RE 92 250/12.97

replaces: 09.96

Variable Displacement Pump KVA

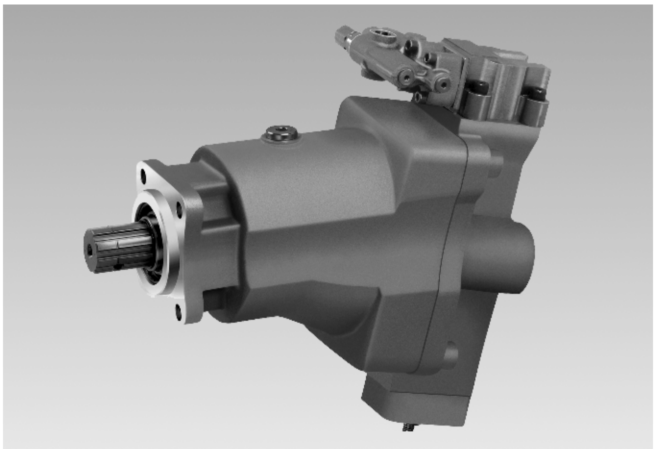
for commercial vehicles, open circuits

Sizes 55...107

Series 6

Nominal pressure 300 bar

Peak pressure 350 bar



KVA...DRS

List of contents

Features

- Variable displacement pump with axial tapered piston rotary group of bent axis design. Designed especially to meet the requirements of truck applications.
- Output flow is proportional to drive speed and pump displacement and is steplessly variable between maximum and zero ($q_{V\ max}$ to $q_{V\ min}$ = 0).
- Favourable power/weight ratio, small overall dimensions, optimum efficiency and economic design
- Self aspirating, for open circuit operation
- Flange and shaft designed for direct mounting on truck gearbox PTO´s

- Further information:

  Fixed displacement pump KFA RE 91501

  Designed especially to meet the requirements of truck applications.

Ordering Code

KVA7V	O			/	6	3		–	M	E	K	64

Fluid

Mineral oil (no code)	

Axial piston unit

Variable displacement, bent axis design for commercial vehicles Nominal pressure 300 bar, peak pressure 350 bar	**KVA7V**

Mode of operation

Pump in open circuits	**O**

Size

≙ Displacement $V_{g\ max}$ (cm^3)	**55**	**80**	**107**

Control and adjustment devices

	55	80	107	
Constant pressure control, with load sensing function	●	●	●	**DRS**
Electrical control, with proportional solenoid, 24V	○	○	●	**EP2**

Series

	6

Index

	3

Direction of rotation

Viewed on shaft end	clockwise	**R**
	anti-clockwise	**L**

Seals

FPM (2 shaft seals)	**M**

Shaft end

Splined shaft similar DIN ISO 14 (for truck use)	**E**

Mounting flange

Special flange ISO 7653-1985 (for truck use)	**K**

Service line connections

Port A(B): threads at rear	**64**

● = available
○ = in preparation, available on enquiry
– = not available

Technical Data

Hydraulic fluid

We request that before starting a project detailed information about the choise of hydraulic fluids and application conditions are taken from our catalogue sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable hydraulic fluids).

When using environmentally acceptable hydraulic fluids possible limitations for the technical data have been taken into consideration. If necessary please contact our technical department (please indicate type fo the hydraulic fluid used in your application when ordering).

Attention: For the operation with water-containing HF-fluids the variable displacement pump KVA is not suitable.

Operating viscosity range

We recommend that the operating viscosity (at operating temperature), for both efficiency and life of the unit, be chosen within the optimum range of:

ν_{opt} = opt. operating viscosity 16...36 mm^2/s

referred to tank temperature at open circuit.

Viscosity limits

The limiting values for viscosity are as follows:

ν_{min} = 5 mm^2/s

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

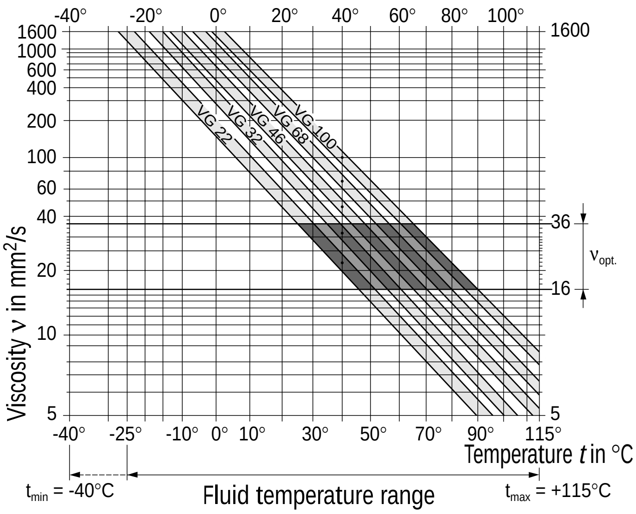
Please note that the max. fluid temperature of 115°C is also not exceeded in certain areas (for instance bearing area).

