Axial piston-compact unit
AA4CSG (A4CSG)

Features
- Axial piston pump - 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 short in length)
- Favorable power to weight ratio
- Low noise level
- Long service life
- High efficiency
- New electro-hydraulic control EP with proportional solenoid and zero displacement position at power loss (fail safe function)
- Throughdrive for multiple pump combinations also possible with integrated boost pump
- Full through drive capability, tandems of same size possible
- For further information on control and regulating devices see separate data sheets RA 92 076 and RA 92 080

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## Ordering code / standard program

### Version

<table>
<thead>
<tr>
<th></th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAE version</td>
<td>●</td>
<td>●</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Metric version (no code)</td>
<td>-</td>
<td>-</td>
<td>●</td>
<td>●</td>
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</table>

### Axial piston unit

Compact unit, swashplate design, variable displacement
Nominal pressure 5100 psi (350 bar), peak pressure 5800 psi (400 bar)

### Type of operation

Pump, closed circuit operation

### Size

<table>
<thead>
<tr>
<th>Displacement $V_{g\text{ max}}$ in$^3$ (cm$^3$)</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(250)</td>
<td>(355)</td>
<td>(500)</td>
<td>(750)</td>
</tr>
</tbody>
</table>

### Control and adjustment devices

<table>
<thead>
<tr>
<th>Control / Adjustment Devices</th>
<th>HM</th>
<th>HS</th>
<th>EO</th>
<th>HD</th>
<th>EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydr. adjustment, control volume dependent</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hydr. adjustment with servo-/-proportional valve</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Electronic control</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Hydr. control, pilot pressure dependent</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Electro-hydraulic control with proportional solenoid</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### Series

<table>
<thead>
<tr>
<th>Series</th>
<th>30</th>
</tr>
</thead>
</table>

### Direction of rotation

- viewing at shaft end
- clockwise
- counter-clockwise

### Seals

FKM (Fluorcarbon rubber)

### Shaft end

<table>
<thead>
<tr>
<th>Shaft end</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAE parallel keyed shaft</td>
<td>●</td>
<td>●</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SAE splined shaft</td>
<td>●</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SAE splined shaft with run out spline</td>
<td>-</td>
<td>●</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Metric keyed parallel shaft DIN 6885</td>
<td>-</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Metric splined shaft DIN 5480</td>
<td>-</td>
<td>-</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### Mounting flange

- 4-hole to SAE J744 (ISO 3019-1) | ●   | ●   | -   | -   |
- 8-hole to ISO 3019-2 | -   | -   | ●   | ●   |

### Port connections

- Ports A:B: SAE flanged opposite sides
- UNC threaded bolt holes | ●   | ●   | -   | -   | 85
- Ports A:B: SAE flanged opposite sides
- metric threaded bolt holes | -   | -   | ●   | ●   | 35

### Boost pump

- with integrated boost pump | ●   | ●   | ●   | ●   |
- without integrated boost pump | ○   | ○   | ●   | ○   |

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

<table>
<thead>
<tr>
<th>Version</th>
<th>A4CS</th>
<th>G</th>
<th>/</th>
<th>30</th>
<th>-</th>
<th>V</th>
</tr>
</thead>
</table>

### Through drive
- Prepared for through drive, no coupling, no adapter flange, closed with cover
- With through drive for mounting of second pump (for further options see page 18)

<table>
<thead>
<tr>
<th>Flange SAE J744</th>
<th>Shaft coupling splined SAE J744 to mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>127-4(^1) (C)</td>
<td>32-4 11/4 in 14T (C) AA4VSO/G 40</td>
</tr>
<tr>
<td>127-4(^1) (C)</td>
<td>38-4 11/2 in 17T (C-C) AA4VSO/G 71</td>
</tr>
<tr>
<td>152-4(^1) (D)</td>
<td>44-4 13/4 in 13T (D) AA4VSO/G 125</td>
</tr>
<tr>
<td>152-4(^1) (D)</td>
<td>50-4 2 in 15T (F) AA4VSO/G 180</td>
</tr>
<tr>
<td>165-4(^1) (E)</td>
<td>50-4 2 in 15T (F) AA4CSG, AA4VSO/G 250</td>
</tr>
<tr>
<td>165-4(^1) (E)</td>
<td>50-4 2 in 15T (F) AA4CSG, AA4VSO/G 355</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flange ISO 3019-2 (metr.)</th>
<th>Shaft coupling splined DIN 5480 to mount</th>
</tr>
</thead>
<tbody>
<tr>
<td>315, 8-hole</td>
<td>W 80x3x30x25x9g A4CSG, A4VSO/G 500</td>
</tr>
<tr>
<td>400, 8-hole</td>
<td>W 90x3x30x28x9g A4CSG, A4VSO/G 750</td>
</tr>
</tbody>
</table>

### Valves
- Integrated: boost-, control pressure relief- and flushing valve; direct operated mainline relief valves\(^2\)
- Integrated: boost-, control pressure relief- and flushing valve; pilot operated mainline relief valves\(^2\)

### 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 RA 92076)
- With built on filter in boost circuit (M) and sandwichplate filter for HS-control (see RA 92076)
Technical data

