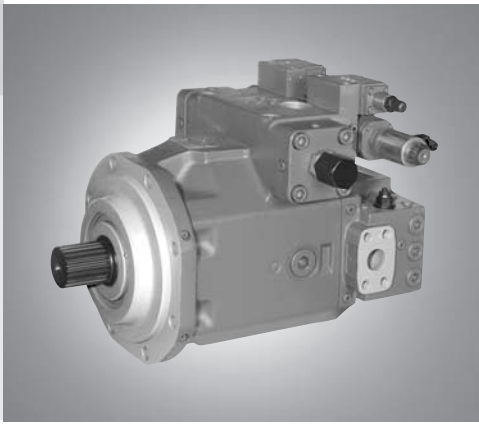
Axial piston-compact unit AA4CSG (A4CSG)

RA 92 105/05.04 1/32

closed loop circuit



Size 250...750
Series 3
Nominal pressure 5100 psi (350 bar)
Peak pressure 5800 psi (400 bar)

Contents

Features

- Axialpiston 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 boostpump and all required controlvalves 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-hydr. control EP with proportional solenoid and zero displacement position at power loss (fail safe function)
- Throughdrive for multiple pumpcombinations 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

Ordering code / standard program

Version

	250	355	500	750	
SAE version	●	●	–	–	A
Metric version (no code)	–	–	●	●	

Axial piston unit

Compact unit, swashplate design, variable displacement Nominal pressure 5100 psi (350 bar), peak pressure 5800 psi (400 bar)	A4CS

Type of operation

Pump, closed circuit operation	G

Size

		250	355	500	750
≙ Displacement $V_{g\,max}$	in³	15.26	21.66	30.51	45.77
	(cm³)	(250)	(355)	(500)	(750)

Control and adjustment devices

Hydr. adjustment, control volume dependent	HM	❍	❍	❍	❍	HM..	see RA 92076
Hydr. adjustment with servo-/ proportional valve	HS	❍	❍	❍	❍	HS..	see RA 92076
Electronic control	EO	❍	❍	❍	❍	EO..	see RA 92076
Hydr. control, pilot pressure dependent	HD	❍	●	●	❍	HD..	see RA 92080
Electro-hydraulic control with proportional solenoid	EP	●	●	●	●	EP..	see RA 92084 in prep.

Series

	30

Direction of rotation

viewing at shaft end	clockwise	R
	counter-clockwise	L

Seals

FKM (Fluorcarbon rubber)	V

Shaft end

	250	355	500	750	
SAE parallel keyed shaft	●	●	–	–	K
SAE splined shaft	●	–	–	–	S
SAE splined shaft with run out spline	–	●	–	–	R
Metric keyed parallel shaft DIN 6885	–	–	●	●	P
Metric splined shaft DIN 5480	–	–	●	●	Z

Mounting flange

4-hole to SAE J744 (ISO 3019-1)	●	●	–	–	D
8-hole to ISO 3019-2	–	–	●	●	H

Port connections

Ports A,B: SAE flanged opposite sides Port S: SAE flanged on side 90° offset	UNC threaded bolt holes	●	●	–	–	85
Ports A,B: SAE flanged opposite sides Port S: SAE flanged on side 90° offset	metric threaded bolt holes	–	–	●	●	35

Boost pump

	250	355	500	750	
with integrated boost pump	●	●	●	●	F
without integrated boost pump	❍	❍	●	❍	K

● = available ❍ = in preparation – = not available

Ordering code / standard program

		A4CS	G			/	30		–	V							

Version

Axial piston unit

Type of operation

Size

Control and adjustment device

Series

Direction of rotation

Seals

Shaft end

Mounting flange

Port connections

Boost pump

Through drive

					250	355	500	750	
prepared for through drive, no coupling, no adapter flange, closed with cover					●	●	●	●	**99**
with through drive for mounting of second pump (for further options see page 18)									
Flange SAE J744	shaft coupling splined SAE J744			to mount					
127-4[1]) (C)	32-4	11/4 in 14T	(C)	AA4VSO/G 40	❍	❍	❍	❍	**15**
127-4[1]) (C)	38-4	11/2 in 17T	(C-C)	AA4VSO/G 71	❍	❍	❍	❍	**16**
152-4[1]) (D)	44-4	13/4 in 13T	(D)	AA4VSO/G 125	●	●	●	❍	**17**
152-4[1]) (D)	50-4	2 in 15T	(F)	AA4VSO/G 180	❍	❍	❍	❍	**78**
165-4[1]) (E)	50-4	2 in 15T	(F)	AA4CSG, AA4VSO/G 250	❍	❍	❍	❍	**18**
165-4[1]) (E)	50-4	2 in 15T	(F)	AA4CSG, AA4VSO/G 355	–	❍	❍	❍	**18**
Flange ISO 3019-2 (metr.)	shaft coupling splined DIN 5480			to mount					
315, 8-hole	W 80x3x30x25x9g			A4CSG, A4VSO/G 500	–	–	●	❍	**43**
400, 8-hole	W 90x3x30x28x9g			A4CSG, A4VSO/G 750	–	–	–	❍	**76**
Flange SAE J 744	shaft coupling splined SAE J744			to mount					
82-2[1]) (A)	16-4	5/8 in 9T	(A)	AZPF, PGF2	●	●	●	❍	**01**
82-2[1]) (A)	19-4	3/4 in 11T	(A-B)	A10VSO 10, 18	❍	❍	❍	❍	**52**
101-2[1]) (B)	22-4	7/8 in 13T	(B)	(A)A10V(S)O 28, PGF3, AZPN/G	●	●	●	❍	**68**
101-2[1]) (B)	25-4	1 in 15T	(B-B)	(A)A10V(S)O 45, PGH4	❍	❍	●	❍	**04**
127-2[1]) (C)	32-4	11/4 in 14T	(C)	(A)A10V(S)O 71	●	●	●	❍	**07**
127-2[1]) (C)	38-4	11/2 in 17T	(C-C)	(A)A10V(S)O 100, PGH5	❍	❍	❍	❍	**24**
152-4[1]) (D)	44-4	13/4 in 13T	(D)	(A)A10V(S)O 140	●	●	●	❍	**17**

[1]) 2 = 2-bolt; 4 = 4-bolt to SAE J744

Valves

Integrated: boost-, control pressure relief- and flushing valve; direct operated mainline relief valves [2])	❍	❍	❍	❍	**3**
Integrated: boost-, control pressure relief- and flushing valve; pilot operated mainline relief valves [2])	●	●	●	●	**4**

[2]) crossover relief valves

Filtration

without filter	●	●	●	●	**N**
with threaded connection for filter in boost circuit	●	●	●	●	**D**
with built on filter (optical-electr. dirt indicator) in boost circuit	●	●	●	❍	**M**
with threaded connection f. filter in boost circuit (D) a. sandwichplate filter for HS-control (see RA 92076)	❍	❍	–	–	**Z**
with built on filter in boost circuit (M) and sandwichplate filter for HS-control (see RA 92076)	❍	❍	–	–	**U**

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 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 oprating temperature) be selected in the range

ν_{opt} = optimum operating viscosity 80...170 SUS (16....36 mm²/s)

referred to circuit temperature (closed circuit)

Viscosity range for operation with 100% duty cycle

$\nu_{operating}$ = 80...463 SUS (16 .... 100 mm²/s)

Limit of viscosity range

For critical operating conditions the following values apply:

ν_{min} = 60 SUS (10 mm²/s)
for short periods (t < 3 min.)
at max. leakage fluid temp. of 195 °F (90 °C).

ν_{max} = 4600 SUS (1000 mm²/s)
for short periods on cold start (the optimum viscosity should be reached within 15 minutes)
$t_{min} \geq -13$ °F (– 25° C)

Temperature range (see selection diagram)

t_{min} = –13 °F (– 25° C)

t_{max} = +195 °F (+90 °C)

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 (ν_{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 ν_{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.

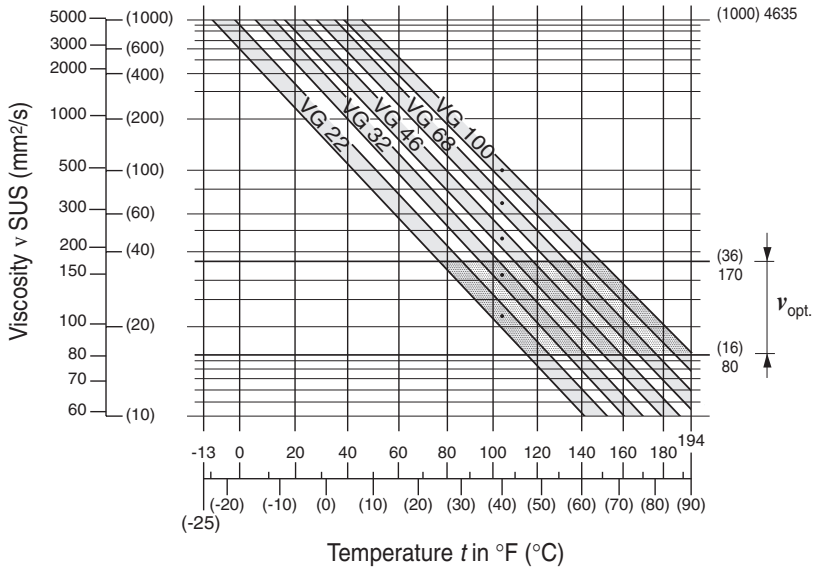
To ensure a reliable functioning of the axial piston unit, a minimum cleanliness of

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

Selection diagram



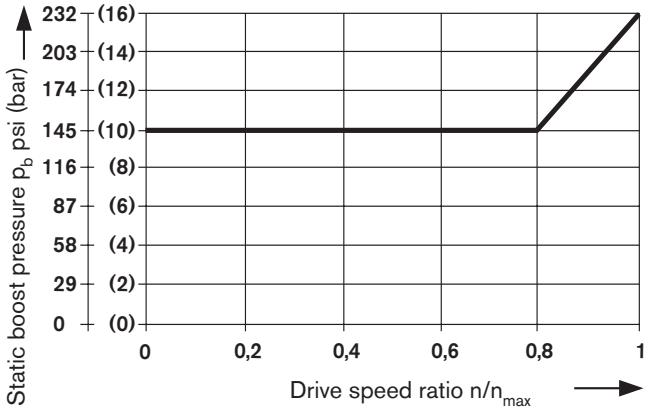
Technical Data (valid for operation on mineral oil)

Operating pressure range

Inlet

(Pressures acc. to DIN 24312)

Required static boost pressure, depending on drive speed



Required static boost pressure(at $n/n_{max}=1$)

$p_{b\ min}$ _____ 232 psi (16 bar)*

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

at $p_{b\ min}$ _____ 116 psi (8 bar)*

Maximum static boost pressure

$p_{b\ max}$ (for HM2/3, HS, EO2, HD u. EP) _____ 290 psi (20 bar)*

$p_{b\ max}$ (for HM1 u. EO1), _____ 435 psi (30 bar)*

* absolute pressure at port M_{E3} with flushingvalve spool in shifted position .

Permissible pressure spikes in boostcircuit min. 58 psi (4 bar) abs.

max. _____ 580 psi (40 bar) abs.

Depending on the energy transmission properties of the system, boost pressure fluctuations can occur. In order to prevent damage in the system, boost pressure protection is necessary, which monitors the static boostpressure part. Ports M_{E3} or M_{K4} are suitable to monitor the boost pressure. It is recommended to check regularly the boost pressure for the permissible max. and min. spikes with suitable measuring equipment.

In order to prevent excessive boost pressure spikes, a low pressure accumulator can be connected to ports E_2, E_3 or K_4 . Accumulator sizing as well as the selection for the optimum connecting location depend on the system behaviour and the operating conditions under consideration of the available boost flow. Depending on the total systems leakage fluid flow, it may be necessary to increase the boost flow by means of a larger, or additional boost pump.

With integrated auxiliary pump - Version F..

Inlet pressure at port S

$p_{S\ min}$ _____ 11.6 psi (0,8 bar) abs.

$p_{S\ max}$ _____ 435 psi (30 bar) abs.

