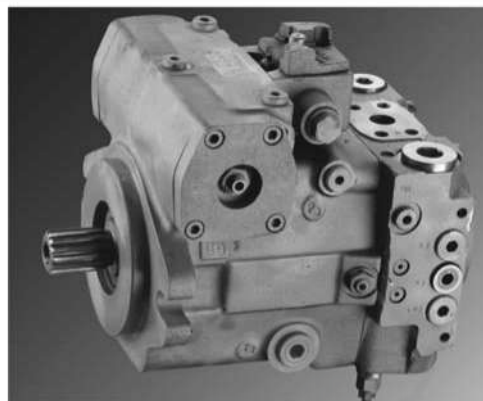




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1. Model Description	002
2. Specifications terms	006
3. Technical data	006
4. Implementation standard of the hydraulic pumps	006
5. Control parts	007
6. Fluid choice	010
7. Dimensions & Size of piston pump	011
8. Installation instructions	023

FEATURES

- Hydraulic Units for traveling Machinery.
- Variable axial piston pump of swashplate design for hydrostatic closed circuit transmissions
- Flow is proportional to drive speed and displacement and is infinitely variable
- Adjust the angle of swashplate to realize the stepless variable
- 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.
- Auxiliary pump as the function of boosting pump & controlling oil pump
- The maximum boost pressure is limited by a built-in boost pressure- relief valve
- The integral pressure cut-off is standard
- Nominal pressure 40MPa
- Long service life, high-precision bearings
- Parker seals

1 Model Description

1 Model Description

01 Axial piston unit

Variable pump, swashplate design, used for traveling machinery.

A4V

02 Operation mode

Pump, closed circuit

G

03 Size

△Displacement $V_{g,max}$ (ml/r)

28

40

56

71

90

125

04 Control device [★ : available ; ☆ : on request ; — : not available]

mechanical servo

☆

☆

★

★

★

☆

HW

speed related U=12VDC

☆

☆

☆

☆

☆

☆

DA1

speed related U=24VDC

☆

☆

☆

☆

☆

☆

DA2

pilot-pressure related

without supply filtration

☆

☆

☆

☆

☆

☆

HD1

pilot-pressure related

with supply filtration

☆

☆

☆

☆

☆

☆

HD3

with proportional solenoid,

without supply filtration U=12VDC

☆

☆

☆

☆

☆

☆

EP1

U=24VDC

☆

☆

☆

☆

☆

☆

EP2

with proportional solenoid,

with supply filtration U=12VDC

☆

☆

☆

☆

☆

☆

EP3

U=24VDC

☆

☆

☆

☆

☆

☆

Ep4

05 with switch solenoid

With pressure cut-off (standard)

☆

☆

★

★

★

☆

D

06 Neutral position switch (only for HW)

Without neutral position switch

☆

☆

★

★

★

☆

With neutral position switch

☆

☆

★

★

★

☆

L

07 Mechanical stroke limiter

Without mechanical stroke

limiter (without code)

☆

☆

★

★

★

☆

With mechanical stroke limiter,

external variable

☆

☆

★

★

★

☆

M

08 Ports X3, X4 for positioning pressure

Without ports X3, X4

☆

☆

★

★

★

☆

With ports X3, X4

☆

☆

★

★

★

☆

T

09 DA control valve

Without DA control valve

☆

☆

★

★

★

☆

1

With DA control valve,

Fixed setting value

☆

☆

★

★

★

☆

2

With DA control

clockwise

☆

☆

☆

☆

☆

☆

3L

valve, Mech. Adjusting
by controlled stick

anticlockwise

☆

☆

☆

☆

☆

☆

3R

1 Model Description

10 Series

Series number	☆	☆	★	★	★	☆	32
---------------	---	---	---	---	---	---	----

11 Direction of rotation

Viewed from Shaft	endclockwise	R
	anticlockwise	L

12 Seals

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

13 Shaft end

Splined shaft DIN 5480	for single pump	☆	☆	★	★	★	☆	Z
	for combination pump	—	☆	★	★	★	☆	A
Splined shaft ANSI B92.1a	for single pump	☆	☆	☆	☆	☆	☆	S
	for combination pump	—	—	☆	☆	—	☆	T

14 Mounting flange

	28	40	56	71	90	125	
SAE J744—2 hole	☆	☆	★	—	—	—	C
SAE J744—2+4 hole	—	—	—	★	★	☆	F

15 service line ports

SAE flange portA/B top and bottom	ssuction port S bottom	—	☆	★	★	★	☆	02
	suction port S at top	—	☆	★	★	★	☆	03
SAE flange portsA/B same side	suction port S bottom	☆	—	—	—	—	—	10
	suction port S at top	☆	—	—	—	—	—	13

16 Boost pump

Without integrated boost							
pumpwithout through drive	☆	☆	★	★	★	☆	N00
with through drive	☆	☆	★	★	★	☆	K..
With integrated boost							
pumpwithout through drive	☆	☆	★	★	★	☆	F00
with through drive	☆	☆	★	★	★	☆	F..

17 Through drive

Flange SAE J744 Hub for splined shaft		28	40	56	71	90	125	
82-2(A)	5/8 in 9T 16/32DP	☆	☆	★	★	★	☆	.01
101-2(B)	7/8 in 13T 16/32DP	☆	☆	★	★	★	☆	.02
	1 in 15T 16/32DP	☆	☆	★	★	★	☆	.04
127-2(C)	1 in 15T 16/32DP	—	☆	—	—	—	—	.09
	14T 12/24DP	—	—	★	★	★	☆	.07
152-2/4(D)	W35 2×30×16×9g	—	—	—	—	★	—	.73
	1 3/4 in 13T 8/16DP	—	—	—	—	—	☆	.69

1 Model Description

18 Valves setting range		28	40	56	71	90	125	
With high-pressure relief valve, pilot operated	10~42MPa with bypass	—	—	—	★	★	☆	1
With high-pressure relief valve, direct operated (fixed setting)	10~42MPa without bypass	☆	☆	★	—	—	—	3
	10~42MPa with bypass	☆	☆	★	—	—	—	5
	10~25MPa without bypass	☆	☆	★	—	—	—	4
	10~25MPa with bypass	☆	☆	★	—	—	—	6
19. Filtration		28	40	56	71	90	125	
Filtration in the suction line of boost pump (filter not included in supply)		☆	☆	★	★	★	☆	S
Filtration in pressure line of boost pump ports for external boost circuit filtration, (Fe and Fa)		☆	☆	★	★	★	☆	D
20 .Swivel angle indicator		28	40	56	71	90	125	
Without swivel angle indicator								
(without code)		☆	☆	★	★	★	☆	
Electrical swivel angle sensor		☆	☆	☆	☆	☆	☆	R

Note : ★ : available ; ☆ : on request ; — : not available

1 Model Description

◆ Ordering code

	HL	—	A4V	G				D					/	32		—	N		
HILEAD series																			
Axial piston unit																			
Operation mode																			
Size																			
Controlling method																			
with switch solenoid																			
Neutral position switch (only for HW)																			
Mechanical stroke limiter																			
Ports X3, X4 for positioning pressure																			
DA control valve																			
Series																			
Direction of rotation																			
Seals																			
Shaft extension																			
Mounting flange																			
Service line ports (UN fixing thread)																			

To continue :

Boost pump					
Through drive					
Valves					
Filter					
Swivel angle indicator					

2. Specifications terms

The output flow : $Q = V_g \cdot n \cdot \eta_v / 1000$ L/min
 Torque : $M = 1.59 V_g \cdot \Delta P / 10 \eta_m$ N.m
 power : $P = M \cdot n / 9549 = Q \cdot \Delta P / 60 \eta_t$ KW
 Note : V_g = capacity mL/r ΔP = pressure Mpa n = speed rpm
 η_v = Volumetric efficiency

3. Technical data

3.1 Performance parameters [these figures did not consider the efficiency of mechanical and volumetric efficiency]

Size		28	40	56	71	90	125
Variable pump Displacement V_g max	cm ³ /r	28	40	56	71	90	125
Displacement for boost pump V_g Sp	cm ³ /r	6.2	8.8	11.8	19.8	19.8	28.5
Max speed n_{max}	rpm	4200	4000	3600	3300	3000	2800
Min speed n_{min}	rpm	500	500	500	500	500	500
Max flow at $n = n_{max}$	L/min	117.6	160	201.6	234.3	270	350
Max power at $n = n_{max}$ $V = V_g$ max ($\Delta P = 40$ MPa)	KW	78.4	106.6	134.4	156.2	180	233.3
Max Torque at $V = V_g$ max $\Delta P = 40$ MPa	Nm	178	254.4	356	451.5	572.4	795
Fill volume V	L	1	1.1	1.5	1.5	1.5	2.2
Weight	Kg	30	32	39	50	61	82

3.2 The working pressure range of hydraulic pump.

3.2.1 [suction port] working pressure range [auxiliary pump] Suction pressure P_s min : ≥ 0.8 bar

3.2.2 Working pressure range of the case drain port.

a. Variable pump.