Fluid

Prior to project design, please see our data sheets RA 90220 (mineral oil) and RA 90221 (environmentally acceptable fluids) for detailed information on fluids and application conditions. The variable displacement pump (A)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 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

\[ \nu_{\text{opt}} = \text{optimum operating viscosity } 80...170 \text{ SUS (16...36 mm}^2/\text{s}) \]

referred to circuit temperature (closed circuit)

Viscosity range for operation with 100% duty cycle

\[ \nu_{\text{operating}} = 80...463 \text{ SUS (16 ... 100 mm}^2/\text{s}) \]

Limit of viscosity range

For critical operating conditions the following values apply:

\[ \nu_{\text{min}} = 60 \text{ SUS (10 mm}^2/\text{s)} \]
for short periods (t < 3 min.)
at max. leakage fluid temp. of 195 °F (90 °C).

\[ \nu_{\text{max}} = 4600 \text{ SUS (1000 mm}^2/\text{s)} \]
for short periods on cold start (the optimum viscosity should be reached within 15 minutes)

\[ t_{\text{min}} \geq -13 \text{ °F (} -25 \text{ °C)} \]

Temperature range (see selection diagram)

\[ t_{\text{min}} = -13 \text{ °F (} -25 \text{ °C)} \]
\[ t_{\text{max}} = +195 \text{ °F (} +90 \text{ °C)} \]

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 \( X \) °C the operating temperature in the circuit is 140 °F (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 195 °F (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 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.

* draft issue 1999
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

Outlet
(Pressures acc. to DIN 24312)

Variable pump:
Pressure at port A or B
nominal pressure $p_N$ ____________ 5100 psi (350 bar)
Peak pressure $p_{\text{max}}$ ____________ 5800 psi (400 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

With integrated auxiliary pump - Version F

Inlet pressure at port S

$P_{S\text{ min}}$ ______________________ 11.6 psi (0.8 bar) abs.
$P_{S\text{ max}}$ ______________________ 435 psi (30 bar) abs.
Technical Data

Table of values (theoretical values, without considering \( h_{mh} \) and \( h_i \); values rounded)

<table>
<thead>
<tr>
<th>Size</th>
<th>Variable pump ( V_{g \text{ max}} ) in(^3)</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( (\text{cm}^3) )</td>
<td>(cm(^3))</td>
<td>(cm(^3))</td>
<td>(cm(^3))</td>
<td>(cm(^3))</td>
</tr>
<tr>
<td>Displacement</td>
<td>Vg max</td>
<td>15.26</td>
<td>21.7</td>
<td>30.51</td>
<td>45.8</td>
</tr>
<tr>
<td></td>
<td>integr. boost pump ( V_{gH} ) cm(^3)</td>
<td>3.84</td>
<td>4.88</td>
<td>5.98</td>
<td>8.72</td>
</tr>
<tr>
<td>Drive speed</td>
<td>max. speed ( n_{\text{max}} ) rpm</td>
<td>2200</td>
<td>2000</td>
<td>1800</td>
<td>1600</td>
</tr>
<tr>
<td></td>
<td>min. speed ( n_{\text{min}} ) rpm</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>Max. flow (variable pump)</td>
<td>at ( n_{\text{max}} ) ( q_{v \text{ max}} ) gpm (L/min)</td>
<td>145.3</td>
<td>187.6</td>
<td>237.8</td>
<td>317.0</td>
</tr>
<tr>
<td></td>
<td>at ( n_{k} = 1200 ) rpm ( q_{1200} ) gpm (L/min)</td>
<td>79.3</td>
<td>112.5</td>
<td>158.5</td>
<td>237.8</td>
</tr>
<tr>
<td></td>
<td>at ( n_{k} = 1800 ) rpm ( q_{1800} ) gpm (L/min)</td>
<td>118.9</td>
<td>168.8</td>
<td>237.7</td>
<td>–</td>
</tr>
<tr>
<td>Max. power (variable pump, ( \Delta p = 5100 \text{ psi} ) (350 bar) without boost pump)</td>
<td>at ( n_{\text{max}} ) ( P_{\text{max}} ) HP (kW)</td>
<td>432</td>
<td>558</td>
<td>707</td>
<td>943</td>
</tr>
<tr>
<td></td>
<td>at ( n_{k} = 1200 ) rpm ( P_{1200} ) HP (kW)</td>
<td>236</td>
<td>334.7</td>
<td>471.6</td>
<td>707.6</td>
</tr>
<tr>
<td></td>
<td>at ( n_{k} = 1800 ) rpm ( P_{1800} ) HP (kW)</td>
<td>353.8</td>
<td>502.3</td>
<td>707</td>
<td>–</td>
</tr>
<tr>
<td>Max. torque at ( V_{g \text{ max}} ) ( \Delta p = 5100 \text{ psi} ) (350 bar) (variable pump without boost pump)</td>
<td>( T_{\text{max}} ) lb-ft (Nm)</td>
<td>1032</td>
<td>1465</td>
<td>2064</td>
<td>3096</td>
</tr>
<tr>
<td></td>
<td>( \Delta p = 1450 \text{ psi} ) (100 bar) ( T ) lb-ft (Nm)</td>
<td>295</td>
<td>416</td>
<td>586</td>
<td>879</td>
</tr>
<tr>
<td>Moment of inertia about drive axis</td>
<td>( J ) lb-ft(^2) (kgm(^2))</td>
<td>2.276</td>
<td>4.509</td>
<td>7.890</td>
<td>15.66</td>
</tr>
<tr>
<td>Torsional stiffness</td>
<td>Shaft end ( K / P ) lb-ft/рад (kNm/рад)</td>
<td>326491</td>
<td>599918</td>
<td>843865</td>
<td>1370820</td>
</tr>
<tr>
<td></td>
<td>Shaft end ( S / R / Z ) lb-ft/рад (kNm/рад)</td>
<td>271216</td>
<td>350075</td>
<td>891033</td>
<td>1335444</td>
</tr>
<tr>
<td>Case volume</td>
<td>gal (L)</td>
<td>2.64</td>
<td>2.11</td>
<td>3.70</td>
<td>5.02</td>
</tr>
<tr>
<td>Weight approx. (Pump with EP-control and integrated boost pump)</td>
<td>m lbs (kg)</td>
<td>472</td>
<td>523</td>
<td>772</td>
<td>1102</td>
</tr>
</tbody>
</table>

