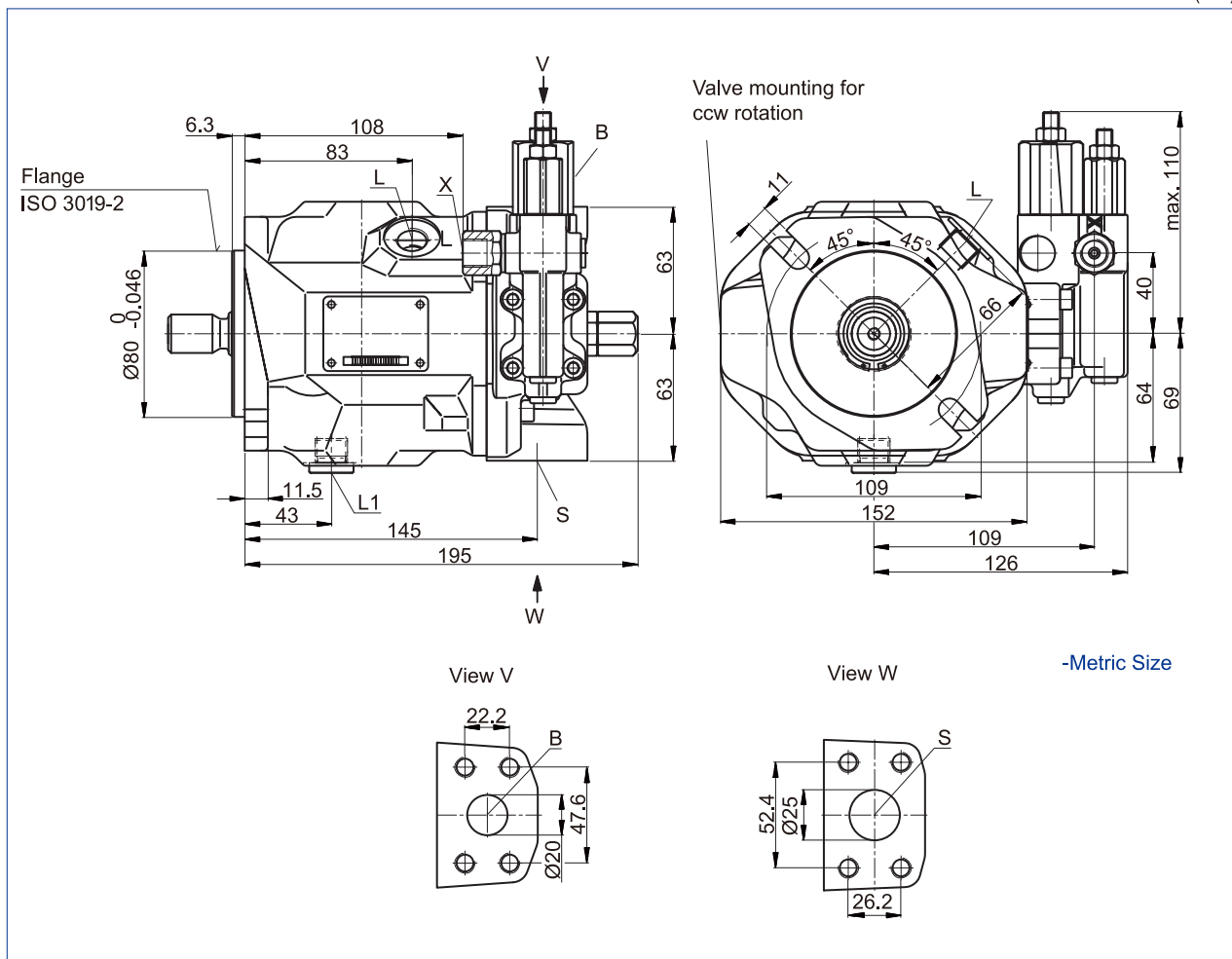


Dimensions size 18

DFR, DFR1 – Pressure and flow control, hydraulic

Clockwise rotation

Before finalizing your design request a certified
installation drawing.
Dimensions in (mm).



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ³⁾ DIN 13	3/4 in M10 x 1.5 : 17 (deep)	5100(350)	O
S	Suction line, fastening thread	SAE J518 ³⁾ DIN 13	1 in M10 x 1.5 : 17 (deep)	145(10)	O
L	Case drain fluid	DIN 3852 ⁴⁾	M16 x 1.5 : 12 (deep)	30(2)	O ⁵⁾
L ₁	Case drain fluid	DIN 3852 ⁴⁾	M16 x 1.5 : 12 (deep)	30(2)	X ⁵⁾
X	Pilot pressure	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ⁴⁾	G 1/4 in	5100(350)	O

1) For the maximum tightening torques the general instructions on page A-64 must be observed.

2) Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

3) The dimension follow SAE J518, Metric fastening thread and standard thread are different.

4) The spot face can be deeper than as specified in the standard.

5) Depending on the installation position, L or L₁ must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions size 18



Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

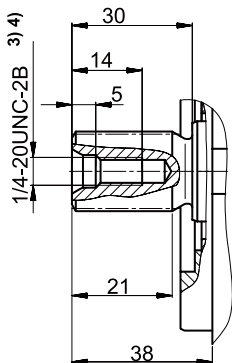
A

17

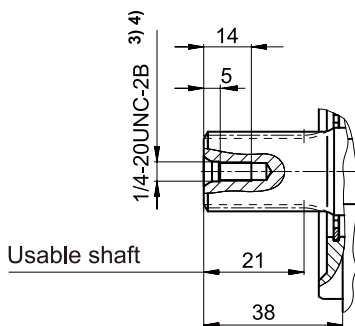
PA10VSO - Metric Size

Drive shaft

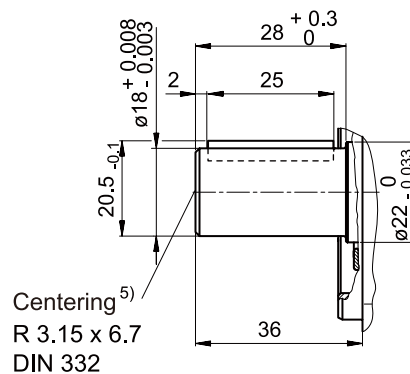
S Splined shaft 3/4 in
11T 16/32DP¹⁾ (SAE J744)



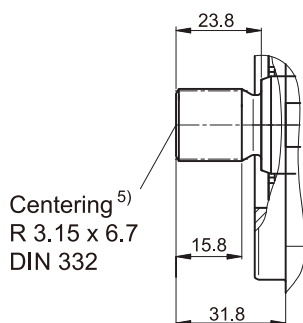
R Splined shaft 3/4 in
11T 16/32DP¹⁾²⁾ (SAE J744)



P Parallel shaft key
DIN 6885 · A6x6x25



U Splined shaft 5/8 in
9T 16/32DP¹⁾²⁾ (SAE J744)



¹⁾ ANSI B92.1a · 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed

⁵⁾ Coupling axially secured, e.g. with a clamp coupling or radially mounted clamping screw

Dimensions size 18

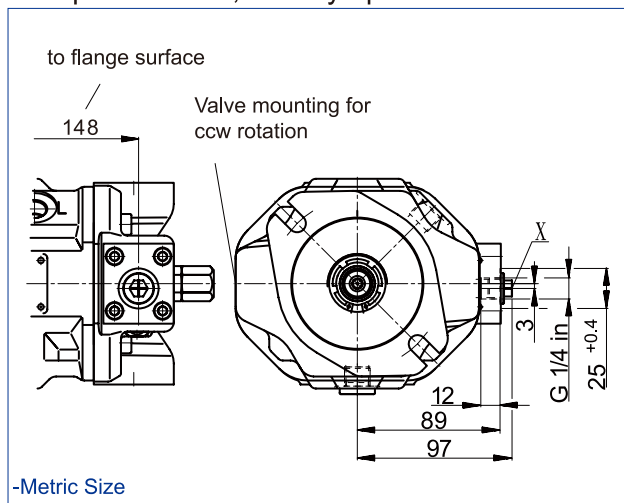
A

18

PA10VSO - Metric Size

DG

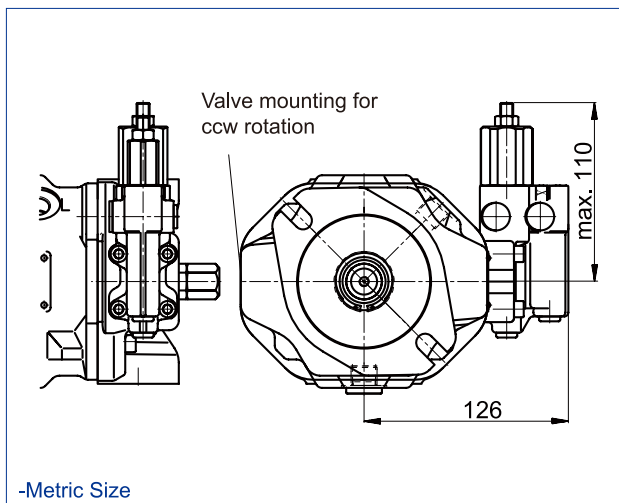
Two-point control, directly operated



DR

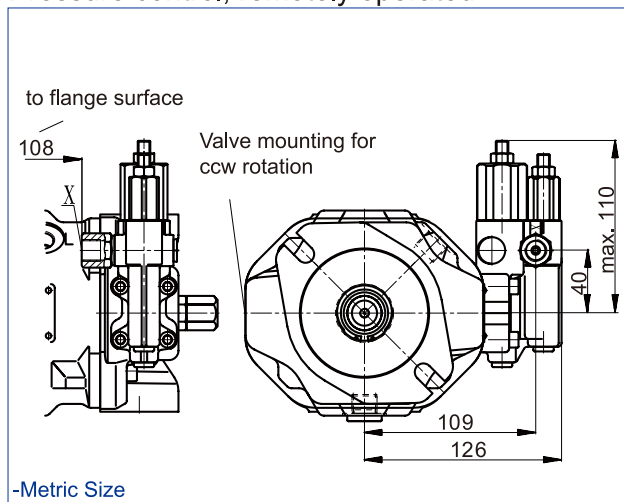
Pressure control

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).



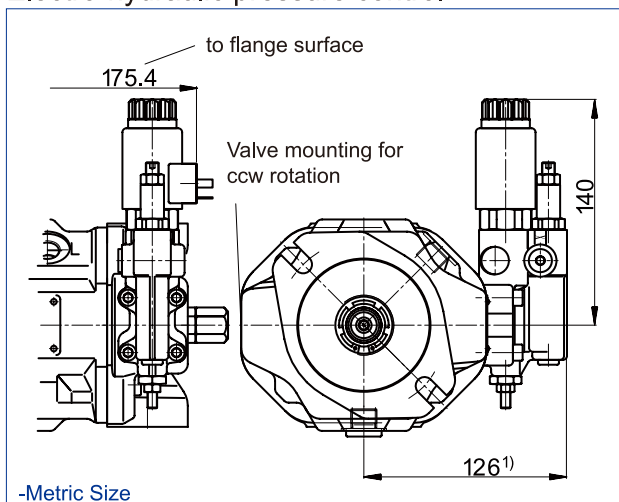
DRG

Pressure control, remotely operated



ED7., ER7.

Electro-hydraulic pressure control



¹⁾ ER7.: 161 mm if using a sandwich plate pressure reducing valve.

Dimensions size 28



DFR/DFR1 – Pressure and flow control, hydraulic

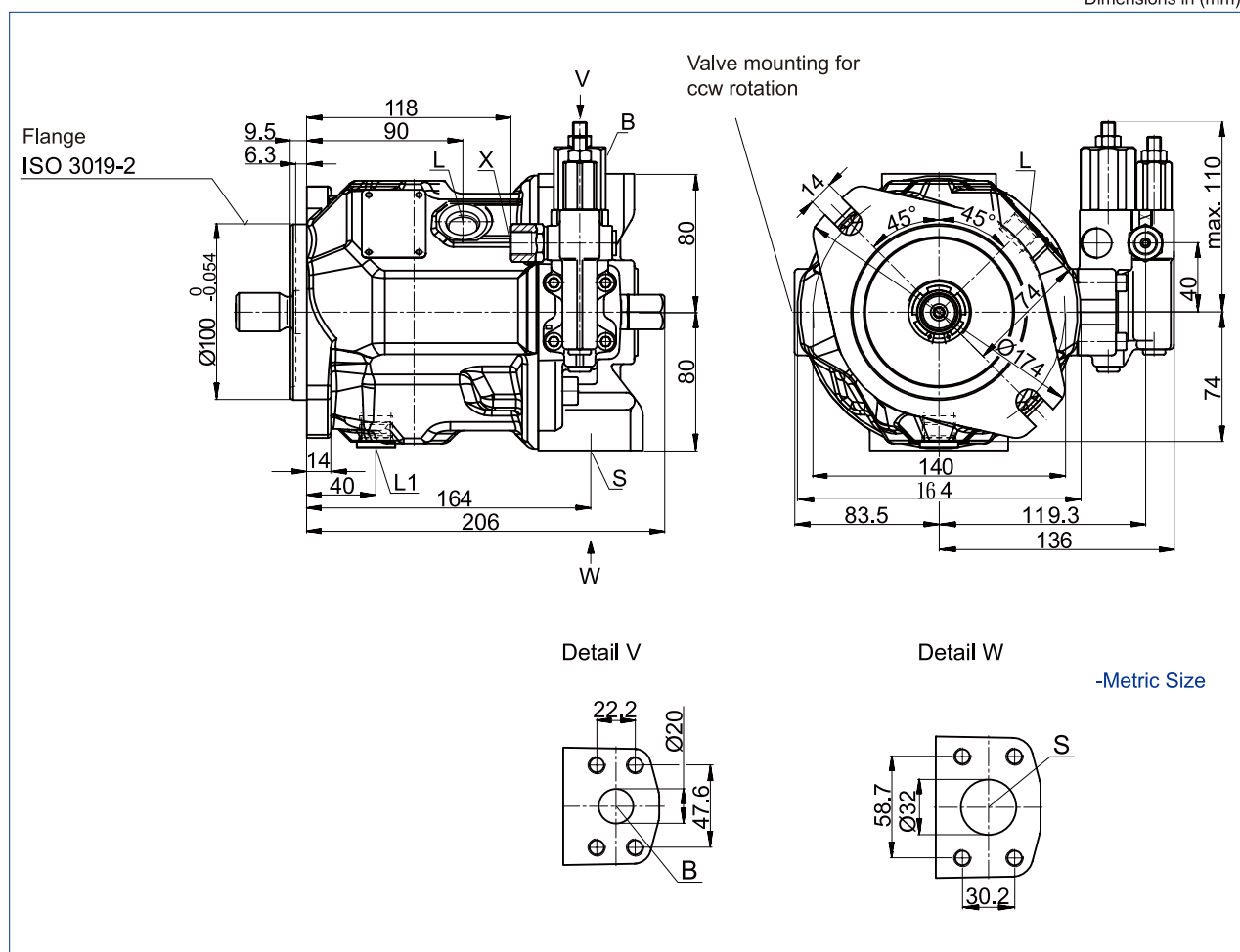
Clockwise rotation

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

A

19

PA10VSO - Metric Size



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ³⁾ DIN 13	3/4 in M10 x 1.5 : 17 (deep)	5100(350)	O
S	Suction line, fastening thread	SAE J518 ³⁾ DIN 13	1 1/4 in M10 x 1.5 : 17 (deep)	145(10)	O
L	Case drain fluid	DIN 3852 ⁴⁾	M18 x 1.5 : 12 (deep)	30(2)	O ⁵⁾
L ₁	Case drain fluid	DIN 3852 ⁴⁾	M18 x 1.5 : 12 (deep)	30(2)	X ⁵⁾
X	Pilot pressure	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ⁴⁾	G 1/4 in : 12 (deep)	5100(350)	O

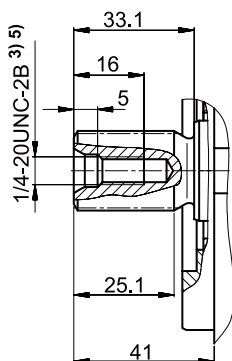
- ¹⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.
- ²⁾ Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.
- ³⁾ The dimension follow SAE J518, Metric fastening thread and standard thread are different.
- ⁴⁾ The spot face can be deeper than as specified in the standard.
- ⁵⁾ Depending on the installation position, L or L₁ must be connected (the following page A-62、A-63, please check assembling instruction.)
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 28

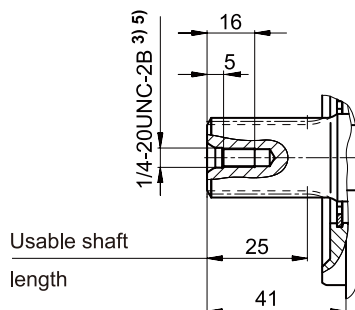
Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

Drive shaft

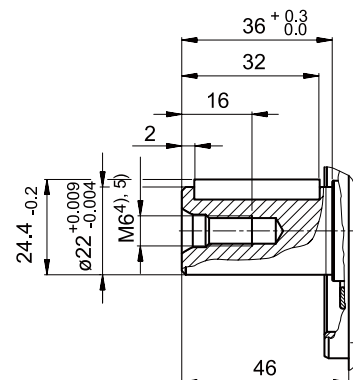
S Splined shaft 7/8 in
13T 16/32DP¹⁾ (SAE J744)



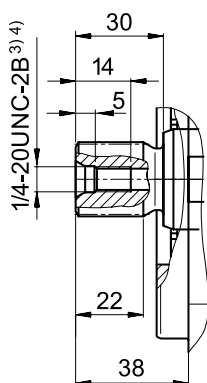
R Splined shaft 7/8 in
13T 16/32DP¹⁾²⁾ (SAE J744)



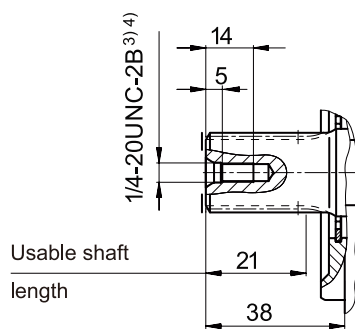
P Parallel shaft key
DIN 6885, A6x6x32



U Splined shaft 3/4 in
11T 16/32DP¹⁾ (SAE J744)



W Splined shaft 3/4 in
11T 16/32DP¹⁾²⁾ (SAE J744)



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ Thread according to DIN 13

⁵⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

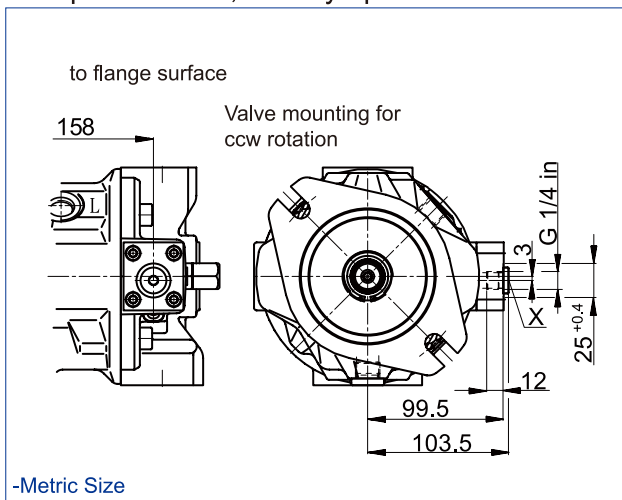


Dimensions size 28

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

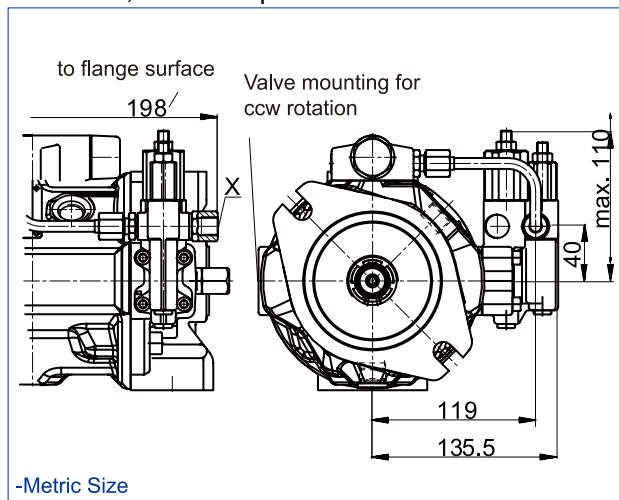
DG

Two-point control, directly operated



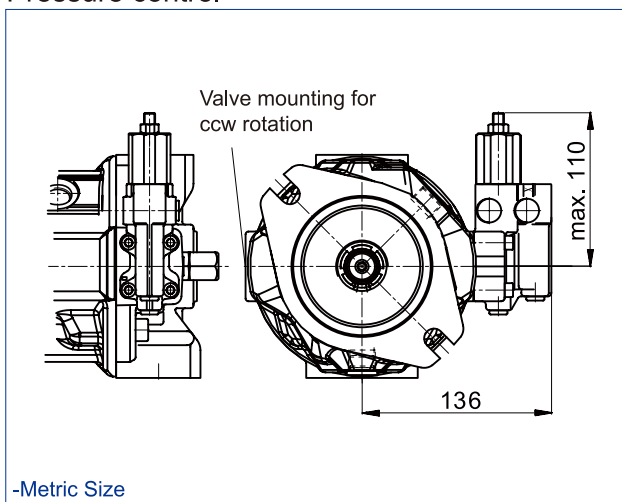
DFLR

Pressure, flow and power control



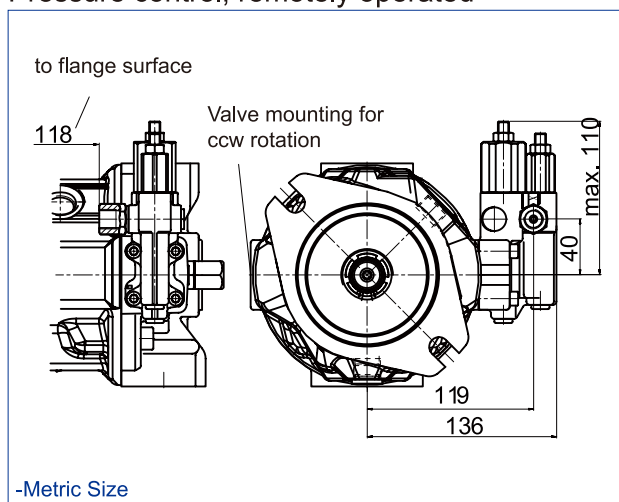
DR

Pressure control



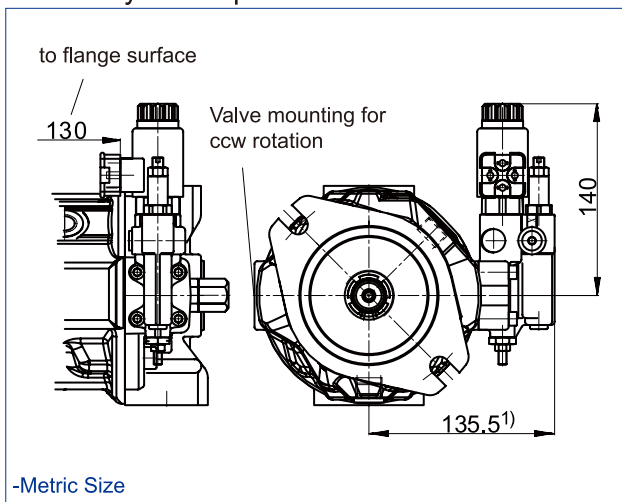
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control



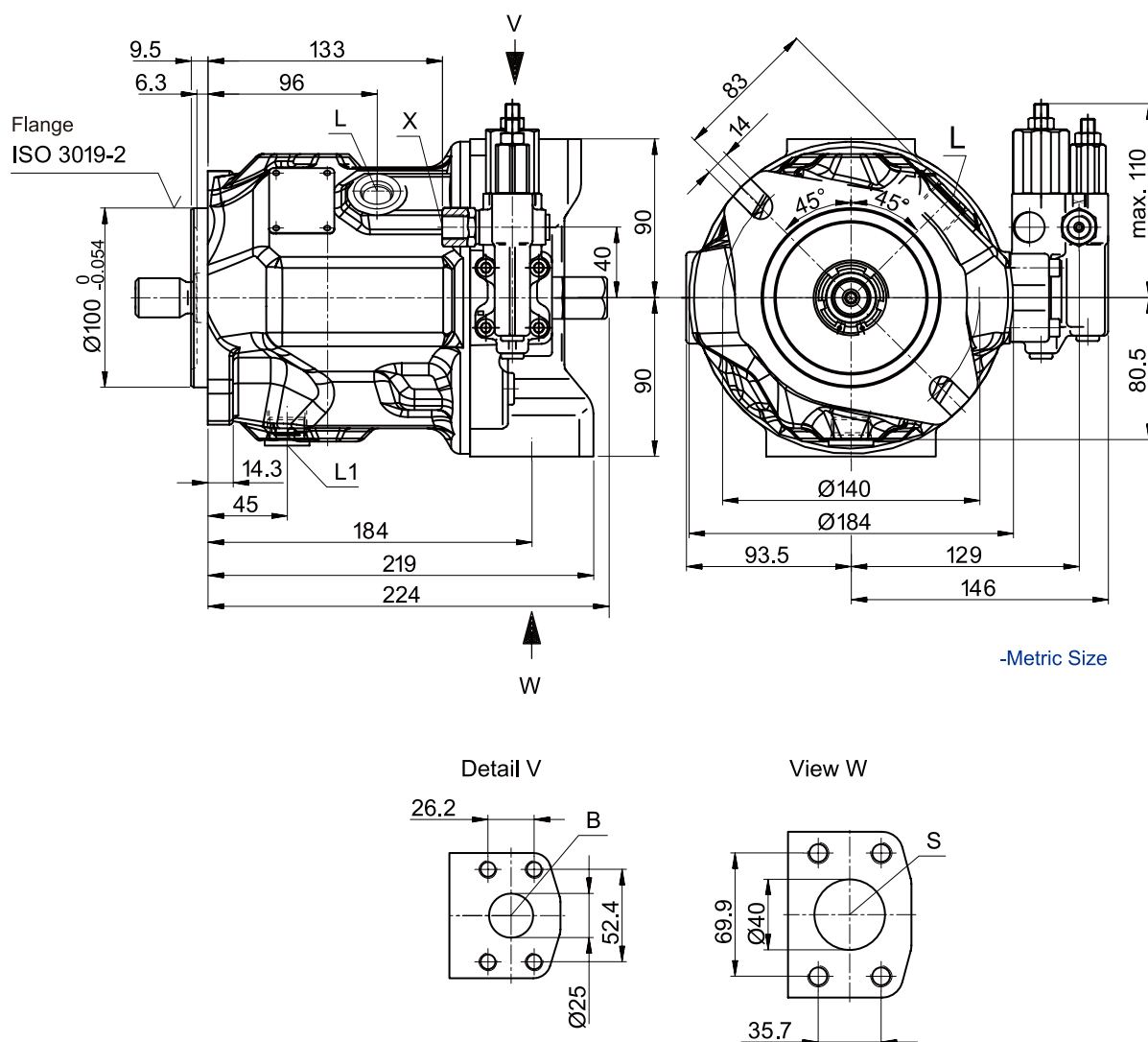
¹⁾ ER7.: 170.5 mm when using a sandwich plate pressure reducing valve.