ν_{max} = 1600 mm^2/s

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

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

Selection diagram



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 tank (open circuit) in relation to the ambient temperature.

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

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

Important: The leakage fluid temperature is influenced by pressure and speed and is typically higher than the tank temperature. However, maximum temperature at any point in the system must be less than 115°C.

Please consult Brueninghaus Hydromatik if the a.m. conditions connot be kept at extreme operation parameters or because of high ambient temperature.

Filtration of fluid

The finer the filtration the better the achieved purity grade of the pressure fluid and the longer the life of the axial piston unit.

To ensure the functioning of the axial piston unit a minimum purity grade of:

9 to NAS 1638

6 to SAE

18/15 to ISO/DIS 4406 is necessary.

If above mentioned grades cannot be maintained please consult us.

Direction of flow

Clockwise rotation	Anti-clockwise rotation
S to **B**	**S** to **A**

Installation position

With drive shaft horizontal. The pump housing must be filled with fluid prior to commissioning, and must remain full whenever it is operating.

For pump installation positions above the tank special measures are necessary.

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

Working pressure range – inlet side

Absolute pressure at port S (suction inlet)

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

$p_{abs\ max}$ ______ 2 bar

Working pressure range – outlet side

Pressure at ports A or B

Nominal pressure p_N ______ 300 bar

Peak pressure p_{max} ______ 350 bar

(pressure data to DIN 24312)

Case drain fluid

The housing room is connected to the suction chamber, a leakage line from port "R" is therefore not necessary (port "R" is plugged).
The design with control DRS necesitates a leakage pipe from port "T" to the tank (not needed with control EP).

Technical Data

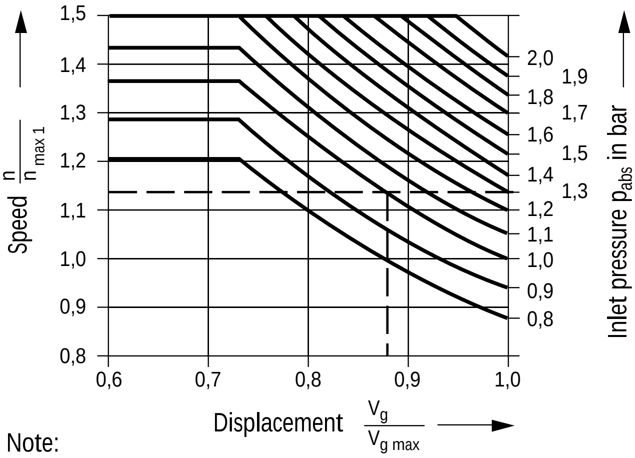
Table of values (theoretical values, without considering mech-hyd. and volumetric efficiency, values rounded)

Size				55	80	107
Displacement		$V_{g\,max}$	cm^3	54,8	80	107
Max. speed [1])	at $V_{g\,max}$	$n_{max\,1}$	rpm	2500	2240	2150
	at $V_g < V_{g\,max}$ (see diagram)	$n_{max\,2}$	rpm	3400	3000	2900
Max. perm. speed (speed limit) with increased inlet pressure p_{abs} at suction inlet S or $V_g < V_{g\,max}$ (see diagram)		$n_{max\,perm.}$	rpm	3750	3350	3200
Max. flow at $n_{max\,1}$ [2])		$q_{V\,max\,1}$	L/min	133	174	223
Max. drive power, at $q_{V\,max\,1}$; Δp = 300 bar		$P_{max\,1}$	kW	68	90	115
Perm. torque at $V_{g\,max}$; Δp = 300 bar		T	Nm	261	382	510
Weight torque		T_G	Nm	21	28,5	41
Moment of inertia about the drive axis		J	kgm^2	0,0034	0,0064	0,0102
Weight (approx.)		m	kg	16	20	24

[1]) The values shown are valid for an absolute pressure p_{abs} = 1 bar at the suction inlet »S« and operated on mineral oil. By increasing the inlet pressure (p_{abs} > 1 bar) the speed may be increased to the max. permissible speed (speed limit), see diagram.
[2]) 3 % flow losses included.