Determination of size

\[
q_v = \frac{V_g \times n \times \eta_v}{231} \quad \text{[gpm]} \\
T = \frac{V_g \times \Delta p}{24 \pi \times \eta_{mh}} \quad \text{[lb-ft]} \\
P = \frac{q_v \times \Delta p}{1714 \times \eta_t} \quad \text{[HP]}
\]

\( V_g = \) geometr. displacement per revolution in \( \text{in}^3 \) (cm\(^3\))

\( \Delta p = \) Pressure differential in psi (bar)

\( n = \) Drive speed in rpm (min\(^{-1}\))

\( \eta_v = \) Volumetric efficiency

\( \eta_{mh} = \) Mechanical-hydraulic efficiency

\( \eta_t = \) Overall efficiency (\( \eta_t = \eta_v \times \eta_{mh} \))

Permissible forces on drive shaft

<table>
<thead>
<tr>
<th>Size</th>
<th>( F_{q \text{ max}} ) lbf (N)</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible radial force</td>
<td>( F_{q \text{ max}} ) (N)</td>
<td>450</td>
<td>495</td>
<td>562</td>
<td>674</td>
</tr>
<tr>
<td>Permissible axial force</td>
<td>( \pm F_{ax \text{ max}} ) lbf (N)</td>
<td>405</td>
<td>450</td>
<td>450</td>
<td>495</td>
</tr>
</tbody>
</table>

Application of forces
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 following flushing flows are recommended for the various pump sizes:

<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 (gpm)</td>
<td>2.64</td>
<td>3.96</td>
<td>5.28</td>
<td>7.93</td>
</tr>
<tr>
<td>(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. 43 psi (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 $T_{in}$ as well as the max. permissible through drive torque $T_{t}$ 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;S / R / Z&quot;</td>
<td>$T_{in}$</td>
<td>lb-ft</td>
<td>Nm</td>
<td>lb-ft</td>
</tr>
<tr>
<td>(Nm)</td>
<td>(2782)</td>
<td>(3372)</td>
<td>(5566)</td>
<td>(8348)</td>
</tr>
<tr>
<td>Max. perm. through drive torque</td>
<td>$T_{t}$</td>
<td>lb-ft</td>
<td>Nm</td>
<td>1026</td>
</tr>
<tr>
<td>(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;K / P&quot;</td>
<td>$T_{in}$</td>
<td>lb-ft</td>
<td>Nm</td>
<td>1696</td>
</tr>
<tr>
<td>(Nm)</td>
<td>(2300)</td>
<td>(3557)</td>
<td>(5200)</td>
<td>(7513)</td>
</tr>
<tr>
<td>Max. perm. through drive torque</td>
<td>$T_{t}$</td>
<td>lb-ft</td>
<td>Nm</td>
<td>1026</td>
</tr>
<tr>
<td>(Nm)</td>
<td>(1391)</td>
<td>(1976)</td>
<td>(2783)</td>
<td>(4174)</td>
</tr>
</tbody>
</table>

$T_{in} = \text{Max. permissible drive torque on pump 1}$

$T_{t} = \text{Max. permissible through drive torque}$
Summary of control and adjustment devices

**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

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**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.

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**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.

**Electrically controlled**

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

---

*see RA 92076*
Summary of control and adjustment devices

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)
- Power control and electric control of pilot pressure (HD.U)

see RA 92080

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 RA 92084 (in preparation)
Unit dimensions size 250

Example AA4CSG250EPG/30R-XXB85F994N

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Code</th>
<th>Tightening Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure port, high press. range</td>
<td>SAE J518 1 1/2 in, code 62</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>fixing thread</td>
<td>ISO 68 5/8-11UNC-2B; 1.14 (29) deep</td>
<td>see safety instructions</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range</td>
<td>SAE J518 2 1/2 in, code 61</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>fixing thread</td>
<td>ISO 68 1/2-13UNC-2B; 1.06 (27) deep</td>
<td>66 lb-ft (90 Nm)</td>
</tr>
<tr>
<td>MA, MB, MABP</td>
<td>Test points press. ports</td>
<td>ISO 11926 9/16-18UNF-2B; 0.51 (13) deep (plugged)</td>
<td>59 lb-ft (80 Nm)</td>
</tr>
<tr>
<td>MS</td>
<td>Test point inlet pressure</td>
<td>ISO 11926 9/16-18UNF-2B; 0.51 (13) deep (plugged)</td>
<td>59 lb-ft (80 Nm)</td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>ISO 11926 1 5/8-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>708 lb-ft (960 Nm)</td>
</tr>
<tr>
<td>E1</td>
<td>To filter</td>
<td>ISO 11926 1 5/16-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
</tr>
<tr>
<td>E2</td>
<td>From filter</td>
<td>ISO 11926 1 5/16-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
</tr>
<tr>
<td>K1</td>
<td>Flushing port</td>
<td>ISO 11926 1 5/16-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
</tr>
</tbody>
</table>

1) note safety instructions, page 32

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).
**Unit dimensions size 250**

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).

