SUPER
HYDRAULICS
Pump,Motor,Spare Parts

# Liebherr Hydraulic pumps

## Versatility and Longevity

**DPVO Series:** DPVO108_DPVO140_DPVO165_DPVO165i_DPVO215_DPVO215i

**DPVD Series:** DPVD108

**DPVP Series:** DPVP108_ DPVP165_DPVP165i

**DPVG Series:** DPVG108_DPVG165_DPVG250

**LPF Series:** LPF45_LPF75

**LPVD Series:** LPVD45_LPVD64_LPVD75_LPVD90_LPVD100_LPVD107_LPVD125_LPVD140_LPVD150

## Flexibility and modular design

The modular element system used for the regulator, through drives and attachment flanges makes Liebherr's hydraulic pumps and motors exceptionally flexible and suitable for many different applications. An optimal solution can be found for every power train system.

## Long life and reliability

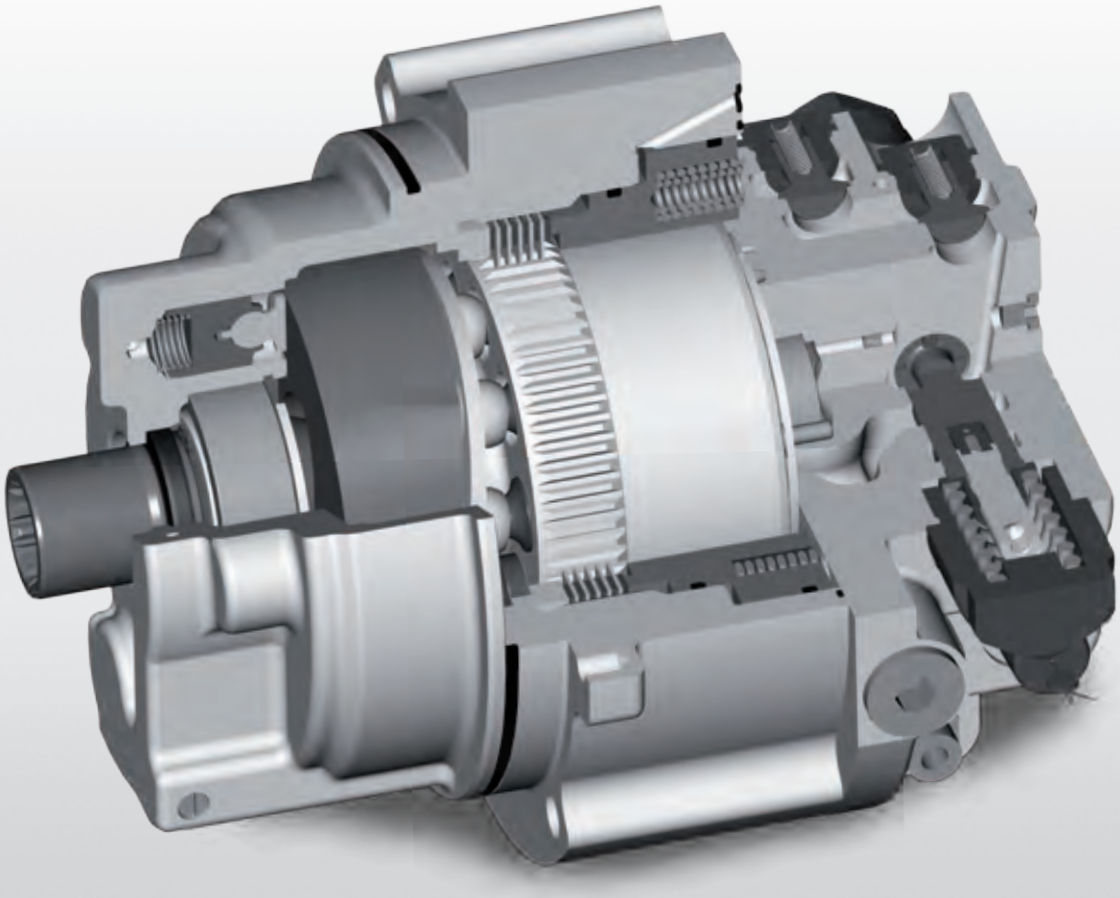
Liebherr's many years of experience and the use of the very latest technologies are factors that promote the development of all its new products. Thanks to high-strength materials and design ratings for long-term strength at high pressures, Liebherr hydraulic components satisfy the high standards demanded for modern construction machinery. Combinations of the most suitable grades of steel are a guarantee of long component life and low wear.

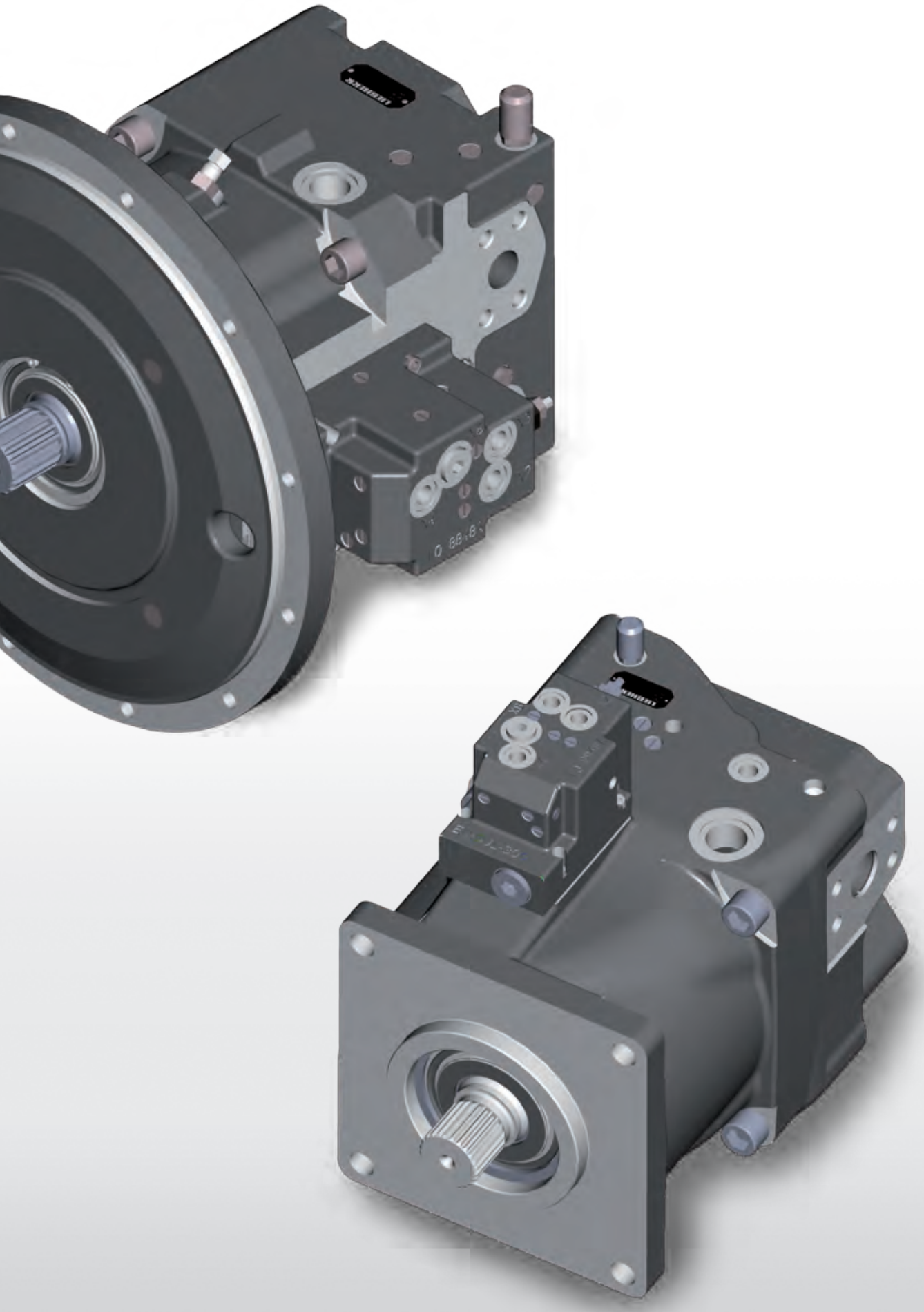
## Optimised efficiency

Pumps and motors owe their high efficiency to an excellent energy optimization especially in the part-load area. A high slewing angle is reached by the swash-plate units. For maximum efficiency, sliding contact points are optimised with regard to torque and flow volume. A low friction controll gives the posssibility to make very accurate and precise adjustments.

## Low noise

Ultra-modern development and design methods keep noise emissions from Liebherr hydraulic components down to an exceptionally low level. With the aid of modern CAE software, power units, valves and housing structures are designed and rated specifically for the lowest possible pulsations and vibrations. This prevents an excessive noise burden impoves the operating confort.





The modular construction principle allows products to be matched accurately to individual needs.

# Flexibility and modular design

Liebherr builds axial piston, swashplate hydraulic pumps and motors for use in open and closed circuits. Its extensive range of pumps and motors covers all hydraulic drive demands and categories in an optimal way.