For details of connection options and drive shafts, see also page A-19 and A-20.

Dimensions size 45

DFR/DFR1 – Pressure and flow control, hydraulic
Clockwise rotation

Before finalizing your design request a certified
installation drawing.
Dimensions in (mm).



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ³⁾ DIN 13	1 in M10 x 1.5 : 17 (deep)	5100(350)	O
S	Suction line, fastening thread	SAE J518 ³⁾ DIN 13	1 1/2in M12 x 1.75 : 20 (deep)	145(10)	O
L	Case drain fluid	DIN 3852 ⁴⁾	M22 x 1.5 : 14 (deep)	30(2)	O ⁵⁾
L ₁	Case drain fluid	DIN 3852 ⁴⁾	M22 x 1.5 : 14 (deep)	30(2)	X ⁵⁾
X	Pilot pressure	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ⁴⁾	G 1/4 in	5100(350)	O

1) For the maximum tightening torques the general instructions on page A-64 must be observed.

2) Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

3) The dimension follow SAE J518, Metric fastening thread and standard thread are different.

4) The spot face can be deeper than as specified in the standard

5) Depending on the installation position, L or L₁ must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions size 45



Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

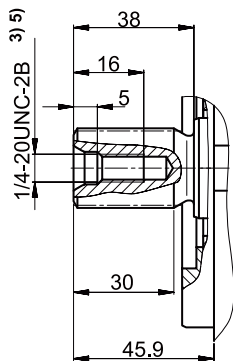
A

23

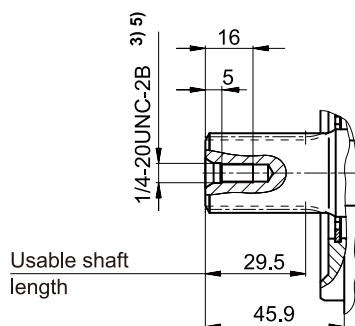
PA10VSO - Metric Size

Drive shaft

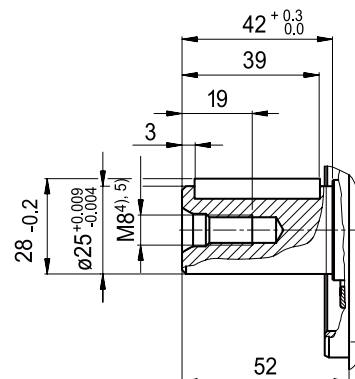
S Splined shaft 1 in
15T 16/32DP¹⁾ (SAE J744)



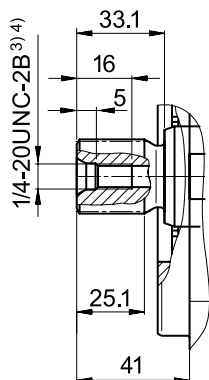
R Splined shaft 1 in
15T 16/32DP¹⁾²⁾ (SAE J744)



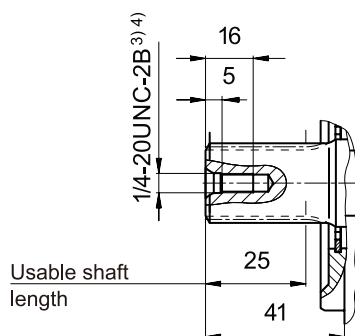
P Parallel shaft key
DIN 6885 · A8x7x36



U Splined shaft 7/8 in
13T 16/32DP¹⁾ (SAE J744)



W Splined shaft 7/8 in
13T 16/32DP¹⁾²⁾ (SAE J744)



¹⁾ ANSI B92.1a · 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ Thread according to DIN 13

⁵⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

Dimensions size 45

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

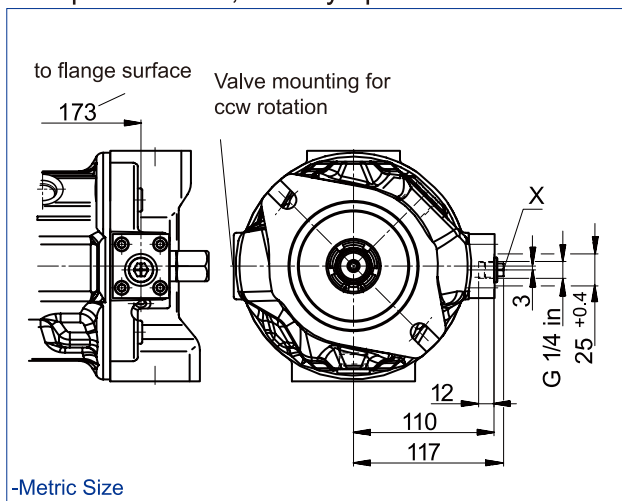
A

24

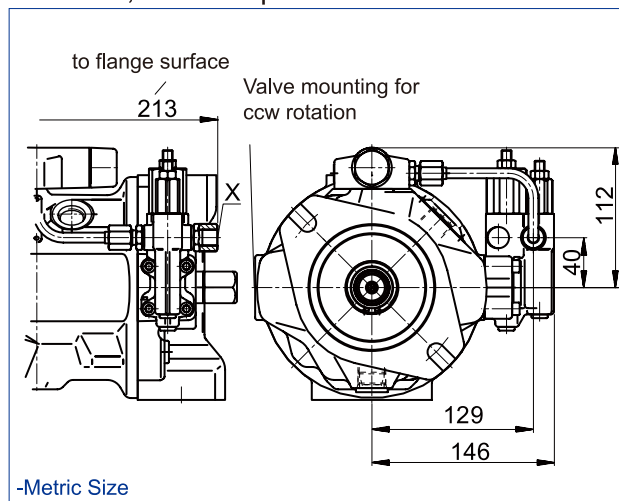
PA10VSO - Metric Size

DG

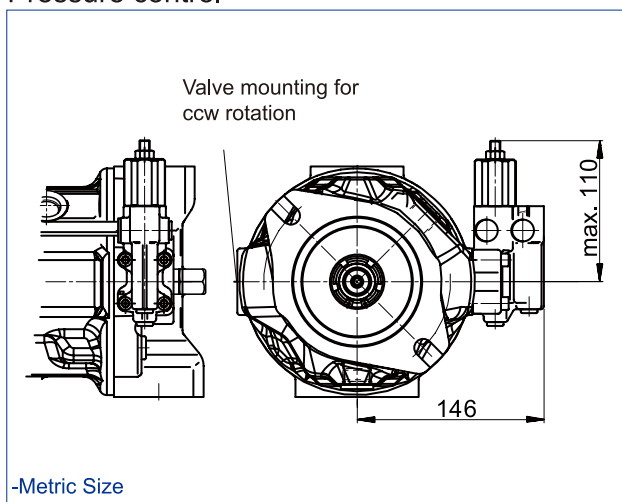
Two-point control, directly operated

**DFLR**

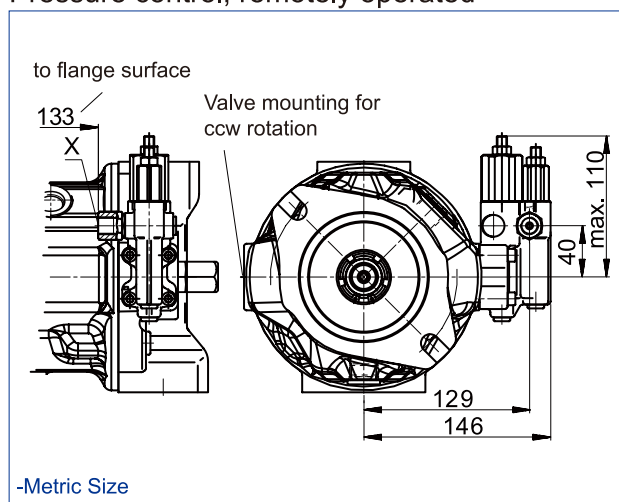
Pressure, flow and power control

**DR**

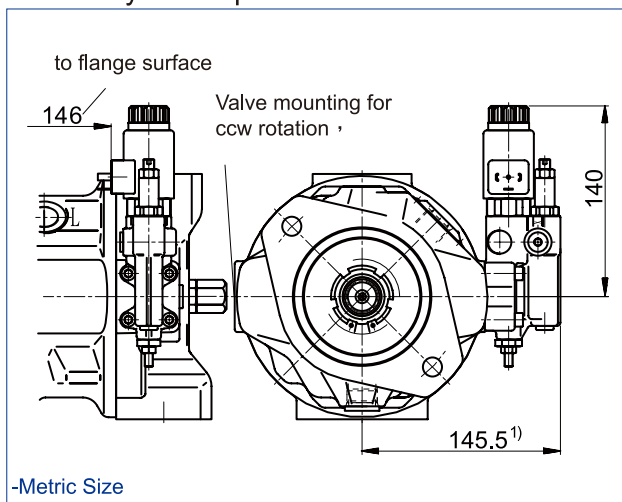
Pressure control

**DRG**

Pressure control, remotely operated

**ED7. / ER7.**

Electro-hydraulic pressure control



¹⁾ ER7.: 180.5 mm if using a sandwich plate pressure reducing valve.

Dimensions size 71



DFR/DFR1 – Pressure and flow control, hydraulic

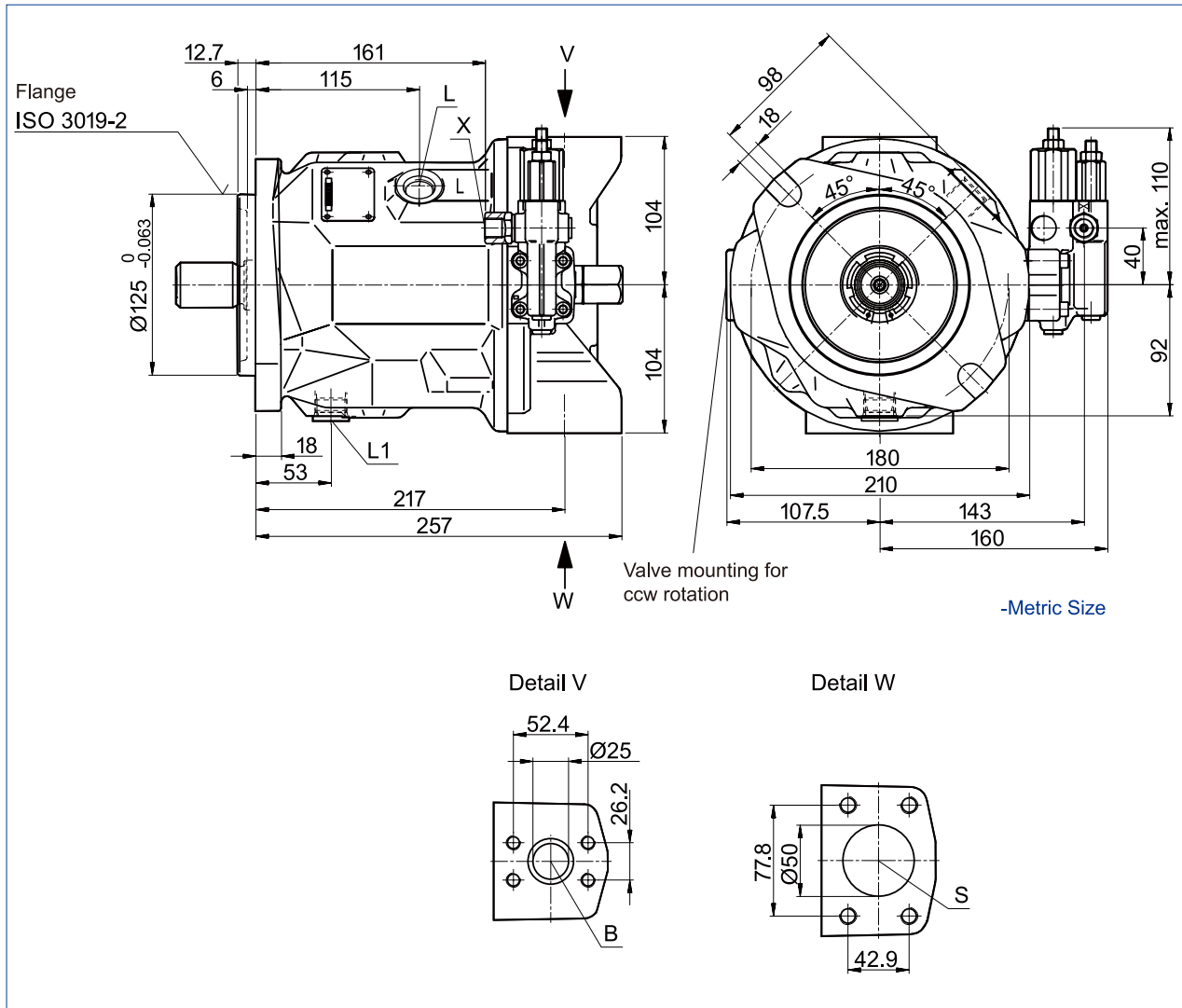
Clockwise rotation

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

A

25

PA10VSO - Metric Size



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ³⁾ DIN 13	1 in M10 x 1.5 : 17 (deep)	500(350)	O
S	Suction line, fastening thread	SAE J518 ³⁾ DIN 13	2 in M12 x 1.75 : 20 (deep)	145(10)	O
L	Case drain fluid	DIN 3852 ⁴⁾	M22 x 1.5 : 14 (deep)	30(2)	O ⁵⁾
L ₁	Case drain fluid	DIN 3852 ⁴⁾	M22 x 1.5 : 14 (deep)	30(2)	X ⁵⁾
X	Pilot pressure	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ⁴⁾	G 1/4 in	5100(350)	O

¹⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

²⁾ Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

³⁾ The dimension follow SAE J518, Metric fastening thread and standard thread are different.

⁴⁾ The spot face can be deeper than as specified in the standard.

⁵⁾ Depending on the installation position, L or L₁ must be connected (the following page A-62 、 A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions size 71

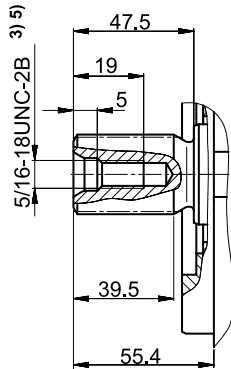
YEOSHE

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

Drive shaft

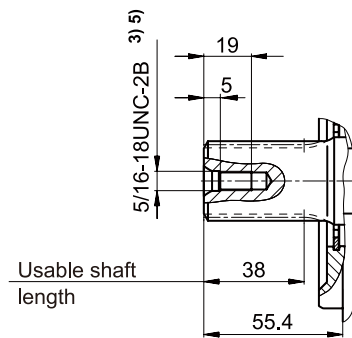
S

Splined shaft 1 1/4 in
14T 12/24DP¹⁾ (SAE J744)



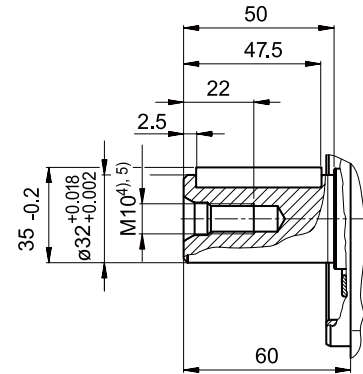
R

Splined shaft 1 1/4 in
14T 12/24DP¹⁾²⁾ (SAE J744)



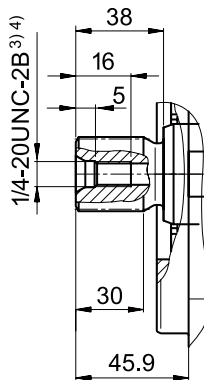
P

Parallel shaft key
DIN 6885 · A10x8x45



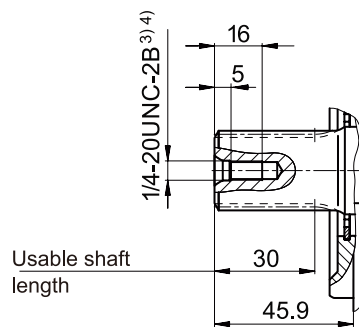
U

Splined shaft 1 in
15T 16/32DP¹⁾ (SAE J744)



W

Splined shaft 1 in
15T 16/32DP¹⁾²⁾ (SAE J744)



- ¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5
²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard
³⁾ Thread according to ASME B1.1
⁴⁾ Thread according to DIN 13
⁵⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.



Dimensions size 71

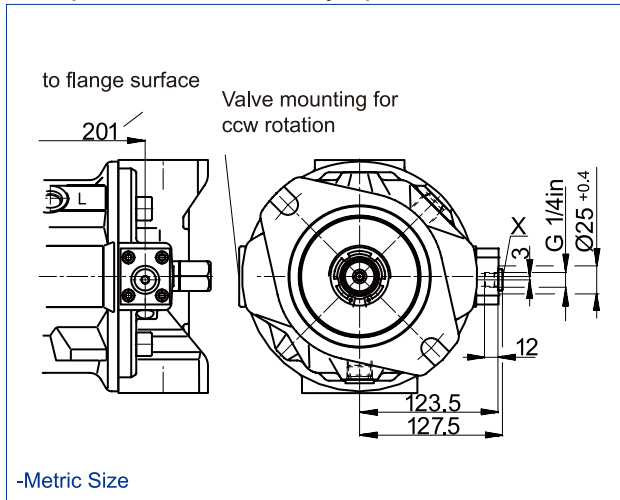
A

27

PA10VSO - Metric Size

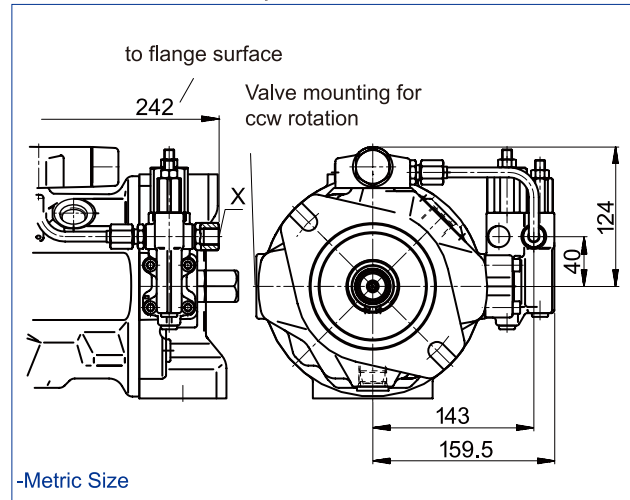
DG

Two-point control, directly operated



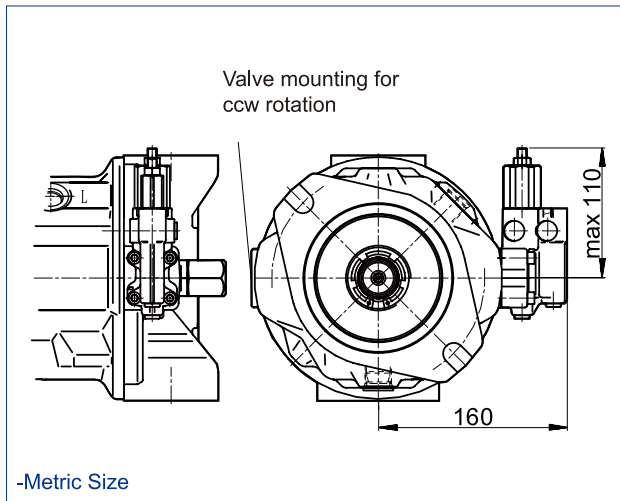
DFLR

Pressure, flow and power control



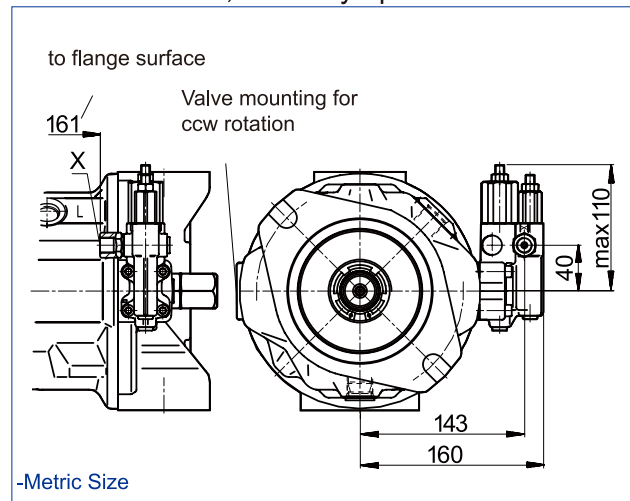
DR

Pressure control



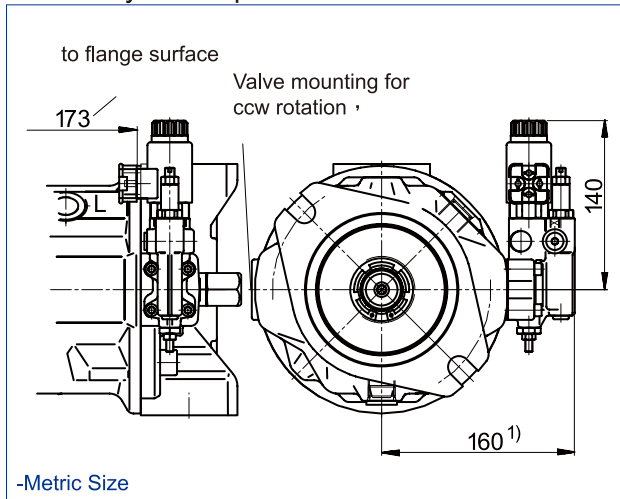
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control

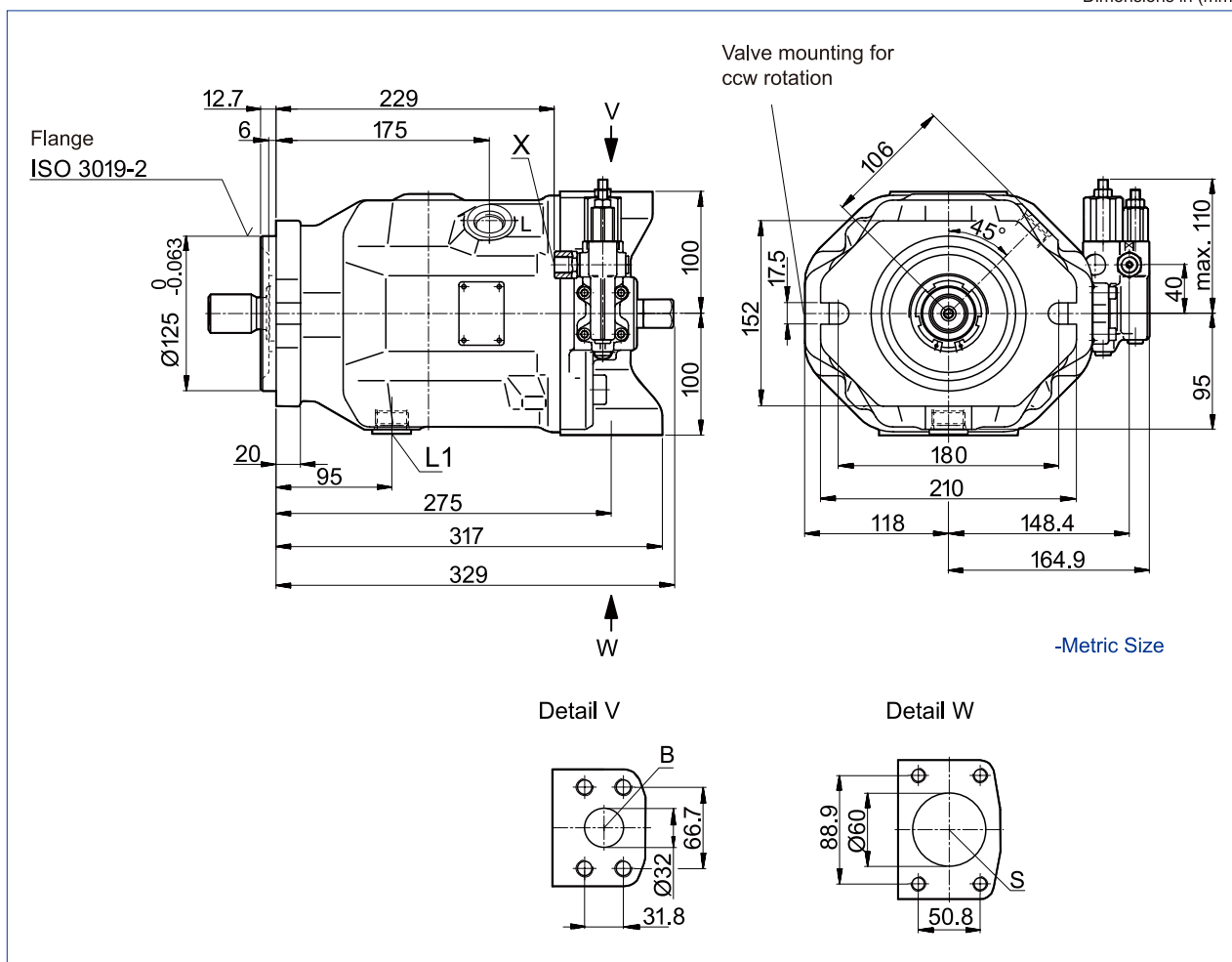


¹⁾ ER7.: 195 mm if using a sandwich plate pressure reducing valve.