Nominal pressure $P = 40$ MPa Peak pressure $P_{max} = 45$ MPa Total pressure [pressure A + pressure B] = 70MPa

b. Auxiliary pump.

Max pressure $P = 4$ MPa

3.2.3 Working pressure range of case drain.

Ports T1, T2 case drain port, permissive Max pressure : $P = 0.6$ MPa

Instant [$t < 0.1$ S] permissive Max pressure : $P = 0.8$ MPa

When normal continual work, case drain pressure $P \leq 0.3$ MPa

The matters needing attention:

- a, During commissioning and operation, the pump body must be filled with hydraulic fluid and air bled.
- b, To reduce the noise, all connection pipeline isolates with flexible part and the fuel tank.
- c, When the hydraulic pump continuously moving under the nominal pressure or the interrupted peak pressure, you must use the auxiliary unit to cool fluid, ensure that the fluid temperature does not surpass the prescribed limit, the fluid temperature in circuit not more than 115°C

4. Implementation standard of the hydraulic pumps

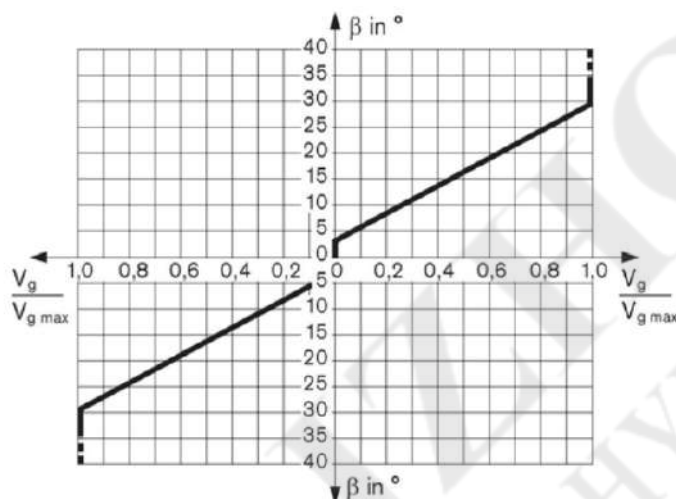
JB/T 7043-2006 hydraulic axial piston

5. Control parts

5.1 Hydraulic control, mechanical servo HW

5.1.1 Principle : Displacement related to the operation direction of control stick's a or b angle, fluid pass through the HW control unit, as a result, pressure variable to piston pump's variable cavity, realizing the stepless change of swashplate and displacement, fluid flowing direction controlled by stick's operation directional. If the pump simultaneously equipped with a DA control valve, then travelling drive device controlled automatically.

5.1.2 The characteristic curve as following chart :



1

Note : a. Control lever :

Between 0 to V_{gmax} ----- $\beta=3^\circ$ to $\pm 29^\circ$

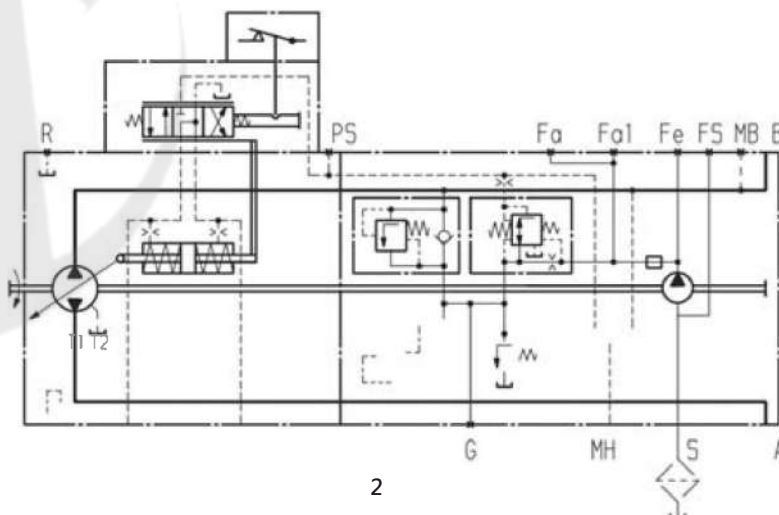
Mech. stop for β : -----size 28~71 : $\pm 40^\circ$

size 90~125 $\pm 35^\circ$

b. The characteristic curve is possibly offset by piston pump's working condition [working pressure, oil temperature];

c. The Max torque is 1.7 N.m on the control stick, when the HW control stick on control device does not have torque, the spring return function cause the oil pump return to the Neutral position automatically.

5.1.3 Hydraulic System Chart :



2

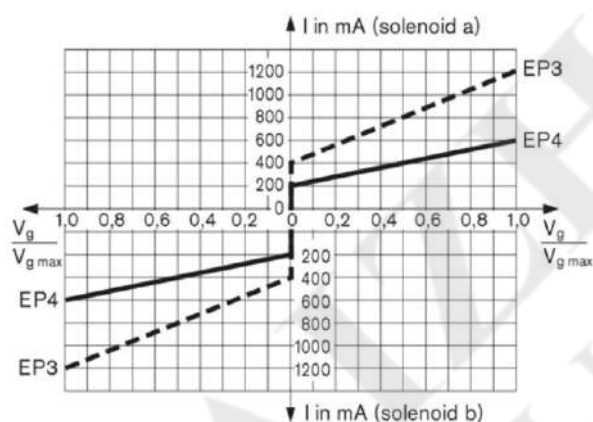
5. Control parts

5.2 EP - proportional control, electric

5.2.1 Principle : Displacement related to the two proportional electro-magnets [a & b] on current intensity, fluid pass through

the EP control unit, as a result, pressure variable to piston pump's variable cavity, realizing the stepless change of swashplate and displacement, each electro-magnet corresponds a fluid flow direction. If the pump simultaneously equipped with a DA control valve, then travelling drive device controlled automatically.

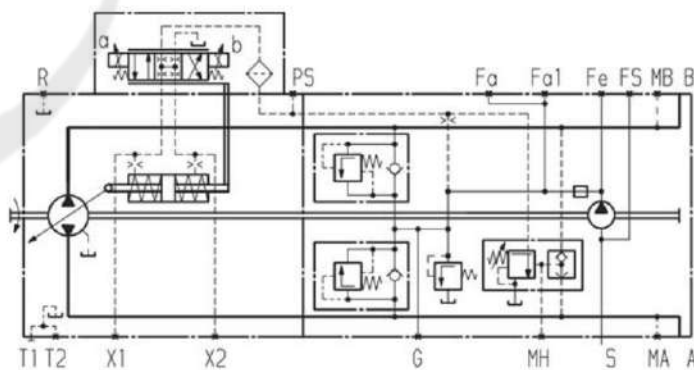
5.2.2 The characteristic curve chart :



3

Technical parameters for solenoid	EP1/EP3	EP2/EP4
Voltage	12V DC ($\pm 10\%$)	24V Dc ($\pm 10\%$)
controlling current	400~1200 mA	200~600 mA
Max. current	1540 mA	770mA
Frequency	100Hz	100Hz
Working time	100%	100%

5.2.3 The characteristic curve chart:



4

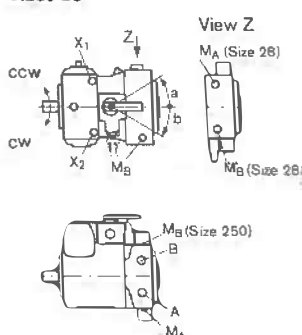
5. Control parts

Note :

1 . Assignment Direction of rotation - Control - Direction of through put flow

Direction of rotation	Clockwise		Anti clockwise	
Operating stick	a	b	a	b
Actuation of solenoid [EP]	b	a	b	a
Control pressure	X2	X1	X2	X1
Through put flow	B to A	A to B	A to B	B to A
Operating pressure	MA	MB	MB	MA

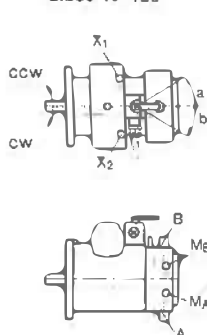
Sizes 28



Outline drawing of HW pump

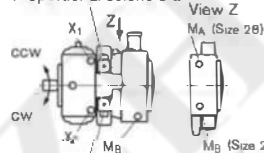
5

Sizes 40-125

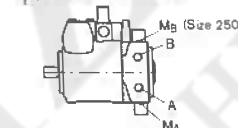


Sizes 28

Proportional solenoid a

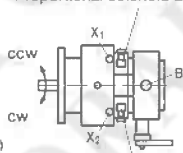


Proportional solenoid b

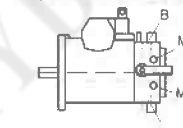


Sizes 40-125

Proportional solenoid a



Proportional solenoid b



Outline drawing of EP pump

6

2 . High-pressure relief valves

a. The two high-pressure relief valves protect the hydrostatic transmission (pump and motor) from overload. It limit the maximum pressure in the respective high-pressure line and serve at the same time as boost valves

