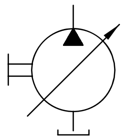
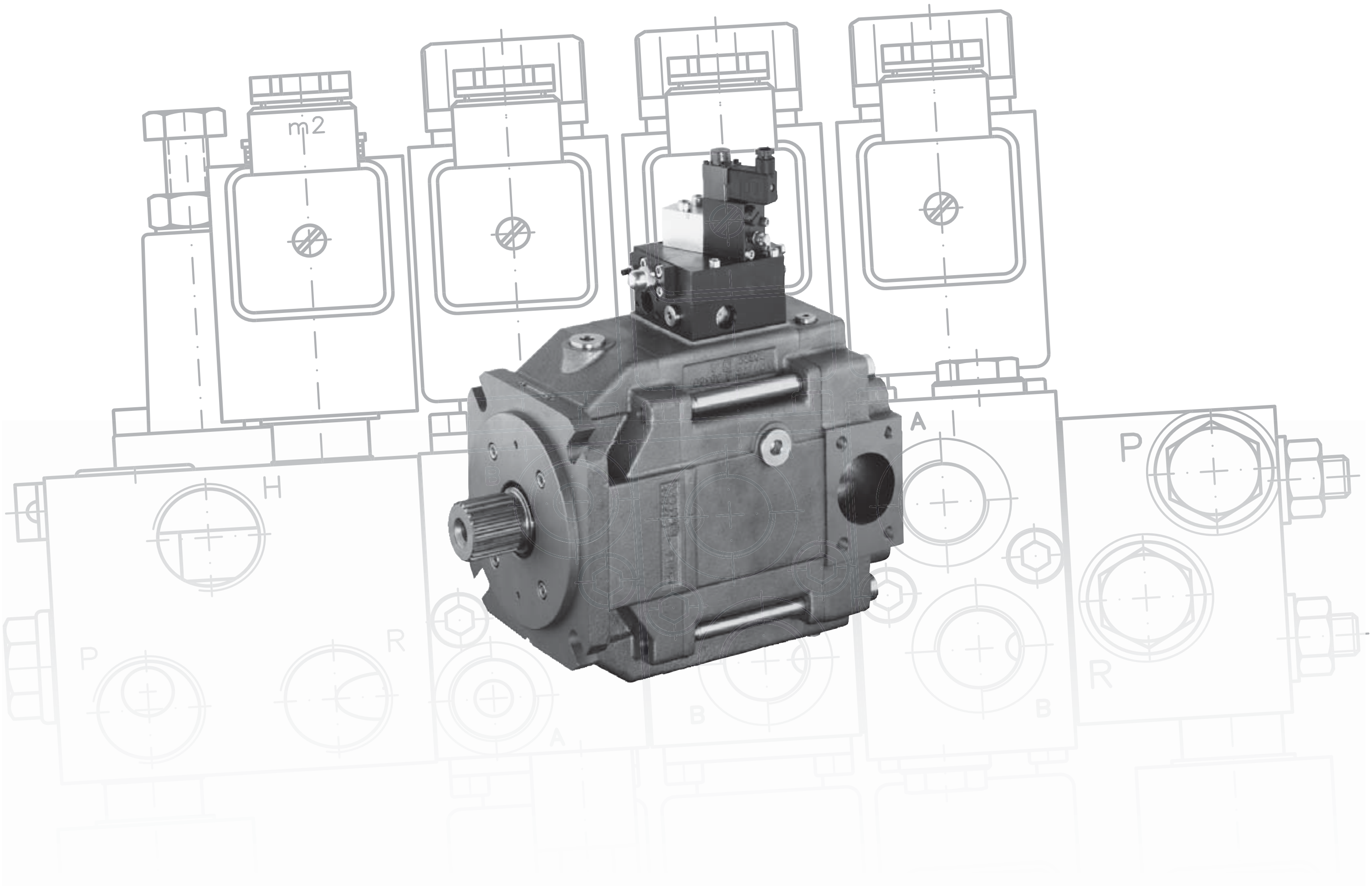
Variable displacement axial piston pump type V30E

Individual pump or pump combination

Nominal pressure $p_{nom\ max}$:	350 bar
Peak pressure p_{max}:	420 bar
Geometric displacement V_{max}:	95 ... 270 cm³/rev.