Diagram

Calculation of inlet pressure p_{abs} at suction inlet S or of the reduction in pump displacement for an increase in speed



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

Flow $$q_V = \frac{V_g \cdot n \cdot \eta_v}{1000} \quad \text{in L/min}$$

Drive torque $$T = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} \quad \text{in Nm}$$

Drive power $$P = \frac{2\,\pi \cdot T \cdot n}{60\,000} = \frac{T \cdot n}{9549} = \frac{q_V \cdot \Delta p}{600 \cdot \eta_t} \quad \text{in kW}$$

V_g = geom. displacement per rev. in cm^3
T = torque in Nm
Δp = differential pressure in bar
n = speed in rpm
η_v = volumetric efficiency
η_{mh} = mech-hyd. efficiency
η_t = overall efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Accessories for KVA

For the KVA-pump the following accessories are available from Brueninghaus Hydromatik:

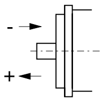
– Coupling flange, used in pump operation via a joint shaft (see RE 95001)
– Suction pipe, in all variations (see RE 95004)
– Adaption flange, for KVA-mounting in unfavourable mounting conditions (on enquiry)

Technical Data

Pump drive

Permissible axial load of the drive shaft, for drives with radial force load (pinion, V-belt drives), please contact us!
The values shown are maximum values and are not permitted for continuous operation.

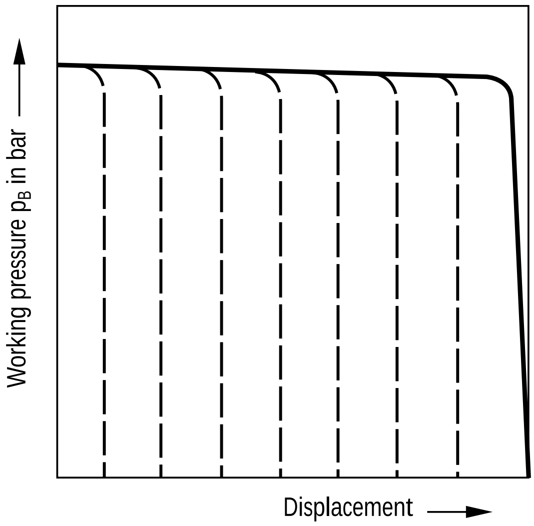
Size			55	80	107
with pump stationary or on low pressure by-pass	$\pm F_{ax\ max}$	N	0	0	0
permissible axial load/bar working pressure	$+ F_{ax\ perm.}$	N/bar	8,7	10,6	12,9
	$- F_{ax\ perm.}$	N/bar	-66	-86	-103



$- F_{ax\ max}$ = increases bearing life
$+ F_{ax\ max}$ = reduces bearing life (avoid if possible)

DRS Constant Pressure Control with Load Sensing Function

The DRS controller operates as a load sensing guided flow regulator (load sensing function) which is superimposed by a pressure regulator after obtaining a set pressure value.



Load sensing function

The load sensing valve regulate the pump displacement in order to match the requirement of the consumer unit.

The pump flow is influenced by the external orifice (control block, throttle) fitted between pump and serviced unit, but is not affected by load pressure throughout the range below the set pressure.

The valve compares pressure before and after the orifice and maintains the pressure drop (differential pressure Δp) across the orifice – and therefore the pump flow – constant.

If differential pressure Δp increases, the pump is swivelled back towards $V_{g\,min}$, and if Δp decreases the pump is swivelled out towards $V_{g\,max}$ until a balance is restored within the valve.

$\Delta p_{orifice} = p_{pump} - p_{serviced\ unit}$

Setting range for Δp: ____________________ 10 – 26 bar

(higher values on request, standard setting 18 bar)

The standby pressure for zero stroke operation (orifice closed) is insignificant above the Δp setting.

The orifice is not included in the standard supply.

Function of the constant pressure control

Should working pressure exceed the set pressure at the valve, the flow of the pump will swivel back in direction $V_{g\,min}$ until the control deviation drops down.

The constant pressure control is superimposed on the load sensing valve, i.e. the load sensing function operates below the set pressure.