Dimensions size 100

DFR/DFR1 – Pressure and flow control, hydraulic
Clockwise rotation

Before finalizing your design request a certified
installation drawing.
Dimensions in (mm).



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ³⁾ DIN 13	1 1/4 in M14 x 2 : 19 (deep)	5100(350)	O
S	Suction line, fastening thread	SAE J518 ³⁾ DIN 13	2 1/2 in M12 x 1.75 : 17 (deep)	145(10)	O
L	Case drain fluid	DIN 3852 ⁴⁾	M27 x 2 : 16 (deep)	30(2)	O ⁵⁾
L ₁	Case drain fluid	DIN 3852 ⁴⁾	M27 x 2 : 16 (deep)	30(2)	X ⁵⁾
X	Pilot pressure	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ⁴⁾	G 1/4 in	5100(350)	O

1) For the maximum tightening torques the general instructions on page A-64 must be observed.

2) Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

3) The dimension follow SAE J518, Metric fastening thread and standard thread are different.

4) The spot face can be deeper than as specified in the standard

5) Depending on the installation position, L or L₁ must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)



Dimensions size 100

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

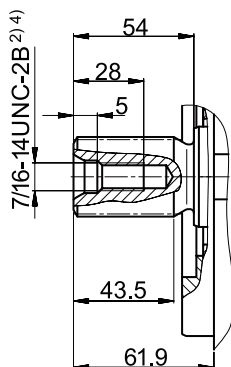
A

29

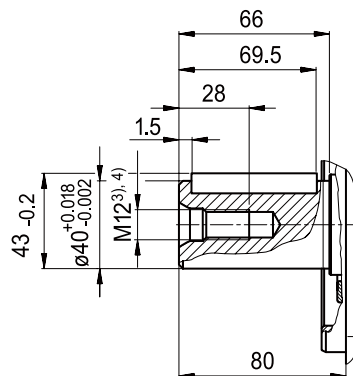
PA10VSO - Metric Size

Drive shaft

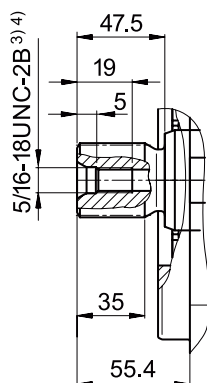
- S** Splined shaft 1 1/2 in
17T 12/24DP¹⁾ (SAE J744)



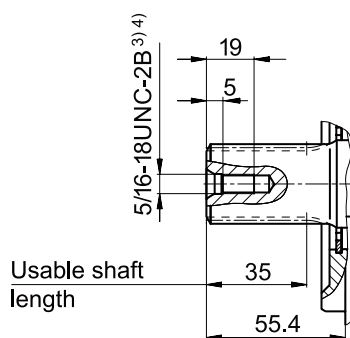
- P** Parallel shaft key
DIN 6885 · A12x8x68



- U** Splined shaft 1 1/4 in
14T 12/24DP1¹⁾ (SAE J744)



- W** Splined shaft 1 1/4 in
14T 12/24DP¹⁾²⁾ (SAE J744)



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ Thread according to DIN 13

⁵⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

Dimensions size 100

A

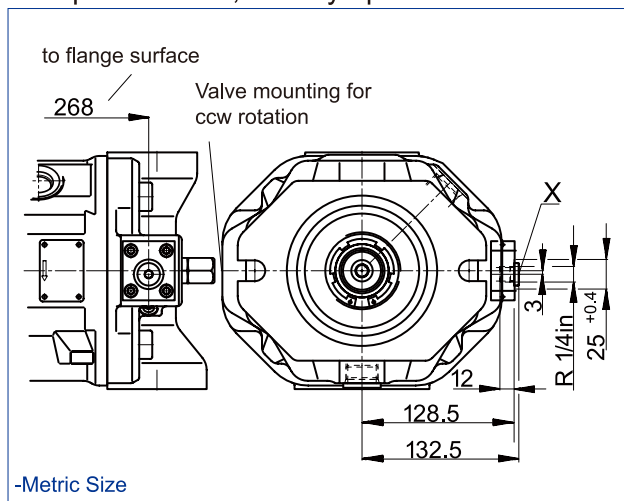
30

PA10VSO - Metric Size

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

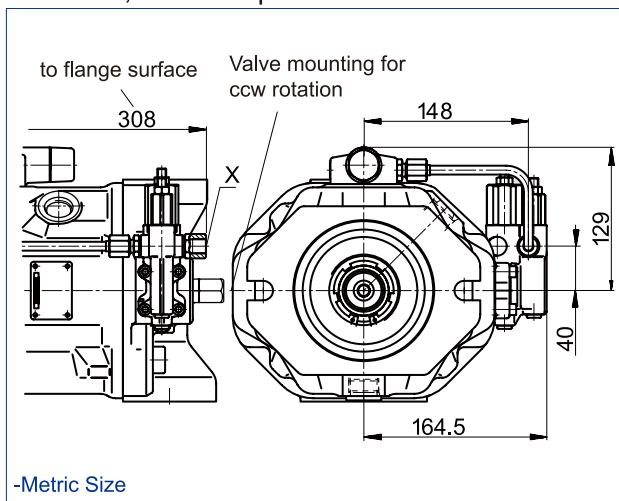
DG

Two-point control, directly operated



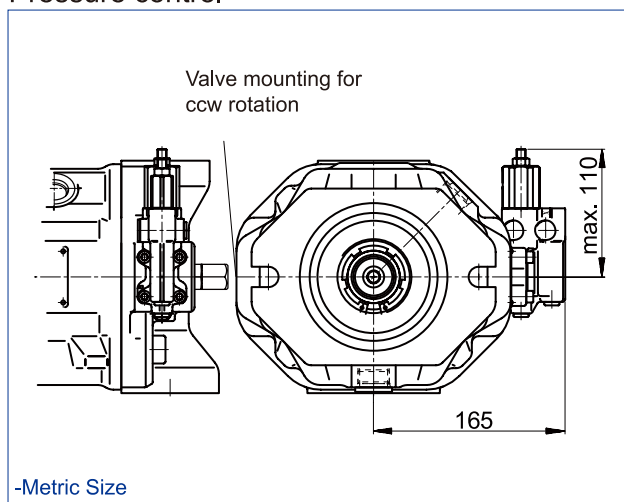
DFLR

Pressure, flow and power control



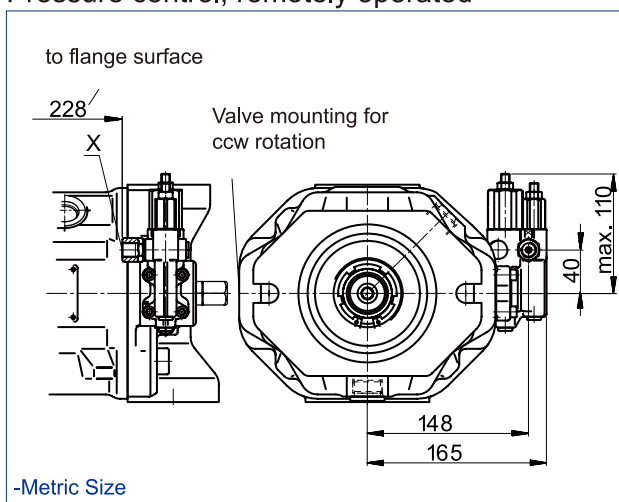
DR

Pressure control



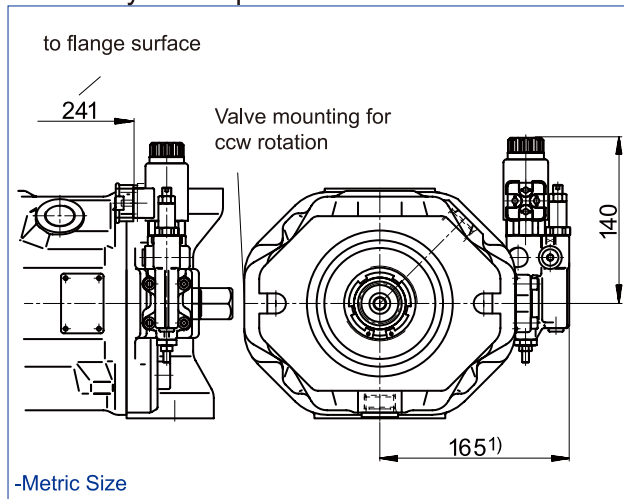
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control



¹⁾ ER7.: 200 mm when using a sandwich plate pressure reducing valve.

Dimensions size 140



DFR/DFR1 — Pressure and flow control, hydraulic

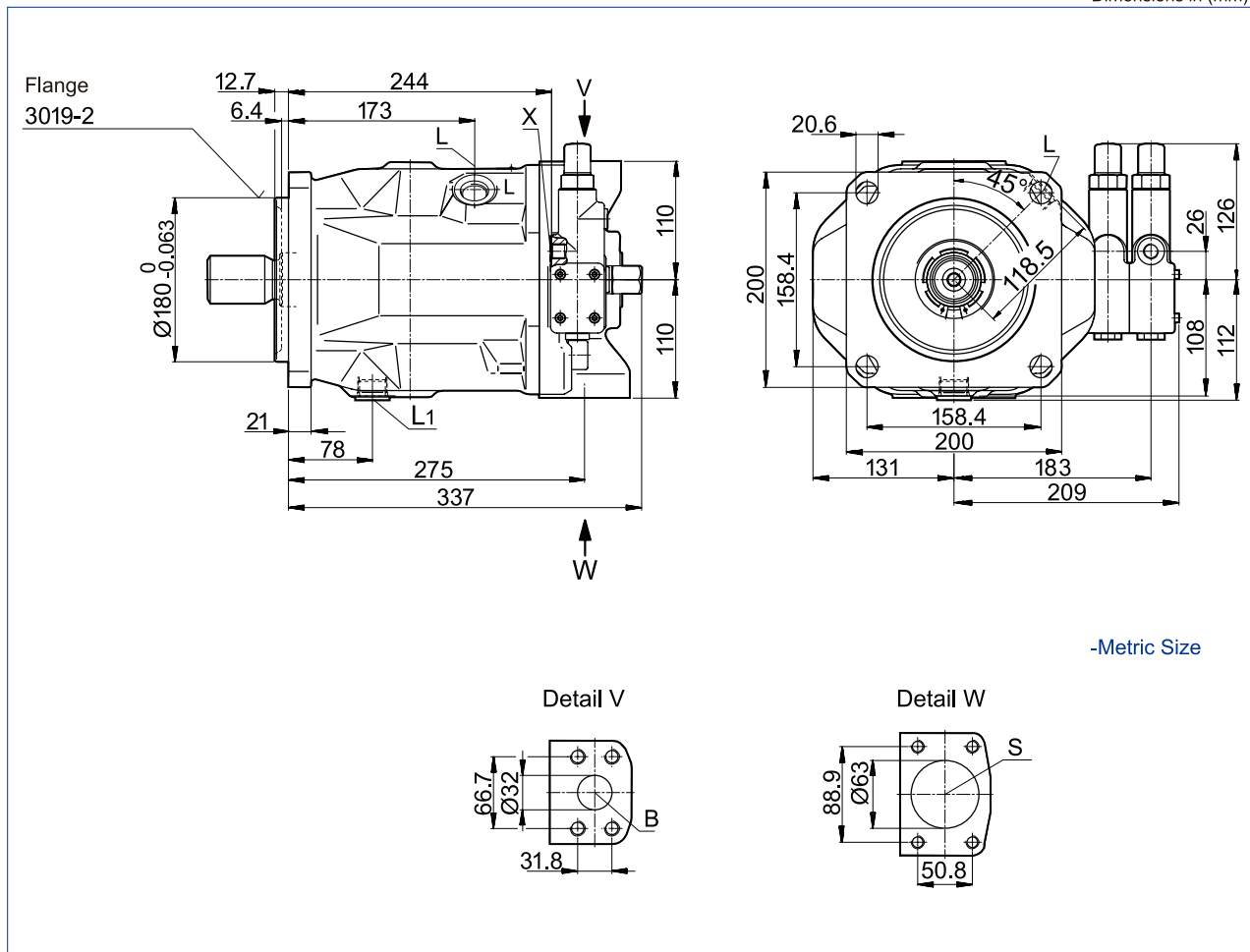
Clockwise rotation

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

A

31

PA10VSO - Metric Size



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ³⁾ DIN 13	1 1/4 in M14 x 2 : 19 (deep)	5100(350)	O
S	Suction line, fastening thread	SAE J518 ³⁾ DIN 13	2 1/2 in M12 x 1.75 : 17 (deep)	145(10)	O
L	Case drain fluid	DIN 3852 ⁴⁾	M27 x 2 : 16 (deep)	30(2)	O ⁵⁾
L ₁	Case drain fluid	DIN 3852 ⁴⁾	M27 x 2 : 16 (deep)	30(2)	X ⁵⁾
X	Pilot pressure	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
X	Pilot press. with DG-control	DIN 3852 ⁴⁾	M14 x 1.5 : 12 (deep)	5100(350)	O
M _H	Gauge port, high pressure	DIN 3852	M14 x 1.5 : 12 deep	5100(350)	X

¹⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

²⁾ Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

³⁾ The dimension follow SAE J518, Metric fastening thread and standard thread are different.

⁴⁾ The spot face can be deeper than as specified in the standard

⁵⁾ Depending on the installation position, L or L₁ must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

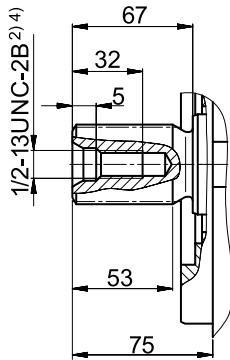
Dimensions size 140

YEOSHE

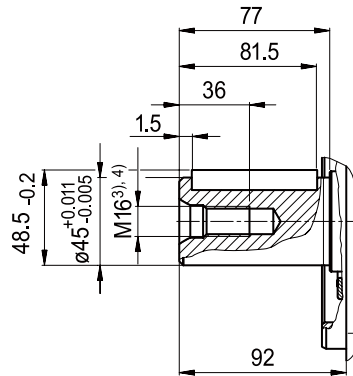
Before finalizing your design request a certified
installation drawing.
Dimensions in (mm).

Drive

S Splined shaft 1 3/4 in
13T 8/16DP ¹⁾ (SAE J744)



P Parallel shaft key
DIN 6885 · A14x9x80



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Thread according to ASME B1.1

³⁾ Thread according to DIN 13

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

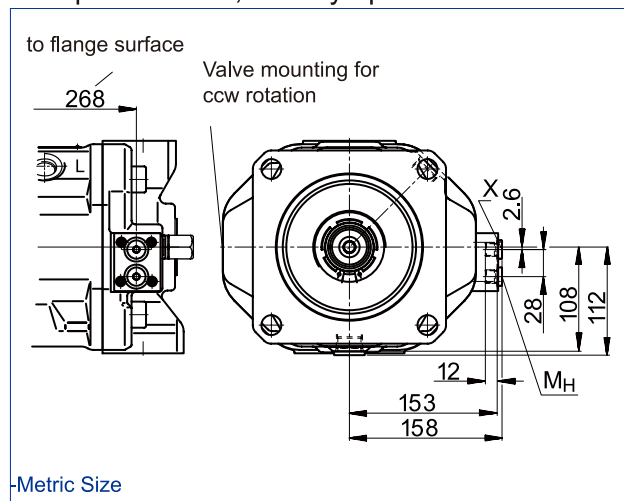


Dimensions size 140

Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

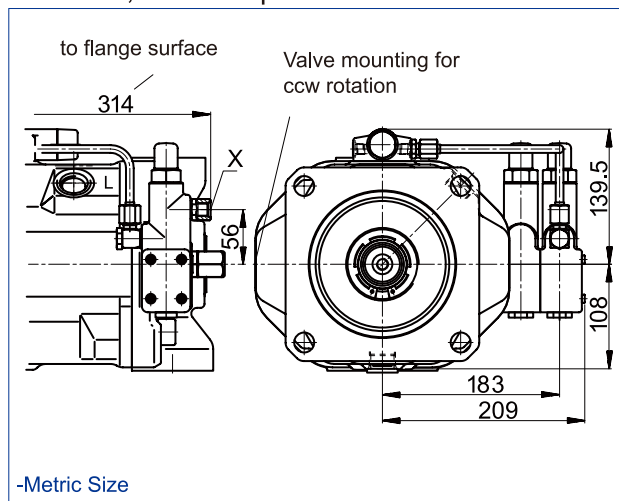
DG

Two-point control, directly operated



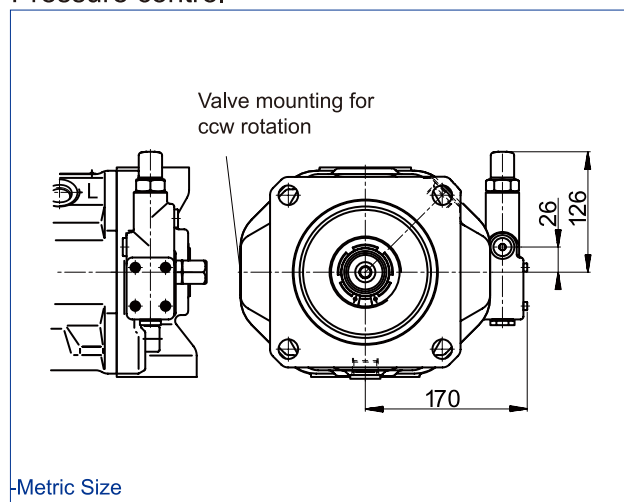
DFLR

Pressure, flow and power control



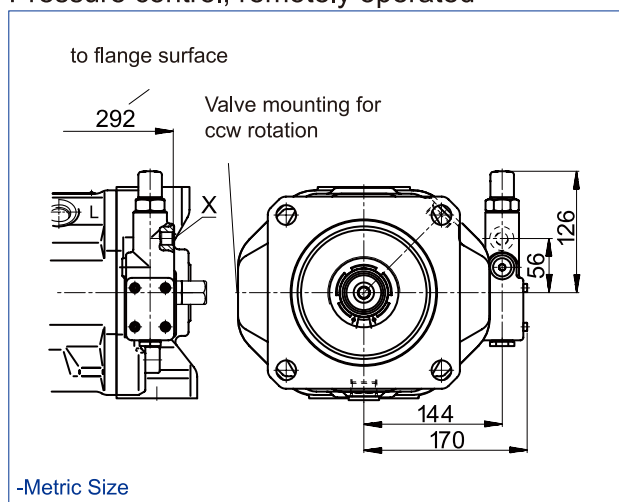
DR

Pressure control



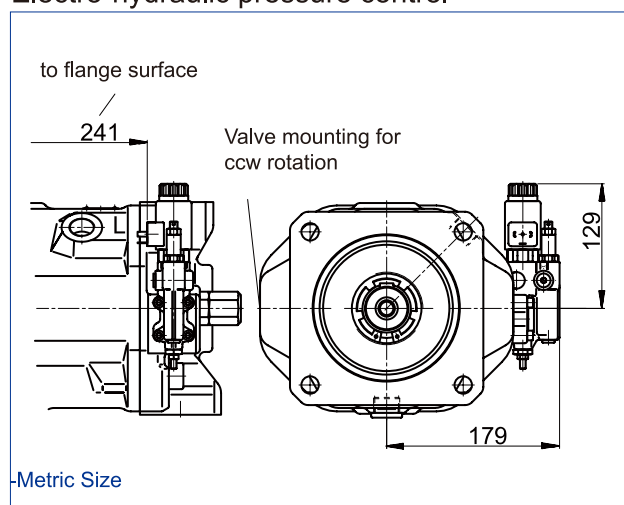
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control



¹⁾ ER7.: 214 mm when using a sandwich plate pressure reducing valve.

