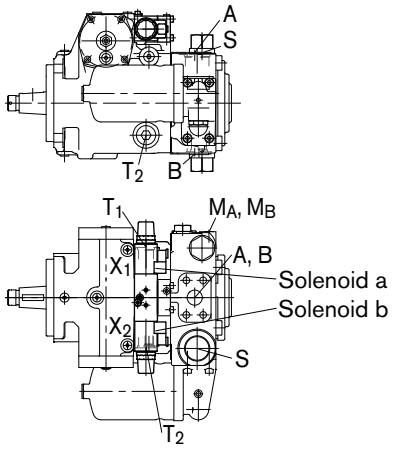
– BODAS controller RC
  Series 20 _____ RE 95200
  Series 21 _____ RE 95201
  Series 22 _____ RE 95202
  Series 30 _____ RE 95203
  and application software

– Analog amplifier RA _____ RE 95230

Further information can also be found on the Internet at: www.boschrexroth.com/mobile-electronics.

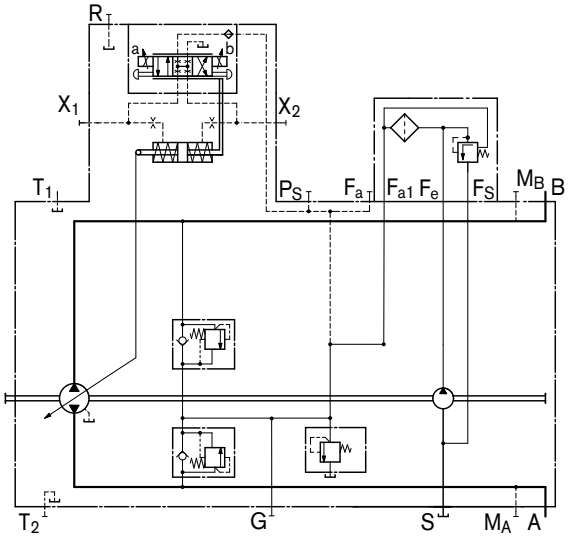
Assignment
Direction of rotation – Control – Flow direction

		Actuation of solenoid	Control pressure	Flow direction	Operating pressure
Direction of rotation	cw	a	X_1	A to B	M_B
		b	X_2	B to A	M_A
	ccw	a	X_1	B to A	M_A
		b	X_2	A to B	M_B



EP – Proportional control electric

Circuit diagram



Note

The spring return feature in the control unit is not a safety device

The spool valve inside the control unit can get stuck in an undefined position by internal contamination (contaminated hydraulic fluid, abrasion or residual contamination from system components). As a result, the axial piston unit can no longer supply the flow specified by the operator.

Check whether your application requires that remedial measures be taken on your machine in order to bring the driven consumer into a neutral position (e. g. immediate stop).

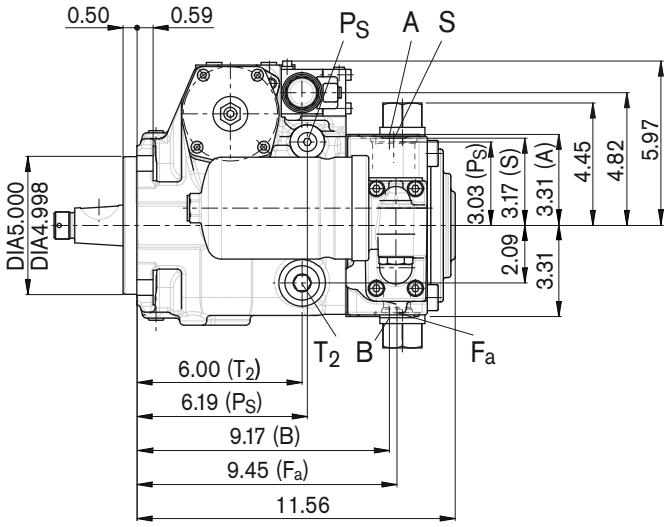
Dimensions size 71

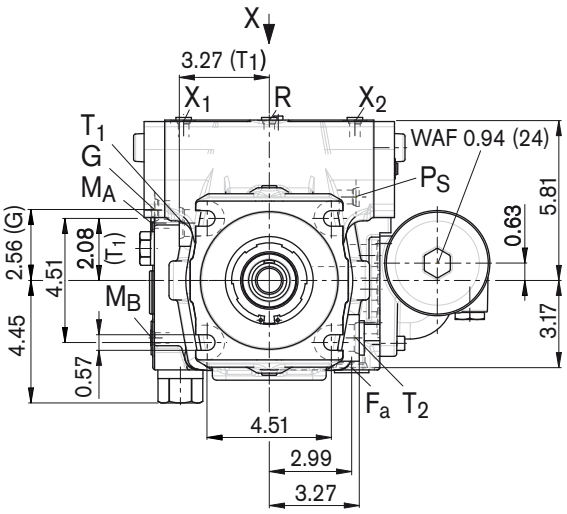
Before finalizing your design, request a binding installation drawing. Dimensions in in.