## In the product program:

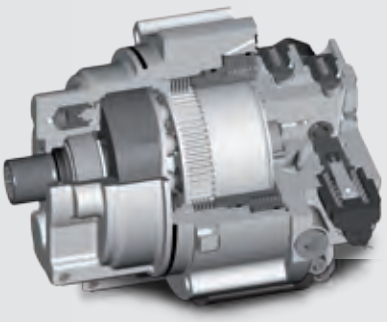
- single, double and parallel pumps and single or double motors
- variable or constant displacement volumes
- integrated multi-output transmissions
- hydraulic motors with brake valves or integrated multi-disc brakes
- multi-purpose modular regulator system

## Modular system

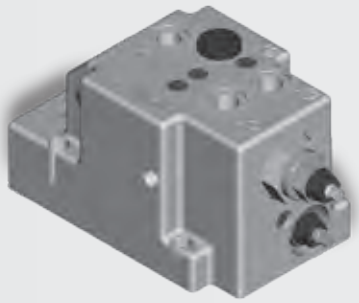
Since the product program uses a modular-element principle, it permits the use of widely varying regulators according to the requirements, as well as the use of assembling flanges and through-drives according to ISO and SAE standards.

## Integrated functions

A high level of functional integration means that only a minimum of installed space is needed. This allows an accurate control as well as a smooth drive and operating comfort for the end-user of the machine.

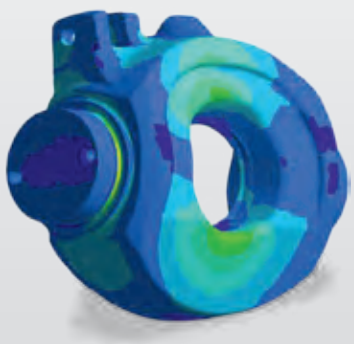


The integration of the brake valve, the holding brake and the central control unit into the hydraulic motor is an example of high functional density and low cost.



The modular regulator system permits the use of:

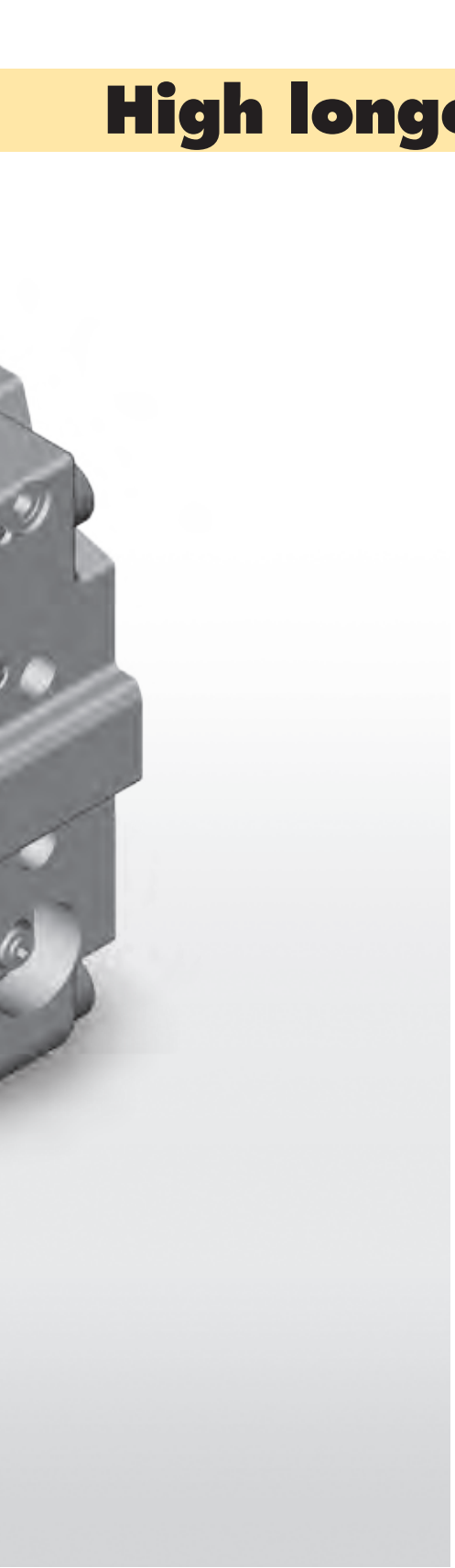
- power regulators
- hydraulic pressure proportional regulator
- pressure cutoff
- load sensing
- positive control
- electric proportional regulator



**FE Analysis**

Stress analysis of swelling joke

# High longevity



At the product development stage, the foundations are laid for the high quality and performance of Liebherr hydraulic pumps and motors. Design features that have proved successful are retained and combined with new, innovative ideas.

## Systematic simulation

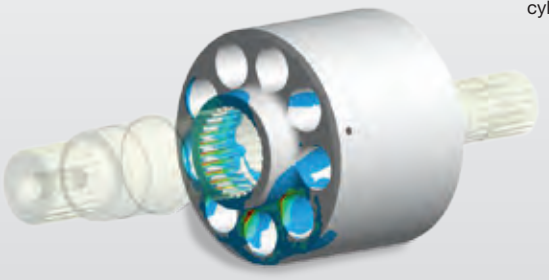
The use of modern CAE software for simulation shortens development times and results in optimal component designs.

## Precision and accuracy

The very highest level of manufacturing technology ensures high-precision results.

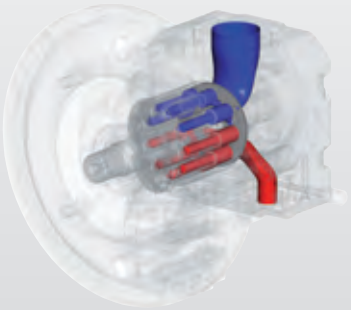
## Demanding experimental conditions

New products are not only tried out in the laboratory and on the test rig, but also optimised in practical applications. As an example, long-term tests at pressures of more than 450 bar are carried out.



**FE Analysis**
cylinder distortion.

Modern, flexible manufacturing facilities.



**CFD simulation**

- Minimising pressure losses
- Optimised flow paths
- Increased suction limit for self-priming pumps

# Optimised efficiency

Increasing the swiveling angle to 22 degrees results in higher component power density and higher power conversion with less space requirements. The units' conversion range are also higher with a better efficiency. Increasing the pressure range to 450 bar for components forming a closed circuit also boosts power density. At the same time, smaller units can be selected, which has a favourable effect on cost.

## Dynamics

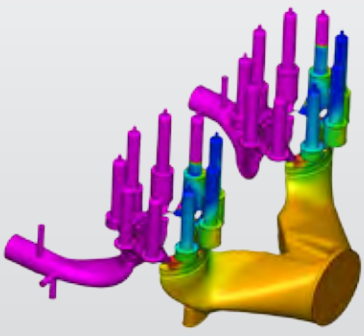
Components in a closed circuit can be regulated in a load-dependent or independant manner. In this way, travel drive can for instance be matched accurately to a vehicle's travel characteristic. Precise regulation of components in an open circuit with low losses is assured by a close tolerance field.

## Optimised flow

Modern CFD software is used to minimise pressure losses in the ports. Simulation methods and measurements ensure that pressure pulsations remain low and the timing can be adjusted to suit the optimal operating point.

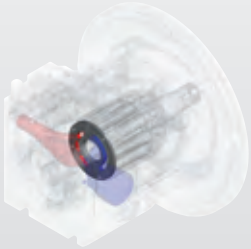
## Reduced friction

New materials and construction principles such as the combination of piston and sliding shoe keep friction losses low.



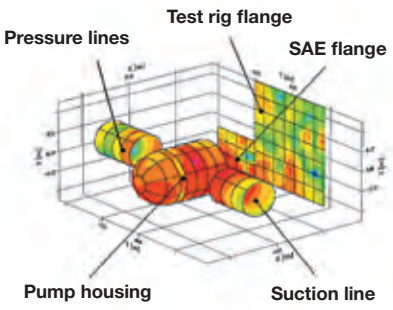
**CFD simulation**

- Timing simulation
- Determining optimal operating point by adaptation of valve plate geometry
- Improved efficiency and low pulsation



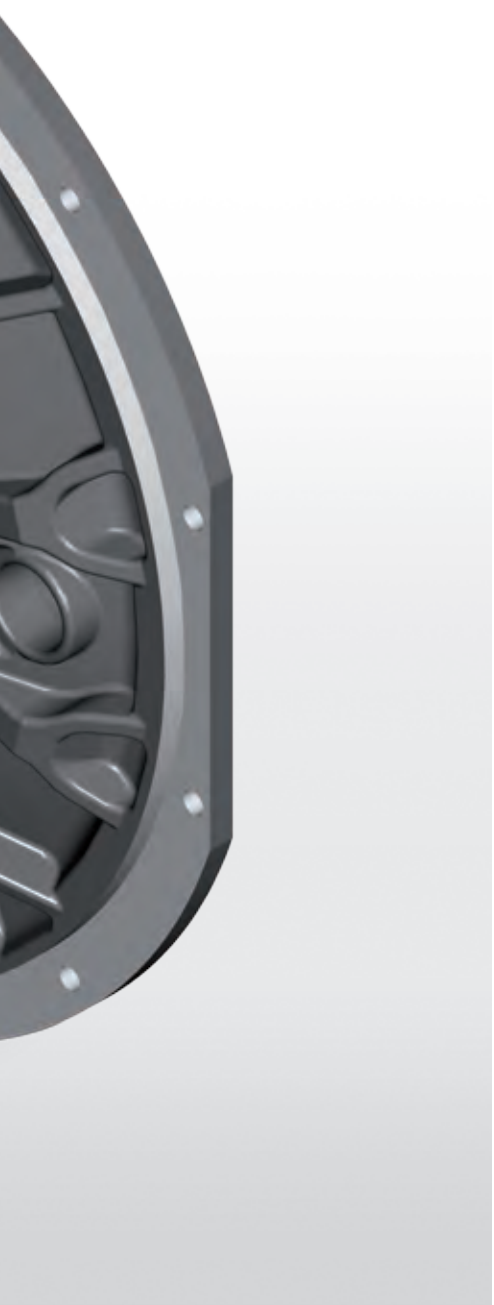
**Valve plate**

The discharching grooves exert an influence on noise generation and efficiency. They have been optimised by simulation and the results validated by testing.