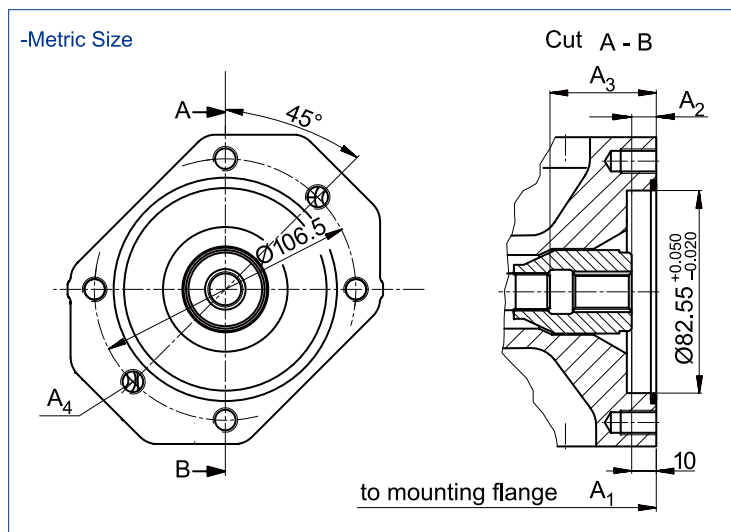
Dimensions through drive

A

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PA10VSO - Metric Size

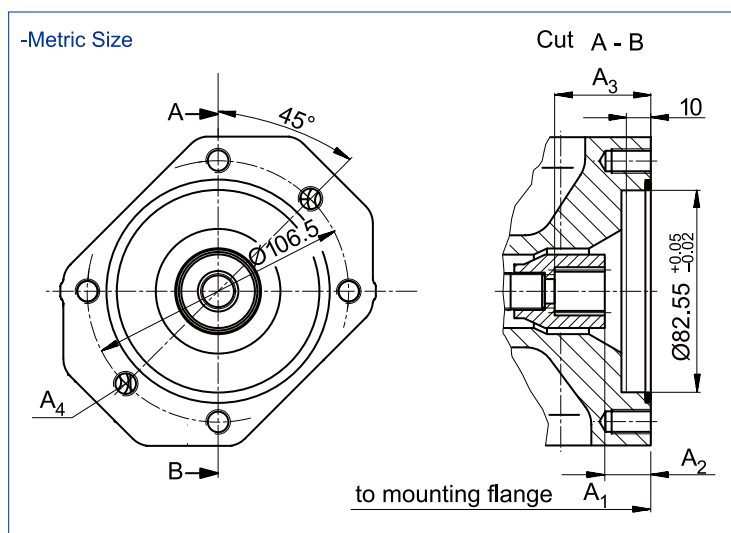
K01 flange ISO 3019-1 (SAE J744 - 82-2 (A))
Coupling for splined shaft according to ANSI B92.1a-1996



5/8 in 9T 16/32 DP¹⁾ (SAE J744 - 16-4 (A))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
18	7.16 (182)	0.39 (10)	1.70 (43.3)	M10 x 1.5, 0.57(14.5) deep
28	8.03 (204)	0.39 (10)	1.33 (33.7)	M10 x 1.5, 0.62(16) deep
45	9.02 (229)	0.42 (10.7)	2.10 (53.4)	M10 x 1.5, 0.62(16) deep
71	10.51 (267)	0.46 (11.8)	2.41 (61.3)	M10 x 1.5, 0.78(20) deep
100	13.31 (338)	0.41 (10.5)	2.56 (65)	M10 x 1.5, 0.62(16) deep
140	13.78 (350)	0.43 (10.8)	3.04 (77.3)	M10 x 1.5, 0.62(16) deep

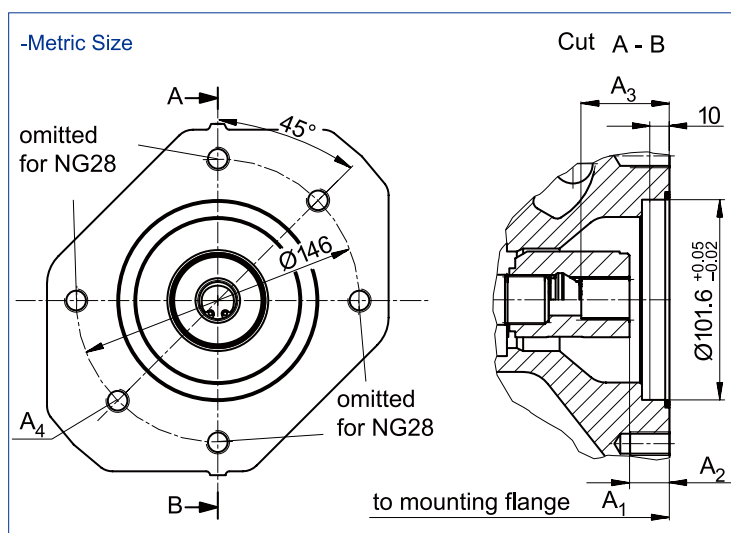
K52 flange ISO 3019-2 (SAE J744 - 82-2 (A))
Coupling for splined shaft according to ANSI B92.1a-1996



3/4 in 11T 16/32 DP¹⁾ (SAE J744 - 19-4 (A-B))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
18	7.16 (182)	0.74 (18.8)	1.52 (38.7)	M10 x 1.5, 0.57(14.5) deep
28	8.03 (204)	0.74 (18.8)	1.52 (38.7)	M10 x 1.5, 0.62(16) deep
45	9.02 (229)	0.744 (18.9)	1.52 (38.7)	M10 x 1.5, 0.62(16) deep
71	10.51 (267)	0.84 (21.3)	1.63 (41.4)	M10 x 1.5, 0.78(20) deep
100	13.31 (338)	0.75 (19)	1.53 (38.9)	M10 x 1.5, 0.62(16) deep
140	13.78 (350)	0.744 (18.9)	1.52 (38.6)	M10 x 1.5, 0.62(16) deep

K68 flange ISO 3019-2 (SAE J744 - 101-2 (B))
Coupling for splined shaft according to ANSI B92.1a-1996



7/8 in 13T 16/32 DP¹⁾ (SAE J744 - 22-4 (B))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
28	8.03 (204)	0.70 (17.8)	1.64 (41.7)	M12 x 1.75, continuous
45	9.02 (229)	0.704 (17.9)	1.64 (41.7)	M12 x 1.75, 0.71(18) deep
71	10.51 (267)	0.80 (20.3)	1.74 (44.1)	M12 x 1.75, 0.78(20) deep
100	13.31 (338)	0.71 (18)	1.65 (41.9)	M12 x 1.75, 0.78(20) deep
140	13.78 (350)	0.70 (17.8)	1.64 (41.6)	M12 x 1.75, 0.78(20) deep

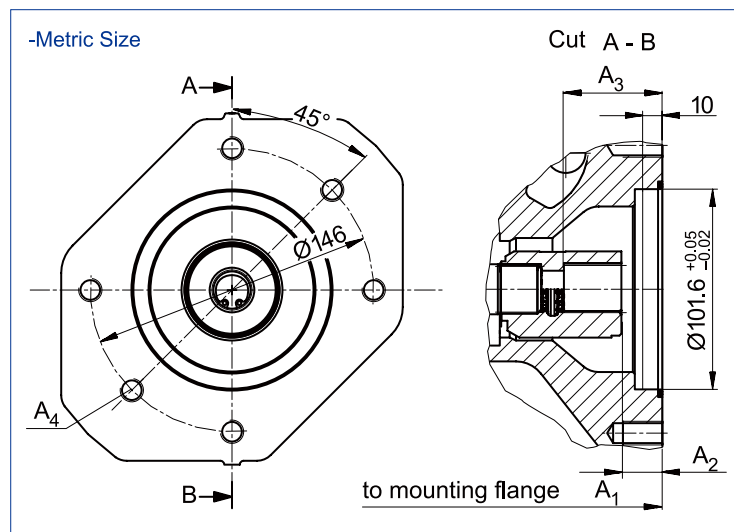
¹⁾ 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.



Dimensions through drive

K04 flange ISO 3019-2 (SAE J744 - 101-2 (B))
Coupling for splined shaft according to ANSI B92.1a-1996



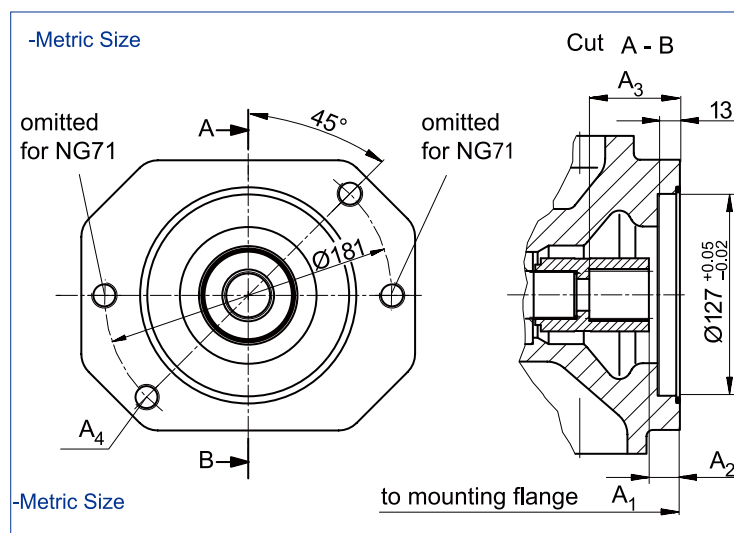
Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

1 in 15T 16/32 DP¹⁾ (SAE J744 - 25-4 (B-B))

Inch (mm)

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
45	9.02 (229)	0.724 (18.4)	1.84 (46.7)	M12 x 1.75, 0.71(18) deep
71	10.51 (267)	0.82 (20.8)	1.93 (49.1)	M12 x 1.75, 0.78(20) deep
100	13.31 (338)	0.716 (18.2)	1.83 (46.6)	M12 x 1.75, 0.78(20) deep
140	13.78 (350)	0.72 (18.3)	1.81 (45.9)	M12 x 1.75, 0.78(20) deep

K07 flange ISO 3019-2 (SAE J744 - 127-2 (C))
Coupling for splined shaft according to ANSI B92.1a-1996

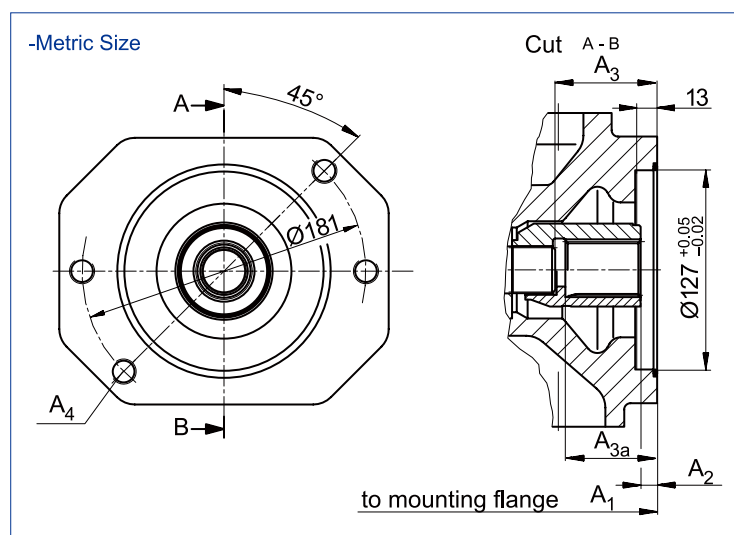


1 1/4 in 14T 12/24 DP¹⁾ (SAE J744 - 32-4 (C))

Inch (mm)

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
71	10.51 (267)	0.86 (21.8)	2.31 (58.6)	M16 x 2, continuous
100	13.31 (338)	0.77 (19.5)	2.22 (56.4)	M6 x 2, continuous
140	13.78 (350)	0.76 (19.3)	2.21 (56.1)	M16 x 2, 0.94(24) deep

K24 flange ISO 3019-2 (SAE J744 - 127-2 (C))
Coupling for splined shaft according to ANSI B92.1a-1996



1 1/2 in 17T 12/24 DP¹⁾ (SAE J744 - 38-4 (C-C))

Inch (mm)

NG	A ₁	A ₂	A ₃ ³⁾	A _{3a} ⁴⁾	A ₄ ²⁾
100	13.31 (338)	0.41 (10.5)	2.56 (65)	—	M16 x 2, continuous
140	13.78 (350)	0.42 (10.8)	2.95 (75)	—	M16 x 2, 0.94 (24) deep
	13.78 (350)	0.40 (10.3)	—	2.72 (69.1)	M16 x 2, 0.94 (24) deep

³⁾ Coupling without stop

⁴⁾ Coupling with stop

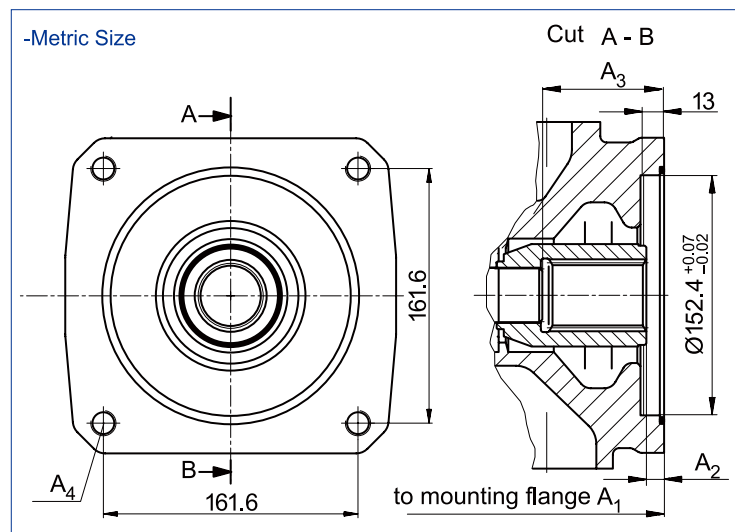
¹⁾ 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.

Dimensions through drive

K17 flange ISO 3019-2 (SAE J744 - 152-4 (A))
Coupling for splined shaft according to ANSI B92.1a-1996

Before finalizing your design request a certified
installation drawing.
Dimensions in (mm).

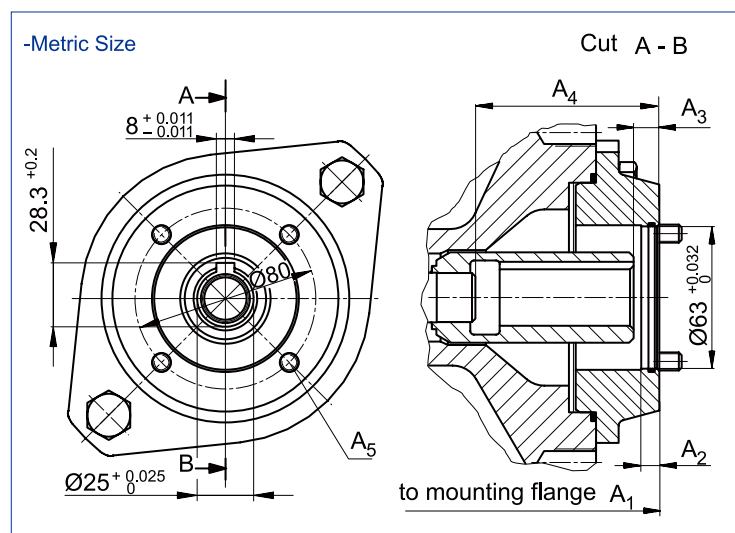


1 3/4 in 13T 8/16 DP ¹⁾ (SAE J744 - 44-4 (D))

Inch (mm)

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
140	13.78 (350)	0.43 (11)	3.04 (77.3)	M6 x 2, continuous

K57 flange for mounting R4 radial piston pump of metric 4 hole
flange coupling for metric parallel shaft key.



mm

NG	A ₁	A ₂	A ₃	A ₄	A ₅ ³⁾
28	232	8	10.6	58.4	M8
45	257	8	11	81	M8
71	283	8	12.5	77	M10
100	354	8	10.5	81	M10
140	366	8	11	93	M8

¹⁾ 30° pressure angle, flat root, side fit, tolerance class 5°

²⁾ Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.

³⁾ Screws for mounting the radial piston motor are included in the delivery contents.



Dimensions through drive

KB2 flange ISO 3019-2 - 80A2SW

Coupling for splined shaft according to ANSI B92.1a-1996

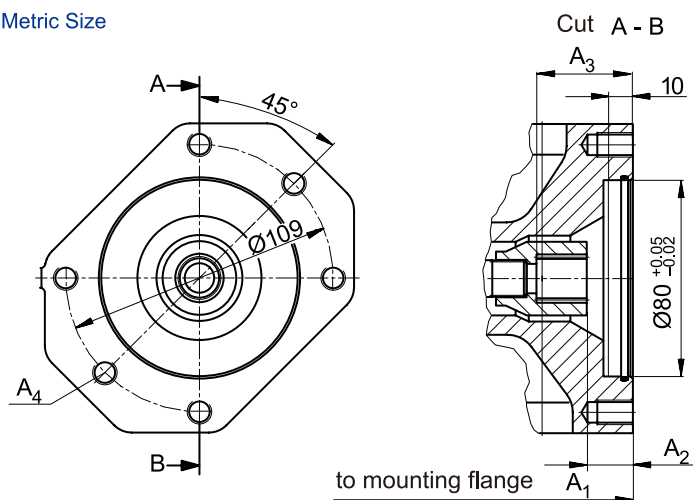
Before finalizing your design request a certified installation drawing.
Dimensions in (mm).

A

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PA10VSO - Metric Size

-Metric Size



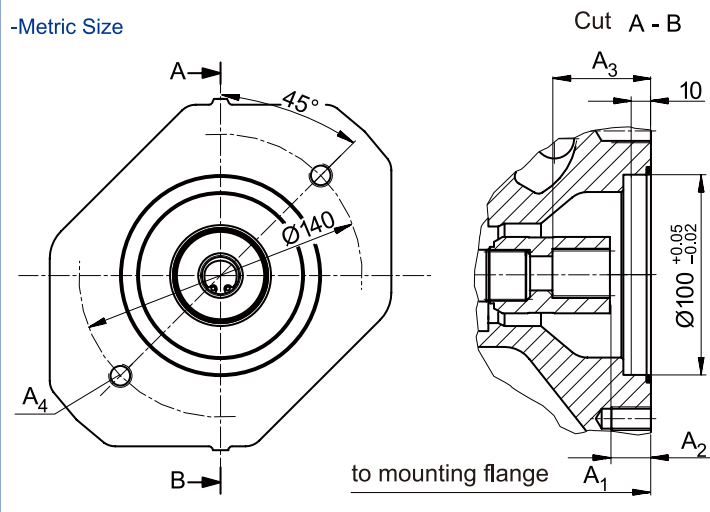
3/4 in 11T 16/32 DP ¹⁾ (SAE J744 - 19-4 (A-B))
mm

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
18	182	18.8	38.7	M10 x 1.5 14.5 deep
28	204	18.8	38.7	M10 x 1.5 16 deep
45	229	18.9	38.7	M10 x 1.5 16 deep
71	267	21.3	41.4	M10 x 1.5 20 deep
100	338	19	38.9	M10 x 1.5 20 deep
140	350	18.9	38.6	M10 x 1.5 20 deep

KB3 flange ISO 3019-2 - 100A2SW

Coupling for splined shaft according to ANSI B92.1a-1996

-Metric Size



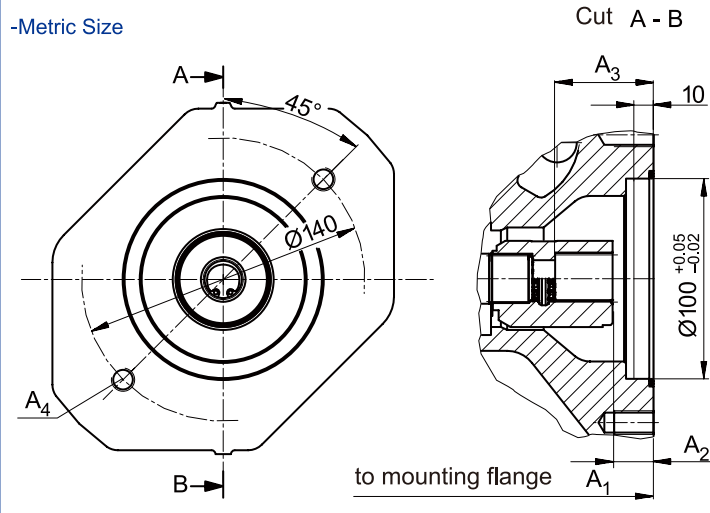
7/8 in 13T 16/32 DP ¹⁾ (SAE J744 - 22-4 (B))
mm

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
28	204	17.8	41.7	M12 x 1.5 , continuous
45	229	17.9	41.7	M12 x 1.5 , continuous
71	267	20.3	44.1	M12 x 1.5 , 20 deep
100	338	18	41.9	M12 x 1.5 , 20 deep
140	350	17.8	41.6	M12 x 1.5 , 20 deep

KB4 flange ISO 3019-2 - 100A2SW

Coupling for splined shaft according to ANSI B92.1a-1996

-Metric Size



1 in 15T 16/32 DP ¹⁾ (SAE J744 - 25-4 (B-B))
mm

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
45	229	18.4	46.7	M12 x 1.75 , continuous
71	267	20.8	49.1	M12 x 1.75 , 20 deep
100	338	18.2	46.6	M12 x 1.75 , 20 deep
140	350	18.3	45.9	M12 x 1.75 , 20 deep

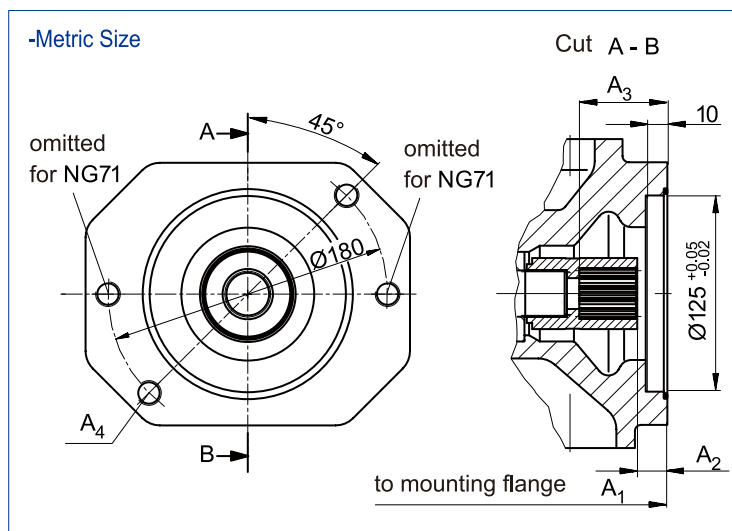
¹⁾ 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.

Dimensions through drive

KB5 flange ISO 3019-2 - 125A2SW
Coupling for splined shaft according to ANSI B92.1a-1996

Before finalizing your design request a certified
installation drawing.
Dimensions in (mm).

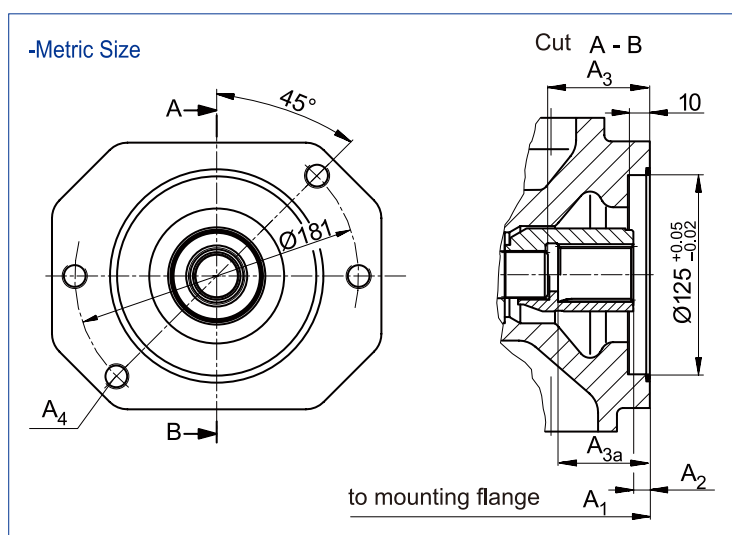


1 1/4 in 14T 12/24 DP¹⁾ (SAE J744 - 32-4 (C))

mm

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
71	267	21.8	58.6	M16 x 2 , continuous
100	338	19.5	56.4	M16 x 2 , continuous
140	350	19.3	56.1	M16 x 2 , 24 deep

KB6 flange ISO 3019-2 - 125A2SW
Coupling for splined shaft according to ANSI B92.1a-1996

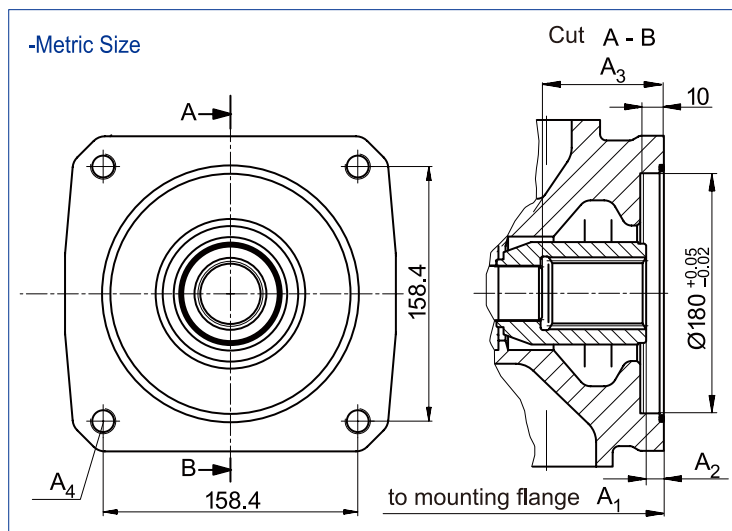


1 1/2 in 17T 12/24 DP¹⁾ (SAE J744 - 38-4 (C-C))

mm

NG	A ₁	A ₂	A ₃ ³⁾	A _{3a} ⁴⁾	A ₄ ²⁾
100	338	10.5	65	—	M16 x 2 , continuous
140	350	10.8	75	—	M16 x 2 , 24 deep
	350	10.3	—	69.1	M16 x 2 , 24 deep

KB7 flange ISO 3019-2 - 180B4HW
Coupling for splined shaft according to ANSI B92.1a-1996



1 3/4 in 13T 8/16 DP¹⁾ (SAE J744 - 44-4 (D))

mm

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
140	350	11.3	77.3	M16 x 2 , continuous

3) Coupling without stop

4) Coupling with stop

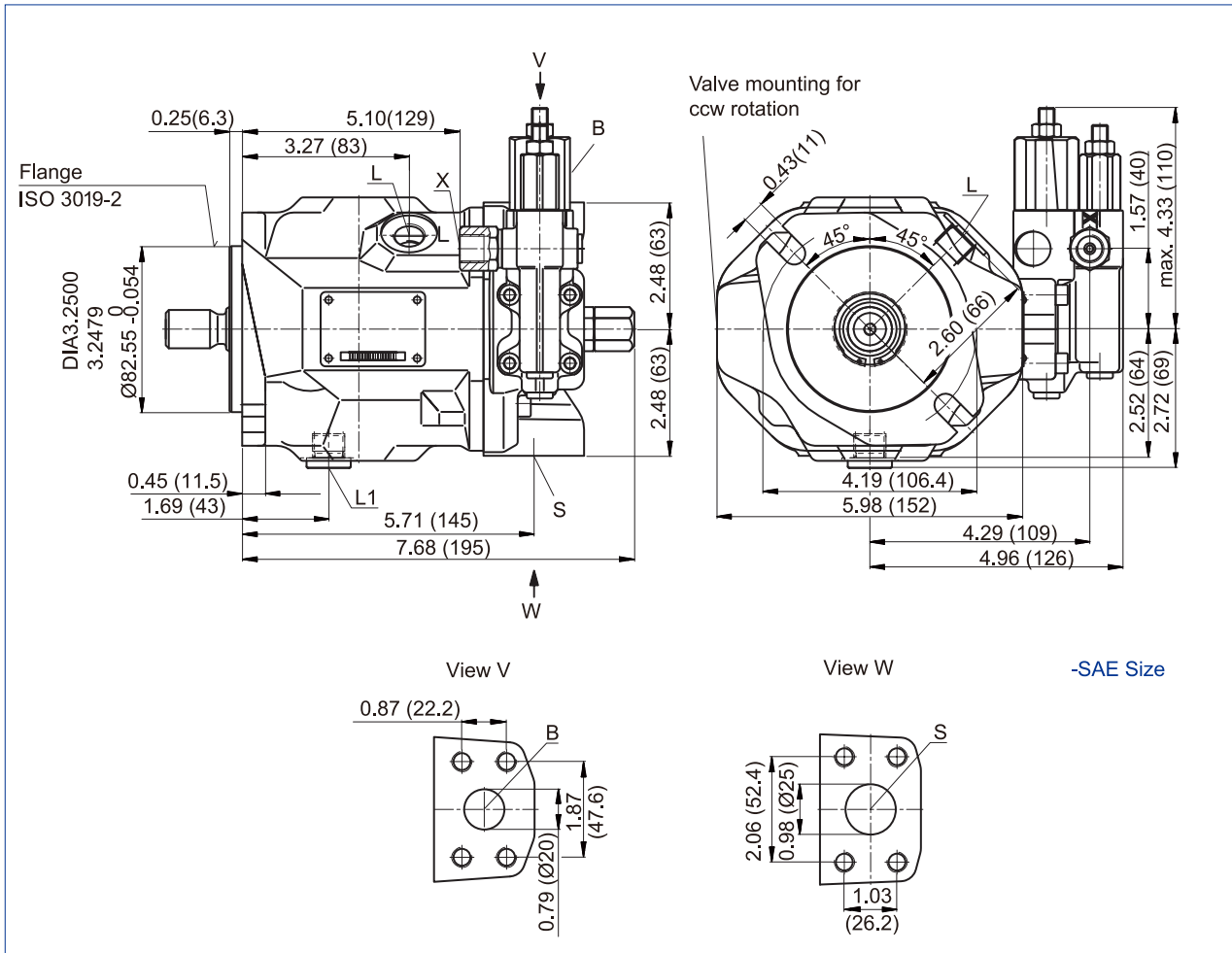
1) 30° pressure angle, flat root, side fit, tolerance class 5

2) Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.