Outlet

(Pressures acc. to DIN 24312)

Variable pump:

Pressure at port A or B

nominal pressure p_N _____ 5100 psi (350 bar)

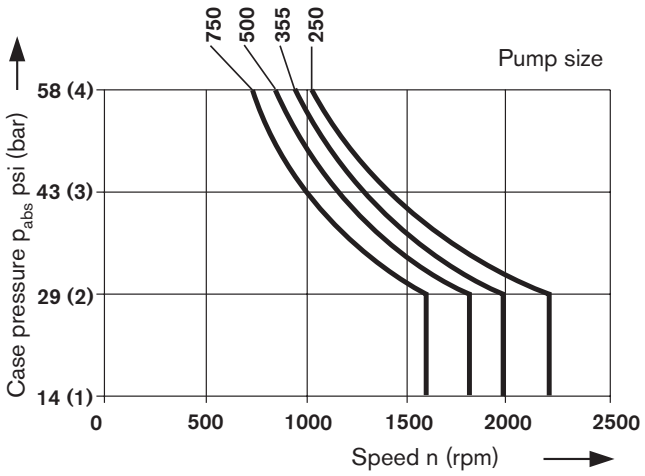
Peak pressure p_{max} _____ 5800 psi (400 bar)

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



Max. case pressure (housing pressure)

$p_{L\ abs\ max}$ _____ 58 psi (4 bar)

Technical Data

Table of values (theoretical values, without considering h_{mh} und h_v; values rounded)

Size				250	355	500	750
Displacement	Variable pump	$V_{g\,max}$	in³ (cm³)	15.26 (250)	21.7 (355)	30.51 (500)	45.8 (750)
	integr. boost pump	$V_{g\,H}$	in³ (cm³)	3.84 (63)	4.88 (80)	5.98 (98)	8.72 (143)
Drive speed	max. speed	n_{max}	rpm	2200	2000	1800	1600
	min. speed	n_{min}	rpm	800	800	800	800
Max. flow (variable pump)	at n_{max}	$q_{v\,max}$	gpm (L/min)	145.3 (550)	187.6 (710)	237.8 (900)	317.0 (1200)
	at n_E = 1200 rpm	$q_{v\,1200}$	gpm (L/min)	79.3 (300)	112.5 (426)	158.5 (600)	237.8 (900)
	at n_E = 1800 rpm	$q_{v\,1800}$	gpm (L/min)	118.9 (450)	168.8 (639)	237.7 (900)	– –
Max. power (variable pump, Δp = 5100 psi (350 bar) without boost pump)	at n_{max}	P_{max}	HP (kW)	432 (321)	558 (414)	707 (525)	943 (700)
	at n_E = 1200 rpm	P_{1200}	HP (kW)	236 (175)	334.7 (248)	471.6 (350)	707.6 (525)
	at n_E = 1800 rpm	P_{1800}	HP (kW)	353.8 (263)	502.3 (373)	707 (525)	– –
Max. torque at $V_{g\,max}$ (variable pump without boost pump)	Δp = 5100 psi (350 bar)	T_{max}	lb-ft (Nm)	1032 (1391)	1465 (1976)	2064 (2783)	3096 (4174)
	Δp = 1450 psi (100 bar)	T	lb-ft (Nm)	295 (398)	416 (564)	586 (795)	879 (1193)
Moment of inertia about drive axis		J	lb-ft² (kgm²)	2.276 (0.96)	4.509 (0.19)	7.890 (0.333)	15.66 (0.66)
Torsional stiffness	Shaft end K / P		lb-ft/rad (kNm/rad)	326491 (443)	599918 (814)	843865 (1145)	1370820 (1860)
	Shaft end S / R / Z		lb-ft/rad (kNm/rad)	271216 (368)	350075 (475)	891033 (1209)	1335444 (1812)
Case volume			gal (L)	2.64 (10)	2.11 (8)	3.70 (14)	5.02 (19)
Weight approx.. (Pump with EP-control and integrated boost pump)		m	lbs (kg)	472 (214)	523 (237)	772 (350)	1102 (500)

Determination of size

Flow $q_v = \frac{V_g \cdot n \cdot \eta_v}{231}$ [gpm] $\left(q_v = \frac{V_g \cdot n \cdot \eta_v}{1000}\ \text{[L/min]}\right)$

Drive torque $T = \frac{V_g \cdot \Delta p}{24 \cdot \pi \cdot \eta_{mh}}$ [lb-ft] $\left(T = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}}\ \text{[Nm]}\right)$

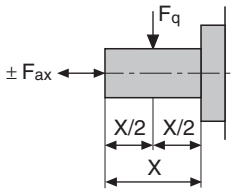
Power $P = \frac{q_v \cdot \Delta p}{1714 \cdot \eta_t}$ [HP] $\left(P = \frac{2\pi \cdot T \cdot n}{60\,000} = \frac{q_v \cdot \Delta p}{600 \cdot \eta_t}\ \text{[kW]}\right)$

V_g = geometr. displacement per revolution in in³ (cm³)
Δp = Pressure differential in psi (bar)
n = Drive speed in rpm (min⁻¹)
η_v = Volumetric efficiency
η_{mh} = Mechanical-hydraulic efficiency
η_t = Overall efficiency ($\eta_t = \eta_v \bullet \eta_{mh}$)

Permissible forces on drive shaft

Size			250	355	500	750
Permissible radial force	$F_{q\,max}$	lbf (N)	450 (2000)	495 (2200)	562 (2500)	674 (3000)
Permissible axial force	$\pm F_{ax\,max}$	lbf (N)	405 (1800)	450 (2000)	450 (2000)	495 (2200)

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:

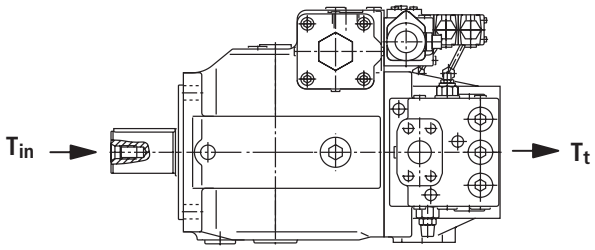
Size			250	355	500	750
Flushing flow	q_{sp}	gpm (L/min)	2.64 (10)	3.96 (15)	5.28 (20)	7.93 (30)

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.

Size			250	355	500	750
Max. perm. drive torque on pump 1 with shaft "**S / R / Z**"	T_{in}	lb-ft (Nm)	2052 (2782)	2487 (3372)	4105 (5566)	6157 (8348)
Max. perm. through drive torque	T_t	lb-ft (Nm)	1026 (1391)	1457 (1976)	2053 (2783)	3079 (4174)

Size			250	355	500	750
Max. perm. drive torque on pump 1 with shaft "**K / P**"	T_{in}	lb-ft (Nm)	1696 (2300)	2624 (3557)	3835 (5200)	5542 (7513)
Max. perm. through drive torque	T_t	lb-ft (Nm)	1026 (1391)	1457 (1976)	2053 (2783)	3079 (4174)

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

T_t = 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 X_1 and X_2

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

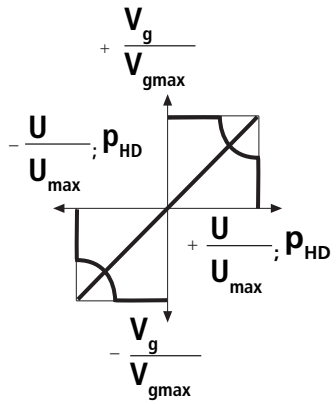
see RA 92076

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**



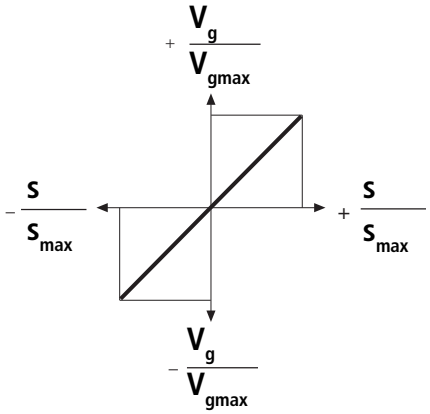
see RA 92076

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)



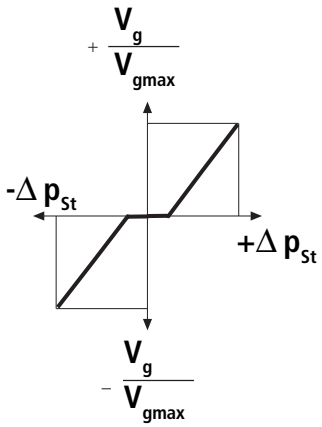
see RA 92076

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)



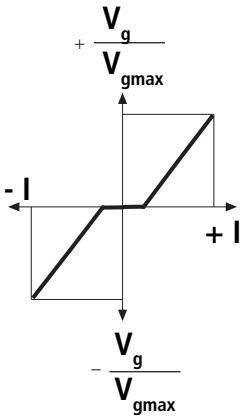
see RA 92080

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)

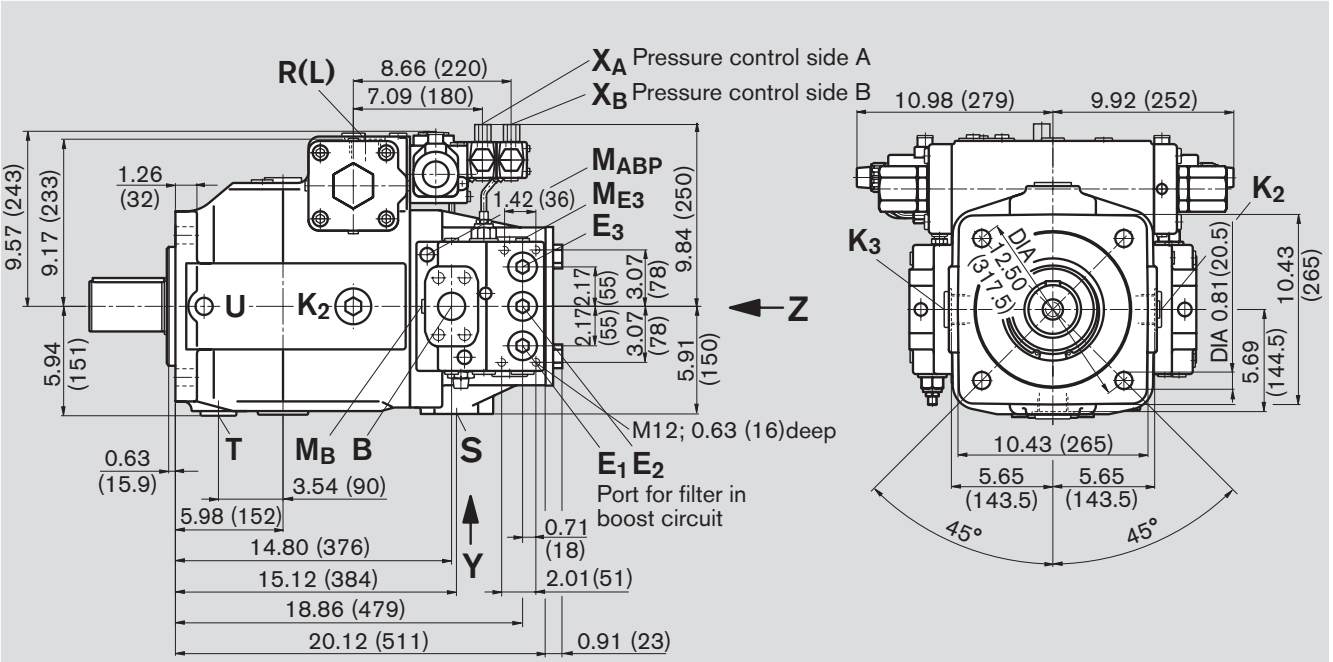


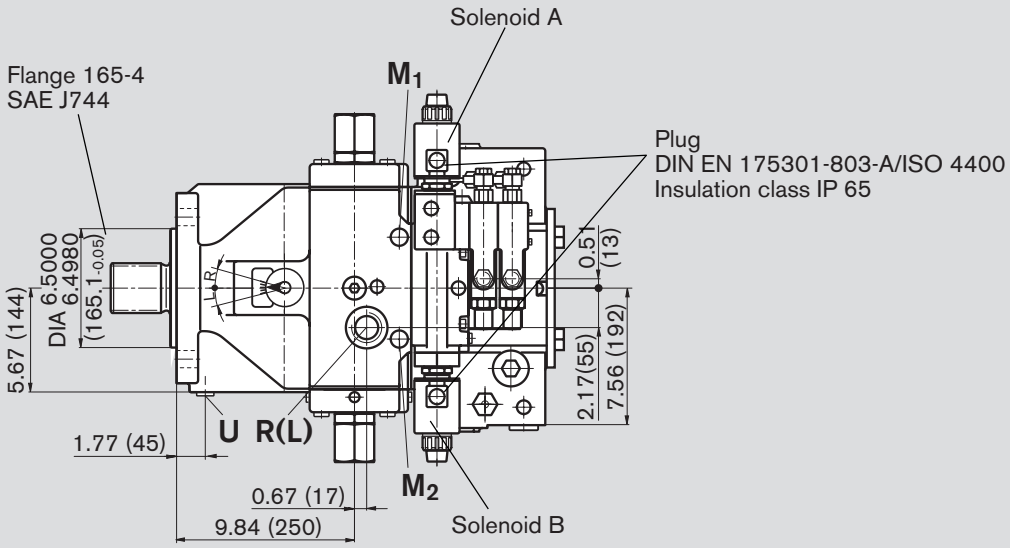
see RA 92084
(in preparation)

