TS-A2FE

Fixed Plug-in Motor
Size: 28 to 180
Nominal Pressure: 400 Bar
Maximum Pressure: 450 Bar
Open and Closed Circuits

Index

Ordering Code

	TS-A2F		E		/	6		W	–	V				
01	02	03	04	05		06	07	08		09	10	11	12	13

Hydraulic fluid

01	Mineral oil and HFD.	
	HFB, HFC hydraulic fluid Sizes 28 to 180 (without code)	
		E-

Axial piston unit

02	Bent-axis design, fixed	TS-A2F

Drive shaft bearing

		28 to 180	
03	Standard bearing (without code)	●	
	Long-life bearing	–	L

Operating mode

04	Motor, plug-in version	E

Sizes (NG)

05	Geometric displacement, see table of values on page 7										
	28	32	45	56	63	80	90	107	125	160	180

Series

06		6

Index

07	NG28 to 180	1

Direction of rotation

08	Viewed on drive shaft, bidirectional	W

Seals

09	FKM (fluor-caoutchouc)	V

	Drive shafts	28	32	45	56	63	80	90	107	125	160	180	
10	Splined shaft DIN 5480	●	●	●	●	●	●	●	●	●	●	●	A
		●	●	●	●	●	●	●	●	●	●	●	Z

Mounting flanges

			28 to 180	
11	ISO 3019-2	2-hole	●	L

● = Available – = Not available

Ordering Code

	TS-A2F		E		/	6		W	–	V				
01	02	03	04	05		06	07	08		09	10	11	12	13

	Port plates			28	32	45	56	63	80	90	107	125	160	180	
12	SAE flange ports A and B at rear	01	0	–	–	–	–	–	–	–	–	–	–	–	010
			7	–	–	–	–	–	–	–	–	–	–	–	017
	SAE flange ports A and B at side, opposite	02	0	–	–	–	–	–	–	–	–	–	–	–	020
			7	–	–	●	●	●	●	●	●	●	●	●	027
	SAE flange ports A and B at bottom (same side)	10	0	●	●	●	●	●	●	●	●	●	●	●	100
			7	–	–	–	–	–	–	–	–	–	–	–	107
	Port plate BVD	17	1	–	–	–	–	–	–	–	●	●	–	–	171 178
		18	8	●	●	●	●	●	●	●	●	●	●	●	181
	Port plate with pressure-relief valves	19	1	●	●	●	●	●	●	●	●	●	●	●	191
			2	●	●	●	●	●	●	●	●	●	●	●	192

	Valves	
	Without valve	0
	Pressure-relief valve (without pressure boost facility)	1
	Pressure-relief valve (with pressure boost facility)	2
	Flushing and boost pressure valve, mounted	7
	Counterbalance valve BVD/BVE mounted[2)3)]	8
	Flushing and boost pressure valve, integrated	9

	Speed sensor	28 to 45	56 to 180	
13	Without speed sensor (without code)	●	●	
	Prepared for HDD speed sensor	●	●	F
	HDD speed sensor mounted[5)]	●	●	H
	Prepared for DSA speed sensor	❍	❍	U
	DSA speed sensor mounted[5)]	❍	❍	V

● = Available ❍ = On request – = Not available

Technical data

Table of values (theoretical values, without efficiency and tolerances; values rounded)

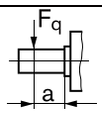
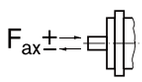
Size	NG		28	32	45	56	63	80
Displacement geometric, per revolution	V_g	cm^3	28.1	32	45.6	56.1	63	80.4
Speed maximum[1)]	n_{nom}	rpm	6300	6300	5600	5000	5000	4500
	n_{max}[2)]	rpm	6900	6900	6200	5500	5500	5000
Input flow[3)] at n_{nom} and V_g	q_V	L/min	177	202	255	281	315	362
Torque[4)] at V_g and $\Delta p = 350$ bar	T	Nm	157	178	254	313	351	448
$\Delta p = 400$ bar	T	Nm	179	204	290	357	401	512
Rotary stiffness	c	kNm/rad	2.93	3.12	4.18	5.94	6.25	8.73
Moment of inertia for rotary group	J_{GR}	kgm^2	0.0012	0.0012	0.0024	0.0042	0.0042	0.0072
Maximum angular acceleration	α	rad/s^2	6500	6500	14600	7500	7500	6000
Case volume	V	L	0.20	0.20	0.33	0.45	0.45	0.55
Mass (approx.)	m	kg	10.5	10.5	15	18	19	23

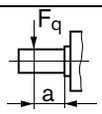
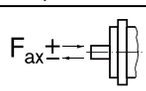
Size	NG		90	107	125	160	180
Displacement geometric, per revolution	V_g	cm^3	90	106.7	125	160.4	180
Speed maximum[1)]	n_{nom}	rpm	4500	4000	4000	3600	3600
	n_{max}[2)]	rpm	5000	4400	4400	4000	4000
Input flow3[)] at n_{nom} and V_g	q_V	L/min	405	427	500	577	648
Torque[4)] at V_g and $\Delta p = 350$ bar	T	Nm	501	594	696	893	1003
$\Delta p = 400$ bar	T	Nm	573	679	796	1021	1146
Rotary stiffness	c	kNm/rad	9.14	11.2	11.9	17.4	18.2
Moment of inertia for rotary group	J_{GR}	kgm^2	0.0072	0.0116	0.0116	0.0220	0.0220
Maximum angular acceleration	α	rad/s^2	6000	4500	4500	3500	3500
Case volume	V	L	0.55	0.8	0.8	1.1	1.1
Mass (approx.)	m	kg	25	34	36	47	48

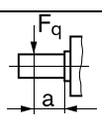
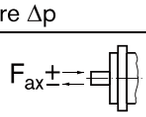
Technical data

Permissible radial and axial forces of the drive shafts

(splined shaft and parallel keyed shaft)