Dimensions size 18

DFR, DFR1 – Pressure and flow control, hydraulic
Clockwise rotation

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ASME B1.1	3/4 in 3/8-16 UNC-2B; 0.79 (20) deep	5100(350)	O
S	Suction line, fastening thread	SAE J518 ASME B1.1	1 in 3/8-16 UNC-2B; 0.79 (20) deep	145(10)	O
L	Case drain fluid	ISO 11926 ³⁾	9/16-18 UNF-2B; 0.47 (12) deep	30(2)	O ⁴⁾
L1	Case drain fluid	ISO 11926 ³⁾	9/16-18 UNF-2B; 0.47 (12) deep	30(2)	X ⁴⁾
X	Pilot pressure	ISO 11926 ³⁾	7/16-20 UNF-2B; 0.45 (12) deep	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ³⁾	G 1/4 in; 0.47 (12) deep	5100(350)	O

1) For the maximum tightening torques the general instructions on page A-64 must be observed.

2) Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

3) The spot face can be deeper than as specified in the standard.

4) Depending on the installation position, L or L1 must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

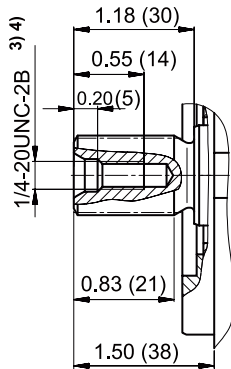
Dimensions size 18



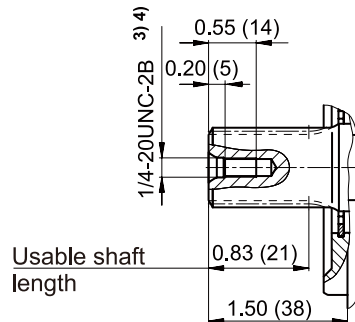
Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

Drive shaft

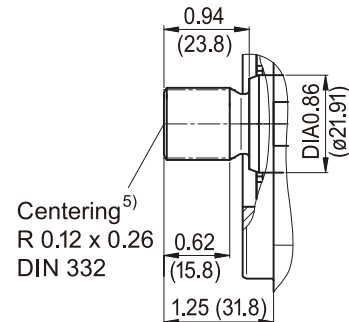
S Splined shaft 3/4 in
11T 16/32DP¹⁾ (SAE J744)



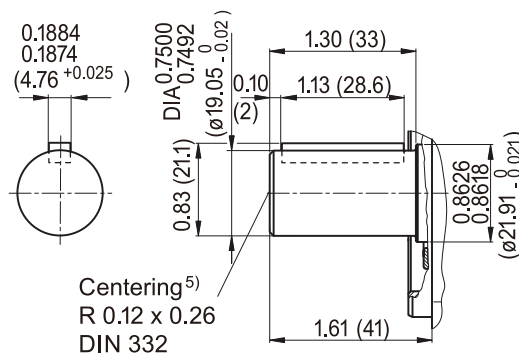
R Splined shaft 3/4 in
11T 16/32DP¹⁾²⁾ (SAE J744)



U Splined shaft 5/8 in
9T 16/32DP¹⁾ (SAE J744)



K Parallel shaft key
ISO 3019-1, 19-1



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed

⁵⁾ Coupling axially secured, e.g. with a clamp coupling or radially mounted clamping screw

Dimensions size 18

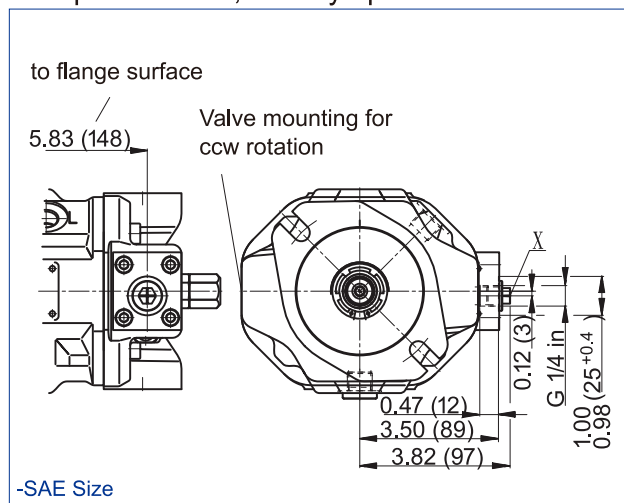
A

41

PA10VSO - SAE Size

DG

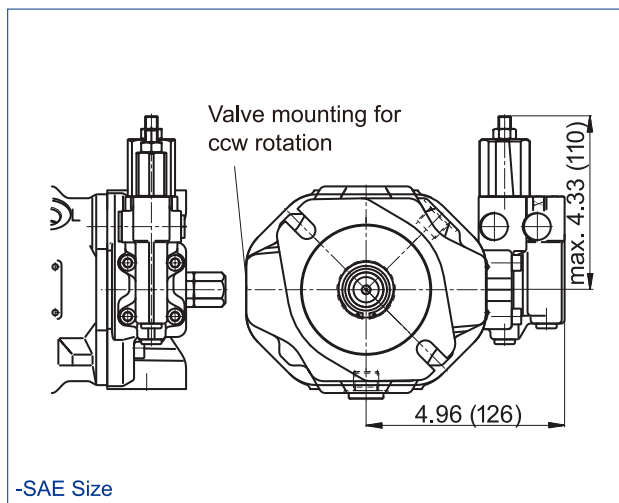
Two-point control, directly operated



DR

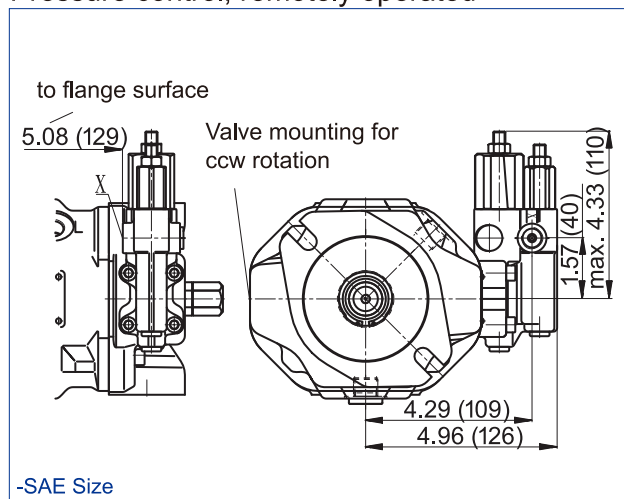
Pressure control

Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).



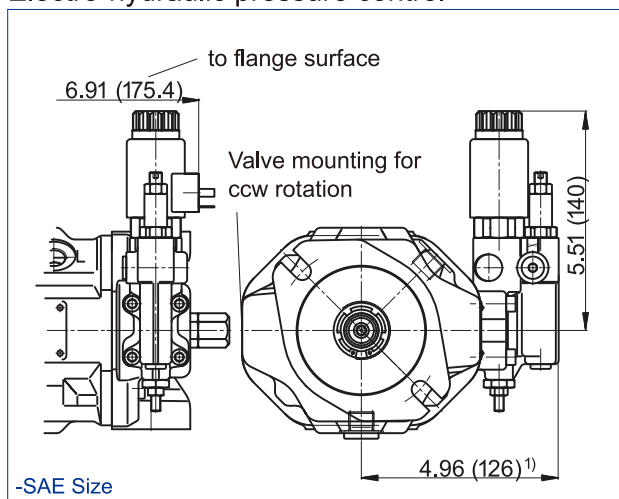
DRG

Pressure control, remotely operated



ED7., ER7.

Electro-hydraulic pressure control



Dimensions size 28



DFR/DFR1 – Pressure and flow control, hydraulic

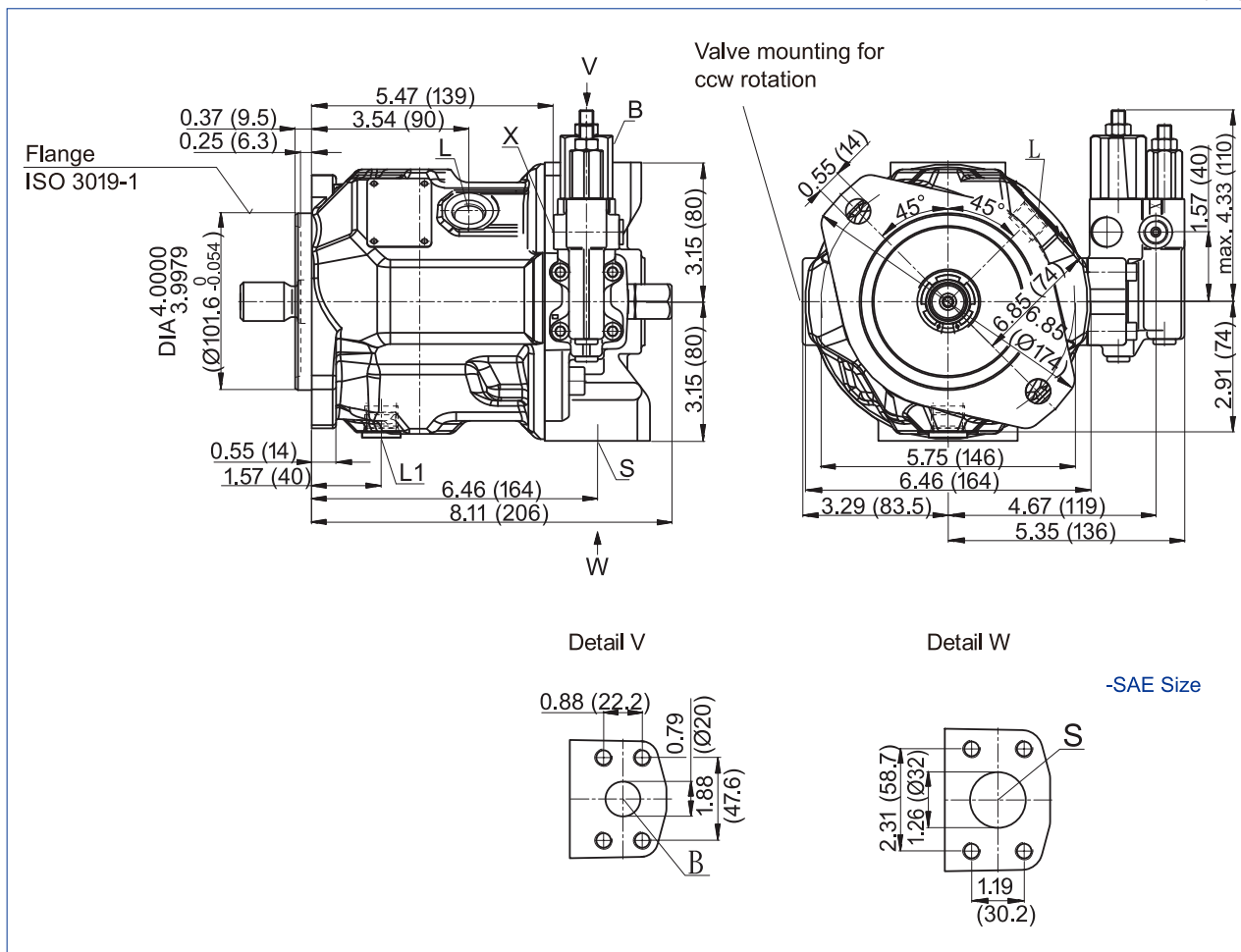
Clockwise rotation

Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

A

42

PA10VSO - SAE Size



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ASME B1.1	3/4 in 3/8-16 UNC-2B; 0.79 (20) deep	5100(350)	O
S	Suction line, fastening thread	SAE J518 ASME B1.1	1 1/4 in 7/16-14 UNC-2B; 0.94 (24) deep	145(10)	O
L	Case drain fluid	ISO 11926 ³⁾	3/4-16 UNF-2B; 0.47 (12) deep	30(2)	O ⁴⁾
L1	Case drain fluid	ISO 11926 ³⁾	3/4-16 UNF-2B; 0.47 (12) deep	30(2)	X ⁴⁾
X	Pilot pressure	ISO 11926 ³⁾	7/16-14 UNC-12B; 0.47 (12) deep	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ³⁾	G 1/4in; 0.47 (12) deep	5100(350)	O

- For the maximum tightening torques the general instructions on page A-64 must be observed.
- Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.
- The spot face can be deeper than as specified in the standard.
- Depending on the installation position, L or L1 must be connected (the following page A-62 \ A-63, please check assembling instruction.)
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 28

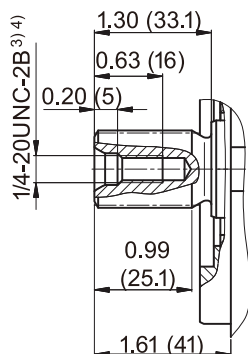
YEOSHE

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).

Drive shaft

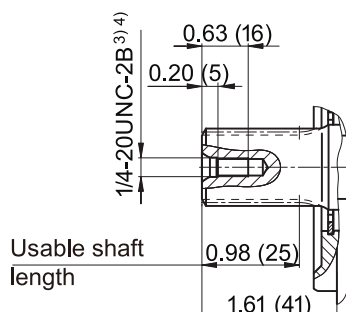
S

Splined shaft 7/8 in
13T 16/32DP¹⁾ (SAE J744)



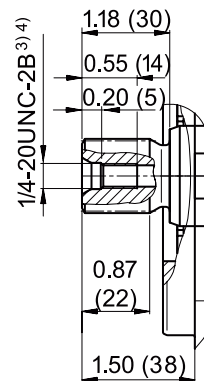
R

Splined shaft 7/8 in
13T 16/32DP¹⁾²⁾ (SAE J744)



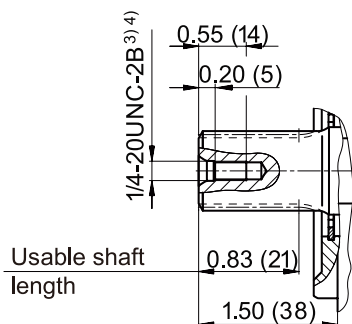
U

Splined shaft 3/4 in
11T 16/32DP¹⁾ (SAE J744)



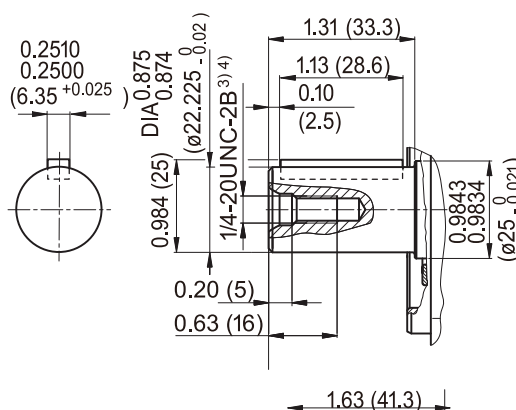
W

Splined shaft 3/4 in
11T 16/32DP¹⁾²⁾ (SAE J744)



K

Parallel shaft key
ISO 3019-1, 22-1



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

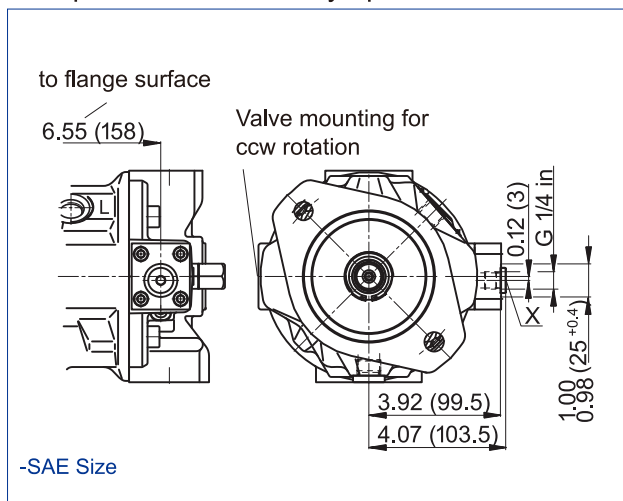
Dimensions size 28



Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

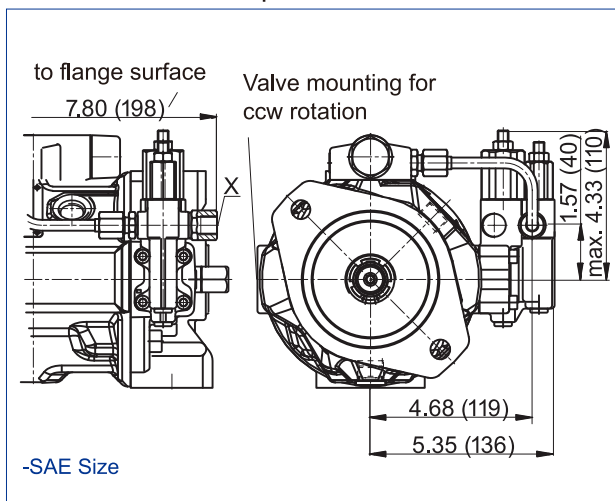
DG

Two-point control, directly operated



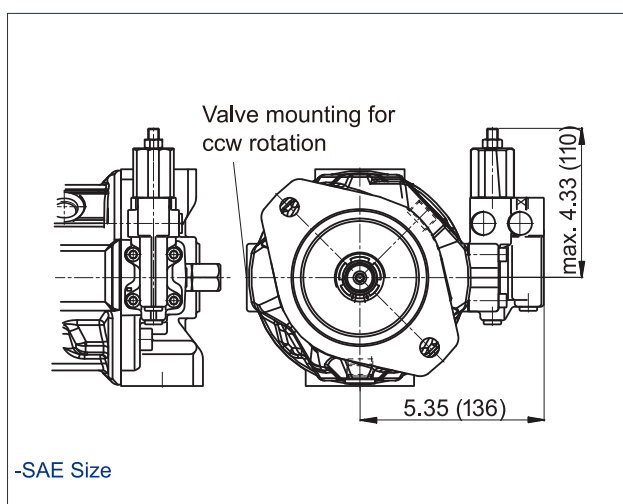
DFLR

Pressure, flow and power control



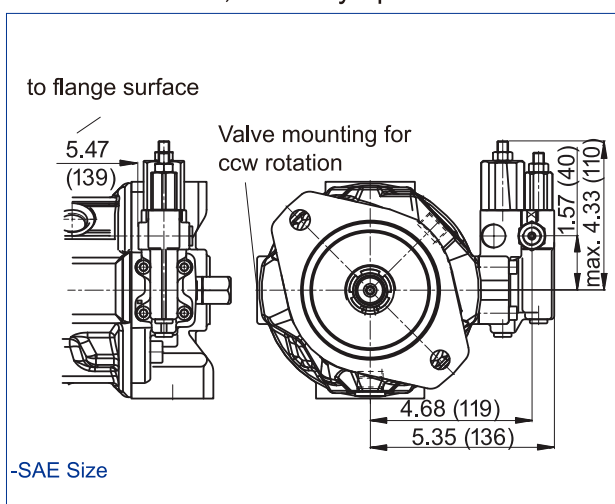
DR

Pressure control



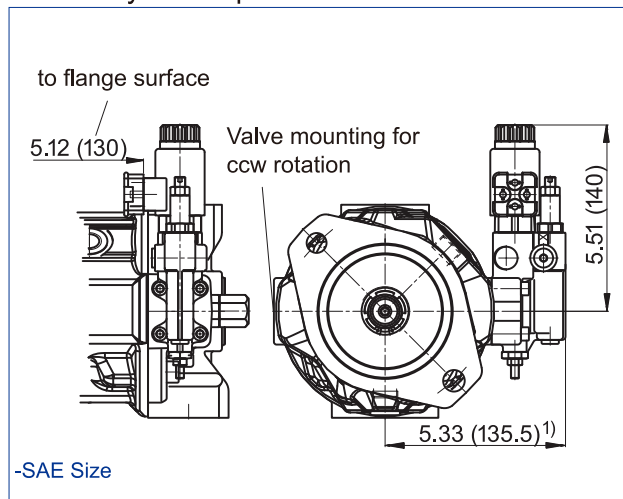
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control

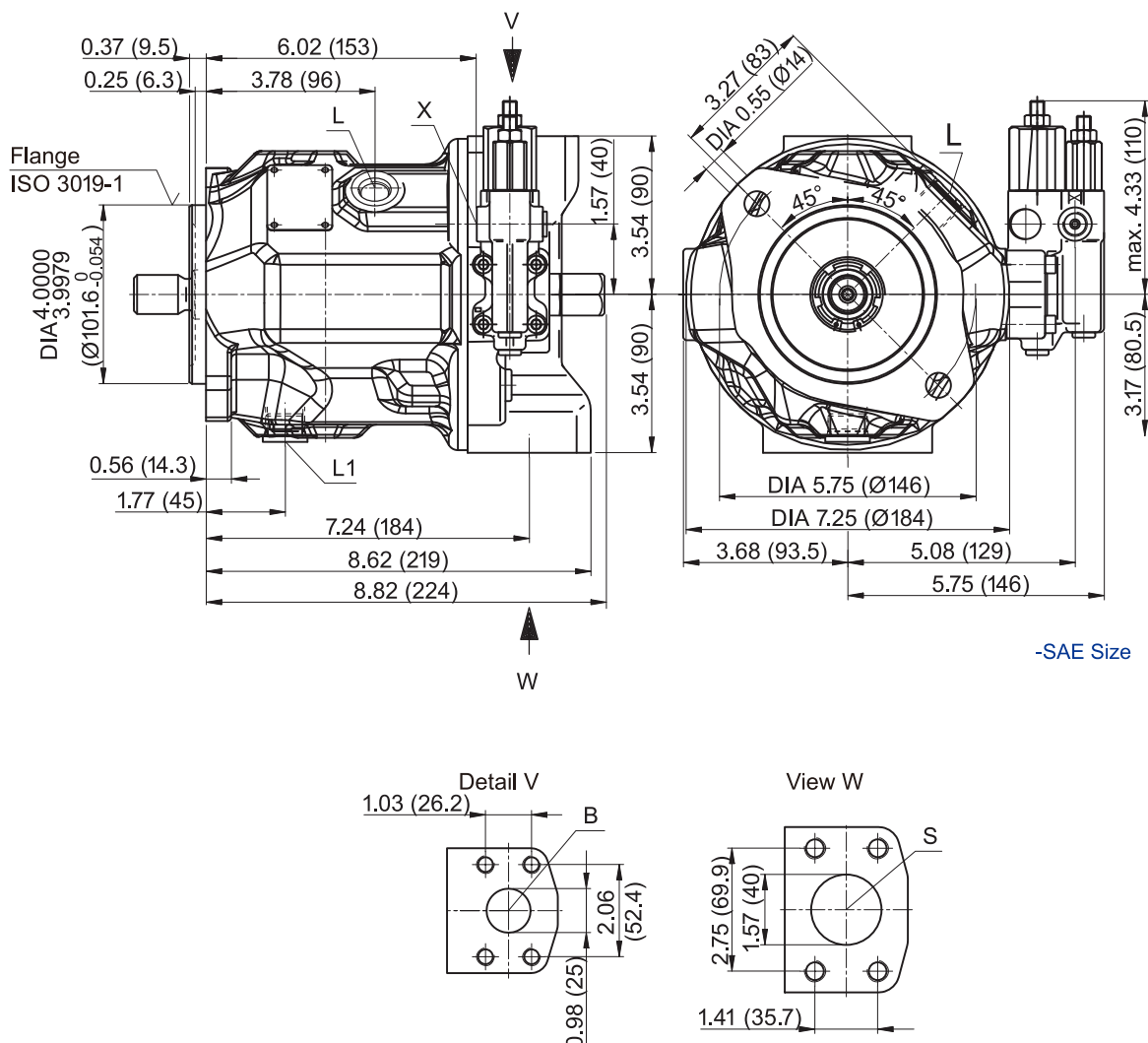


¹⁾ ER7.: 170.5 mm when using a sandwich plate pressure reducing valve.
For details of connection options and drive shafts, see also page A-42 and A-43.

