

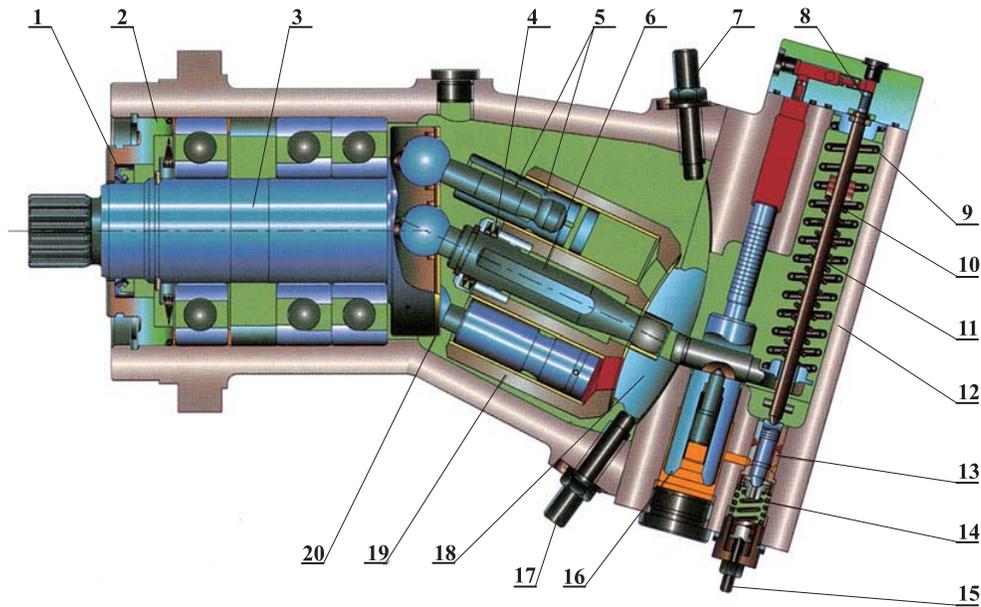
Characteristics:

Self-centering spherical control area allows torque-free. Cylinder bearing, low peripheral speed and high efficiency. Drive shaft capable of accepting radial loading.

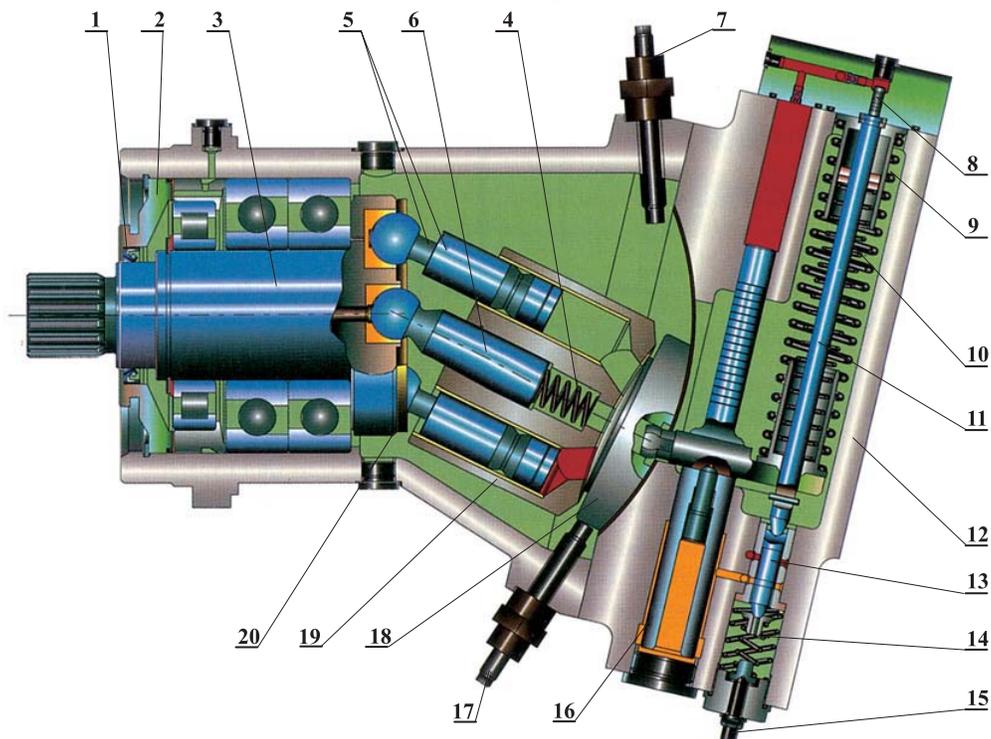
Description :

This D7V.0 5.1 Variable Displacement Pump widely used for open circuit in hydrostatic transmission Its flow and speed is proportional to the displacement. Its can operate adjust displacement with stepless on constant speed.

D7V V2.0 Section Series 20~160



D7V V 5.1 Section Series 250~500



| | | | |
|-----|----------------------|-----|-------------------|
| 1. | Oil seal kit | 11. | Control rod |
| 2. | Front Cover | 12. | Regulator housing |
| 3. | Shaft | 13. | Assembly parts |
| 4. | Dishing Spring | 14. | Adjusting spring |
| 5. | Piston | 15. | Adjusting screw |
| 6. | Center Pin | 16. | Flow piston |
| 7. | Limiter screw | 17. | Limiter screw |
| 8. | Pilot piston | 18. | Port plate |
| 9. | Bigger power spring | 19. | Cylinder block |
| 10. | Smaller power spring | 20. | Retainer |

NOTE:

To help ensure its longevity, please be careful to:

1. Keep the operating fluid clean anywhere.
2. Change the hydraulic fluid periodically (Operation 1000~3000 hours or six months).

Variable displacement pump D7V

Type Code

| D7V | | 160 | LV | 2.0 | L | Z | F | 0 | 0 |
|-------------------------------------|-------------|---|----|-----|---|---|---|---|---|
| Pump Type | | Auxiliary Equipment | | | | | | | |
| Variable Displacement Pump D7V | | None O | | | | | | | |
| Displacement(Vgmin~Vgmax) | Size | with pressure cutoff built-on for LV,EL,HD D | | | | | | | |
| (0~20.5ml/r) | 20 | constant pressure remote control F | | | | | | | |
| (8.1~2.81ml/r) | 28 | Stroke Limiter | | | | | | | |
| (0~40.1ml/r) | 40 | None O | | | | | | | |
| (15.8~54.8ml/r) | 55 | Stroke limiter mechanically adjustable (for LV,DR) M | | | | | | | |
| (0~58.5ml/r) | 58 | Stroke limiter,hydraulic (for LV) H | | | | | | | |
| (23.1~80ml/r) | 80 | Pipe Connections | | | | | | | |
| (0~78ml/r) | 78 | (series 20~500) F | | | | | | | |
| (30.8~107ml/r) | 107 | Pressure port: SAE flange,on side | | | | | | | |
| (0~117ml/r) | 117 | Suction port: SAE flange,on side | | | | | | | |
| (46.1~160ml/r) | 160 | (series 20~160) G | | | | | | | |
| (0~250ml/r) | 250 | Pressure port : threaded, on side | | | | | | | |
| (0~355ml/r) | 355 | Suction port: SAE flange,on side | | | | | | | |
| (0~500ml/r) | 500 | Shaft End | | | | | | | |
| Control Device | | GB1096-79 Keyed Shaft P | | | | | | | |
| Constant horsepower control | LV | DIN5480 Splined Shaft Z | | | | | | | |
| Constant pressure control | DR | GB3478.1-83 Keyed Shaft S | | | | | | | |
| Electrical control | EL | Direction of Rotation (View on shaft end) | | | | | | | |
| Hydraulic control, pressure related | HD | clockwise R | | | | | | | |
| Manual control(with handwheel) | MA | anti-clockwise L | | | | | | | |
| Series | | | | | | | | | |
| Series 2.0, Size 20~160 | 2.0 | | | | | | | | |
| Series 5.1, Size 250~500 | 5.1 | | | | | | | | |

Ordering Example:

D7V, 160, LV, 2.0, L, Z, F, O, 0

Axial piston variable displacement pump D7V, Size 160, with constant horsepower control, Series 2.0,anti-clockwise rotation,splined shaft DIN5480,SAE side flange connections without auxiliary equipment.