1) note safety instructions, page 32
**Unit dimensions size 355**

Example AA4CSG355EPG/30R-XXB85F994N

**Ports**

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>Thread</th>
<th>Max. tightening torque 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure port, high press. range</td>
<td>SAE J518 1 1/2 in, code 62</td>
<td>–</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range</td>
<td>SAE J518 2 1/2 in, code 61</td>
<td>–</td>
</tr>
<tr>
<td>MB</td>
<td>Test points press. ports</td>
<td>ISO 68 5/8-11UNC-2B; 0.51 (13) deep (plugged)</td>
<td>59 lb-ft (80 Nm)</td>
</tr>
<tr>
<td>MB</td>
<td>Test point inlet pressure</td>
<td>ISO 68 5/8-11UNC-2B; 0.51 (13) deep (plugged)</td>
<td>59 lb-ft (80 Nm)</td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>ISO 11926 9/16-18UNF-2B; 0.79 (20) deep (plugged)</td>
<td>708 lb-ft (960 Nm)</td>
</tr>
<tr>
<td>E1</td>
<td>To filter</td>
<td>ISO 11926 1 5/16-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
</tr>
<tr>
<td>E2</td>
<td>From filter</td>
<td>ISO 11926 1 5/16-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
</tr>
<tr>
<td>K1</td>
<td>Flushing port</td>
<td>ISO 11926 1 5/16-12UN-2B; 0.79 (20) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
</tr>
</tbody>
</table>

1) note safety instructions, page 32

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

Dimensions in inches (mm).

---

**Further views and ports on page 13**
Unit dimensions size 355

Shaft ends

K  Keyed 2 3/4in

R  Splined 2in 15T 8/16DP
similar to SAE J744 – 50-4 (F)
usable spline length 2.26

Ports

K2, K3  Flushing port
R(L)  Oil fill and air bleed
U  Bearing flushing port
E3  External boost flow port
ME3  Test point boost pressure
K4  Accumulator port
MK4  Test point loop flushing press.
M1, M2  Test point control pressure
X4, X5  Pilot port for pressure control

Max. tightening torque 1)

1) note safety instructions, page 32

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).
Unit dimensions size 500
Example A4CSG500EPD/30R-XXH35F994N

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
<th>SAE J 518</th>
<th>M20</th>
<th>M12</th>
<th>M33x2</th>
<th>M33x2</th>
<th>M14x1.5</th>
<th>M14x1.5</th>
<th>M14x1.5</th>
<th>M14x1.5</th>
<th>Max. tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure port, high press. range</td>
<td>2.01 in, code 62</td>
<td>0.94 (24) deep</td>
<td>see safety instructions</td>
<td>96 lb-ft (130 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range</td>
<td>2.17 in, code 61</td>
<td>0.67 (17) deep</td>
<td>59 lb-ft (80 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAB,MBS,MAB</td>
<td>Test points press. ports</td>
<td>0.71 (18) deep</td>
<td>0.47 (12) deep (plugged)</td>
<td>59 lb-ft (80 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>Test point inlet pressure</td>
<td>0.71 (18) deep</td>
<td>0.47 (12) deep (plugged)</td>
<td>708 lb-ft (960 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>0.71 (18) deep</td>
<td>0.47 (12) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>To filter</td>
<td>0.71 (18) deep</td>
<td>0.47 (12) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>From filter</td>
<td>0.71 (18) deep</td>
<td>0.47 (12) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K1</td>
<td>Flushing port</td>
<td>0.71 (18) deep</td>
<td>0.47 (12) deep (plugged)</td>
<td>398 lb-ft (540 Nm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) note safety instructions, page 32
Unit dimensions size 500

Shaft ends

P  Keyed DIN 6885
    AS 22x14x125

Z  Splined DIN 5480
    W80x3x30x25x9g

Ports

K₂, K₃  Flushing port
R(L)    Oil fill and air bleed
U       Bearing flushing port
E₃      External boost flow port
Mₑ₃     Test point boost pressure
K₄      Accumulator port
Mₖ₄     Test point loop flushing pressure
M₁      Test point control chamber press.
M₂      Test point control chamber press.

