Axial piston-compact unit A4CSG

Size 250...750
Series 3
Nominal pressure 350 bar
Peak pressure 400 bar

closed loop circuit

Contents

- Model code/standard program: 2, 3
- Fluid: 4
- Technical data: 5...7
- Control- and adjustment devices: 8, 9
- Unit dimensions size 250: 10, 11
- Unit dimensions size 355: 12, 13
- Unit dimensions size 500: 14, 15
- Unit dimensions size 750: 16, 17
- Through drive: 18
- Overview combination options onto A4CSG: 18
- Dimensions of pump combinations and through drives F/K99: 19
- Dimensions through drives F/K99 and F/K34: 20
- Dimensions through drives F/K35 and F/K77: 21
- Dimensions through drives F/K43 and F/K01: 22
- Dimensions through drives F/K02 and F/K68: 23
- Dimensions through drives F/K04 and F/K07: 24
- Dimensions through drives F/K17 and types of filtration: 25
- Integrated boost pump and valve technology - circuit diagram: 26
- Integrated boost pump and valve technology - description: 27
- Mounted boost pump filter - dimensions: 28
- Mounted boost pump filter - circuit diagram: 29
- External supply of boost pressure - without boost pump: 30
- Installation and commissioning instructions: 31
- Safety instructions: 32

Features

- Axial piston variable displacement, swashplate design for hydrostatic drives in closed circuits.
- The flow is proportional to input speed and displacement. It can be infinitely varied by adjustment of the swashplate.
- The necessary boost pump and all required control valves are integrated.
- One common auxiliary pump for boost and EP-control pressure
- Compact design (extremely small in length)
- Favourable power to weight ratio
- Low noise level
- Long service life
- High efficiency
- New electro-hydr. control EP with proportional solenoid and zero displacement position at power loss
- Throughdrive for multiple pump combinations also possible with integrated boost pump

For further information on control- and regulating devices see separate data sheets
RE 92 072, RE 92 076 and RE 92 080
## Model code / standard program

### Axial piston unit
- Compact unit, swashplate design, variable

### Type of operation
- Pump, closed circuit operation

### Size
- **Displacement** $V_{g_{max}}$ (cm$^3$)
  - 250 355 500 750

### Control and adjustment devices
- **Manual adjustment**
  - MA
- **Electric motor adjustment**
  - EM
- **Hydr. adjustment, control volume dependent**
  - HM
- **Hydr. adjustment with servo-/ proportional valve**
  - HS
- **Electronic control**
  - EO
- **Hydr.control , pilot pressure dependent**
  - HD
- **Electro-hydr. control with proportional solenoid**
  - EP

### Series
- 30

### Direction of rotation
- **viewing at shaft end**
  - clockwise R
  - counter-clockwise L

### Seals
- FPM (Fluorcarbon rubber)

**Shaft end**
- 250 355 500 750
  - Metric keyed parallel shaft DIN 6885
  - Metric splined shaft DIN 5480

**Mounting flange similar to ISO 3019-2**
- 4-hole
- 8-hole

**Port connections**
- Ports A, B: SAE flanged opposite sides
- Port S: SAE on side 90° offset

**Boost pump**
- with integrated boost pump
  - 250 355 500 750
- without integrated boost pump

---

= Preferred program

● = available  ○ = in preparation  - = not available
## Model code / standard program

<table>
<thead>
<tr>
<th>A4CS</th>
<th>G</th>
<th>/</th>
<th>30</th>
<th>–</th>
<th>V</th>
<th>35</th>
</tr>
</thead>
</table>

### Axial piston unit
- **Type of operation**
- **Size**
- **Control and adjustment device**
- **Series**
- **Direction of rotation**
- **Seals**
- **Mounting flange**
- **Port connections**
- **Boost pump**

### Through drive
- **With through drive shaft, without coupler, without adapter flange, closed with cover**
- **With through drive for mounting of second pump** (for further options see page 18)
- **Flange ISO 3019-2 (metr.)**
- **Coupler for shaft end DIN 5480**
- **To mount**

<table>
<thead>
<tr>
<th>Model code / standard program</th>
</tr>
</thead>
<tbody>
<tr>
<td>A4CS G / 30 – V 35</td>
</tr>
</tbody>
</table>

### shaft end
- **Model code / standard program**
- **Boost pump**

### Valves
- **Boost-, control press. relief- and flushing valve integrated**
- **Direct operated mainline relief valves integrated**

### Filtration
- **Without filter**
- **With threaded connection for filter in boost circuit**
- **With built on filter (optical-electr. dirt indicator) in boost circuit**
- **With threaded connection f. filter in boost circuit (D) a. sandwichplate filter for HS-control** (see RE 92076)
- **With built on filter in boost circuit (M) and sandwichplate filter for HS-control** (see RE 92076)
Technical data

Fluid

Prior to project design, please see our data sheets RE 90220 (mineral oil) and RE 90221 (environmentally acceptable fluids) for detailed information on fluids and application conditions. The variable displacement pump A4CSG is suitable for operation on mineral oil. When using environmentally acceptable fluids attention must be paid to possible limitations of the technical data. If necessary please contact us (when ordering, please state in clear text the fluid to be used).

Operating viscosity range

For optimum efficiency and service life we recommend that the operating viscosity (at operating temperature) be selected in the range

\[ \nu_{\text{opt}} = \text{optimum operating viscosity } 16 \ldots 36 \text{ mm}^2/\text{s} \]

referred to circuit temperature (closed circuit)

Viscosity range for operation with 100% duty cycle

\[ \nu_{\text{operating}} = 16 \ldots 100 \text{ mm}^2/\text{s} \]

Limit of viscosity range

For critical operating conditions the following values apply:

\[ \nu_{\text{min}} = 10 \text{ mm}^2/\text{s} \]

for short periods \( t < 3 \) min.,

at max. leakage fluid temp. of 90 °C.

\[ \nu_{\text{max}} = 1000 \text{ mm}^2/\text{s} \]

for short periods on cold start (the optimum viscosity should be reached within 15 minutes)

\[ t_{\text{min}} \geq -25^\circ \text{C} \]

Temperature range (see selection diagram)

\[ t_{\text{min}} = -25^\circ \text{C} \]

\[ t_{\text{max}} = +90^\circ \text{C} \]

Selection diagram

Notes on the selection of hydraulic fluid

In order to select the correct fluid, it is necessary to know the operating temperature in the closed circuit in relation to the ambient temperature.

