

## 2.4 HEAVY DUTY SERIES CONTENTS

PPV102

### Ordering Code

- 2.4.1 Heavy Duty Series
- 2.4.2 Heavy Duty Series compensator
- 2.4.3 Standard gear pump models

### Technical Information

- 2.4.4 Specifications
- 2.4.5 Hydraulic fluids
- 2.4.6 Viscosity range
- 2.4.7 Temperature range
- 2.4.8 Fire-resistant fluids
- 2.4.9 Seals
- 2.4.10 Filtration
- 2.4.11 Adjustments
- 2.4.12 Installation notes

### Control Options

- 2.4.13 Variable delivery positive displacement control
- 2.4.14 Variable delivery electrical displacement control
- 2.4.15 Power control
- 2.4.16 Power and positive displacement control
- 2.4.17 Power and electrical displacement control
- 2.4.18 Pressure compensation control
- 2.4.19 Pressure compensation and load sensing control
- 2.4.20 Power and pressure compensation
- 2.4.21 Power / pressure compensation and positive displacement control
- 2.4.22 Power / pressure compensation and electrical displacement control
- 2.4.23 Power, pressure compensation and load sensing control

### Performance Data

- 2.4.24 PPV102-63
- 2.4.25 PPV102-112
- 2.4.26 PPV102-180 / -360
- 2.4.27 PPV102-280 / -560

### Dimensions

- 2.4.28 PPV102-63 / -112 / -180 / -280
- 2.4.29 PPV102-360 / -560
- 2.4.30 Regulators
- 2.4.31 Auxiliary ports
- 2.4.32 Suction and discharge ports
- 2.4.33 Through drive for optional gear pump

## ORDERING CODE

### 2.4.1 Heavy Duty Series

|                                                         |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------------------------------|--|--|--|--|--|--|--|--|--|
|                                                         |                                                                                              | PPV102 - 112 - 1 0 N R S - 4000 - - - XXXX |  |  |  |  |  |  |  |  |  |
| <b>Axial piston pump</b>                                |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| <b>Heavy Duty Series</b>                                |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| <b>Size</b>                                             |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| 63                                                      | 63 cm³/rev                                                                                   |                                            |  |  |  |  |  |  |  |  |  |
| 112                                                     | 112 cm³/rev                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| 180                                                     | 180 cm³/rev                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| 280                                                     | 280 cm³/rev                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| 360                                                     | 2 x 180 cm³/rev                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| 560                                                     | 2 x 280 cm³/rev                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| <b>Fluid type</b>                                       |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| -                                                       | Mineral oil                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| W                                                       | Water glycol                                                                                 |                                            |  |  |  |  |  |  |  |  |  |
| P                                                       | Polyolester                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| <b>Open circuit: 1</b>                                  |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| <b>Gear pumps, through drive and pilot port options</b> |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| 0                                                       | No gear pump, no pilot port                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| 1                                                       | 10 cm³/rev with built-in safety valve, set to 40 bar (50 bar max), not for sizes 360 and 560 |                                            |  |  |  |  |  |  |  |  |  |
| 2                                                       | 15 cm³/rev with built-in safety valve, set to 40 bar (50 bar max), not for sizes 360 and 560 |                                            |  |  |  |  |  |  |  |  |  |
| 3                                                       | No gear pump, with pilot ports                                                               |                                            |  |  |  |  |  |  |  |  |  |
| 6                                                       | With pilot ports, SAE A through drive, 13 T splined shaft                                    |                                            |  |  |  |  |  |  |  |  |  |
| H                                                       | With pilot ports, SAE A through drive, 9 T splined shaft                                     |                                            |  |  |  |  |  |  |  |  |  |
| 7                                                       | No pilot port, SAE A through drive, 13 T splined shaft                                       |                                            |  |  |  |  |  |  |  |  |  |
| G                                                       | No pilot port, SAE A through drive, 9 T splined shaft                                        |                                            |  |  |  |  |  |  |  |  |  |
| A                                                       | SAE B through drive for sizes 280, 360 and 560 only                                          |                                            |  |  |  |  |  |  |  |  |  |
| <b>Installation type</b>                                |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| N                                                       | Flange mounting                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| <b>Shaft rotation</b> (viewed from shaft end)           |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| R                                                       | Clockwise                                                                                    |                                            |  |  |  |  |  |  |  |  |  |
| L                                                       | Anti-clockwise, sizes 360 and 560 only                                                       |                                            |  |  |  |  |  |  |  |  |  |
| <b>Series</b>                                           |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| S                                                       | Low pressure pulsation (standard)                                                            |                                            |  |  |  |  |  |  |  |  |  |
| <b>Installation position</b>                            |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| -                                                       | Horizontal (standard)                                                                        |                                            |  |  |  |  |  |  |  |  |  |
| V                                                       | Horizontal / vertical                                                                        |                                            |  |  |  |  |  |  |  |  |  |
| <b>Compensator ordering code</b> (see next page)        |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| <b>Confluent block</b> (sizes 360 and 560 only)         |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| -                                                       | Single pump                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| 0                                                       | Without confluent block                                                                      |                                            |  |  |  |  |  |  |  |  |  |
| R                                                       | Rear outlet                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| S                                                       | Side outlet                                                                                  |                                            |  |  |  |  |  |  |  |  |  |
| <b>Auxiliary gear pump</b> (sizes 360 and 560 only)     |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| -                                                       | No gear pump                                                                                 |                                            |  |  |  |  |  |  |  |  |  |
| 1                                                       | With gear pump, see Standard Gear Pump Arrangements                                          |                                            |  |  |  |  |  |  |  |  |  |
| <b>Modification number</b>                              |                                                                                              |                                            |  |  |  |  |  |  |  |  |  |
| XXXX                                                    | Determined by manufacturer                                                                   |                                            |  |  |  |  |  |  |  |  |  |

## 2.4.2 Heavy Duty Series compensator

### Power control / pressure compensation

- 0 No power control and no pressure compensation
- 1 Power control
- 4 Pressure compensation
- 7 Power control and pressure compensation

### Displacement control

- 0 No displacement control
- P Positive displacement control
- N Negative displacement control
- E Electrical positive displacement control
- L Load sensing control

### Power control mode

- 0 No power control
  - L Low setting range
  - M Medium setting range
  - H High setting range
- see table: Power Setting Code

### Power setting code

- 0 No power control
- 1 - 4 Power setting code – see table: Power Setting Code

### Power setting code

Standard compensator code at 1500 rpm drive speed,  
pumps without auxiliary gear pump

| Motor<br>power [kW] | Nominal size [cm³] |     |     |     |     |     |
|---------------------|--------------------|-----|-----|-----|-----|-----|
|                     | 63                 | 112 | 180 | 280 | 360 | 560 |
| 11                  | L4                 |     |     |     |     |     |
| 15                  | L1                 |     |     |     |     |     |
| 18.5                | M2                 |     |     |     |     |     |
| 22                  | M1                 | L3  |     |     |     |     |
| 30                  | H2                 | M3  | L3  |     |     |     |
| 37                  |                    | M1  | L1  |     |     |     |
| 45                  |                    | H5  | M4  |     |     |     |
| 55                  |                    | H3  | M2  | L2  |     |     |
| 75                  |                    |     | H4  | M4  | L2  |     |
| 90                  |                    |     | H2  | M2  | M4  |     |
| 110                 |                    |     |     | H4  | M2  | L3  |
| 132                 |                    |     |     | H2  | H4  | L1  |
| 160                 |                    |     |     |     | H2  | M3  |
| 200                 |                    |     |     |     |     | M1  |
| 250                 |                    |     |     |     |     | H4  |
| 280                 |                    |     |     |     |     | H2  |

For other drive speeds or different power settings, please contact HYDAC.