Unit dimensions size 250

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

Example AA4CSG250EPG/30R-XXB85F994N





Further views and ports on page 11

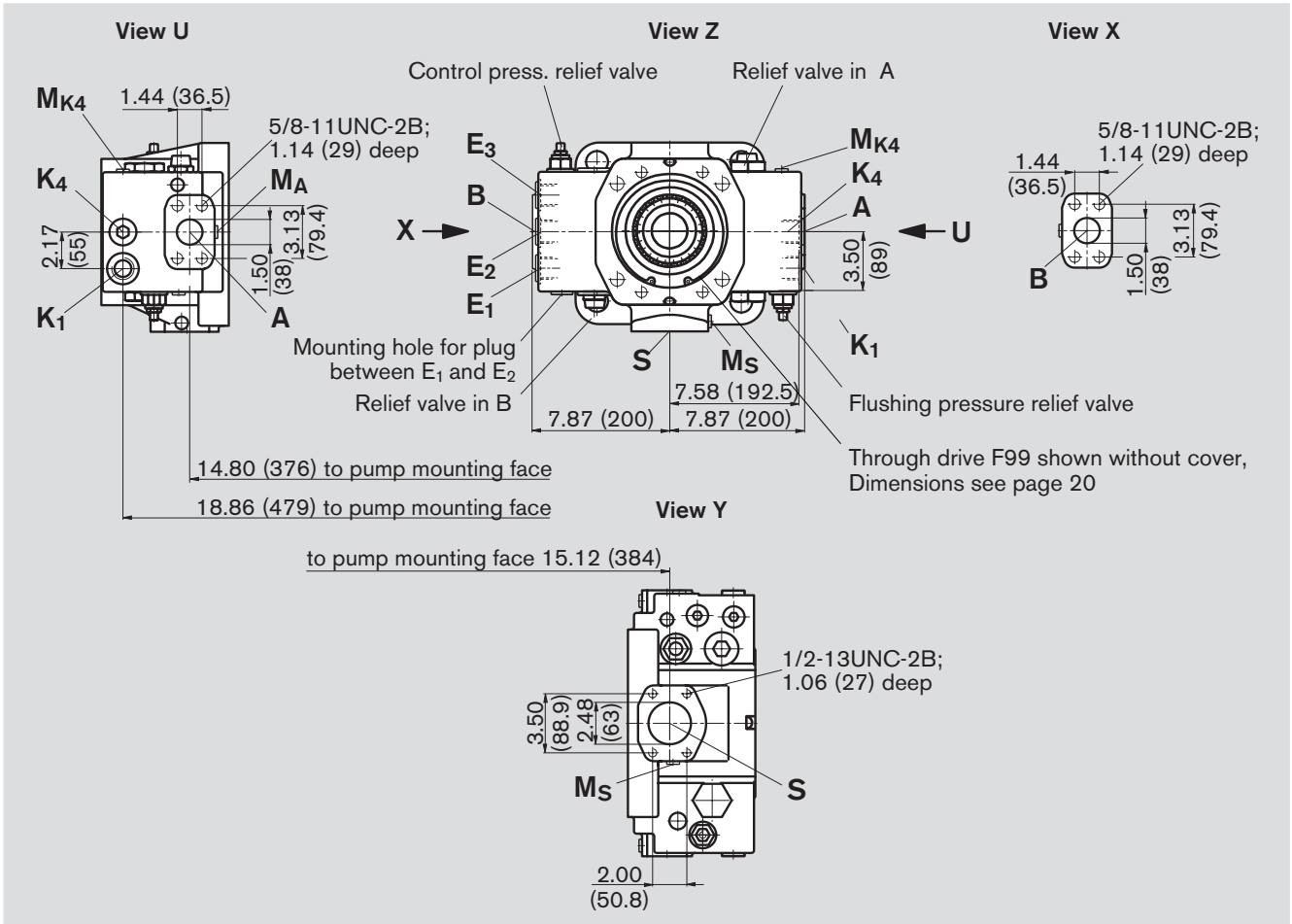
Ports

				Max. tightening torque [1]
A, B	Pressure port, high press. range	SAE J518	1 1/2 in, code 62	–
	fixing thread	ISO 68	5/8-11UNC-2B; 1.14 (29) deep	see safety instructions
S	Inlet port, standard press. range	SAE J518	2 1/2 in, code 61	–
	fixing thread	ISO 68	1/2-13UNC-2B; 1.06 (27) deep	66 lb-ft (90 Nm)
M_A,M_B,M_{ABP}	Test points press. ports	ISO 11926	9/16-18UNF-2B; 0.51(13) deep (plugged)	59 lb-ft (80 Nm)
M_S	Test point inlet pressure	ISO 11926	9/16-18UNF-2B; 0.51(13) deep (plugged)	59 lb-ft (80 Nm)
T	Oil drain	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep (plugged)	708 lb-ft (960 Nm)
E_1	To filter	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
E_2	From filter	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
K_1	Flushing port	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)

[1]) note safety instructions, page 32

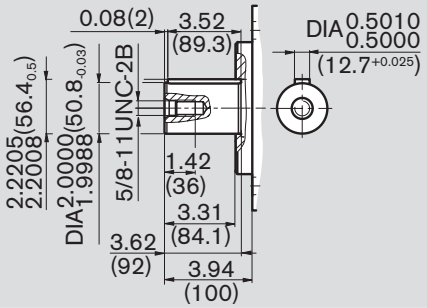
Unit dimensions size 250

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

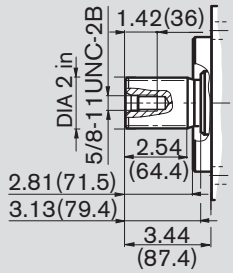


Shaft ends

K Keyed 2in



S Splined 2in 15T 8/16DP SAE J744 – 50-4 (F)



Ports

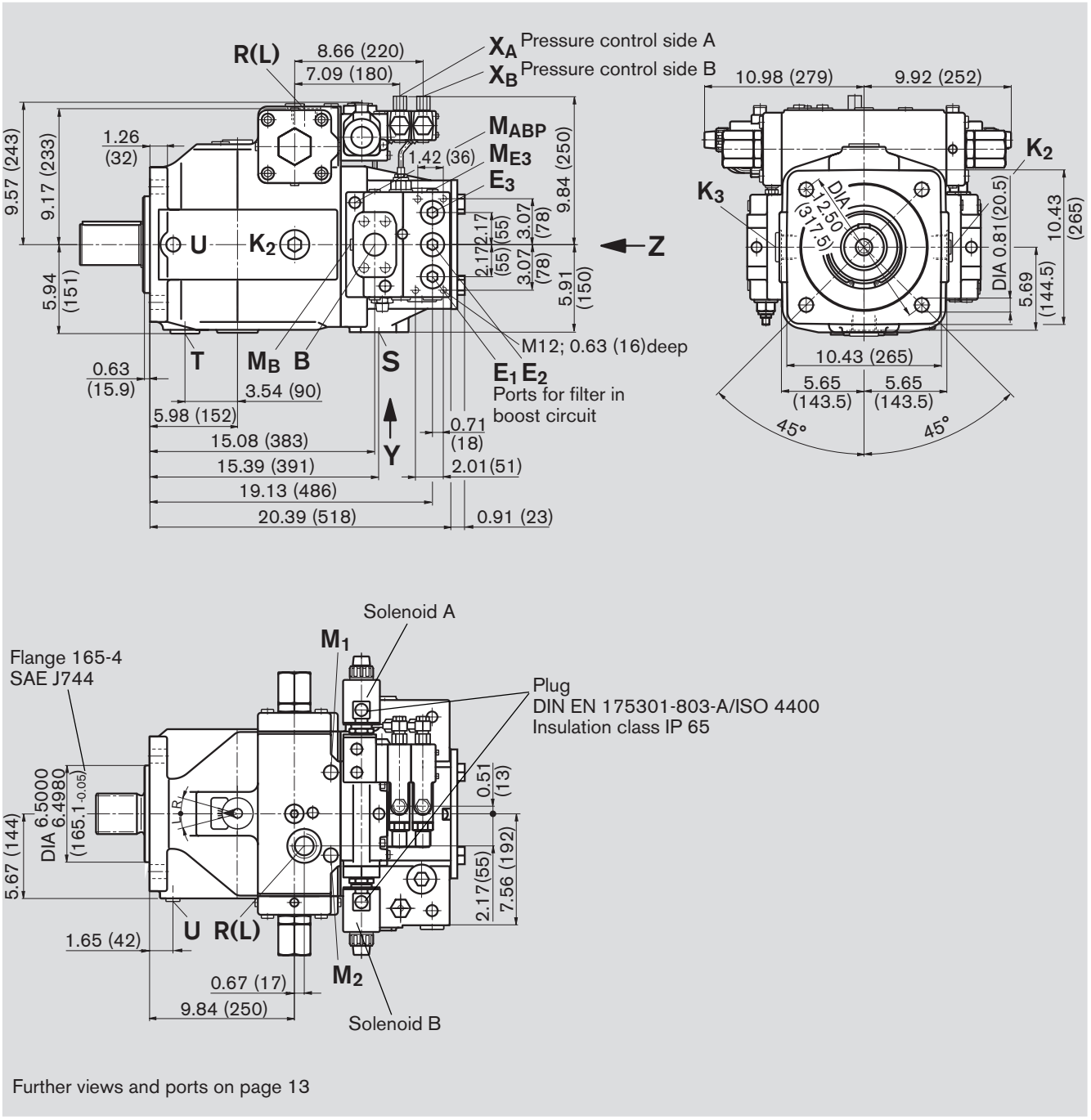
					Max. tightening torque [1]
K_2, K_3	Flushing port	ISO 11926	1 5/8-12UN-2B;	0.79 (20) deep (plugged)	708 lb-ft (960 Nm)
R(L)	Oil fill and air bleed	ISO 11926	1 5/8-12UN-2B;	0.79 (20) deep	708 lb-ft (960 Nm)
U	Bearing flushing port	ISO 11926	7/16-20UNF-2B;	0.47 (12) deep (plugged)	30 lb-ft (40 Nm)
E_3	External boost flow port	ISO 11926	1 5/16-12UN-2B;	0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
M_{E3}	Test point boost pressure	ISO 11926	9/16-18UNF-2B;	0.51(13) deep (plugged)	59 lb-ft (80 Nm)
K_4	Accumulator port	ISO 11926	1 5/16-12UN-2B;	0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
M_{K4}	Test point loop flushing press.	ISO 11926	9/16-18UNF-2B;	0.51(13) deep (plugged)	59 lb-ft (80 Nm)
M_1, M_2	Test point control pressure	DIN 3852	M18x1,5;	0.47 (12) deep (plugged)	103 lb-ft (140 Nm)
X_A, X_B	Pilot port for pressure control	ISO 11926	9/16-18UNF-2B;	0.51(13) deep	59 lb-ft (80 Nm)

[1]) note safety instructions, page 32

Unit dimensions size 355

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

Example AA4CSG355EPG/30R-XXB85F994N



Further views and ports on page 13

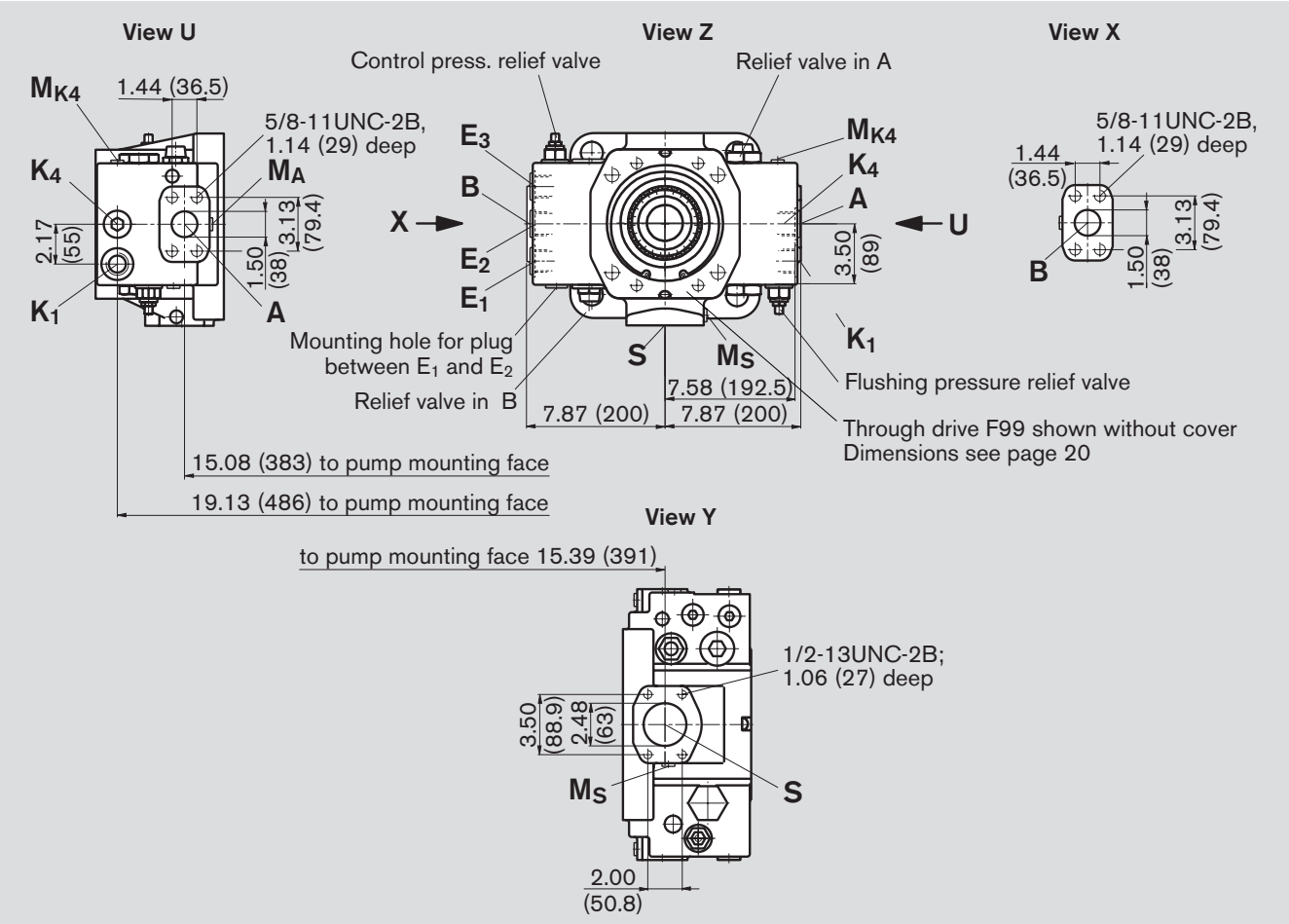
Ports

				Max. tightening torque [1]
A, B	Pressure port, high press. range	SAE J518	1 1/2 in, code 62	–
	fixing thread	ISO 68	5/8-11UNC-2B; 1.14 (29) deep	see safety instructions
S	Inlet port, standard press. range	SAE J518	2 1/2 in, code 61	–
	fixing thread	ISO 68	1/2-13UNC-2B; 1.06 (27) deep	66 lb-ft (90 Nm)
M_A,M_B,M_{ABP}	Test points press. ports	ISO 11926	9/16-18UNF-2B; 0.51(13) deep (plugged)	59 lb-ft (80 Nm)
M_S	Test point inlet pressure	ISO 11926	9/16-18UNF-2B; 0.51(13) deep (plugged)	59 lb-ft (80 Nm)
T	Oil drain	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep (plugged)	708 lb-ft (960 Nm)
E_1	To filter	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
E_2	From filter	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
K_1	Flushing port	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)

