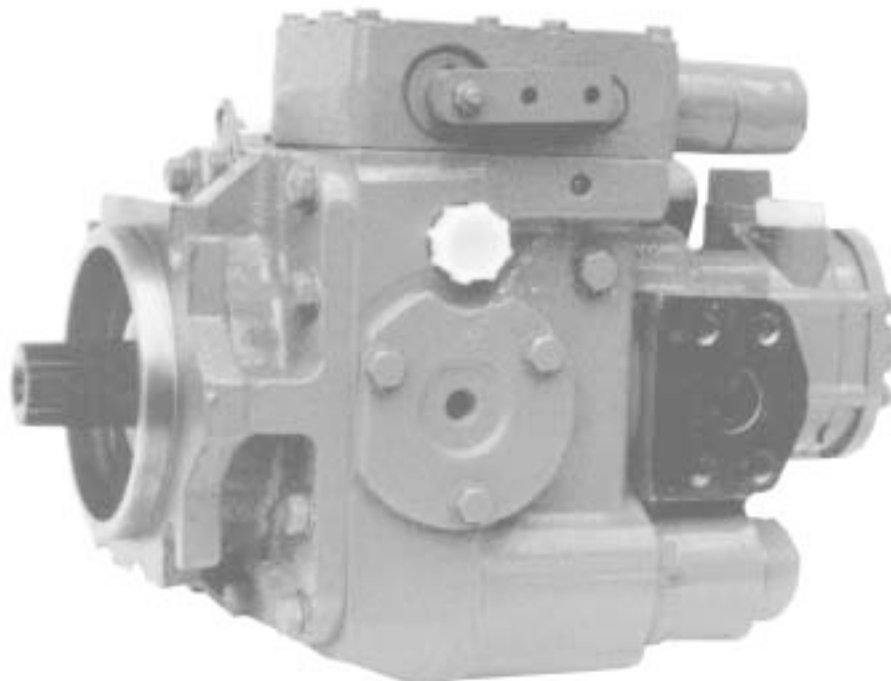


**TIDAL FLUID POWER
AXIAL PISTON PUMPS & MOTORS SERIES 20**



TIDAL FLUID POWER

AXIAL PISTON PUMPS SERIES 20

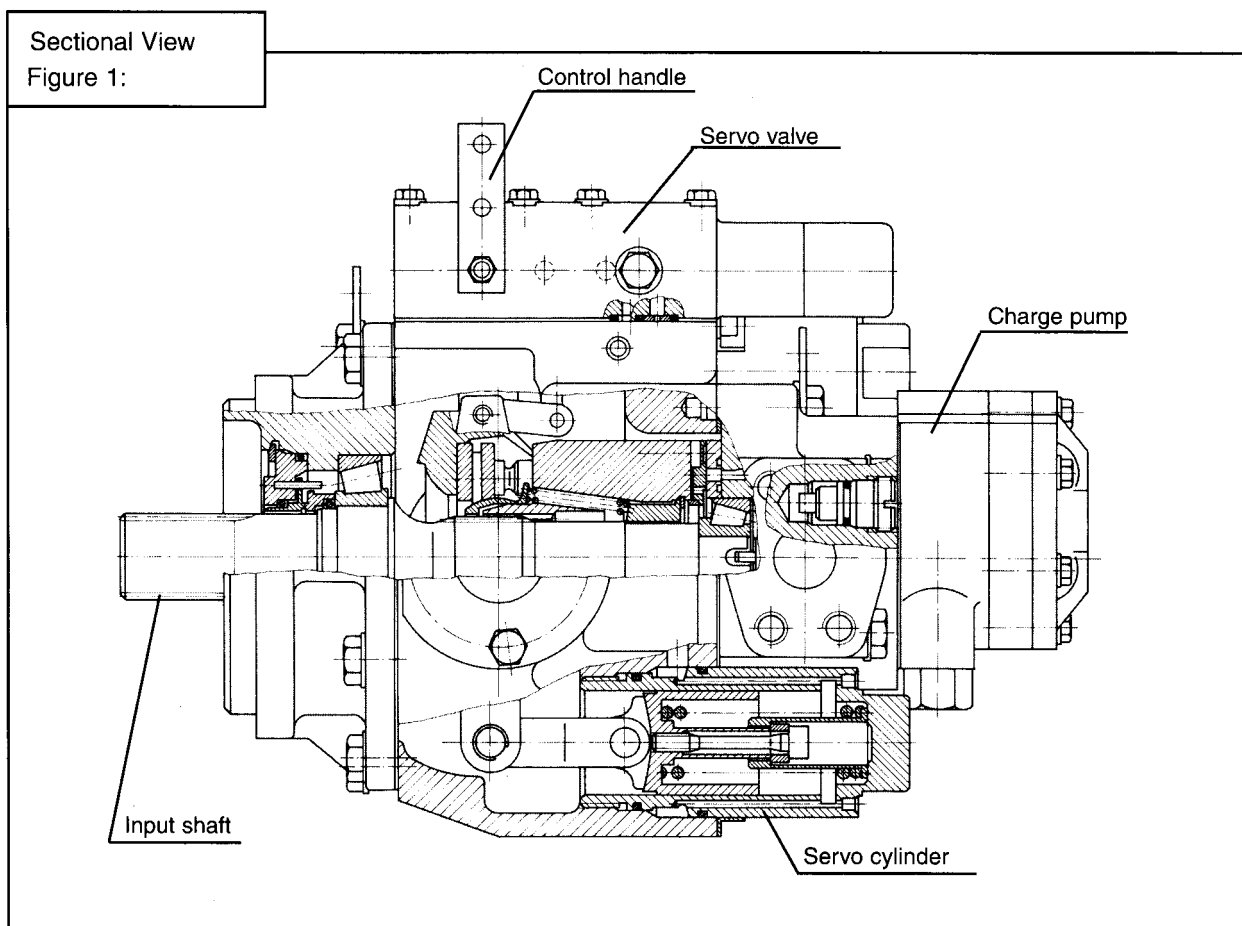


General Description

Axial piston variable displacement pumps, Series 20, are of swashplate construction with variable flow capability suitable for hydrostatic transmissions with closed loop circuit.

The flow rate is proportional to the pump's driven speed and displacement, which, in turn, is determined by the swashplate angle. The latter is infinitely adjustable between zero and maximum displacement.

Flow direction is reversed by tilting the swashplate to the opposite side of the neutral or zero displacement position.



Features

Axial piston variable displacement pumps, Series 20, are well-engineered and easy to handle. The full-length shaft with a highly efficient tapered roller bearing arrangement offers a high loading capacity for external radial forces.

Additional pumps can be built on.

The hydro-mechanical servo displacement control maintains the selected swashplate position and hence pump displacement.

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Upon release of the control handle, the swashplate automatically returns to the null position and the flow becomes zero.

High case pressures can be achieved without leakage even at the lowest temperatures by using suitable shaft seals.

The servo valve arrangement offers the facility to incorporate function regulators and remote control systems. Axial piston units are designed for easy servicing, complete dismantling and reassembly can be carried out with standard handtools, and all components or sub-assemblies are replaceable.