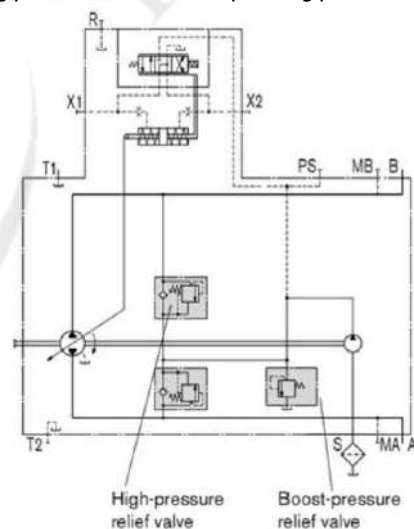
b. Standard pressure setting: High- pressure relief valves P max-----42MPa

Boost-pressure relief valve PSP ----- 4MPa

Please 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.

c. The position chart of Relief valve:

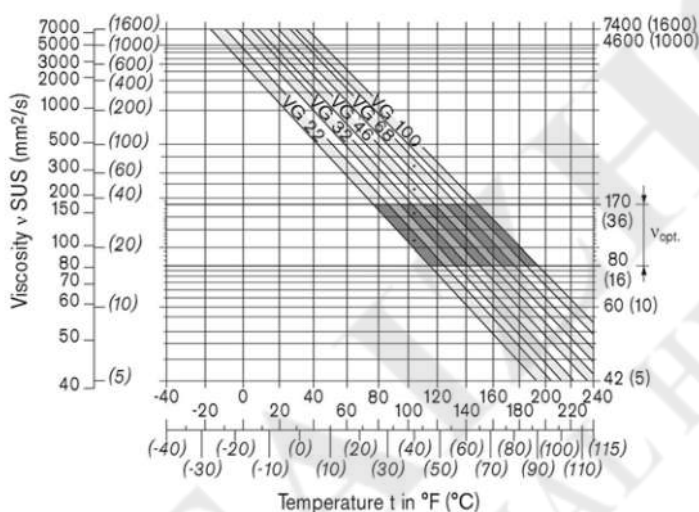


7

6. Fluid choice

6.1 In order to ensure the selection of fluid trouble-free and high-performance work. In the systems design period, you should choose the hydraulic fluid of the hydraulic system be based on conditions carefully, All the mineral oil are extent applicable to the axial piston units, which Application of the basic division of the above depends on the relationship of the water, temperature and viscosity, and consider oxidation and corrosion protection, material compatibility, air and water separation properties.

6.2 In order to ensure long service life of equipment, we recommend using the hydraulic fluid on working temperature, which the working viscosity is 16~36mm²/s. Please refer to the following chart, choose the viscosity of hydraulic fluid. Select the highest level of viscosity as possible in each working conditions.



8

6.3 In order to ensure the normal work of axial piston pump unit, the Min grade requirement for the fluid cleanliness is:

Grade $^{18}/_{15}$ In accordance with GB/T 14039-1993

Grade 9 In accordance with NAS 1638

Grade $^{18}/_{15}$ In accordance with ISO/DIS 4406

Fluid in the high temperature [$75^{\circ}\text{C} \leq t, t \geq 90^{\circ}\text{C}$], the lowest grade for cleanliness:

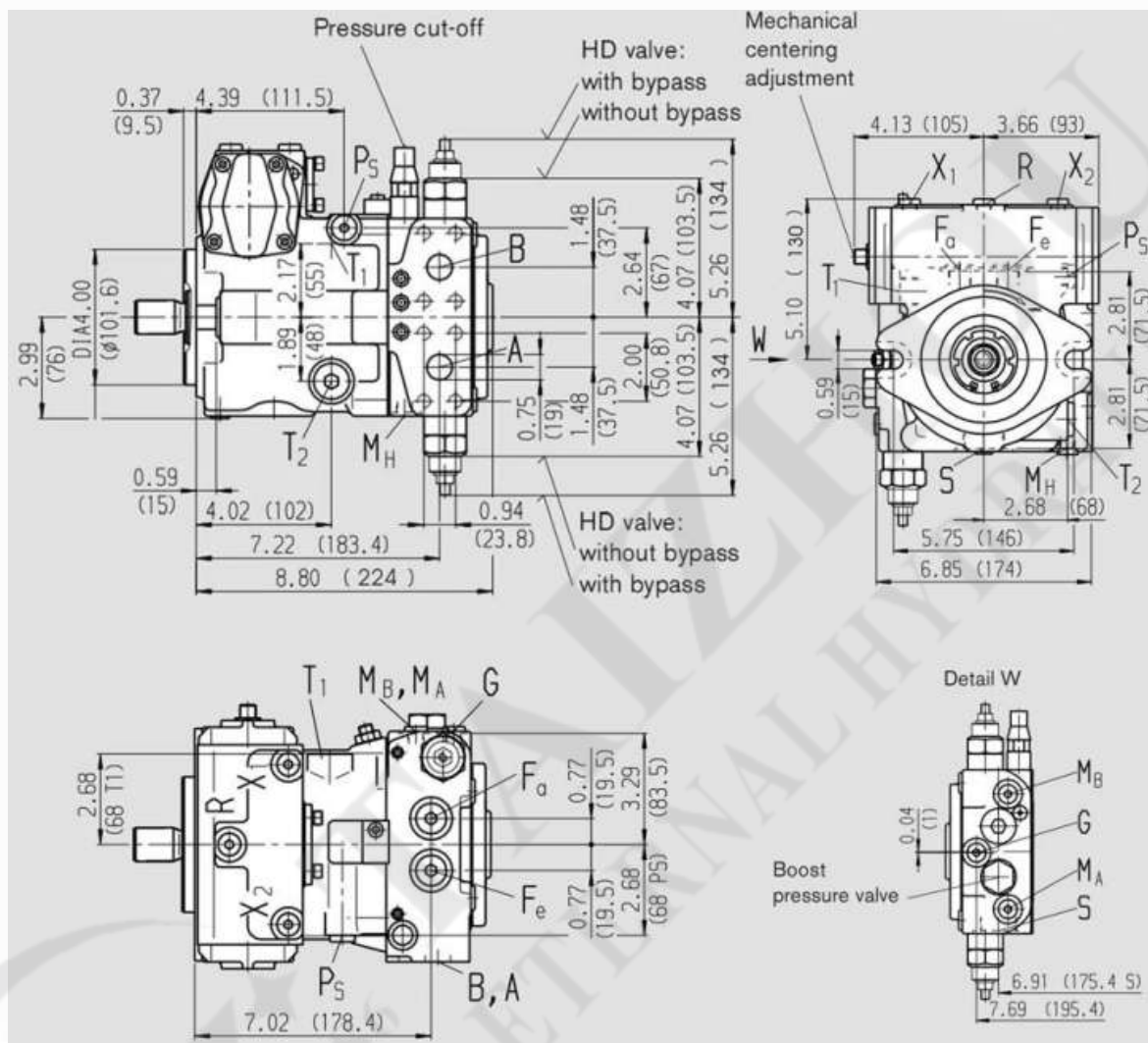
Grade $^{17}/_{14}$ In accordance with GB/T 14039-1993

Grade 8 In accordance with NAS 1638

Grade $^{17}/_{14}$ In accordance with ISO/DIS 4406

7. Dimensions & Size of piston pump

Unit Dimensions, size HL-A4VG-28 [Fig : without control unit]



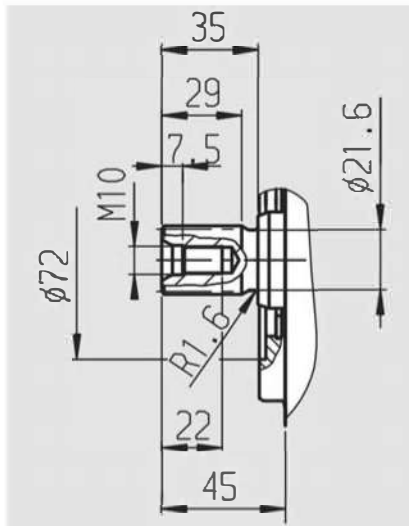
9

Ports

A, B	Service line ports (high-pressure series) fixing thread A/B	SAE ³ / ₄ in M10,14 deep
T ₁	case drain or fill	M22X1.5,14 deep
T	case drain	M22X1.5,14 deep
M _A , M _B	pressure gauge - operating pressure A, B	M22X1.5,12 deep
R	air bleed	M22X1.5,12 deep
S	boost suction port	M33X2,18 deep
X ₁ , X ₂	port for control pressures (before orifice)	M12X1.5,12 deep
G	pressure port for auxiliary circuits	M12X1.5,12 deep
P _s	control pressure supply	M14X1.5,12 deep
F _a	filter output	M18X1.5,12 deep
F _e	filter input	M18X1.5,12 deep
M _H	port for balanced high pressure	M12X1.5,12 deep