Max. tightening torque ¹)

<table>
<thead>
<tr>
<th>Port</th>
<th>Size (inch)</th>
<th>Size (mm)</th>
<th>Torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>K₂, K₃</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>R(L)</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>U</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>E₃</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>Mₑ₃</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>K₄</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>Mₖ₄</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>M₁</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
<tr>
<td>M₂</td>
<td>7.09(180)</td>
<td>1.97(50)</td>
<td>5.19(130)</td>
</tr>
</tbody>
</table>

¹) note safety instructions, page 32
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 port, high press. range fixing thread</td>
<td>SAE J 518 2 in, code 62 DIN 13 M20; 0.94 (24) deep</td>
</tr>
<tr>
<td>S</td>
<td>Inlet port, standard press. range fixing thread</td>
<td>SAE J 518 2 1/2 in, code 61 DIN 13 M12; 0.67 (17) deep</td>
</tr>
<tr>
<td>M_A M_B M_AB</td>
<td>Test points press. ports</td>
<td>DIN 3852 M14x1,5; 0.47 (12) deep (plugged)</td>
</tr>
<tr>
<td>M_S</td>
<td>Test point inlet pressure</td>
<td>DIN 3852 M14x1,5; 0.47 (12) deep (plugged)</td>
</tr>
<tr>
<td>T</td>
<td>Oil drain</td>
<td>DIN 3852 M48x2; 0.87 (22) deep (plugged)</td>
</tr>
<tr>
<td>E_1</td>
<td>To filter</td>
<td>DIN 3852 M33x2; 0.71 (18) deep (plugged)</td>
</tr>
<tr>
<td>E_2</td>
<td>From filter</td>
<td>DIN 3852 M33x2; 0.71 (18) deep (plugged)</td>
</tr>
<tr>
<td>K_1</td>
<td>Flushing port</td>
<td>DIN 3852 M33x2; 0.71 (18) deep</td>
</tr>
</tbody>
</table>

Max. tightening torque:

- see safety instructions
- 96 lb-ft (130 Nm)
- 59 lb-ft (80 Nm)
- 708 lb-ft (960 Nm)
- 398 lb-ft (540 Nm)

1) note safety instructions, page 32
Before finalising your design, please request a certified installation drawing.
Dimensions in inches (mm).

Shaft ends

P Keyed DIN 6885
AS 25x14x125

Z Splined DIN 5480
W90x3x30x25x9g

Ports

K2, K3 Flushing port
R(L) Oil fill and air bleed
U Bearing flushing port
E3 External boost flow port
M3 Test point boost pressure
K4 Accumulator port
M4 Test point loop flushing pressure
M1 Test point control chamber press.
M2 Test point control chamber press.
XAx XB Pilot port for pressure control

Max. tightening torque 1)

DIN 3852 M48x2; 0.87 (22) deep (plugged)
708 lb-ft (960 Nm)
DIN 3852 M48x2; 0.87 (22) deep
708 lb-ft (960 Nm)
DIN 3852 M18x1.5; 0.47 (12) deep (plugged)
103 lb-ft (140 Nm)
DIN 3852 M33x2; 0.71 (18) deep (plugged)
398 lb-ft (540 Nm)
DIN 3852 M14x1.5; 0.47 (12) deep (plugged)
59 lb-ft (80 Nm)
DIN 3852 M33x2; 0.71 (18) deep (plugged)
398 lb-ft (540 Nm)
DIN 3852 M14x1.5; 0.47 (12) deep (plugged)
59 lb-ft (80 Nm)
DIN 3852 M22x1.5; 0.55 (14) deep (plugged)
151 lb-ft (210 Nm)
DIN 3852 M14x1.5; 0.47 (12) deep (plugged)
59 lb-ft (80 Nm)
DIN 3852 M14x1.5; 0.47 (12) deep (plugged)
59 lb-ft (80 Nm)

1) note safety instructions, page 32
Through drive

Although the compact unit (A)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 99:
- with through drive shaft, without shaft coupling, without adapter flange; unit closed with oiltight cover.

for all other through drives:
- Shaft coupling, mounting screws, seal, and if necessary an adapter flange

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.

Overview mounting options onto A4CSG

<table>
<thead>
<tr>
<th>Through drive - (A)A4CSG</th>
<th>Suitable for 2. Pumtype</th>
<th>Ext./internal gear pump</th>
<th>Available for pump-size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange SAE J744 (ISO 3019-1)</td>
<td>Flange</td>
<td>Shaft coupling</td>
<td>Short code</td>
</tr>
<tr>
<td>127-4 (C) 1)</td>
<td>32-4 1 1/4in-14T3)</td>
<td>F/K16</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>38-4 1 1/4in-17T3)</td>
<td>F/K16</td>
<td>–</td>
</tr>
<tr>
<td>152-4 (D) 1)</td>
<td>44-4 1 3/4in-13T3)</td>
<td>F/K17</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>50-4 2 in-15T3)</td>
<td>F/K78</td>
<td>–</td>
</tr>
<tr>
<td>165-4 (E) 1)</td>
<td>50-4 2 in-15T3)</td>
<td>F/K18</td>
<td>250 (S)</td>
</tr>
<tr>
<td></td>
<td>50-4 2 in-15T3)</td>
<td>F/K18</td>
<td>355 (R)</td>
</tr>
<tr>
<td>82-2 (A) 1)</td>
<td>16-4 5/8in-9T3)</td>
<td>F/K01</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>19-4 3/4 in-11T3)</td>
<td>F/K52</td>
<td>–</td>
</tr>
<tr>
<td>101-2 (B) 1)</td>
<td>22-4 7/8 in-13T3)</td>
<td>F/K68</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>25-4 1 in-15T3)</td>
<td>F/K04</td>
<td>–</td>
</tr>
<tr>
<td>127-2 (C) 1)</td>
<td>32-4 1 1/4 in-14T3)</td>
<td>F/K07</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>38-4 1 1/2in-17T3)</td>
<td>F/K24</td>
<td>–</td>
</tr>
</tbody>
</table>