Technical Data:

Operating Pressure Range:

Pressure at ports A or B:

Nominal pressure _____ $P_n=35\text{MPa}$

Peak pressure _____ $P_{\text{max}}=40\text{MPa}$

Inlet operating Pressure at port S:

$P_{\text{abs min}}$ _____ 0.08MPa

$P_{\text{abs max}}$ _____ 0.2MPa

Fluid Temperature Range: 25~80 C

Viscosity Range:

t_{min} _____ $10\text{mm}^2/\text{s}$

t_{max} _____ (for short periods) $1000\text{mm}^2/\text{s}$

Optimum Operating Viscosity: _____ $16\sim 25\text{mm}^2/\text{s}$

Fluid Recommendation: 40 low-solidifying

Filtration of Hydraulic Fluid:

Recommended filtration 10um. Coarser filtration of 25 to 40um is possible. However longer service life is achieved with filtration of 10um (reduce wear).

Flow Direction

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

Mounting position:

Optional. Pump's housing must be filled with oil; When mounting within a-tank the plug must be removed from port R and this port must be at the top. 90° pipe bend to be screwed in (noise reduction).

Drive Shaft Up Vertical Setting

For this case a model with ports U1 and U2 must be ordered (indicate in clear text: "with ports U1 and U2"). The minimum oil level must not fall below the "A" line. as shown in Fig. 1.

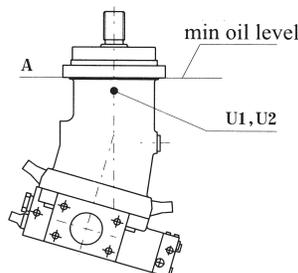


Fig.1

Mounting on top of oil tank

Mounting of the D7V pump above tank must be considered as a special pump installation and should only be realized under specific conditions.

- 1) With various control device, pump's angel is max. ($V_{g\text{max}}$) before start. Further to adjustment form $V_{g\text{min}}$ before start ($V_{g\text{min}}=0$). The min. flow screw limiter must be operation at $Q=0$.
- 2) Pump equipped at top of oil tank, when ordering need description "use for set on oil tank".
- 3) Pump's suction port should be located up. And also the suction pipe is possible shorter. The pipe end should be low 200mm than oil. The flow speed in suction pipe should keep speed between 0.8~1.0m/s. Mounting as Fig.2.

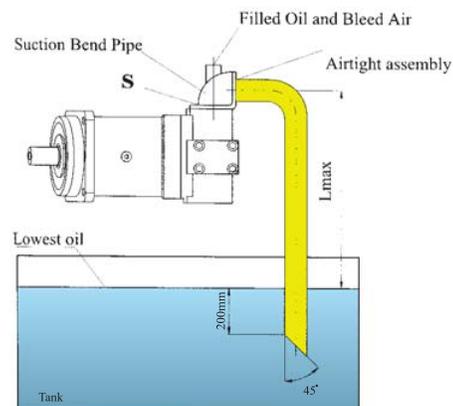


Fig.1

Variable Displacement pump D7V

D7V pump 2.0 series, mounting on top of oil tank, different size and speed, pipe length and watch for inner Diameter

| Size | Max. speed nmax (r/min) | Max. length Of suction pipe L max (mm) | Calculated suction pipe(mm) at flow velocity v=0.9m/s and Vgmax | |
|------|-------------------------------|--|--|-----------------------------|
| | | | speed nmax (r/min) | speed nE=1450max (r/min) |
| 20 | 3610 | 600 | 41.8 | 26.5 |
| 28 | 2660 | 600 | 42 | 31 |
| 40 | 3040 | 750 | 53.6 | 37 |
| 55 | 2240 | 750 | 53.8 | 43.3 |
| 58 | 2700 | 750 | 61.3 | 45 |
| 80 | 2015 | 750 | 61.6 | 52 |
| 78 | 2410 | 750 | 66.6 | 26.5 |
| 107 | 1800 | 750 | 67.5 | 60.5 |
| 117 | 2125 | 850 | 76.6 | 63.3 |
| 160 | 1565 | 850 | 77 | 74 |

Note : Viewed Values are suction absolute pressure 0.09MPa.

Calculation of Size

$$\text{Swept Volume } Q = \frac{Vg \times n \times nv}{1000} \quad [1/\text{min}]$$

$$\text{Drive Torque } M = \frac{1.59 \times Vg \times P}{10 \times n \text{ mh}} \quad [\text{N m}]$$

$$\text{Drive Power } P = \frac{M \times n}{9549} \quad [\text{kW}]$$

max geometric displacement [ml/r]
 differential pressure [MPa]
 speed [r/min]
 volumetric efficiency
 mechanical-hydraulic efficiency
 overall efficiency

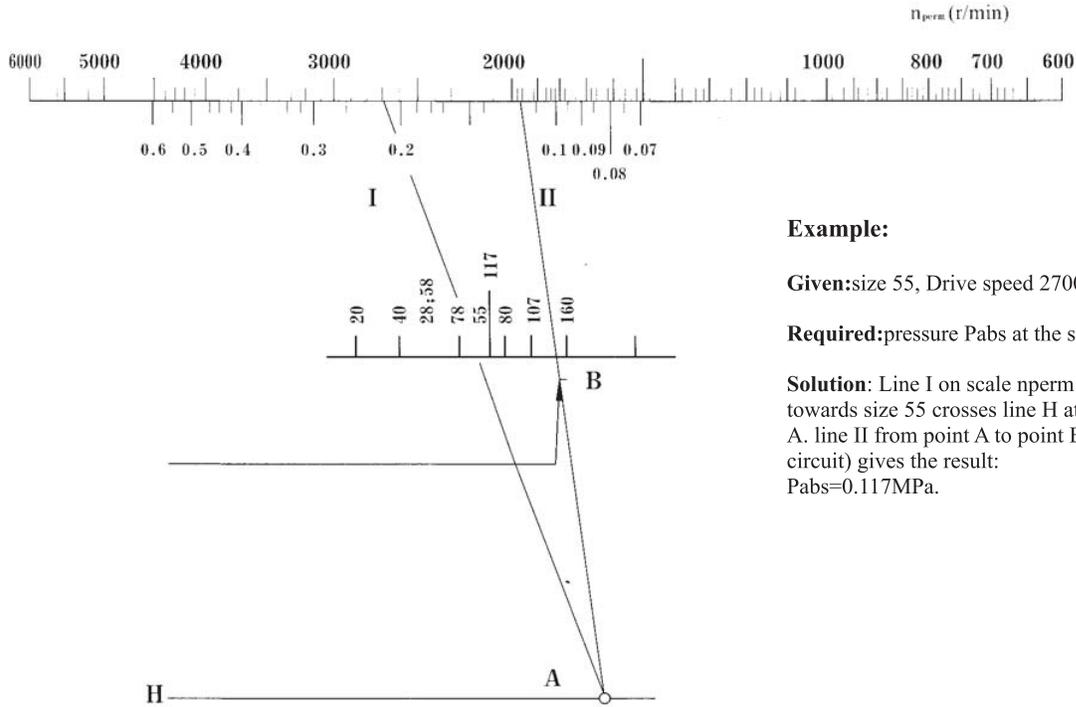
Technical data Form (Theoretical values, without considering η_{mh} and η_v)