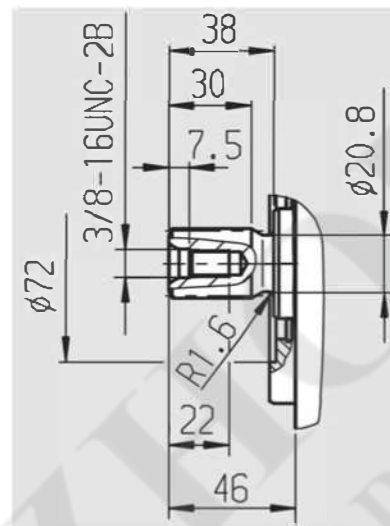
7. Dimensions & Size of piston pump

Shaft ends



Z Spline shaft DIN 5480
W25×1.25×30×18×9g

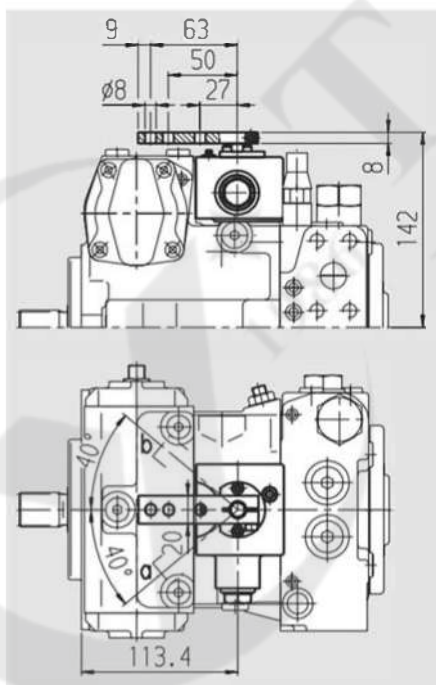
10



S Spline shaft SAE J744-25-4
1 in 15T 16/32DP

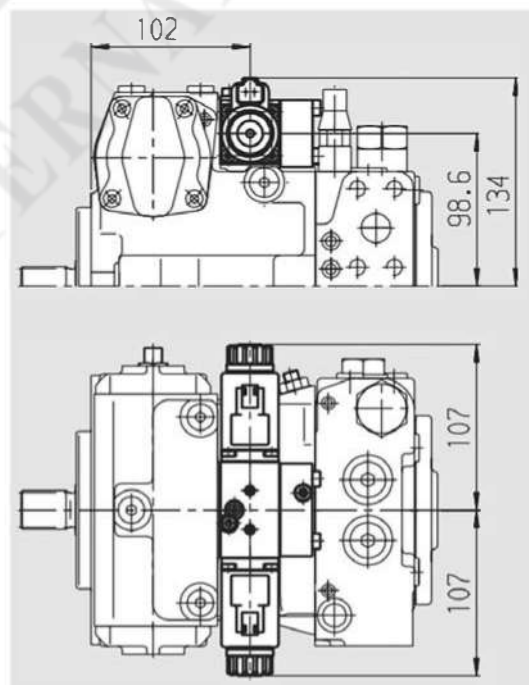
11

The outline drawing of variable pump



Hydraulic control, mechanical servo, HW

12

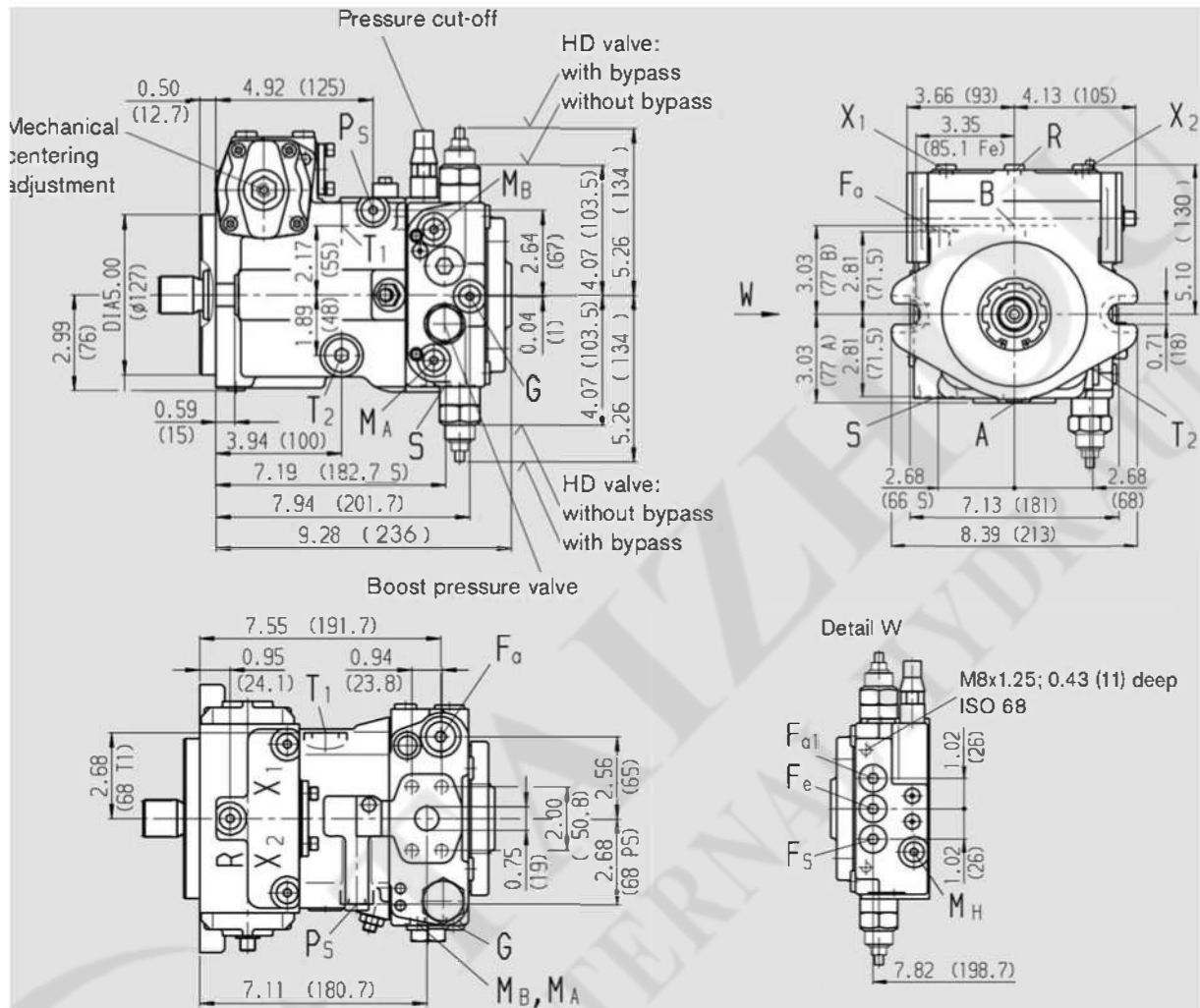


Electric control with proportional solenoid, EP

13

7. Dimensions & Size of piston pump

Unit Dimensions, size HL-A4VG-40 [Fig : without control unit]



Ports

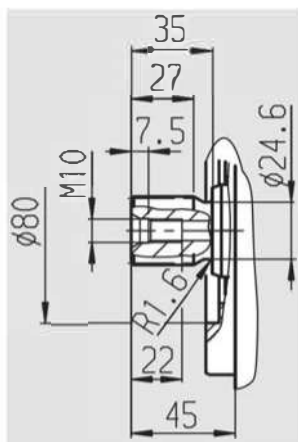
14

A, B	service line ports (high-pressure series) fixing thread A/B
T ₁	case drain or fill
T ₂	case drain
M _A , M _B	pressure gauge - operating pressure A, B
R	air bleed
S	boost suction port
X ₁ , X ₂	port for control pressures (before orifice)
G	pressure port for auxiliary circuits
P _s	control pressure supply
F _a	filter output
F _{a1}	filter output (filter assembly)
F _e	filter input
F _s	filter output
M _H	port for balanced high pressure