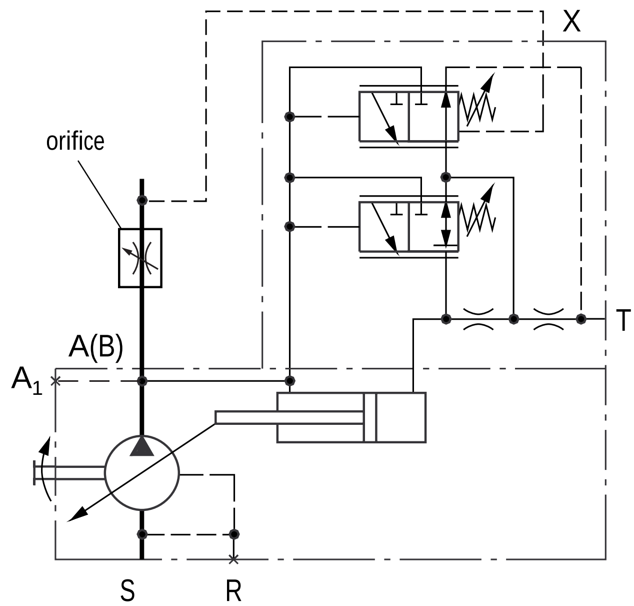
Setting range, constant pressure control: ________ 80 – 320 bar

(standard setting: 300 bar)

Any relief valve included in a circuit to limit the max. pressure must be set to a cracking pressure at least 20 bar above the pressure control setting.

In unoperated (zero pressure) condition, the pump is swivelled to its starting position ($V_{g\,max}$) by means of a control spring.

Circuit diagram



Zero stroke operation

The standard pump unit is designed for intermittent constant pressure operation.

For protection of the thermic stability the T-port ***must*** be placed externally and connected through the customer.

The zero stroke operation is permissible up to a working pressure p_B= 300 bar at a tank temperature of ≤ 50 °C.

When ordering, state in clear text:

- Setting of the constant pressure control
- Δp setting of the load sensing function

(If there is no clear specification, pump will be delivered with standard setting, see above).

EP2 Electrical Control with Proportional Solenoid

The electrical control with proportional solenoid allows stepless and programmable setting of the pump displacement. Control is proportional to solenoid force (current strength). The control force at the control piston is generated by a proportional solenoid.

For control of the proportional solenoid, a 24 V DC supply with current levels between 200 and 600 mA is required.

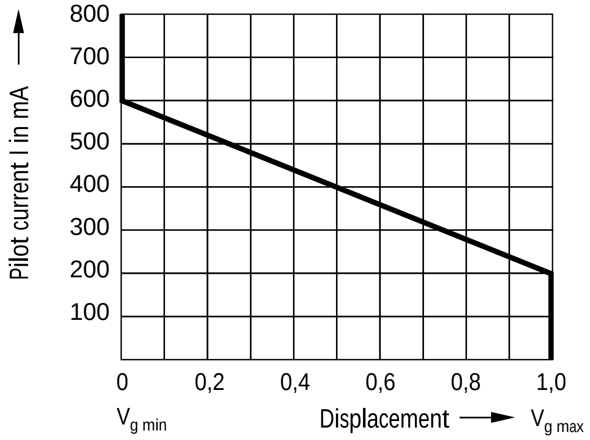
Start of control (at $V_{g\ max}$) ________ 200 mA

End of control (at $V_{g\ min}$) ________ 600 mA

Insulation class IP 54

Start position in zero pressure condition at $V_{g\ max}$.

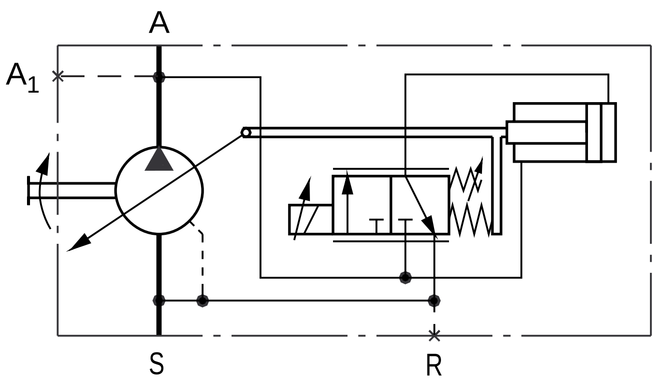
Control from $V_{g\ max}$ to $V_{g\ min}$



Suitable control for the proportional solenoid are proportional amplifier PV (see catalogue sheet RE 95023) and chopper amplifier CV (see catalogue sheet RE 95029).