Distribution of sound intensity.

# Low noise



Modern CAE tools are used for the design and development of Liebherr's hydraulic pumps and motors. Measurements are taken on the manufacturer's own acoustic test rig, in order to keep pulsation and noise emission as low as possible.

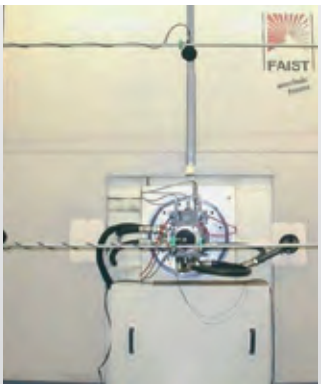
## Optimal construction

The strong, closed housing with integrated bearings for swivel joke adjustment and reinforced SAE assembling flanges reduce noise emissions considerably.

## Vibrational behavior

Using the finite element method (FEM) pump or motor vibration can be calculated and the shape and structure of the housing optimised. Increasing the rigidity of the housing has a positive effect on the acoustic behavior of the machine.

Noise is measured in an acoustic chamber




**Noise measurements**

Various tests are carried out:
- Long-term tests
- Component tests
- Function tests

# Contents

# Hydraulic pumps

## Open circuit

Axial piston pumps are designed for hydrostatic open-circuit drives. The flow volume is proportional to the drive speed and the displacement volume.
The volumetric flow can be varied steplessly by altering the displacement of the swashplate

### Operating pressure range, suction side

Absolute pressure at port S
P abs $_{min}$ = 0,8 bar
P abs $_{max}$= 2 bar

### Operating pressure range, output side

Pressure at port A
Series A:
Nominal pressure $P_N$ = 350 bar;
working pressure $P_{max}$ = 380 bar
Series D:
Nominal pressure $P_N$ = 380 bar;
working pressure $P_{max}$ = 400 bar

### Housing pressure

The maximum housing pressure of 2 bar should not be exceeded.

### Direction of rotation

Preferred direction of rotation: clockwise
Counter-clockwise rotation on request

### Through drive

Through drive to additional auxiliary pumps is possible on request.

### Installed position

Preferred installed position: with suction port at bottom.
Installed position to be avoided: regulating device at bottom.

### Zero displacement volume

Only possible for a short time at max. speed (risk of overheating).

For further technical data, see pages 14 to 25.

## Closed circuit

DPVG axial piston pumps are designed for closed circuit hydrostatic drives. The flow volume is proportional to the drive speed and displacement volume, and can be adjusted steplessly.
As the swivel angle of the swashplate increases, the volumetric flow rises from 0 toward its maximum value.
Two high pressure limiting and feed valves protect the pump and the motor, and are integrated directly into the DPVG.
The integrated auxiliary boost pump acts as a feed and control-circuit oil pump and is protected by a boost pressure relief valve. Integrated pressure cutoff is available as an option.

### Operating pressure range

Pressure at port A or B

| | |
|---|---|
| Nominal pressure $P_N$ | = 450 bar |
| Maximum pressure $P_{max}$ | = 500 bar |
| Boost pressure (at 2000 1/min) $P_{sp}$ | = 20 to 35 bar |

### Auxiliary pump

| | |
|---|---|
| Suction pressure Ps $_{min}$ | = 0.8 bar absolute |
| During cold start | = 0.5 bar absolute |

### Temperature range

The pumps are authorised to operate between - 25°C and 115°C.
For operation below - 25°C please consult the manufacturer.

### Pressure fluids

See page 27

### Fluid leakage pressure

Permissible fluid leakage pressure = 2 bar

### Installed position

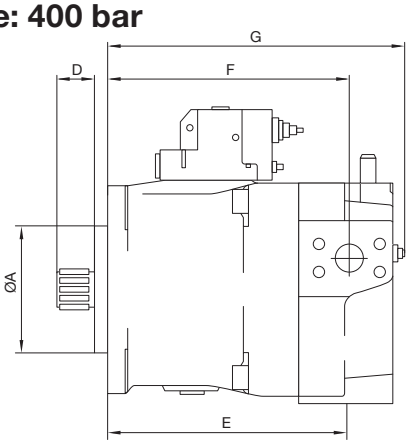
Any position is permitted. The housing must be filled with the pressure fluid and bled.

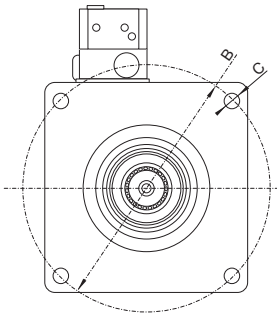
### Direction of rotation

Either direction is permitted

# Series D: variable displacement pump DPVO (open circuit)

## Nominal pressure: 380 bar / Maximum pressure: 400 bar




| Nominal size | | | | 108 | 165 | 215 | 215i* |
|---|---|---|---|---|---|---|---|
| Displacement | | $V_{g\,max}$ | cm³ | 107.7 | 167.8 | 216.6 | 216.6 |
| Max. speed | at $V_{g\,max}$ ** | $n_{max}$ | min⁻¹ | 2400 | 2100 | 2000 | 2500 |
| Volumetric flow | at $n_{max}$ | $q_{v\,max}$ | L/min | 258 | 352 | 433 | 542 |
| Drive power | $\Delta_p$ = 380 bar | $P_{max}$ | kW | 163 | 223 | 274 | 343 |
| Drive torque | $\Delta_p$ = 380 bar | $T_{max}$ | Nm | 651 | 1015 | 1310 | 1310 |

* with impeller.

** These values apply with an absolute pressure of 1 bar at the suction port. Higher suction limit values are possible if the suction pressure Pabs is raised at the suction port.

| Product dimensions*** | (mm) | 108 | 165 | 215 | 215i* |
|---|---|---|---|---|---|
| Splined shaft profile | DIN 5480 tol. 9g | W40x2x18 | W45x2x21 | W50x2x24 | W50x2x24 |
| Centering diameter | A | 361.95 | 447.7 | 447.7 | 165.1 |
| Screw connecting diameter | B | 403 | 466.7 | 466.7 | 317.5 |
| Fastening bores | C | 11 | 11 | 11 | 21 |
| Splined shaft length | D | 46 | 49 | 45 | 49.1 |
| SAE connection length, suction | E | 234.5 | 276.5 | 326 | 335 |
| SAE connection length, pressure | F | 250.5 | 260.5 | 329.5 | 319 |
| Overall length | G | 310.5 | 347.5 | 400 | 398 |
| Pressure port | SAE (6000 psi) | 1" | 1 1/4" | 1 1/2" | 1 1/2" |
| Suction port | SAE (500 psi) | 2 1/2" | 3" | 3 1/2" | 3 1/2" |
| Oil leakage port | | M26x1.5 | M26x1.5 | M33x2 | M33x2 |

*** Dimensions may vary according to configuration and additional equipment (installation drawing on request).

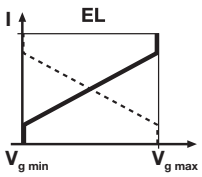
### Note

Various mounting flanges are possible (SAE J617a, SAE J744, DIN/ISO 3019)
Integrated gear-type pump for control circuit oil is possible.
Through-drive for pumps up to the same size as the installed pump is possible.

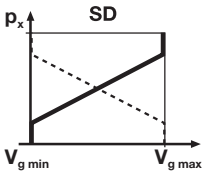
### Control / regulation

Other regulator function combinations available on request.

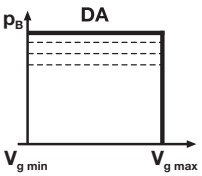
Electric proportional adjustment (positive or negative characteristic curve)



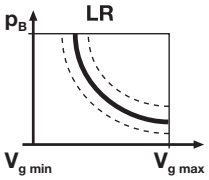

Hydraulic adjustment proportional to control pressure (positive or negative characteristic curve)