SAE ³ / ₄ in
M10,17 deep
M22X1.5,14 deep
M22X1.5,14 deep
M22X1.5,12 deep
M22X1.5,12 deep
M33X2,18 deep
M12X1.5,12 deep
M12X1.5,12 deep
M14X1.5,12 deep
M18X1.5,12 deep
M18X1.5,12 deep
M18X1.5,12 deep
M18X1.5,12 deep
M12X1.5,12 deep

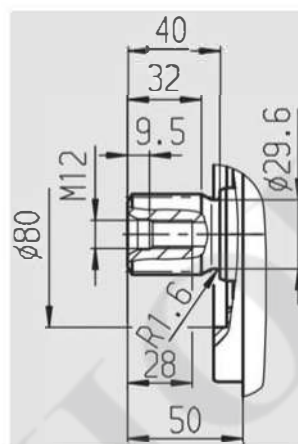
7. Dimensions & Size of piston pump

Shaft ends



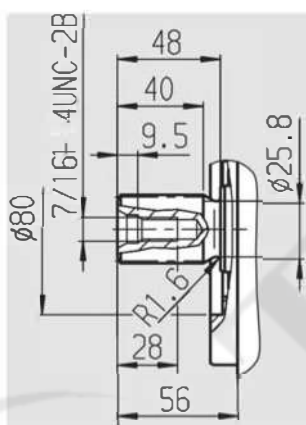
Z Splined shaft DIN 5480
W30×2×30×14×9g

15



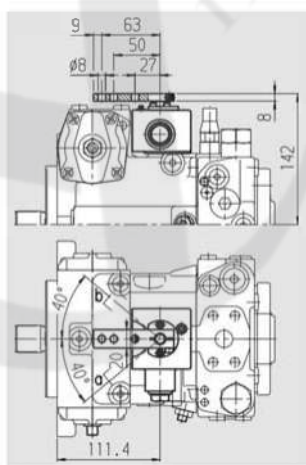
A Splined shaft DIN 5480
W35×2×30×16×9g

16



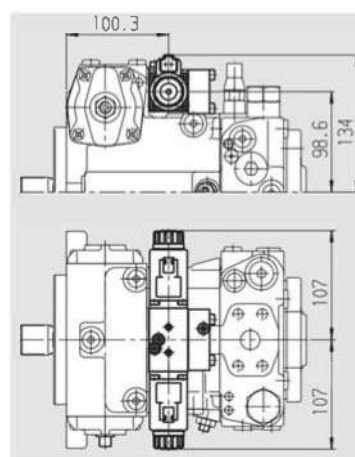
S Splined shaft SAE J744-32-4
1 1/4 in 14T¹²/₂₄DP

17



Hydraulic control, mechanical servo, HW

18



Electric control with proportional solenoid, EP

19

Unit Dimensions,size HL-A4VG-56 [Fig : without control unit]

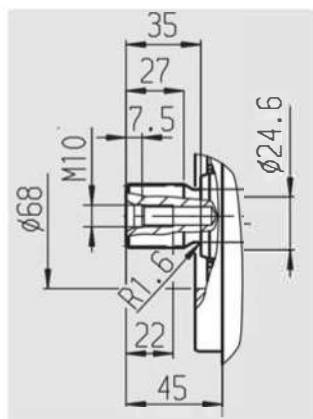


A, B	service line ports (high-pressure series) fixing thread A/B
T ₁	case drain or fill
T ₂	case drain
M _A , M _B	pressure gauge - operating pressure A, B
R	air bleed
S	boost suction port
X ₁ , X ₂	port for control pressures (before orifice)
G	pressure port for auxiliary circuits
P _s	control pressure supply
F _a	filter output
F _{a1}	filter output (filter assembly)
F _e	filter input
F _s	filter output
M _u	port for balanced high pressure

M10,17 deep
M22X1.5,14 deep
M22X1.5,14 deep
M22X1.5,12 deep
M22X1.5,12 deep
M33X2,18 deep
M12X1.5,12 deep
M12X1.5,12 deep
M14X1.5,12 deep
M18X1.5,12 deep
M18X1.5,12 deep
M18X1.5,12 deep
M18X1.5,12 deep
M12X1.5,12 deep

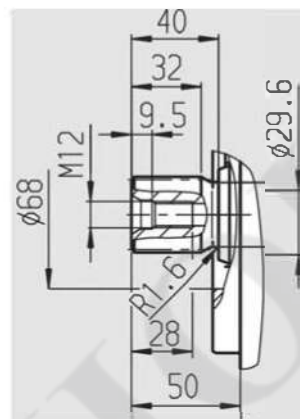
7. Dimensions & Size of piston pump

Shaft ends



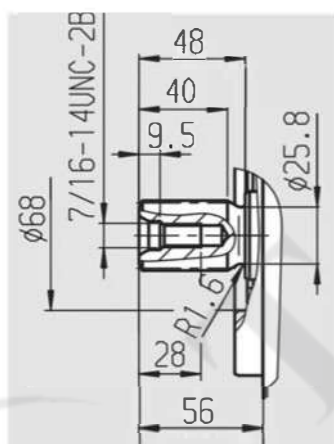
Z Splined shaft DIN 5480
W30×2×30×14×9g

21



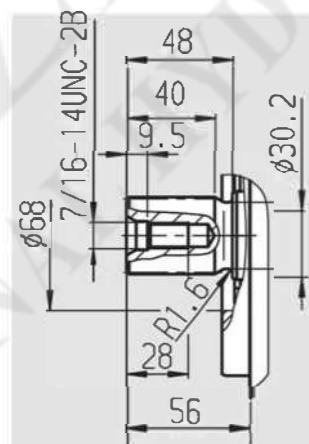
A Splined shaft DIN 5480
W35×2×30×16×9g

22



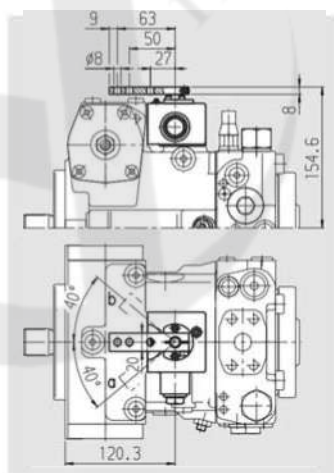
S Splined shaft SAE J744-32-4
1 1/4 in 14T¹²/₂₄DP

23



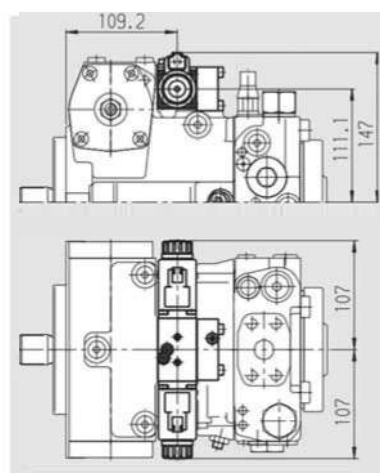
T Splined shaft SAE J744-25-4
1 3/8 in 21T¹⁶/₃₂DP