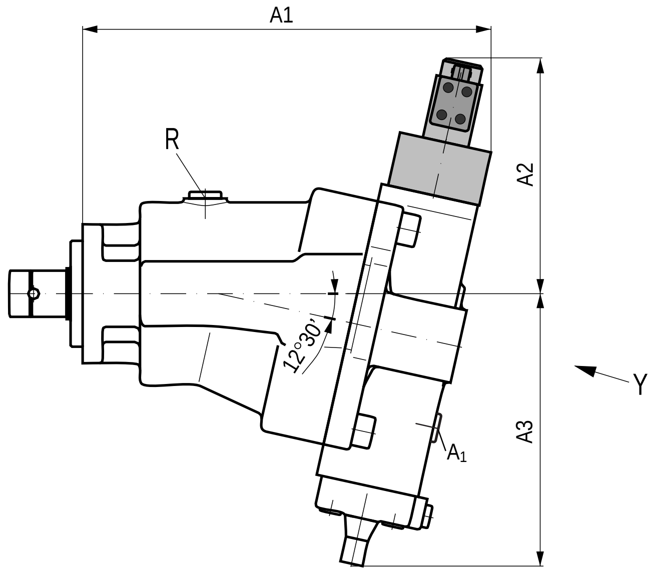
By using an electronic control card control of swivel time is also possible.