| Size | | 20 | 28 | 40 | 55 | 58 | 80 | 78 | 107 | 117 | 160 | 250 | 355 | 500 | |
|---------------------------|---------------------------|----------------------------------|--------|---------|--------|--------|--------|--------|--------|--------|--------|-------|-------|-------|------|
| Control Device | | | | | | | | | | | | | | | |
| Constant HP control | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Constant pressure control | | ● | | ● | | ● | | ● | | ● | | ● | ● | ● | |
| Electrical control | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Hydraulic control | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Manual control | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |
| Displacement | | Vgmax (ml/r) | 20.5 | 28.1 | 40.1 | 54.8 | 58.5 | 80 | 78 | 107 | 117 | 160 | 250 | 355 | 500 |
| | | Vgmin (ml/r) | 0 | 8.1 | 0 | 15.8 | 0 | 23.1 | 0 | 30.8 | 0 | 46.1 | 0 | 0 | 0 |
| Max.speed | | 0.09MPa 1 nmax 0.09 (r/min) | 3800 | 2800 | 2800 | 2360 | 2850 | 2120 | 2540 | 1900 | 2240 | 1650 | 1400 | 1250 | 1120 |
| | | 0.10MPa 1 nmax 0.10 (r/min) | 4100 | 3000 | 3400 | 2500 | 3000 | 2240 | 2700 | 2000 | 2360 | 1750 | 1500 | 1320 | 1200 |
| | | 0.15MPa 1 nmax 0.15 (r/min) | 4750 | 3600 | 3750 | 3000 | 3350 | 2750 | 3000 | 2450 | 2650 | 2100 | 1850 | 1650 | 1500 |
| Max.flow | | nmax0.09 Qmax 0.09 (l/min) | 76 | 76 | 124 | 125 | 162 | 165 | 192 | 197 | 254 | 256 | 340 | 430 | 543 |
| | | nmax0.10 Qmax 0.10 (l/min) | 82 | 82 | 132 | 133 | 170 | 174 | 204 | 208 | 268 | 272 | 364 | 455 | 582 |
| | | nmax0.15 Qmax 0.15 (l/min) | 94 | 98 | 146 | 160 | 191 | 213 | 227 | 254 | 301 | 326 | 449 | 568 | 728 |
| Max.power | | Qmax 0.09 Pmax 0.09 (kw) | 46 | 46 | 75 | 75 | 97 | 99 | 115 | 119 | 153 | 154 | 204 | 259 | 327 |
| | | Qmax 0.10 Pmax 0.10 (kw) | 49 | 49 | 79 | 80 | 102 | 105 | 122 | 125 | 161 | 164 | 219 | 274 | 350 |
| | | P=35MPa Qmax 0.15 Pmax 0.15 (kw) | 57 | 59 | 89 | 96 | 115 | 128 | 137 | 153 | 181 | 196 | 270 | 342 | 438 |
| Flow | nE = 1450r/min (l/min) | 28.2 | 39.5 | 56.4 | 77.1 | 82.3 | 112.5 | 110 | 150.5 | 164.6 | 225 | 351.6 | 499 | 703 | |
| Power | nE = 1450r/min 35MPa (kW) | 17 | 24 | 34 | 46 | 50 | 68 | 66 | 91 | 99 | 135 | 211 | 300 | 423 | |
| Toraque M | | Vgmax P=10Mpa (N.m/10MPa) | 32.6 | 44.7 | 63.8 | 87.1 | 93 | 127.2 | 124 | 170.1 | 186 | 254.4 | 397.5 | 564.5 | 795 |
| | | Vgmin P=10Mpa (N.m/10MPa) | – | 12.9 | – | 25.1 | – | 36.7 | – | 49 | – | 73.3 | – | – | – |
| | | Vgmin P=35Mpa (N. m) | 114 | 156 | 233 | 305 | 326 | 445 | 434 | 595 | 651 | 890 | 1391 | 1976 | 2783 |
| Mmax. Torque | | Vgmin P=35MPa (N. m) | – | 45 | – | 88 | – | 129 | – | 171 | – | 275 | – | – | – |
| Moment | | J (Kgm2) | 0.0017 | 7.0.017 | 0.0052 | 0.0052 | 0.0109 | 0.0109 | 0.0167 | 0.0167 | 0.0322 | 0.088 | 0.160 | 0.270 | |
| Wight | | (kg) | 19 | 19 | 19 | 28 | 44 | 53 | 53 | 53 | 76 | 76 | 105 | 165 | 245 |

Note:

- ① The values shown are valid for Vgmax, with an absolute pressure at suction inlet S and when operated on mineral oil.
- ② Calculated with a volumetric efficiency of 97%.
- ③ Pump's speed don't exceed the permissible max. speed at 0.15MPa in suction S. on those sizes with Vgmin>0, however the maximum speeds can be increased to the values for those sizes with Vgmin=0 by reducing the displacement (Vg<Vgmax) and maintaining max. flow. the relevant sizes are 28-20, 55-40, 80-68, 107-78, 160-117, For example size 28, Vgmax=28, lml/r, reduced the displacement to 20.5ml/r and keep the max.flow is 94 l/min, the max.speed can be from 3600r/min to increase 4750r/min.

Permissible speed n_{perm} and suction pressure P_{abs} can be read from the nomograph, However, the max. speeds (see table) and min. and max. suction pressure must be taken into account.



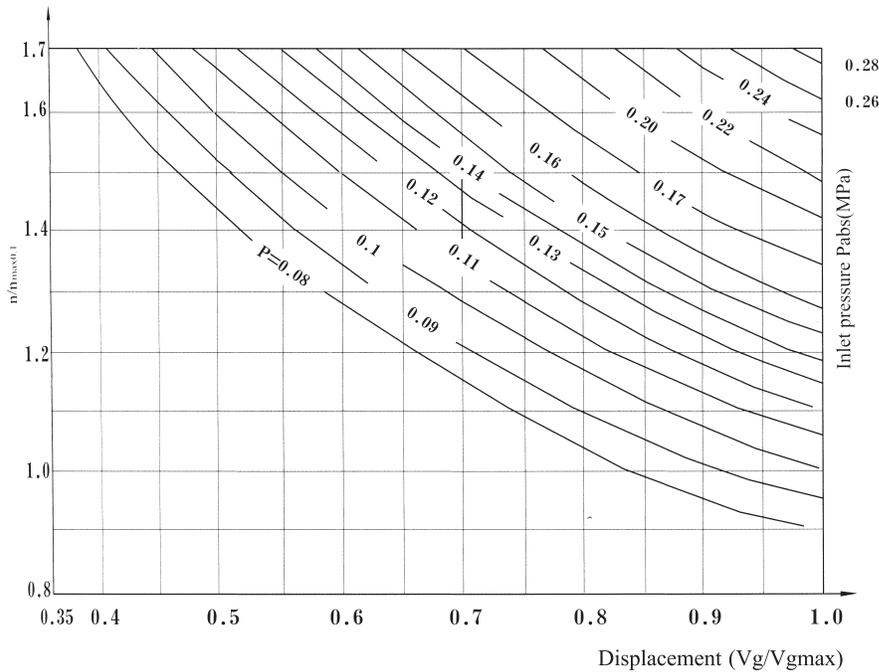
Example:

Given: size 55, Drive speed 2700r/min

Required: pressure P_{abs} at the suction Inlet S

Solution: Line I on scale n_{perm} drawn towards size 55 crosses line H at point A. line II from point A to point B (open circuit) gives the result: $P_{abs}=0.117\text{MPa}$.

Size 250~500
Calculation of Inlet Pressure P_{abs} at Suction Inlet S and used Speeds.



Example:

Given: Size 55,
Drive speed 1320rpm
Required: pressure P_{as} at suction inlet S

Solution: $\frac{n}{n_{max} \cdot 0.1} = \frac{1320}{1200} = 1.1$

gives an inlet pressure of $P_{abs}=0.12\text{MPa}$ at full swivel. If for example free flow is only possible with $P_{abs}=0.1\text{MPa}$, the displacement must be reduced to 87.6%.

Variable Displacement pump D7V

LV Constant Horsepower Control

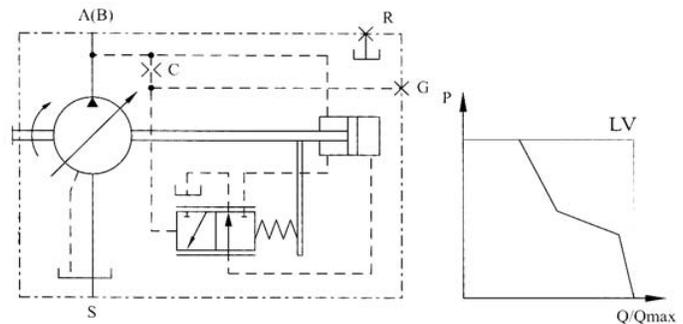
LV Constant horsepower control regulates flow in relation to pressure and makes out-put power constant that is:

$$P = P \times Q / 60 = \text{Constance}$$

P: Power (kW). P: Pressure difference between input and output (MPa). Q: Flow(L/min). Hydraulic pilot force acts on a side of pilot piston. When it overcomes a pilot spring force arranged on the other side of the pilot piston, the pilot oil is fed into the cave of control piston. The pump swivel angle from V_{gmax} to V_{gmin} swing. Then the displacement will be reduced (Viewed on page two Section).