### Power control adjustment range at 1500 rpm drive speed

| Power<br>control mode         | Nominal size [cm³] |             |             |              |               |               |
|-------------------------------|--------------------|-------------|-------------|--------------|---------------|---------------|
|                               | 63                 | 112         | 180         | 280          | 360           | 560           |
| <b>L</b> Low setting range    | 10.6 - 18.9        | 19.1 - 30.7 | 29.9 - 45.6 | 46.8 - 75.0  | 59.9 - 91.1   | 93.5 - 160.0  |
| <b>M</b> Medium setting range | 15.6 - 22.4        | 27.1 - 45.6 | 43.9 - 75.0 | 67.3 - 113.5 | 87.9 - 134.5  | 137.2 - 239.2 |
| <b>H</b> High setting range   | 22.0 - 33.8        | 37.0 - 62.1 | 55.0 - 96.5 | 90.0 - 150.1 | 109.4 - 192.9 | 197.3 - 300.3 |

## 2.4.3 Standard gear pump models

| Pump size and ordering code |   |   |   |   |   |   |   |      |   |   |     | Gear pump displacement    |
|-----------------------------|---|---|---|---|---|---|---|------|---|---|-----|---------------------------|
| PPV102-63                   | – | 1 | 1 | # | # | S | – | #### | – | # |     | 10 cm <sup>3</sup> /rev   |
| PPV102-112                  | – | 1 | 1 | # | # | S | – | #### | – | # |     | 10 cm <sup>3</sup> /rev   |
| PPV102-180                  | – | 1 | 1 | # | # | S | – | #### | – | # |     | 10 cm <sup>3</sup> /rev   |
| PPV102-280                  | – | 1 | 2 | # | # | S | – | #### | – | # |     | 15 cm <sup>2</sup> /rev   |
| PPV102-360                  | – | 1 | A | # | # | S | – | #### | – | # | – 1 | 25.3 cm <sup>3</sup> /rev |
| PPV102-560                  | – | 1 | A | # | # | S | – | #### | – | # | – 1 | 32.5 cm <sup>3</sup> /rev |

Note: The "#" denotes all available models for the pump. See point 2.4.1 Ordering code for the pump.

## TECHNICAL INFORMATION

### 2.4.4 Specifications

| Pump size                 |                  |           | 63   | 112  | 180  | 280  | 360  | 560  |
|---------------------------|------------------|-----------|------|------|------|------|------|------|
| Geometric displacement    |                  | [cm³/rev] | 63   | 112  | 180  | 280  | 360  | 560  |
| Pressure                  | Rated            | [bar]     | 350  |      |      |      |      |      |
|                           | Peak             | [bar]     | 400  |      |      |      |      |      |
| Drive speed               | Min.             | [rpm]     | 600  |      |      |      |      |      |
|                           | Max.self-priming | [rpm]     | 1800 | 1800 | 1800 | 1500 | 1800 | 1500 |
|                           | Max. *           | [rpm]     | 3250 | 2700 | 2300 | 2000 | 2300 | 2000 |
| Power (1500 rpm, 350 bar) |                  | [kW]      | 61   | 108  | 173  | 270  | 347  | 539  |
| Drive torque (350 bar)    |                  | [Nm]      | 388  | 688  | 1101 | 1720 | 2210 | 3430 |
| Pre-fill oil volume       |                  | [cm³]     | 1000 | 1200 | 2900 | 3200 | 6000 | 6500 |
| Approx. weight            |                  | [kg]      | 48   | 68   | 86   | 160  | 160  | 300  |

\* required supply pressure p = 1 bar (2 bar abs.)

### 2.4.5 Hydraulic fluids

|                     |                                                                                                                          |
|---------------------|--------------------------------------------------------------------------------------------------------------------------|
| H, HL               | Mineral Oil                                                                                                              |
| HEES                | Fatty acid esters (Polyolester), biodegradable                                                                           |
| HFC                 | Water glycol                                                                                                             |
| HLP, HLPD, HV, HVLP | High quality hydraulic fluids based on mineral oil and with additional anti-wear properties (at pressures above 200 bar) |
| HFD-U               | Polyolester                                                                                                              |

For use with other fluids, please contact HYDAC.

### 2.4.6 Viscosity range

|                                        |                                   |
|----------------------------------------|-----------------------------------|
| Minimum viscosity:                     | 10 cSt (mm <sup>2</sup> /s)       |
| Normal operating viscosity:            | 10 - 200 cSt (mm <sup>2</sup> /s) |
| Maximum viscosity (during cold start): | 1000 cSt (mm <sup>2</sup> /s)     |

### 2.4.7 Temperature range

-20 to +80 °C

#### Note:

The highest fluid temperature will be at the drain port of the pump, up to 20 °C higher than in the reservoir.

## 2.4.8 Fire-resistant fluids

|                                           | Fluid type  |              |               |
|-------------------------------------------|-------------|--------------|---------------|
|                                           | Mineral oil | Polyolester  | Water glycol* |
| Maximum continuous pressure (bar)         | 350         |              | 207           |
| Temperature range (°C)                    | -20 ~ +80   | 0 ~ +60      | 10 ~ 50       |
| Cavitation resistance                     | ○           | △            | △             |
| Pump service life compared to mineral oil | 100 %       | 50 % ~ 100 % | 20 % ~ 80 %   |

○ = Recommended  
△ = Acceptable but with reduced pump life  
\* = Do not exceed the rated speed. \*  
Maximum speed for size 280 pumps when operated with water glycol:  
1500 rpm

## 2.4.9 Seals

| Fluid type code (see Ordering code) | Generic fluid type | Shaft seal ring material | General seal material (O-Rings) |
|-------------------------------------|--------------------|--------------------------|---------------------------------|
| –                                   | Mineral oil        | FPM                      | NBR                             |
| W                                   | Water glycol       | NBR                      | NBR                             |
| P                                   | Polyolester        | FPM                      | FPM                             |

## 2.4.10 Filtration

For maximum service life of the pump and system components, the system should be protected from contamination by effective filtration.

Cleanliness class to NAS 1638 Class 9 (20/18/15 ISO 4406:1999) or cleaner.

## 2.4.11 Adjustments

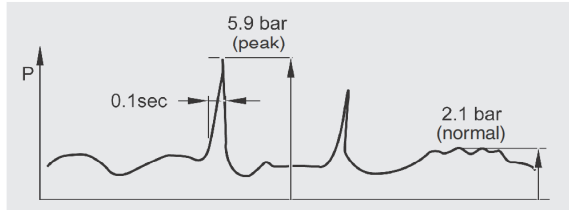
| Pump size  | Volume                                  |                              |
|------------|-----------------------------------------|------------------------------|
|            | Volume adjustment screw rate per ¼ turn | Min. adjustable displacement |
|            | [cm³]                                   | [cm³/rev]                    |
| PPV102-63  | 1.54                                    | 22.5                         |
| PPV102-112 | 2.86                                    | 56                           |
| PPV102-180 | 3.81                                    | 87                           |
| PPV102-280 | 5.10                                    | 140                          |
| PPV102-360 | 3.81                                    | 2x 87                        |
| PPV102-560 | 5.10                                    | 2x 140                       |

## 2.4.12 Installation notes

### Recommended pump installation

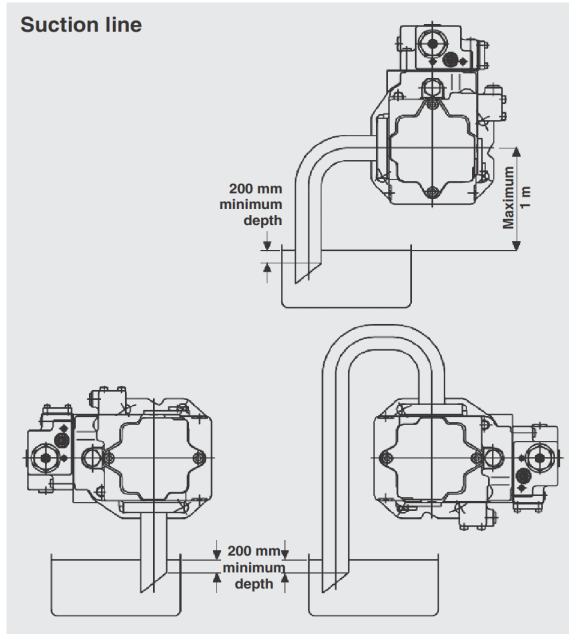
The pump should be installed horizontally with the case drain line initially rising above the level of the pump before continuing to the tank as shown in the diagram below. Do not connect the drain line to the suction line.

The top drain port should always be used and the internal diameter of the drain line should be equal to or larger than the drain port to minimise pressure in the pump case. The pressure in the pump case should not exceed 2.1 bar as shown in the diagram below. Peak pressure should never exceed 5.9 bar.



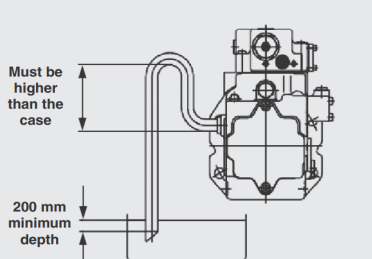
### Installing the pump above the tank

#### Suction line



#### Drain line

"Goose neck" configuration ensures oil remains in the pump case.



### Precautions:

- The suction and drain lines must be immersed at least 200 mm below the lowest oil level under operating conditions.
- The distance between the oil surface and the centre of the shaft must not exceed 1 m.
- The oil in the pump case must be refilled if the pump has not been operated for one month or longer.
- When installing a HYDAC pump always ensure that the fluid in the pump is prevented from draining away during stoppages.