EP – Proportional control electric

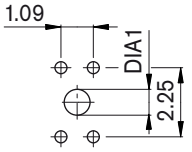
Standard: suction port S at top (04)

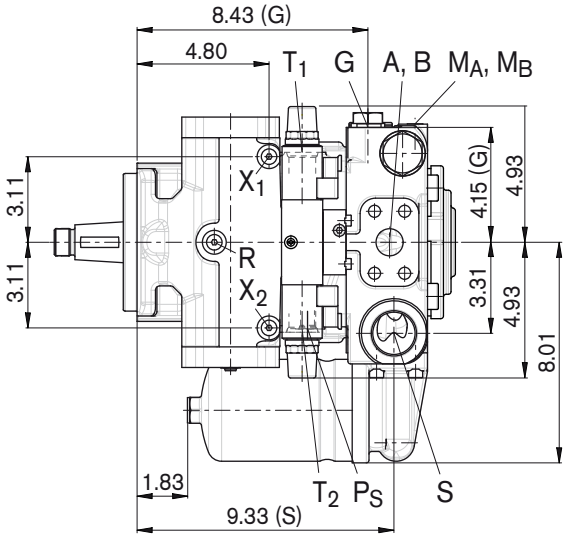
Option: suction port S at bottom (03): port plate turned through 180°





Detail X
Port A/B

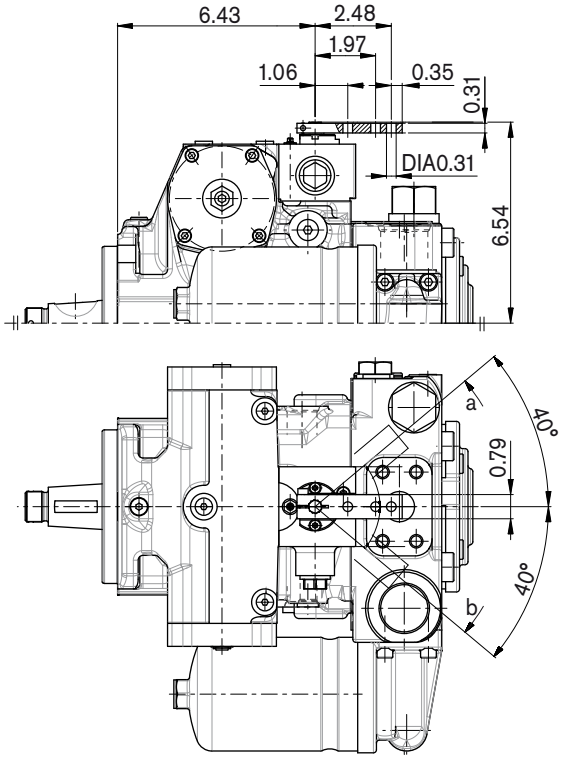




Dimensions size 71

Before finalizing your design, request a binding installation drawing. Dimensions in in.

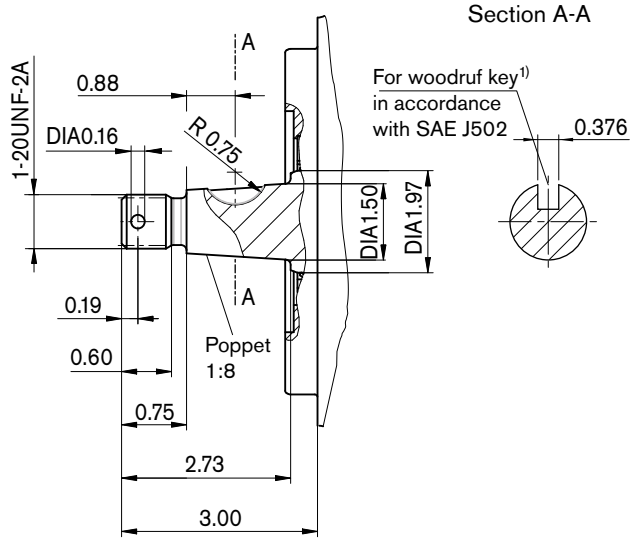
HW – Proportional control hydraulic, mechanical servo



Note
Mounting position of the lever not specified on delivery, to be aligned by the customer

Drive shaft

M9 Tapered shaft
SAE J501 (tapered 1:8)



Ports

Designation	Port for	Standard	Size [in][2]	Maximum pressure [psi (bar)][3]	State
A, B	Service line Fixing thread A/B	SAE J518[4] ISO 68	1 in 7/16-14UNC-2B; 0.67 (17) deep	6500 (450)	O
S	Suction	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	75 (5)	O
T_1	Tank	ISO 11926	1 1/16-12UN-2B; 0.79 (20) deep	45 (3)	O[5]
T_2	Tank	ISO 11926	1 1/16-12UN-2B; 0.77 (19.5)deep	45 (3)	X[5]
R	Air bleed	ISO 11926	7/16-20UNF-2B; 0.47 (12)deep	45 (3)	X
X_1, X_2	Control pressure (upstream of orifice)	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	580 (40)	X
X_3, X_4[6]	Stroking chamber pressure	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	580 (40)	X
G	Boost pressure	ISO 11926	3/4-16UNF-2B; 0.59 (15) deep	580 (40)	X
P_S	Pilot pressure, inlet	ISO 11926	9/16-18UNF-2B; 0.51 (13) deep	580 (40)	X
M_A, M_B	Measuring pressure A, B	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	6500 (450)	X
F_a	Boost pressure inlet	ISO 11926	1 1/16-12UN-2B; 0.79 (20) deep	580 (40)	X

1) ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5
2) Observe the general instructions on page 24 for the maximum tightening torques.
3) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
4) Only dimensions according to SAE J518
5) Depending on installation position, T_1 or T_2 must be connected (see also page 22).
6) Optional, see page 18