The hydraulic fluid should be selected so that within the operating temperature range, the viscosity lies within the optimum range \( \nu_{\text{opt}} \) (see shaded section of the selection diagram). We recommend that the higher viscosity grade is selected in each case.

Example: at an ambient temperature of \( X^\circ \text{C} \) the operating temperature in the circuit is 60 °C. In the optimum viscosity range \( \nu_{\text{opt}} \) (shaded area), this corresponds to viscosity grades VG 46 or VG 68, VG 68 should be selected.

Important: The leakage oil temperature is influenced by pressure and speed and is typically higher than the circuit temperature. However max. temperature at any point in the system may not exceed 90 °C.

If the above mentioned conditions cannot be kept due to extreme operating parameters or high ambient temperatures, please consult us.

Filtration of fluid

The finer the filtration, the better the achieved cleanliness of the fluid and the longer the life of the axial piston unit.

To ensure a reliable functioning of the axial piston unit, a minimum cleanliness of

\[ 20/18/15 \text{ acc. to ISO 4406} \]

is necessary.

If above conditions cannot be met, we ask you to consult with us. For notes on the types of filtration see page 25.
Technical Data (valid for operation on mineral oil)

**Operating pressure range**

**Inlet**
(Pressures acc. to DIN 24312)

Required static boost pressure, depending on drive speed

![Graph showing the relationship between static boost pressure and drive speed ratio.]

Required static boost pressure (at \( \frac{n}{n_{max}} = 1 \))

\[ p_{b_{min}} \] \hspace{1cm} 16 \text{ bar}\]

Minimum static boost pressure (short periods), relief valve setting

at \( p_{b_{min}} \) \hspace{1cm} 8 \text{ bar}\]

Maximum static boost pressure

\( p_{b_{max}} \) (for MA, EM, HM2/3, HS, EO2, HD u. EP) \hspace{1cm} 20 \text{ bar}\]

\( p_{b_{max}} \) (for HM1 u. EO1) \hspace{1cm} 30 \text{ bar}\]

* absolute pressure at port ME3 with flushing valve spool in shifted position.

Permissible pressure spikes in boost circuit

min. \( 4 \text{ bar abs.} \)

max. \( 40 \text{ bar abs.} \)

**Outlet**
(Pressures acc. to DIN 24312)

Variable pump:

Pressure at port A or B

nominal pressure \( p_N \) \hspace{1cm} 350 \text{ bar} \]

Peak pressure \( p_{\text{max}} \) \hspace{1cm} 400 \text{ bar} \]

**Case drain pressure**

The service life of the shaft seal depends on the drive speed and case pressure. The diagram shows permissible limiting values at intermittent pressure loads on the shaft seal, which may not be exceeded.

A static case pressure, close to the max. limit will result in decreased service life of the shaft seal.

Permissible case pressure (housing pressure) depending on the drive speed

![Graph showing the relationship between case pressure and drive speed.]

Max. case pressure (housing pressure)

\( p_L_{\text{abs max}} \) \hspace{1cm} 4 \text{ bar} \]

**With integrated auxiliary pump - Version F.**

**Inlet**

Pressure at port S

\( p_{S_{min}} \) \hspace{1cm} \geq 0.8 \text{ bar abs.} \]

\( p_{S_{max}} \) \hspace{1cm} 30 \text{ bar abs.} \]
## Technical Data

### Table of values

| Size                  | Variable pump $V_{g \text{ max}}$ cm³ | integr. boost pump $V_{g \text{ max}}$ cm³ | Drive speed max. speed $n_{\text{max}}$ rpm | min. speed $n_{\text{min}}$ rpm | Max. flow (variable pump) at $n_{\text{max}}$ $q_{v \text{ max}}$ L/min | at $n_{E} = 1500$ rpm $L/min$ | Max. power at $n_{\text{omax}}$ $P_{o \text{ max}}$ kW | at $n_{E} = 1500$ rpm kW | Torque at $V_{g \text{ max}}$ $\Delta p = 350$ bar $T_{\text{max}}$ Nm | Variable pump (without boost pump) $\Delta p = 100$ bar $T$ Nm | Moment of inertia about drive axis $J$ kgm² | Max. perm. angular acceleration rad/s² | Torsional stiffness Shaft end P kNm/rad | Shaft end Z kNm/rad | Case volume L | Weight approx. (Pump with EP-control a. integr. boost pump) m kg |
|-----------------------|----------------------------------------|-------------------------------------------|---------------------------------------------|-------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------|------------------------------------------------------------------|---------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|-----------------------------|-----------------------------|
|                       | 250                                    | 355                                      | 500                                         | 750                           | 250                                                                          | 355                                           | 500                                                             | 750                             | 250                                                                       | 355                                                                      | 500                                                                       | 750                                                                       | 250                         | 355                         |

### Calculation of size

**Flow**

$$q_x = \frac{V_g \cdot n \cdot \eta_v}{1000} \text{[L/min]}$$

$$V_g = \text{geometr. displacement per revolution in cm³}$$

$$\Delta p = \text{Pressure differential in bar}$$

$$n = \text{Drive speed in rpm}$$

$$\eta_v = \text{volumetric efficiency}$$

$$\eta_{mh} = \text{mechanical-hydraulic efficiency}$$

**Drive torque**

$$T = \frac{1,59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} \text{[Nm]}$$

**Power**

$$P = \frac{2 \pi \cdot T \cdot n}{60 \cdot 000} \frac{q_x \cdot \Delta p}{600 \cdot \eta_t} \text{[kW]}$$

$$\eta_t = \text{Overall efficiency (}\eta_t = \eta_v \cdot \eta_{mh})$$

### Permissible forces on drive shaft

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible radial force $F_{g \text{ max}}$ N</td>
<td>2000</td>
<td>2200</td>
<td>2500</td>
<td>3000</td>
</tr>
<tr>
<td>Permissible axial force $\pm F_{ax \text{ max}}$ N</td>
<td>1800</td>
<td>2000</td>
<td>2000</td>
<td>2200</td>
</tr>
</tbody>
</table>

Application of forces

![Application of forces diagram](image_url)
### Technical Data

### Bearing flushing

For the following operating conditions bearing flushing is required for reliable continuous operation:

- Applications with special fluids (non mineral oils), due to limited lubricity and narrow operating temperature range
- Operation with critical conditions of temperature and viscosity with mineral oil
- With vertical mounting position of pump (shaft upwards) in order to ensure lubrication of front bearing and shaft seal.