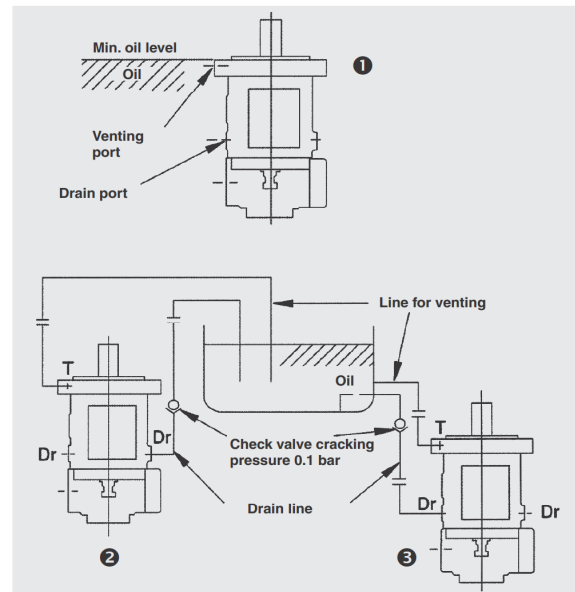
### Vertical installation of the pump (shaft at the top)

For applications requiring vertical installation (shaft at the top) the pump must be provided with additional means to lubricate the front bearing. Do not use a standard pump for this type of application (a "V - vertical installation" version should be used instead).

The oil level in the tank should be higher than the pump mounting flange (see diagram 1 below). If the oil level in the tank is lower than the mounting flange, forced lubrication is required through the venting port (1-2 l/min.)

When installing the pump in the tank and submerged in the oil, open the drain and venting ports to provide adequate lubrication to the internal components.

If the pump is installed outside the tank, the drain and venting lines must be run to the tank (see diagram 3). If these lines are higher than the level of the oil (see diagram 2), they must be filled with oil before commissioning.



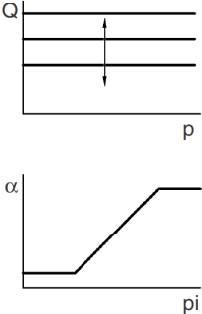
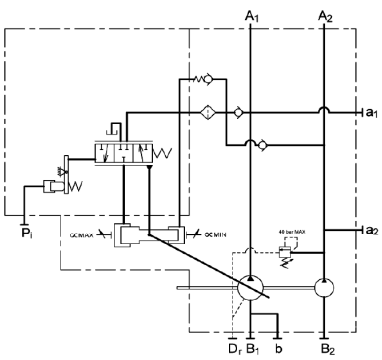
A check valve with cracking pressure of 0.1 bar should be fitted to the case drain port as shown.

### Recommended check valves

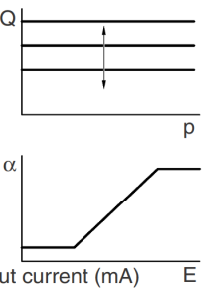
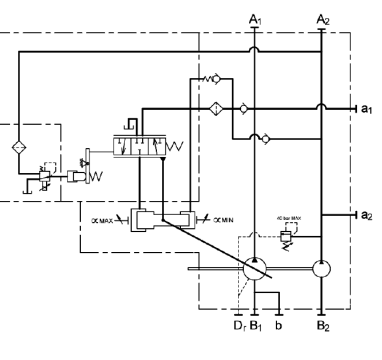
| Pump                     | Check valve            | Part no. |
|--------------------------|------------------------|----------|
| PPV102-63                | RV-12-0.1X/0 - 0.1 bar | 3474099  |
| PPV102-112 to PPV102-280 | RV-16-0.1X/0 - 0.1 bar | 858636   |
| PPV102-360 to PPV102-560 | RV-20-0.1X/0 - 0.1 bar | 706734   |

## CONTROL OPTIONS

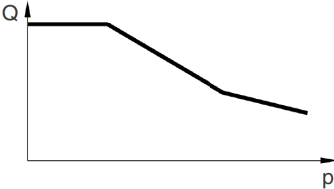
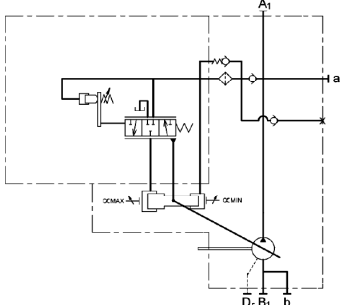
### 2.4.13 Variable delivery positive displacement control – 0P

| Description                                                                                                                                                                                                                                | Performance characteristics                                                                                                            | Hydraulic circuit                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>The pilot pressure enables the flow rate of the pump to be steplessly adjusted.</p> <p>An increase in pilot pressure will result in an increase in flow, hence the positive control.</p> <p>Also available as negative control - 0N</p> |  <p>Range of displacement control<br/>2.5 – 100 %</p> |  |

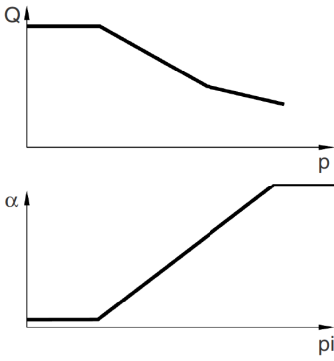
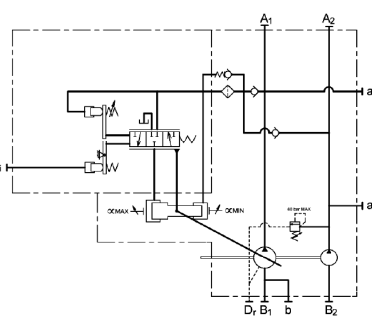
### 2.4.14 Variable delivery electrical displacement control – 0E

| Description                                                                                                                                                                                                                                                           | Performance characteristics                                                                                                             | Hydraulic circuit                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>The proportional valve enables the flow rate of the pump to be steplessly adjusted.</p> <p>If the gear pump is also ordered, there is no need for additional external piping for the proportional valve.</p> <p>An electrical amplifier card is also required.</p> |  <p>Range of displacement control<br/>2.5 – 100 %</p> |  |

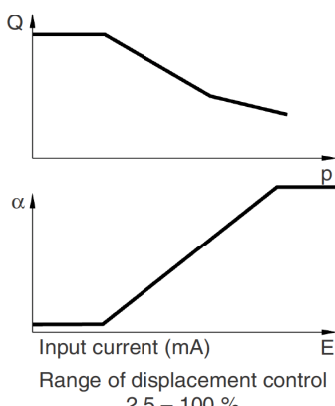
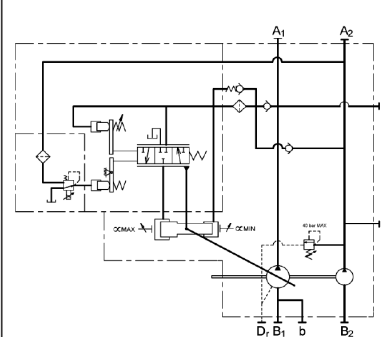
## 2.4.15 Power control – 10

| Description                                                                                                                                                                             | Performance characteristics                                                       | Hydraulic circuit                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <p>In response to a rise in operating pressure, the swash plate adjustment angle is reduced, limiting the input power.</p> <p>This control prevents an overload of the drive motor.</p> |  |  |

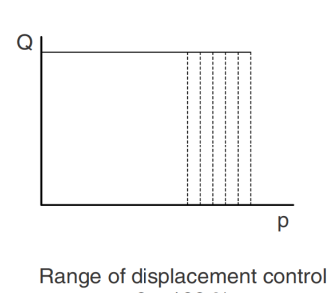
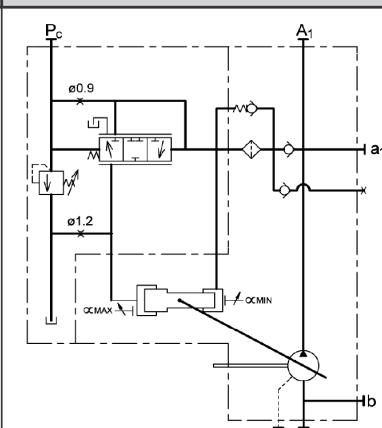
## 2.4.16 Power and positive displacement control – 1P

| Description                                                                                                                                                                                                                                                                                                                 | Performance characteristics                                                                                                            | Hydraulic circuit                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>This is a combination of power control and positive displacement control.</p> <p>The pilot pressure enables the flow rate of the pump to be steplessly adjusted.</p> <p>An increase in pilot pressure will result in an increase in flow, hence the positive control.</p> <p>Also available as negative control - 1N</p> |  <p>Range of displacement control<br/>15 – 100 %</p> |  |