Flange ISO 3019-2 (metric)

<table>
<thead>
<tr>
<th>Through drive - (A)A4CSG</th>
<th>Suitable for 2. Pumtype</th>
<th>Ext./internal gear pump</th>
<th>Available for pump-size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange W80x3x30x25x9g 4)</td>
<td>F/K43</td>
<td>500 (Z)</td>
<td>500 (Z)</td>
</tr>
<tr>
<td>400 4)</td>
<td>F/K76</td>
<td>750 (Z)</td>
<td>750 (Z)</td>
</tr>
</tbody>
</table>

1) 2 = 2-hole, 4 = 4-hole; 2) 8-hole; 3) drive shafts according to SAE J744 OCT83; 4) to DIN 5480;
5) Rexroth recommends special versions for the gear pumps. Please consult us.

Permissible overhanging moment in relation to the mounting flange of pump 1

\[ T_m = \frac{m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3}{12} \text{ lb-ft} \]
\[ T_m = \frac{m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3}{102} \text{ in Nm} \]

Weight of pumps in lbs (kg)
Distance to center of gravity in (mm)

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perm. overhanging moment</td>
<td>Tm</td>
<td>lb-ft</td>
<td>6858</td>
<td>6858</td>
</tr>
<tr>
<td>(Nm)</td>
<td>(9300)</td>
<td>(9300)</td>
<td>(15600)</td>
<td>(19500)</td>
</tr>
<tr>
<td>Perm. overhanging moment</td>
<td>Tm</td>
<td>lb-ft</td>
<td>686</td>
<td>686</td>
</tr>
<tr>
<td>(Nm)</td>
<td>(930)</td>
<td>(930)</td>
<td>(1560)</td>
<td>(1950)</td>
</tr>
<tr>
<td>with dyn. mass acc.</td>
<td>10g = 98.1 m/sec²</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perm. overhanging moment</td>
<td>Tm</td>
<td>lb-ft</td>
<td>686</td>
<td>686</td>
</tr>
<tr>
<td>(Nm)</td>
<td>(930)</td>
<td>(930)</td>
<td>(1560)</td>
<td>(1950)</td>
</tr>
<tr>
<td>Dist. to center of gravity</td>
<td>l1</td>
<td>in</td>
<td>8.27</td>
<td>8.66</td>
</tr>
<tr>
<td>(mm)</td>
<td>(210)</td>
<td>(220)</td>
<td>(230)</td>
<td>(260)</td>
</tr>
</tbody>
</table>

Weight m 1 lbs (kg) | 471 | 521 | 770 | 1100 |
| (kg) | (214) | (237) | (350) | (500) |

Dist. to center of gravity l 1 in | 8.27 | 8.66 | 9.06 | 10.24 |
| (mm) | (210) | (220) | (230) | (260) |
Dimensions pump combinations

Pump combinations (A)A4CSG + (A)A4CSG

![Diagram of pump combinations](image)

Overall length A

<table>
<thead>
<tr>
<th>1st Pump</th>
<th>2nd Pump with through drive F/K99</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AA4CSG 250</td>
</tr>
<tr>
<td>AA4CSG 250</td>
<td>1069</td>
</tr>
<tr>
<td>AA4CSG 355</td>
<td>1070 1083</td>
</tr>
<tr>
<td>A4CSG 500</td>
<td>1235</td>
</tr>
<tr>
<td>A4CSG 750</td>
<td>1302</td>
</tr>
</tbody>
</table>

Dimensions in inches (mm).

Other values on request.
Dimensions through drive F/K99

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

### Size 250 and 355

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>20.19 (511)</td>
</tr>
<tr>
<td>355</td>
<td>20.39 (518)</td>
</tr>
</tbody>
</table>

#### Section M-N

- **shown without cover**
- **W 42x1.25x30x32x9g** DIN 5480
- **M16; 0.94 (24)deep\(^1\)**
- **M20; 0.94 (24)deep\(^1\)**
- **A1 to mounting face**

### 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>21.73</td>
<td>DIA 4.53</td>
<td>0.13</td>
<td>1.61</td>
<td>3.74</td>
</tr>
<tr>
<td></td>
<td>(552)</td>
<td>(115)</td>
<td>(3.4)</td>
<td>(41)</td>
<td>(95)</td>
</tr>
<tr>
<td>750</td>
<td>24.37</td>
<td>DIA 4.53</td>
<td>0.13</td>
<td>1.77</td>
<td>4.59</td>
</tr>
<tr>
<td></td>
<td>(619)</td>
<td>(115)</td>
<td>(3.4)</td>
<td>(45)</td>
<td>(116.6)</td>
</tr>
</tbody>
</table>

#### Section M-N

- **shown without cover**
- **W55x1.25x30x42x9g** DIN 5480
- **M16; 0.94 (24)deep\(^1\)**
- **M20; 0.94 (24)deep\(^1\)**

---

1) DIN 13, Tightening torque see safety instructions
Dimensions through drive F/K17 and F/K43