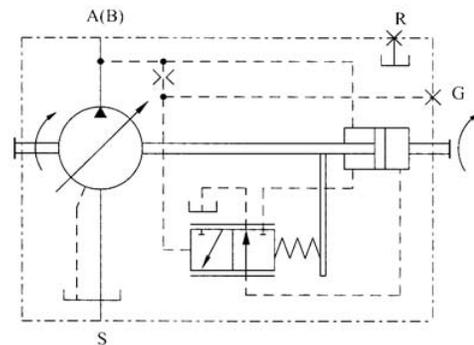
Start of control at 5MPa

Through port G via throttle port C can carry on high pressure control (summation HP control).



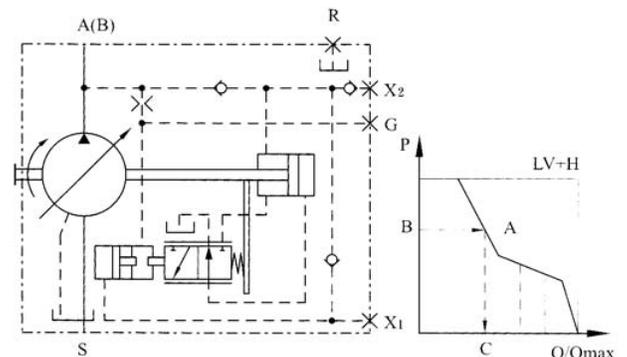
Constant HP control with stroke limiter

By means of a mechanical stroke limiter. The max. displacement can be infinitely varied or limited. Adjusted range from V_{gmax} to V_{gmin} .



Constant HP control with hydraulic stroke limiter

A pilot pressure (port X1) of at least 10% of the operating pressure is required for the hydraulic stroke limiter, max. permissible pressure at port X=20MPa (for all sizes). If it is required to limit the flow at an operating pressure < 5MPa then a boost pressure of min. 5MPa must be applied port X2 (at port X1 then, min. 10%=0.5MPa).

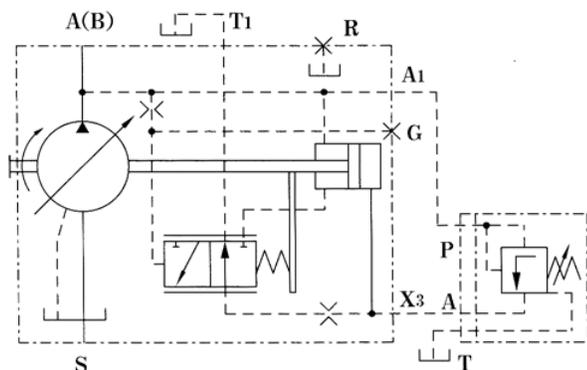


Constant HP control with pressure cut-off

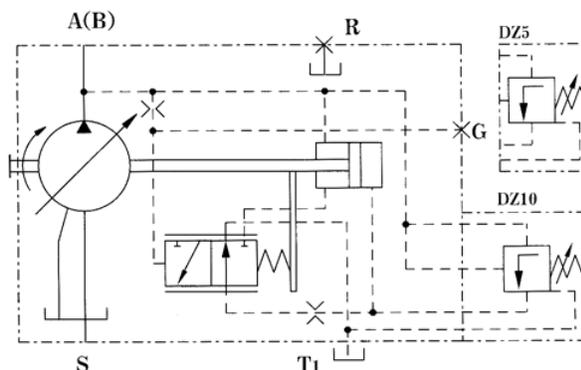
Be used for all kinds of size $V_{gmin}=0$

Pressure cut-off is based on constant horsepower control carrying on a constant pressure control. It realized operators by ordered sequences valve. When pressure up to set pressure (max.)(adjusting pressure range to 31.5 MPa), the order of valve will be opened, then the flow will be reduced to $Q=0$.

Order valve and pump separately fixed. Size 20~117



Order valve and pump separately fixed, Size 250~500



DZ5 used for size 250, DZ10 used for size 355~500.

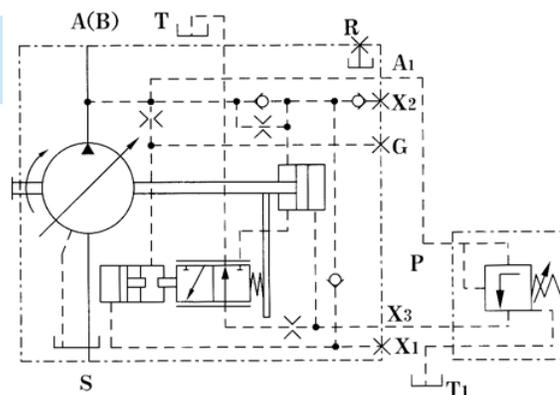
Continuous operation in zero position please view the constant pressure control DR

Note :

Order valve port T and pilot valve port T1 must be connected with oil tank(cooler).

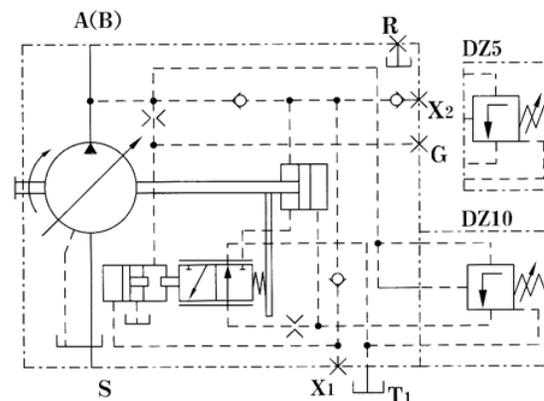
Constant HP control with pressure cut-off<remote> and hydraulic stroke limiter

The sequence valve is mounted separately from the pump in any suitable location on a subplate (remote control). The max./single pipe length must not exceed 5m. Order sequence valve and subplate separately.



Constant HP control with pressure cut-off and hydraulic stroke limiter

Order valve fixed on pump directly. Size 250~500
DZ5 used for size 250, DZ10 used for size 355~500



- A,B** Operating port
- G** Summation HP control port
- R** Port o drain air
- S** Suction port
- T1** Pilot port
- X1** Pilot pressure
- X2** Remote pressure
- A1,X3** Ports for remote control valve

Variable Displacement pump D7V

Constant Pressure Control DR

The constant pressure control remains the pressure in a hydraulic system constant within its control range in spite of changing pump flow requirements. the variable pump supplies only the volume of fluid required by the services. Should operating pressure exceed the set pressure, the pump is automatically swivelled back to a smaller angle. The required pressure is set either direct at the pump (valve built-in, standard model) or at the separate sequence valve for the model with remote control.

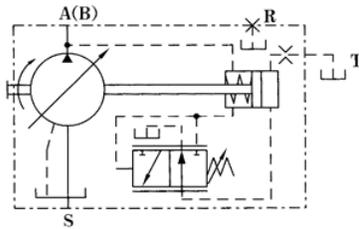
Pressure Setting Range:

Standard model:Set pressure from 5MPa to 35MPa.

Remote model:Set pressure form 5mPa to 31.5MPa.

| | | |
|-----------|--------|---------|
| size | 20~117 | 250~500 |
| Pmax(MPa) | 1 | 1.4 |

D Constant pressure control (valve built-in), Standrad

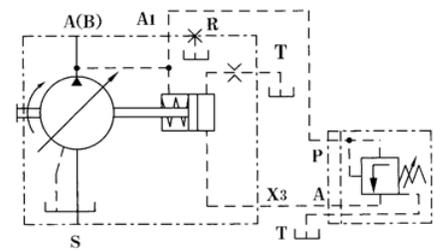


Note : order sequence valve and subplate separately. Port T from the sequence valve must be piped separately to tank.

A pressure relief valve installed in the system for protection of the max.pressure must be set 2 MP a above the setting of the constant pressure control.

The max.single pipe length should not exceed 5 m.