Dimensions size 45

DFR/DFR1 – Pressure and flow control, hydraulic

Clockwise rotation

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).

Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ASME B1.1	1 in 3/8-16 UNC-2B; 0.71 (18) deep	5100(350)	O
S	Suction line, fastening thread	SAE J518 ASME B1.1	1 1/2 in 1/2-13 UNC-2B; 0.87 (22) deep	145(10)	O
L	Case drain fluid	ISO 11926 ³⁾	7/8-14 UNF-2B; 0.55 (14) deep	30(2)	O ⁴⁾
L1	Case drain fluid	ISO 11926 ³⁾	7/8-14 UNF-2B; 0.55 (14) deep	30(2)	X ⁴⁾
X	Pilot pressure	ISO 11926 ³⁾	7/16-20 UNF-2B; 0.45 (12) deep	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ³⁾	G 1/4 in	5100(350)	O

1) For the maximum tightening torques the general instructions on page A-64 must be observed.

2) Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

3) The spot face can be deeper than as specified in the standard.

4) Depending on the installation position, L or L1 must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions size 45



Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

A

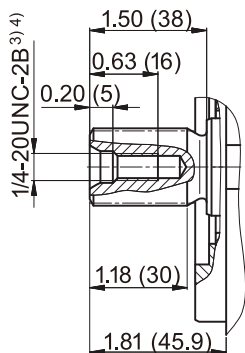
46

PA10VSO - SAE Size

Drive shaft

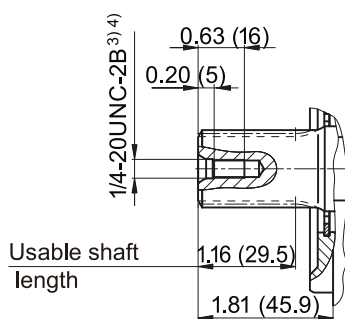
S

Splined shaft 1 in
15T 16/32DP¹⁾ (SAE J744)



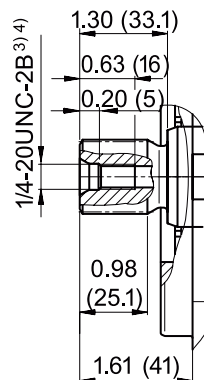
R

Splined shaft 1 in
15T 16/32DP¹⁾²⁾ (SAE J744)



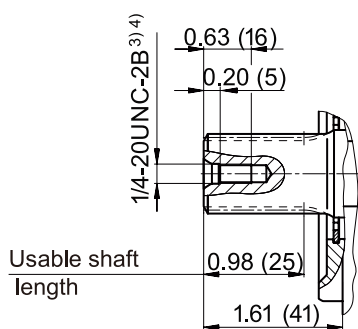
U

Splined shaft 7/8 in
13T 16/32DP¹⁾ (SAE J744)



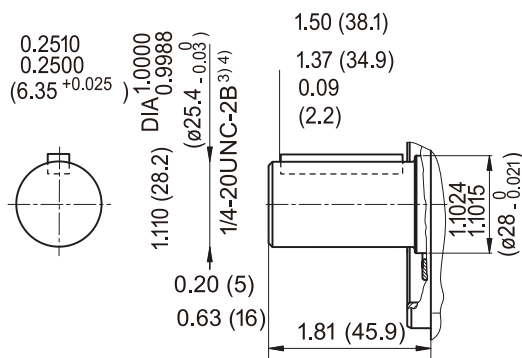
W

Splined shaft 7/8 in
13T 16/32DP¹⁾²⁾ (SAE J744)



K

Parallel shaft key
ISO 3019-1, 25-1



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

Dimensions size 45

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).

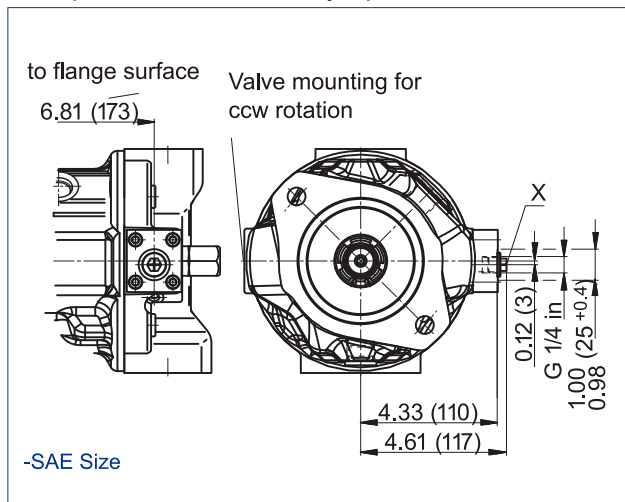
A

47

PA10VSO - SAE Size

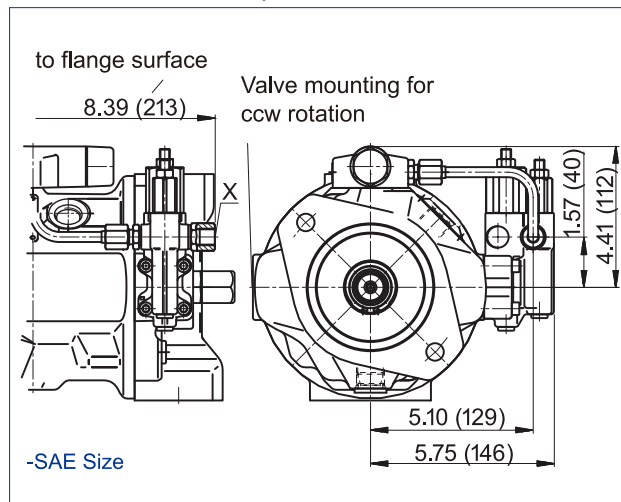
DG

Two-point control, directly operated



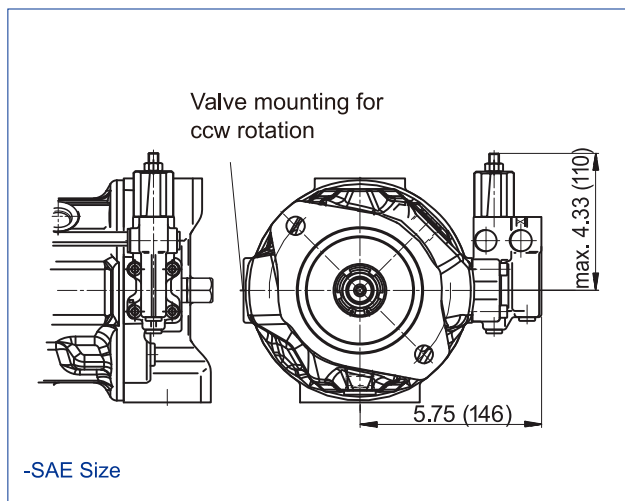
DFLR

Pressure, flow and power control



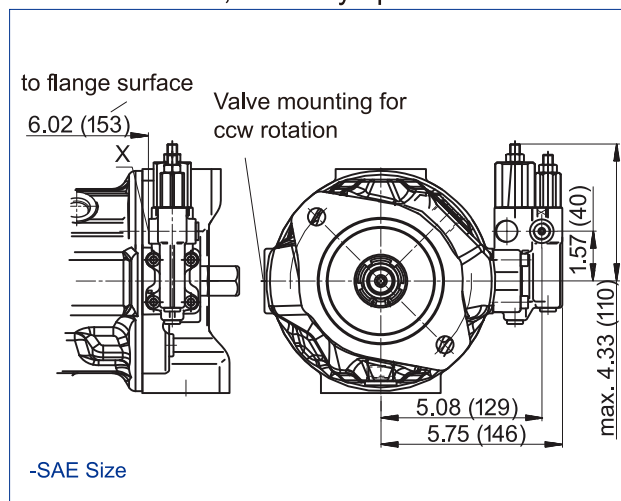
DR

Pressure control



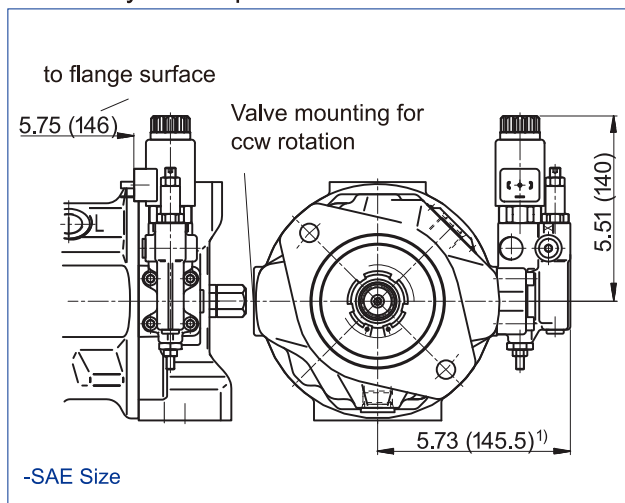
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control



¹⁾ ER7.: 180.5 mm if using a sandwich plate pressure reducing valve.

Dimensions size 71



DFR/DFR1 – Pressure and flow control, hydraulic

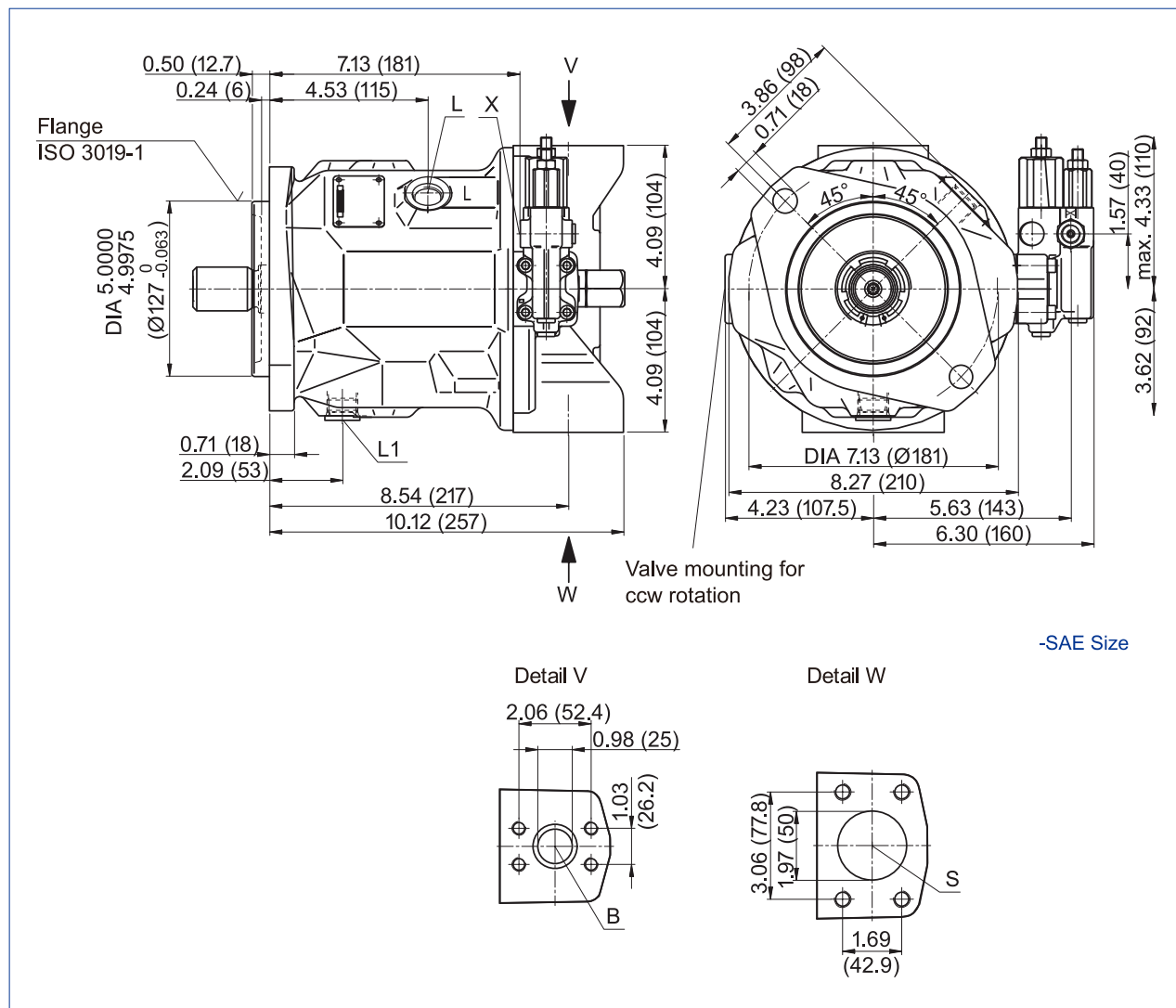
Clockwise rotation

Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

A

48

PA10VSO - SAE Size



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ASME B1.1	1 in 3/8-16 UNC-2B; 0.71 (18) deep	5100(350)	O
S	Suction line, fastening thread	SAE J518 ASME B1.1	2 in 1/2-13 UNC-2B; 0.87 (22) deep	145(10)	O
L	Case drain fluid	ISO 11926 ³⁾	7/8-14 UNF-2B; 0.55 (14) deep	30(2)	O ⁴⁾
L1	Case drain fluid	ISO 11926 ³⁾	7/8-14 UNF-2B; 0.55 (14) deep	30(2)	X ⁴⁾
X	Pilot pressure	ISO 11926 ³⁾	7/16-20 UNF-2B; 0.45 (12) deep	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ³⁾	G 1/4 in	5100(350)	O

- For the maximum tightening torques the general instructions on page A-64 must be observed.
- Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.
- The spot face can be deeper than as specified in the standard.
- Depending on the installation position, L or L1 must be connected (the following page A-62 \ A-63, please check assembling instruction.)
O = Must be connected (plugged on delivery)
X = Plugged (in normal operation)

Dimensions size 71

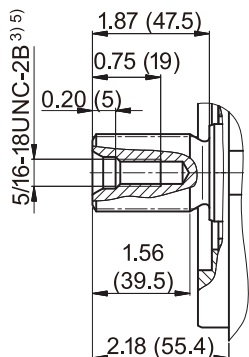
YEOSHE

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).

Drive shaft

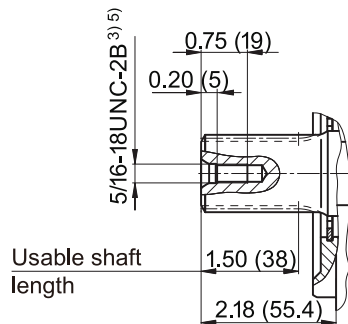
S

Splined shaft 1 1/4 in
14T 12/24DP¹⁾ (SAE J744)



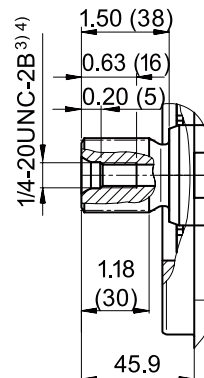
R

Splined shaft 1 1/4 in
14T 12/24DP¹⁾ (SAE J744)



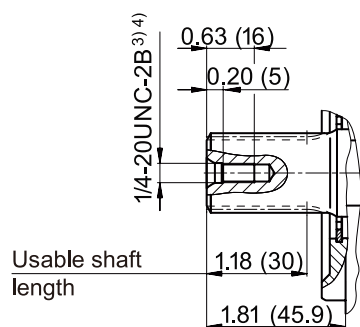
U

Splined shaft 1 in
15T 16/32DP¹⁾ (SAE J744)



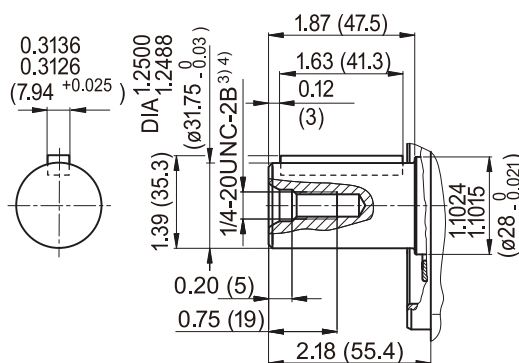
W

Splined shaft 1 in
15T 16/32DP¹⁾ (SAE J744)



K

Parallel shaft key
ISO 3019-1, 32-1



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

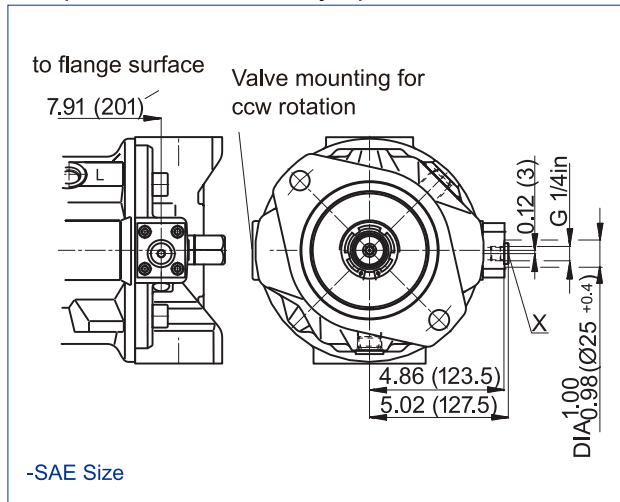


Dimensions size 71

Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

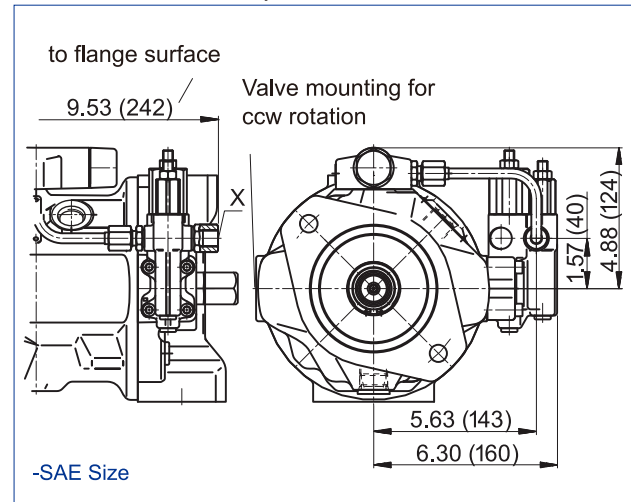
DG

Two-point control, directly operated



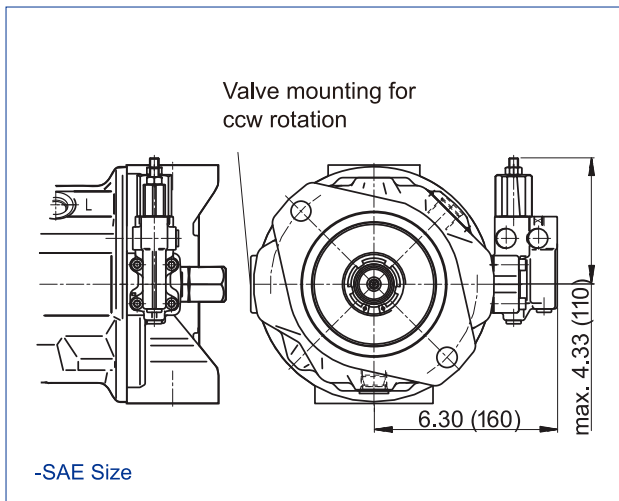
DFLR

Pressure, flow and power control



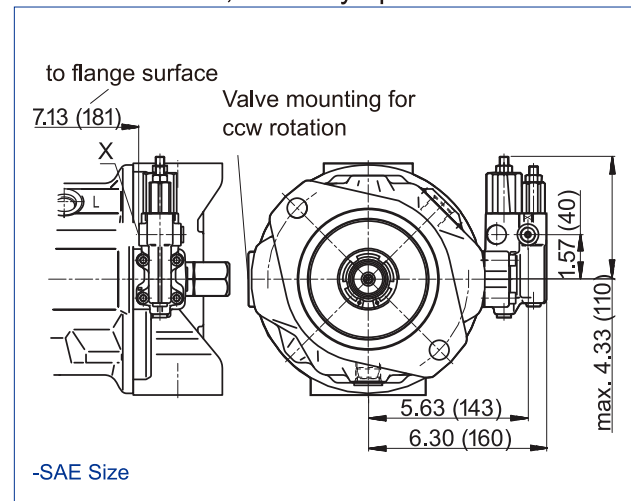
DR

Pressure control



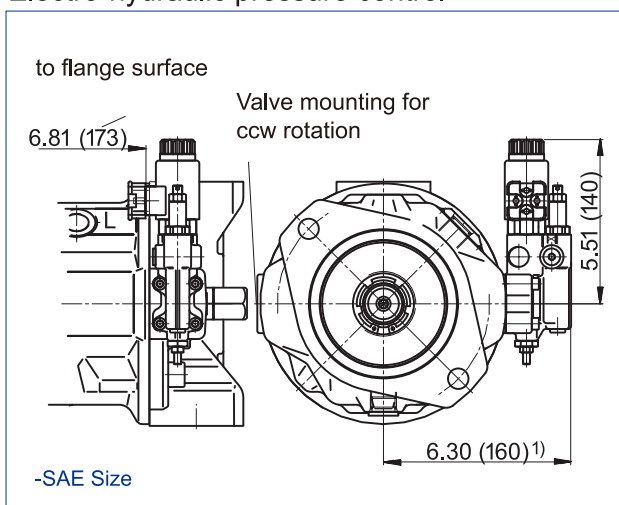
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control



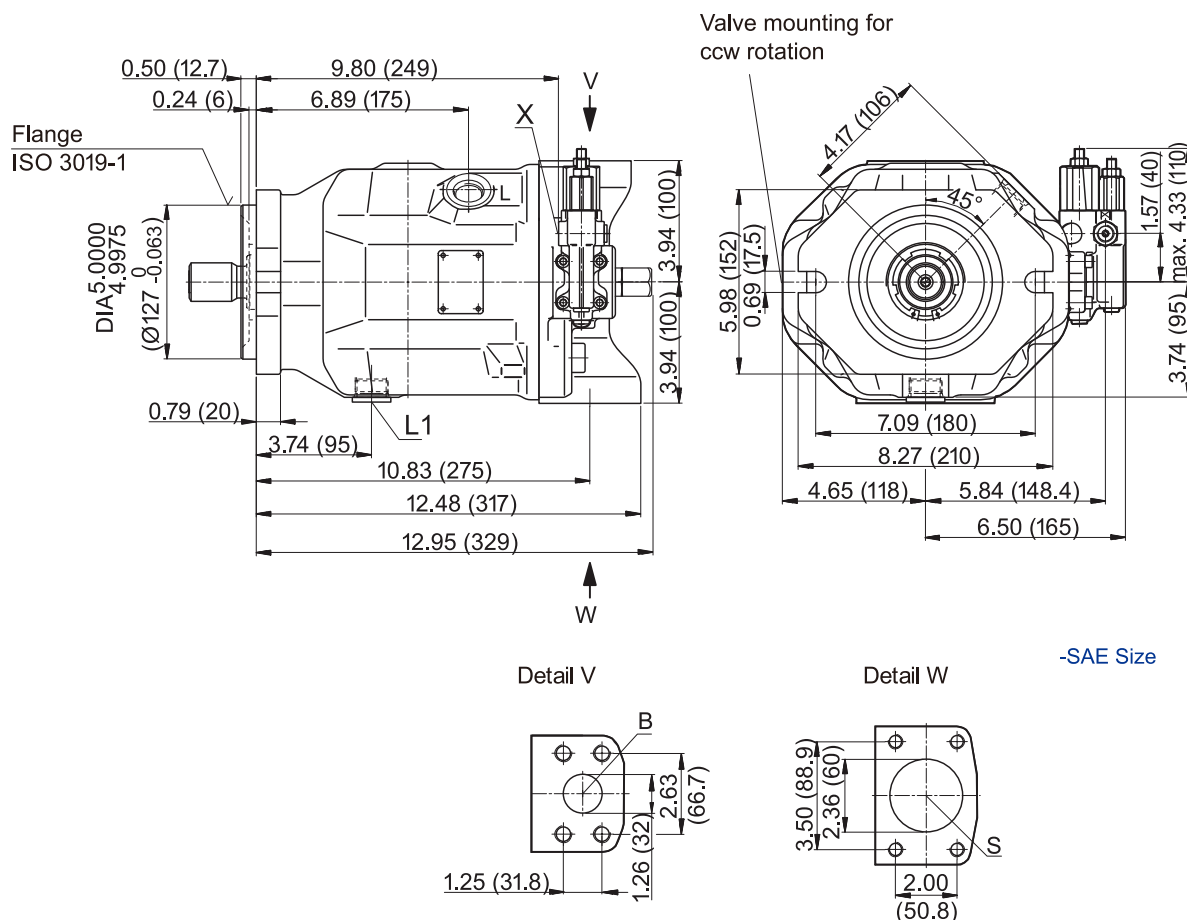
¹⁾ ER7.: 195 mm if using a sandwich plate pressure reducing valve.