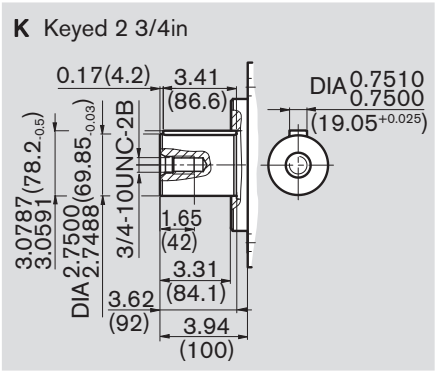
[1]) note safety instructions, page 32

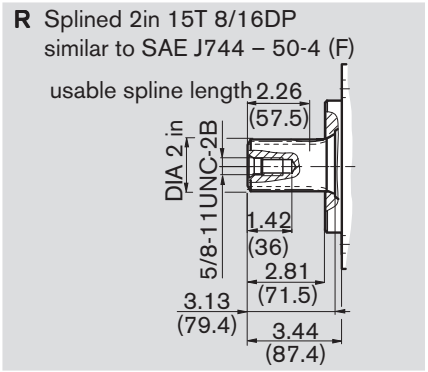
Unit dimensions size 355

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



Shaft ends





Ports

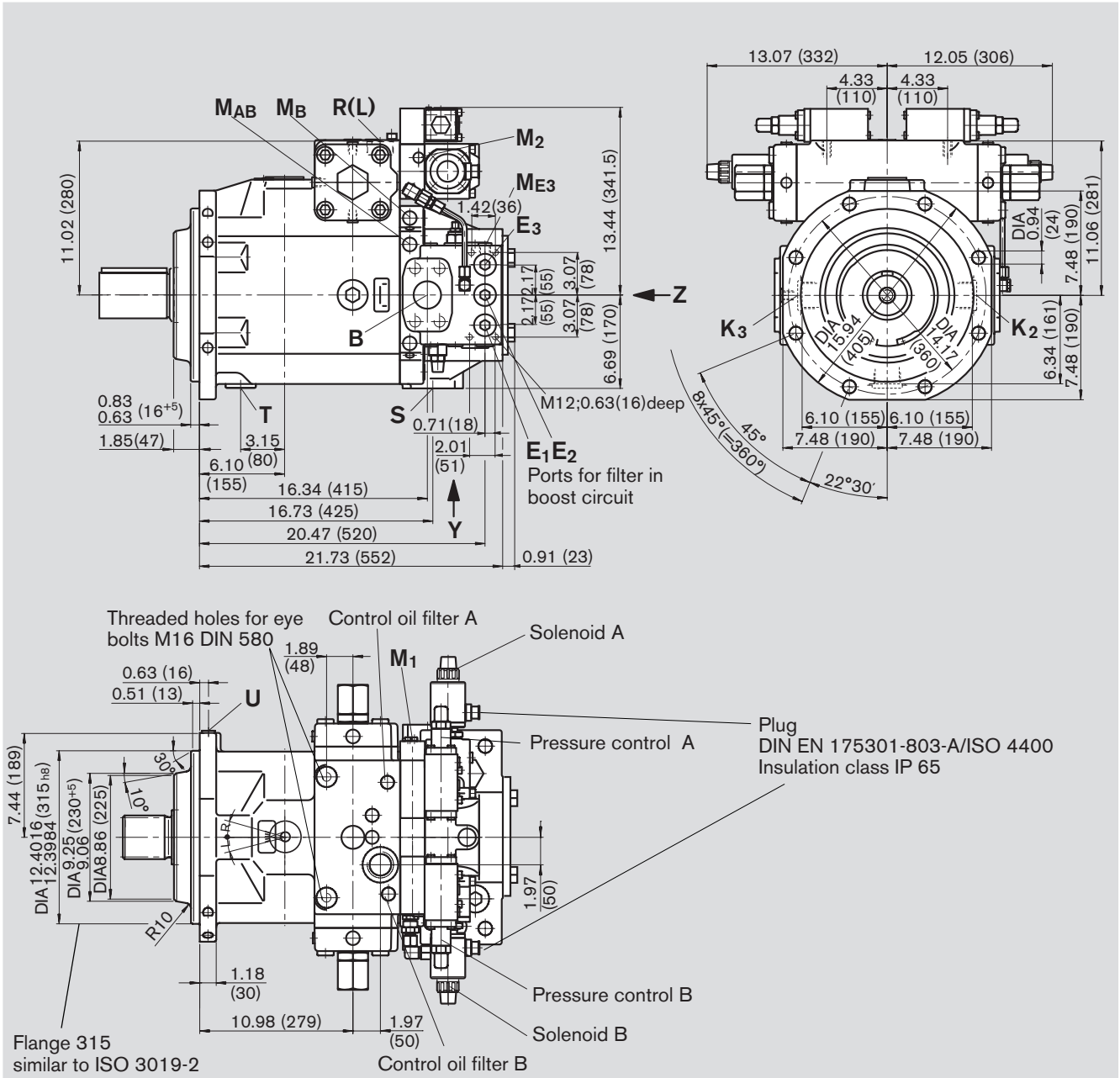
				Max. tightening torque [1)]
K_2, K_3	Flushing port	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep (plugged)	708 lb-ft (960 Nm)
R(L)	Oil fill and air bleed	ISO 11926	1 5/8-12UN-2B; 0.79 (20) deep	708 lb-ft (960 Nm)
U	Bearing flushing port	ISO 11926	3/4-16UNF-2B; 0.59 (15) deep (plugged)	118 lb-ft (160 Nm)
E_3	External boost flow port	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
M_{E3}	Test point boost pressure	ISO 11926	9/16-18UNF-2B; 0.51(13) deep (plugged)	59 lb-ft (80 Nm)
K_4	Accumulator port	ISO 11926	1 5/16-12UN-2B; 0.79 (20) deep (plugged)	398 lb-ft (540 Nm)
M_{K4}	Test point loop flushing press.	ISO 11926	9/16-18UNF-2B; 0.51(13) deep (plugged)	59 lb-ft (80 Nm)
M_1, M_2	Test point control pressure	DIN 3852	M18x1,5; 0.47 (12) deep (plugged)	103 lb-ft (140 Nm)
X_A, X_B	Pilot port for pressure control	ISO 11926	9/16-18UNF-2B; 0.51(13) deep	59 lb-ft (80 Nm)

[1)] note safety instructions, page 32

Unit dimensions size 500

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

Example A4CSG500EPD/30R-XXH35F994N



Further views and ports on page 15

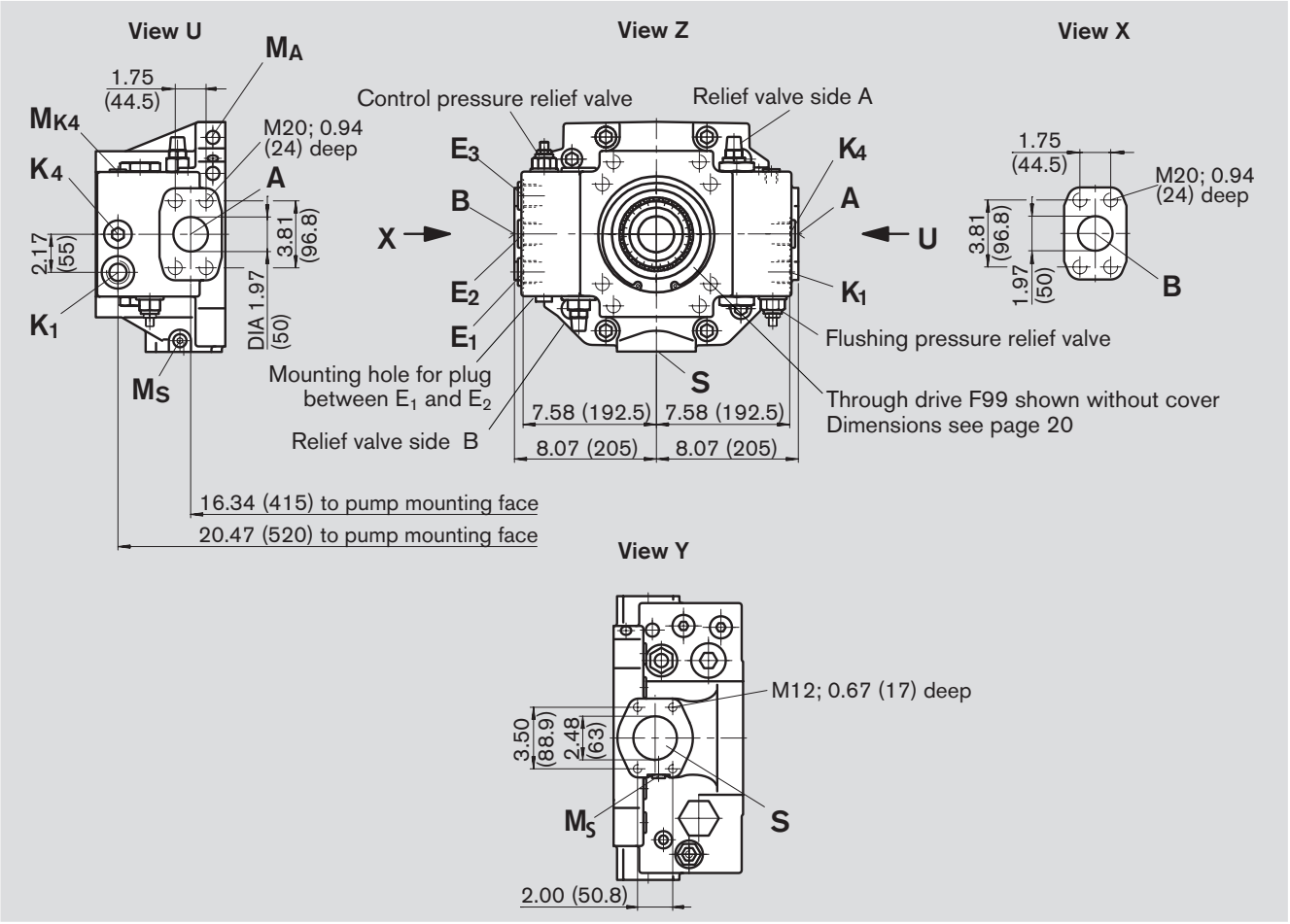
Ports

					Max. tightening torque [1]
A, B	Pressure port, high press. range	SAE J 518	2 in, code 62		–
	fixing thread	DIN 13	M20;	0.94 (24) deep	see safety instructions
S	Inlet port, standardpress. range	SAE J518	2 1/2 in, code 61		–
	fixing thread	DIN 13	M12;	0.67 (17) deep	96 lb-ft (130 Nm)
M_A,M_B,M_{AB}	Test points press. ports	DIN 3852	M14x1,5;	0.47(12) deep (plugged)	59 lb-ft (80 Nm)
M_S	Test point inlet pressure	DIN 3852	M14x1,5;	0.47(12) deep (plugged)	59 lb-ft (80 Nm)
T	Oil drain	DIN 3852	M48x2;	0.87(22) deep (plugged)	708 lb-ft (960 Nm)
E_1	To filter	DIN 3852	M33x2;	0.71(18) deep (plugged)	398 lb-ft (540 Nm)
E_2	From filter	DIN 3852	M33x2;	0.71(18) deep (plugged)	398 lb-ft (540 Nm)
K_1	Flushing port	DIN 3852	M33x2;	0.71(18) deep	398 lb-ft (540 Nm)