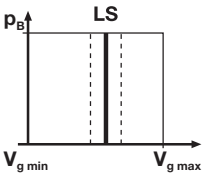

Pressure control or pressure cutoff




Hyperbolic power regulation




Load Sensing



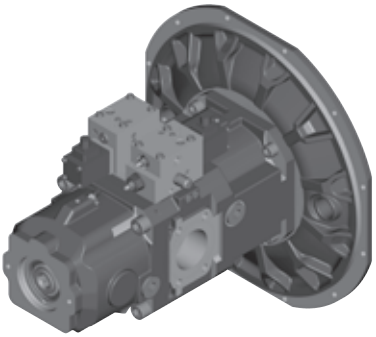
# Type key for Series D hydraulic pumps

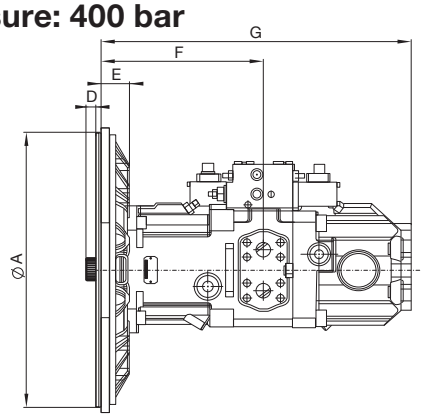
| | DPV | 0 | / | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pump type** | | | | | | | | | | | | | | |
| Variable displacement pump, series D | DPV | | | | | | | | | | | | | |
| **Circuit type** | | | | | | | | | | | | | | |
| Open | 0 | | | | | | | | | | | | | |
| **Nominal size** | | | | | | | | | | | | | | |
| | 108 165 215 | | | | | | | | | | | | | |
| **Minimum displacement*** | | | | | | | | | | | | | | |
| 0 - 15 % of $V_{g\,max}$, value in [cm³] | • • • | 000 - 032.5 | | | | | | | | | | | | |
| * Other values on request | | | | | | | | | | | | | | |
| **Control / regulation*** | | | | | | | | | | | | | | |
| Electric proportional adjustment / pressure cutoff | • • ○ | EL / DA | | | | | | | | | | | | |
| Hyperbolic power control / load sensing | • • • | LR / LS | | | | | | | | | | | | |
| Hyperbolic power control / hydraulic adjustment proportional to control pressure/ pressure cutoff | ○ ○ • | LR / SD / DA | | | | | | | | | | | | |
| Electric proportional adjustment / load sensing | ○ ○ • | EL / LS | | | | | | | | | | | | |
| Fan drive | • ○ ○ | LU | | | | | | | | | | | | |
| Pressure control or pressure cutoff | ○ ○ ○ | DA | | | | | | | | | | | | |
| * Other controls on request | | | | | | | | | | | | | | |
| **Version** | | | | | | | | | | | | | | |
| | | 1 | | | | | | | | | | | | |
| | | 2 | | | | | | | | | | | | |
| **Direction of rotation (looking at input shaft)** | | | | | | | | | | | | | | |
| right | • • • | R | | | | | | | | | | | | |
| left | ○ • • | L | | | | | | | | | | | | |
| **Mounting flange*** | | | | | | | | | | | | | | |
| Diesel engine flange SAE 1 (SAE J617a) | ○ ○ ○ | 11 | | | | | | | | | | | | |
| Diesel engine flange SAE 2 (SAE J617a) | • • • | 12 | | | | | | | | | | | | |
| Diesel engine flange SAE 3 (SAE J617a) | ○ ○ - | 13 | | | | | | | | | | | | |
| Diesel engine flange SAE 4 (SAE J617a) | • • - | 14 | | | | | | | | | | | | |
| SAE D (SAE J744) | ○ ○ - | 24 | | | | | | | | | | | | |
| SAE E (SAE J744) | - - • | 25 | | | | | | | | | | | | |
| DIN / ISO 3019 | • • ○ | 31 ... | | | | | | | | | | | | |
| Non-standard flange | ○ ○ ○ | 51 ... | | | | | | | | | | | | |
| * Other mounting flanges on request | | | | | | | | | | | | | | |
| **Shaft end** | | | | | | | | | | | | | | |
| Splined shaft DIN 5480 | • • • | 1 | | | | | | | | | | | | |
| Splined shaft SAE J744 | ○ ○ ○ | 2 | | | | | | | | | | | | |
| **Connections** | | | | | | | | | | | | | | |
| High-pressure ports: SAE (6000 PSI) | • • • | | | | | | | | | | | | | |
| Suction ports: SAE (500 PSI) | • • • | A | | | | | | | | | | | | |
| Oil leakage and control pressure ports: metric (DIN 3852) | • • • | | | | | | | | | | | | | |
| All ports: metric thread | ○ ○ ○ | B | | | | | | | | | | | | |
| **Charge pump / impeller** | | | | | | | | | | | | | | |
| Without impeller | • • - | O | | | | | | | | | | | | |
| With impeller | - - • | I | | | | | | | | | | | | |
| **Gear-type pump for control circuit oil** | | | | | | | | | | | | | | |
| Without gear-type pump | • • • | 00 | | | | | | | | | | | | |
| With gear-type pump $V_g$ = 24 [cm³] | • • ○ | 24 | | | | | | | | | | | | |
| **Through-drive** | | | | | | | | | | | | | | |
| Without through-drive | • • • | 0 | | | | | | | | | | | | |
| SAE A | ○ ○ ○ | A | | | | | | | | | | | | |
| SAE B | • • • | B | | | | | | | | | | | | |
| SAE C | ○ ○ ○ | C | | | | | | | | | | | | |
| SAE D | ○ • ○ | D | | | | | | | | | | | | |
| SAE E | ○ ○ • | E | | | | | | | | | | | | |
| Non-standard flange with through-drive | • • ○ | K | | | | | | | | | | | | |

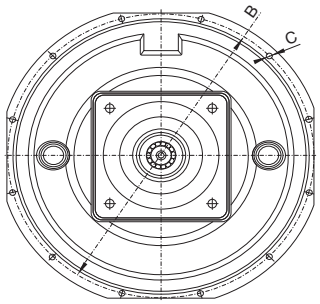
• available
○ on request
- not available

# Series D: double variable displacement pump DPVD (open circuit)

## Nominal pressure: 380 bar / Maximum pressure: 400 bar






| **Nominal size** | All data for each drive | | | **108** |
|---|---|---|---|---|
| Displacement | | $V_{g\,max}$ | $cm^3$ | 107.7 |
| Max. speed | at $V_{g\,max}$* | $n_{max}$ | $min^{-1}$ | 2200 |
| Volumetric flow | at $n_{max}$ | $q_{v\,max}$ | L/min | 237 |
| Drive power | $\Delta_p$ = 380 bar | $P_{max}$ | kW | 150 |
| Drive torque | $\Delta_p$ = 380 bar | $T_{max}$ | Nm | 651 |

* These values apply with an absolute pressure of 1 bar at the suction port. Higher suction limit values are possible if the suction pressure Pabs is raised at the suction port. .

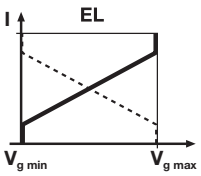
| **Product dimensions**** | **(mm)** | **108** |
|---|---|---|
| Splined shaft profile | DIN 5480 tol. 9g | W40x2x18 |
| Centering diameter | A | 511.18 |
| Screw connecting diameter | B | 530.2 |
| Fastening bores | C | 11 |
| Splined shaft length | D | 45 |
| Shaft collar / mounting flange | E | 48 |
| Connection length, SAE flanges (suction and pressure) | F | 277.9 |
| Overall length | G | 531.9 |
| Pressure ports | SAE (6000 psi) | 1'' |
| Suction port | SAE (500 psi) | 3'' |
| Oil leakage port | | M33x2 |

** Dimensions may vary according to configuration and additional equipment (installation drawing on request).

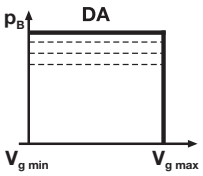
### Control / regulation

Other regulator function combinations available on request.

Electric proportional adjustment




Pressure control or pressure cutoff



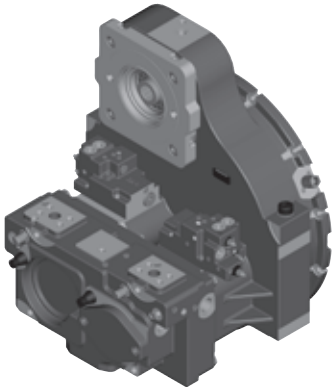
# Type key for Series D hydraulic pumps

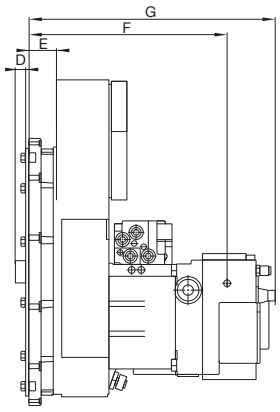
| | DPVD | O | | / | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pump type** | | | | | | | | | | | | | | |
| Double variable displacement pump, Series D | DPVD | | | | | | | | | | | | | |
| **Circuit type** | | | | | | | | | | | | | | |
| Open | O | | | | | | | | | | | | | |
| **Nominal size (per drive)** | | | | | | | | | | | | | | |
| | 108 | | | | | | | | | | | | | |
| **Minimum displacement (per drive)*** | | | | | | | | | | | | | | |
| 0 - 15 % of $V_{g\,max}$, value in [cm³] | • | 000 - 020 | | | | | | | | | | | | |
| * Other values on request | | | | | | | | | | | | | | |
| **Control / regulation**** | | | | | | | | | | | | | | |
| Electric proportional adjustment / pressure cutoff | • | EI/DA | | | | | | | | | | | | |
| ** Other controls on request | | | | | | | | | | | | | | |
| **Version** | | | | | | | | | | | | | | |
| | | 1 | | | | | | | | | | | | |
| **Direction of rotation (looking at input shaft)** | | | | | | | | | | | | | | |
| right | • | R | | | | | | | | | | | | |
| left | ○ | L | | | | | | | | | | | | |
| **Mounting flange***** | | | | | | | | | | | | | | |
| Diesel engine flange SAE 1 (SAE J617a) | • | 11 | | | | | | | | | | | | |
| Diesel engine flange SAE 2 (SAE J617a) | ○ | 12 | | | | | | | | | | | | |
| Diesel engine flange SAE 3 (SAE J617a) | ○ | 13 | | | | | | | | | | | | |
| Diesel engine flange SAE 4 (SAE J617a) | ○ | 14 | | | | | | | | | | | | |
| SAE D (SAE J744) | ○ | 24 | | | | | | | | | | | | |
| DIN / ISO 3019 | ○ | 31 ... | | | | | | | | | | | | |
| Non-standard flange | ○ | 51 ... | | | | | | | | | | | | |
| *** Other mounting flanges on request | | | | | | | | | | | | | | |
| **Shaft end** | | | | | | | | | | | | | | |
| Splined shaft DIN 5480 | • | 1 | | | | | | | | | | | | |
| Splined shaft SAE J744 | ○ | 2 | | | | | | | | | | | | |
| **Connections** | | | | | | | | | | | | | | |
| High-pressure ports: SAE (6000 PSI) | • | | | | | | | | | | | | | |
| Suction ports: SAE (500 PSI) | • | A | | | | | | | | | | | | |
| Oil leakage and control pressure ports: metric (DIN 3852) | • | | | | | | | | | | | | | |
| All ports: metric thread | ○ | B | | | | | | | | | | | | |
| **Charge pump / impeller** | | | | | | | | | | | | | | |
| Without impeller | • | O | | | | | | | | | | | | |
| With impeller | - | I | | | | | | | | | | | | |
| **Gear-type pump for control circuit oil** | | | | | | | | | | | | | | |
| Without gear-type pump | • | 00 | | | | | | | | | | | | |
| With gear-type pump $V_g$ = 24 [cm³] | ○ | 24 | | | | | | | | | | | | |
| **Through-drive** | | | | | | | | | | | | | | |
| Without through-drive | ○ | 0 | | | | | | | | | | | | |
| SAE A | ○ | A | | | | | | | | | | | | |
| SAE B | • | B | | | | | | | | | | | | |
| Non-standard flange with through-drive | ○ | K | | | | | | | | | | | | |