Switching symbol:





Product documentation

D 7960 E

10-2014-2.0

HAWE Hydraulik SE - Streitfeldstr. 25 • 81673 München

Contents

1 Overview: Type V30E variable displacement axial piston pump

The variable displacement axial piston pumps type V30E are designed for open circuits in industrial and mobile hydraulics and operate according to the swash plate principle. A thru-shaft is available as an option to enable the connection of additional variable displacement axial piston pumps or an auxiliary pump. The self-suction speed, reduced noise emissions and pulsation, increased service life and significantly reduced weight all provide real advantages. A wide range of controllers (modular principle) offers the user a wide range of application possibilities.

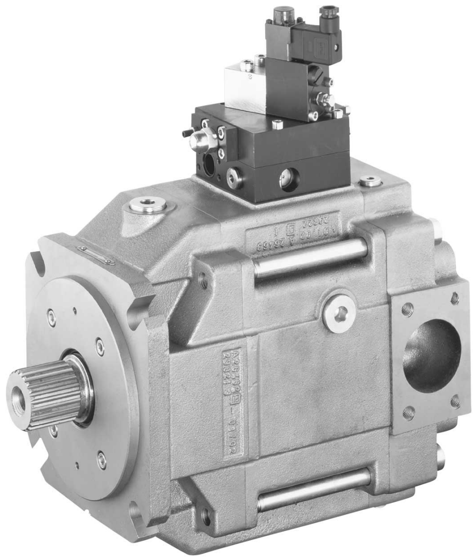


Figure 1: Variable displacement axial piston pump type V30E

Features and benefits:

- Low-noise emissions
- Wide range of controllers
- Full torque available at the second pump in tandem pump applications

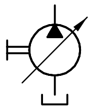
Intended applications:

- Offshore, marine systems
- Test benches
- Mining
- Material handling, logistics
- Construction machines

2 Available versions, main data

2.1 Basic version

Switching symbol:



Order coding example:

V30E	-095	R	D	G	N	- 2	- 0	- XX	/LP	- 200	C 211	- Z 05

2nd pump 2nd pump: see Chapter 4.4.2, "Combination with dent pump"

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Nominal size Table 1 Nominal size

Basic type

Table 1 Nominal size

Coding	Geometric displacement (cm³/rev.)	Nominal pressure p_{nom} (bar)	Peak pressure p_{max} (bar)
095	98	350	420
160	160	350	420
270	270	350	420

Table 2 Rotation directions

Coding	Description
L	Anti-clockwise
R	Clockwise

Note
When using HFC pressure fluid (Table 5, coding C), p_{max} = 300 bar

Table 3 Shaft versions

Coding	Description	Designation/Standard	Max. drive torque (Nm)
D	Spline shaft	W45x2x21x9g DIN 5480 (V30E-095)	1200
		W50x2x24x9g DIN 5480 (V30E-160)	1700
		W60x2x28x9g DIN 5480 (V30E-270)	3400
K	Parallel key	∅40 - 12x8x80 DIN 6885 (V30E-095)	650
		∅50 - 14x9x80 DIN 6885 (V30E-160)	850
		∅60 - 18x11x100 DIN 6885 (V30E-270)	1700
S	Spline shaft	SAE-D J 744 13T 8/16 DP 44-4 ISO 3019-1 (V30E-095, V30E-160)	1200
		17T 8/16 DP (V30E-270)	3100
U	Spline shaft	SAE-D J 744 13T 8/16 DP 44-4 ISO 3019-1 (only V30E-270)	1200

Table 4 Flange versions (input side)

Coding	Description	Designation
G	Flange	160 B4 HW ISO 3019-2 (V30E-095)
		180 B4 HW ISO 3019-2 (V30E-160, V30E-270)
F	Flange	SAE-D 4-hole J 744 152-4 ISO 3019-1 (V30E-095, V30E-160)
W	Flange	SAE-D 4-hole J 744 152-4 ISO 3019-1 (V30E-270)

Table 5 Seals

Coding	Description
N	NBR
V	FKM
E	EPDM
C	FKM, suitable for HFC, see restrictions Chapter 5, "Installation information"

Table 6 Housing versions

Coding	Description
1	No thru-shaft
2	Thru-shaft, see Chapter 4.4.1, "Pump combinations"

Table 7 Additional functions, pivoting angle indicator

Coding	Description
0	None
1	With indicator
2	With pivoting angle pick-up (Hall sensor)