Flushing is carried out via port "U", which is located in the front flange area of the pump. The flushing oil flows through the front bearing and leaves the system together with the leakage oil at the case drain port.

The split in torque between the 1. and 2. pump is optional.

The max. permissible drive torque $T_{Ges}$ as well as the max. permissible through drive torque $T_D$ may not be exceeded.

#### Maximum drive and through drive torques

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flushing flow $q_{sp}$ L/min</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>30</td>
</tr>
</tbody>
</table>

These flushing flows create a pressure drop of approx. 3 bar between port "U" and pump housing (including fitting).

#### Notes regarding bearing flushing

When using bearing flushing at port "U" the throttle screw, which can be found at port "U", has to be turned in all the way to its stop.

### Maximum drive and through drive torques

The split in torque between the 1. and 2. pump is optional.

The max. permissible drive torque $T_{Ges}$ as well as the max. permissible through drive torque $T_D$ may not be exceeded.

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. perm. drive torque on pump 1 with shaft &quot;Z&quot; $T_{Ges}$ Nm</td>
<td>2782</td>
<td>3952</td>
<td>5566</td>
<td>8348</td>
</tr>
<tr>
<td>Max. perm. through drive torque $T_D$ Nm</td>
<td>1391</td>
<td>1976</td>
<td>2783</td>
<td>4174</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. perm. drive torque on pump 1 with shaft &quot;P&quot; $T_{Ges}$ Nm</td>
<td>2300</td>
<td>3557</td>
<td>5200</td>
<td>7513</td>
</tr>
<tr>
<td>Max. perm. through drive torque $T_D$ Nm</td>
<td>1391</td>
<td>1976</td>
<td>2783</td>
<td>4174</td>
</tr>
</tbody>
</table>

$T_{Ges}$ = Max. permissible drive torque on pump 1
$T_D$ = Max. permissible through drive torque
Summary of control and adjustment devices

**Manuel adjustment MA**
Handwheel operated stepless adjustment of displacement

**Electric motor adjustment EM**
Stepless adjustment of displacement via an electric motor.
With a programmed sequence control, various intermediate displacements can be selected by means of built-in limit switches or a potentiometer.

**Hydraulic displacement control HM 1/2/3**
control volume dependent
The pump displacement is infinitely variable in relation to the pilot oil volume at ports X₁ and X₂

Application: – 2-point control
 – basic control device for servo- or proportional control

**Hydraulic displacement control**
HS, HS1, HS3
with servo- or proportional valve
The stepless displacement control is accomplished by means of a servo- or proportional valve with electrical feedback of the swivel angle.

**Electronic control**
Optional: servo valve (HS/HS1), proportional valve (HS3), short circuit valve (HS1K, HS3K), without valves (HSE, HS1E, HS3E) The **HS3P**- control is fitted with a built-on pressure transducer so that it can be utilised for electrical pressure- and power control
Summary of control and adjustment devices

Hydraulic-electronically operated displacement control EO 1/2

The stepless adjustment of the displacement is accomplished by means of a proportional valve with electrical feedback of the swivel angle. **Electronically controlled**

Optional:
- Short circuit valve (EO1K, EO2K)
- Without valves (EO1E, EO2E)

---

Hydraulic control HD1/2/3

Pilot pressure dependent

Stepless adjustment of pump displacement in relation to pilot pressure. The displacement is proportional to the applied pilot pressure.

Optional:
- Pilot pressure curves (HD1, HD2, HD3)
- Pressure control (HD.A, HD.B, HD.D)
- Remote pressure control (HD.GA, HD.GB, HD.G)
- Power control (HD.P)
- Electric control of pilot pressure (HD.T)

---

Electro-hydraulic control EP

With proportional solenoid

A valve with two proportional solenoids gives a pressure signal to one of the pumps pilot control chambers. The pressure signal and also the displacement is proportional to the solenoid current. Each solenoid operates one direction of flow.

Voltage 24 V
Nominal current 800 mA
Resistance at 20°C 19 Ω

Optional:
- with pressure control (EPA, EPB, EPD);
- with pressure control remote (EPGA, EPGB, EPG)

---

See RE 92080
Before finalising your design, please request a certified installation drawing.

Unit dimensions size 250

Example A4CSG250EPG/30R-XXB35F994N

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>SAE J518c</th>
<th>DIN 13</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure port, high press. range fixing thread</td>
<td>1 1/2 in</td>
<td>M16; 21 deep</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range fixing thread</td>
<td>2 1/2 in</td>
<td>M12; 17 deep</td>
<td>see safety instructions</td>
</tr>
<tr>
<td>M_A</td>
<td>Test points press. ports</td>
<td>M14x1,5; 12 deep (closed)</td>
<td>80 Nm</td>
<td></td>
</tr>
<tr>
<td>M_S</td>
<td>Test point inlet pressure</td>
<td>M14x1,5; 12 deep (closed)</td>
<td>80 Nm</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>M42x2; 20 deep (closed)</td>
<td>720 Nm</td>
<td></td>
</tr>
<tr>
<td>E_1</td>
<td>To filter</td>
<td>M33x2; 18 deep (closed)</td>
<td>540 Nm</td>
<td></td>
</tr>
<tr>
<td>E_2</td>
<td>From filter</td>
<td>M33x2; 18 deep (closed)</td>
<td>540 Nm</td>
<td></td>
</tr>
<tr>
<td>K_1</td>
<td>Flushing port</td>
<td>M33x2; 18 deep</td>
<td>540 Nm</td>
<td></td>
</tr>
</tbody>
</table>

Max. tightening torque ¹)

- see safety instructions
- see safety instructions

¹) Follow manufacturer’s instructions of used fittings
### Unit dimensions size 250

**View U**

![View U diagram with labels and dimensions]

**View Z**

![View Z diagram with labels and dimensions]

**View X**

![View X diagram with labels and dimensions]

**View Y**

![View Y diagram with labels and dimensions]

#### Shafts ends

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
<th>Code</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Keyed DIN 6885</td>
<td>AS 18x11x100</td>
<td>3 100 84x76</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key</th>
<th>Description</th>
<th>Code</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Z</td>
<td>Splined DIN 5480</td>
<td>W60x2x30x28x9g</td>
<td></td>
</tr>
</tbody>
</table>

#### Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Code</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>K2, K3</td>
<td>Flushing port</td>
<td>DIN 3852</td>
<td>M42x2; 20 deep (closed) 720 Nm</td>
</tr>
<tr>
<td>R(L)</td>
<td>Oil fill and air bleed</td>
<td>DIN 3852</td>
<td>M42x2; 20 deep 720 Nm</td>
</tr>
<tr>
<td>U</td>
<td>Bearing flushing port</td>
<td>DIN 3852</td>
<td>M14x1,5; 12 deep (closed) 80 Nm</td>
</tr>
<tr>
<td>E3</td>
<td>External boost flow port</td>
<td>DIN 3852</td>
<td>M33x2; 18 deep (closed) 540 Nm</td>
</tr>
<tr>
<td>K4</td>
<td>Test point boost pressure</td>
<td>DIN 3852</td>
<td>M33x2; 18 deep (closed) 540 Nm</td>
</tr>
<tr>
<td>K1</td>
<td>Accumulator port</td>
<td>DIN 3852</td>
<td>M42x2; 20 deep 720 Nm</td>
</tr>
<tr>
<td>E1</td>
<td>Test point loop flushing press.</td>
<td>DIN 3852</td>
<td>M14x1,5; 12 deep (closed) 80 Nm</td>
</tr>
<tr>
<td>M1, M2</td>
<td>Test point control pressure</td>
<td>DIN 3852</td>
<td>M14x1,5; 12 deep (closed) 80 Nm</td>
</tr>
<tr>
<td>XA1</td>
<td>Pilot port relief valve in A</td>
<td>DIN 3852</td>
<td>M14x1,5; 12 deep (closed) 80 Nm</td>
</tr>
<tr>
<td>XA2</td>
<td>Pilot port for pressure control</td>
<td>DIN 3852</td>
<td>M14x1,5; 12 deep 80 Nm</td>
</tr>
</tbody>
</table>

**Max. tightening torque 1)**

- 720 Nm
- 720 Nm
- 80 Nm
- 80 Nm
- 140 Nm
- 80 Nm
- 80 Nm
- 80 Nm

---

Before finalising your design, please request a certified installation drawing.
Unit dimensions size 355

Example A4CSG355EPG/300-XXB35F994N

Before finalising your design, please request a certified installation drawing.

Ports

- **A, B**: Pressure port, high press. range
  - SAE J518c: 1 1/2 in
  - DIN 13: M16; 21 deep

- **S**: Inlet port, standard press. range
  - SAE J518c: 2 1/2 in
  - DIN 13: M12; 17 deep

- **M_A, M_B, M_AB**: Test points press. ports
  - DIN 3852: M14x1.5; 12 deep (closed)
  - 80 Nm

- **M_S**: Test point inlet pressure
  - DIN 3852: M14x1.5; 12 deep (closed)
  - 80 Nm

- **T**: Oil drain
  - DIN 3852: M42x2; 20 deep (closed)
  - 720 Nm

- **E_1**: To filter
  - DIN 3852: M33x2; 18 deep (closed)
  - 540 Nm

- **E_2**: From filter
  - DIN 3852: M33x2; 18 deep (closed)
  - 540 Nm

- **K_1**: Flushing port
  - DIN 3852: M33x2; 18 deep
  - 540 Nm

1) Follow manufacturer’s instructions of used fittings.

Max. tightening torque

- See safety instructions

Further views and ports on page 13
Unit dimensions size 355

Shaft ends

P  Keyed DIN 6885
   AS 20x12x100

Z  Splined DIN 5480
   W70x3x30x22x9g

Ports

- K₂, K₃  Flushing port  DIN 3852  M42x2;  20 deep (closed)  720 Nm
- R(L)  Oil fill + air bleed  DIN 3852  M42x2;  20 deep  720 Nm
- U  Bearing flushing port  DIN 3852  M18x1,5;  12 deep (closed)  140 Nm
- E₄  External boost flow port  DIN 3852  M33x2;  18 deep (closed)  540 Nm
- Mₖ₃  Test point boost pressure  DIN 3852  M14x1,5;  12 deep (closed)  80 Nm
- K₄  Accumulator port  DIN 3852  M33x2;  18 deep (closed)  540 Nm
- Mₖ₄  Test point loop flushing pressure  DIN 3852  M14x1,5;  12 deep (closed)  80 Nm
- Mₘ₃, M₂  Test point control pressure  DIN 3852  M18x1,5;  12 deep (closed)  140 Nm
- Xₐ₁  Pilot port relief valve in A  DIN 3852  M14x1,5;  12 deep (closed)  80 Nm
- Xₙ₁  Pilot port relief valve in B  DIN 3852  M14x1,5;  12 deep  80 Nm
- Xₐ₂, Xₙ₂  pilot port pressure control  DIN 3852  M14x1,5;  12 deep

Max. tightening torque: ³)
Unit dimensions size 500

Example A4CSG500EPD/30R-XXH35F994N

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure port, high press. range</td>
<td>SAE J 518c 2 in</td>
</tr>
<tr>
<td></td>
<td>fixing thread</td>
<td>DIN 13 M20; 24 deep</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range</td>
<td>SAE J 518c 2 1/2 in</td>
</tr>
<tr>
<td></td>
<td>fixing thread</td>
<td>DIN 13 M12; 17 deep</td>
</tr>
<tr>
<td>MAB, M_S, M_AB</td>
<td>Test points press. ports</td>
<td>DIN 3852 M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>M_S</td>
<td>Test point inlet pressure</td>
<td>DIN 3852 M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>DIN 3852 M48x2; 22 deep (closed)</td>
</tr>
<tr>
<td>E_1</td>
<td>To filter</td>
<td>DIN 3852 M33x2; 18 deep (closed)</td>
</tr>
<tr>
<td>E_2</td>
<td>From filter</td>
<td>DIN 3852 M33x2; 18 deep (closed)</td>
</tr>
<tr>
<td>K_1</td>
<td>Flushing port</td>
<td>DIN 3852 M33x2; 18 deep</td>
</tr>
</tbody>
</table>

Max. tightening torque ¹)