Circuit diagram



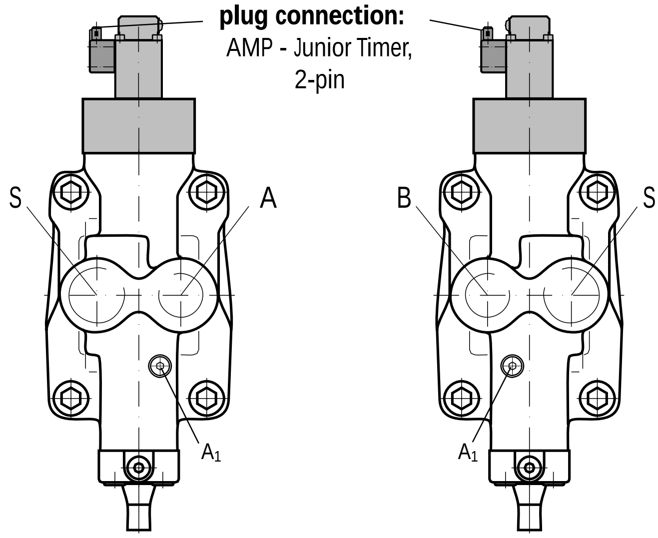
Unit dimensions EP2

general dimensions and connections see page 8-10



View Y

anti-clockwise rotation | clockwise rotation

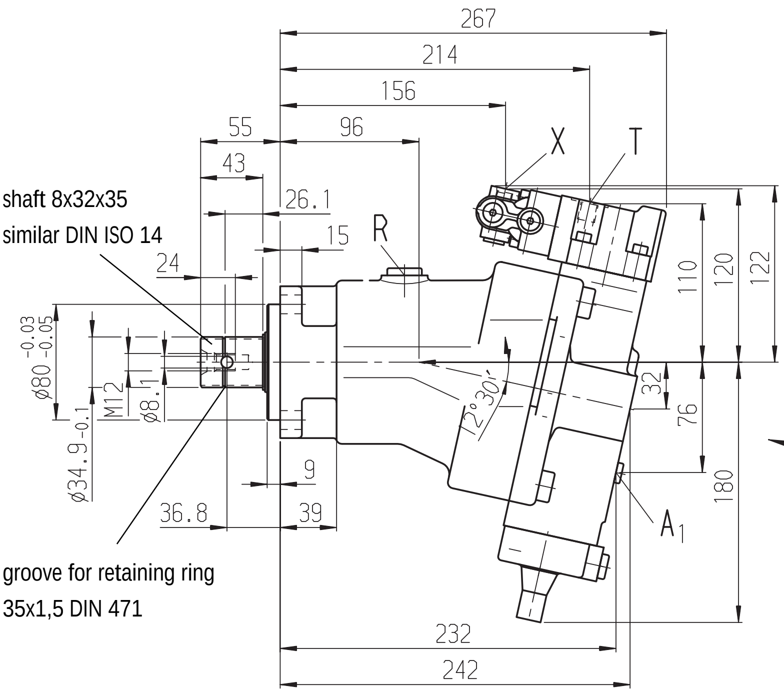


Size	A1	A2	A3
55			
80			
107	306	178	206

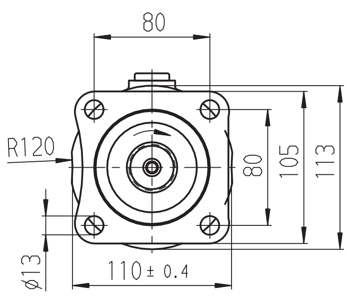
Unit Dimensions, Size 55

Prior to finalising your design, please obtain a certified drawing.