O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

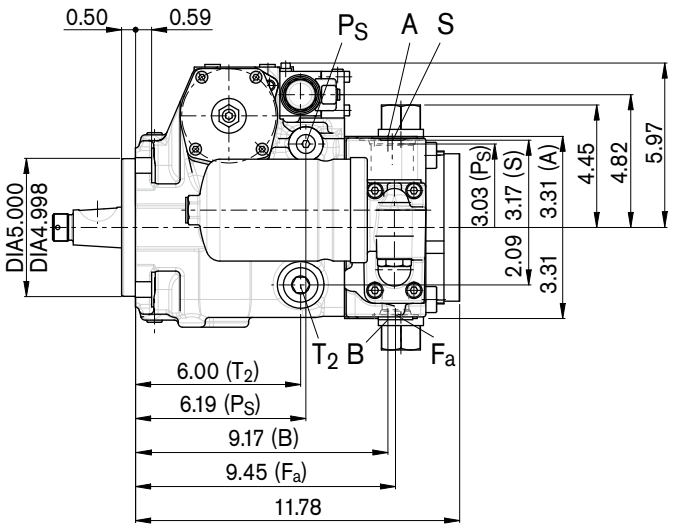
Dimensions size 90

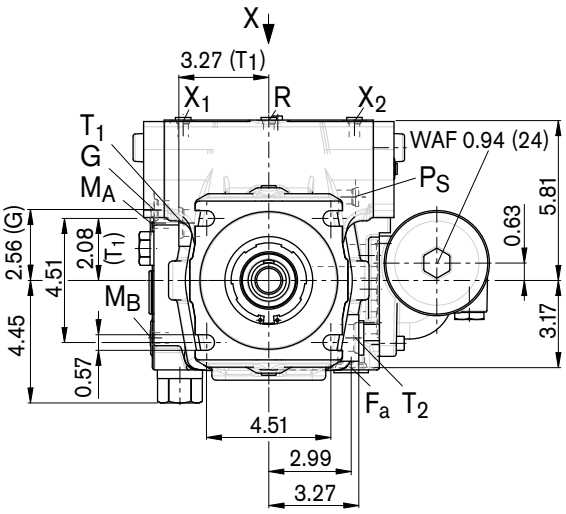
Before finalizing your design, request a binding installation drawing. Dimensions in in.

EP – Proportional control electric

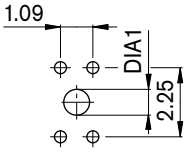
Standard: suction port S at top (04)

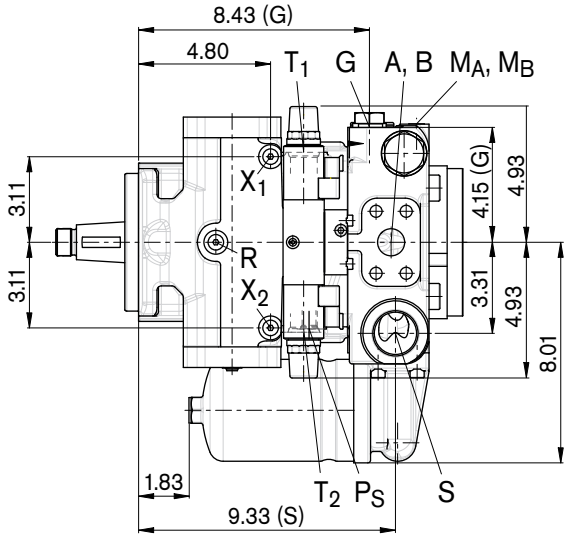
Option: suction port S at bottom (03): port plate turned through 180°





Detail X
Port A/B

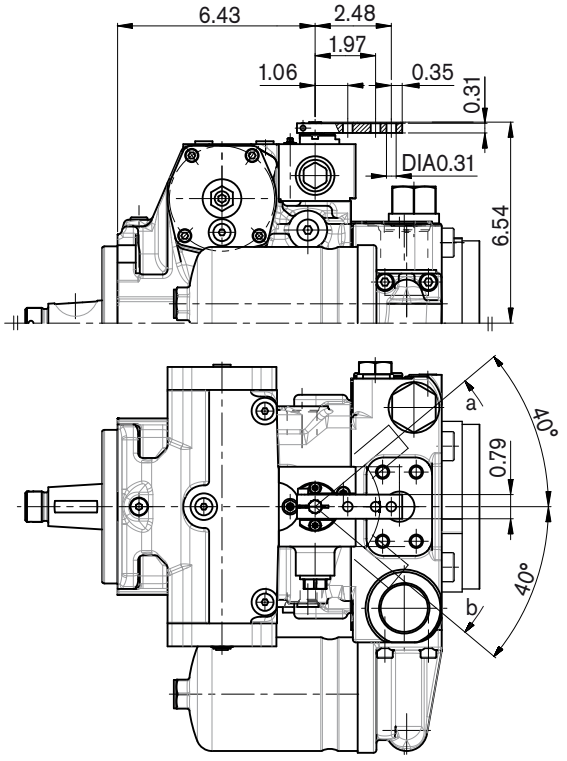




Dimensions size 90

Before finalizing your design, request a binding installation drawing. Dimensions in in.