Constant pressure control,remote



Size 20~117 Adjustment times

| Size | 20 | 40 | 58 | 78 | 117 |
|---|------|------|------|------|------|
| Vgmin-Vgmax te(s) pressure unloading 35-5MPa | 0.16 | 0.2 | 0.25 | 0.25 | 0.25 |
| Vgmin-Vgmax te(s) pressure unloading 5-35MPa | 0.03 | 0.04 | 0.05 | 0.05 | 0.06 |

The values in the table are increased by 3 times.

Parallel Operation

For parallel operation of several D7V pumps with constant pressure control. a steeper curce is used for the constant pressure control (P=1.5MPa)

Please indicate this requirement in text after the type code when ordering “parallel operation”

Stroke Limiter

The max.displacement can be steplessly limited between Vgmax to Vgmin.by means of a mechanical stroke limiter
For details see control device LV.

- A,B** Pressure port
- R** Drain port
- S** Suction port
- T** Pilot port
- A1,X3** Ports for remote control valve

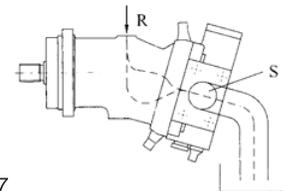
Zero stroke operation with flushing of housing

Max.pressure Pmax(MPa)
31.5

Max.Temperature tmax(0C)
50

Size 20 40 58 78 117
Flushing flow 2 4 6 8 12 12.5 16 25

Connection for flushing fluid



The indicated values applicable at the pump speed of 1450 r/min. zero stroke operation without flushing of housing.

Temperature of flushing fluid>tank temperature.

| Max.pressure Pmax(MPA) | Max. Temperature tmax(0C) | Max.pressure Pmax(MPA) | Max. Temperature tmax(0C) |
|------------------------|---------------------------|------------------------|---------------------------|
| 31.5 | 50 | 20 | 50 |

Note : When mounting the D7V on top of tank and at zero stroke operation for longer periods of time at pressure up to Pmax 31.5 MPa a min. flow > corresponding to flushing flow as indicated for each size in the above table must be set instead of case flushing.

Electric Proportional Control EL

The electric control permits stepless and programmable adjustment of the pump displacement, pump displacement is proportional to the solenoid force. i.e.the strength of solenoid current.

For to size 20~160

Control solenoid valve need a DC 24V(12V) and current 300~630mA (600~1260mA).

Start of control current apporx.300mA(600mA)

End of control current apporx. 630mA(1260mA)

For to size 250~500

Control Solenoid valve need a DC 24V and current 350~800mA.

Start of control current apporx.350mA

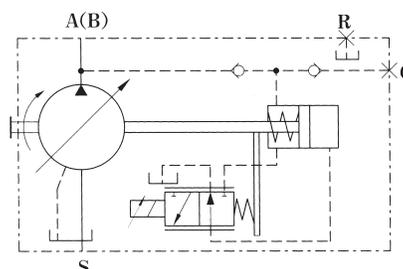
End of control current apporx.800mA

Control ajust from V_{gmax} .If need anti-control (from V_{gmin} to V_{gmin}) please consult technical department.

If pump is to be moved out of the zero position($V_g=0$) or the operating pressure $<4MPa$, a pilot pressure of 4MPa is necessary at port G.

Time For Adjustment

| Size | 20 | 40 | 58 | 78 | 117 |
|----------------------------------|------|------|------|------|------|
| $V_{gmin} - V_{gmax} T_{min}(s)$ | 0.16 | 0.2 | 0.25 | 0.25 | 0.3 |
| $V_{gmax} - V_{gmin} T_{min}(s)$ | 0.12 | 0.16 | 0.2 | 0.2 | 0.25 |



Note : The viewed time in form is pump's operating pressure $P_b=20MPa$.

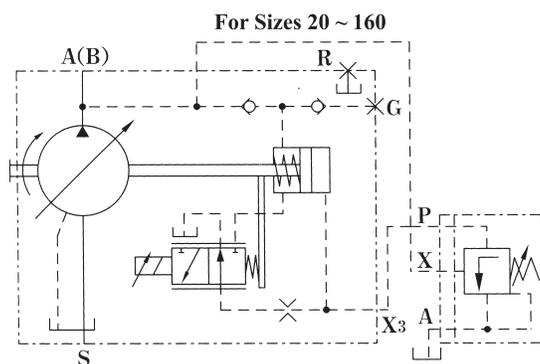
Hysteresis

A hysteresis of +2.5~4%(approx.) is present in the control because of the electric/hydraulic control (referred to the complete adjustment range V_{gmin} to V_{gmax}). The repeatability of the pump position. when starting from the same direction is around 2~4%.

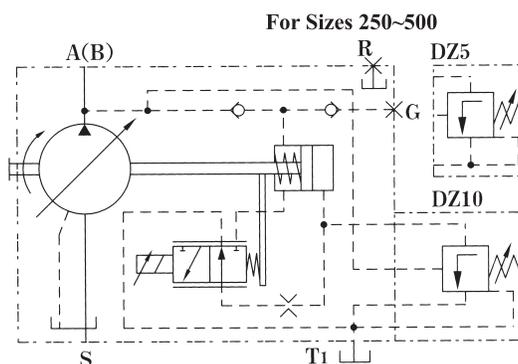
Note : mounting of the pump with EL control inside the oil tank is possible, only when using mineral hydraulic oils and with a max. oil temperature in the tank of 80 0C. (If the pump is to be submersed in oil. please indicate in clear text when ordering)

Electric control EL with pressure cut-off

For all sizes with $V_{min}=0$, for description see control device HD, Order sequence valve and subplate separately.



Note : port A from the sequence must be piped separately to tank(cooler).



DZ5 used for size 250, DZ10 used for size 355~500

| | Port |
|--------|--------------------------------|
| A, B | Operating port |
| S | Suction port |
| A1, A3 | Ports for remote control valve |

For details see constant pressure control DR

| | |
|---|----------------------|
| G | Remote pressure port |
| R | Port o drain air |
| T | Pilot port |

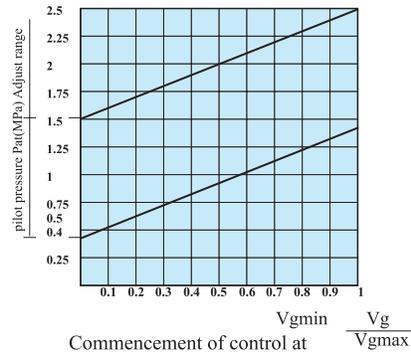
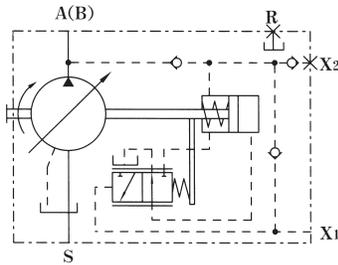
Variable Displacement pump D7V

Hydraulic control, pressure related HD

The hydraulic control, pressure related, permits the stepless adjustment of the pump displacement in relation to pilot pressure, Adjustment is proportional to the pilot pressure at port X1. When using the HD control as 2-Position control (V_{min} to V_{gmax}), the pilot oil pressure on port X1 must not exceed 4MPa.

Adjustment is from V_{gmin} to V_{gmax} .

The increase in pilot pressure over the complete adjustment range is 1 MPa. The setting range for commencement of control is 0.4 MPa to 1.5MPa. The necessary control oil is taken from the high pressure circuit, and a minimum operating pressure of 4MPa is required. If necessary apply pilot pressure of 4MPa at port X2. The oil flow at pilot X1 is a approx. 0.5L/min.

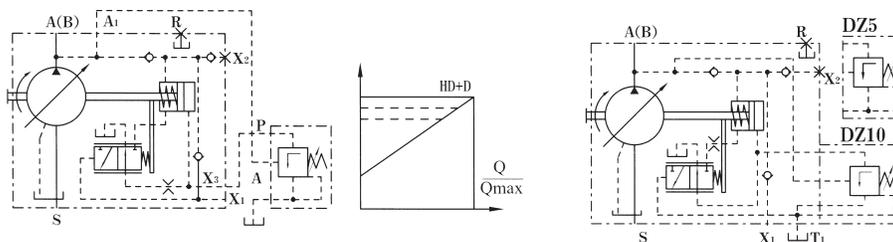


Hydraulic control, pressure related , HD

Hydraulic control, pressure related with cut-off

For all sizes with $V_{gmin}=0$

The pressure cut-off serves to limit the flow as a function of high pressure so that a predetermined Operating pressure is not exceeded. This function is not carried out by a sequence valve. On reaching the set max. pressure (adjustment range up to 31.5MPa), the valve opens and the flow is automatically reduced to $Q=0$. The sequence valve is mounted separately from the pump in any suitable location by mean of a single pipe length should not exceed 5 m, Order sequence valve and subplate separately.