Size	NG		28	28	32	45	56	56	56
Drive shaft	ø	mm	25	30	30	30	30	30	35
Maximum radial force at distance a (from shaft collar) 	$F_{q\ max}$	kN	5.7	5.4	5.4	7.6	9.5	7.8	9.1
	a	mm	16	16	16	18	18	18	18
with permissible torque	T_{max}	Nm	179	179	204	290	357	294	357
≙ permissible pressure Δp	Δp_{perm}	bar	400	400	400	400	400	330	400
Maximum axial force 	$+F_{ax\ max}$	N	500	500	500	630	800	800	800
	$-F_{ax\ max}$	N	0	0	0	0	0	0	0
Permissible axial force per bar operating pressure	$\pm F_{ax\ perm/bar}$	N/bar	5.2	5.2	5.2	7.0	8.7	8.7	8.7

Size	NG		63	80	80	80	90	107	107
Drive shaft	ø	mm	35	35	35	40	40	40	45
Maximum radial force at distance a (from shaft collar) 	$F_{q\ max}$	kN	9.1	11.6	11.1	11.4	11.4	13.6	14.1
	a	mm	18	20	20	20	20	20	20
with permissible torque	T_{max}	Nm	401	512	488	512	573	679	679
≙ permissible pressure Δp	Δp_{perm}	bar	400	400	380	400	400	400	400
Maximum axial force 	$+F_{ax\ max}$	N	800	1000	1000	1000	1000	1250	1250
	$-F_{ax\ max}$	N	0	0	0	0	0	0	0
Permissible axial force per bar operating pressure	$\pm F_{ax\ perm/bar}$	N/bar	8.7	10.6	10.6	10.6	10.6	12.9	12.9

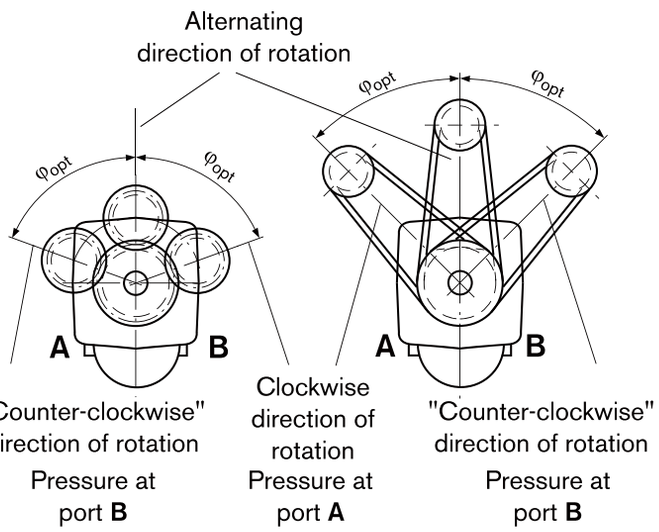
Size	NG		125	160	160	180
Drive shaft	ø	mm	45	45	50	50
Maximum radial force at distance a (from shaft collar) 	$F_{q\ max}$	kN	14.1	18.1	18.3	18.3
	a	mm	20	25	25	25
with permissible torque	T_{max}	Nm	796	1021	1021	1146
≙ permissible pressure Δp	Δp_{perm}	bar	400	400	400	400
Maximum axial force 	$+F_{ax\ max}$	N	1250	1600	1600	1600
	$-F_{ax\ max}$	N	0	0	0	0
Permissible axial force per bar operating pressure	$\pm F_{ax\ perm/bar}$	N/bar	12.9	16.7	16.7	16.7

Technical data

Effect of radial force F_q on the service life of bearings

By selecting a suitable direction of radial force F_q, the load on the bearings, caused by the internal rotary group forces can be reduced, thus optimizing the service life of the bearings. Recommended position of mating gear is dependent on direction of rotation. Examples:

	Toothed gear drive	V-belt output
NG	φ_{opt}	φ_{opt}
28 to 180	± 70°	± 45°



Determining the operating characteristics

Input flow $q_v = \dfrac{V_g \cdot n}{1000 \cdot \eta_v}$ [L/min]

Speed $n = \dfrac{q_V \cdot 1000 \cdot \eta_v}{V_g}$ [min^{-1}]

Torque $T = \dfrac{V_g \cdot \Delta p \cdot \eta_{mh}}{20 \cdot \pi}$ [Nm]

Power $P = \dfrac{2\,\pi \cdot T \cdot n}{60000} = \dfrac{q_v \cdot \Delta p \cdot \eta_t}{600}$ [kW]