24



Hydraulic control, mechanical servo, HW

25

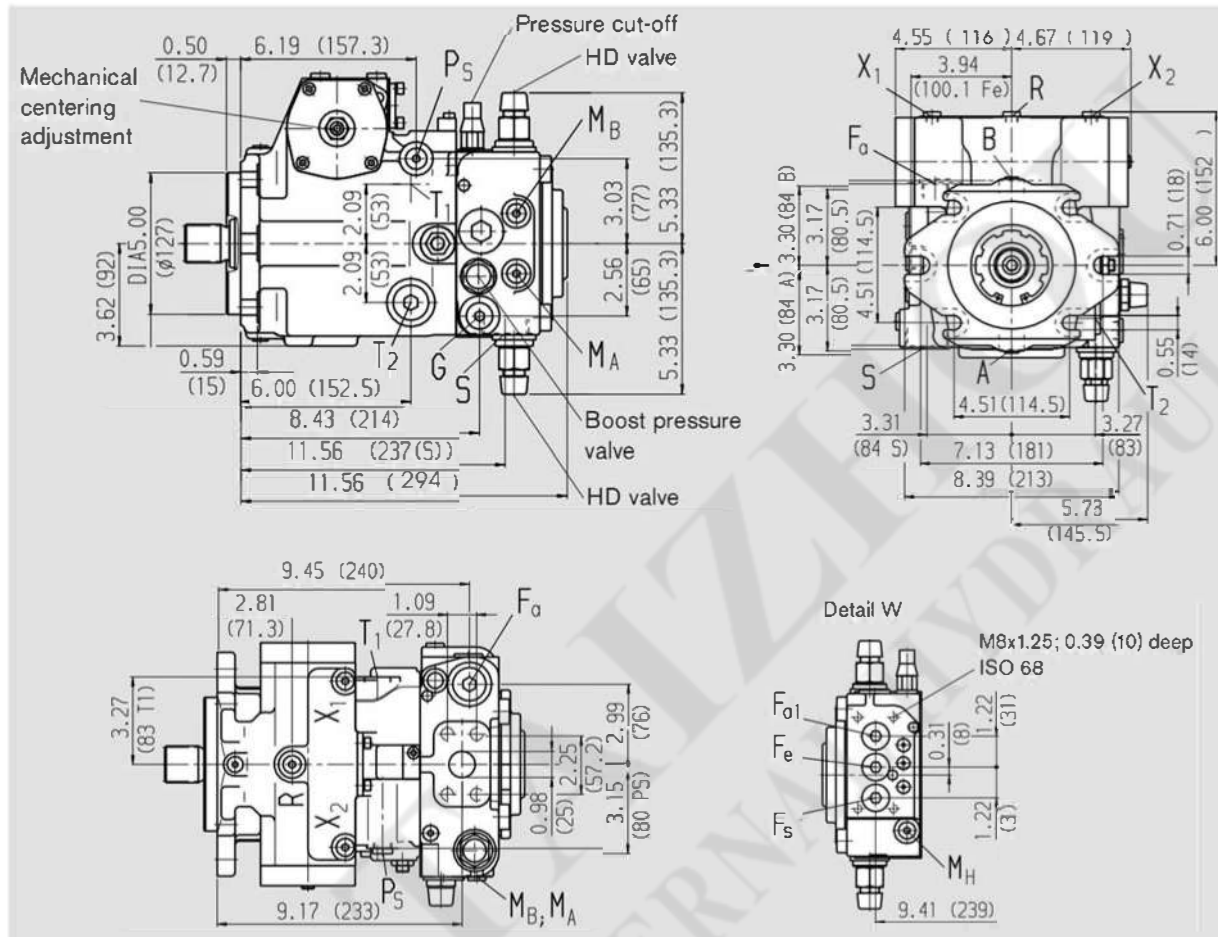


Electric control with proportional solenoid, EP

26

7. Dimensions & Size of piston pump

Unit Dimensions, size HL-A4VG-71 [Fig : without control unit]



27

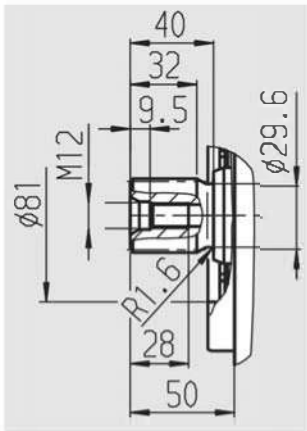
Ports

A, B	service line ports (high-pressure series)
	fixing thread A/B
T ₁	case drain or fill
T ₂	case drain
M _A , M _B	pressure gauge - operating pressure A, B
R	air bleed
S	boost suction port
X ₁ , X ₂	port for control pressures (before orifice)
G	pressure port for auxiliary circuits
P _s	control pressure supply
F _a	filter output
F _{a1}	filter output (filter assembly)
F _e	filter input
F _s	filter output
M _H	port for balanced high pressure

SAE1 in
M12,18 deep
M26X1.5,14 deep
M26X1.5,14 deep
M12X1.5,12 deep
M12X1.5,12 deep
M42X2,18 deep
M12X1.5,12 deep
M12X1.5,12 deep
M14X1.5,16 deep
M26X1.5,16 deep
M26X1.5,16 deep
M26X1.5,16 deep
M18X1.5,12 deep
M12X1.5,12 deep

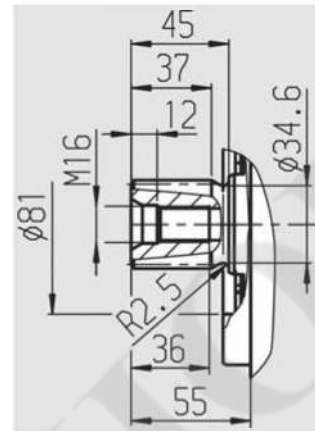
7. Dimensions & Size of piston pump

Shaft ends



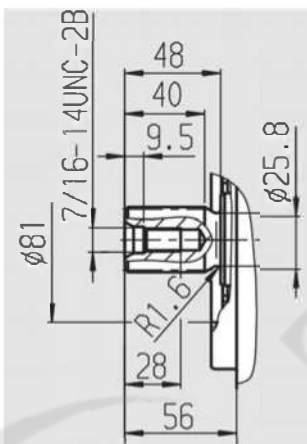
Z Splined shaft DIN 5480
W35×2×30×16×9g

28



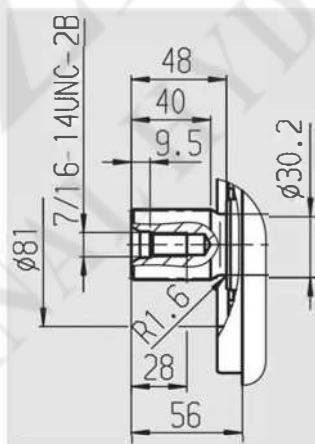
A Splined shaft DIN 5480
W40×2×30×18×9g

29



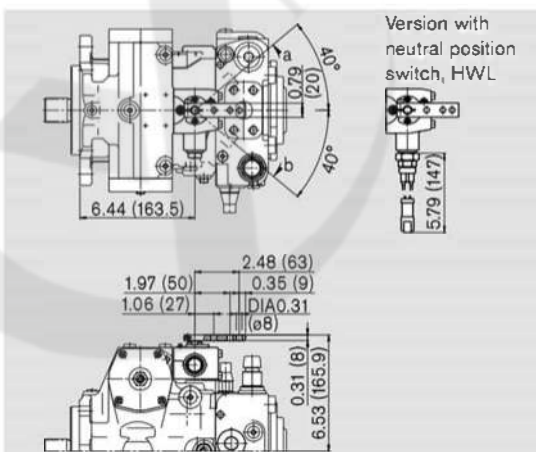
S Splined shaft SAE J744-32-4
1 1/4 in 14T^{12/24}DP

30



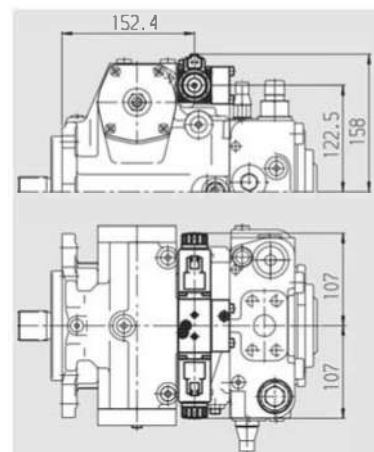
T Splined shaft SAE J744-25-4
1 3/8 in 21T^{16/32}DP