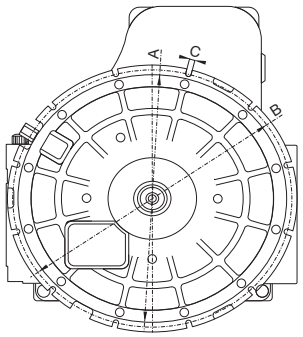
• available
○ on request
- not available

# Series D: parallel variable displacement pump DPVP (open circuit)

## Nominal pressure: 380 bar / Maximum pressure: 400 bar






| Nominal size | All data for each power unit | | | 108 | 165 | 165i* |
|---|---|---|---|---|---|---|
| Displacement | | $V_{g\,max}$ | $cm^3$ | 107.7 | 167.8 | 167.8 |
| Max. drive speed | at $V_{g\,max}$ ** | $n_{max}$ | $min^{-1}$ | 2300 | 2100 | 2600 |
| Volumetric flow | at $n_{max}$ | $q_{v\,max}$ | L/min | 248 | 352 | 436 |
| Drive power | $\Delta_p$ = 380 bar | $P_{max}$ | kW | 163 | 223 | 276 |
| Drive torque | $\Delta_p$ = 380 bar | $T_{max}$ | Nm | 651 | 1015 | 1015 |

* with impeller.

** These values apply with an absolute pressure of 1 bar at the suction port. Higher suction limit values are possible if the suction pressure Pabs is raised at the suction port.

| Product dimensions*** | (mm) | 108 | 165 | 165i* |
|---|---|---|---|---|
| Splined shaft profile | DIN 5480 tol. 9g | W50x2x24 | W70x3x22 | W70x3x22 |
| Centering diameter | A | 511.18 **** | 511.18 | 511.18 |
| Screw connecting diameter | B | 530.2 | 530.2 | 530.2 |
| Fastening bores | C | 11 | 11 | 11 |
| Splined shaft length | D | 45 | 67 | 67 |
| Shaft collar / mounting flange | E | 46 | 26,5 | 26,5 |
| SAE connection length pressure | F | 369.4 | 423 | 423 |
| Overall length | G | 462 | 517.9 | 605.9 |
| Pressure ports | SAE (6000 psi) | 1" | 1 1/4" | 1 1/4" |
| Suction port | SAE (500 psi) | 3" | 4" | 3" |
| Oil leakage port | | M33x2 | M33x2 | M33x2 |

*** Dimensions may vary according to configuration and additional equipment (installation drawing on request).
****DPVP 108 also available with SAE-2 mounting flange.

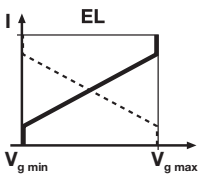
### Note

DPVP pumps can be used in single or twin circuit systems.
Integrated gear-type pump for control circuit oil (24 cc) standard on output II, other versions on request.
Pump transmission housing with and without 3rd output (direction of rotation left or right possible at output III).
Through-drives to output I and/or output II are possible.
Different pump transmission ratios are possible (precise data available on request)

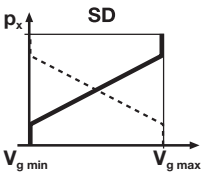
### Control / regulation

Other regulator function combinations available on request.

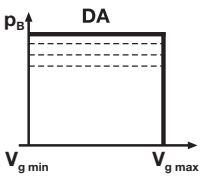
Electric proportional adjustment (positive or negative characteristic curve)



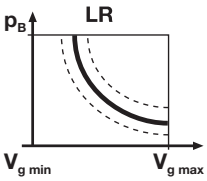

Hydraulic adjustment proportional to control pressure (positive or negative characteristic curve)



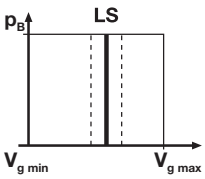

Pressure control or pressure cutoff



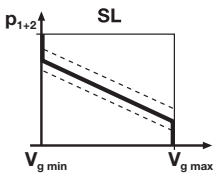

Hyperbolic power regulation




Load Sensing




Cumulative power regulation



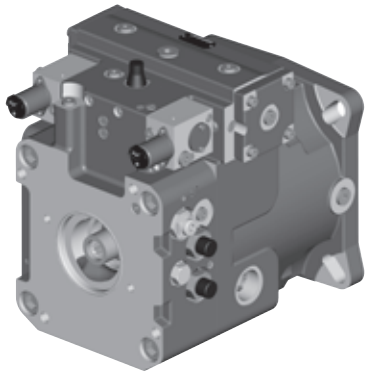
# Type key for Series D hydraulic pumps

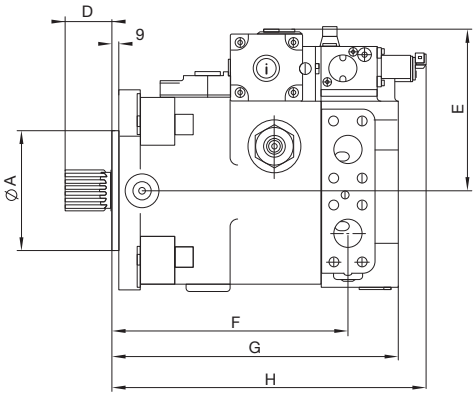
| | | | |
|---|---|---|---|
| | DPVP | O | / |
| **Pump type** | | | |
| Parallel variable displacement pump, Series D | DPVP | | |
| **Circuit type** | | | |
| Open | O | | |
| **Nominal size (per drive)** | | | |
| | 108 | 165 | |
| **Minimum displacement (per drive)*** | | | |
| 0 - 15 % of $V_{g\,max}$, value in [cm³] | • | • | 000 - 034 |
| * Other values on request | | | |
| **Control / regulation**** | | | |
| Electric proportional adjustment / pressure cutoff | ○ | ○ | EL / DA |
| Hyperbolic power control / load sensing | • | ○ | LR / LS |
| Cumulative power control / Adjustment proportional to control pressure | • | • | SL / SD |
| Hyperbolic power control / Adjustment proportional to control pressure / pressure cutoff | • | • | LR / SD / DA |
| Electric proportional adjustment / Load sensing | • | • | EL / LS |
| ** Other controls on request | | | |
| **Version** | | | |
| | | | 1 |
| **Direction of rotation (looking at input shaft)** | | | |
| right | • | • | R |
| left | - | - | L |
| **Mounting flange** | | | |
| Diesel engine flange SAE 1 (SAE J617a) | • | • | 11 |
| Diesel engine flange SAE 2 (SAE J617a) | • | - | 12 |
| **Shaft end** | | | |
| Splined shaft DIN 5480 | • | • | 1 |
| Splined shaft SAE J744 | ○ | ○ | 2 |
| **Connections** | | | |
| High-pressure ports: SAE (6000 PSI) | • | • | |
| Suction ports: SAE (500 PSI) | • | • | A |
| Oil leakage and control pressure ports: metric (DIN 3852) | • | • | |
| All ports: metric thread | ○ | ○ | B |
| **Charge pump / impeller** | | | |
| Without impeller | • | • | O |
| With impeller | - | • | I |
| **Gear-type pump** | | | |
| Without gear-type pump | ○ | ○ | 00 |
| With gear-type pump $V_g$ = 24 [cm³] | • | • | 24 |
| **Through-drive (side P1 and / or P2)** | | | |
| Without through-drive | • | • | 0 |
| SAE A | ○ | ○ | A |
| SAE B | • | • | B |
| SAE C | ○ | ○ | C |
| SAE D | ○ | ○ | D |

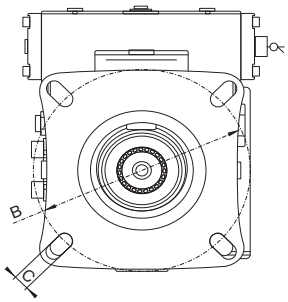
• available
○ on request
- not available

# Series D: variable displacement pump DPVG (closed circuit)

## Nominal pressure: 450 bar / Maximum pressure: 500 bar






| Nominal size | | | | 108 | 165 | 250 |
|---|---|---|---|---|---|---|
| Displacement | | $V_{g\,max}$ | $cm^3$ | 107.7 | 167.8 | 250.5 |
| Max. speed | at $V_{g\,max}$ | $n_{max}$ | $min^{-1}$ | 3000 | 2700 | 2400 |
| Volumetric flow | at $n_{max}$ | $q_{v\,max}$ | L/min | 323 | 453 | 601 |
| Drive power | $\Delta_p$ = 430 bar | $P_{max}$ | kW | 232 | 325 | 431 |
| Drive torque | $\Delta_p$ = 430 bar | $T_{max}$ | Nm | 737 | 1149 | 1715 |

| Product dimensions* | (mm) | 108 | 165 | 250 |
|---|---|---|---|---|
| Splined shaft profile | DIN 5480 tol. 9g | W40x2x18 | W45x2x21 | W55x2x26 |
| Centering diameter | A | 180 | 200 | 224 |
| Screw connecting diameter | B | 224 | 250 | 280 |
| Fastening bores | C | 17 | 21 | 22 |
| Splined shaft length | D | 45 | 51 | 56 |
| Height adjustment | E | 190 | 206 | 225.5 |
| SAE connection length, pressure | F | 223 | 270 | 293 |
| Length without/with integrated feed pump | G | 268 / 315.5 | - / 323 | 366.5 / - |
| Overall length | H | 330.5 | 358.5 | 392.5 |
| Pressure ports | SAE (6000 psi) | 1" | 1 1/4" | 1 1/2" |
| Oil leakage port | | M33x2 | M42x2 | M42x2 |

* Dimensions may vary according to configuration and additional equipment (installation drawing on request).