V_g = Displacement per revolution in cm^3

Δp = Differential pressure in bar

n = Speed in rpm

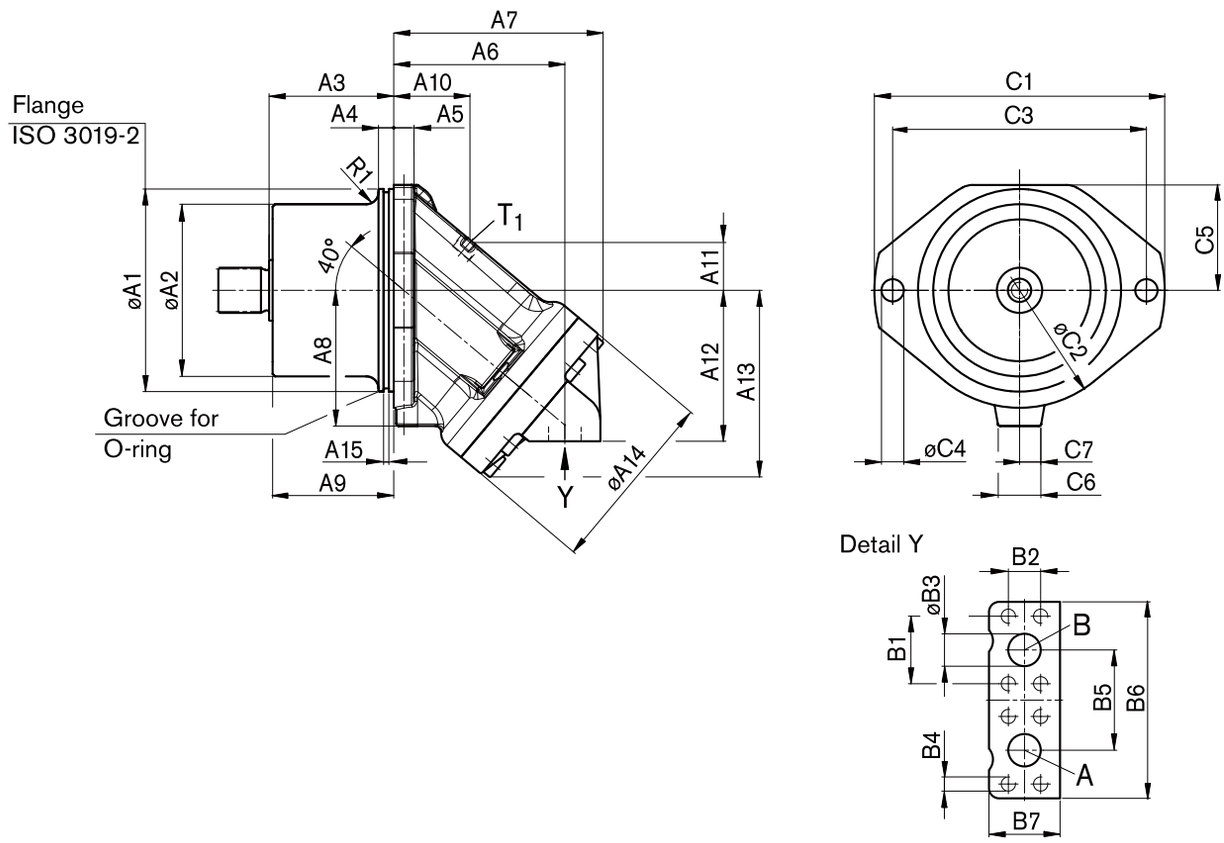
η_v = Volumetric efficiency

η_{mh} = Mechanical-hydraulic efficiency

η_t = Total efficiency ($\eta_t = \eta_v \cdot \eta_{mh}$)

Unit Dimensions

Port plate 10 – SAE flange ports at bottom



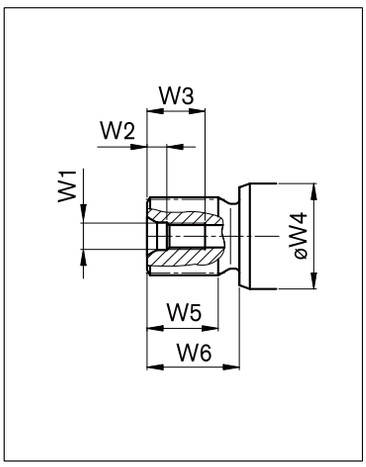
Size	øA1	øA2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	øA14	A15
28, 32	$135_{-0.025}$	$94_{-0.5}$	88.8	15	16	94	114	95	87.1	45	27	91	106	106	5.2
45	$160_{-0.025}$	$117^{+1.5}_{-2}$	92.3	15	18	109	133	106	90	50	31.3	102	119	118	5.2
56, 63	$160_{-0.025}$	$121_{-0.5}$	92.3	15	18	122	146	109	90	59	34	107	130	128	5.2
80, 90	$190_{-0.029}$	$140.3_{-0.5}$	110	15	20	127	157	123	106	54	41	121	145	138	5.2
107, 125	$200_{-0.029}$	$152.3_{-0.5}$	122.8	15	20	143	178	135	119	58	41	136	157	150	5.2
160, 180	$200_{-0.029}$	$171.6_{-0.5}$	122.8	15	20	169	206	134	119.3	75	47	149	185	180	5.2

Size	B1	B2	øB3	B4, DIN 13	B5	B6	B7	C1	øC2	C3	øC4	C5	C6	C7
28, 32	40.5	18.2	13	M8 x 1.25; 15 deep	59	115	40	188	154	160	14	71	42	13
45	50.8	23.8	19	M10 x 1.5; 17 deep	75	147	49	235	190	200	18	82	47.5	15
56, 63	50.8	23.8	19	M10 x 1.5; 17 deep	75	147	48	235	190	200	18	82	36	0
80, 90	57.2	27.8	25	M12 x 1.75; 17 deep	84	166	60	260	220	224	22	98	40	0
107, 125	66.7	31.8	32	M14 x 2; 19 deep	99	194	70	286	232	250	22	103	40	0
160, 180	66.7	31.8	32	M14 x 2; 19 deep	99	194	70	286	232	250	22	104	42	0

Size	R1	O-ring	Service line port A, B SAE J518	Drain port T_1 DIN 3852
28, 32	10	126 x 4	1/2 in	M16 x 1.5; 12 deep
45	10	150 x 4	3/4 in	M18 x 1.5; 12 deep
56, 63	10	150 x 4	3/4 in	M18 x 1.5; 12 deep
80, 90	10	180 x 4	1 in	M18 x 1.5; 12 deep
107, 125	16	192 x 4	1 1/4 in	M18 x 1.5; 12 deep
160, 180	12	192 x 4	1 1/4 in	M22 x 1.5; 14 deep

Unit Dimensions

Drive shaft



Size	Splined shaft (DIN 5480)	W1	W2	W3	øW4	W5	W6
28, 32	**A** W30 x 2 x 14 x 9g	M10 x 1.5	7.5	22	35	27	35
28	**Z** W25 x 1.25 x 18 x 9g	M8 x 1.25	6	19	35	28	43
45	**Z** W30 x 2 x 14 x 9g	M12 x 1.75	9.5	28	35	27	35
56, 63	**A** W35 x 2 x 16 x 9g	M12 x 1.75	9.5	28	40	32	40
56	**Z** W30 x 2 x 14 x 9g	M12 x 1.75	9.5	28	40	27	35
80, 90	**A** W40 x 2 x 18 x 9g	M16 x 2	12	36	45	37	45
80	**Z** W35 x 2 x 16 x 9g	M12 x 1.75	9.5	28	45	32	40
107, 125	**A** W45 x 2 x 21 x 9g	M16 x 2	12	36	50	42	50
107	**Z** W40 x 2 x 18 x 9g	M12 x 1.75	9.5	28	50	37	45
160, 180	**A** W50 x 2 x 24 x 9g	M16 x 2	12	36	60	44	55
160	**Z** W45 x 2 x 21 x 9g	M16 x 2	12	36	60	42	50

Flushing and Boost Pressure Valve

The flushing and boost pressure valve is used to remove heat from the hydraulic circuit.

In an open circuit, it is used only for flushing the housing.

In a closed circuit, it ensures a minimum boost pressure level in addition to the case flushing.

Hydraulic fluid is directed from the respective low pressure side into the motor housing. This is then fed into the reservoir, together with the case drain fluid. The hydraulic fluid, removed out of the closed circuit must be replaced by cooled hydraulic fluid from the boost pump.