Constant pressure control, with load sensing functions DRS

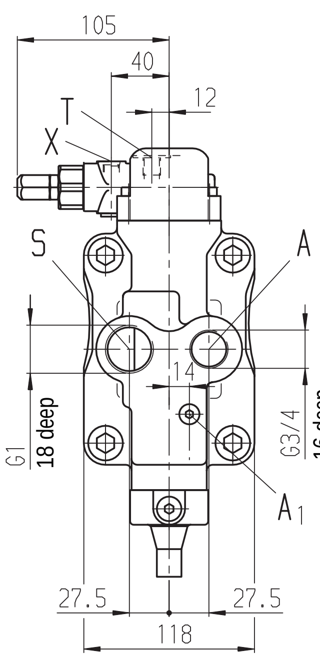


Detail

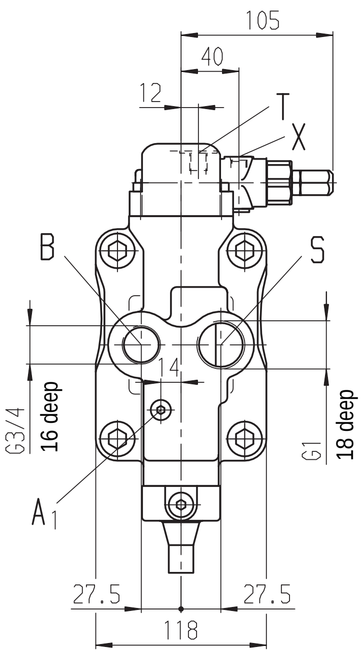


View Y

anti-clockwise rotation



clockwise rotation



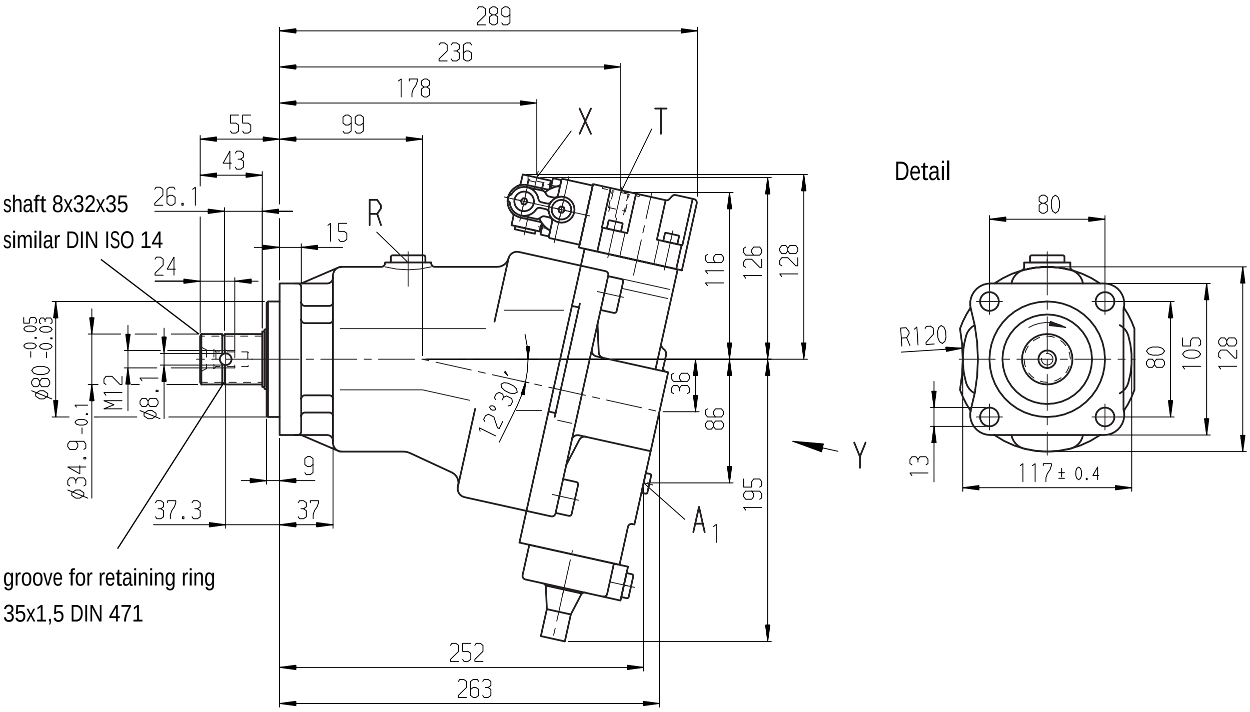
Connections

A (B)	Service line ports	G 3/4
S	Suction port	G1
R	Bleed port (leakage returned internally)	M 18x1,5 (plugged)
T	Leakage port	M12x1,5
A_1	Gauge point for high pressure	M10x1 (plugged)
X	Port for Δp-control (load sensing function)	7/16-20UNF-2B

Unit Dimensions, Size 80

Prior to finalising your design, please obtain a certified drawing.

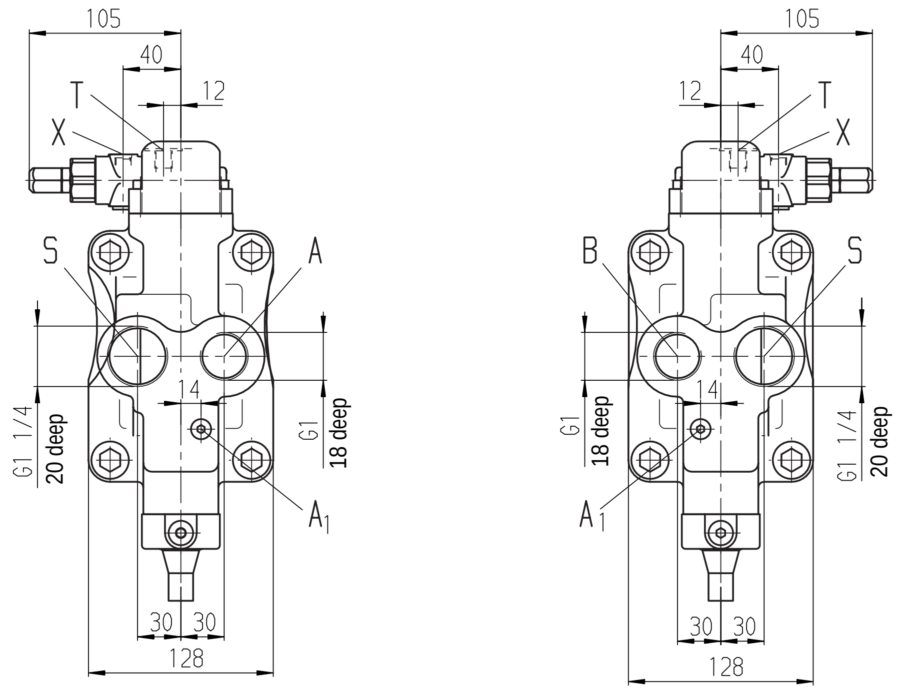
Constant pressure control, with load sensing functions DRS