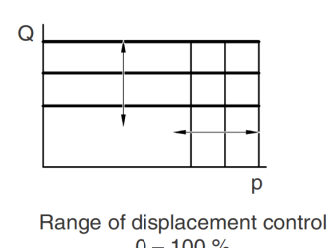
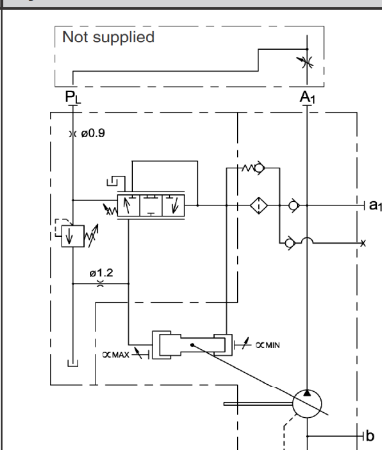
## 2.3.17 Power and electrical displacement control - 1E

| Description                                                                                                                                                                                                                                                                                                    | Performance characteristics                                                                                                                                      | Hydraulic circuit                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>This is a combination of power control and electrical displacement control.</p> <p>The proportional valve enables the flow rate of the pump to be steplessly adjusted.</p> <p>An increase in the input signal will result in an increase in flow.</p> <p>An electrical amplifier card is also required.</p> |  <p>Input current (mA)</p> <p>Range of displacement control<br/>2.5 – 100 %</p> |  |

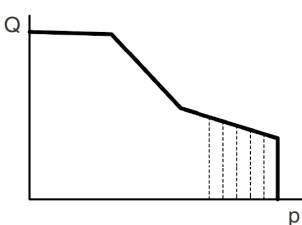
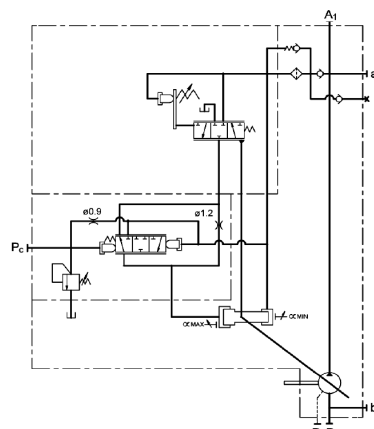
## 2.4.18 Pressure compensation control – 4000

| Description                                                                                                                                                                                                                                                                                                                                                                                        | Performance characteristics                                                                                                            | Hydraulic circuit                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <p>As the system pressure rises to the pre-set value, the swash plate pivots back to prevent the system pressure from exceeding the compensator setting.</p> <p>A pressure relief valve must be built into the system.</p> <p><b>Note:</b> The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.</p> |  <p>Range of displacement control<br/>0 – 100 %</p> |  |

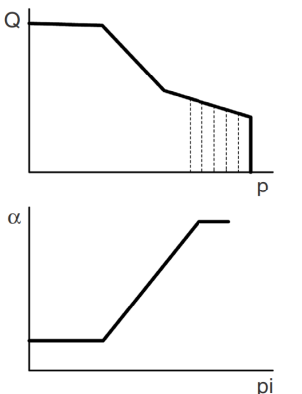
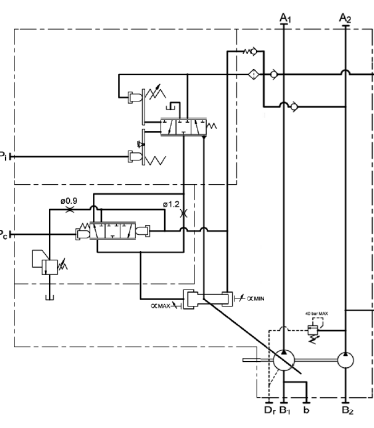
## 2.4.19 Pressure compensation and load sensing control - 4L00

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Performance characteristics                                                                                                            | Hydraulic circuit                                                                     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <p>The pump displacement is controlled to match the flow requirements as a function of the system differential pressure (load pressure vs. pump pressure). The factory setting of the differential pressure is 25 bar.</p> <p>In addition, there is a pressure cut-off function incorporated into the control.</p> <p><b>Note:</b> The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.</p> |  <p>Range of displacement control<br/>0 – 100 %</p> |  |

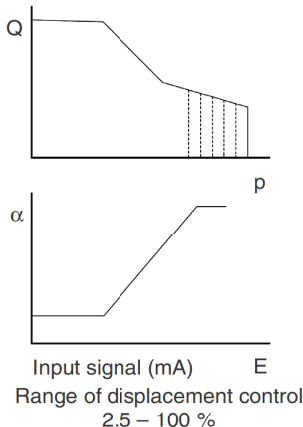
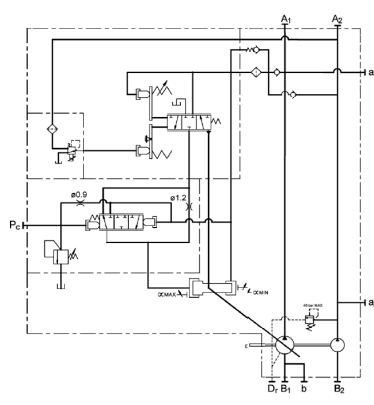
## 2.4.20 Power and pressure compensation - 70

| Description                                                                                                                                                                         | Performance characteristics                                                       | Hydraulic circuit                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <p>This is a combination of power control and pressure compensation.</p> <p><b>Note:</b> The factory pressure setting is 320 bar with an adjustable range of 80 bar to 350 bar.</p> |  |  |

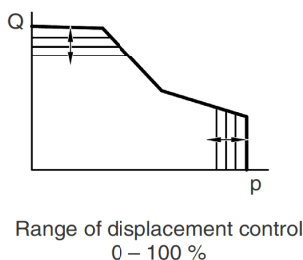
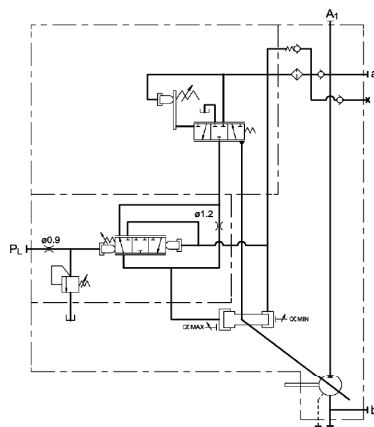
## 2.4.21 Power, pressure compensation and positive displacement control - 7P

| Description                                                                                                                                                                                                                                                                                                                                                                                                                    | Performance characteristics                                                                                                             | Hydraulic circuit                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>This is a combination of power control and pressure compensation.</p> <p>The pilot pressure enables the flow rate of the pump to be steplessly adjusted.</p> <p>An increase in pilot pressure will result in an increase in flow, hence the positive control.</p> <p><b>Note:</b> The factory pressure setting is 315 bar with an adjustable range of 80 bar to 350 bar.</p> <p>Also available as negative control - 7N</p> |  <p>Range of displacement control<br/>2.5 – 100 %</p> |  |

## 2.4.22 Power, pressure compensation and electrical displacement control - 7E

| Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Performance characteristics                                                                                                                                    | Hydraulic circuit                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| <p>This is a combination of power control, pressure compensation and electrical displacement control.</p> <p>The proportional valve enables the flow rate of the pump to be steplessly adjusted. An increase in the input signal will result in an increase in flow.</p> <p>An electrical amplifier card is also required.</p> <p><b>Note:</b> The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.</p> |  <p>Input signal (mA) E<br/>Range of displacement control<br/>2.5 – 100 %</p> |  |

## 2.4.23 Power, pressure compensation and load sensing control - 7L

| Description                                                                                                                                                                                                                                                                                                                                                                        | Performance characteristics                                                                                                            | Hydraulic circuit                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| <p>This is a combination of power control, pressure compensation and load sensing control.</p> <p>The factory setting of the differential pressure is 25 bar with a setting range of 10 bar to 30 bar.</p> <p><b>Note:</b> The factory pressure setting is 200 bar with an adjustable range of 80 bar to 315 bar. Pressures above 315 bar must be stated clearly on the order.</p> |  <p>Range of displacement control<br/>0 – 100 %</p> |  |

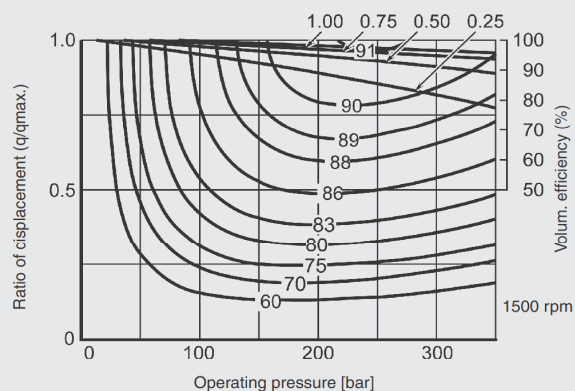
### Recommended valve for use with remote pressure compensation

| Type:         | Part no.: |
|---------------|-----------|
| DB4E-01X-630V | 716004    |