With port plate 027 (sizes 45 to 180) the valve is mounted directly on the fixed motor.

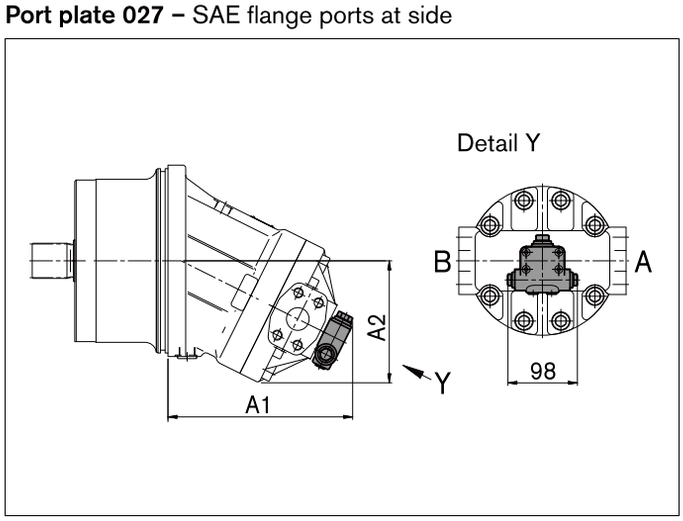
Cracking pressure of pressure retaining valve
(observe when setting the primary valve)
Sizes 45 to 180, fixed setting _____ 16 bar

Switching pressure of flushing piston Δp
Sizes 45 to 180 _____ 8±1 bar

Flushing flow q_v
Orifice (throttles with integrated valve) can be used to set the flushing flows as required.
Following parameters are based on:
$\Delta p_{ND} = p_{ND} - p_G = 25$ bar and $\nu = 10$ mm²/s
(p_{ND} = low pressure, p_G = case pressure)

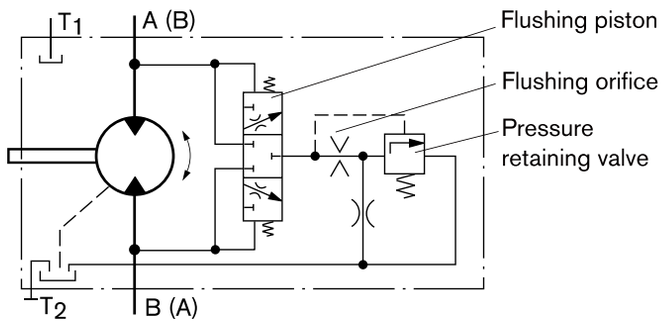
Dimensions

Sizes 107 to 180
Port plate 027 – SAE flange ports at side



Size	A1	A2
107, 125	211	192
160, 180	232	201

Schematic



Standard flushing flows

Flushing and boost pressure valve

Size	Flushing flow q_v [L/min]	ø [mm]
45	3.5	1.2
107, 125	8	1.8
160, 180	10	2.0

With sizes 45 to 180, orifices can be supplied for flushing flows from 3.5 to 10 L/min. For other flushing flows, please state the required flushing flow when ordering. The flushing flow without orifice is approx. 12 to 14 L at low pressure $\Delta p_{ND} = 25$ bar.

Flushing and boost pressure valve

Size	Throttle ø [mm]	q_v [L/min]
56, 63, 80, 90	1.5	6
	1.8	7.3

Pressure Relief Valve

The MHDB pressure-relief valves protect the hydraulic motor from overload. As soon as the set cracking pressure is reached, the hydraulic fluid flows from the high-pressure side to the low-pressure side.

The pressure-relief valves are only available in combination with port plates 181, 191 or 192 (counterbalance valve for mounting to port plate 181: see next page).

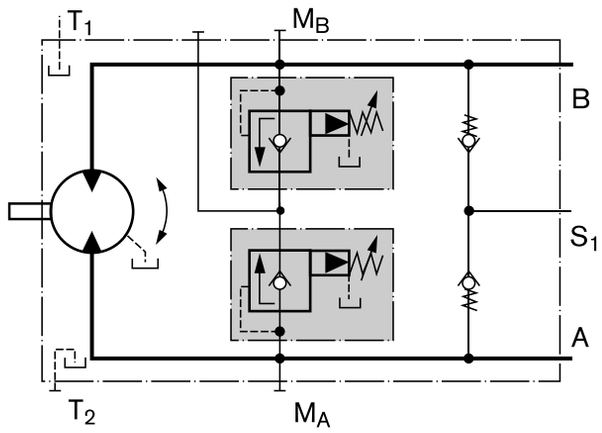
Cracking pressure setting range _____ 50 to 420 bar

With the version "with pressure boost facility" (192), a higher pressure setting can be realized by applying an external pilot pressure of 25 to 30 bar to port P_{St}.

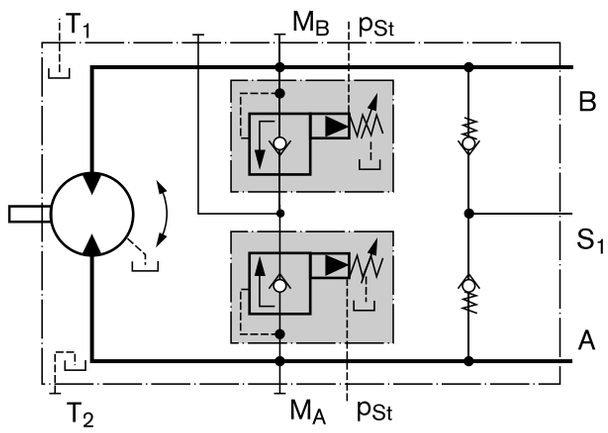
When ordering, please state in plain text:

- Cracking pressure of pressure-relief valve
- Cracking pressure with pilot pressure applied to P_{St} (only with version 192)

Version without pressure boost facility "191"