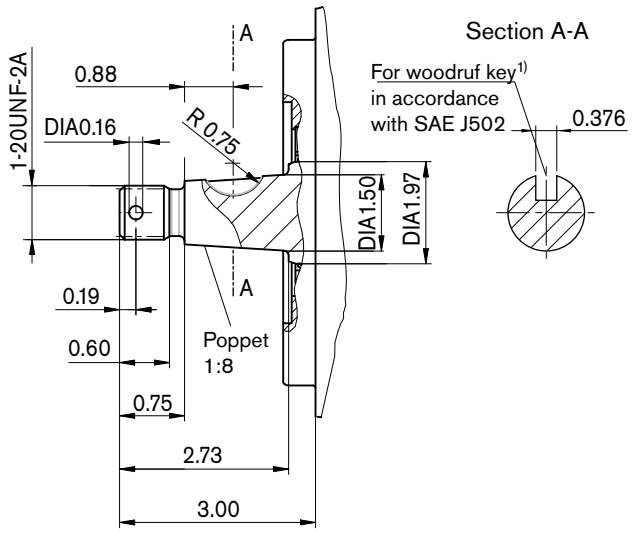
HW – Proportional control hydraulic, mechanical servo



Note
Mounting position of the lever not specified on delivery, to be aligned by the customer

Drive shaft

M9 Tapered shaft
SAE J501 (tapered 1:8)



Ports

Designation	Port for	Standard	Size [in][2]	Maximum pressure [psi (bar)][3]	State
A, B	Service line	SAE J518[4]	1 in	6500 (450)	O
	Fixing thread A/B	ISO 68	7/16-14UNC-2B; 0.67 (17) deep		
S	Suction	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	75 (5)	O
T_1	Tank	ISO 11926	1 1/16-12UN-2B; 0.79 (20) deep	45 (3)	O[5]
T_2	Tank	ISO 11926	1 1/16-12UN-2B; 0.77 (19.5) deep	45 (3)	X[5]
R	Air bleed	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	45 (3)	X
X_1, X_2	Control pressure (upstream of orifice)	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	580 (40)	X
X_3, X_4[6]	Stroking chamber pressure	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	580 (40)	X
G	Boost pressure	ISO 11926	3/4-16UNF-2B; 0.59 (15) deep	580 (40)	X
P_S	Pilot pressure, inlet	ISO 11926	9/16-18UNF-2B; 0.51 (13) deep	580 (40)	X
M_A, M_B	Measuring pressure A, B	ISO 11926	7/16-20UNF-2B; 0.47 (12) deep	6500 (450)	X
F_a	Boost pressure inlet	ISO 11926	1 1/16-12UN-2B; 0.79 (20) deep	580 (40)	X

1) ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5
2) Observe the general instructions on page 24 for the maximum tightening torques.
3) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings.
4) Only dimensions according to SAE J518
5) Depending on installation position, T_1 or T_2 must be connected (see also page 22).
6) Optional, see page 18

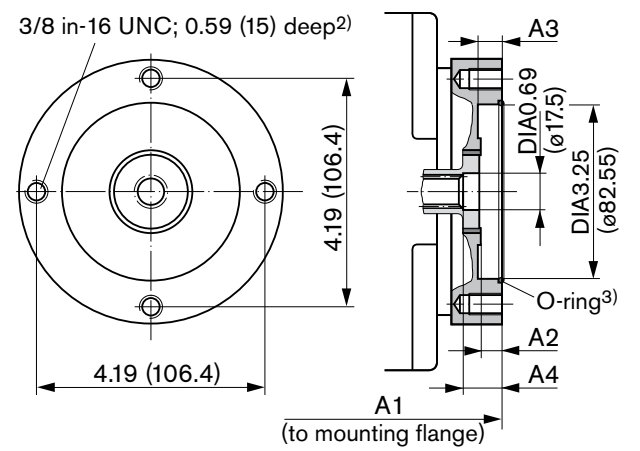
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Through drive dimensions

Before finalizing your design, request a binding installation drawing. Dimensions in in (mm).

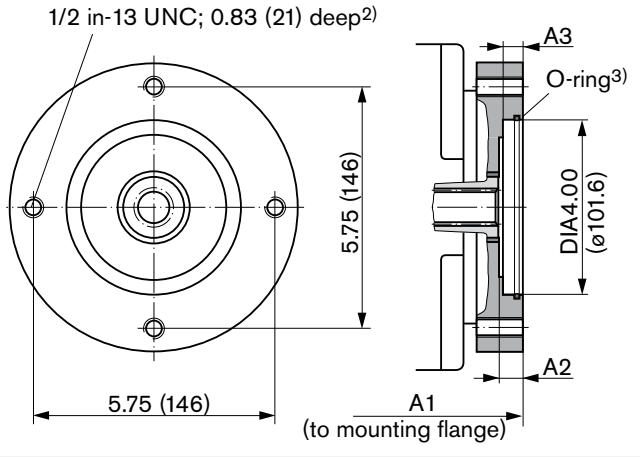
Flange SAE J744			Coupling for splined shaft[1]					
	Mounting variant							
Diameter	Symbol	Designation	Diameter		Designation	**071**	**090**	
Without						●	●	**0000**
82-2	֍	A3	5/8 in 9T	16/32DP	S2	●	●	**A3S2**
101-2	֍	B3	7/8 in 13T	16/32DP	S4	●	●	**B3S4**

82-2



NG		A1	A2	A3	A4
71	in	11.81	0.35	0.39	0.78
	mm	300.1	9	10	19.8
90	in	12.03	0.35	0.39	0.78
	mm	305.6	9	10	19.8

101-2



NG		A1	A2	A3
71	in	12.01	0.47	0.39
	mm	305.1	12	9.8
90	in	12.23	0.47	0.39
	mm	310.6	12	9.8