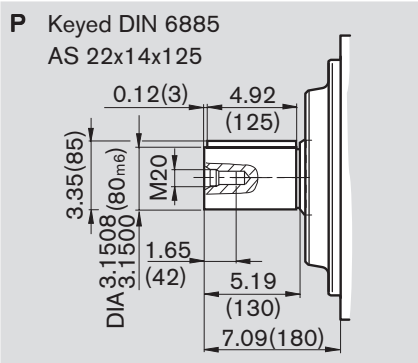
[1]) note safety instructions, page 32

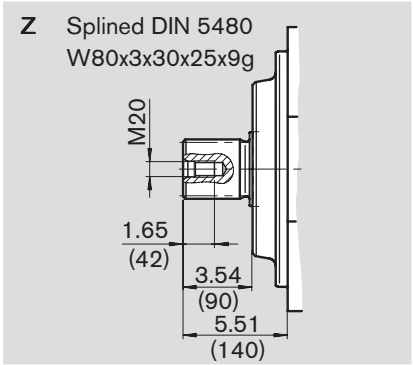
Unit dimensions size 500

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



Shaft ends





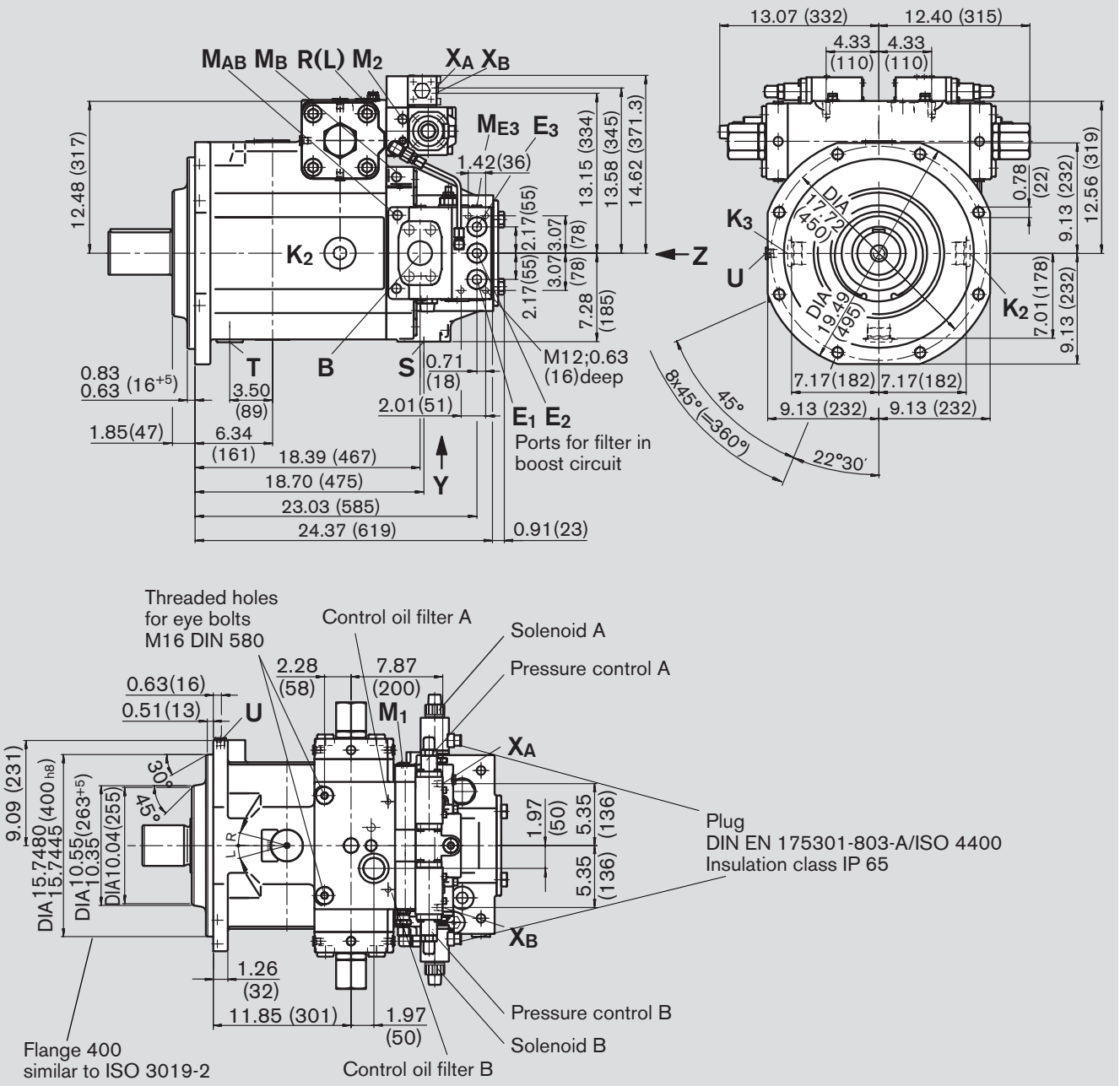
Ports					Max. tightening torque [1]
K_2, K_3	Flushing port	DIN 3852	M48x2;	0.87 (22) deep (plugged)	708 lb-ft (960 Nm)
R(L)	Oil fill and air bleed	DIN 3852	M48x2;	0.87 (22) deep	708 lb-ft (960 Nm)
U	Bearing flushing port	DIN 3852	M18x1,5;	0.47 (12) deep (plugged)	103 lb-ft (140 Nm)
E_3	External boost flow port	DIN 3852	M33x2;	0.71 (18) deep (plugged)	398 lb-ft (540 Nm)
M_{E3}	Test point boost pressure	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
K_4	Accumulator port	DIN 3852	M33x2;	0.71 (18) deep (plugged)	398 lb-ft (540 Nm)
M_{K4}	Test point loop flushing pressure	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
M_1	Test point control chamber press.	DIN 3852	M22x1,5;	0.55 (14) deep (plugged)	151 lb-ft (210 Nm)
M_2	Test point control chamber press.	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)

[1]) note safety instructions, page 32

Unit dimensions size 750

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

Example A4CSG750EPG/30R-XXH35F994N



Further views and ports on page 17

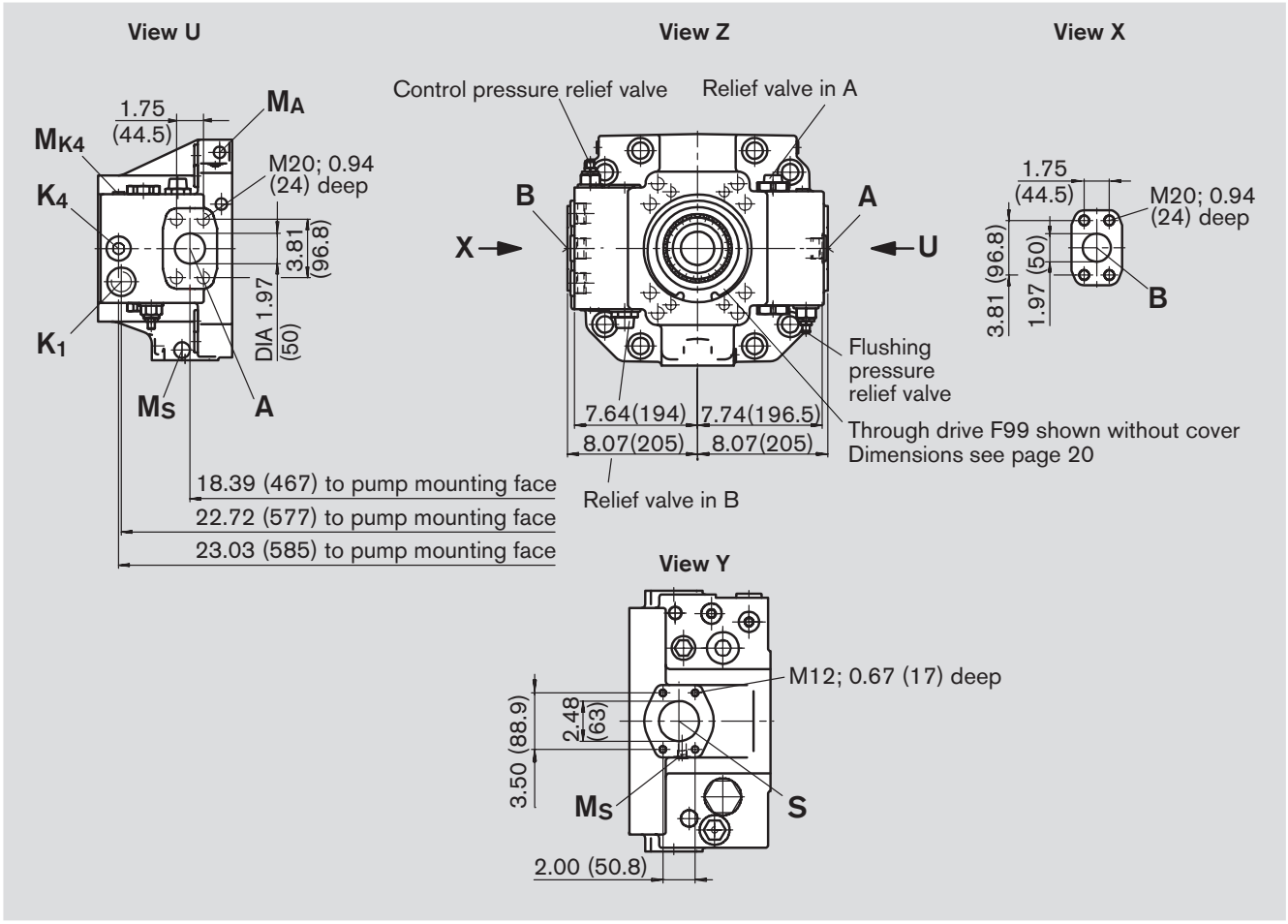
Ports

					Max. tightening torque [1]
A, B	Pressure port, high press. range	SAE J 518	2 in, code 62		–
	fixing thread	DIN 13	M20;	0.94 (24) deep	see safety instructions
S	Inlet port, standardpress. range	SAE J518	2 1/2 in, code 61		–
	fixing thread	DIN 13	M12;	0.67 (17) deep	96 lb-ft (130 Nm)
M_A,M_B,M_{AB}	Test points press. ports	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
M_S	Test point inlet pressure	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
T	Oil drain	DIN 3852	M48x2;	0.87 (22) deep (plugged)	708 lb-ft (960 Nm)
E_1	To filter	DIN 3852	M33x2;	0.71 (18) deep (plugged)	398 lb-ft (540 Nm)
E_2	From filter	DIN 3852	M33x2;	0.71 (18) deep (plugged)	398 lb-ft (540 Nm)
K_1	Flushing port	DIN 3852	M33x2;	0.71 (18) deep	398 lb-ft (540 Nm)

[1]) note safety instructions, page 32

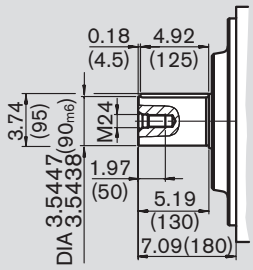
Unit dimensions size 750

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

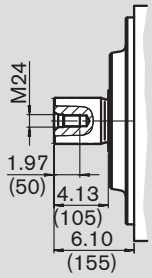


Shaft ends

P Keyed DIN 6885
AS 25x14x125



Z Splined DIN 5480
W90x3x30x25x9g



Ports

					Max. tightening torque [1]
K_2, K_3	Flushing port	DIN 3852	M48x2;	0.87 (22) deep (plugged)	708 lb-ft (960 Nm)
R(L)	Oil fill and air bleed	DIN 3852	M48x2;	0.87 (22) deep	708 lb-ft (960 Nm)
U	Bearing flushing port	DIN 3852	M18x1,5;	0.47 (12) deep (plugged)	103 lb-ft (140 Nm)
E_3	External boost flow port	DIN 3852	M33x2;	0.71 (18) deep (plugged)	398 lb-ft (540 Nm)
M_{E3}	Test point boost pressure	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
K_4	Accumulator port	DIN 3852	M33x2;	0.71 (18) deep (plugged)	398 lb-ft (540 Nm)
M_{K4}	Test point loop flushing pressure	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
M_1	Test point control chamber press.	DIN 3852	M22x1,5;	0.55 (14) deep (plugged)	151 lb-ft (210 Nm)
M_2	Test point control chamber press.	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)
X_A, X_B	Pilot port for pressure control	DIN 3852	M14x1,5;	0.47 (12) deep (plugged)	59 lb-ft (80 Nm)

[1]) note safety instructions, page 32

Through drive

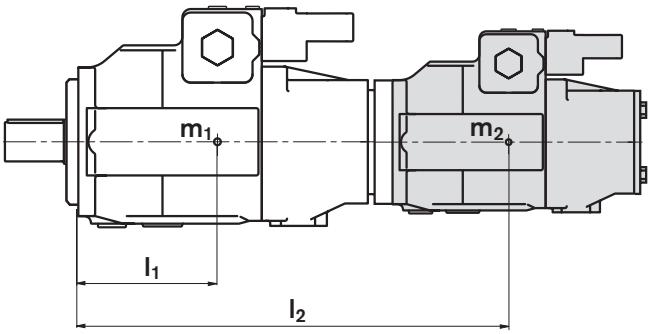
Although the compact unit (A)A4CSG has a built in boost pump, it can be supplied with a through drive as per the model codes on page 3.
For the various through drive versions see the codes on page 3 (codes 99...17).
This code designation is sufficient if no further pump has to be factory mounted.