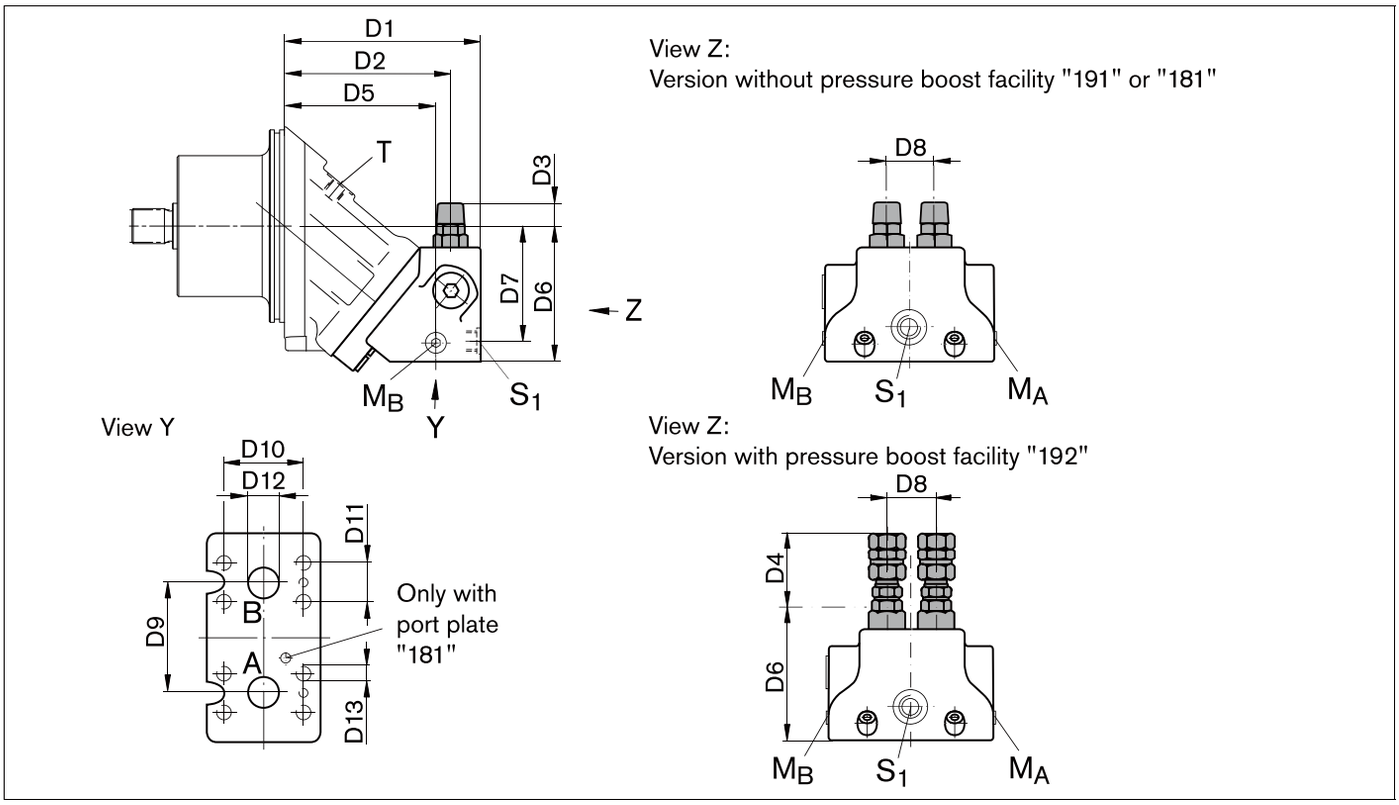


Version with pressure boost facility "192"



Pressure Relief Valve

Dimensions



Size		D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13
28, 32	MHDB.**16**	145	122	25	68	110	102	87	36	66	50.8	23.8	ø19	M10; 17 deep
45	MHDB.**16**	161	137	22	65	126	113	98	36	66	50.8	23.8	ø19	M10; 17 deep
56, 63	MHDB.**22**	189	162	19	61	147	124	105	42	75	50.8	23.8	ø19	M10; 13 deep
80, 90	MHDB.**22**	193	165	17.5	59	151	134	114	42	75	57.2	27.8	ø25	M12; 18 deep
107, 125	MHDB.**32**	216	184	10	52	168	149.5	130	53	84	66.7	31.8	ø32	M14; 19 deep
160, 180	MHDB.**32**	249	218	5	47	202	170	149	53	84	66.7	31.8	ø32	M14; 19 deep

Size	A, B	S_1	M_A, M_B	P_{St}
28, 32	3/4 in	M22 x 1.5; 14 deep	M20 x 1.5; 14 deep	G 1/4
45	3/4 in	M22 x 1.5; 14 deep	M20 x 1.5; 14 deep	G 1/4
56, 63	3/4 in	M26 x 1.5; 16 deep	M26 x 1.5; 16 deep	G 1/4
80, 90	1 in	M26 x 1.5; 16 deep	M26 x 1.5; 16 deep	G 1/4
107, 125	1 1/4 in	M26 x 1.5; 16 deep	M26 x 1.5; 16 deep	G 1/4
160, 180	1 1/4 in	M26 x 1.5; 16 deep	M30 x 1.5; 16 deep	G 1/4

Assembly instruction for port plate with pressure boost facility "192":
The lock nut must be counterheld when installing the hydraulic line at the p_{st} port!

Ports

Designation	Port for	Standard	Size	Maximum pressure [bar]	State
A, B	Service line	SAE J518	See above	450	O
S_1	Supply (only with port plate 191/192)	DIN 3852	See above	5	O
M_A, M_B	Measuring operating pressure	DIN 3852	See above	450	X
P_{St}	Pilot pressure (only with port plate 192)	DIN ISO 228	See above	30	O

Counterbalance Valve BVD

Function

Travel drive/winch counterbalance valves are designed to reduce the danger of overspeeding and cavitation of axial piston motors in open circuits. Cavitation occurs if the motor speed is greater than it should be for the given input flow while braking, travelling downhill, or lowering a load.

If the inlet pressure drops, the counterbalance spool throttles the return flow and brakes the motor until the inlet pressure returns to approx. 20 bar.