1) Coupling for splined shaft according to ANSI B92.1a-1976, 30° pressure angle, flat root, side fit, tolerance class 5
2) Thread according to ISO 68, observe the general instructions on page 24 for the maximum tightening torques.
3) O-ring included in the delivery contents

Overview of attachments

Through drive			Attachment – 2nd pump			
Flange	Coupling for splined shaft	Short code	AA10VG NG (shaft)	AA10VO/31 NG (shaft)	A10VO/53 NG (shaft)	External gear pump
82-2 (A)	5/8 in	**A3S2**	–	18 (U)	10 (U)	Size F NG4 to 22[1)]
101-2 (B)	7/8 in	**B3S4**	18 (S)	28 (S,R) 45 (U,W)	28 (S,R) 45 (U,W)	Size N NG20 to 32[1)] Size G NG38 to 45[1)]

1) Rexroth recommends special versions of the gear pumps. Please contact us.

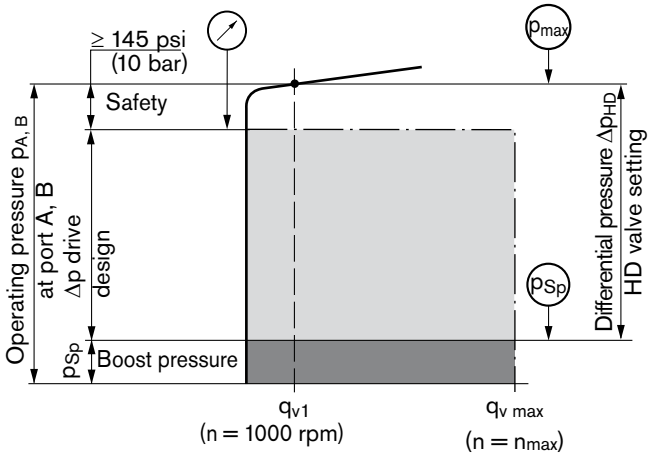
High-pressure relief valves

The two high-pressure relief valves protect the hydrostatic transmission (pump and motor) from overload. They limit the maximum pressure in the respective high-pressure line and serve simultaneously as boost valves.

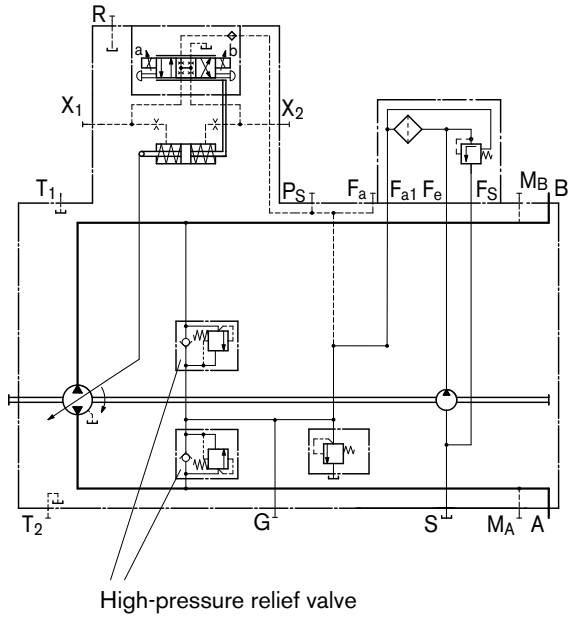
Standard adjustment Δp_{HD} _____ 5800 psi (400 bar)

Please contact us regarding other pressure settings.

Setting diagram



Circuit diagramm



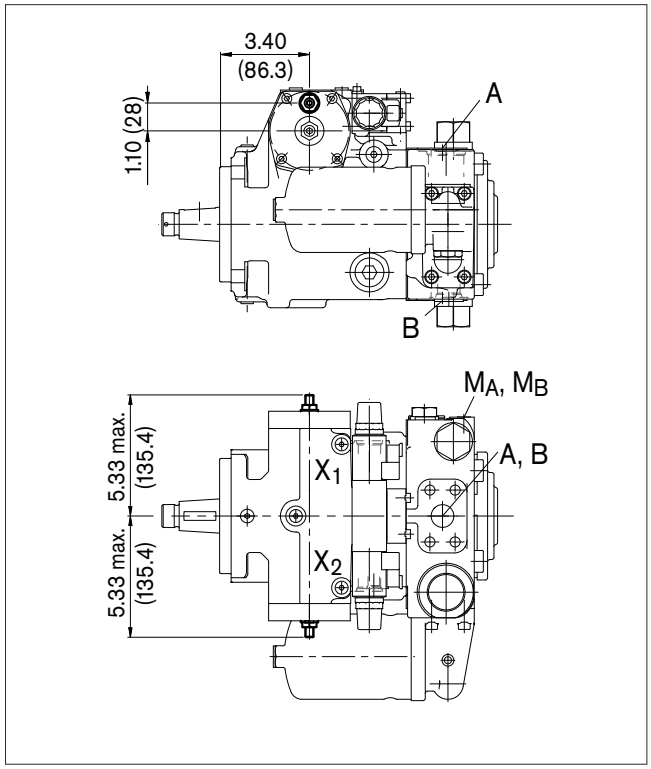
Note

The valve settings are made at **n = 1000 rpm** and at **$V_{g\ max}$ ($q_{v\ 1}$)**. There may be deviations in the opening pressures with other operating parameters.