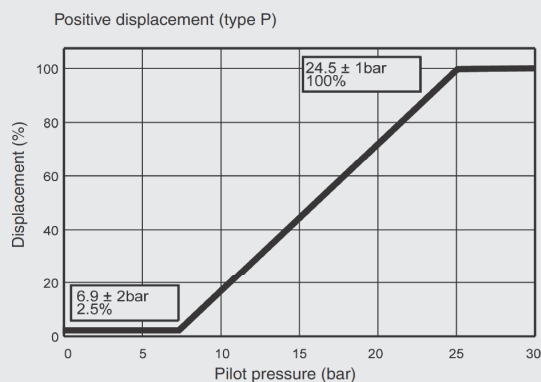
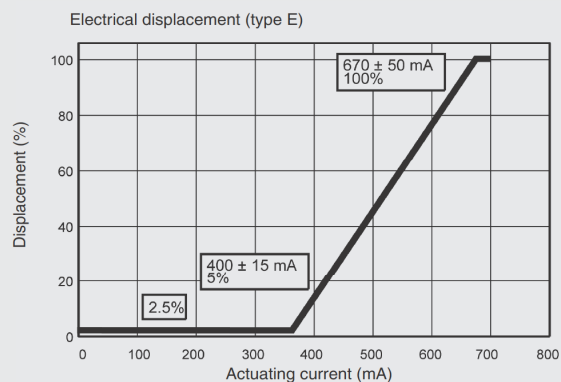
## PERFORMANCE DATA

2.4.24 PPV102-63

### ● Efficiency

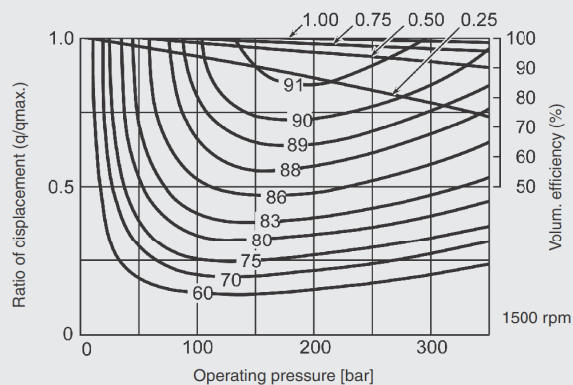


### ● Displacement control curves

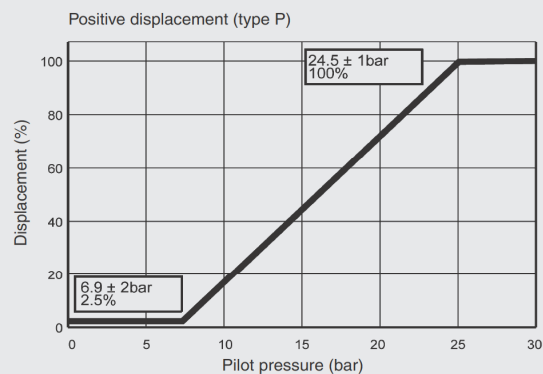
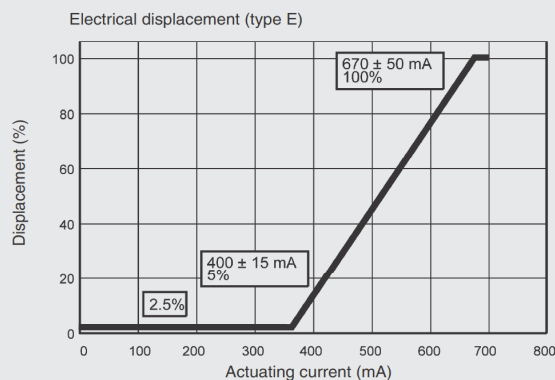


## 2.4.25 PPV102-112

### ● Efficiency

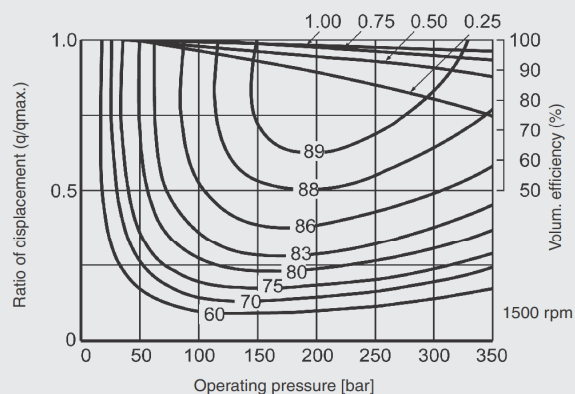


### ● Displacement control curves

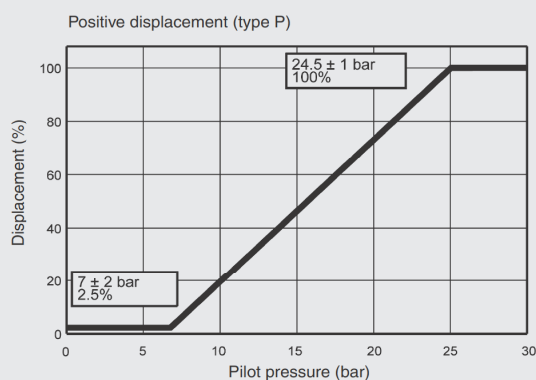
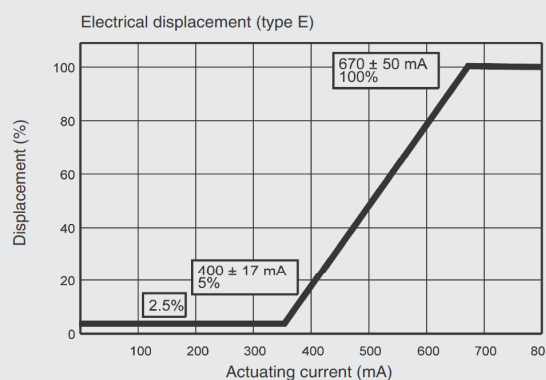


## 2.4.26 PPV102-180 / -360

### ● Efficiency

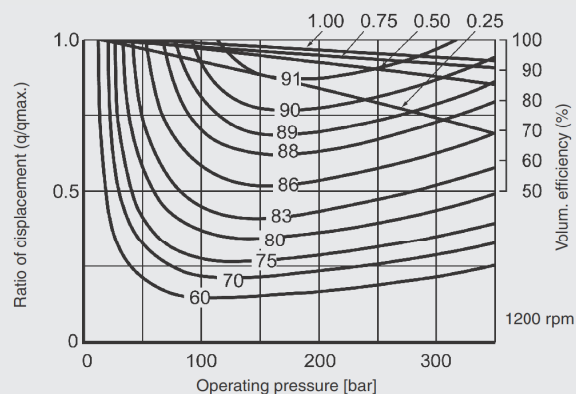


### ● Displacement control curves

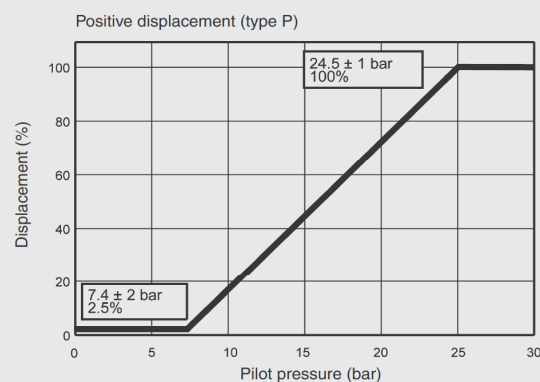
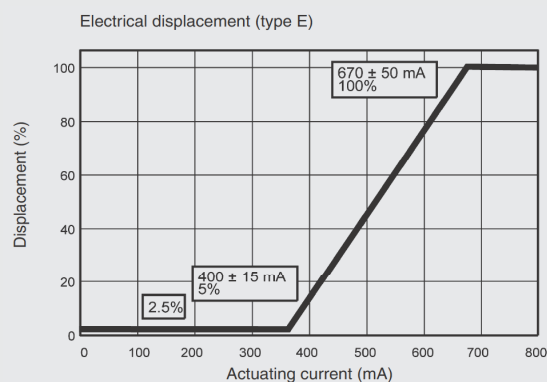