Note

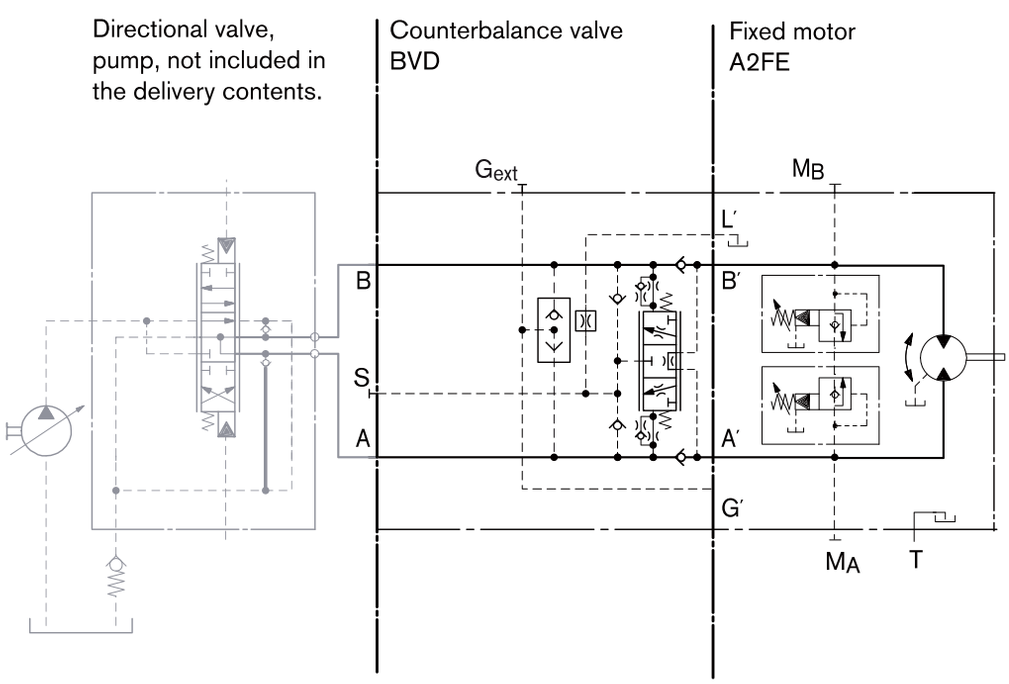
- BVD available for sizes 28 to 180 and BVE available for sizes 107 to 180.
- The counterbalance valve must be ordered additionally. We recommend ordering the counterbalance valve and the motor as a set. Ordering example: TS-A2FE90/61W-VAB**188**+BVD20F27S/41B-V03K16D0400S12
- The counterbalance valve does not replace the mechanical service brake and park brake.
- For the design of the brake release valve, we must know for the mechanical park brake:
  - the pressure at the start of opening
  - the volume of the counterbalance spool between minimum stroke (brake closed) and maximum stroke (brake released with 21 bar)
  - the required closing time for a warm device (oil viscosity approx. 15 mm^2/s)

Travel drive counterbalance valve BVD...F

Application option

- Travel drive on wheeled excavators

Example schematic for travel drive on wheeled excavators
TS-A2FE90/61W-VAB188+BVD20F27S/41B-V03K16D0400S12



Counterbalance Valve BVD

Winch counterbalance valve BVD...W

Application options

– Winch drive in cranes (BVD)

– Track drive in excavator crawlers (BVD)

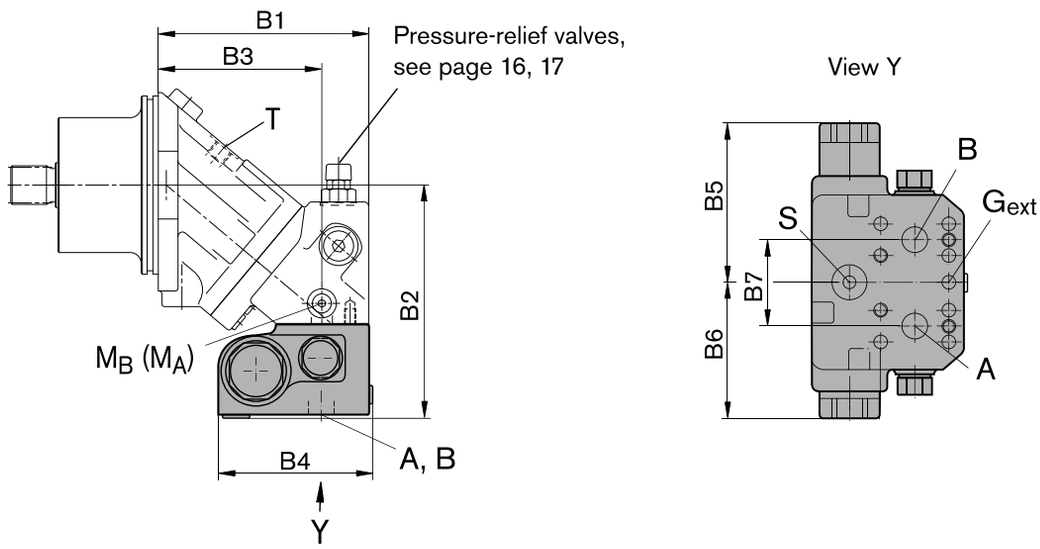
Permissible input flow or pressure in operation with BVD

Motor	Without valve		Restricted values in operation with BVD			
			BVD			
NG	p_{nom}/p_{max} [bar]	$q_{V\ max}$ [L/min]	NG	p_{nom}/p_{max} [bar]	q_V [L/min]	Code
28	400/450	176	20 (BVD)	350/420	100	188
32		201				
45		255				
56		280			220	
63		315				
80		360				
90		405				
107		427				178
125		500				
107		427	25 (BVD)		320	188
125		500				
160		577				
180		648				

BVD _____counterbalance valve, double-acting

Counterbalance Valve BVD and BVE

Dimensions



A2FE Size	Counterbalance valve Type	Ports A, B	Dimensions B1	B2	B3	B4 (S)	B4 (L)	B5	B6	B7
28, 32	BVD**20**..16	3/4 in	145	175	110	142	147	139	98	66
45	BVD**20**..16	3/4 in	161	196	126	142	147	139	98	66
56, 63	BVD**20**..17	3/4 in	189	197	147	142	147	139	98	75
80, 90	BVD**20**..27	1 in	193	207	151	142	147	139	98	75
107, 125	BVD**20**..28	1 in	216	238	168	142	147	139	98	84
107, 125	BVD**25**..38	$1^1/_4$ in	216	239	168	158	163	175	120.5	84
160, 180	BVD**25**..38	$1^1/_4$ in	249	260	202	158	163	175	120.5	84
107, 125	BVE**25**..38	$1^1/_4$ in	216	240	168	167	172	214	137	84
160, 180	BVE**25**..38	$1^1/_4$ in	249	260	202	167	172	214	137	84