<table>
<thead>
<tr>
<th>Port</th>
<th>Max. tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>–</td>
</tr>
<tr>
<td>S</td>
<td>see safety instructions</td>
</tr>
<tr>
<td>MAB, M_S, M_AB</td>
<td>see safety instructions</td>
</tr>
<tr>
<td>E_1</td>
<td>80 Nm</td>
</tr>
<tr>
<td>E_2</td>
<td>80 Nm</td>
</tr>
<tr>
<td>K_1</td>
<td>960 Nm</td>
</tr>
</tbody>
</table>

¹) Follow manufacturer’s instructions of used fittings
Unit dimensions size 500

Ports

- **K₂, K₃** Flushing port
  - DIN 3852 M48x2; 22 deep (closed) 960 Nm
- **R(L)** Oil fill + air bleed
  - DIN 3852 M48x2; 22 deep 960 Nm
- **U** Bearing flushing port
  - DIN 3852 M18x1,5; 12 deep (closed) 140 Nm
- **E₂** External boost flow port
  - DIN 3852 M33x2; 18 deep (closed) 540 Nm
- **Mₑ₃** Test point boost pressure
  - DIN 3852 M14x1,5; 12 deep (closed) 80 Nm
- **Kₛ** Accumulator port
  - DIN 3852 M33x2; 18 deep (closed) 540 Nm
- **Mₑ₄** Test point loop flushing pressure
  - DIN 3852 M14x1,5; 12 deep (closed) 80 Nm
- **Mₒ** Test point control chamber press.
  - DIN 3852 M22x1,5; 14 deep (closed) 210 Nm
- **Mₑ₂** Test point control chamber press.
  - DIN 3852 M14x1,5; 12 deep (closed) 80 Nm
- **Xₐ₁** Pilot port relief valve in A
  - DIN 3852 M14x1,5; 12 deep (closed) 80 Nm
- **Xₐ₁** Pilot port relief valve in B
  - DIN 3852 M14x1,5; 12 deep (closed) 80 Nm

Max. tightening torque ¹)

Before finalising your design, please request a certified installation drawing.
Before finalising your design, please request a certified installation drawing.

Unit dimensions size 750

Example A4CSG750EPG/30R-XXH35F994N

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure ports, high press. range</td>
<td>SAE J 518c 2 in, DIN 13 M20; 24 deep</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range</td>
<td>SAE J 518c 2 1/2 in, DIN 13 M12; 17 deep</td>
</tr>
<tr>
<td>M_{AB}, M_{BS}, M_{AS}</td>
<td>Test points pressure ports</td>
<td>DIN 3852 M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>M_{S}</td>
<td>Test point inlet pressure</td>
<td>DIN 3852 M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>DIN 3852 M48x2; 22 deep (closed)</td>
</tr>
<tr>
<td>E_{1}</td>
<td>To filter</td>
<td>DIN 3852 M33x2; 18 deep (closed)</td>
</tr>
<tr>
<td>E_{2}</td>
<td>From filter</td>
<td>DIN 3852 M33x2; 18 deep (closed)</td>
</tr>
<tr>
<td>K_{1}</td>
<td>Flushing port</td>
<td>DIN 3852 M33x2; 18 deep</td>
</tr>
</tbody>
</table>

Max. tightening torque 1)

- see safety instructions
- see safety instructions
- 80 Nm
- 80 Nm
- 960 Nm
- 540 Nm
- 540 Nm
- 540 Nm

1) Follow manufacturer’s instructions of used fittings

Further views and ports on page 17
Unit dimensions size 750

Before finalising your design, please request a certified installation drawing

Shaft ends

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Max. tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>K₂₄, K₃</td>
<td>Flushing port</td>
<td>M48x2; 22 deep (closed)</td>
</tr>
<tr>
<td>R(L)</td>
<td>Oil fill + air bleed</td>
<td>M48x2; 22 deep</td>
</tr>
<tr>
<td>U</td>
<td>Bearing flushing port</td>
<td>M18x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>E₃</td>
<td>External boost flow port</td>
<td>M33x2; 18 deep (closed)</td>
</tr>
<tr>
<td>Mₑ₃</td>
<td>Test point boost pressure</td>
<td>M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>K₁</td>
<td>Accumulator port</td>
<td>M33x2; 18 deep (closed)</td>
</tr>
<tr>
<td>Mₖ₄</td>
<td>Test point loop flushing pressure</td>
<td>M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>M₁</td>
<td>Test point control chamber press.</td>
<td>M22x1,5; 14 deep (closed)</td>
</tr>
<tr>
<td>M₃</td>
<td>Test point control chamber press.</td>
<td>M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>Xₐ₁</td>
<td>Pilot port relief valve A</td>
<td>M14x1,5; 12 deep (closed)</td>
</tr>
<tr>
<td>Xₜ₁</td>
<td>Pilot port relief valve B</td>
<td>M14x1,5; 12 deep (closed)</td>
</tr>
</tbody>
</table>

Ports

View U

- Mₐ
- Xₐ₁
- Mₖ₄
- K₄
- K₁

Dimensions: 467 to pump mounting face

View Z

- Control pressure relief valve
- Relief valve in A
- Flushing pressure relief valve
- Through drive F99 shown without cover
- Dimensions see page 20

View X

- Relief valve in B

View Y

- Mₙ₁

Dimensions: M20; 24 deep
Through drive

Although the compact unit A4CSG has a built in boost pump, it can be supplied with a through drive as per the model codes on page 3.
For the various through drive versions see the codes on page 3 (codes 99 – 17).
This code designation is sufficient if no further pump has to be factory mounted.
Included in this case are:
for F/K 31 – 17:
Shaft coupler, mounting screws, seal, and if necessary an adapter flange
for F/K 99:
with through drive shaft, without shaft coupler, without adapter flange; unit closed with oiltight cover.

Combination pumps

Independent circuits are available for the user when further pumps are built on.

1. If the combination consists of 2 Rexroth axial piston pumps and if these 2 units have to be factory assembled together both pump model codes should be joined by a “+++”.