Dimensions size 100

DFR/DFR1 – Pressure and flow control, hydraulic

Clockwise rotation

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ASME B1.1	1 1/4 in 1/2-13 UNC-2B; 0.75 (19) deep	5100(350)	O
S	Suction line, fastening thread	SAE J518 ASME B1.1	2 1/2 in 1/2-13 UNC-2B; 1.06 (27) deep	145(10)	O
L	Case drain fluid	ISO 11926 ³⁾	1 1/16-12 UNF-2B; 0.63 (16) deep	30(2)	O ⁴⁾
L1	Case drain fluid	ISO 11926 ³⁾	1 1/16-12 UNF-2B; 0.63 (16) deep	30(2)	X ⁴⁾
X	Pilot pressure	ISO 11926 ³⁾	7/16-20 UNF-2B; 0.45 (12) deep	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ³⁾	G 1/4 in	5100(350)	O

1) For the maximum tightening torques the general instructions on page A-64 must be observed.

2) Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

3) The spot face can be deeper than as specified in the standard.

4) Depending on the installation position, L or L1 must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions size 100



Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

A

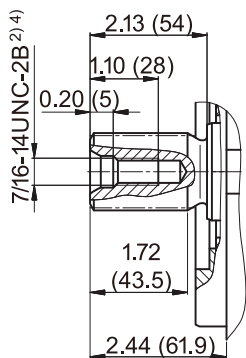
52

PA10VSO - SAE Size

Drive shaft

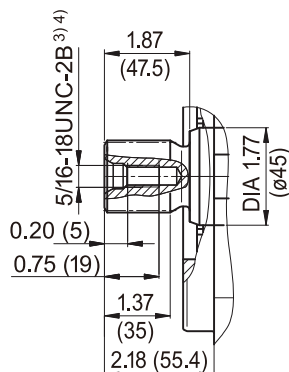
S

Splined shaft 1 1/2 in
17T 12/24DP ¹⁾(SAE J744)



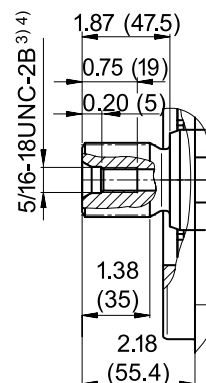
R

Splined shaft 1 1/4 in
14T 12/24DP ¹⁾2)(SAE J744)



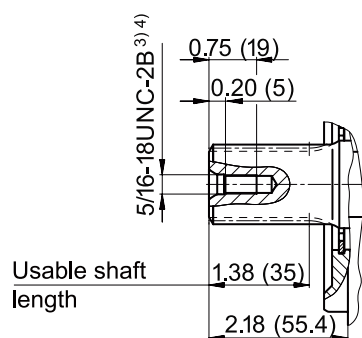
U

Splined shaft 1 1/4 in
14T 12/24DP ¹⁾(SAE J744)



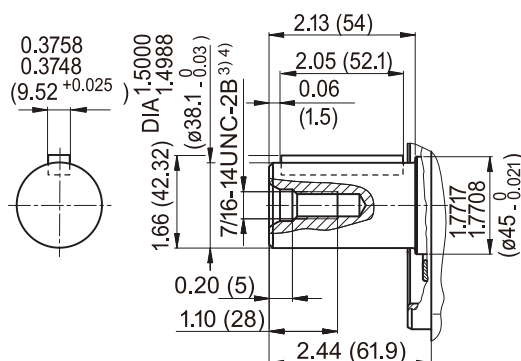
W

Splined shaft 1 1/4 in
14T 12/24DP ¹⁾2)(SAE J744)



K

Parallel shaft key
ISO 3019-1, 38-1



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Splines according to ANSI B92.1a, run out of spline is a deviation from standard

³⁾ Thread according to ASME B1.1

⁴⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

Dimensions size 100

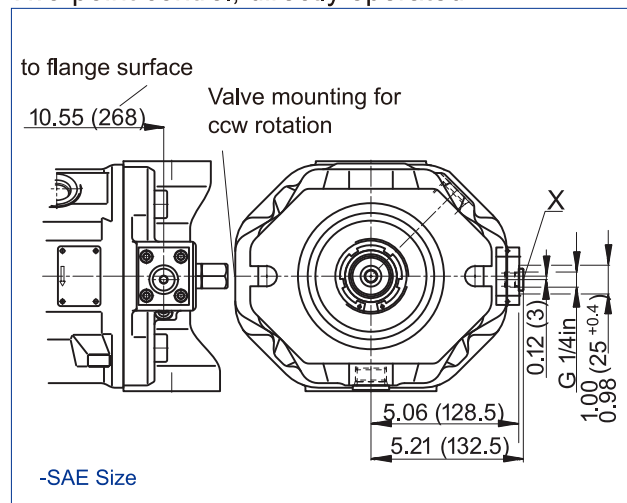
A

53

PA10VSO - SAE Size

DG

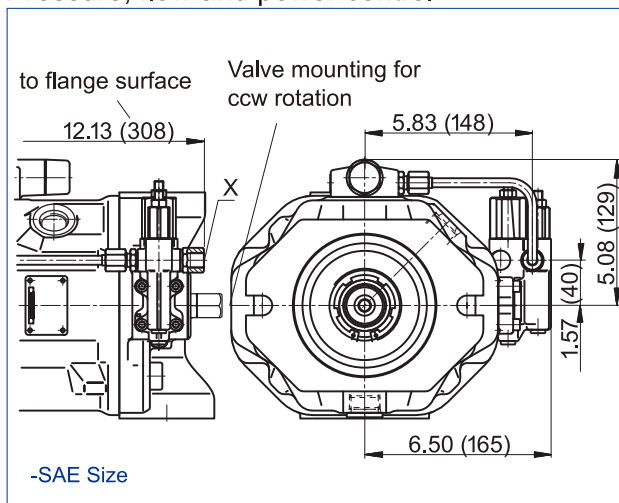
Two-point control, directly operated



Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

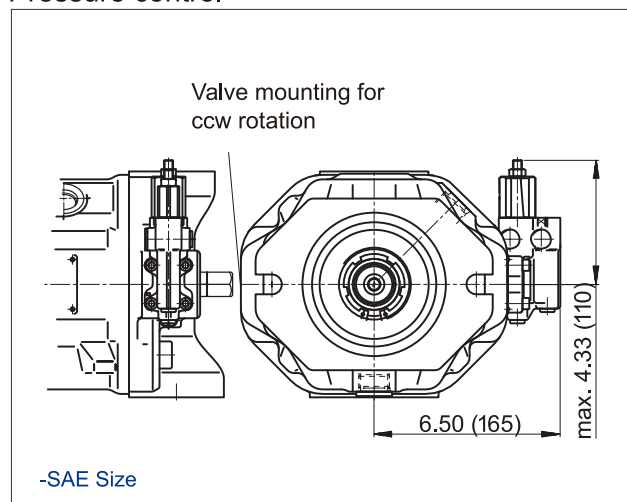
DFLR

Pressure, flow and power control



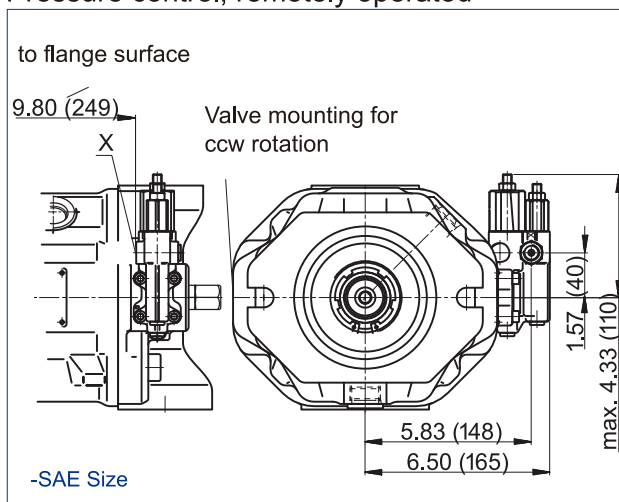
DR

Pressure control



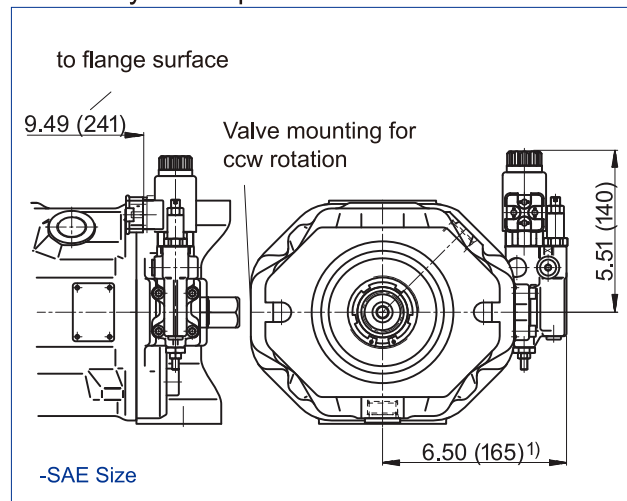
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control



¹⁾ ER7.: 200 mm when using a sandwich plate pressure reducing valve.

Dimensions size 140



DFR/DFR1 — Pressure and flow control, hydraulic

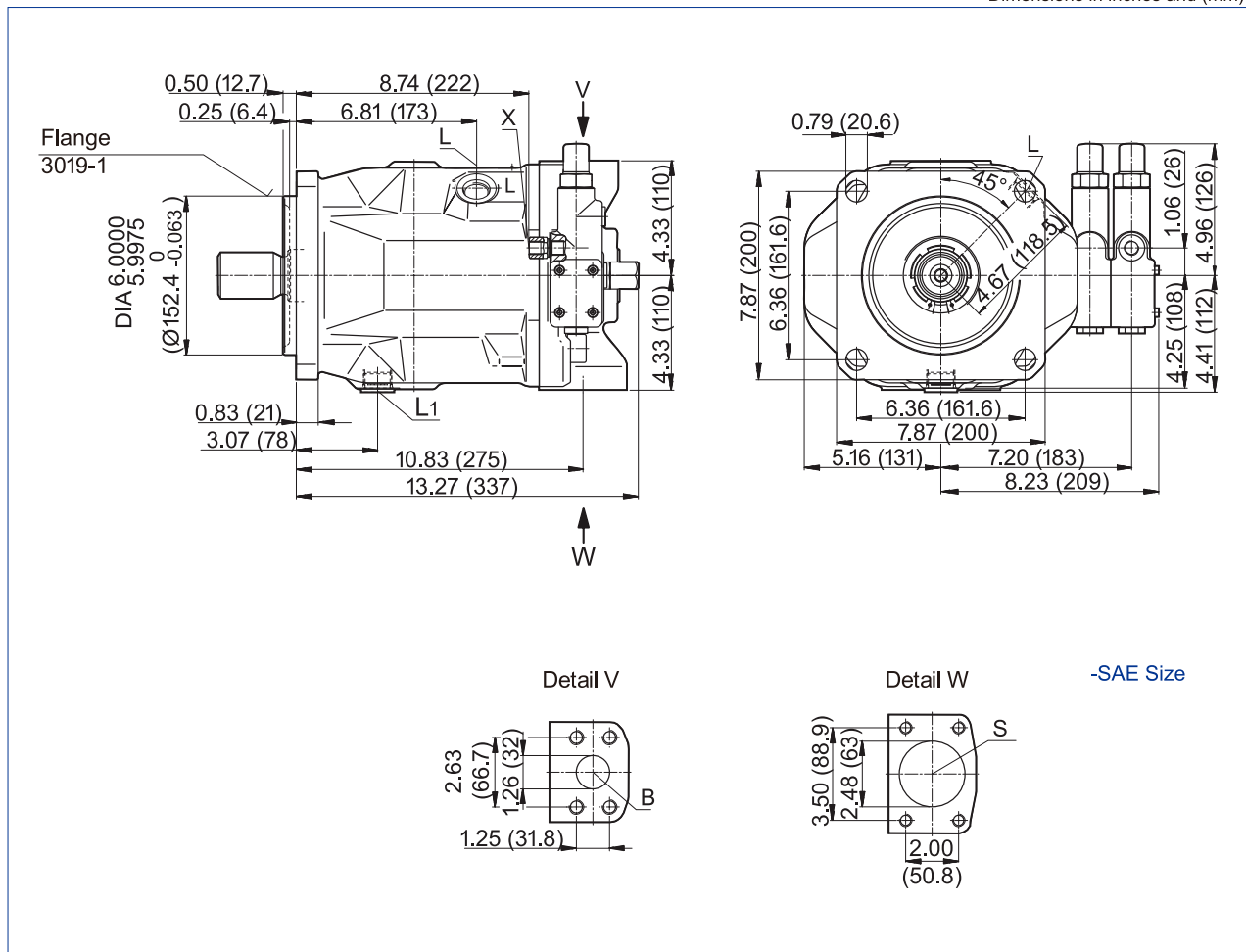
Clockwise rotation

Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

A

54

PA10VSO - SAE Size



Ports

Designation	Port for	Standard	Size ¹⁾	Maximum pressure[psi(bar)] ²⁾	State
B	Service line, fastening thread	SAE J518 ASME B1.1	1 1/4 in 1/2-13 UNC-2B; 0.94 (24) deep	5100(350)	O
S	Suction line, fastening thread	SAE J518 ASME B1.1	2 1/2 in 1/2-13 UNC-2B; 0.94 (24) deep	145(10)	O
L	Case drain fluid	ISO 11926 ³⁾	1 1/16-12 UNF-2B; 0.63 (16) deep 30(2)		O ⁴⁾
L1	Case drain fluid	ISO 11926 ³⁾	1 1/16-12 UNF-2B; 0.63 (16) deep 30(2)		X ⁴⁾
X	Pilot pressure	ISO 11926 ³⁾	9/16-18 UNF-2B; 0.51 (13) deep	5100(350)	O
X	Pilot press. with DG-control	DIN ISO 228 ³⁾	M14 x 1.5; 0.47 (12) deep	5100(350)	O
M _H	Gauge port, high pressure	DIN 3852	M14 x 1.5; 0.47 (12) deep	5100(350)	X

¹⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.

²⁾ Depending on the application, short-term pressure spikes can occur. Keep this in mind when selecting measuring equipment and fittings. Pressure values in bar absolute.

³⁾ The spot face can be deeper than as specified in the standard.

⁴⁾ Depending on the installation position, L or L1 must be connected (the following page A-62 \ A-63, please check assembling instruction.)

O = Must be connected (plugged on delivery)

X = Plugged (in normal operation)

Dimensions size 140

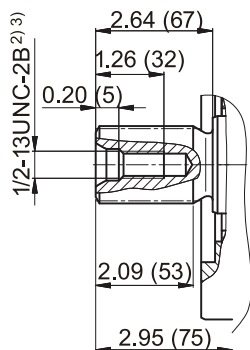
YEOSHE

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).

Drive

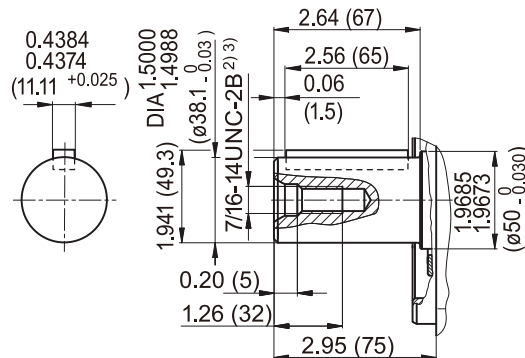
S

Splined shaft 1 3/4 in
13T 8/16DP¹⁾ (SAE J744)



K

Parallel shaft key
ISO 3019-1, 44-1



¹⁾ ANSI B92.1a, 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Thread according to ASME B1.1

³⁾ For the maximum tightening torques the general instructions on page A-64 must be observed.



Dimensions size 140

Before finalizing your design request a certified installation drawing.
Dimensions in inches and (mm).

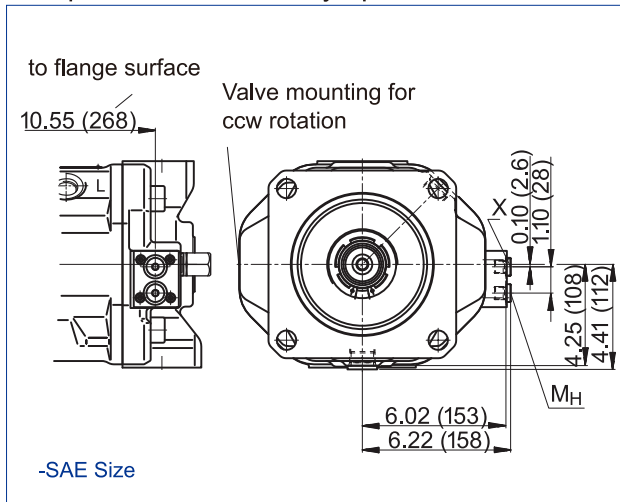
A

56

PA10VSO - SAE Size

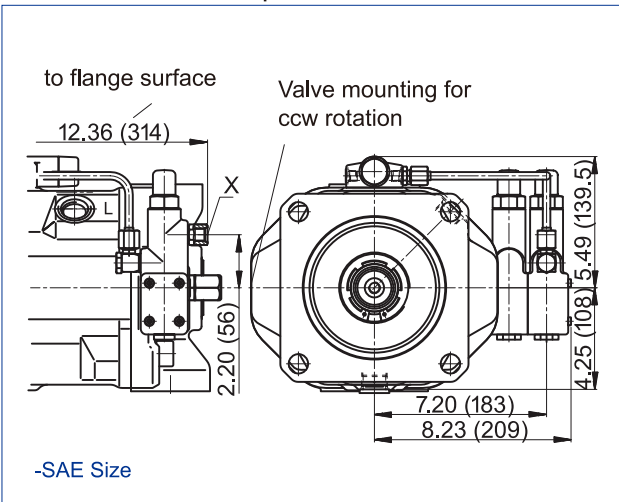
DG

Two-point control, directly operated



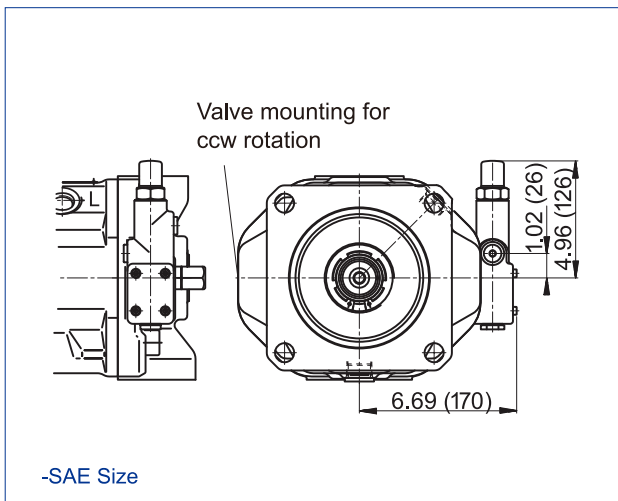
DFLR

Pressure, flow and power control



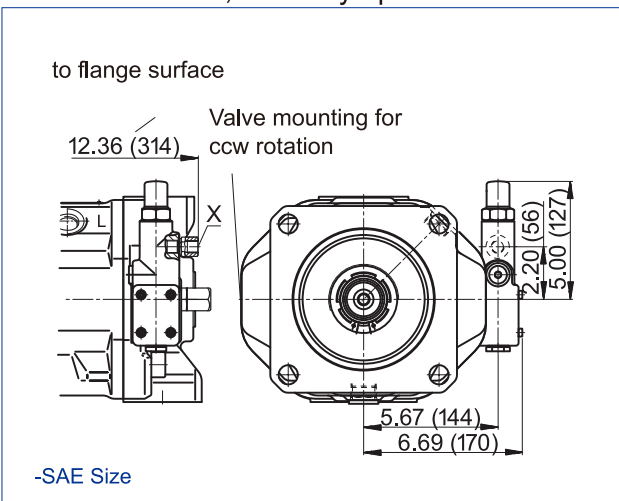
DR

Pressure control



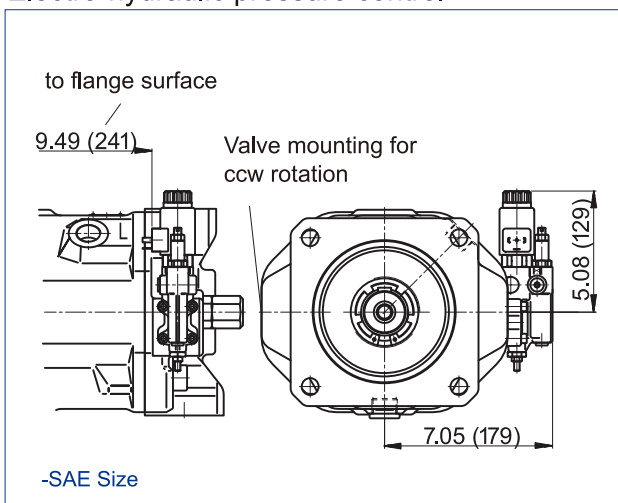
DRG

Pressure control, remotely operated



ED7. / ER7.

Electro-hydraulic pressure control

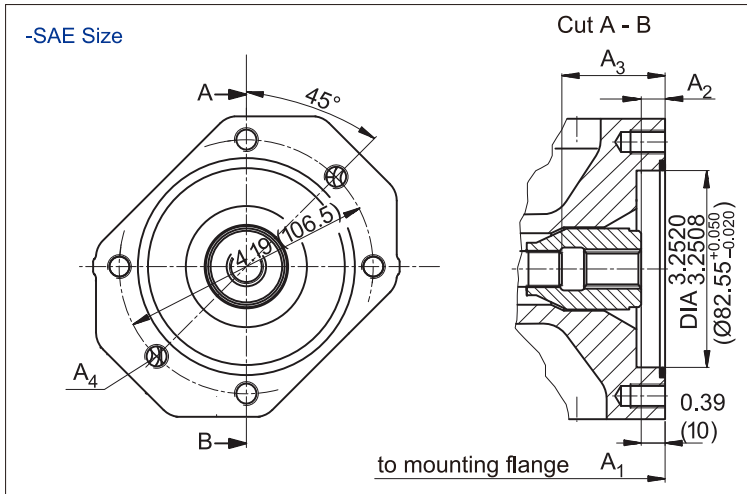


¹⁾ ER7.: 214 mm when using a sandwich plate pressure reducing valve.

Dimensions through drive

K01 flange ISO 3019-1 (SAE J744 - 82-2 (A))
Coupling for splined shaft according to ANSI B92.1a

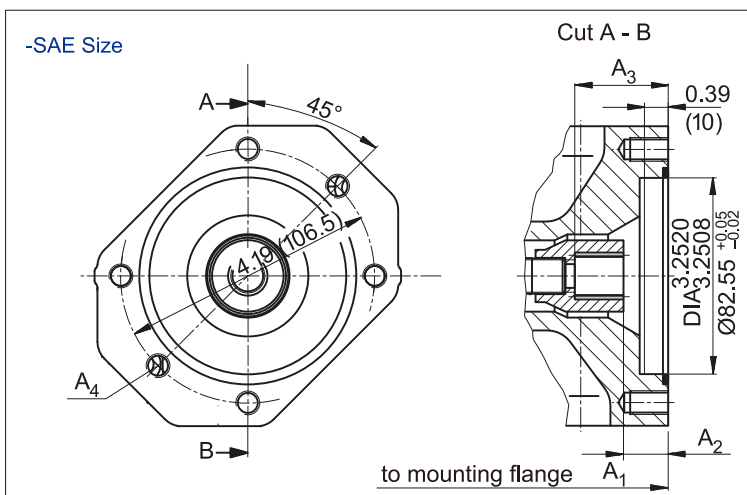
Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).