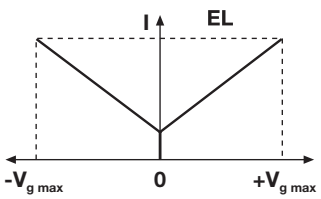
### Note

Different mounting flanges are possible (SAE J617a, SAE J744, DIN/ISO 3019).
With/without integrated boost pump; integrated boost pressure relief valve is possible.
Through drive for pumps up to same size is possible.
HD port are possible at the side or underneath.

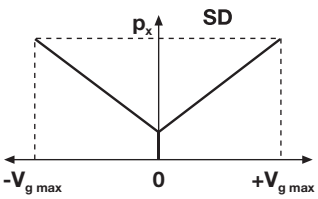
### Control / regulation

Other regulator function combinations available on request.

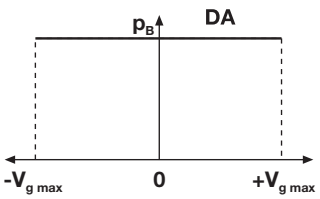
Electric proportional adjustment




Hydraulic proportional adjustment depending on control pressure




Pressure cutoff



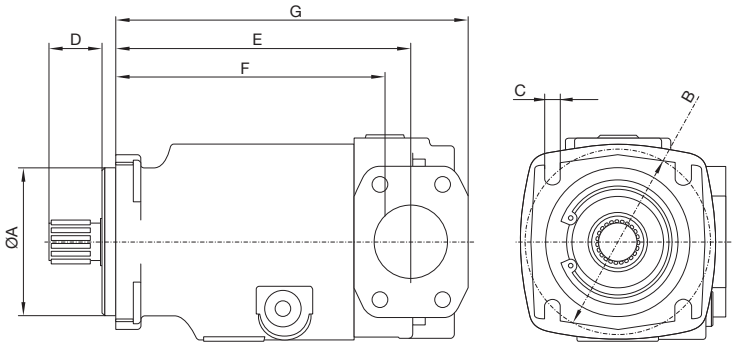
# Type key for Series D hydraulic pumps

| | DPVG | G | / | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Pump type** | | | | | | | | | | | | | | | |
| Variable displacement pump, series D | DPVG | | | | | | | | | | | | | | |
| **Circuit type** | | | | | | | | | | | | | | | |
| closed | G | | | | | | | | | | | | | | |
| **Nominal size** | | | | | | | | | | | | | | | |
| | 108 165 250 | | | | | | | | | | | | | | |
| **Minimum displacement** | | | | | | | | | | | | | | | |
| $V_{g\,min}$ = 0 (cm³) | • • • | 000 | | | | | | | | | | | | | |
| **Control / regulation** | | | | | | | | | | | | | | | |
| Electric proportional adjustment / pressure cutoff | • • • | EL / DA | | | | | | | | | | | | | |
| Electric proportional adjustment | ○ ○ • | EL | | | | | | | | | | | | | |
| Hydraulic proportional adjustment depending on control pressure | ○ ○ ○ | SD | | | | | | | | | | | | | |
| Torque control, hydraulic | ○ ○ • | TCH | | | | | | | | | | | | | |
| Torque control, electric | ○ ○ ○ | TCE | | | | | | | | | | | | | |
| Speed control, hydraulic | ○ ○ ○ | DZH | | | | | | | | | | | | | |
| Speed control, electric | ○ ○ ○ | DZE | | | | | | | | | | | | | |
| **Version** | | | | | | | | | | | | | | | |
| | | 1 | | | | | | | | | | | | | |
| **Direction of rotation (looking at input shaft)** | | | | | | | | | | | | | | | |
| right | • • • | R | | | | | | | | | | | | | |
| left | • • • | L | | | | | | | | | | | | | |
| **Mounting flange*** | | | | | | | | | | | | | | | |
| Diesel engine flange SAE 1 (SAE J617a) | ○ ○ ○ | 11 | | | | | | | | | | | | | |
| Diesel engine flange SAE 2 (SAE J617a) | ○ ○ ○ | 12 | | | | | | | | | | | | | |
| Diesel engine flange SAE 3 (SAE J617a) | ○ ○ ○ | 13 | | | | | | | | | | | | | |
| Diesel engine flange SAE 4 (SAE J617a) | ○ ○ - | 14 | | | | | | | | | | | | | |
| SAE D (SAE J744) | ○ ○ - | 24 | | | | | | | | | | | | | |
| SAE E (SAE J744) | - ○ • | 25 | | | | | | | | | | | | | |
| DIN / ISO 3019 | • • • | 31 ... | | | | | | | | | | | | | |
| Transmission flange | ○ ○ ○ | 41 ... | | | | | | | | | | | | | |
| Non-standard flange | ○ ○ ○ | 51 ... | | | | | | | | | | | | | |
| * Other mounting flanges on request | | | | | | | | | | | | | | | |
| **Shaft end** | | | | | | | | | | | | | | | |
| Splined shaft DIN 5480 | • • • | 1 | | | | | | | | | | | | | |
| Splined shaft SAE J744 | ○ ○ ○ | 2 | | | | | | | | | | | | | |
| **Connections** | | | | | | | | | | | | | | | |
| High pressure ports: SAE (6000 PSI) | • • • | | | | | | | | | | | | | | |
| Suction ports: SAE (500 PSI) | • • ○ | A | | | | | | | | | | | | | |
| Oil leakage and control pressure ports: metric (DIN 3852) | • • • | | | | | | | | | | | | | | |
| All ports: metric thread | ○ ○ ○ | B | | | | | | | | | | | | | |
| **Attachments** | | | | | | | | | | | | | | | |
| No attachment | • • • | O | | | | | | | | | | | | | |
| **Integrated boost pump**** | | | | | | | | | | | | | | | |
| Without boost pump | • ○ • | 00 | | | | | | | | | | | | | |
| With boost pump, $V_g$ = 30 [cm³] | • ○ ○ | 30 | | | | | | | | | | | | | |
| With boost pump, $V_g$ = 40 [cm³] | • ○ ○ | 40 | | | | | | | | | | | | | |
| With boost pump, $V_g$ = 50 [cm³] | ○ • ○ | 50 | | | | | | | | | | | | | |
| ** Other nominal sizes on request | | | | | | | | | | | | | | | |
| **Through-drive** | | | | | | | | | | | | | | | |
| Without through-drive | ○ ○ • | 0 | | | | | | | | | | | | | |
| SAE A | ○ ○ ○ | A | | | | | | | | | | | | | |
| SAE B | • • • | B | | | | | | | | | | | | | |
| SAE C | ○ ○ ○ | C | | | | | | | | | | | | | |
| SAE D | ○ ○ • | D | | | | | | | | | | | | | |
| SAE E | ○ ○ ○ | E | | | | | | | | | | | | | |
| Non-standard flange with through-drive | • ○ • | K | | | | | | | | | | | | | |
| **Valve** | | | | | | | | | | | | | | | |
| Feed valve | • • • | NS | | | | | | | | | | | | | |
| High pressure relief valve | • • • | DB | | | | | | | | | | | | | |

• available
○ on request
- not available

# Series A: constant displacement pump LPF (open circuit)

## Nominal pressure: 350 bar / Maximum pressure: 380 bar

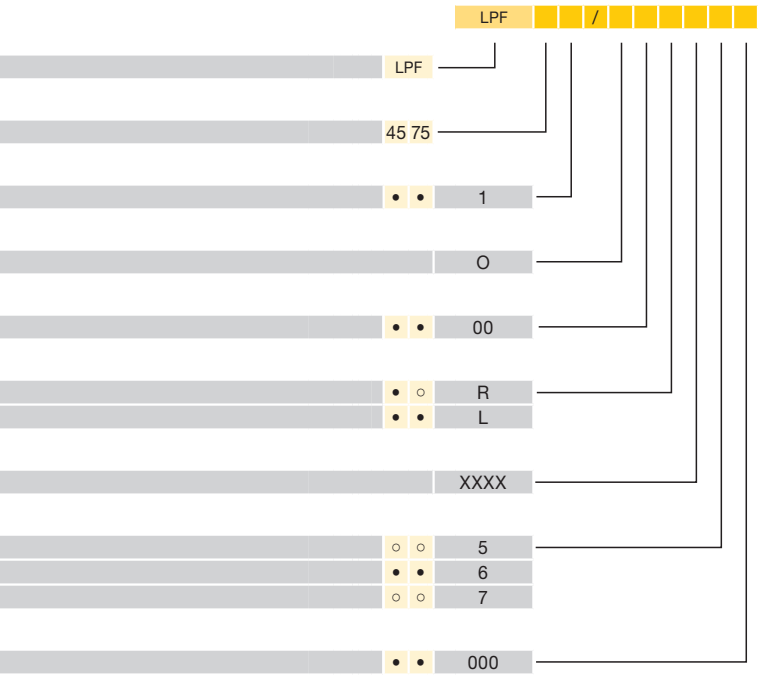



| Nominal size | | | | 45 | 75 |
|---|---|---|---|---|---|
| Displacement | | $V_{g\,max}$ | $cm^3$ | 45.6 | 75 |
| Max. speed | at $V_{g\,max}$ | $n_{max}$ | $min^{-1}$ | 2700 | 2540 |
| Volumetric flow | at $n_{max}$ | $q_{v\,max}$ | L/min | 123 | 191 |
| Drive power | $\Delta_p$ = 350 bar | $P_{max}$ | kW | 82 | 127 |
| Drive torque | $\Delta_p$ = 350 bar | $T_{max}$ | Nm | 290 | 478 |