Ports

Designation	Port for	Version	Standard	Size	Maximum pressure [bar]	State
A, B	Service line		SAE J518	see table above	420	O
S	Infeed	BVD20	DIN 3852	M22 x 1.5; 14 deep	30	X
		BVD25, BVE25	DIN 3852	M27 x 2; 16 deep	30	X
Br	Brake release, reduced high pressure	L	DIN 3852	M12 x 1.5; 12.5 deep	30	O
G_{ext}	Brake release, high pressure	S	DIN 3852	M12 x 1.5; 12.5 deep	420	X
M_A, M_B	Measuring pressure A and B		ISO 61493	M12 x 1.5; 12 deep	420	X

Counterbalance Valve BVD and BVE

Mounting the counterbalance valve

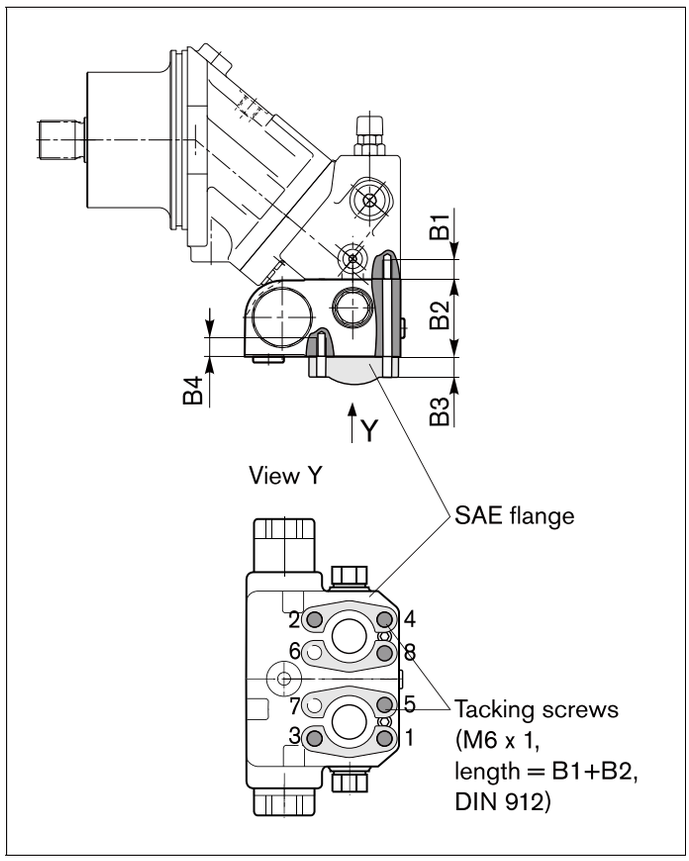
When delivered, the counterbalance valve is mounted to the motor with two tacking screws (transport protection). The tacking screws may not be removed while mounting the service lines. If the counterbalance valve and motor are delivered separately, the counterbalance valve must first be mounted to the motor port plate using the provided tacking screws. The counterbalance valve is finally mounted to the motor by screwing on the SAE flange with the following screws:

6 screws (**1, 2, 3, 4, 5, 8**) _____ length B1+B2+B3
2 screws (**6, 7**) _____ length B3+B4

Tighten the screws in two steps in the specified sequence from 1 to 8 (see following scheme).

In the first step, the screws must be tightened with half the tightening torque, and in the second step with the maximum tightening torque (see following table).

Thread	Strength class	Tightening torque [Nm]
M6 x 1 (tacking screw)	10.9	15.5
M10	10.9	75
M12	10.9	130
M14	10.9	205



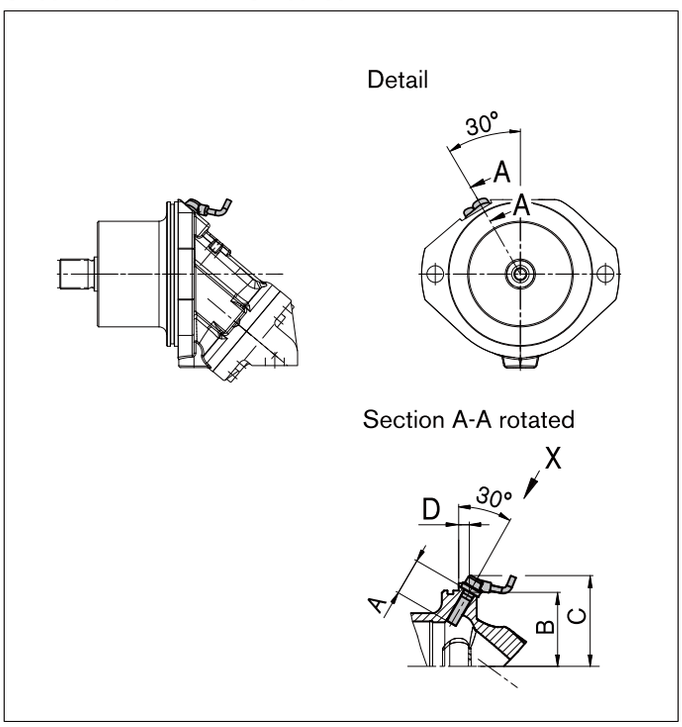
Size	28, 32, 45	56, 63	80, 90	107, 125, 160, 180	107, 125
Port plate	18				17
B1[1)]	M10 x 1.5; 17 deep	M10 x 1.5; 17 deep	M12 x 1.75; 18 deep	M14 x 2; 19 deep	M12 x 1.75; 17 deep
B2	78[2)]	68	68	85	68
B3	customer-specific				
B4	M10 x 1.5; 15 deep	M10 x 1.5; 15 deep	M12 x 1.75; 16 deep	M14 x 2; 19 deep	M12 x 1.75; 16 deep