**F/K17**  
Flange  SAE J744 – 152-4 (SAE D-4-hole)  
Shaft coupler  for shaft to SAE J 744 – 44-4 (D) 1 3/4in 13T 8/16 DP  
for mounting of AA4VSO/G 125 (shaft S, see RA 92050) or A10VO 140 (shaft S, see RA 92701)  
or AA10VSO 140 (shaft S, see RA 92711)

Size 250, 355 and 500

<table>
<thead>
<tr>
<th>Size</th>
<th>( A_1 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>20.98 (533)</td>
</tr>
<tr>
<td>355</td>
<td>21.26 (540)</td>
</tr>
<tr>
<td>500</td>
<td>23.62 (600)</td>
</tr>
</tbody>
</table>

**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 RA 92 050 resp. 92 100)

Size 500

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).
Dimensions through drive F/K01

**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 ³)

for mounting of AZPF or PGF2 (shaft J, flange U2, see RE10 213)

---

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

Dimensions in inches (mm).
Dimensions through drive F/K68 and F/K04

**F/K68**  
Flange SAE J744 – 101-2 (SAE B-2-hole)  
Shaft coupler for shaft to SAE J744 22-4 (B) 7/8in 13T 16/32 DP ²  
for mounting of A10VO 28 (shaft S, see RA 92 701 resp. RA 92703) or AA10VSO 28 (shaft S, see RA 92711) or internal gear pump PGF3 (shaft J, flange U2, see RE 10 213) or AZPN/G

<table>
<thead>
<tr>
<th>Size</th>
<th>A₁</th>
<th>A₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>20.98 (533)</td>
<td>0.41 (10.3)</td>
</tr>
<tr>
<td>355</td>
<td>21.26 (540)</td>
<td>0.41 (10.3)</td>
</tr>
<tr>
<td>500</td>
<td>22.60 (574)</td>
<td>0.37 (9.3)</td>
</tr>
</tbody>
</table>

**F/K04**  
Flange SAE J744 – 101-2 (SAE B-2-hole)  
Shaft coupler for shaft to SAE J744 25-4 (B-B) 1 in 15T 16/32 DP ²  
for mounting of A10VO 45 (shaft S, see RA 92 701 resp. RA 92703) or AA10VSO 45 (shaft S, see RA 92711) or of an internal gear pump PGH4 (shaft R, flange U2, see RE 10 223)

Size NG 500

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).
Dimensions through drive F/K07

**F/K07**
- **Flange** SAE J744 – 127-2 (SAE C-2-hole)
- **Shaft coupler** for shaft to SAE J 744 32-4 (C) 1 1/4\(\text{in}\) 14T 12/24 DP
  
  for mounting of A10VO 71 (shaft S, see RA 92 701) or AA10VSO 71 (shaft S, see RA 92711)

**Size 250, 355 and 500**

![Diagram](image)

**Section M-N**

<table>
<thead>
<tr>
<th>Size</th>
<th>(A_1)</th>
<th>(A_2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>21.54 (547)</td>
<td>0.78 (19.9)</td>
</tr>
<tr>
<td>355</td>
<td>21.81 (554)</td>
<td>0.78 (19.9)</td>
</tr>
<tr>
<td>500</td>
<td>23.15 (588)</td>
<td>0.41 (10.3)</td>
</tr>
</tbody>
</table>

1) DIN 13, tightening torque see safety instructions

2) 30° pressure angle, flat root, side fit, class 5.

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).
Types of filtration

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

The ports $E_1$ and $E_2$ 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 $E_1$ and $E_2$ 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 $E_1$ and $E_2$ are provided to mount a filter externally.

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

The internal passage between $E_1$ and $E_2$ is plugged.

Caution: For proper pump function $E_1$ and $E_2$ have to be connected (preferably via a correctly sized filter)

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

Circuit drawing

Example A4CSG500 EPG/30R-XXB35F994N

Ports

<table>
<thead>
<tr>
<th>Port</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B</td>
<td>Pressure ports</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 (plugged)</td>
</tr>
<tr>
<td>M_S</td>
<td>Test point inlet port (plugged)</td>
</tr>
<tr>
<td>E1</td>
<td>To filter (plugged)</td>
</tr>
<tr>
<td>E2</td>
<td>From filter (plugged)</td>
</tr>
<tr>
<td>K_1</td>
<td>Flushing port</td>
</tr>
<tr>
<td>K_2, K_3</td>
<td>Flushing port (plugged)</td>
</tr>
<tr>
<td>R(L)</td>
<td>Oil fill + air bleed</td>
</tr>
<tr>
<td>U</td>
<td>Bearing flushing port (plugged)</td>
</tr>
<tr>
<td>E_3</td>
<td>External boost flow port (plugged)</td>
</tr>
<tr>
<td>M_E3</td>
<td>Test point boost pressure (plugged)</td>
</tr>
<tr>
<td>K_4</td>
<td>Accumulator port (plugged)</td>
</tr>
<tr>
<td>M_K4</td>
<td>Test point loop flushing pressure (plugged)</td>
</tr>
<tr>
<td>M_1, M_2</td>
<td>Test point control pressure (plugged)</td>
</tr>
<tr>
<td>X_A, X_B</td>
<td>Pilot port for remote pressure control</td>
</tr>
</tbody>
</table>

Circuit drawing NG 500/750 with EPD-control and filter see page 29; without integrated boostpump see page 30.
Integrated boost pump and -control valves (Version F..)