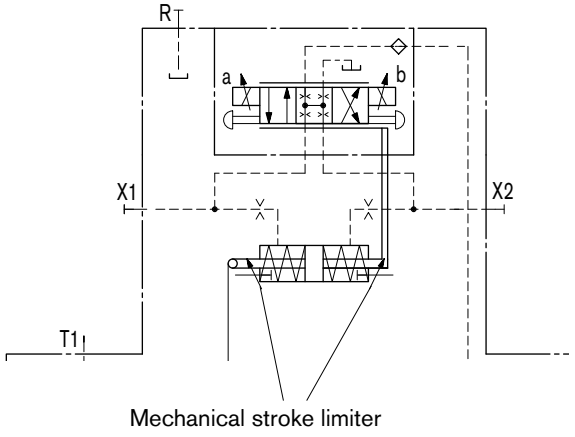
Mechanical stroke limiter, M

The mechanical stroke limiter is an auxiliary function allowing the maximum displacement of the pump to be steplessly reduced, regardless of the control unit used.

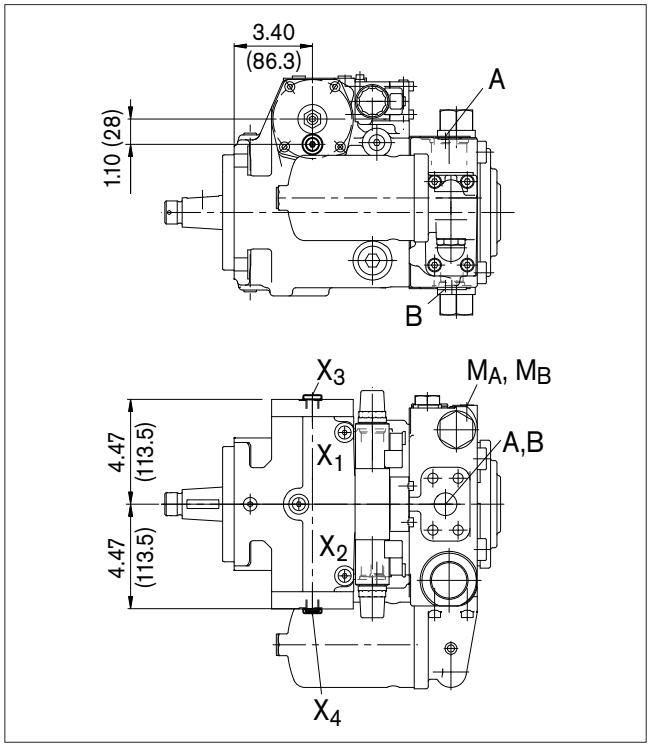
The stroke of the stroke cylinder and hence the maximum swivel angle of the pump are limited by means of two adjusting screws.



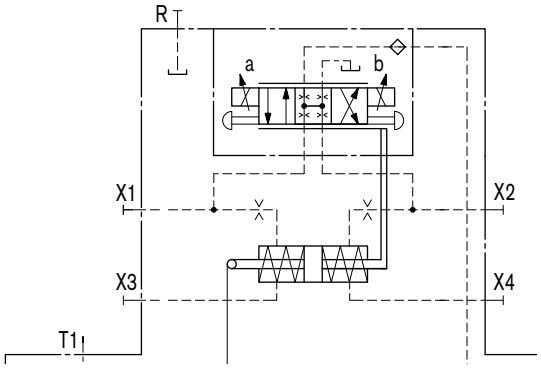
Circuit diagram



Ports X_3 and X_4 for stroking chamber pressure, T



Circuit diagram



Designation	Port for	Standard	Size [in][1)]	Maximum pressure [psi (bar)][2)]	State
X_3, X_4	Stroking chamber pressure	ISO 11926	7/16-20UNF-2B; 0.47 deep	580 (40)	X

1) Observe the general instructions on page 24 for the maximum tightening torques.

2) Short-term pressure spikes may occur depending on the application. Keep this in mind when selecting measuring devices and fittings. Before finalizing your design, request a binding installation drawing. Dimensions in in (mm).

Filtration boost circuit

Version F
Filtration in pressure line of boost pump, filter mounted

Filter type _____ filter **without** bypass

Filter grade (absolute) _____ 20 microns

Filter material _____ glass fiber

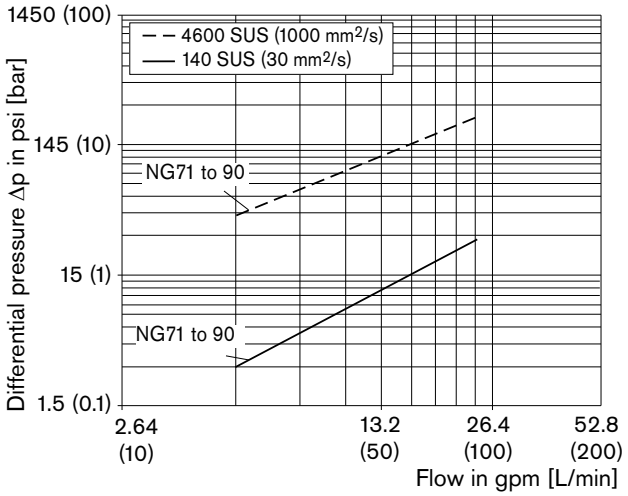
Pressure capacity _____ 1450 psi (100 bar)