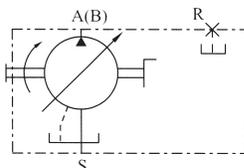


Note : port A from the sequence must be piped separately to tank (cooler).

For details see constant pressure control DR

Manual Control, MA

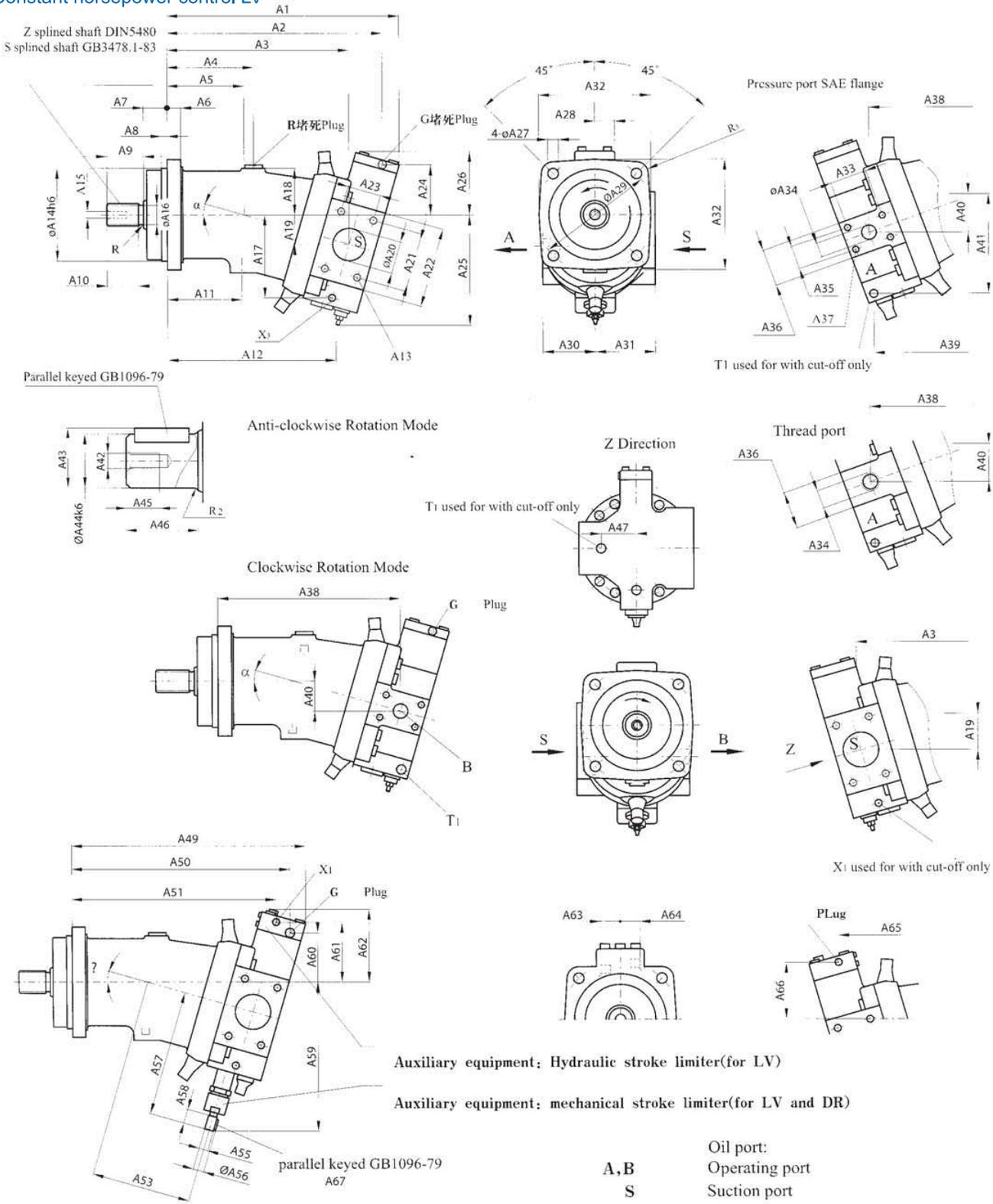
By turning the handwheel, a piston is moved in an axial direction by means of a threaded splide. A carrier pin moves the port plate on its sliding plate, thus permitting stepless variation of the pump displacement a the range V_{gmin} to V_{gmax} .



| | |
|-------------------|--------------------------------|
| Oil port : | |
| A,B | Operating port |
| S | Suction port |
| R | Port drain ait |
| T1 | Pilot oil return line |
| X1 | Pilot pressure port |
| X2 | Remote pressure port |
| A1,X3 | Ports for remote control valve |

Unit Dimensions Series 2.0 size 20~160

Constant horsepower control LV



- A, B Oil port
- S Operating port
- R Suction port
- T1 Air bleed port
- X1 Pilot oil return line
- X2 Pilot pressure port
- X2 Remote pressure port
- A1, X3 Ports for remote control valve
- G Remote pressure port

Variable Displacement pump D7V

Unit Dimensions Series 2.0 size 20~160

Constant horsepower control LV Series 2.0 size 20~160 Data Form

| Size | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 | A9 | A10 | A11 | A12 | A13 | deep | A14 | A15 | A16 | A17 | A18 | A19 | A20 | |
|------|----|-----|-----|-----|-----|-----|----|----|----|-----|------|-------|-----|------|-----|-----|-----|------|-----|-----|------|----|
| 20 | 9 | 251 | 224 | 199 | 107 | 75 | 16 | 25 | 8 | 43 | 28 | 80 | 160 | M12 | 20 | 100 | M8 | 21.5 | 85 | 52 | 20 | 38 |
| 28 | 16 | 260 | 232 | 195 | 107 | 75 | 16 | 25 | 8 | 43 | 28 | 80 | 149 | M12 | 20 | 100 | M8 | 21.5 | 95 | 50 | 34 | 38 |
| 40 | 9 | 317 | 287 | 255 | 123 | 108 | 20 | 32 | 10 | 35 | 28 | 123 | 244 | M12 | 20 | 125 | M12 | 25 | 95 | 63 | 23 | 50 |
| 55 | 16 | 327 | 296 | 251 | 123 | 108 | 20 | 32 | 10 | 35 | 28 | 123 | - | M12 | 20 | 125 | M12 | 25 | - | 63 | 41 | 50 |
| 58 | 9 | 374 | 337 | 304 | 152 | 137 | 23 | 32 | 10 | 40 | 33 | 152 | 295 | M12 | 18 | 140 | M12 | 30 | 106 | 77 | 26.5 | 63 |
| 80 | 16 | 385 | 351 | 300 | 152 | 137 | 23 | 32 | 10 | 40 | 33 | 152 | - | M12 | 18 | 140 | M12 | 30 | - | 77 | 48 | 63 |
| 78 | 9 | 381 | 347 | 310 | 145 | 130 | 25 | 40 | 10 | 45 | 37.5 | 145 | 298 | M12 | 17 | 160 | M12 | 35 | 113 | 80 | 29 | 63 |
| 107 | 16 | 393 | 358 | 305 | 145 | 130 | 25 | 40 | 10 | 45 | 37.5 | 145 | - | M12 | 17 | 160 | M12 | 35 | - | 80 | 50 | 63 |
| 117 | 9 | 443 | 402 | 364 | 214 | 156 | 28 | 40 | 12 | 50 | 43 | 174.5 | 350 | M16 | 24 | 180 | M16 | 40 | 130 | 93 | 33 | 75 |
| 160 | 16 | 454 | 414 | 359 | 213 | 156 | 28 | 40 | 12 | 50 | 43 | 174.5 | - | M16 | 24 | 180 | M16 | 40 | - | 88 | 58 | 75 |