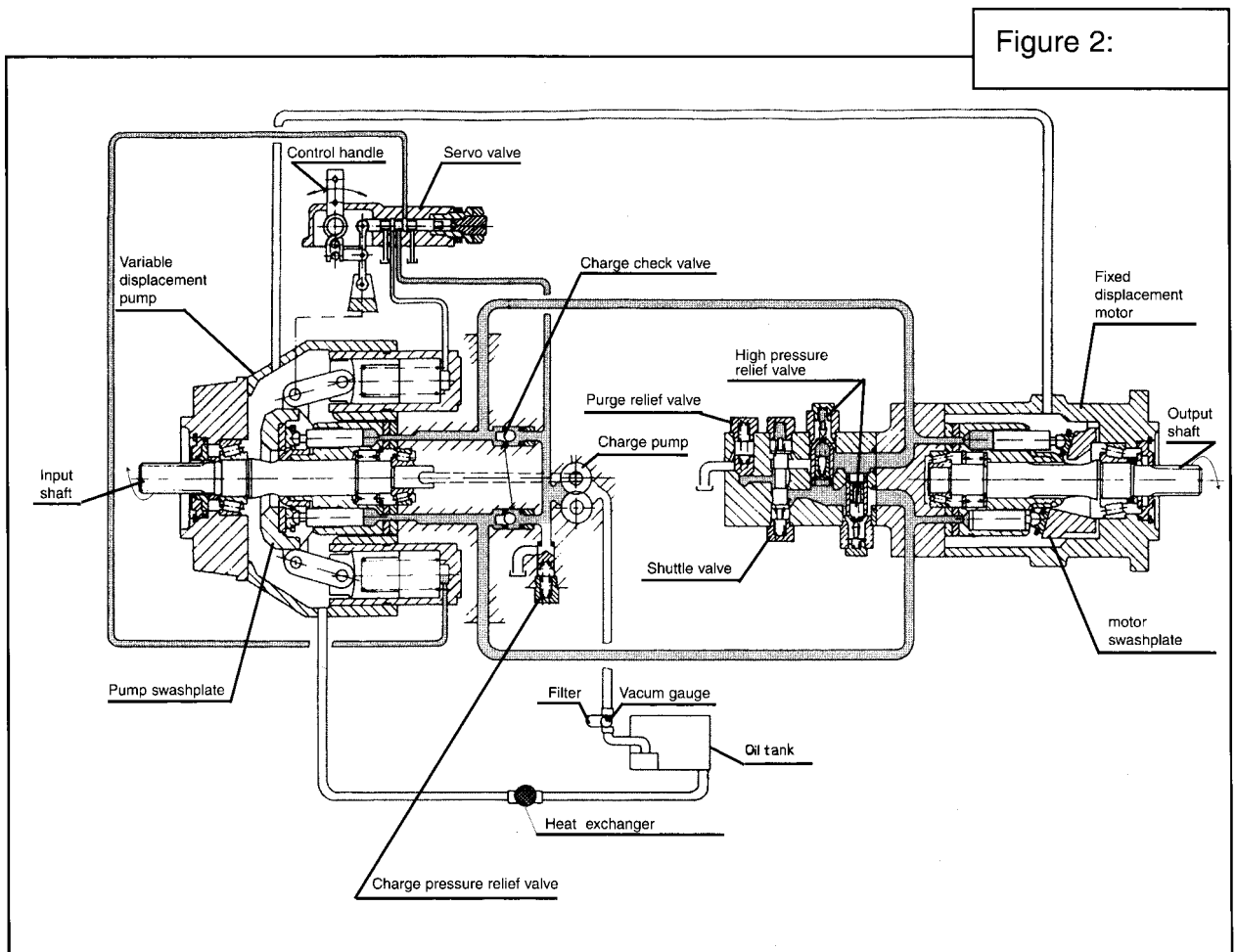


Figure 2 shows schematically the function of a hydrostatic transmission using an axial piston variable displacement pump and a fixed displacement motor.

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AXIAL PISTON PUMPS SERIES 20



Technical Data

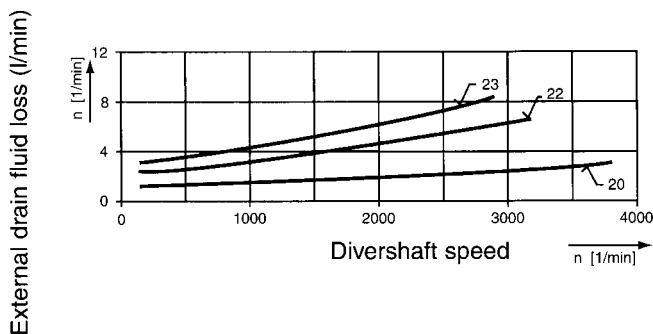
Table 1:

| | Dimension | Frame Size | | |
|--------------------------------------------------------------------|-----------------------------------|-----------------------------------------|--------|--------|
| | | 20 | 22 | 23 |
| Max. displacement per revolution of the variable displacement pump | cm ³ | 33,3 | 69,8 | 89,0 |
| Max. flow | dm ³ min ⁻¹ | 119,54 | 196,14 | 230,51 |
| Displacement per revolution of the charge pump | cm ³ | 12,3 | 18,03 | 18,03 |
| Max. pressure | MPa | 35 | | |
| Nominal pressure | MPa | 21 | | |
| Max. pressure of controls | MPa | 3,5 | | |
| Charging pressure | MPa | 0,8-2,0 | | |
| Max. pressure in a case | MPa | maximum constant 0,25, intermittent 0,5 | | |
| Maximum speed + | min ⁻¹ | 3590 | 2810 | 2590 |
| Minimum speed | min ⁻¹ | 500 | | |
| Nominal speed | min ⁻¹ | 1500 | | |
| Kinematic viscosity range of working fluid | mm ² s ⁻¹ | 1000 12-600 25-35 | | |
| - starting | | | | |
| - operating | | | | |
| - optimum | | | | |
| Kind of working fluid | | mineral oil | | |
| Operating temperature | °C (K) | - 40 to + 50 (233 - 323) | | |
| Max. temperature of working in tank | °C (K) | 80 (353) | | |
| Purity of working fluid | µm | 10 | | |
| Sense of rotation of the shaft | | clockwise or counterclockwise | | |
| Maximum swashplate angle | Degrees | ± 18° | | |
| Weight | kg | 45 | 63 | 78 |

+ For higher speeds contact our Application department.

Determination of Nominal Pump Size

Figure 3: External drain fluid loss for frame sizes 20 - 23



$$Q_e = \frac{V_g \cdot n \cdot \eta_v}{1000} \quad [l/min]$$

$$M_e = \frac{15,9 \cdot V_g \cdot \Delta_p}{100 \cdot \eta_{mh}} \quad [Nm]$$

$$P_e = \frac{M_g \cdot n}{9550} = \frac{Q_e \cdot \Delta_p}{600 \cdot \eta_t} \quad [kW]$$

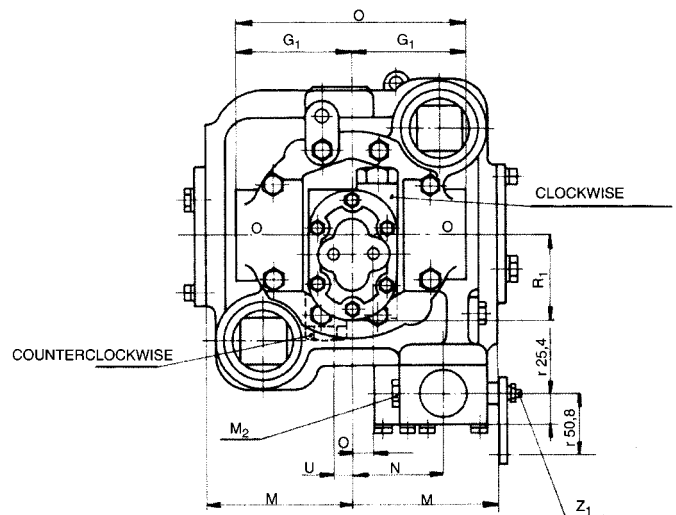
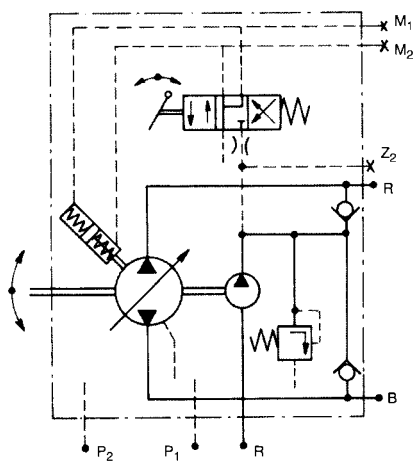
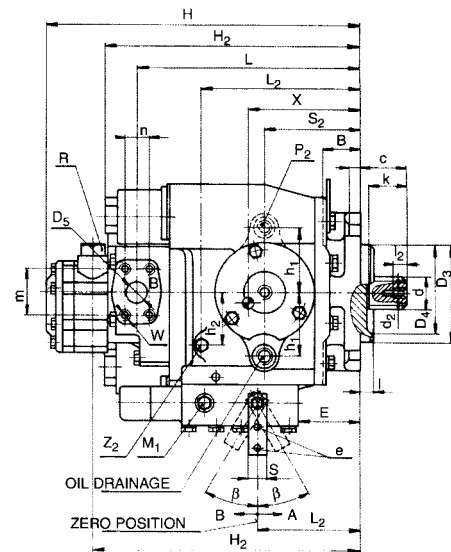
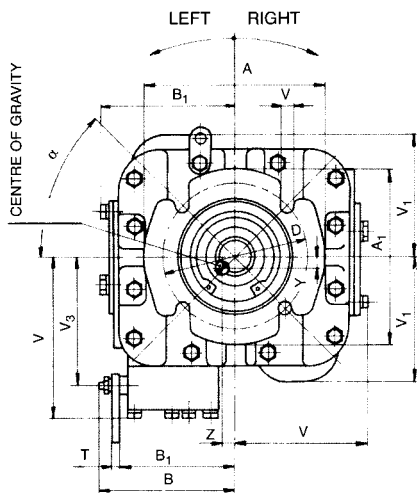
V_g - Displacement [cm³] per revolution
 Δ_p - High pressure minus low pressure [MPa]
 n - Speed [1/min]
 η_v - Volumetric efficiency
 η_{mh} - Mechanical - hydraulic efficiency
 η_t - Total efficiency