High press. mainline reliefs (crossover relief valves)
The 2 crossover relief valves are pilot operated.
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 are normally set to a pressure level of 5100 psi (350) bar.
If another setting is required, please state that in clear text.

Charge pressure relief valve
direct operated
Adjustment range $\Delta p_{Sp} 145...290$ psi (10...20) bar
Standard setting: 232 psi (16) bar absolute

Integrated boost pump
Standard sizes

<table>
<thead>
<tr>
<th>Size</th>
<th>250</th>
<th>355</th>
<th>500</th>
<th>750</th>
</tr>
</thead>
<tbody>
<tr>
<td>in³</td>
<td>3.84</td>
<td>4.88</td>
<td>5.98</td>
<td>8.72</td>
</tr>
<tr>
<td>cm³</td>
<td>63</td>
<td>80</td>
<td>98</td>
<td>143</td>
</tr>
</tbody>
</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 0.008 in (0.2 mm) filter screen 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 $\Delta p_{St} 145...290$ psi (10...20 bar)
Standard setting: $\Delta p_{Sp} + \Delta p_{St} = 464$ psi (32 bar)
At low operating pressure (i.e. main pump in center position) the auxiliary pump pressure is limited to 464 psi (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 need for an additional pump for control pressure.

As soon as the pressure level in one of the circuit pressure sides exceeds the 464 psi (32 bar), the control pressure is taken from this source via the check valves. At the same time, the relief valve is pilot open.

With the controls EO1 and HM1 the necessary control energy can always be taken out of the boost circuit (Port $M_{eo}$).
Recommended setting: 362 psi (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.

Pickup pressure of dirt indicator
\[ \Delta p_p = 65...72 \text{ psi (5 bar – 0,5 bar)} \]

Opening pressure of bypass valve
\[ \Delta p_o = 87...96 \text{ psi (6 bar +0,6 bar)} \]

Before finalising your design, please request a certified installation drawing.
Dimensions in inches (mm).

Dimensions size 250...500

<table>
<thead>
<tr>
<th>Size</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>27.62 (701.5)</td>
</tr>
<tr>
<td>355</td>
<td>27.89 (708.5)</td>
</tr>
<tr>
<td>500</td>
<td>29.23 (742.5)</td>
</tr>
</tbody>
</table>
Subplate mounted filter in boost circuit (Version M..)

Circuit diagram
Example A4CSG<sub>500/750</sub> EPD/30R-XXH35F994M

Mounting of filter onto size 250...500
DFBN/HC330QE10D1.X/V-L24
with electrical-optical dirt indicator
internal connection between E<sub>1</sub> and E<sub>2</sub> plugged
model code M

Control oil filter screen
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 0.008 in (0.2 mm) filter screen insert for coarse
particles (regardless of the model code for filtration).

Ports
- A, B: Pressure port
- S: Inlet port
- M<sub>A</sub>, M<sub>B</sub>, M<sub>AB</sub>: Test points pressure port (plugged)
- M<sub>S</sub>: Test point inlet pressure (plugged)
- T: Oil drain (plugged)
- K<sub>1</sub>: Flushing port
- K<sub>2</sub>, K<sub>3</sub>: Flushing port (plugged)
- R(L): Oil fill + air bleed (plugged)
- U: Bearing flushing port (plugged)
- M<sub>E3</sub>: Test point boost pressure (plugged)
- K<sub>4</sub>: Accumulator port (plugged)
- M<sub>K4</sub>: Test point loop flushing pressure (plugged)
- M<sub>1</sub>, M<sub>2</sub>: Test point control pressure (plugged)
External supply of boost flow - without integr. boostpump (Vers. 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. E* for version K..N/D without filter

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


1) note safety instructions, page 32

Circuit diagram

Example A4CSG 500 EPD/30R-XXB35KKKKK174M

Ports

- **E** resp. **E2**  **Boost inlet** DIN 3852 M33x2; 0.71 (18) deep 398 lb-ft (540) Nm max. tightening torque 1)
- **A, B**  Pressure port
- **M_A, M_B, M_AB**  Test points pressure ports
- **T**  Oil drain
- **K_1**  Flushing port

**K_2, K_3**  Flushing port
**R(L)**  Oil fill + air bleed
**U**  Port for bearing flushing
**K_4**  Accumulator port
**M_E3**  Test point for boost pressure
**M_K4**  Test point loop flushing pressure
**M_1, M_2**  Test point control pressure

Before finalising your design, please request a certified installation drawing. Dimensions in inches (mm).
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 deairated.

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 11.6 psi (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 isolated from the tank by flexible members.

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 11.6 psi (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.

Fig. 1

Fig. 3

Fig. 4

Fig. 5

h_{max} = 31.50 \text{ in (800 mm)}

h_{min} = 7.87 \text{ in (200 mm)}
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: The tightening torques mentioned in this data sheet are maximum values and must not be exceeded (max. values for thread). Manufacturer’s information concerning the maximum permitted tightening torques of the various fittings is to be observed!
  For fastening screws to ISO 68 and/or DIN 13 we recommend to check the permissible tightening torques in each individual case acc. to VDI 2230 dated 2003.
- **CAUTION:**
  During and shortly after operation of a pump the housing and especially a solenoid can be extremely hot, avoid being burned!