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

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



m_1, m_2, m_3 Weight of pumps in lbs (kg)
l_1, l_2, l_3 Distance to center of gravity in (mm)

$$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{12} \text{ lb-ft}$$

$$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{102} \text{ in Nm}$$

Size			250	355	500	750
Perm. overhanging moment	T_m	lb-ft (Nm)	6858 (9300)	6858 (9300)	11505 (15600)	14380 (19500)
Perm. overhanging moment with dyn. mass acc. of 10g ≙ 98,1 m/sec²	T_m	lb-ft (Nm)	686 (930)	686 (930)	1150 (1560)	1438 (1950)
Weight	m_1	lbs (kg)	471 (214)	521 (237)	770 (350)	1100 (500)
Dist. to center of gravity	l_1	in (mm)	8.27 (210)	8.66 (220)	9.06 (230)	10.24 (260)

Combination pumps

Independent circuits are avilable 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

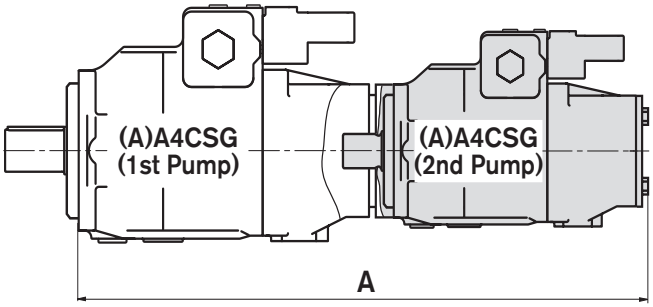
Through drive - (A)A4CSG			Suitable for 2. Pumptype					Available
Flange	Shaft coupling	Short code	(A)A4CSG Size (shaft)	(A)A4VSO/(H)G Size (shaft)	(A)A10V(S)O/31 Size (shaft)	A10V(S)O/52 Size (shaft)	Ext./internal gear pump	for pump-size
Flange SAE J744 (ISO 3019-1)								
127-4 (C) [1]	32-4 1 1/4in-14T[3]	**F/K15**	–	40 (S)	–	–	–	in prep.
	38-4 1 1/4in-17T[3]	**F/K16**	–	71 (S)	–	–	–	in prep.
152-4 (D) [1]	44-4 1 3/4in-13T[3]	**F/K17**	–	125 (S)	140 (S)	–	–	250...500
	50-4 2 in-15T[3]	**F/K78**	–	180 (S)	–	–	–	in prep.
165-4 (E) [1]	50-4 2 in-15T[3]	**F/K18**	250 (S)	250 (S)	–	–	–	in prep.
	50-4 2 in-15T[3]	**F/K18**	355 (R)	355 (R)	–	–	–	in prep.
82-2 (A) [1]	16-4 5/8 in-9T[3]	**F/K01**	–	–	–	–	AZPF[5]/PGF2	250...500
	19-4 3/4 in-11T[3]	**F/K52**	–	–	10(S),18(S,R)	–	–	in prep.
101-2 (B) [1]	22-4 7/8 in-13T[3]	**F/K68**	–	–	28(S)	28(S)	AZPN/G[5], PGF3	250...500
	25-4 1 in-15T[3]	**F/K04**	–	–	45(S)	45(S)	PGH4	500
127-2 (C) [1]	32-4 1 1/4 in-14T [3]	**F/K07**	–	–	71(S)	–	–	250...500
	38-4 1 1/2 in-17T[3]	**F/K24**	–	–	100 (S)	85 (S)	PGH5	in prep.
Flange ISO 3019-2 (metric)								
315 [2]	W80x3x30x25x9g [4]	**F/K43**	500 (Z)	500 (Z)	–	–	–	500
400 [2]	W90x3x30x28x9g [4]	**F/K76**	750 (Z)	750 (Z)	–	–	–	in prep.

[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.

Dimensions pump combinations

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

Pump combinations (A)A4CSG + (A)A4CSG



Overall lenght A

	2nd Pump with through drive F/K99			
1st Pump	**AA4CSG 250**	**AA4CSG 355**	**A4CSG 500**	**A4CSG 750**
AA4CSG 250	1069	–	–	–
AA4CSG 355	1070	1083	–	–
A4CSG 500			1235	–
A4CSG 750			1302	

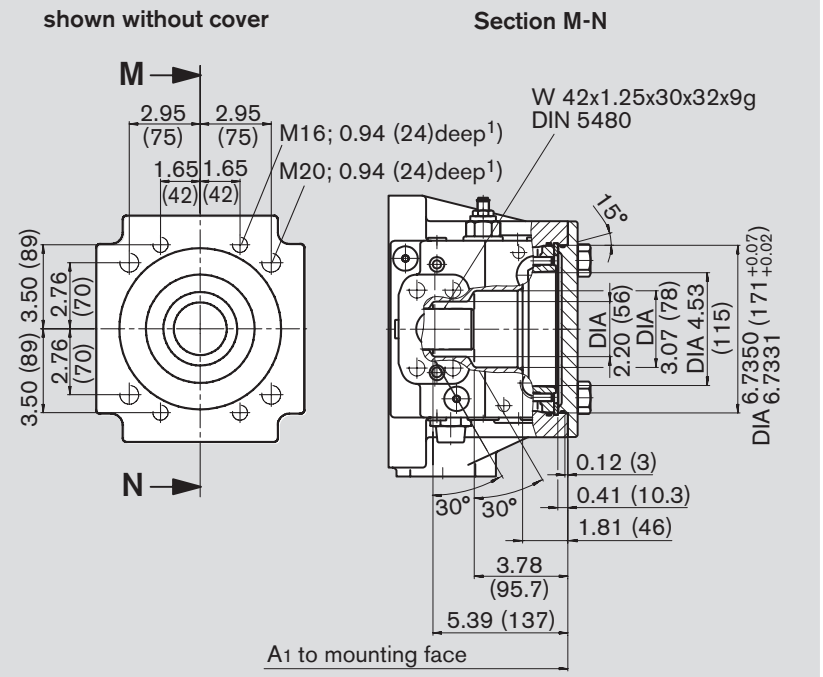
other values on request

Dimensions through drive F/K99

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

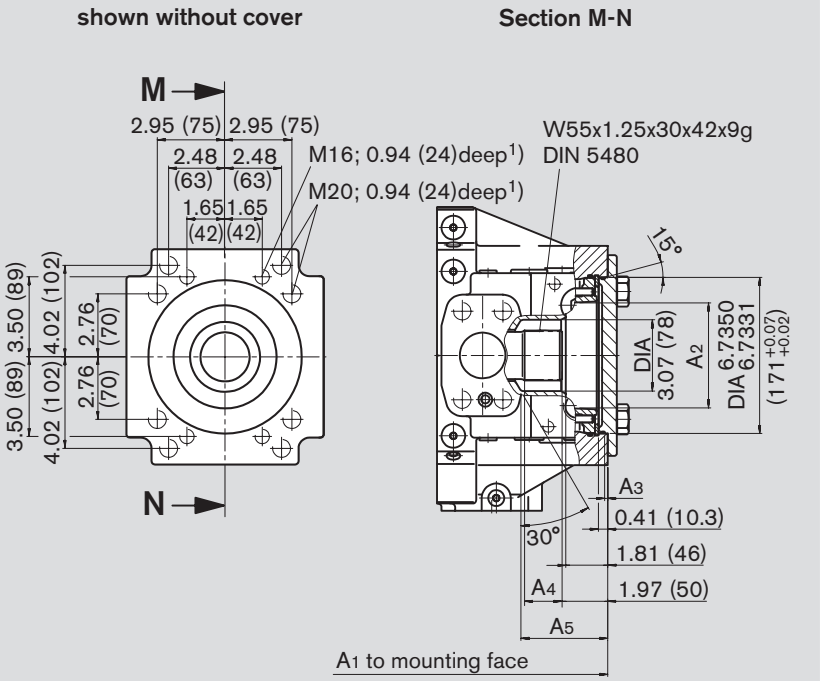
F/K99 **with through drive shaft,** without shaft coupler, without adapter flange, closed with cover

Size 250 and 355



Size	A_1
250	20.19 (511)
355	20.39 (518)

Size 500 and 750



Size	A_1	A_2	A_3	A_4	A_5
500	21.73 (552)	DIA 4.53 (115)	0.13 (3.4)	1.61 (41)	3.74 (95)
750	24.37 (619)	DIA 4.53 (115)	0.13 (3.4)	1.77 (45)	4.59 (116.6)

1) DIN 13, Tightening torque see safety instructions

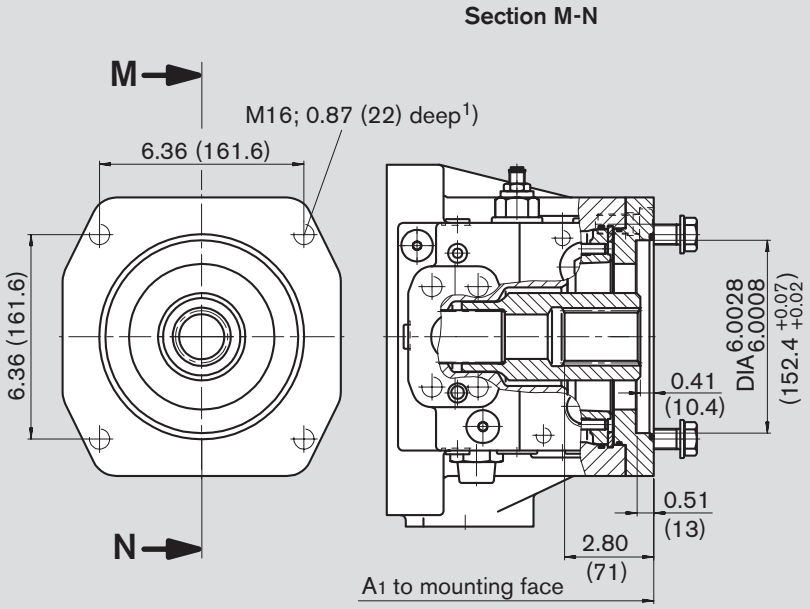
Dimensions through drive F/K17 and F/K43

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

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 [2])
for mounting of AA4VSO/G 125 (shaft S, see RA 92050) or A10VO 140 (shaft S, see RA 92 701)
or AA10VSO 140 (shaft S, see RA 92711)

Size 250, 355 and 500

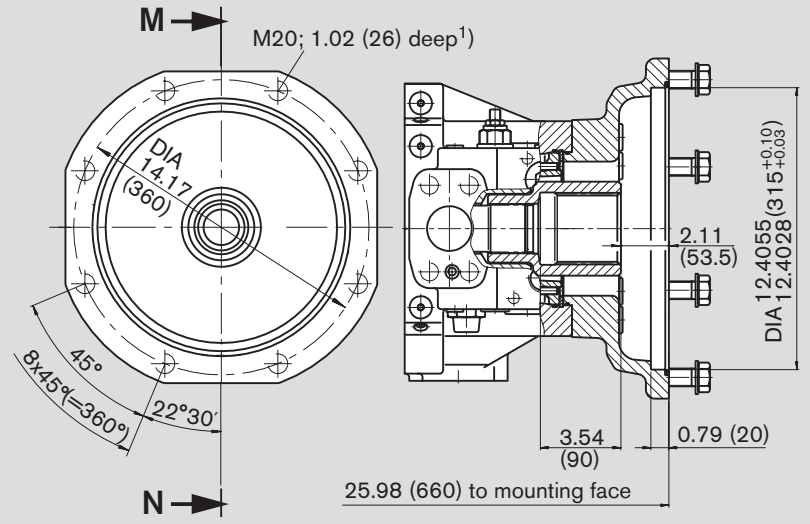


Size	A_1
250	20.98 (533)
355	21.26 (540)
500	23.62 (600)

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



[1]) DIN 13, tightening torque see safety instructions

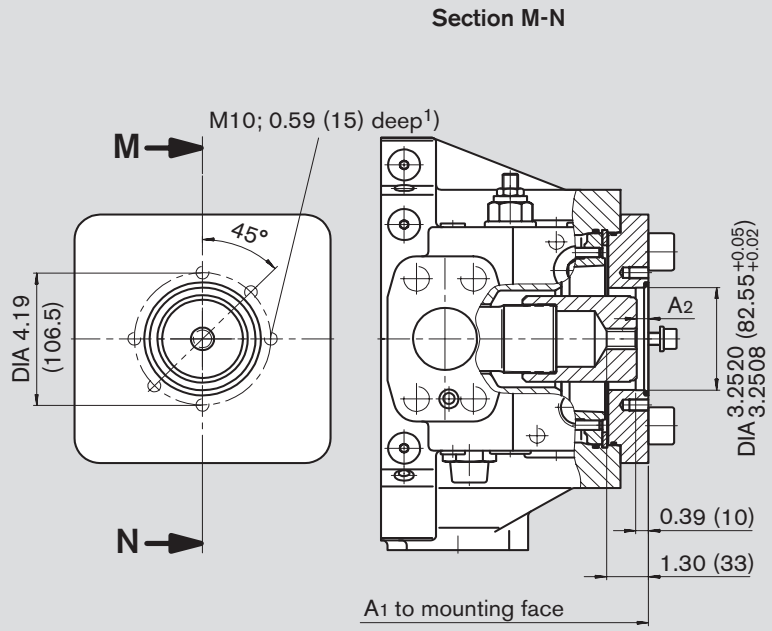
[2]) 30° pressure angle, flat root, side fit, class 5

Dimensions through drive F/K01

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

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 [2])
for mounting of AZPF or PGF2 (shaft J, flange U2, see RE10 213)

Size 250, 355 and 500



Size	A_1	A_2
250	20.98 (533)	0.41 (10.5)
355	21.26 (540)	0.41 (10.5)
500	22.60 (574)	0.37 (9.3)

[1]) DIN 13, tightening torque see safety instructions

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

Dimensions through drive F/K68 and F/K04

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

F/K68

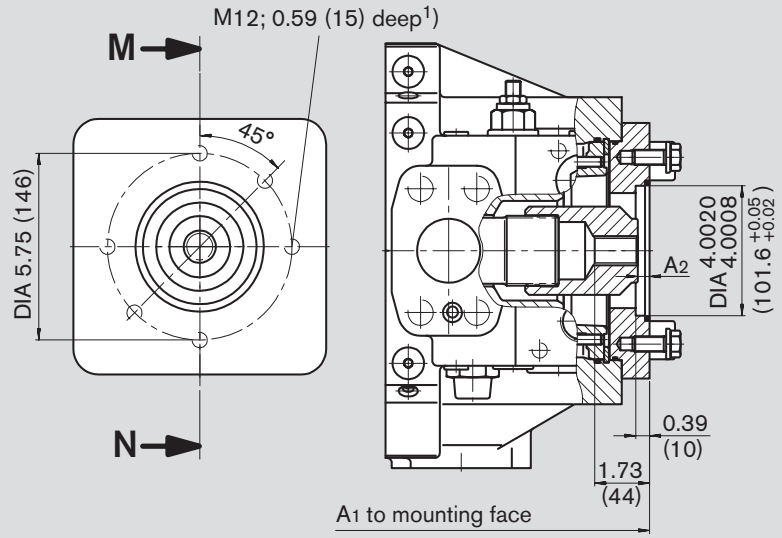
Flange SAE J744 – 101-2 (SAE B-2-hole)