Ordering example:
A4CSG 500 EPG/30 R–VPH35F434M +++
A4CSG 500 EPG/30 R–VZH35F994M

2. If a gear pump is to be factory mounted, please consult us.

Max. permissible input and through drive torques see page 7.

perm. moment of inertia

\[ T_m = \frac{m_1 l_1 + m_2 l_2 + m_3 l_3}{10^2} \] in Nm

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>365</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perm. moment of inertia ( T_m ) Nm</td>
<td>9300</td>
<td>9300</td>
<td>15600</td>
<td>19500</td>
</tr>
<tr>
<td>Perm. moment of inertia ( T_m ) Nm with dyn. mass acc., of 10g ( \Delta = 98.1 ) m/sec^2</td>
<td>930</td>
<td>930</td>
<td>1560</td>
<td>1950</td>
</tr>
</tbody>
</table>

Weight \( m_1 \) kg

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>365</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight ( m_1 ) kg</td>
<td>214</td>
<td>237</td>
<td>350</td>
<td>500</td>
</tr>
</tbody>
</table>

Dist. to center of gravity \( l_1 \) mm

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>365</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dist. to center of gravity ( l_1 ) mm</td>
<td>210</td>
<td>220</td>
<td>230</td>
<td>260</td>
</tr>
</tbody>
</table>

Overview mounting options onto A4CSG

<table>
<thead>
<tr>
<th>Flange</th>
<th>Shaft coupler</th>
<th>Short code</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 3019-2 (metric)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80, 2-hole</td>
<td>19-4 (3/4in, 11T)</td>
<td>F/KB2</td>
</tr>
<tr>
<td>100, 2-hole</td>
<td>22-4 (7/8in, 13T)</td>
<td>F/KB3</td>
</tr>
<tr>
<td>125, 2-hole</td>
<td>32-4 (1 1/4in, 14T)</td>
<td>F/KB8</td>
</tr>
<tr>
<td>160, 4-hole</td>
<td>W 32x2x30x14x9g</td>
<td>F/K31</td>
</tr>
<tr>
<td>180, 4-hole</td>
<td>W 38x1 (1 1/2in, 17T)</td>
<td>F/KB6</td>
</tr>
<tr>
<td>224, 4-hole</td>
<td>W 60x2x30x28x9g</td>
<td>F/K35</td>
</tr>
<tr>
<td>315, 5-hole</td>
<td>W 80x3x30x25x9g</td>
<td>F/K43</td>
</tr>
<tr>
<td>400, 8-hole</td>
<td>W 90x3x30x28x9g</td>
<td>F/K76</td>
</tr>
<tr>
<td>SAE J 744 (ISO 3019-1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>82-2 (A)</td>
<td>16-4 (5/8in, 9T)</td>
<td>F/K01</td>
</tr>
<tr>
<td>101-2 (B)</td>
<td>22-4 (7/8in, 13T)</td>
<td>F/K02</td>
</tr>
<tr>
<td>127-2 (C)</td>
<td>32-4 (1 1/4in, 14T)</td>
<td>F/K07</td>
</tr>
<tr>
<td>152-4 (D)</td>
<td>44-4 (1 3/4in, 13T)</td>
<td>F/K17</td>
</tr>
</tbody>
</table>

1) Flange ISO 3019-2 (metric)
2) to DIN 5480
3) Drive shafts acc. to SAE J744 OCT83
4) Rexroth recommends special versions for the gear pumps. Please consult us.
Dimensions pump combinations and through drive F/K99

Pump combinations A4CSG + A4CSG

Overall length A

<table>
<thead>
<tr>
<th></th>
<th>A4CSG (1st Pump)</th>
<th>A4CSG (2nd Pump with through drive F/K99)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>355</td>
<td>355</td>
<td>355</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>750</td>
<td>750</td>
<td>750</td>
</tr>
</tbody>
</table>

F/K99 with through drive shaft, without shaft coupler,
without adapter flange, closed with cover

Size 250 and 355

shown without cover

Section M-N

Size 250 and 355

<table>
<thead>
<tr>
<th>Size</th>
<th>A_t</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>509</td>
</tr>
<tr>
<td>355</td>
<td>516</td>
</tr>
</tbody>
</table>

Sizes 500 and 750 see page 20

1) DIN 13, Tightening torque see safety instructions
Dimensions through drive F/K99 and F/K34

**F/K99** with through drive shaft, without shaft coupler, without adapter flange, closed with cover

**F/K34** Flange ISO 3019-2 160 4-hole

- **Shaft coupler** for shaft to DIN 5480 N 50x2x30x24x8H
- for mounting of A4VSO/H/G (shaft Z, see RE 92 050, 92 110 resp. 92 100)

### Size 500 and 750

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>552</td>
<td>ø115</td>
<td>3.4</td>
<td>41</td>
<td>95</td>
</tr>
<tr>
<td>750</td>
<td>619</td>
<td>ø115</td>
<td>3.4</td>
<td>45</td>
<td>116.6</td>
</tr>
</tbody>
</table>

### Size 250 and 355

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>531</td>
</tr>
<tr>
<td>355</td>
<td>538</td>
</tr>
</tbody>
</table>

1) DIN 13, Tightening torque see safety instructions
Dimensions through drive F/K35 and F/K77

**F/K35**  
**Flange**  ISO 3019-2  224  4-hole  
**Shaft coupler**  for shaft to DIN 5480 N 60x2x30x28x8H  
for mounting of A4CSG 250 or an A4VSO/H/G 250 (shaft Z, see RE 92 050, 92 110 resp. 92 100)

Size 250

[Diagram of F/K35]

**F/K77**  
**Flange**  ISO 3019-2  224  4-hole  
**Shaft coupler**  for shaft to DIN 5480 N 70x3x30x22x8H  
for mounting of A4CSG 355 or an A4VSO/G 355 (shaft Z see RE 92 050 resp. 92 100)

Size 355

[Diagram of F/K77]

1) DIN 13, tightening torque see safety instructions
Dimensions through drive F/K43 and F/K01

**F/K43**  
Flange ISO 3019-2 315 8-hole  
Shaft coupler for shaft to DIN 5480 N 80x3x30x25x8H  
for mounting of A4CSG 500 or an A4VSO/G 500 (shaft Z, see RE 92 050 resp. 92 100)

Size 500

**F/K01**  
Flange SAE J744 – 82-2 (SAE A-2-hole)  
Shaft coupler for shaft to SAE J744 16-4 (A) 5/8in 9T 16/32 DP  
for mounting of AZPF or PGF2 (shaft J, flange U2, see RE10 213)

Size 250, 355 and 500

<table>
<thead>
<tr>
<th>Size</th>
<th>A₁</th>
<th>A₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>531</td>
<td>10,5</td>
</tr>
<tr>
<td>355</td>
<td>538</td>
<td>10,5</td>
</tr>
<tr>
<td>500</td>
<td>574</td>
<td>9,3</td>
</tr>
</tbody>
</table>