Filter arrangement _____ mounted on pump

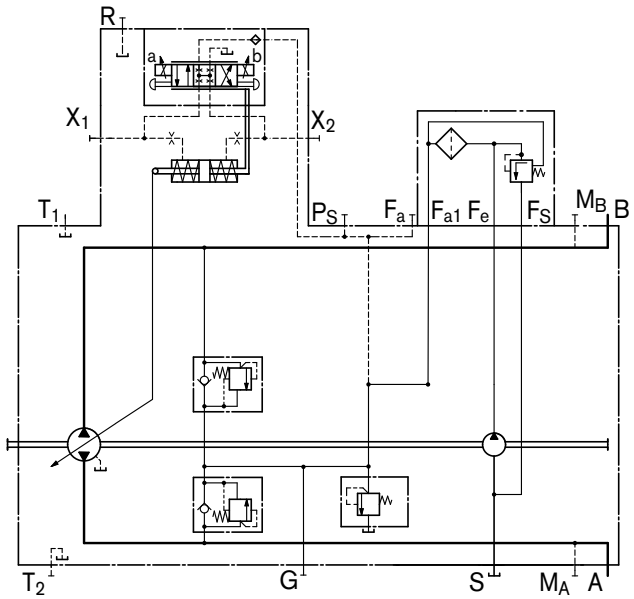
Note
Filter is equipped with **cold start valve** and thereby protects the system from damage.
The valve opens at flow resistance $\Delta p \geq 90$ psi (6 bar).

Filter characteristic

Differential pressure/volumetric flow characteristics conforming to ISO 3968 (valid for new filter cartridge).



Circuit diagram - variation F (with mountable filter)



Connector for solenoids

Before finalizing your design, request a binding installation drawing. Dimensions in in (mm).

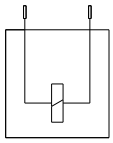
DEUTSCH DT04-2P-EP04, 2-pin

Molded, without bidirectional suppressor diode _____ P

Type of protection according to DIN/EN 60529:
IP67 and IP69K

Circuit symbol

Without bidirectional suppressor diode



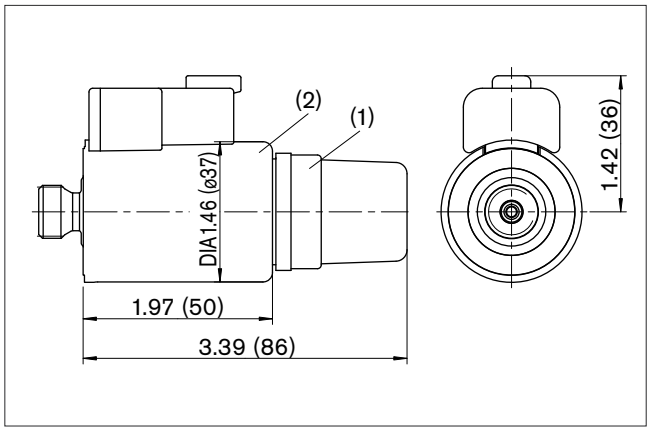
Mating connector

DEUTSCH DT06-2S-EP04
Rexroth Mat. No. R902601804

Consisting of:	DT designation
– 1 case	DT06-2S-EP04
– 1 wedge	W2S
– 2 female connectors	0462-201-16141

The mating connector is not included in the delivery contents. This can be supplied by Rexroth on request.

Solenoid with manual override button and spring return



Note
Manual override (emergency actuation) can be applied in the event of a malfunction in the electrical system.
Not approved for continuous operation!

Changing connector position

If necessary, you can change the position of the connector by turning the solenoid.

To do this, proceed as follows:

1. Loosen the fixing nut (1) of the solenoid. To do this, turn the fixing nut (1) one turn counter-clockwise.
2. Turn the solenoid body (2) to the desired position.
3. Retighten the fixing nut. Tightening torque of the fixing nut: 3.7+0.7 lb-ft (5+1 Nm) (WAF 1.02 (26), 12-sided DIN 3124)

On delivery, the position of the connector may differ from that shown in the brochure or drawing.

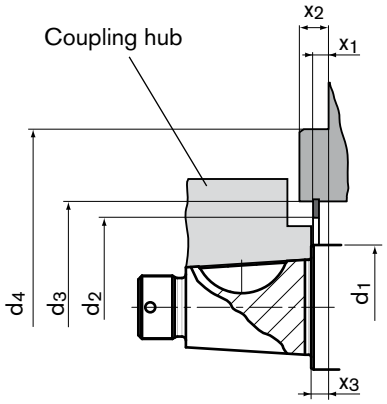
Installation situation for coupling assembly

Before finalizing your design, request a binding installation drawing. Dimensions in in (mm).

To ensure that rotating components (coupling hub) and fixed components (case, retaining ring) do not come into contact with each other, the installation conditions described here must be observed.

SAE tapered shaft

Drive shaft M9
The outer diameter of the coupling hub must be smaller than the inner diameter of the retaining ring $\mathbf{d_2}$ in the area near the drive shaft collar (dimension $x_2 - x_3$).



NG	Mounting flange		ød1	ød2 min	ød3	ød4	x1	x2	x3
71	127-4	in	1.77	2.62	3.189 ±0.004	5.00	0.276 +0.008	0.500 -0.02	0.315 +0.035 -0.024
		mm	45	66.5	81 ±0.1	127	7.0 +0.2	12.7 −0.5	8 +0.9 −0.6
90	127-4	in	1.97	2.62	3.189 ±0.004	5.00	0.276 +0.008	0.500 -0.02	0.315 +0.035 -0.024
		mm	50	66.5	81 ±0.1	127	7.0 +0.2	12.7 −0.5	8 +0.9 −0.6

Installation instructions

Before finalizing your design, request a binding installation drawing. Dimensions in in (mm).