View Y

anti-clockwise rotation

clockwise rotation



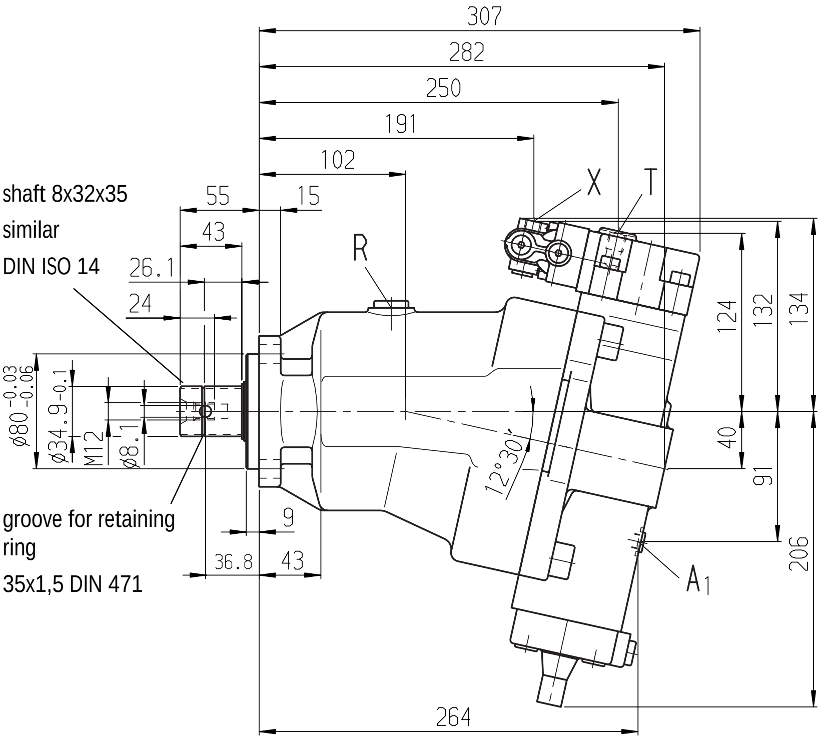
Connections

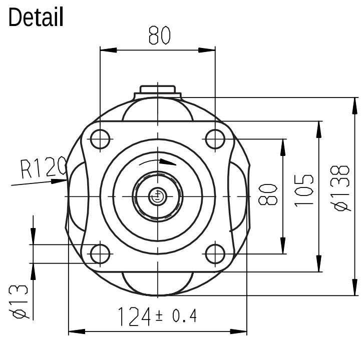
A (B)	Service line ports	G 1
S	Suction port	G 1 1/4
R	Bleed port (leakage returned internally)	M 18x1,5 (plugged)
T	Leakage port	M12x1,5
A_1	Gauge point for high pressure	M10x1 (plugged)
X	Port for Δp-control (load sensing function)	7/16-20UNF-2B

Unit Dimensions, Size 107

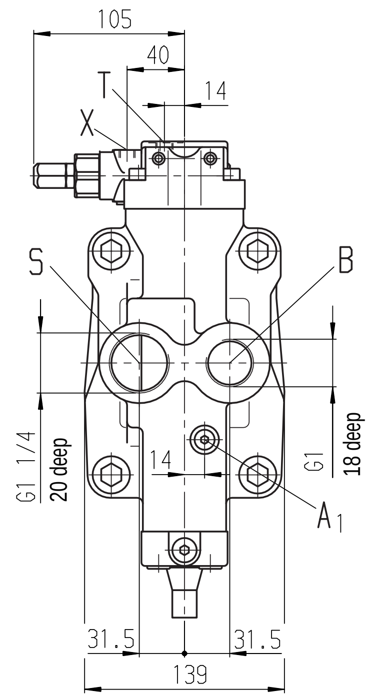
Prior to finalising your design, please obtain a certified drawing.

Constant pressure control, with load sensing functions DRS

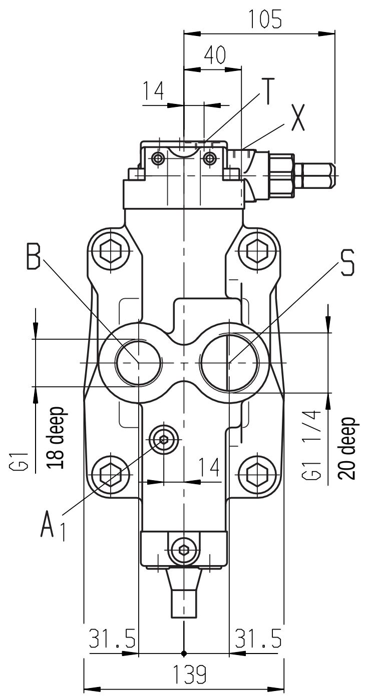




View Y



anti-clockwise rotation



clockwise rotation

Connections

A (B)	Service line ports	G1
S	Suction port	G1 1/4
R	Bleed port (leakage returned internally)	M 18x1,5 (plugged)
T	Leakage port	M12x1,5
A_1	Gauge point for high pressure	M10x1 (plugged)
X	Port for Δp-control (load sensing function)	7/16-20UNF-2B

Notes

Notes

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