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Figure 8 Outline drawing for axial piston variable displacement pumps, Series 20, frame sizes 20 - 23



Deviating control lever of servo-valve in direction:

- A: Causes high pressure in "A" orifice in clockwise pump
Causes high pressure in "B" orifice in counterclockwise pump
- B: Causes high pressure in "B" orifice in clockwise pump
Causes high pressure in "A" orifice in counterclockwise pump

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Table 3: Dimensions /mm/

| Frame size | A | A1 | B | B1 | B2 | B3 | C | D | D3 | D4 | D5 | E | G |
|------------|-----|-----|------|-------|-------|-----|----|-----|-----------------------|-----|------|----|-------|
| 20 | 190 | 146 | 47,6 | 112,7 | 100 | 122 | 56 | 162 | | | | 56 | 163 |
| 22 | 194 | 194 | 48 | 133 | 113 | 135 | 56 | 162 | 127 ^{-0,005} | 108 | 25,4 | 83 | 172 |
| 23 | 194 | 194 | 49 | 150,8 | 123,8 | 146 | 56 | 162 | | | | 90 | 190,4 |

| Frame size | G1 | H | H1 | H2 | H3 | L | L1 | L2 | S | M | N | R1 | S1 |
|------------|-------|-----|-----|-----|-----|-----|-------|------|---------------------|-------|------|------|-----|
| 20 | 81,03 | 340 | 270 | 284 | 352 | 224 | 161,2 | 93,7 | | 94,7 | 55,6 | 68 | 100 |
| 22 | 86 | 381 | 311 | 314 | 381 | 256 | 188 | 119 | 19 ^{-0,25} | 112,7 | 68,3 | 68,3 | 111 |
| 23 | 95,2 | 395 | 320 | 327 | 395 | 270 | 194 | 127 | | 127,6 | 77,8 | 68,3 | 117 |

| Frame size | T | U | V | V1 | V3 | X | Y | Z | W | d | d1 | f |
|------------|---------|----|-----|------|-------|-----|------|------|--------|------------------------|------|------|
| 20 | | | 152 | 11,7 | 115,9 | 159 | 3 | 3 | | | | 16 |
| 22 | 9,3-0,2 | 19 | 165 | 121 | 128,6 | 146 | 9,5 | 9,5 | 3/8-16 | 34,5 ^{-0,17} | M 10 | 16 |
| 23 | | | 171 | 134 | 139,8 | 140 | 12,7 | 12,7 | UNC2B | 37,68 ^{-0,16} | | 17,5 |