## 2.4.27 PPV102-280 / -560

### ● Efficiency

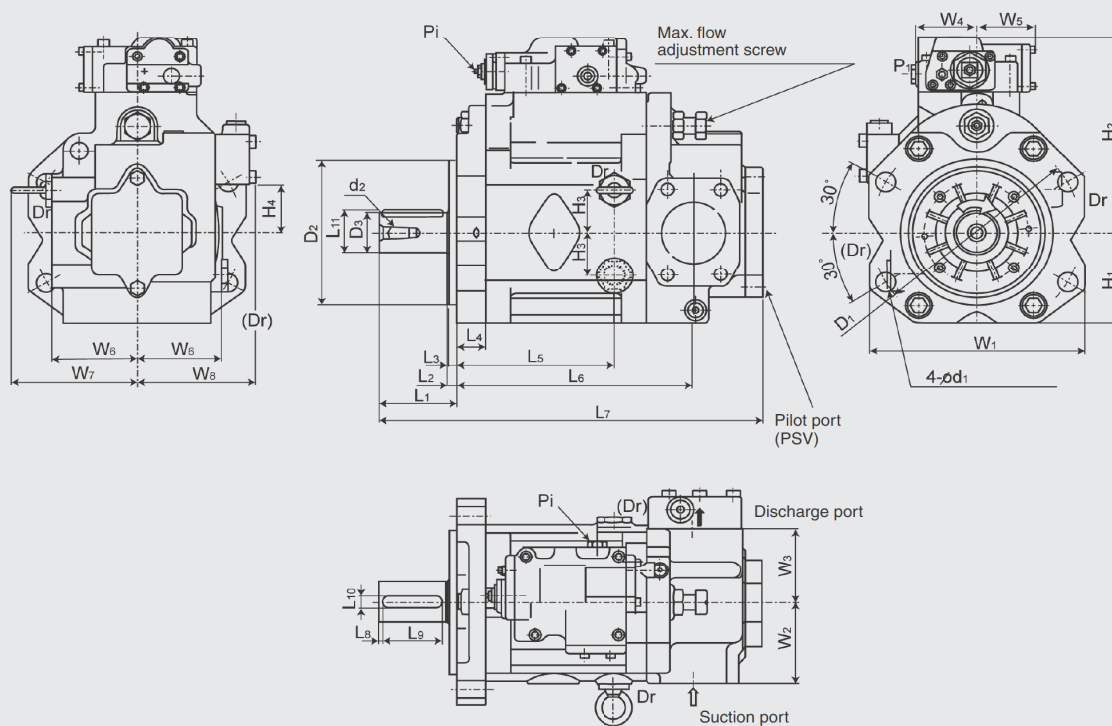


### ● Displacement control curves



## DIMENSIONS

### 2.4.28 PPV102-63 / -112 / -180 / -280



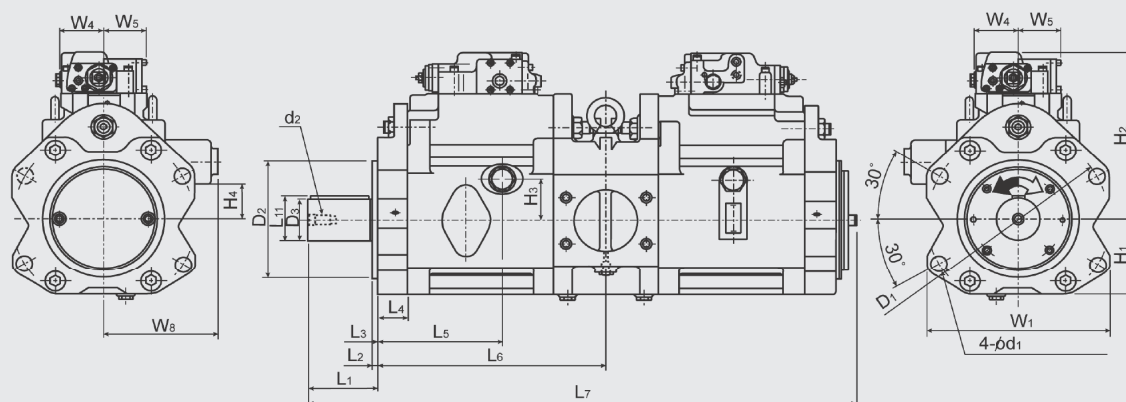
Dimensions (in mm) of single pumps without gear pump

| Pump size | $D_1$ | $D_2$                   | $D_3$            | $L_1$ | $L_2$ | $L_3$ | $L_4$ | $L_5$ | $L_6$ |
|-----------|-------|-------------------------|------------------|-------|-------|-------|-------|-------|-------|
| 63        | 180   | 125<br>-0.050<br>-0.090 | 32 <sup>k6</sup> | 68    | 10    | 8     | 27    | 138   | 210   |
| 112       | 224   | 160<br>-0.050<br>-0.090 | 40 <sup>k6</sup> | 92    | 10    | 8     | 33    | 167   | 249   |
| 180       | 250   | 180<br>-0.050<br>-0.090 | 50 <sup>k6</sup> | 92    | 10    | 8     | 36    | 190   | 285   |
| 280       | 300   | 200<br>-0.050<br>-0.090 | 55 <sup>k6</sup> | 92    | 10    | 8     | 50    | 203   | 351   |

| Pump size | $L_7$ | $L_8$ | $L_9$ | $L_{10}$ | $L_{11}$ | $H_1$ | $H_2$ | $H_3$ | $H_4$ |
|-----------|-------|-------|-------|----------|----------|-------|-------|-------|-------|
| 63        | 349   | 4     | 5     | 10       | 35       | 89    | 195   | 37    | 41    |
| 112       | 419   | 5     | 70    | 12       | 43       | 100   | 220   | 41    | 49    |
| 180       | 466   | 5     | 70    | 14       | 53.5     | 112   | 245   | 53    | 58    |
| 280       | 539   | 5     | 70    | 16       | 59       | 127   | 286   | 70    | 68    |

| Pump size | $W_1$ | $W_2$ | $W_3$ | $W_4$ | $W_5$ | $W_6$ | $W_7$ | $W_8$ | $d_1$ | $d_2$ |
|-----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 63        | 190   | 70    | 70    | 72    | 69    | 76    | 115   | 113   | 18    | M12   |
| 112       | 234   | 90    | 80    | 72    | 69    | 90    | 138   | 125   | 22    | M12   |
| 180       | 256   | 100   | 92    | 72    | 69    | 101   | 149   | 139   | 22    | M16   |
| 280       | 300   | 120   | 120   | 72    | 69    | 118   | —     | 167   | 26    | M16   |

## 2.4.29 PPV102-360 / -560



Direction of rotation

↑ Clockwise

↓ Anti-clockwise

(viewed from shaft end)

Note: pump shown is designed for clockwise rotation.

### Dimensions (in mm) of tandem pumps without gear pump

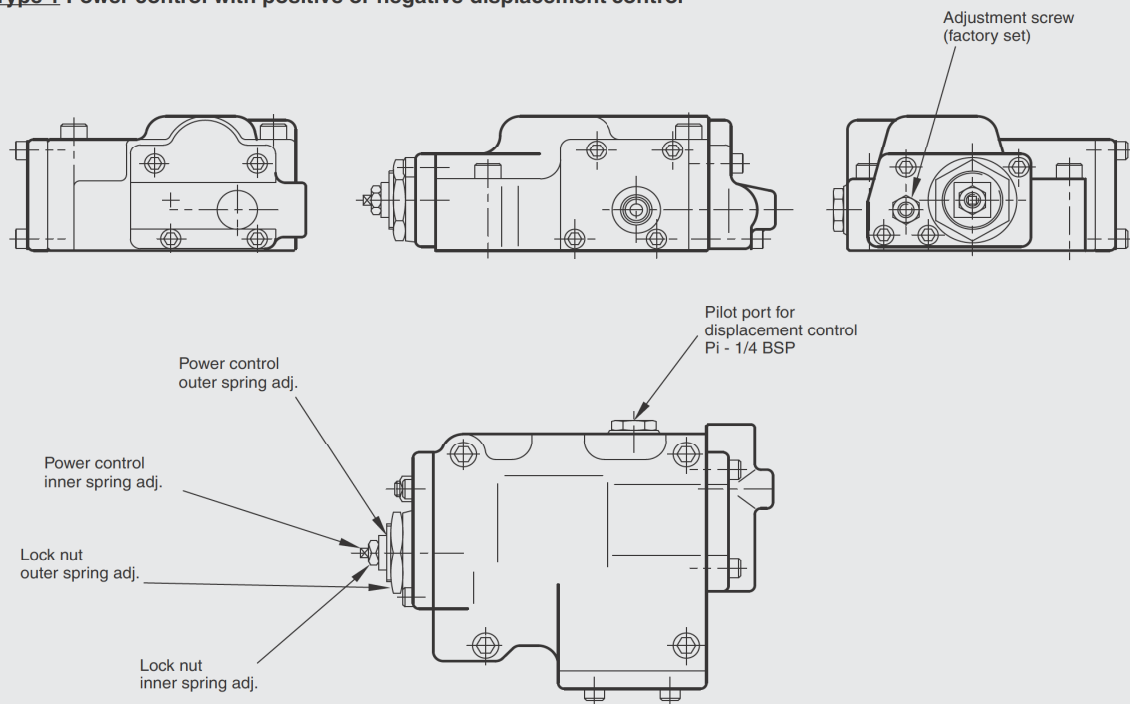
| Pump size | D <sub>1</sub> | D <sub>2</sub>          | D <sub>3</sub>   | L <sub>1</sub> | L <sub>2</sub> | L <sub>3</sub> | L <sub>4</sub> | L <sub>5</sub> | L <sub>6</sub> |
|-----------|----------------|-------------------------|------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 360       | 250            | 180<br>-0.050<br>-0.090 | 60 <sup>k6</sup> | 115            | 10             | 8              | 36             | 190            | 311            |
| 560       | 300            | 200<br>-0.050<br>-0.090 | 70 <sup>k6</sup> | 115            | 10             | 9              | 50             | 203            | 374            |