1) DIN 13, tightening torque see safety instructions  
2) 30° pressure angle, flat root, side fit, class 5
Dimensions through drive F/K02 and F/K68

**F/K02**  
**Flange** SAE J744 – 101-2 (SAE B-2-hole)  
**Shaft coupler** for shaft to SAE J 744 22-4 (B) 7/8in 13T 16/32 DP  
for mounting of AZPN/G

<table>
<thead>
<tr>
<th>Size</th>
<th>$A_1$</th>
<th>$A_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>531</td>
<td>10.3</td>
</tr>
<tr>
<td>500</td>
<td>574</td>
<td>9.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section M-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>ø146</td>
</tr>
<tr>
<td>45°</td>
</tr>
</tbody>
</table>

**F/K68**  
**Flange** SAE J744 – 101-2 (SAE B-2-hole)  
**Shaft coupler** for shaft to SAE J 744 22-4 (B) 7/8in 13T 16/32 DP  
for mounting of A10VO 28 (shaft S, see RE 92 701) or internal gear pump PGF3 (shaft J, flange U2, see RE 10 213)

<table>
<thead>
<tr>
<th>Size</th>
<th>$A_1$</th>
<th>$A_2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>531</td>
<td>10.3</td>
</tr>
<tr>
<td>355</td>
<td>538</td>
<td>10.3</td>
</tr>
<tr>
<td>500</td>
<td>574</td>
<td>9.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Section M-N</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>ø146</td>
</tr>
<tr>
<td>45°</td>
</tr>
</tbody>
</table>

1) DIN 13, tightening torque see safety instructions  
2) 30° pressure angle, flat root, side fit, class 5
Dimensions through drive F/K04 and F/K07

**F/K04**  Flange  SAE J744 – 101-2 (SAE B-2-hole)

- **Shaft coupler** for shaft to SAE J 744 25-4 (C) 1 in 15T 16/32 DP ²)
  
  for mounting of A10VO 45 (shaft S, see RE 92 701) or of an internal gear pump PGH4 (shaft R, flange U2, see RE 10 223)

<table>
<thead>
<tr>
<th>Size</th>
<th>A₁</th>
<th>A₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>545</td>
<td>19.9</td>
</tr>
<tr>
<td>355</td>
<td>552</td>
<td>19.9</td>
</tr>
<tr>
<td>500</td>
<td>588</td>
<td>10.3</td>
</tr>
</tbody>
</table>

**F/K07**  Flange  SAE J744 – 127-2 (SAE C-2-hole)

- **Shaft coupler** for shaft to SAE J 744 32-4 (C) 1 1/4in 14T 12/24 DP ²)
  
  for mounting of A10VO 71 (shaft S, see RE 92 701)

1) DIN 13, tightening torque see safety instructions

2) 30° pressure angle, flat root, side fit, class 5.
Dimensions through drive F/K17

**Version N** - without filter in boost circuit

The ports E1 and E2 are closed with a pressure tight cover and internally connected (see circuit drawing page 26).

If needed, a boost line filter can still be mounted later on at these ports.

In this case, the internal connection between E1 and E2 must be plugged (please consult us).

**Version M** - with built on filter in the boost circuit

In this case a filter is factory mounted into the boostpump pressure line.

Filter version: with bypass and electrical-optical dirt indicator

Filtermodel for pump sizes 250...500:

DFBN/HC330QE10D1.X/V-L24

For further information see pages 28 and 29.

**Version D** - Threaded ports for external mounting of filter in boost pump outlet

Ports E1 and E2 are provided to mount a filter externally.

These ports are open, and only temporarily closed with plastic plugs for transport.

The internal passage between E1 and E2 is plugged.

**Types of filtration**

**Version D** - Threaded ports for external mounting of filter in boost circuit

Ports E1 and E2 are provided to mount a filter externally.

These ports are open, and only temporarily closed with plastic plugs for transport.

The internal passage between E1 and E2 is plugged.

**Circuit drawing version D** (example size 500/750)
Integrated boost pump and control valves (Version F..)

Circuit drawing
Example A4CSG₅₀₀/₇₅₀ EPG/30R-XXB35FF994N do not belong to supply

Circuit drawing NG 500/750 with EPD-control and filter see page 29; without integrated boostpump see page 30.

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure ports</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Inlet port</td>
<td></td>
</tr>
</tbody>
</table>
| M₁₅₂₅₅₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉₉ cent
Integrated boost pump and -control valves (Version F..)

**High press. mainline reliefs (crossover relief valves)**

The 2 pilot operated crossover reliefs have pilot ports for remote control.

The valves limit the max. pressure spikes to an acceptable safe level, and prevent damage to the main pump.

Each pressure side has its own relief valve, which is vented to the low pressure side of the loop.

The valves can be hooked up to pilot reliefs for remote setting of pressure at ports XA1, XB1.

The valves are normally set to a pressure level of 350 bar.

If another setting is required, please state that in clear text.

**Flushing pressure relief valve**

Direct operated

Adjustment range Δp_{Sp} 10...20 bar

Standard setting: 16 bar absolute

**Integrated boost pump**

Standard sizes

<table>
<thead>
<tr>
<th>Size (cm³)</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
</table>

**Control pressure filter**

Controls HD and EP in the size 500 and 750 with internal supply of control pressure out of one of the high pressure sides have always a 0.2 mm filter insert for coarse particles (regardless of the model code for filtration).

**Control pressure relief valve (for EP and HD)**

Direct operated, piloted open by circuit operating pressure.

Adjustment range Δp_{St} 10 - 20 bar

Standard setting: Δp_{Sp} + Δp_{St} = 32 bar

At low operating pressure (i.e. main pump in center position) the auxiliary pump pressure is limited to 32 bar. This pressure level is required to make sure that the pump will stroke when using an HD or EP control. This feature eliminates the use of another pump for control pressure.

As soon as the pressure level in one of the circuit pressure sides exceeds the 32 bar, the control pressure is taken from this source via the check valves. At the same time, the relief valve is piloted open.

This brings the boost pump pressure to the level set at the flushing relief valve, i.e. 16 bar.

This function enables saving of energy, and improves the overall efficiency of the system.