1) Minimum required thread reach 1 x ø-thread
2) Including sandwich plate

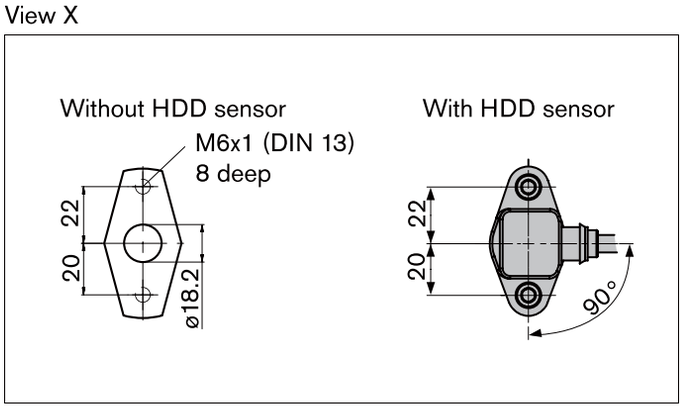
Speed Sensors

The versions TS-A2FE...U and TS-A2FE...F ("prepared for speed sen-sor", i.e. without sensor) is equipped with a toothed ring.On deliveries "prepared for speed sensor", the port is plugged with a pressure-resistant cover. With the DSA or HDD speed sensor mounted a signal proportional to motor speed can be generated. The sensors measures the speed and direction of rotation.
Ordering code, technical data, dimensions and details on the connector, plus safety information about the sensor can be found in the relevant data sheet

Version "V"
Sizes 28 to 180 with DSA sensor



View X



Size			28, 32	45	56, 63	80, 90	107, 125	160, 180	250
Number of teeth			38	45	47	53	59	67	78
DSA	A	Insertion depth (tolerance ± 0.1)	32	32	32	32	32	32	32
	B	Contact surface	66	On request					
	C		On request						
	D		12.3	On request					

Installation Instructions

General

During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This must also be observed following a relatively long standstill as the axial piston unit may drain back to the reservoir via the hydraulic lines.

The case drain fluid in the motor housing must be directed to the reservoir via the highest available drain port (T_1, T_2).

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 drain ports of the units, the shared 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 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 drain line must flow into the reservoir below the minimum fluid level.

Installation position

See the following examples 1 to 5.
Further installation positions are possible upon request.

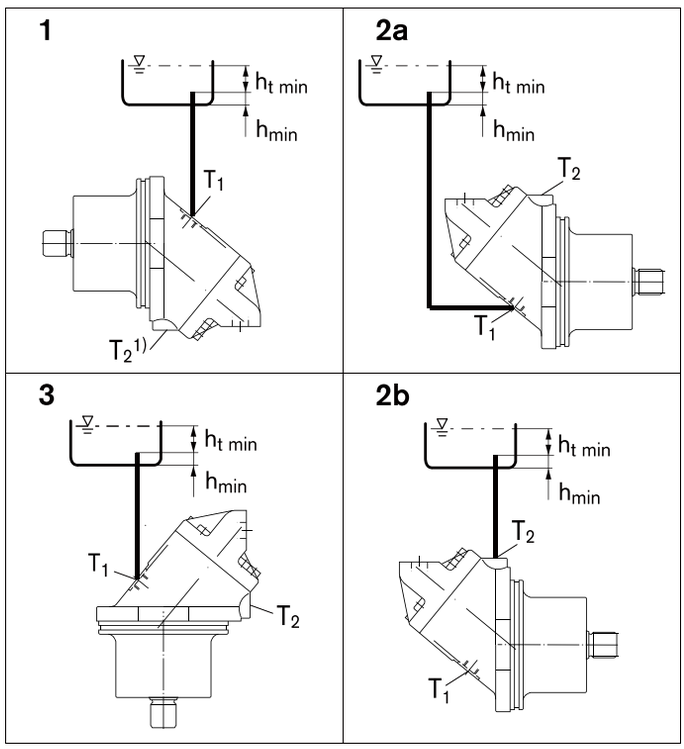
Recommended installation positions: 1 and 2.

Installation position	Air bleed	Filling
1	–	T_1
2	–	T_1 (sizes 28 to 180)
3	–	T_1
4	(L_1)	T_1, (L_1)
5	(L_1)	T_2, (L_1)
6	(L_1)	T_1, (L_1)

L_1	Filling / air bleed
T_1, T_2	Drain port
$h_{t\ min}$	Minimum required immersion depth (200 mm)
h_{min}	Minimum required spacing to reservoir bottom (100 mm)

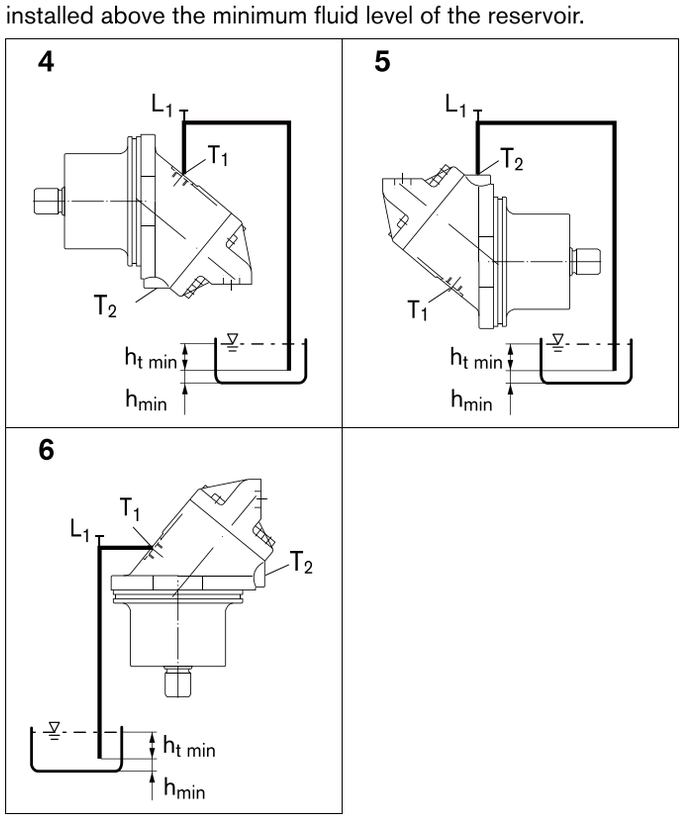
Below-reservoir installation (standard)

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



Above-reservoir installation

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



The specified data is for product description purposes only and may not be deemed to be guaranteed unless expressly confirmed in the contract.

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