Shaft coupler for shaft to SAE J 744 22-4 (B) 7/8in 13T 16/32 DP [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

Size 250, 355 and 500

Section M-N



Size	A_1	A_2
250	20.98 (533)	0.41 (10.3)
355	21.26 (540)	0.41 (10.3)
500	22.60 (574)	0.37 (9.3)

F/K04

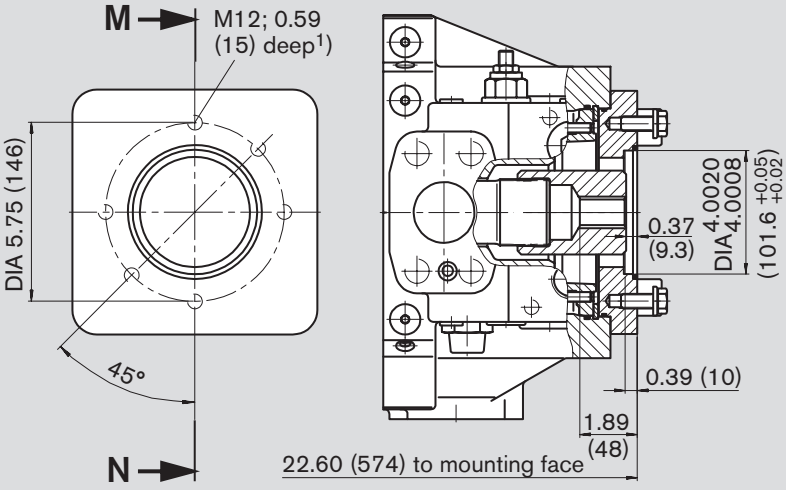
Flange SAE J744 – 101-2 (SAE B-2-hole)

Shaft coupler for shaft to SAE J 744 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

Section M-N



[1]) DIN 13, tightening torque see safety instructions

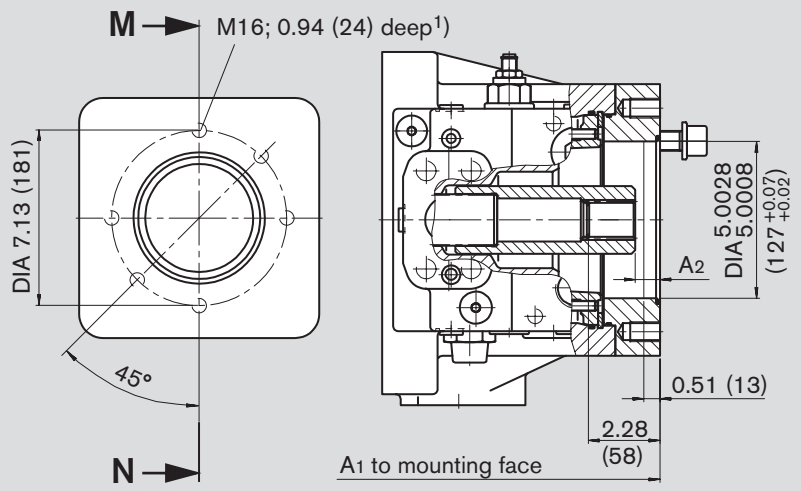
[2]) 30° pressure angle, flat root, side fit, class 5

Dimensions through drive F/K07

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

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 RA 92 701) or AA10VSO 71 (shaft S, see RA 92711)

Size 250, 355 and 500



Size	A_1	A_2
250	21.54 (547)	0.78 (19.9)
355	21.81 (554)	0.78 (19.9)
500	23.15 (588)	0.41 (10.3)

[1]) DIN 13, tightening torque see safety instructions

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

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

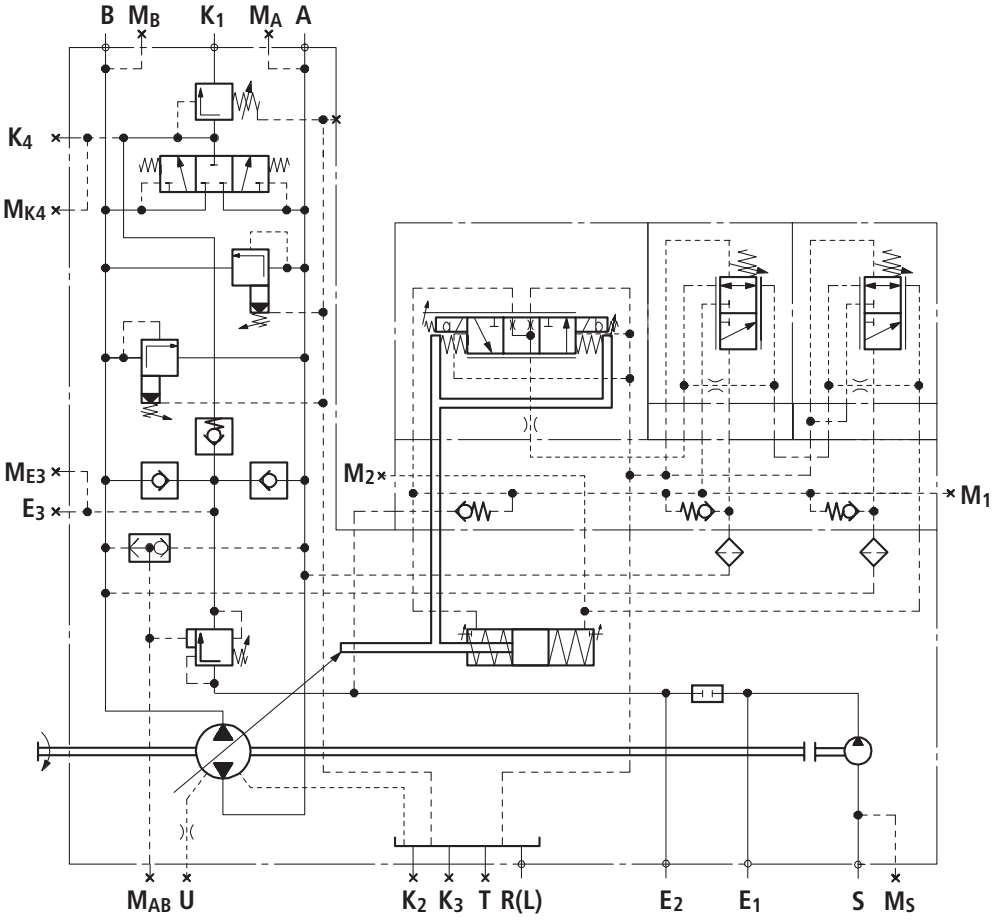
Ports E_1 and E_2 are provided to mount a filter externally.

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)

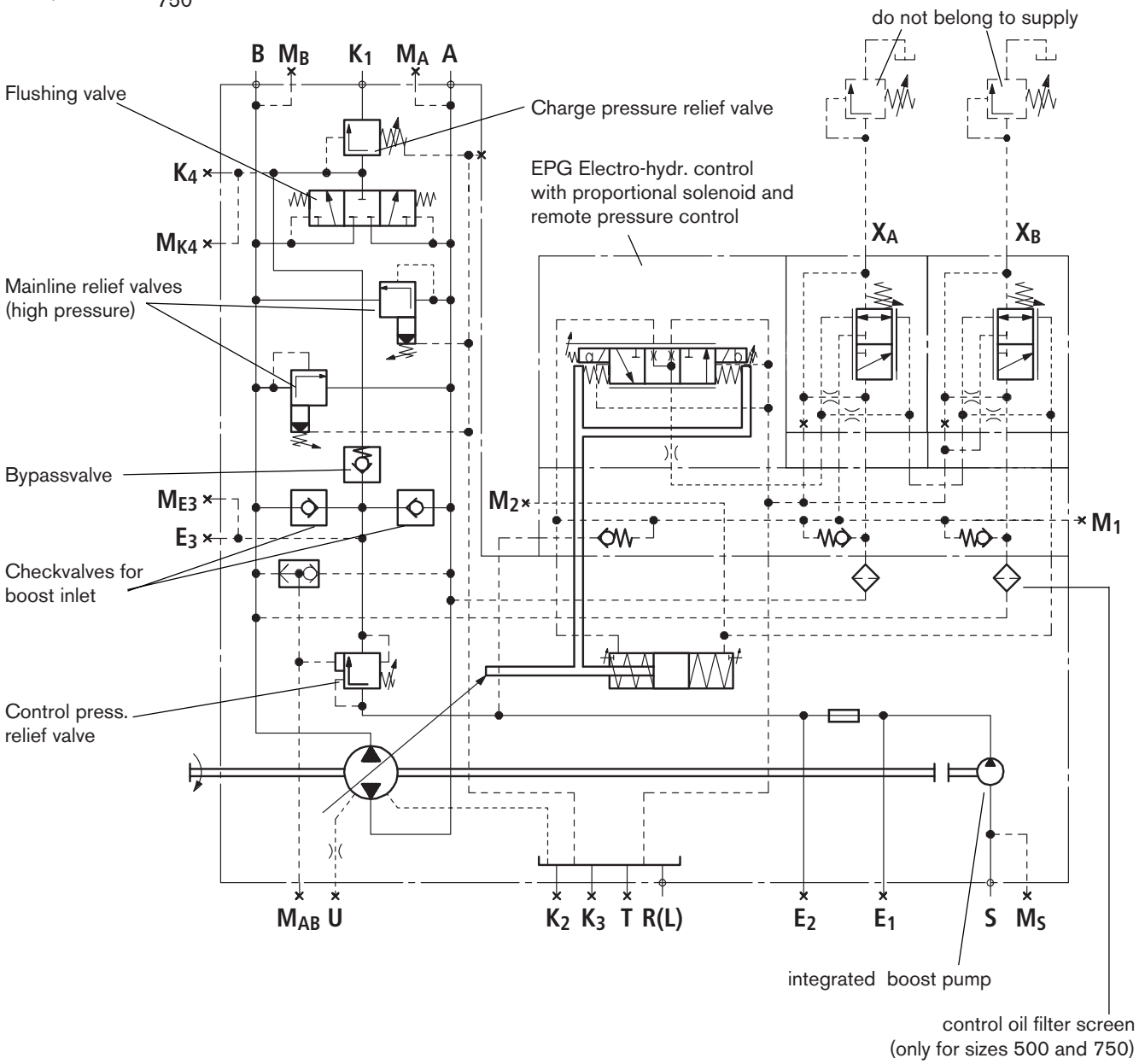
Circuit drawing version D (example size 500/750)



Integrated boost pump and control valves (Version F..)

Circuit drawing

Example A4CSG $\frac{500}{750}$ EPG/30R-XXB35F994N



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

Ports

A, B	Pressure ports	
S	Inlet port	
M_A,M_B,M_{AB}	Test points pressure port	(plugged)
M_S	Test point inlet port	(plugged)
T	Oil drain	(plugged)
E1	To filter	(plugged)
E2	From filter	(plugged)
K_1	Flushing port	
K_2, K_3	Flushing port	(plugged)
R(L)	Oil fill + air bleed	
U	Bearing flushing port	(plugged)
E_3	External boost flow port	(plugged)
M_{E3}	Test point boost pressure	(plugged)
K_4	Accumulator port	(plugged)
M_{K4}	Test point loop flushing pressure	(plugged)
M_1,M_2	Test point control pressure	(plugged)
X_A, X_B	Pilot port for remote pressure control	

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 Δp_{Sp} 145...290 psi (10...20) bar

Standard setting: 232 psi (16) bar absolute

Integrated boost pump

Standard sizes

Size	**250**	**355**	**500**	**750**
in^3	3.84	4.88	5.98	8.72
cm^3	63	80	98	143

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 Δp_{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 piloted open.

This brings the boost pump pressure to the level set at the flushing relief valve, i.e. 232 psi (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: 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..)

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

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.