With the controls EO1 and HM1 the necessary control energy can always be taken out of the boost circuit (Port M_{E3}).

Recommended setting: 25 bar

With all other control options, the control pressure relief valve is not mounted, and the valve cavity is plugged.
Subplate mounted filter in boost circuit (Version M..)

The filter is mounted in the auxiliary pump’s pressure line directly onto the pump.

Filter model: DFBN/HC330QE10D1.X/V–L24
Filter with bypass and electrical-optical dirt indicator.

Dimensions size 250...500

Pickup pressure of dirt indicator
\[ \Delta p_a = 5 \text{ bar} - 0.5 \text{ bar} \]

Opening pressure of bypass valve
\[ \Delta p_0 = 6 \text{ bar} + 0.6 \text{ bar} \]

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>699.5</td>
</tr>
<tr>
<td>355</td>
<td>706.5</td>
</tr>
<tr>
<td>500</td>
<td>742.5</td>
</tr>
</tbody>
</table>
Subplate mounted filter in boost circuit (Version M..)

Circuit diagram
Example A4CSG500 EPD/30R-XXH35F994M

Mounting of filter onto size 250...500
DFBN/HC330QE10D1.X/V-L24
with electrical-optical dirt indicator
internal connection between E1 and E2 plugged
model code M

Control oil filter
Controls HD and EP in the size 500 and 750 with
internal supply of control pressure out of one of the high
pressure sides have always a 0.2 mm filter insert for
coarse particles (regardless of the model code for
filtration).

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure port</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port</td>
</tr>
<tr>
<td>M_A, M_B, M_AB</td>
<td>Test points pressure port (closed)</td>
</tr>
<tr>
<td>M_S</td>
<td>Test point inlet pressure (closed)</td>
</tr>
<tr>
<td>T</td>
<td>Oil drain (closed)</td>
</tr>
<tr>
<td>K_1</td>
<td>Flushing port</td>
</tr>
<tr>
<td>K_2, K_3</td>
<td>Flushing port (closed)</td>
</tr>
<tr>
<td>R(L)</td>
<td>Oil fill + air bleed</td>
</tr>
<tr>
<td>U</td>
<td>Bearing flushing port</td>
</tr>
<tr>
<td>M_E3</td>
<td>Test point boost pressure (closed)</td>
</tr>
<tr>
<td>K_4</td>
<td>Accumulator port</td>
</tr>
<tr>
<td>M_K4</td>
<td>Test point loop flushing pressure</td>
</tr>
<tr>
<td>M_1, M_2</td>
<td>Test point control pressure (closed)</td>
</tr>
<tr>
<td>X_A1</td>
<td>Pilot port relief valve in A (closed)</td>
</tr>
<tr>
<td>X_B1</td>
<td>Pilot port relief valve in B (closed)</td>
</tr>
</tbody>
</table>
External supply of boost flow - without integrated boostpump (Version K..)

This variation is used without the integrated boost pump.

Port E* is used for the connection of the external boost.

In order to guarantee a reliable function it is necessary to maintain a boost flow with a cleanliness class as described on page 4

* resp. E₂ for version K...N/D without filter

Circuit diagram
Example A4CSG 500 EPD/30R-XXB35K174M

Ports

- **E** resp. **E₂** Boost inlet DIN 3852 M33x2; 18 deep 540 Nm max. tightening torque
- E₂ Boost inlet for version without filter
- A, B Pressure port
- Mₐ, Mₐ₂ Mₐ₃ Test points pressure ports
- T Oil drain
- K₁ Flushing port
- K₂, K₃ Flushing port
- R(L) Oil fill + air bleed
- U Port for bearing flushing
- K₄ Accumulator port
- Mₐ₃ Test point for boost pressure
- Mₐ₄ Test point loop flushing pressure
- M₁, M₂ Test point control pressure
- Xₐ₁ Pilot port relief valve in A
- Xₐ₂ Pilot port relief valve in B
Installation and commissioning instructions

During commissioning and during operation the pump housing must be filled with oil. The commissioning must be carried out with low speeds, and without load, until the system is completely deaerated.

During prolonged periods of standstill the housing can loose its oil via the service lines. At renewed start up, the pump housing must be refilled.

The inlet pressure at the suction port S may not fall below 0.8 bar absolute

Mounting position:

Optional.

In order to achieve a low noise level, all hydraulic lines (suction, pressure, and drain lines) should be connected via flexible members to the reservoir.

A check valve in the pump drain line should be avoided. If desirable, please contact us.

1. Vertical installation

With vertical installation and the shaft pointing upwards (fig. 1 and 2) bearing flushing is necessary, in order to provide lubrication for the front bearing and the shaft seal, see page 7.

1.1 Mounting below the reservoir - flooded suction

Prior to mounting fill pump housing (pump in horizontal position). Connect port T to reservoir, R/L closed.

Option for filling in installed condition with shaft pointing upwards: fill through port R and bleed via port T, afterwards close port R.

1.2 Mounting above reservoir - tanktop mounted

Prior to mounting fill pump housing (pump in horizontal position). Connect port T to reservoir, R/L closed.

Option for filling in installed condition with shaft pointing upwards: fill through R/L and bleed via T, afterwards close R(L).

Important: Suction (inlet) pressure at port S may never fall below 0.8 bar absolute.

Avoid mounting above reservoir if low noise levels are important.

2. Horizontal mounting

The highest of the ports T, K1, K2, K3 resp. R/L must be used to fill/bleed the pump and afterwards be piped as case drain.

Prior to start up fill the pump housing.

2.1 Mounting below the reservoir - flooded suction

Case drain and inlet port S to be piped acc. to fig. 3 or 4.

2.2 Mounting above reservoir - tanktop mounted

Case drain and inlet port S to be piped acc. to fig. 5.

Important: Suction (inlet) pressure at port S may never fall below 0.8 bar absolute.
Safety instructions

- The pump A4CSG was designed for operation in closed circuits.
- Systems design, installation and commissioning requires trained technicians or tradesmen.
- All hydraulic ports can only be used for the fastening of hydraulic service lines.
- Tightening torques: please comply with the manufacturer’s information regarding the max. permissible tightening torques for the used fittings.
  For fastening screws to DIN 13 we recommend to check the permissible tightening torques in each individual case acc. to VDI 2230 dated 2003.
- During and shortly after operation of a pump the housing and especially a solenoid can be extremely hot, avoid being burned!