5/8 in 9T 16/32 DP¹⁾(SAE J744 - 16-4 (A))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
18	7.16 (182)	0.39 (10)	1.70 (43.3)	M10 x 1.5, 0.57 (14.5) deep
28	8.03 (204)	0.39 (10)	1.33 (33.7)	M10 x 1.5, 0.62 (16) deep
45	9.02 (229)	0.42 (10.7)	2.10 (53.4)	M10 x 1.5, 0.62 (16) deep
71	10.51 (267)	0.46 (11.8)	2.41 (61.3)	M10 x 1.5, 0.78 (20) deep
100	13.31 (338)	0.41 (10.5)	2.56 (65)	M10 x 1.5, 0.62 (16) deep
140	13.78 (350)	0.43 (10.8)	3.04 (77.3)	M10 x 1.5, 0.62 (16) deep

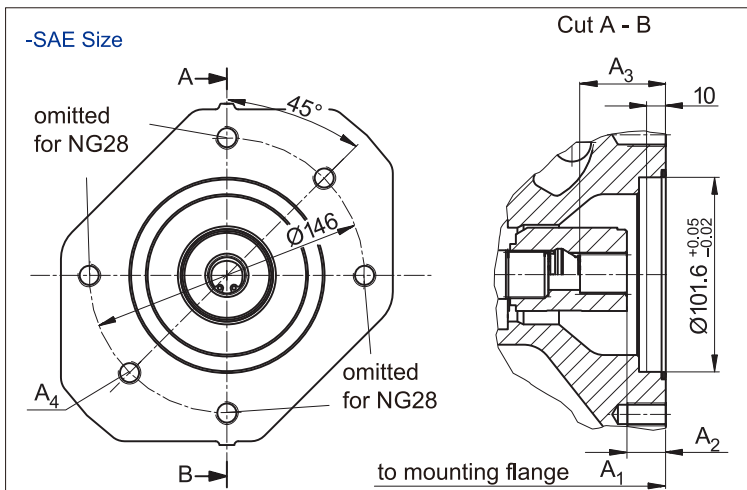
K52 flange ISO 3019-1 (SAE J744 - 82-2 (A))
Coupling for splined shaft according to ANSI B92.1a



3/4 in 11T 16/32 DP¹⁾(SAE J744 - 19-4 (A-B))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
18	7.16 (182)	0.74 (18.8)	1.52 (38.7)	M10 x 1.5, 0.57 (14.5) deep
28	8.03 (204)	0.74 (18.8)	1.52 (38.7)	M10 x 1.5, 0.62 (16) deep
45	9.02 (229)	0.744 (18.9)	1.52 (38.7)	M10 x 1.5, 0.62 (16) deep
71	10.51 (267)	0.84 (21.3)	1.63 (41.4)	M10 x 1.5, 0.78 (20) deep
100	13.31 (338)	0.75 (19)	1.53 (38.9)	M10 x 1.5, 0.62 (16) deep
140	13.78 (350)	0.744 (18.9)	1.52 (38.6)	M10 x 1.5, 0.62 (16) deep

K68 flange ISO 3019-1 (SAE J744 - 101-2 (B))
Coupling for splined shaft according to ANSI B92.1a



7/8 in 13T 16/32 DP¹⁾(SAE J744 - 22-4 (B))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
28	8.03 (204)	0.70 (17.8)	1.64 (41.7)	M12 x 1.75, continuous
45	9.02 (229)	0.704 (17.9)	1.64 (41.7)	M12 x 1.75, 0.71 (18) deep
71	10.51 (267)	0.80 (20.3)	1.74 (44.1)	M12 x 1.75, 0.78 (20) deep
100	13.31 (338)	0.71 (18)	1.65 (41.9)	M12 x 1.75, 0.78 (20) deep
140	13.78 (350)	0.70 (17.8)	1.64 (41.6)	M12 x 1.75, 0.78 (20) deep

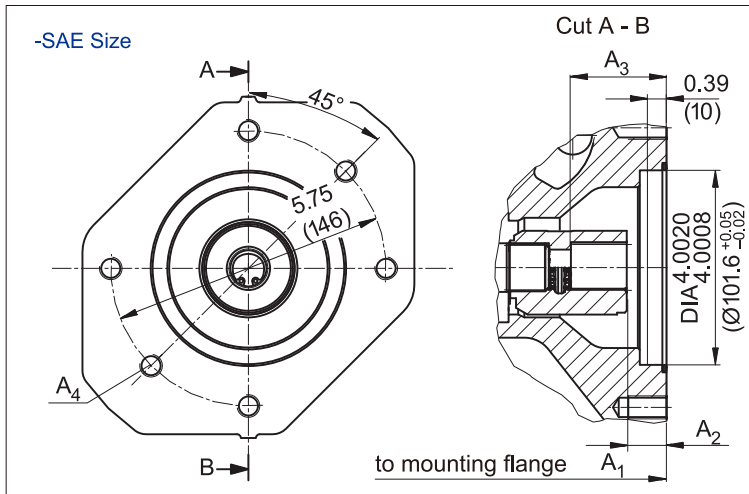
1) 30° pressure angle, flat root, side fit, tolerance class 5

2) Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.

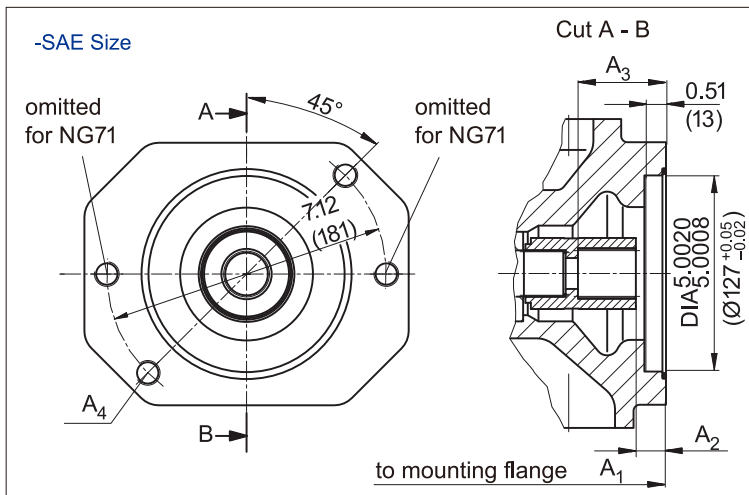


Dimensions through drive

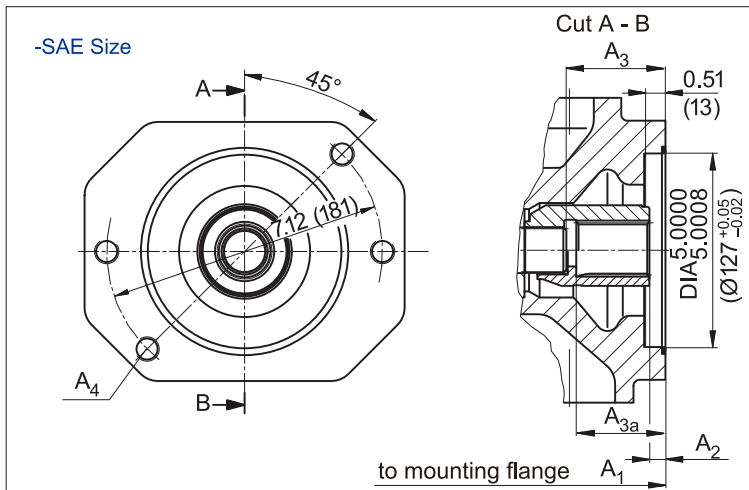
K04 flange ISO 3019-1 (SAE J744 - 101-2 (B))
Coupling for splined shaft according to ANSI B92.1a



K07 flange ISO 3019-1 (SAE J744 - 127-2 (C))
Coupling for splined shaft according to ANSI B92.1a



K24 flange ISO 3019-1 (SAE J744 - 127-2 (C))
Coupling for splined shaft according to ANSI B92.1a



Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).

1 in 15T 16/32 DP¹⁾(SAE J744 - 25-4 (B-B))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
45	9.02 (229)	0.724 (18.4)	1.84 (46.7)	M12 x 1.75, 0.71 (18) deep
71	10.51 (267)	0.82 (20.8)	1.93 (49.1)	M12 x 1.75, 0.78 (20) deep
100	13.31 (338)	0.716 (18.2)	1.83 (46.6)	M12 x 1.75, 0.78 (20) deep
140	13.78 (350)	0.72 (18.3)	1.81 (45.9)	M12 x 1.75, 0.78 (20) deep

1 1/4 in 14T 12/24 DP¹⁾(SAE J744 - 32-4 (C))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
71	10.51 (267)	0.86 (21.8)	2.31 (58.6)	M16 x 2, continuous
100	13.31 (338)	0.77 (19.5)	2.22 (56.4)	M16 x 2, continuous
140	13.78 (350)	0.76 (19.3)	2.21 (56.1)	M16 x 2, 0.94 (24) deep

1 1/2 in 17T 12/24 DP¹⁾(SAE J744 - 38-4 (C-C))

NG	A ₁	A ₂	A ₃ ³⁾	A _{3a} ⁴⁾	A ₄ ²⁾
100	13.31 (338)	0.41 (10.5)	2.56 (65)	—	M16 x 2, continuous
140	13.78 (350)	0.42 (10.8)	2.95 (75)	—	M16 x 2, 0.94 (24) deep
	13.78 (350)	0.40 (10.3)	—	2.72 (69.1)	M16 x 2, 0.94 (24) deep

³⁾ Coupling without stop

⁴⁾ Coupling with stop

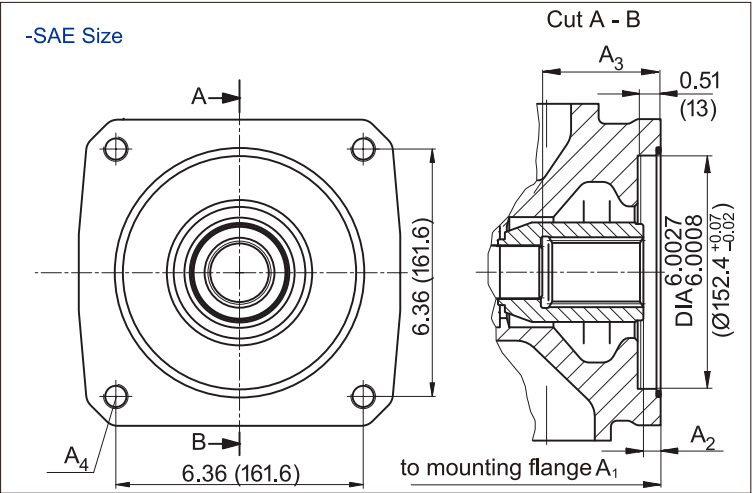
¹⁾ 30° pressure angle, flat root, side fit, tolerance class 5

²⁾ Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.

Dimensions through drive

K17 flange ISO 3019-1 (SAE J744 - 152-4 (A))
Coupling for splined shaft according to ANSI B92.1a

Before finalizing your design request a certified
installation drawing.
Dimensions in inches and (mm).



1 3/4 in 13T 8/16 DP¹⁾(SAE J744 - 44-4 (D))

NG	A ₁	A ₂	A ₃	A ₄ ²⁾
140	13.78 (350)	0.43 (11)	3.04 (77.3)	M6 x 2, continuous

- 1) 30° pressure angle, flat root, side fit, tolerance class 5
- 2) Thread according to DIN 13, observe the general instructions on page A-64 for the maximum tightening torques.



Summary mounting options

ISO (Metric) — mounting flange

Through-drive ¹⁾ Flange ISO 3019-2	Coupling for splined shaft	Short des.	Mounting option – 2nd pump			
			PA10VO/31 NG (shaft)	PA10V(S)O/5x NG (shaft)	Gear pump design(NG)	Through drive available for NG
80-2	3/4 in	KB2	18 (S ∨ R)	10 (S)	–	18 to 140
100-2	7/8 in	KB3	28 (S ∨ R)	–	–	28 to 140
	1 in	KB4	45 (S ∨ R)	–	–	45 to 140
125-2	1 1/4 in	KB5	71 (S ∨ R)	–	–	71 to 140
	1 1/2 in	KB6	100 (S)	–	–	100 to 140
180-4 (4-holeB)	1 3/4 in	KB7	140 (S)	–	–	140

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PA10VSO

Parallel shaft key

Through-drive ¹⁾ Flange ISO 3019-2	Coupling for splined shaft	Short des.	Mounting option – 2nd pump			
			PA10VO/31 NG (shaft)	PA10V(S)O/5x NG (shaft)	Radial piston pump	Through drive available for NG
80-2	3/4 in	K57	–	–	R4	28 to 140

SAE — mounting flange

Through-drive ¹⁾ Flange ISO 3019-1	Coupling for splined shaft	Short des.	Mounting option – 2nd pump			
			PA10VO/31 NG (shaft)	PA10V(S)O/5x NG (shaft)	Gear pump design(NG)	Through drive available for NG
82-2 (A)	5/8 in	K01	18 (U)	10 (U)	F (5 to 22)	18 to 140
	3/4 in	K52	18 (S ∨ R)	10 (S) 18 (U) 18 (S ∨ R)	–	18 to 140
101-2 (B)	7/8 in	K68	28 (S ∨ R) 45 (U ∨ W) ¹⁾	28 (S ∨ R) 45 (U ∨ W) ¹⁾	N/G (26 to 49)	28 to 140
	1 in	K04	45 (S ∨ R) –	45 (S ∨ R) 60 ∨ 63 (U ∨ W) ²⁾	–	45 to 140
127-2 (C)	1 1/4 in	K07	71 (S ∨ R) 100 (U) ³⁾	85 (U ∨ W) ³⁾ 100 (U ∨ W)	–	71 to 140
	1 1/2 in	K24	100 (S)	85 (S) 100 (S)	–	100 to 140
152-4 (4-hole D)	1 3/4 in	K17	140 (S)	–	–	140

¹⁾ Not for main pump NG28 with K68

²⁾ Not for main pump NG45 with K04

³⁾ Not for main pump NG71 with K07

Combination pumps PA10VO + PA10VO

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PA10VSO

When using combination pumps it is possible to have multiple, mutually independent circuits without the need for a splitter gearbox.

When ordering combination pumps the model codes for the first and the second pump must be joined by a "+".

Order example :

PA10VSO100DFR1/31R-VSB12K04+

PA10VSO45DFR/31R-VSA12N00

If no further pumps are to be factory-mounted, the simple type code is sufficient. Included in the delivery contents of the pump with through drive are then: coupling and seal, with plastic cover to prevent penetration by dust and dirt.

It is permissible to use a combination of two single pumps of the same size (tandem pump), considering a dynamic mass acceleration force of maximum 10 g ($= 98.1\text{ m/s}^2$) without an additional support bracket.

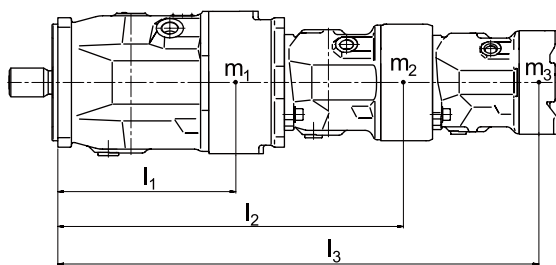
Each through drive is plugged with a non-pressure-resistant cover. Before commissioning the units, they must therefore be equipped with a pressure-resistant cover.

Through drives can also be ordered with pressure-resistant covers. Please specify in clear text.

For combination pumps comprising more than two pumps, the mounting flange must be calculated for the permissible moment of inertia.

Permissible mass moment of inertia

NG			18	28	45	71	100	140
Permissible mass moment of inertia static	T _m	lb-ft	369	649	1010	1593	2213	3319
		(Nm)	(500)	(880)	(1370)	(2160)	(3000)	(4500)
dynamic at 10g (98.1 m/s ²)	T _m	lb-ft	37	65	101	159	221	332
		(Nm)	(50)	(88)	(137)	(216)	(300)	(450)
Mass with through-drive plate	m	lbs	30.8	41.9	55	86	119	150
Mass without through drive		(kg)	(14)	(19)	(25)	(39)	(54)	(68)
(e.g. 2nd pump)	m	lbs	26.6	33	46	73	99	132
		(kg)	(12)	(15)	(21)	(33)	(45)	(60)
Distance center of gravity	l	in	3.54	4.33	5.12	5.91	6.30	6.30
		(mm)	(90)	(110)	(130)	(150)	(160)	(160)



$m_1 \cdot m_2 \cdot m_3$ Mass of pumps [lbs (kg)]

$l_1 \cdot l_2 \cdot l_3$ Distance center of gravity [in (mm)]

$$T_m = (m_1 \cdot l_1 + m_2 \cdot l_2 + m_3 \cdot l_3) \cdot \frac{1}{12(102)} \text{ [lb-ft (Nm)]}$$



Installation instructions

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PA10VSO

General

The axial piston unit must be filled with hydraulic fluid and air bled during commissioning and operation. This must also be observed following a longer standstill as the axial piston unit empty via the hydraulic lines.

Especially with the installation position "drive shaft upwards" or "drive shaft downward", attention must be paid to a complete filling and air bleeding since there is a risk, for example, of dry running.

The case drain fluid in the motor housing must be directed to the reservoir via the highest case drain port (L1, L2, L3).

For combinations of multiple units, make sure that the respective case pressure in each unit is not exceeded. In the event of pressure differences at the case drain ports of the units, the shared case drain line must be changed so that the minimum permissible case pressure of all connected units is not exceeded in any situation. If this is not possible, separate case drain lines must be laid if necessary.

To achieve favorable noise values, decouple all connecting lines using elastic elements and avoid above-reservoir installation.

In all operating conditions, the suction line and case drain line must flow into the reservoir below the minimum fluid level. The permissible suction height h_S is a result of the overall pressure loss, but may not be greater than $h_{S \max} = 31.50$ inch (800 mm). The minimum suction pressure at port S must also not fall below 12 psi (0.8 bar) absolute during operation.

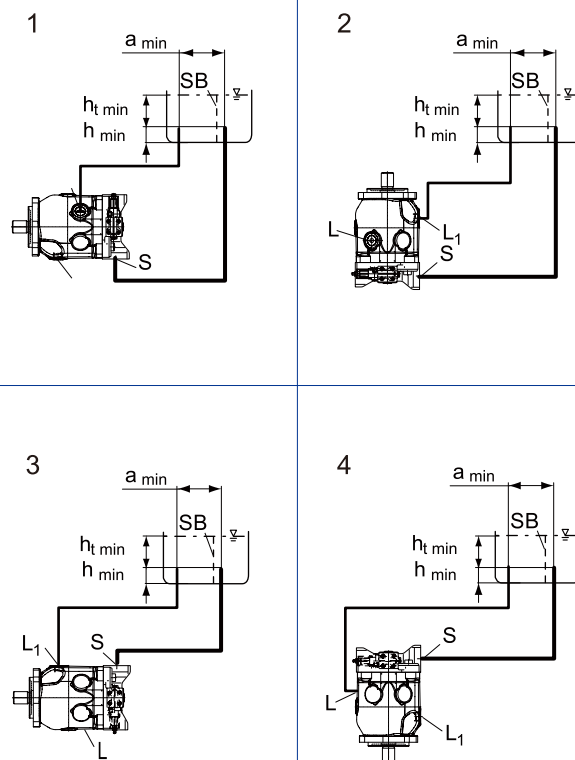
Installation position

See the following examples 1 to 12.

Additional installation positions are available upon request.
Recommended installation positions: 1 and 3.

Below-reservoir installation (standard)

Below-reservoir installation means the axial piston unit is installed outside of the reservoir below the minimum fluid level.



Installation position	Air bleed	Filling
1	L	S + L ₁
2	L ₁	S + L
3	L ₁	S + L
4	L	S + L ₁

please following page A-63.

Installation instructions

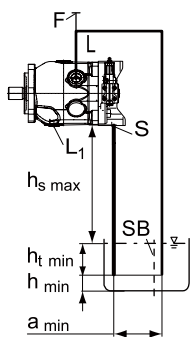
Above-reservoir installation

Above-reservoir installation means the axial piston unit is installed above the minimum fluid level of the reservoir.

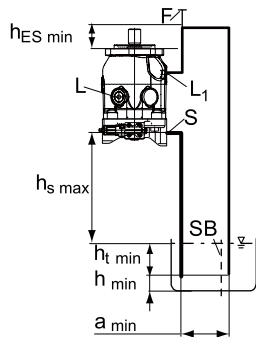
To prevent the axial piston unit from draining, a height difference $h_{ES \min}$ of at least 0.98 inch (25 mm) at port L 1 is required in installation position 6. Observe the maximum permissible suction height $h_{S \max} = 31.50$ inches (800 mm).

A check valve in the case drain line is only permissible in individual cases. Consult us for approval.

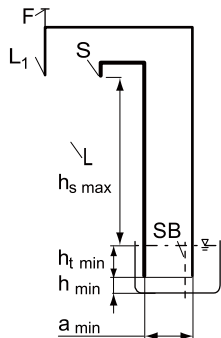
5



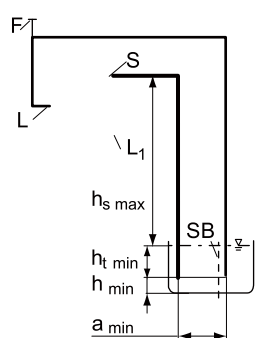
6



7



8



Installation position	Air bleed	Filling
5	F	L (F)
6	F	L ₁ (F)
7	F	S + L ₁ (F)
8	F	S + L (F)

Inside-reservoir installation

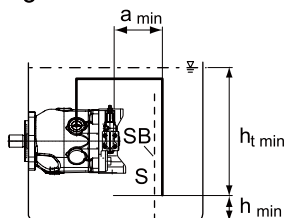
Inside-reservoir installation is when the axial piston unit is installed in the reservoir below the minimum fluid level.

The axial piston unit is completely below the hydraulic fluid.

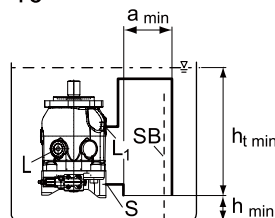
If the minimum fluid level is equal to or below the upper edge of the pump, see chapter "Above-reservoir installation".

Axial piston units with electrical components (e.g. electric control, sensors) may not be installed in a reservoir below the fluid level.

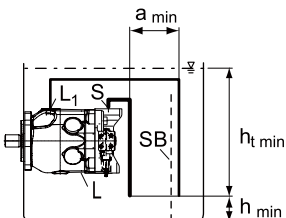
9



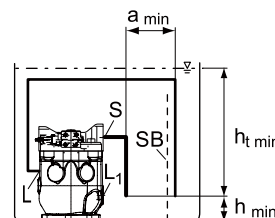
10



11



12



Installation position	Air bleed	Filling
9	L	L ∨ L ₁
10	L ₁	L ∨ L ₁
11	L ₁	S + L ∨ L ₁
12	L	S + L ∨ L ₁

S	Suction port
F	Filling / air bleeding
L ∨ L ₁	Case drain port
SB	Baffle (baffle plate)
ht min	Minimum necessary immersion depth (7.87 inch (200 mm))
h min	Minimum necessary spacing to reservoir bottom (3.94 inch (100 mm))
hes min	Minimum necessary height needed to protect the axial piston unit from draining (0.98 inches (25 mm)).
hs max	Maximum permissible suction height (31.50 inch (800 mm))
a min	When designing the reservoir, ensure adequate distance between the suction line and the case drain line. This prevents the heated, return flow from being drawn directly back into the suction line.



Tightening torques

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PA10VSO

– Fittings:

Observe the manufacturer's instruction regarding the tightening torques of the used fittings.

– Mounting bolts:

For mounting bolts with metric ISO thread according to DIN 13 or thread according to ASME B1.1

– Female threads in axial piston unit :

The maximum permissible tightening torques $M_{G \max}$ are maximum values for the female threads and must not be exceeded. For values, see the following table.

– Threaded plugs :

For the metal threaded plugs supplied with the axial piston unit, the required tightening torques of the threaded plugs M_V apply. For values, see the following table.

Metric Ports Standard	Thread size	Maximum permissible tightening torque for female threads $M_{G \max}$	Required tightening torque for threaded plugs M_V	Size of hexagon socket of threaded plugs
DIN 385	M14 x 1.5	80 Nm	45 Nm	6 mm
	M16 x 1.5	100 Nm	50 Nm	8 mm
	M18 x 1.5	140 Nm	60 Nm	8 mm
	M22 x 1.5	210 Nm	80 Nm	10 mm
	M27 x 2	330 Nm	135 Nm	12 mm
DIN ISO 228	G 1/4 in	70 Nm	–	–

SAE Ports Standard	Thread size	Maximum permissible tightening torque for female threads $M_{G \max}$	Required tightening torque for threaded plugs M	Size of hexagon socket of threaded plugs
DIN 3852 ¹⁾	G1/4	52 lb-ft	–	–
		70 Nm	–	–
	M14 x 1.5	59 lb-ft	26 lb-ft	0.24 inch
		80 Nm	35 Nm	6 mm
DIN ISO 228	G1/4	52 lb-ft	22 lb-ft	0.24 inch
		70 Nm	30 Nm	6 mm
	7/16-20UNF-2B	29 lb-ft	13 lb-ft	3/16 in
ISO 11926	7/16-20UNF-2B	40 Nm	18 Nm	1/4 in
		59 lb-ft	26 lb-ft	
	9/16-18UNF-2B	80 Nm	35 Nm	5/16 in
		118 lb-ft	52 lb-ft	
	3/4-16UNF-2B	160 Nm	70 Nm	3/8 in
		177 lb-ft	81 lb-ft	
	7/8-14UNF-2B	240 Nm	110 Nm	9/16 in
		266 lb-f	125 lb-f	
	1 1/16-12UN-2B	360 Nm	170 Nm	

¹⁾The tightening torques of the threaded plugs M_V apply for screws in the „dry“ state as received on delivery and in the „lightly oiled“ state for installation

General instructions

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PA10VSO

- The PA10VSO pump is designed to be used in open circuit.
- Project planning, installation and commissioning of the axial piston unit require the involvement of qualified personnel.
- Before operating the axial piston unit, please read the appropriate instruction manual thoroughly and completely. If necessary, request these from YEOSHE.
- During and shortly after operation, there is a risk of burns on the axial piston unit and especially on the solenoids. Take appropriate safety measures (e.g. by wearing protective clothing).
- Depending on the operating conditions of the axial piston unit (operating pressure, fluid temperature), the characteristics may shift.
- Service line ports:
 - The ports and fastening threads are designed for the specified maximum pressure. The machine or system manufacturer must ensure that the connecting elements and lines correspond to the specified application conditions (pressure, flow, hydraulic fluid, temperature) with the necessary safety factors.
- The service line ports and function ports are only designed to accommodate hydraulic lines.
- Pressure cut-off and pressure control do not provide security against pressure overload. A separate pressure relief valve is to be provided in the hydraulic system.
- The data and notes contained herein must be adhered to.
- The product is not approved as a component for the safety concept of a general machine according to ISO 13849 / DIN EN ISO 13849.