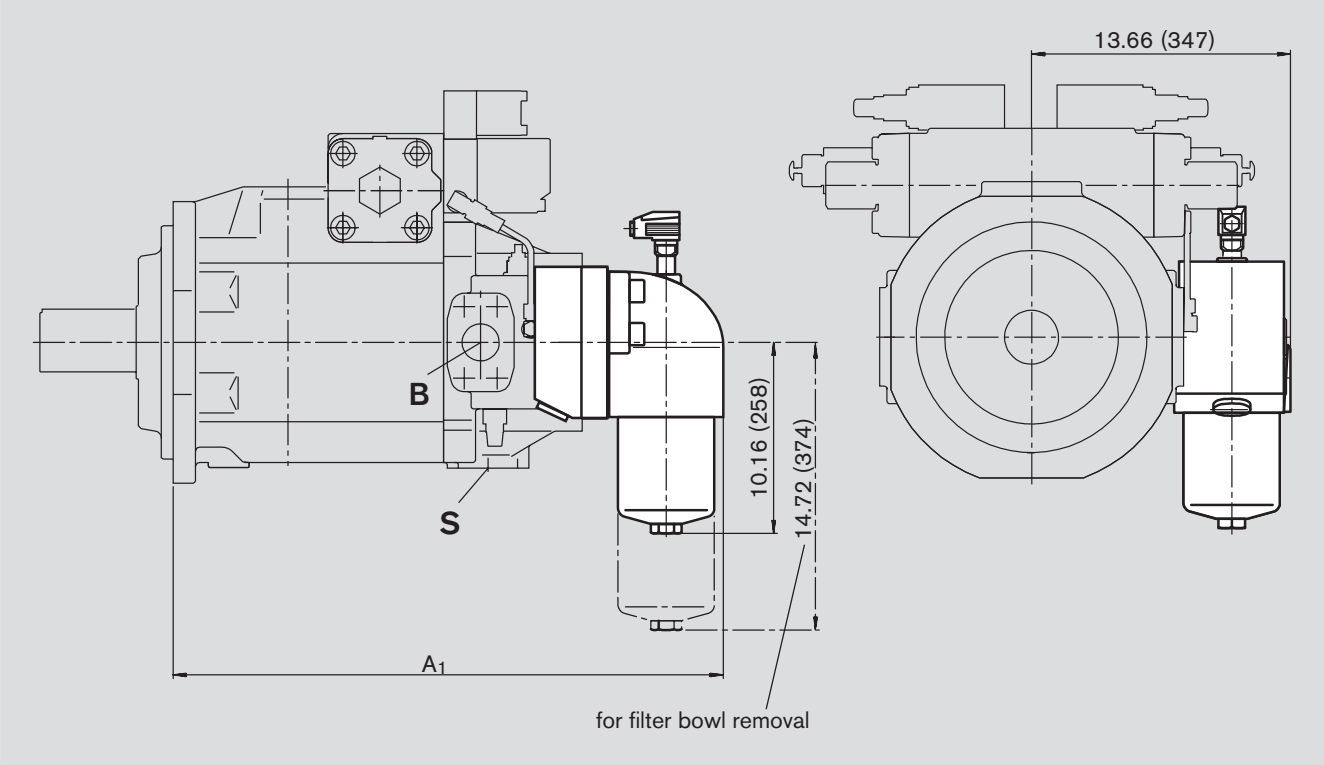
Pickup pressure of dirt indicator

$\Delta p_p = 65...72$ psi (5 bar $_{-\ 0,5\ bar}$)

Opening pressure of bypass valve

$\Delta p_o = 87...96$ psi (6 bar $^{+0,6\ bar}$)

Dimensions size 250...500

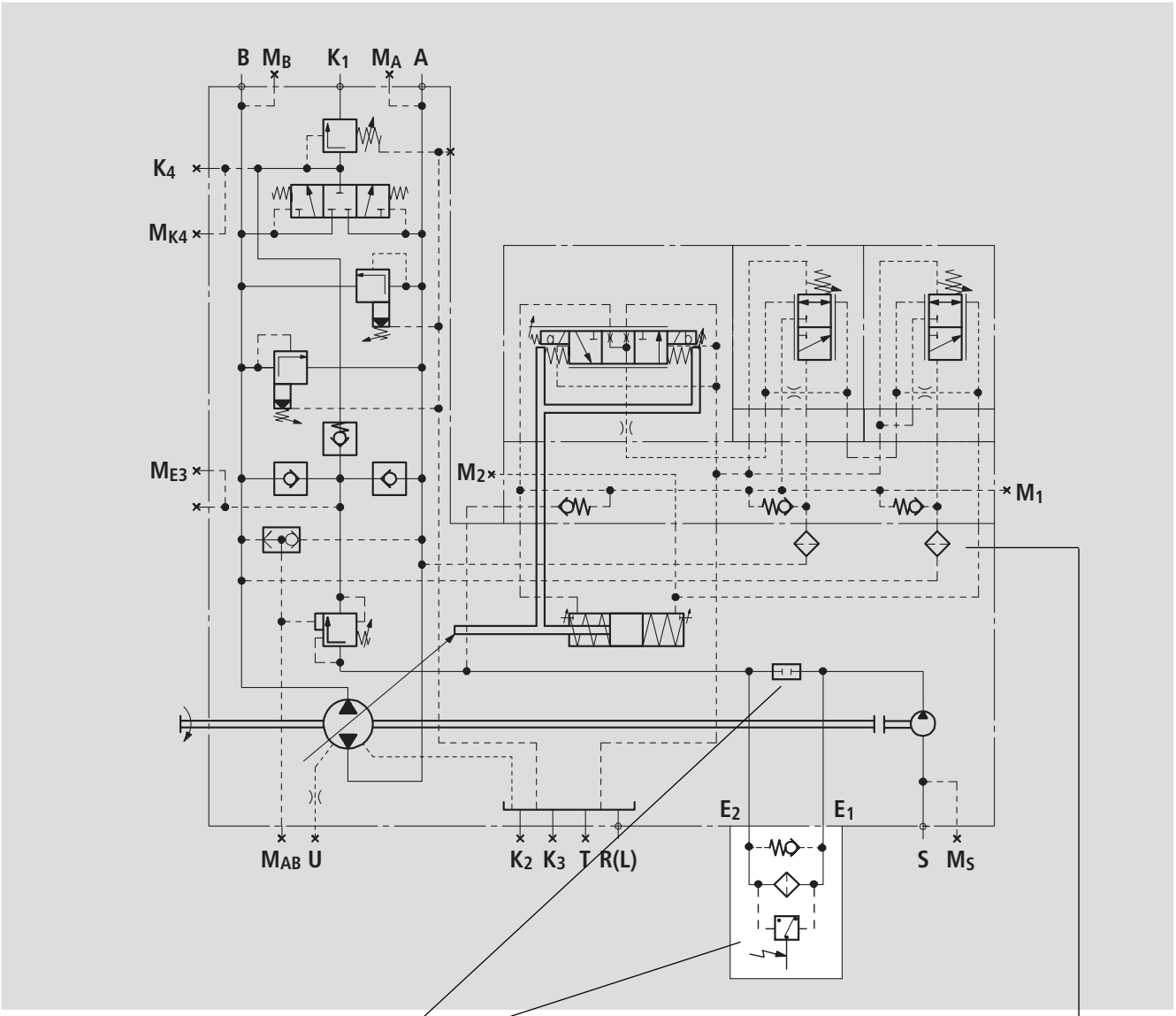


Size	A1
250	27.62 (701.5)
355	27.89 (708.5)
500	29.23 (742.5)

Subplate mounted filter in boost circuit (Version M..)

Circuit diagram

Example A4CSG$\frac{500}{750}$ EPD/30R-XXH35F994**M**



Mounting of filter onto size 250...500
DFBN/HC330QE10D1.X/V-L24
with electrical-optical dirt indicator
internal connection between E_1 and E_2 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_A,M_B,M_{AB}	Test points pressure port	(plugged)
M_S	Test point inlet pressure	(plugged)
T	Oil drain	(plugged)
K_1	Flushing port	
K_2, K_3	Flushing port	(plugged)
R(L)	Oil fill + air bleed	
U	Bearing flushing port	(plugged)
M_{E3}	Test point boost pressure	(plugged)
K_4	Accumulator port	(plugged)
M_{K4}	Test point loop flushing pressure	(plugged)
M_1,M_2	Test point control pressure	(plugged)

External supply of boost flow - without integr. boostpump (Vers. K..)

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

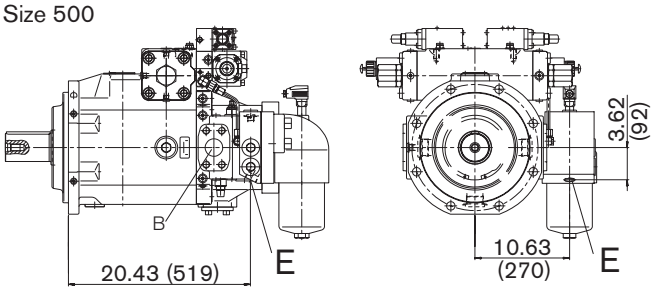
This variation is used without the integrated boost pump.

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_2 for version K...N/D without filter**

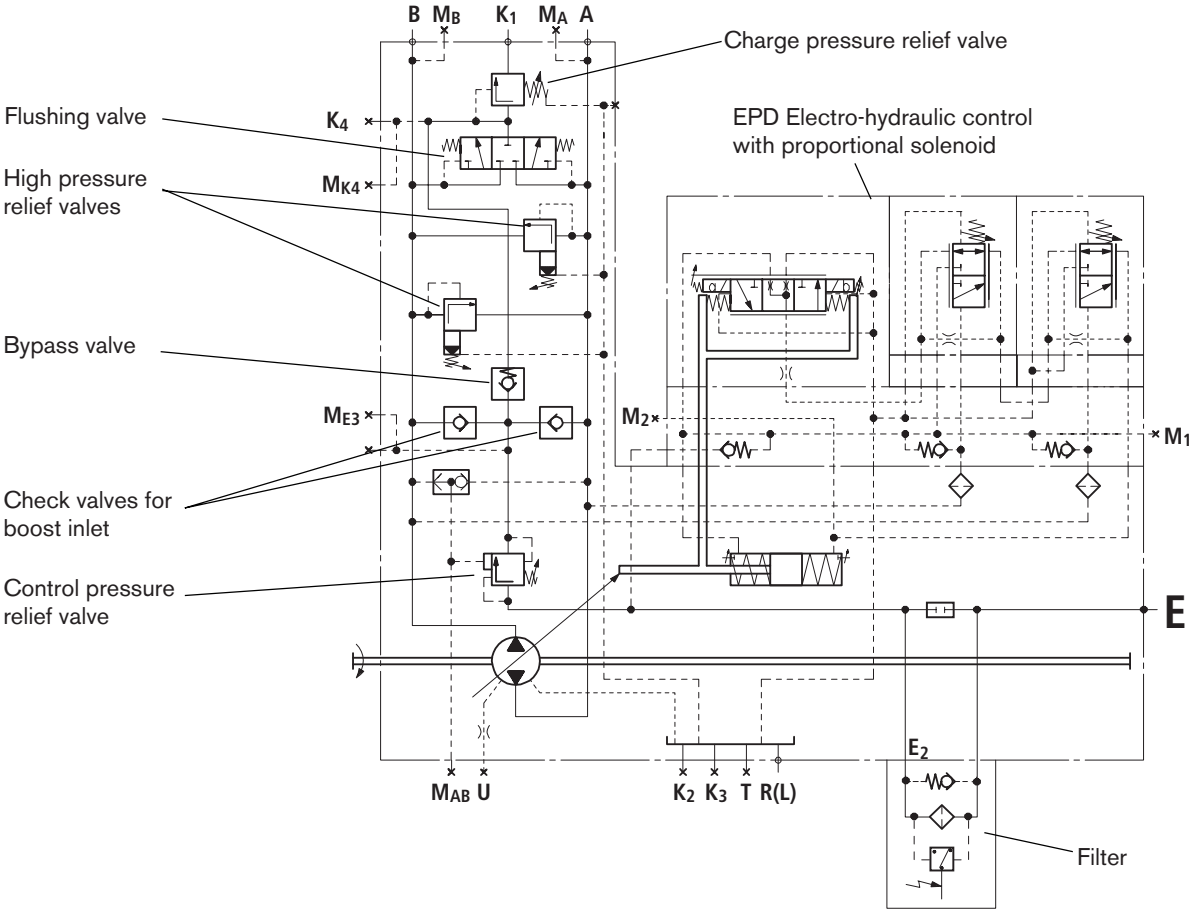
Size 500



Position of port E_2 see page 14

Circuit diagram

Example A4CSG $\frac{500}{750}$ EPD/30R-XXB35**K**174M



Ports

E resp. E_2	**Boost inlet** DIN 3852 M33x2; 0.71 (18) deep 398 lb-ft (540) Nm max. tightening torque [1]
E_2	Boost inlet for version without filter
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

[1] note safety instructions, page 32

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.

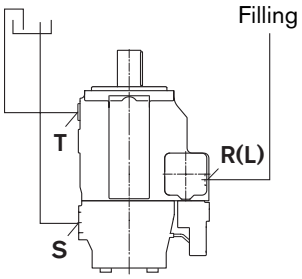


Fig. 1

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 viaT, 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.

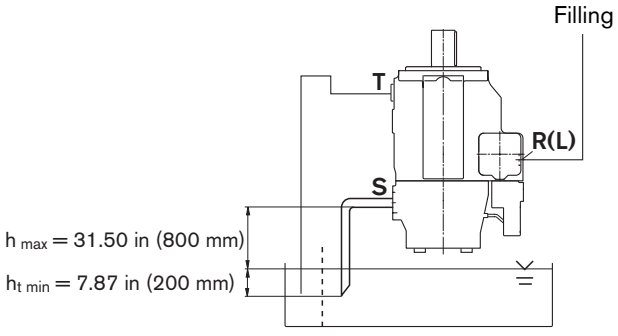


Fig. 2

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 or4.

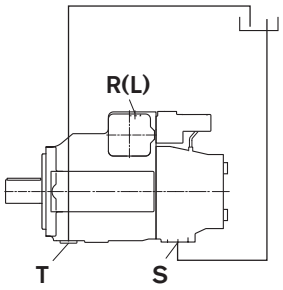


Fig. 3

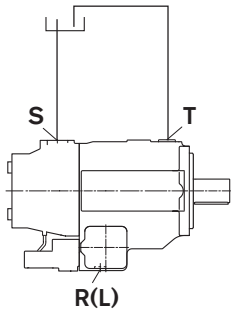


Fig. 4

2.2 Mounting above reservoir - tanktop mounted

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

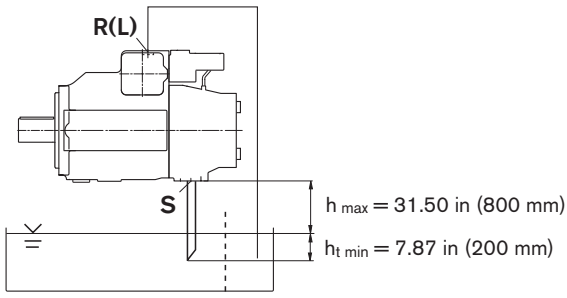


Fig. 5

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!

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