| Product dimensions* | (mm) | 45 | 75 |
|---|---|---|---|
| Splined shaft profile | DIN 5480 tol. 9g | W30x2x14 | W35x2x16 |
| Centering diameter | A | 100 | 125 |
| Screw connecting diameter | B | 125 | 160 |
| Fastening bores | C | 11.5 | 14 |
| Splined shaft length | D | 35 | 41.5 |
| SAE connection length, suction | E | 199.5 | 221.5 |
| SAE connection length, pressure | F | 186 | 205 |
| Overall length | G | 238 | 266 |
| Pressure port | SAE (6000 psi) | 3/4" | 1" |
| Suction port | SAE (500 psi) | 2" | 2" |
| Oil leakage port | | M18x1.5 | M18x1.5 |

* Dimensions may vary according to configuration and additional equipment (installation drawing on request).

# Type key for Series A hydraulic pumps

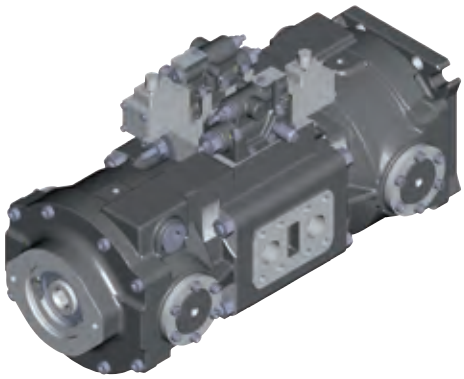


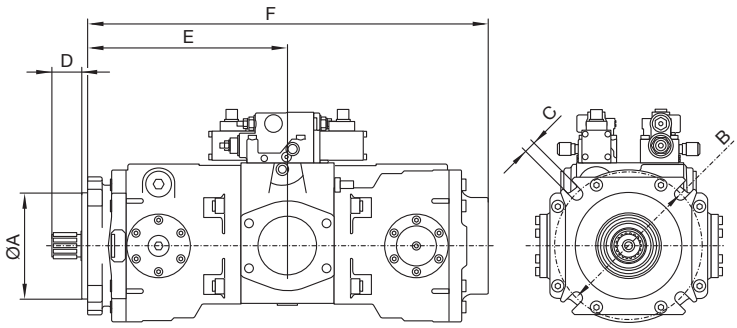

| | | | |
|---|---|---|---|
| **Pump type** | | | |
| Constant displacement pump, Series A | | | LPF |
| **Nominal size** | | | |
| | | | 45 75 |
| **Version** | | | |
| | • | • | 1 |
| **Circuit type** | | | |
| Open | | | O |
| **Control / regulation** | | | |
| No regulator | • | • | 00 |
| **Direction of rotation (looking at input shaft)** | | | |
| right | • | ○ | R |
| left | • | • | L |
| **Drive speed** | | | |
| Applied speed value [1/min] | | | XXXX |
| **Mounting flange** | | | |
| Non-standard flange | ○ | ○ | 5 |
| ISO 4-hole | • | • | 6 |
| ISO 2-hole | ○ | ○ | 7 |
| **Gear-type pump / Through-drive** | | | |
| Without through drive and gear-type pump | • | • | 000 |

• available
○ on request
- not available

# Series A: Double variable displacement pump LPVD (open circuit)

## Nominal pressure: 350 bar / Maximum pressure: 380 bar






| **Nominal size** All data for each power unit | | | | **45** | **64** | **75** | **90** | **100** | **107** | **125** | **140** | **150** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Displacement | | $V_{g\,max}$ | $cm^3$ | 45.6 | 64.3 | 75 | 90.7 | 103.1 | 107.6 | 125.6 | 141.2 | 151.4 |
| Max. speed | at $V_{g\,max}$* | $n_{max}$ | $min^{-1}$ | 3000 | 2760 | 2540 | 2430 | 2320 | 2290 | 2180 | 2150 | 2100 |
| Volumetric flow | at $n_{max}$ | $q_{v\,max}$ | L/min | 137 | 177 | 191 | 220 | 239 | 246 | 274 | 304 | 318 |
| Drive power | $\Delta_p$ = 350 bar | $P_{max}$ | kW | 91 | 118 | 127 | 147 | 159 | 164 | 183 | 203 | 212 |
| Drive torque | $\Delta_p$ = 350 bar | $T_{max}$ | Nm | 290 | 408 | 477 | 578 | 654 | 684 | 802 | 902 | 964 |

* These values apply with an absolute pressure of 1 bar at the suction port. Higher suction limit values are possible if the suction pressure Pabs is raised at the suction port.

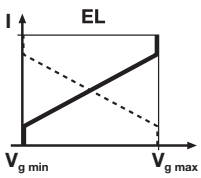
| **Product dimensions**** | **(mm)** | **45** | **64** | **75** | **90** | **100** | **107** | **125** | **140** | **150** |
|---|---|---|---|---|---|---|---|---|---|---|
| Splined shaft profile | DIN 5480 Tol. 9g | W30x2x14 | W35x2x16 | W35x2x16 | W35x2x16 | W40x2x18 | W40x2x18 | W40x2x18 | W40x2x18 | W40x2x18 |
| Centering diameter | A | 127 | 361.95 | 447.7 | 447.7 | 447.7 | 447.7 | 511.18 | 160 | 160 |
| Screw connecting diameter | B | 246.4 | 381 | 466.7 | 466.7 | 466.7 | 466.7 | 530.2 | 310 | 310 |
| Fastening bores | C | 17 | 11 | 11 | 11 | 17 | 11 | 11 | 18 | 18 |
| Splined shaft length | D | 35 | 41 | 41.5 | 41 | 47.25 | 47.25 | 47 | 46 | 46 |
| Connection length. SAE flanges (suction and pressure) | E | 219 | 249 | 259 | 283.5 | 258 | 258 | 310 | 310 | 310 |
| Overall length | F | 449 | 517 | 561 | 563.5 | 583 | 583 | 624 | 624 | 624 |
| Pressure ports | SAE (6000 psi) | 3/4" | 1" | 1" | 1" | 1" | 1" | 1 1/4" | 1 1/4" | 1 1/4" |
| Suction port | SAE (500 psi) | 2 1/2" | 3" | 3" | 3" | 3" | 3" | 3 1/2" | 3 1/2" | 3 1/2" |
| Oil leakage port | | M33x2 | M26x1.5 | M33x2 | M26x1.5 | M33x2 | M33x2 | M33x2 | M33x2 | M32x2 |

** Dimensions may vary according to configuration and additional equipment (installation drawing on request).

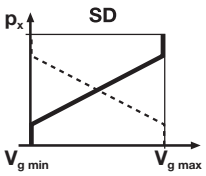
## Control / regulation

Other regulator function combinations available on request.

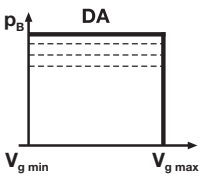
Electric proportional adjustment (positive or negative characteristic curve)



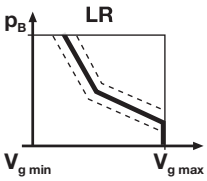

Hydraulic adjustment proportional to control pressure (positive or negative characteristic curve)