| Pump size | L <sub>7</sub> | L <sub>8</sub> | L <sub>9</sub> | L <sub>10</sub> | L <sub>11</sub> | H <sub>1</sub> | H <sub>2</sub> | H <sub>3</sub> | H <sub>4</sub> |
|-----------|----------------|----------------|----------------|-----------------|-----------------|----------------|----------------|----------------|----------------|
| 360       | 786            | 5              | 95             | 18              | 64              | 112            | 245            | 53             | 51             |
| 560       | 896            | 5              | 95             | 20              | 74.5            | 127            | 286            | 70             | 59             |

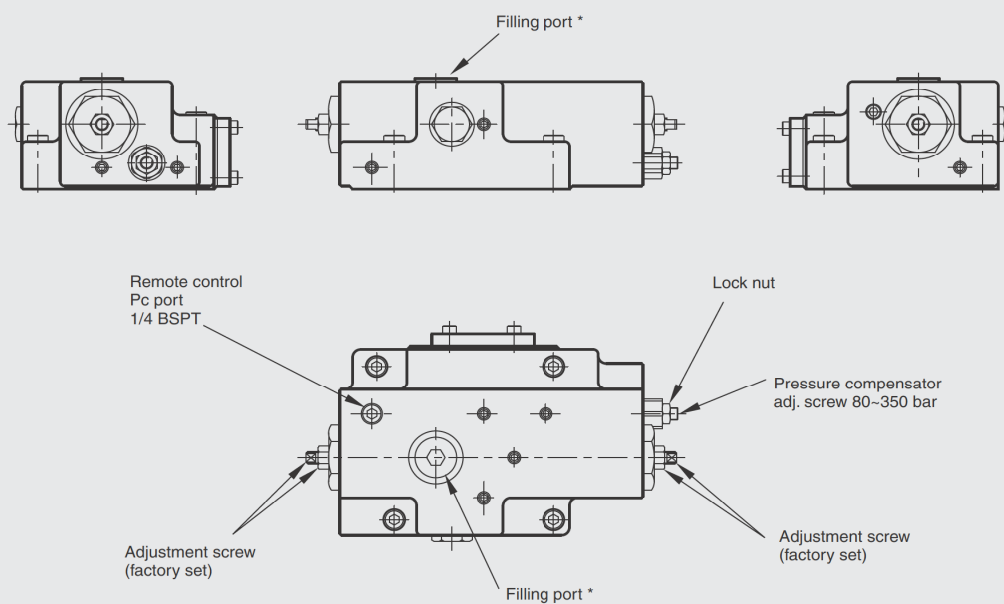
| Pump size | W <sub>1</sub> | W <sub>2</sub> | W <sub>3</sub> | W <sub>4</sub> | W <sub>5</sub> | W <sub>6</sub> | W <sub>8</sub> | d <sub>1</sub> | d <sub>2</sub> |
|-----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 360       | 256            | 100            | 100            | 72             | 69             | 101            | 165            | 22             | M16            |
| 560       | 300            | 120            | 120            | 72             | 69             | 118            | 185            | 26             | M16            |

## 2.4.30 Regulators

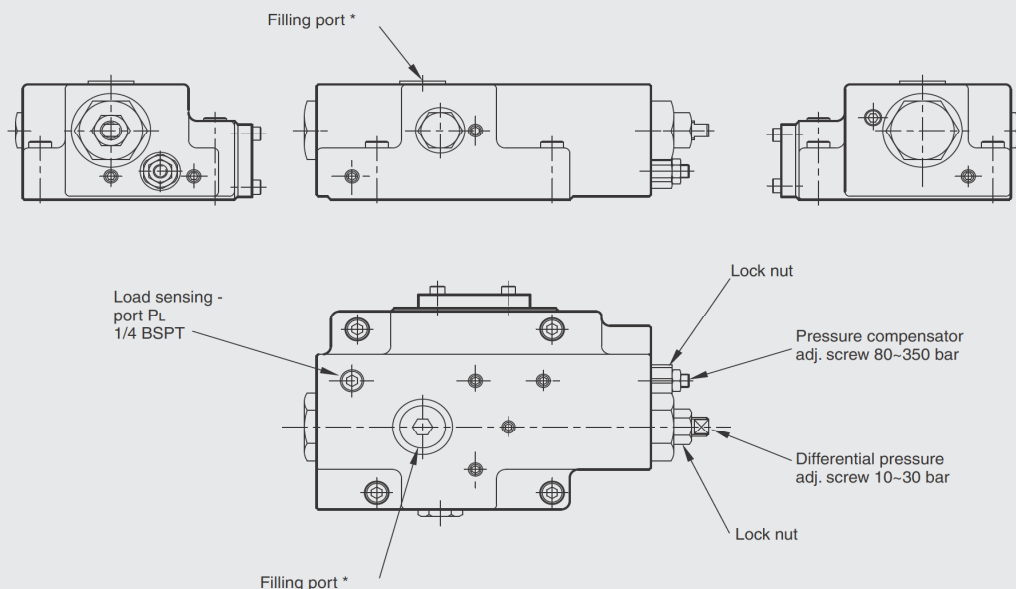
### Type 1 Power control with positive or negative displacement control



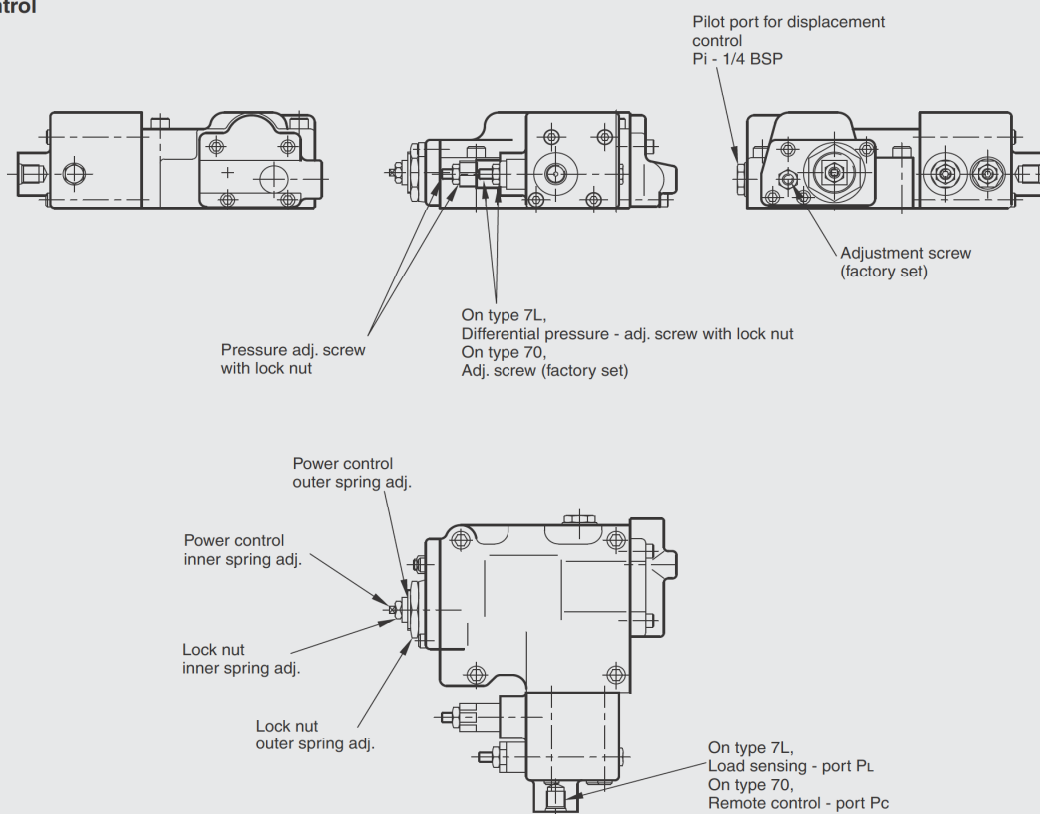
### Type 4 Pressure compensation control