31



Hydraulic control, mechanical servo, HW

32

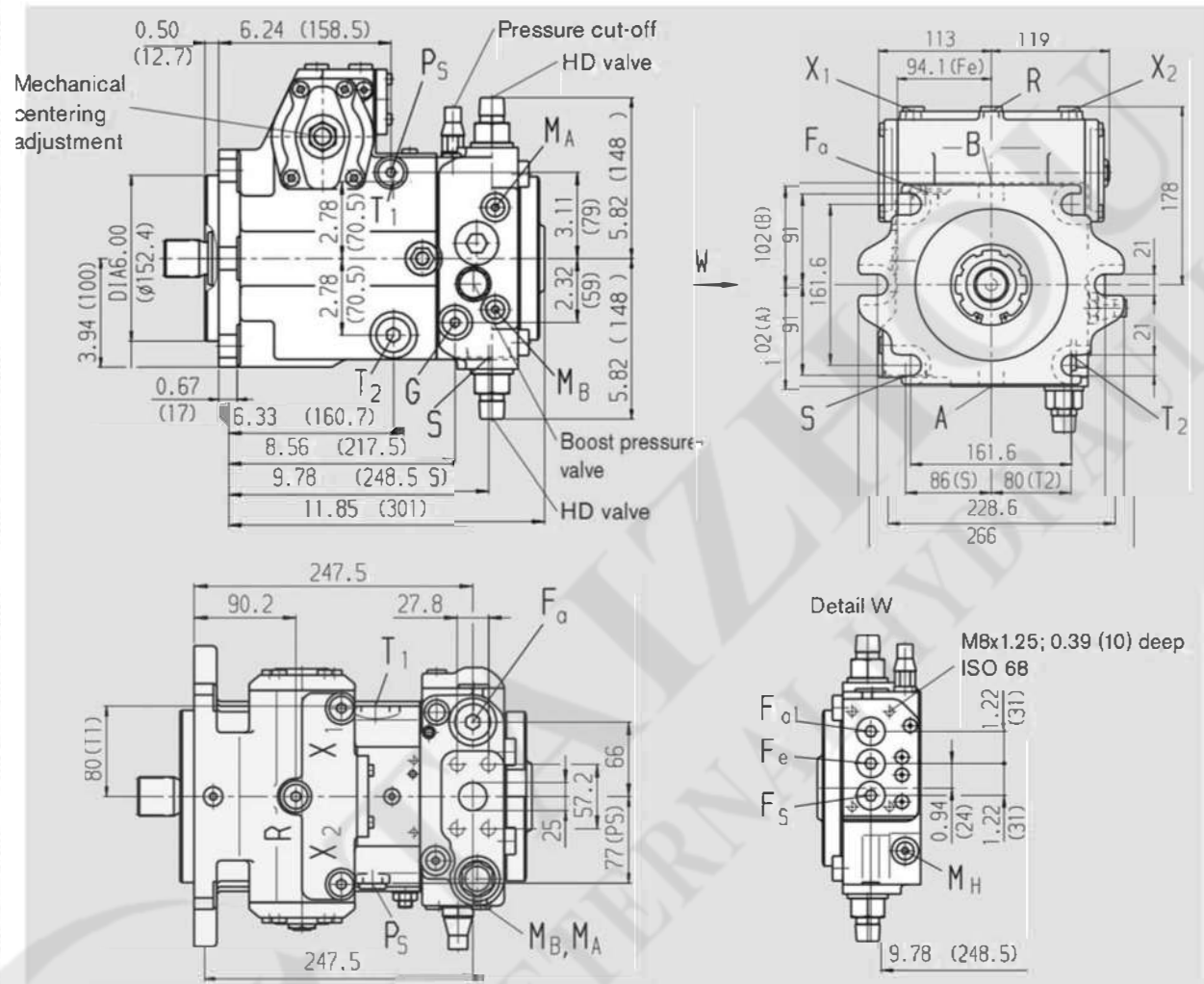


Electric control with proportional solenoid, EP

33

7. Dimensions & Size of piston pump

Unit Dimensions, size HL-A4VG-90 [Fig : without control unit]



34

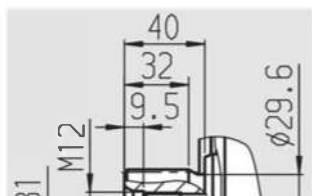
Ports

A, B	service line ports (high-pressure series) fixing thread A/B
T ₁	case drain or fill
T ₂	case drain
M _A , M _B	pressure gauge - operating pressure A, B
R	air bleed
S	boost suction port
X ₁ , X ₂	port for control pressures (before orifice)
G	pressure port for auxiliary circuits
P _s	control pressure supply
F _a	filter output
F _{a1}	filter output (filter assembly)
F _e	filter input
F _s	filter output
M _H	port for balanced high pressure

SAE1 in
M12,18 deep
M26X1.5,14 deep
M26X1.5,14 deep
M12X1.5,12 deep
M16X1.5,12 deep
M42X2,18 deep
M12X1.5,12 deep
M12X1.5,12 deep
M14X1.5,16 deep
M26X1.5,16 deep
M26X1.5,16 deep
M26X1.5,16 deep
M18X1.5,12 deep
M12X1.5,12 deep

7. Dimensions & Size of piston pump

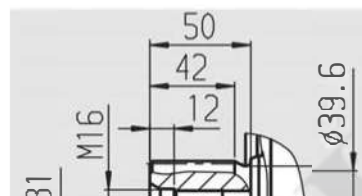
Shaft ends



Z Splined shaft DIN 5480

W35×2×30×16×9g

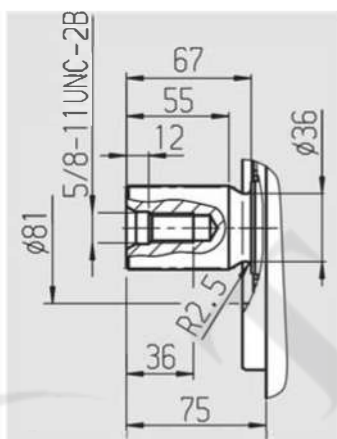
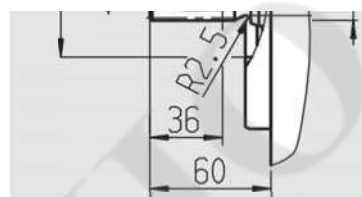
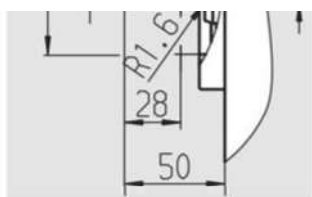
35



A Splined shaft DIN 5480

W45×2×30×21×9g

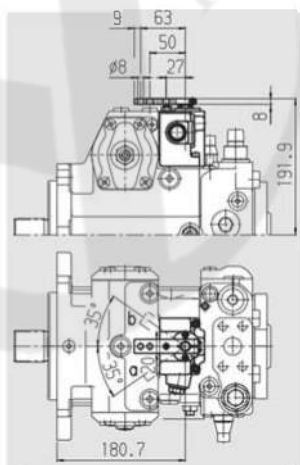
36



S Splined shaft SAE J744-44-4

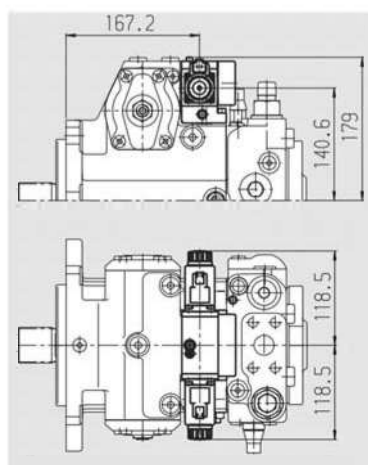
1 3/4 in 13T⁸/₁₆DP

37



Hydraulic control, mechanical servo, HW

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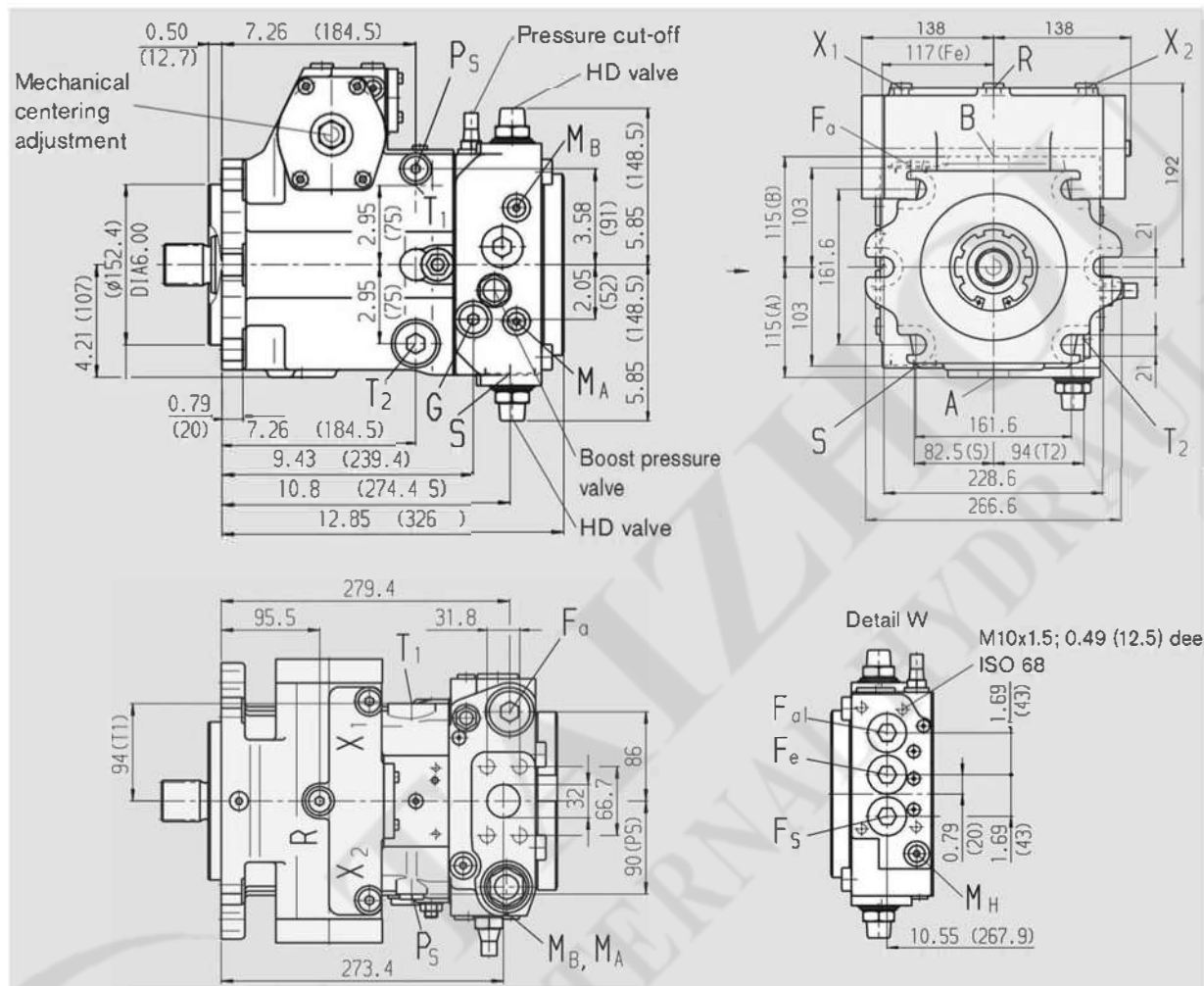