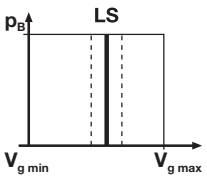

Pressure control or pressure cutoff



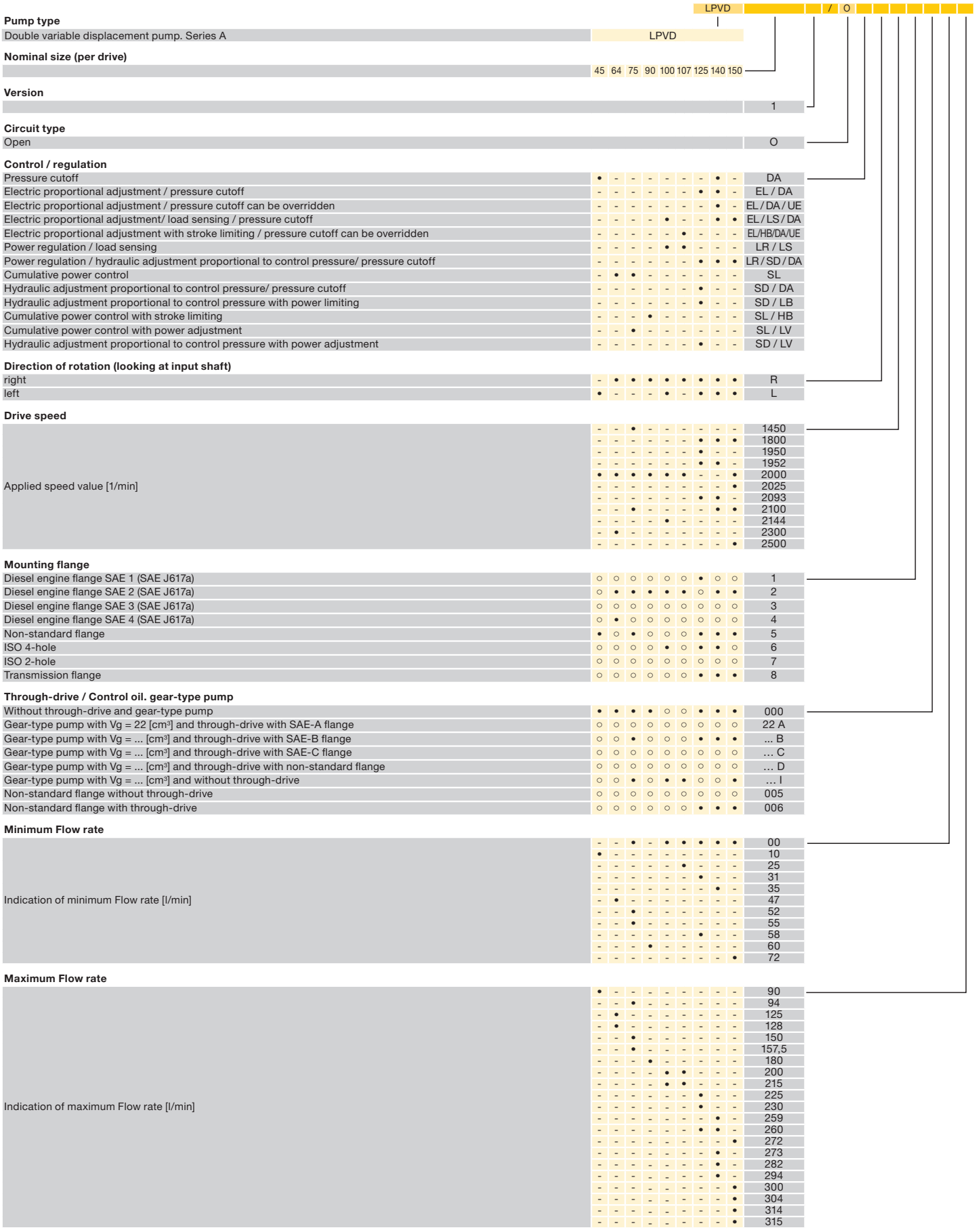

Power regulation



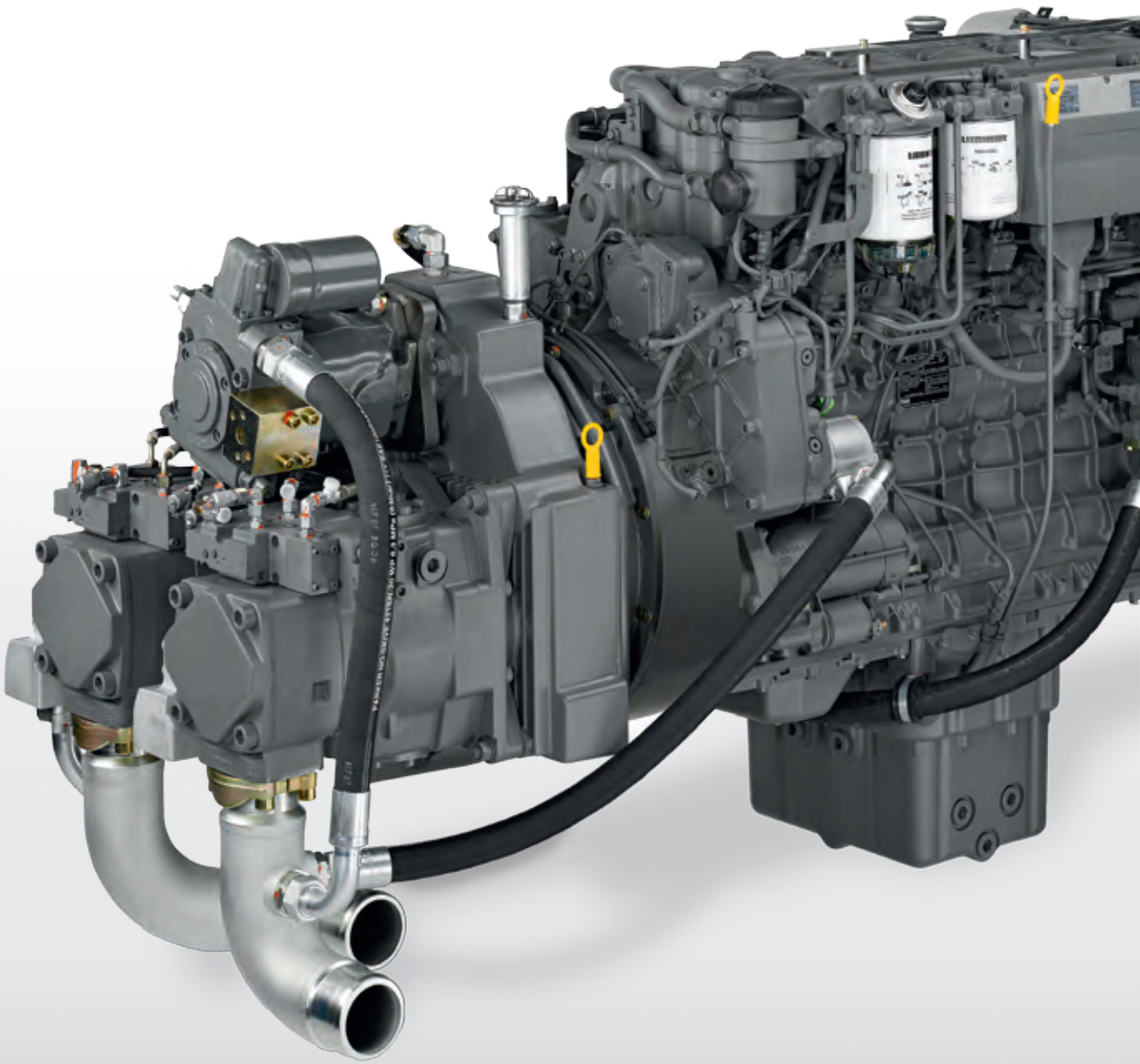

Load Sensing

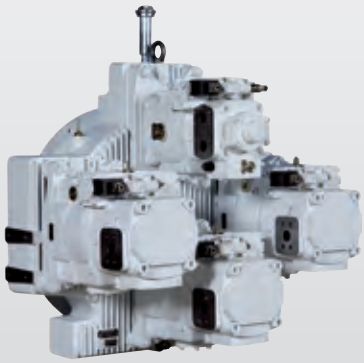


# Type key for Series A hydraulic pumps



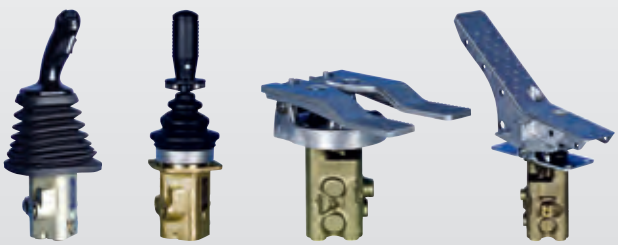

- • available
- ○ on request
- - not available





**Multi-circuit unit**

MKA 450 D
Power rating 504 kW
3 axial piston pumps
250 cc/rev
1 axial piston pump
75 cc/rev



**Pilot control units**

Hand and foot operated hydraulic pilot control units

# Example of a drive train assembly

**AG936**
270 kW (1.500 - 1.800 U/min)

1 multi-output pump splitter box
2 pumps in open circuit
1 pump in closed circuit
1 low-pressure pump
1 gear-type pump

**Multi-circuit unit**

MKA 450 C
Power rating 360 kW
2 axial piston pumps
250 cc/rev
One output not in use

# Liebherr-Component Technologies

Liebherr-Component Technologies AG, with headquarter in Bulle, Switzerland, is responsible for all activities involving the components sector within the Liebherr Group. The companies and corporate units belonging to this sector are specialized in the development, design, manufacture and reconditioning of high performance components in the field of mechanical, hydraulic, and electrical drive as well as control technology.

## Long Years of Experience

Liebherr has decades of experience in the field of top quality components, for use in cranes, construction machinery, in the mining industry, maritime applications, wind turbines, automotive engineering, the aerospace sector, and in transport technology. Synergy effects from the other product sectors of the Liebherr Group of Companies are put to rational use in driving ahead with constant technological further development.

## The Right Solution for Every Need

Thanks to the in-depth manufacturing techniques and the use of the most modern and flexible production resources, Liebherr can provide customers with tailor-made solutions. Every component is developed to meet individual wishes and requirements. Liebherr is your partner for achieving success together, from the product idea to development, manufacture, and taking into service, and right on up to series manufacture. For the mechanical and hydraulic drive train components Liebherr offers reconditioning in different stages from a specialised works.

## System Solutions from One Source

Components from Liebherr are perfectly matched to one another in their functional performance, and in combination they achieve maximum total levels of effect and efficiency. Depending on the requirement, individual components from the broad product selection can be extended up to the complete drive train. This creates system solutions with real conviction, which can be integrated into a whole range of applications.

## Quality and Cutting Edge Technologies

All components meet the highest demands for functional reliability and long service life, even under the toughest conditions. A refined quality management and extensive inspection and testing procedures are applied throughout the entire development and manufacturing process. So they ensure the reliability and long life of the components. Highly qualified staff with a real sense of responsibility plays their part in achieving the fine Liebherr quality standard.

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