## Type 4L Pressure compensation and load sensing control



## Type 7 Power control with positive or negative displacement control, pressure compensation or load sensing control



## 2.4.31 Auxiliary ports

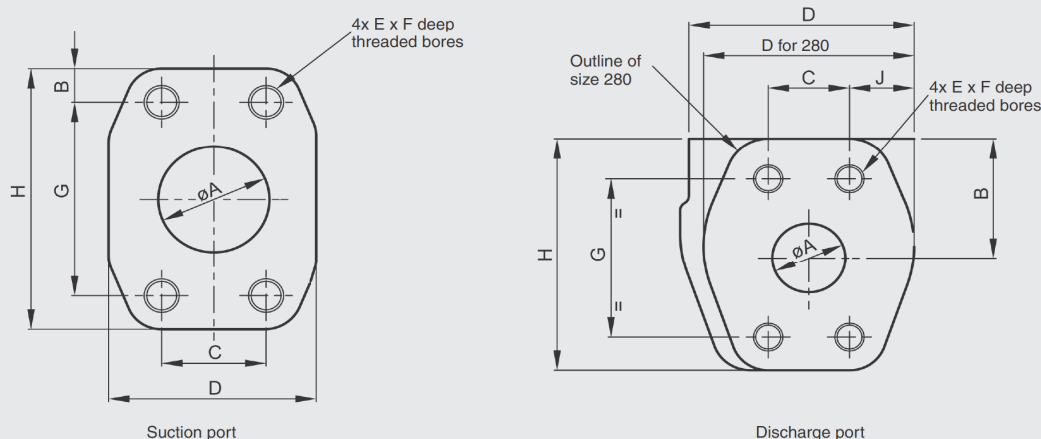
### Dimensions of drain ports (in mm)

| Pump size | a     | b    | c   | d  |
|-----------|-------|------|-----|----|
| 63        | ½ BSP | 22.6 | 2.5 | 19 |
| 112       | ¾ BSP | 30.8 | 3.5 | 20 |
| 180 / 360 | ¾ BSP | 30.8 | 3.5 | 20 |
| 280 / 560 | ¾ BSP | 30.8 | 3.5 | 20 |

### Other ports

| Port                                                       | Size   |
|------------------------------------------------------------|--------|
| P <sub>c</sub> and P <sub>L</sub> for 4000 control         | ¼ BSPT |
| P <sub>c</sub> and P <sub>L</sub> for type 7 control       | ¼ BSP  |
| P <sub>i</sub> and PSI pilot port for displacement control | ¼ BSP  |
| Measurement ports                                          | ¼ BSP  |
| Venting port, V-type<br>Sizes 63, 112, 180, 360            | ⅛ BSP  |
| Venting port, V-type<br>Sizes 280, 560                     | ¼ BSP  |

## 2.4.32 Suction and discharge ports



### Suction port

| Size | A   | B    | C    | D   | E          | F  | G     | H   |
|------|-----|------|------|-----|------------|----|-------|-----|
| 63   | 38  | 12   | 35.7 | 71  | M12 x 1.75 | 18 | 69.9  | 94  |
| 112  | 64  | 12   | 50.8 | 91  | M12 x 1.75 | 18 | 88.9  | 113 |
| 180  | 76  | 15   | 61.9 | 108 | M16 x 2.0  | 24 | 106.4 | 136 |
| 280  | 89  | 15.5 | 69.9 | 123 | M16 x 2.0  | 24 | 120.7 | 152 |
| 360  | 102 | 15   | 77.8 | 152 | M16 x 2.0  | 24 | 130.2 | 162 |
| 560  | 102 | 18   | 77.8 | 152 | M16 x 2.0  | 24 | 130.2 | 170 |

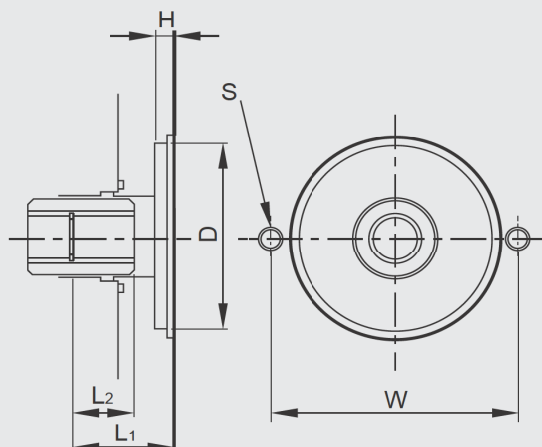
### Discharge port

| Size | A  | B  | C    | D     | E          | F  | G    | H    | J  |
|------|----|----|------|-------|------------|----|------|------|----|
| 63   | 25 | 41 | 27.8 | 77    | M10 x 1.5  | 18 | 57.2 | 83.5 | 22 |
| 112  | 32 | 49 | 31.8 | 91    | M12 x 1.75 | 18 | 66.7 | 98   | 30 |
| 180  | 38 | 58 | 36.5 | 111.5 | M16 x 2.0  | 24 | 79.4 | 112  | 36 |
| 280  | 38 | 70 | 36.5 | 96    | M16 x 2.0  | 24 | 79.4 | 112  | 30 |
| 360  | 32 | 51 | 31.8 | 80    | M12 x 1.75 | 22 | 66.7 | 102  | 23 |
| 560  | 38 | 59 | 36.5 | 83    | M16 x 2.0  | 24 | 79.4 | 117  | 16 |

### When using confluent block:

|     |    |    |      |     |           |    |      |     |    |
|-----|----|----|------|-----|-----------|----|------|-----|----|
| 360 | 51 | 62 | 44.5 | 148 | M20 x 2.5 | 30 | 96.8 | 124 | 26 |
| 560 | 51 | 72 | 44.5 | 180 | M20 x 2.5 | 30 | 96.8 | 140 | 23 |

## 2.4.33 Through drive for optional gear pump



| Pump size                                                                                          |                          | 63, 112, 180, 280                      |                                        | 280, 360, 560                          |
|----------------------------------------------------------------------------------------------------|--------------------------|----------------------------------------|----------------------------------------|----------------------------------------|
| Ordering code                                                                                      | Without pilot port       | 7                                      | G                                      | A                                      |
|                                                                                                    | With pilot port          | 6                                      | H                                      |                                        |
| Dimensions<br>(SAE type "A"<br>for 63, 112, 180 and 280)<br>(SAE type "B"<br>for 280, 360 and 560) | D                        | 82.5                                   |                                        | 101.6                                  |
|                                                                                                    | H                        | 8                                      |                                        | 11                                     |
|                                                                                                    | W                        | 106                                    |                                        | 146                                    |
|                                                                                                    | S                        | 2x M10 – 16 deep                       |                                        | 2x M12 – 20 deep                       |
|                                                                                                    | L <sub>1</sub>           | 43                                     | 34                                     | 43                                     |
|                                                                                                    | L <sub>2</sub>           | 26                                     | 18                                     | 26                                     |
| Dimensions of<br>splined shaft                                                                     | Standard                 | SAE flat root, side fit                |                                        |                                        |
|                                                                                                    | Number of teeth          | 13                                     | 9                                      | 13                                     |
|                                                                                                    | Diametral pitch          | 16/32                                  |                                        |                                        |
|                                                                                                    | Pressure angle           | 30°                                    |                                        |                                        |
|                                                                                                    | Root diameter            | 22.225 <sup>+0.279</sup> <sub>-0</sub> | 16.535 <sup>+0.279</sup> <sub>-0</sub> | 22.225 <sup>+0.279</sup> <sub>-0</sub> |
|                                                                                                    | Measurement between pins | 16.589 <sup>+0</sup> <sub>-0.067</sub> | 10.089 <sup>+0</sup> <sub>-0.095</sub> | 16.589 <sup>+0</sup> <sub>-0.067</sub> |
|                                                                                                    | Pin diameter             | 2.743                                  |                                        |                                        |
| Max. torque (Nm)                                                                                   |                          | 214                                    | 60                                     | 214                                    |