| Frame size | e | h1 | h2 | k | l | l1 | | | m | n |
|------------|------------|------|-------|----|----------|--------|----|-----|------|------|
| 20 | | 62 | 51,16 | 48 | | | | | 52,4 | |
| 22 | 16,73±0,16 | 71,4 | 60,5 | 48 | 12,5±0,2 | min.20 | 22 | 45° | 52,4 | 26,2 |
| 23 | | 77,7 | 65 | 48 | | | 30 | | 52,4 | |

Table 4: Port dimensions, mounting dimensions

| Frame size | M1,2 | P1,2 | R | Z1 | Z2 | X1,2,3 |
|------------|----------------|---------------|---------------|---------------|----------------|----------------|
| 20 | | | | | | |
| 22 | 7/16-20 UNF-2B | 7/8-14 UNF-2B | 7/8-15 UNF-2B | 1/4-20 UNC-2A | 7/16-20 UNF-2B | 7/16-20 UNF-2B |
| 23 | | | | | | |

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TYPE DESIGNATION AND ORDER CODE:

PV **XX** **XX** **X** **X** **X** **X** **X** **X** **X**
1 **2** **3** **4** **5** **6** **7** **8** **9** **10**

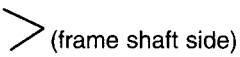
1. Type: PV - Axial Piston Variable Displacement Pump,
for hydrostatic transmissions with closed loop circuit, Serie 20

2. Size: Frame Size Displacement per revolution
 20 33,3 cm³
 22 69,8 cm³
 23 89,0 cm³

3. Displacement controllers and regulators:

- A** - without control unit with cover plate
- B** - without displacement control with connecting link and cover plate
- MH** - hydromechanical displacement controller
- MC** - hydromechanical displacement controller with neutral switch valve (12 V)
- MB** - hydromechanical servovalve with controlling switch of neutral position
- PH** - directly hydraulic control
- RQ.XX** - constant flow limiter side A, side B, displacement l /min
- PR** - direct torque limiter with hydr. displacement controller

4. Direction of rotation:

- R** - right (clockwise) 
- L** - left (counterclockwise)

5. Shaft End:

- A** = 14 teeth, 12/24 pitch, φ 31,2
- B** = 19 teeth, 16/32 pitch, φ 31,75
- C** = 21 teeth, 16/32 pitch, φ 34,5
- D** = 23 teeth, 16/32 pitch, φ 37,68 - valid for size 23
- K** = cone 1: 8, SAE J 501, φ 31,75
- L** = cylindrical φ 34, 925 spring - valid for size 20, 21, 22
- M** = cylindrical φ 44,45 , spring - valid for size 23

6. Pressure and Inlet Ports "A", "B", "C":

- A:** SAE J 518, 1", 6 000 PSI
- B:** SAE J 518, 1", 5 000 PSI
- C:** ISO 6162, 1", 40 Mpa, metric

8. Identification for charge pressure ΔPp:

7. Charge Pump

- A** - 8,2 cm³ - for size 20
- B** - 12,3 cm³ - for size 20, 21
- C** - 18,03 cm³ - for size 22, 23
- N** - without Charge Pump

- 12** - 1,2 Mpa
- 13** - 1,3 Mpa
- 14** - 1,4 Mpa
- 16** - 1,6 Mpa
- 00** - without Charge Pressure

9. Control orifice in the servo valve:

Double Charge Pump:
combination CA - 18,03 + 8,2 cm³

- A** - φ - 0,76 mm **D** - φ 1,36 mm
- B** - φ - 0,91 mm **E** - φ 1,6 mm
- C** - φ - 1,05 mm **N** - without orifice plate

10. No of special modification:

Determined in factory according to the special requirement of the client.