General

During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This is also to be observed following a relatively long standstill as the system may empty via the hydraulic lines.

The case drain fluid in the case interior must be directed to the tank via the highest tank port (T_1, T_2).
The minimum suction pressure at port S must not fall below 12 psi (0.8 bar) absolute (cold start 7.5 psi (0.5 bar) absolute).

In all operational states, the suction line and tank line must flow into the tank below the minimum fluid level.

Installation position

See examples below. Additional installation positions are available upon request.

Recommended installation positions: 1 and 2.

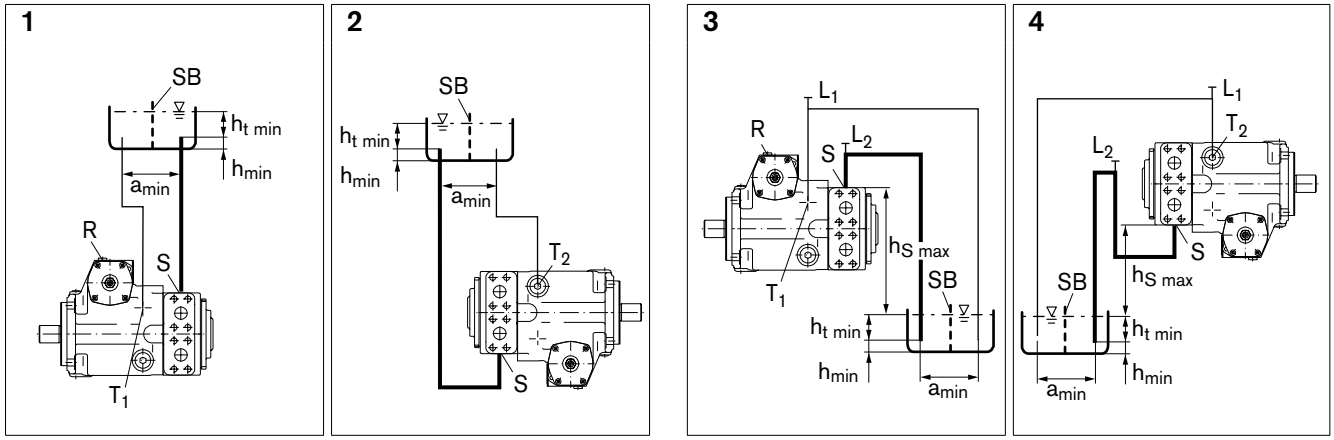
Below-tank installation (standard)

Pump below minimum fluid level of the tank.

Above-tank installation

Pump above minimum fluid level of the tank.

Observe the maximum permissible suction height
$h_{S\,max}$ = 31.5 in (800 mm).



$h_{S\,max}$ = 31.5 in = (800 mm) $h_{t\,min}$ = 7.87 in = (200 mm) h_{min} = 3.94 in = (100 mm) SB = baffle (baffle plate)

When designing the tank, ensure adequate distance a_{min} between the suction line and the case drain line to prevent the heated, return flow from being drawn directly back into the suction line.

Installation position	Air bleed	Filling
1	R	S + T_1
2	–	S + T_2

Installation position	Air bleed	Filling
3	L_2 (S) + R	L_2 (S) + L_1
4	L_2 + L_1 (T_2)	L_2 + L_1 (T_2)

Notes

General instructions

– The A4VTG pump is designed to be used in a closed circuit.

– Project planning, assembly and commissioning of the axial piston unit require the involvement of qualified personnel.

– The service line ports and function ports are only designed to accommodate hydraulic lines.

– During and shortly after operation, there is a risk of burns on the axial piston unit and especially on the solenoids. Take appropriate safety measures (e. g. by wearing protective clothing).

– Depending on the operational state of the axial piston unit (operating pressure, fluid temperature), the characteristic may shift.

– Pressure ports:
The ports and fixing threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified operating conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.

– The data and notes contained herein must be adhered to.

– The following tightening torques apply:

- Threaded hole for axial piston unit:
The maximum permissible tightening torques $M_{G\ max}$ are maximum values for the threaded holes and must not be exceeded. For values, see the following table.

- Fittings:
Observe the manufacturer's instruction regarding the tightening torques of the used fittings.

- Fixing screws:
For fixing screws according to ISO 68 / DIN 13, we recommend checking the tightening torque individually according to VDI 2230.

- Locking screws:
For the metal locking screws supplied with the axial piston unit, the required tightening torques of locking screws M_V apply. For values, see the following table.

– The product is not approved as a component for the safety concept of a general machine according to DIN EN ISO 13849.

Threaded port sizes		Maximum permissible tightening torque of the threaded holes $M_{G\ max}$	Required tightening torque of the locking screws M_V	WAF hexagon socket for the locking screws
Standard	**Size**			
ISO 11926	7/16-20 UNF-2B	30 lb-ft	11 lb-ft	3/16 in
		40 Nm	15 Nm	
	9/16-18 UNF-2B	59 lb-ft	18 lb-ft	1/4 in
		80 Nm	25 Nm	
	3/4-16UNF-2B	118 lb-ft	46 lb-ft	5/16 in
		160 Nm	62 Nm	
	1 1/16-12 UN-2B	266 lb-ft	108 lb-ft	9/16 in
		360 Nm	147 Nm	
	1 5/8-12 UN-2B	708 lb-ft	236 lb-ft	3/4 in
		960 Nm	320 Nm	

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