Electric control with proportional solenoid, EP

39

7. Dimensions & Size of piston pump

Unit Dimensions, size HL-A4VG-125 [Fig : without control unit]



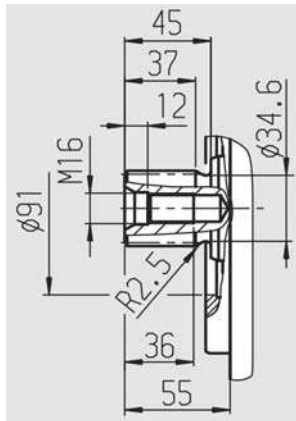
40

Ports

A, B	service line ports (high-pressure series) fixing thread A/B	SAE ¹ / ₄ in M14,22 deep
T ₁	case drain or fill	M26X1.5,14 deep
T ₂	case drain	M26X1.5,14 deep
M _A , M _B	pressure gauge - operating pressure A, B	M12X1.5,12 deep
R	air bleed	M16X1.5,12 deep
S	boost suction port	M42X2,18 deep
X ₁ , X ₂	port for control pressures (before orifice)	M12X1.5,12 deep
G	pressure port for auxiliary circuits	M12X1.5,12 deep
P _s	control pressure supply	M14X2,16 deep
F _a	filter output	M33X2,18 deep
F _{a1}	filter output (filter assembly)	M33X2,18 deep
F _e	filter input	M33X2,18 deep
F _s	filter output	M33X2,128 deep
M _H	port for balanced high pressure	M12X1.5,12 deep

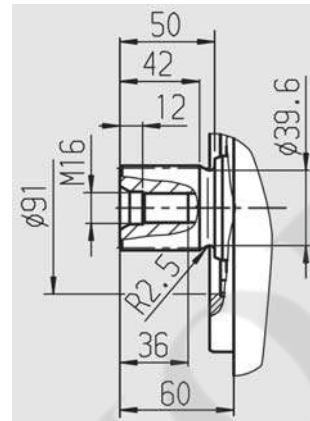
7. Dimensions & Size of piston pump

Shaft ends



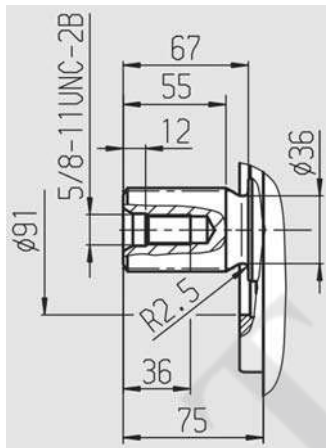
Z Splined shaft DIN 5480
W40×2×30×18×9g

41



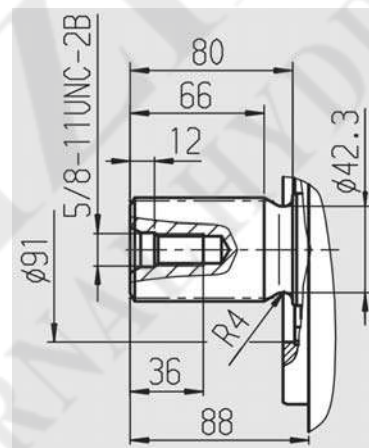
A Splined shaft DIN 5480
W45×2×30×21×9g

42



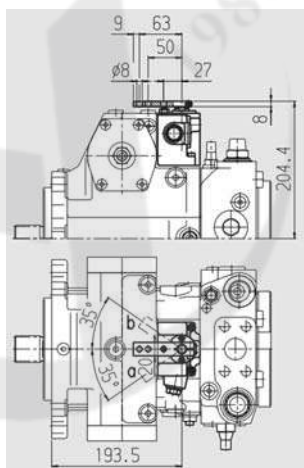
S Splined shaft SAE J744-44-4
1³/₄ in 13T⁸/₁₆DP

43



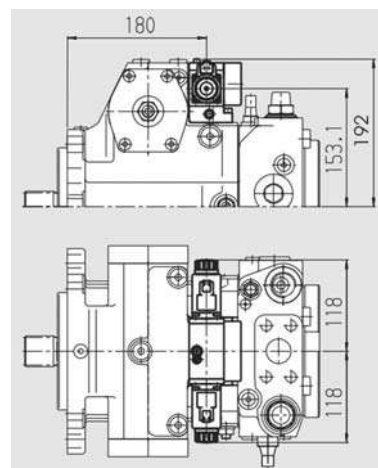
T Splined shaft SAE J744-50-4
2 in 15T⁸/₁₆DP

44



Hydraulic control, mechanical servo, HW

45



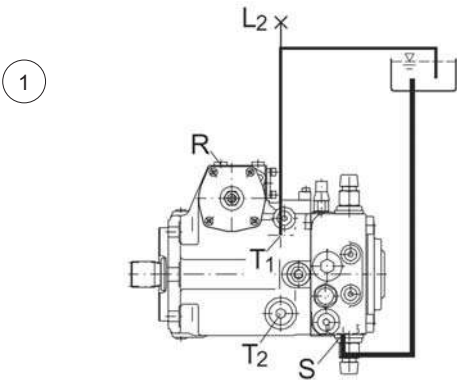
Electric control with proportional solenoid, EP

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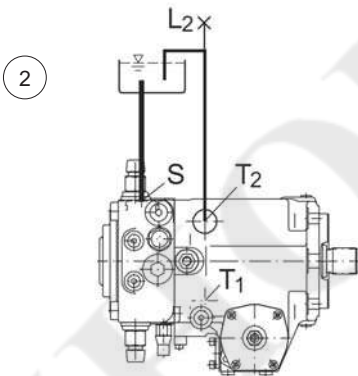
8 Installation instructions

8.1 Installation position

a. Below-tank installation (standard), Pump below the minimum fluid level of the tank. The suction line and case drain line must flow into the tank below the minimum fluid level 200MM , Installing drawing as following:

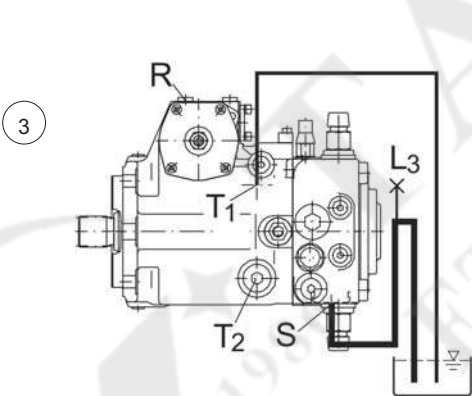


Installing position 1
47

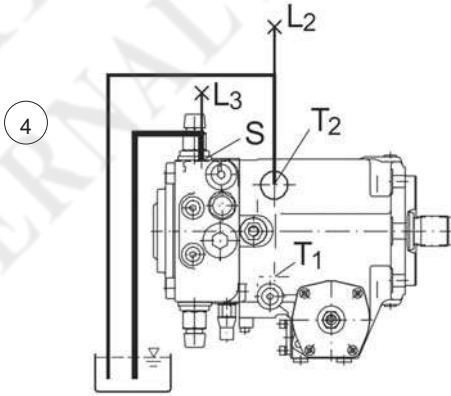


installing position 2
48

b. Above-tank installation Pump above the min. fluid level of the tank, The suction line and case drain line must flow into the tank below the minimum fluid level 200MM , Observe the maximum permissible suction height $h_s \text{ max} = 800 \text{ mm}$, Installing drawing as following:



Installing position 3
49



Installing position 4
50

Note : the position for air bleed and fill port as below chart

Installing position	Air bleed	Fill port
1	R	S+T1 (L2)
2	L2	S+T2 (L2)
3	R	T1+L3
4	L2	S (L3) +T2 (L2)