| Size | A21 | A22 | A23 | A24 | A25 | A26 | A27 | A28 | A29 | A30 | A31 | A32 | A33 | A34 | A35 | A36 | deep | A38 | A39 | A40 | A41 |
|------|-------|-----|------|-----|-----|-----|------|------|-----|-----|-----|-----|------|-----|------|-----|------|-----|-----|-----|-----|
| 20 | 69.9 | 94 | 35.7 | 78 | 132 | 95 | 11 | 23.5 | 125 | 58 | 58 | 118 | 50.8 | 19 | 23.8 | 46 | 17 | 193 | - | 19 | - |
| 28 | 69.9 | 94 | 35.7 | 59 | 145 | 80 | 11 | 23.5 | 125 | 58 | 58 | 118 | 50.8 | 19 | 23.8 | 46 | 17 | 189 | - | 33 | - |
| 40 | 77.8 | 102 | 42.9 | 87 | 166 | 109 | 13.5 | 29 | 160 | 71 | 81 | 150 | 50.8 | 19 | 23.8 | 53 | 17 | 253 | 261 | 23 | 98 |
| 55 | 77.8 | 102 | 42.9 | 64 | 182 | 91 | 13.5 | 29 | 160 | 71 | 81 | 150 | 50.8 | 19 | 23.8 | 53 | 17 | 249 | - | 40 | - |
| 58 | 88.9 | 115 | 50.8 | 93 | 168 | 113 | 13.5 | 33 | 180 | 86 | 92 | 165 | 57.2 | 25 | 27.8 | 64 | 18 | 301 | 313 | 26 | 109 |
| 80 | 88.9 | 115 | 50.8 | 68 | 194 | - | 13.5 | 33 | 180 | 86 | 92 | 165 | 57.2 | 25 | 27.8 | 64 | 17 | 300 | - | 48 | - |
| 78 | 88.9 | 115 | 50.8 | 101 | 180 | 120 | 17.5 | 34 | 200 | 89 | 93 | 190 | 57.2 | 25 | 27.8 | 64 | 17 | 306 | 318 | 28 | 119 |
| 107 | 88.9 | 115 | 50.8 | 73 | 200 | 98 | 17.5 | 34 | 200 | 89 | 93 | 190 | 57.2 | 25 | 27.8 | 64 | 17 | 301 | - | 49 | - |
| 117 | 106.4 | 135 | 60.9 | 114 | 195 | 137 | 17.5 | 36 | 224 | 104 | 113 | 210 | 66.7 | 32 | 31.8 | 70 | 19 | 359 | 369 | 32 | 136 |
| 160 | 106.4 | 135 | 61.9 | 83 | 212 | 112 | 17.5 | 36 | 224 | 104 | 113 | 210 | 66.7 | 32 | 31.8 | 70 | 19 | 354 | - | 57 | - |

| Size | A42 | A43 | A44 | A45 | A46 | A47 | A48 | A49 | A50 | A51 | A52 | deep | A53 | A54 | A55 | A56 | A57 | A58 | A59 | A60 | A61 |
|------|-----|------|-----|-----|-----|-----|-------|-----|-----|-----|-----|------|-------|-----|------|-----|-----|-----|-----|-----|-----|
| 20 | M8 | 27.9 | 25 | 19 | 50 | 38 | M27x2 | 257 | 226 | 23 | M3 | 9 | 108 | 8 | 8.8 | 42 | 161 | 14 | 176 | 77 | 104 |
| 28 | M8 | 27.9 | 25 | 19 | 50 | 38 | M27x2 | 269 | 234 | 242 | M3 | 9 | 108 | 8 | 8.8 | 42 | 161 | 14 | 186 | 58 | 84 |
| 40 | M12 | 33 | 30 | 28 | 60 | 40 | M33x2 | 323 | 290 | 279 | M4 | 10 | 134 | 10 | 11.2 | - | 184 | 16 | 204 | 85 | 117 |
| 55 | M12 | 33 | 30 | 28 | 50 | 40 | M33x2 | 337 | 299 | 292 | M4 | 10 | 134 | 10 | 11.2 | - | 184 | 16 | 215 | 62 | 98 |
| 58 | M12 | 38 | 35 | 28 | 70 | 62 | M42x2 | 378 | 344 | 330 | M5 | 12 | 155.5 | 16 | 18 | 52 | 228 | 24 | 251 | 91 | 116 |
| 80 | M12 | 38 | 35 | 28 | 70 | 62 | M42x2 | 391 | 354 | 343 | M5 | 12 | 155.5 | 16 | 18 | 52 | 228 | 24 | 265 | 65 | 91 |
| 78 | M12 | 43 | 40 | 28 | 80 | 55 | M42x2 | 385 | 352 | 338 | M5 | 12 | 169 | 16 | 18 | 52 | 236 | 24 | 261 | 99 | 124 |
| 107 | M12 | 43 | 40 | 28 | 80 | 55 | M42x2 | 400 | 363 | 351 | M5 | 12 | 169 | 16 | 18 | 52 | 236 | 24 | 276 | 71 | 98 |
| 117 | M16 | 48.5 | 45 | 36 | 90 | 65 | M48x2 | 445 | 408 | 384 | M5 | 12.5 | 192 | 16 | 18 | 65 | 266 | 24 | 294 | 111 | 137 |
| 160 | M16 | 48.5 | 45 | 36 | 90 | 65 | M48x2 | 461 | 420 | 399 | M5 | 12.5 | 192 | 16 | 18 | 65 | 266 | 24 | 310 | 79 | 108 |

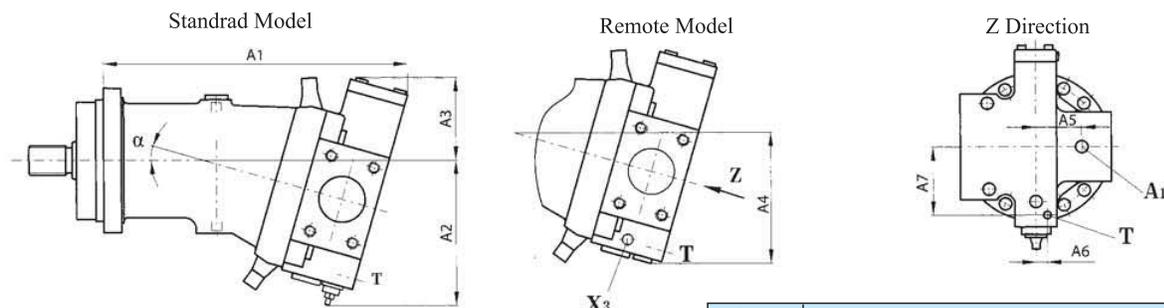
| Size | A62 | A63 | A64 | A65 | A66 | Keyed GB1096-79 A67 | Keyed GB1096-79 | Spline DIN5480 | Spline GB3478.1-83 | R1 | R2 | R3 |
|------|-----|-----|-----|-----|-----|---------------------|-----------------|----------------|---------------------|-----|-----|----|
| 20 | 129 | 35 | 30 | 22 | 92 | Keyed 2x10 | Keyed 8x40 | W25x1.25x18x9g | EXT18Zx1.25mx30Rx5f | 1.2 | 0.8 | |
| 28 | 114 | 35 | 30 | 238 | 73 | Keyed 2x10 | Keyed 8x40 | W25x1.25x18x9g | EXT18Zx1.25mx30Rx5F | 1.2 | 0.8 | |
| 40 | 147 | 30 | 30 | 276 | 104 | Keyed 3x10 | Keyed 8x50 | W30x2x14x9g | EXT14Zx2mx30Rx5F | 1.6 | 1.5 | |
| 55 | 128 | 30 | 30 | 288 | 83 | Keyed 3x10 | Keyed 8x50 | W30x2x14x9g | EXT14Zx2mx30Rx5F | 1.6 | 1.5 | |
| 58 | 142 | 33 | 33 | 328 | 104 | Keyed 5x16 | Keyed 10x56 | W35x2x16x9g | EXT14Zx2mx30Rx5F | 1.6 | 1.6 | |
| 80 | 120 | 33 | 33 | 339 | 80 | Keyed 5x16 | Keyed 10x56 | W35x2x16x9g | EXT16Zx2mx30Rx5F | 1.6 | 1.6 | |
| 78 | 150 | 33 | 33 | 336 | 112 | Keyed 5x16 | Keyed 10x56 | W40x2x18x9g | EXT16Zx2mx30Rx5F | 2.5 | 1.6 | |
| 107 | 126 | 33 | 33 | 348 | 86 | Keyed 5x16 | Keyed 12x63 | W40x2x18x9g | EXT18Zx2mx30Rx5F | 2.5 | 1.6 | |
| 117 | 164 | 34 | 34 | 382 | 125 | Keyed 5x16 | Keyed 12x63 | W45x2x21x9g | EXT21Zx2mx30Rx5F | 2.5 | 2.5 | |
| 160 | 137 | 34 | 34 | 396 | 96 | Keyed 5x16 | Keyed 14x70 | W45x2x21x9g | EXT21Zx2mx30Rx5F | 2.5 | 2.5 | |

| Size | Port | | | | | | | | | Weight (kg) |
|------|---------|---------|---------|---------|---------|---------|-------------|-------|----------|-------------|
| | X1,X2 | A1,X3 | T | TI | R | G | A,B | S | | |
| 20 | M14x1.5 | M12x1.5 | M12x1.5 | M12x1.5 | M16x1.5 | M14x1.5 | SAE3/4' OR | M27x2 | SAE11/2' | 19 |
| 28 | M14x1.5 | M12x1.5 | M12x1.5 | M12x1.5 | M16x1.5 | M14x1.5 | SAE3/4' OR | M27x2 | SAE11/2' | 19 |
| 40 | M14x1.5 | M18x1.5 | M12x1.5 | M18x1.5 | M18x1.5 | M14x1.5 | SAE3/4' OR | M33x2 | SAE12' | 28 |
| 55 | M14x1.5 | M18x1.5 | M12x1.5 | M18x1.5 | M18x1.5 | M14x1.5 | SAE3/4' OR | M33x2 | SAE12' | 28 |
| 58 | M14x1.5 | M18x1.5 | M12x1.5 | M18x1.5 | M18x1.5 | M14x1.5 | SAE1' OR | M42x2 | SAE21/2' | 44 |
| 80 | M14x1.5 | M18x1.5 | M12x1.5 | M18x1.5 | M18x1.5 | M14x1.5 | SAE1' OR | M42x2 | SAE21/2' | 44 |
| 78 | M14x1.5 | M18x1.5 | M12x1.5 | M18x1.5 | M18x1.5 | M14x1.5 | SAE1' OR | M42x2 | SAE21/2' | 53 |
| 107 | M14x1.5 | M18x1.5 | M12x1.5 | M18x1.5 | M18x1.5 | M14x1.5 | SAE1' OR | M42x2 | SAE21/2' | 53 |
| 117 | M14x1.5 | M20x1.5 | M12x1.5 | M18x1.5 | M22x1.5 | M14x1.5 | SAE11/4' OR | M48x2 | SAE3' | 76 |
| 160 | M14x1.5 | M20x1.5 | M12x1.5 | M18x1.5 | M22x1.5 | M14x1.5 | SAE11/4' OR | M48x2 | SAE3' | 76 |

Variable Displacement pump D7V

Unit Dimensions Series 2.0 size 20~160

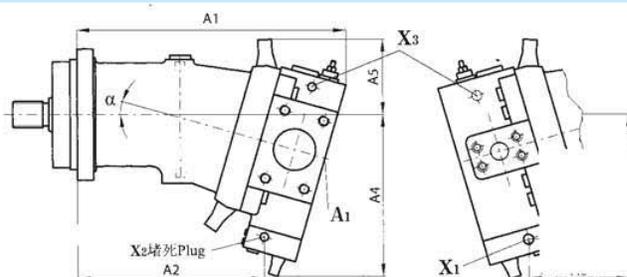
Constant pressure Control DR



Size 20 A1 and X3 used for with pressure cut-off only
 Other sizes A1 and X3 used for remote control

| Size | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|------|-------|-----|-----|-----|----|----|----|
| 20 | 9 251 | 134 | 95 | 106 | 38 | - | - |
| 40 | 9 315 | 166 | 107 | 127 | 40 | 14 | 53 |
| 58 | 9 372 | 160 | 107 | 138 | 62 | 15 | 69 |
| 78 | 9 380 | 180 | 114 | 147 | 60 | 14 | 70 |
| 107 | 9 441 | 199 | 132 | 165 | 65 | 14 | 83 |

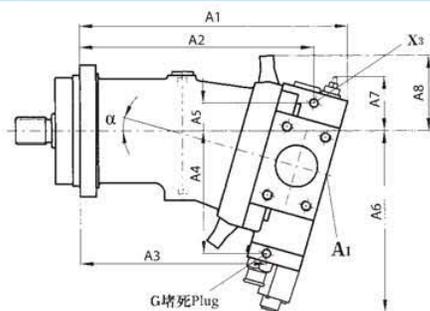
Hydraulic Control HD



A1 and X3 used for with pressure cut-off only

| Size | A1 | A2 | A3 | A4 | A5 | A6 | A7 |
|------|--------|-----|-----|-----|-----|-----|-----|
| 20 | 9 248 | 175 | 132 | 182 | 75 | 190 | 147 |
| 28 | 16 253 | 158 | 143 | 195 | 75 | 172 | 160 |
| 40 | 9 312 | 236 | 151 | 206 | 110 | 233 | 166 |
| 55 | 16 318 | 217 | 166 | 220 | 84 | 212 | 180 |
| 58 | 9 367 | 287 | 158 | 213 | 110 | 285 | 170 |
| 80 | 16 373 | 266 | 175 | 232 | 105 | 263 | 186 |
| 78 | 9 375 | 292 | 107 | 225 | 122 | 290 | 182 |
| 107 | 16 382 | 270 | 188 | 245 | 106 | 266 | 200 |
| 117 | 9 434 | 333 | 188 | 250 | 132 | 331 | 200 |
| 160 | 16 442 | 308 | 209 | 272 | 114 | 305 | 220 |

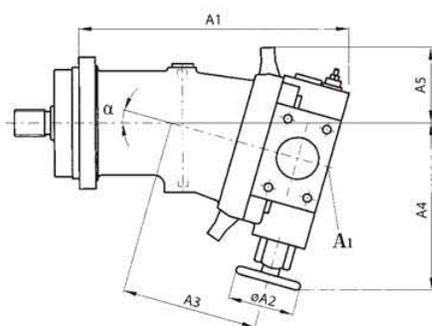
Electric proportional Control EL



Size 20 A1 and X3 used for with pressure cut-off only
 Other sizes A1 and X3 used for remote control

| Size | A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
|------|--------|-----|-----|-----|----|-----|-----|-----|
| 20 | 9 248 | 182 | 144 | 113 | 54 | 216 | 75 | 91 |
| 28 | 16 252 | 188 | 130 | 121 | 41 | 229 | 75 | - |
| 40 | 9 312 | 267 | 201 | 130 | 49 | 234 | - | 110 |
| 55 | 16 318 | 271 | 184 | 140 | 29 | 249 | - | 84 |
| 58 | 9 367 | 320 | 249 | 141 | 52 | 245 | 110 | - |
| 80 | 16 373 | 325 | 231 | 154 | 29 | 264 | 105 | - |
| 78 | 9 374 | 325 | 254 | 153 | 55 | 257 | 122 | - |
| 107 | 16 381 | 330 | 234 | 167 | 31 | 277 | 106 | - |
| 117 | 9 434 | 381 | 294 | 172 | 34 | 279 | 132 | - |
| 160 | 16 442 | 387 | 272 | 187 | 36 | 298 | 114 | - |

Manual Control MA



| Size | A1 | A2 | A3 | A4 | A5 |
|------|--------|-----|-------|-----|-----|
| 20 | 9 251 | 100 | 108 | 175 | 95 |
| 28 | 16 260 | 100 | 108 | 190 | 80 |
| 40 | 9 315 | 102 | 134 | 197 | 107 |
| 55 | 16 323 | 102 | 134 | 215 | 89 |
| 58 | 9 372 | 102 | 155.5 | 215 | 107 |
| 80 | 16 380 | 102 | 155.5 | 235 | 86 |
| 78 | 9 380 | 125 | 169 | 246 | 114 |
| 107 | 16 390 | 125 | 169 | 270 | 92 |
| 117 | 9 441 | 125 | 192 | 261 | 132 |
| 160 | 16 450 | 125 | 192 | 285 | 107 |