Table 8 Controllers

Coding			Description	
-... P -			Pressure controller with adjustable pressure on the integrated pilot valve and port for external pilot valve. The pressure controller automatically maintains a constant system pressure independently of the required delivery flow. Therefore, it is suited to constant pressure systems where differing delivery flows are required or for efficient pressure limitation of a hydraulic system.	
-... Pb -			Coding Pb with external feedback of the pump pressure to compensate for a pressure loss in the pump pressure line.	
-... LSP			Load-sensing controller with pressure limitation. Stand-by pressure adjustable from 15 ... 35 bar. Default differential pressure setting: 27 bar	
-... LSPb			Coding LSPb with external feedback of the pump pressure to compensate for a pressure loss in the pump pressure line.	
- PMVPS 4	- 41 - 42 - 43	/G 12 /G 24	Pressure range -41: (5) ... 180 bar -42: (5) ... 290 bar -43: (5) ... 440 bar **G ..**: Solenoid voltage	Additional, directly mounted proportional pressure-limiting valve for setpoint adjustment for the pressure controller (nominal voltage 12 V DC or 24 V DC with specification of the relevant max. pressure range). Can be combined with all controllers listed above. Valve type PMVPS 4 is used in accordance with D 7485/1 . Retrofitting is possible at any time. **Order coding example:** V30E-095 RDGN - 1 - 0 - XX / P - **PMVPS 4 - 43 / G 24** - 350
- BVPM 1	S R	/G 12 /G 24	**S**: Energised closed (deenergised open) **R**: Energised open (deenergised closed)	Additional, directly mounted 2/2-way directional seated valve for pump direction switching (nominal pressure/stand-by pressure) **Order coding example:** V30E-095 RDGN - 1 - 0 - XX / P - **BVPM 1 S** / G 24 - 350

Table 8 Controllers

Coding	Description
EM.CH	The electro-hydraulic delivery flow controller adjusts the displacement volume of the pump between "zero" and "maximum" in proportion to an electrical input signal, (target 0 ... 10 V or 0 ... 20 mA). The power for the adjustment is taken from the high-pressure line. For system pressures below 50 bar, an additional auxiliary pump is required (thru-shaft). Corresponding auxiliary pump in accordance with Section 7.1: V30E-095: Z 02-5, V30E-160: Z 02-8, V30E-270: Z 02-10 The control system consists of the pump adjustment system, an NG 6 prop. directional valve and a pivoting angle pick-up (coding 2) for actual value determination. Control electronics (coding CH, type DAC-4) compare the setpoint and actual values and supply the solenoid valves with the appropriate current. The control electronics used offer a wide range of options for individual adaptation, such as ramps and setpoint recall. **Note** The adjustment times are approx. 200 ms. The adjustment can be combined with pressure controllers (coding P, PMVPS) and/or power controllers (coding L) to limit pressure and/or power. **Note** In addition, a separately assigned overpressure protection (pressure-limiting valve) is also to be provided in the hydraulic circuit to avoid pressure peaks. **Order coding example:** V30E-095 RKGN - 2 - 2-XX / **EMPCH** - 250 - C212 - Z 02-6 (version with pressure limitation) V30E-270 RSFN - 2 - 2-XX / **EMLSPCH** / 1800 - 350 - C232 - Z 02-11 (version with load-sensing controller) V30E-160 RDGN - 2 - 2-XX / **EMOCH** - C222 - Z 02-9 (version without pressure limitation)
L.	The power controller with exact hyperbolic curve is used in the case of greatly varying pressures where the drive motor must also be protected against overloading. The drive torque is limited along the line "Pressure x Geometric displacement = Constant" by the special structure. If, for example, the pressure doubles at constant speed, the delivery flow is automatically halved. External mechanical adjustment can be made to the drive torque at any time. Only in combination with pressure controller P. or load-sensing controller LSP. . **Order coding example:** V30E-160 RKGN - 0 - 1 - XX / **LP** / 180 - 300 V30E-095 RSFN - 1 - 1 - XX / **LLSP** / 120 - 200 - C 211
Lf	As for coding L. In addition, the set power can be changed (increased) by means of an applied control pressure.
Lf1	As for coding L. In addition, the set power can be changed (reduced) by means of an applied control pressure.

Order coding example:
V30E-160 RDGN-2-0-04/LSP-350- **C 222**

Table 9 Flange versions (output side)

Coding V30E			Flange	Shaft	e.g. mounting of HAWE pump with coding
095	160	270			
C 211	C 221	C 231	SAE-A 2-hole J 744 82-2 ISO 3019-1	SAE-A J 744 (16-4 ISO 3019-1) 9T 16/32 DP	
C 212	C 222	C 232	SAE-A 2-hole J 744 82-2 ISO 3019-1	SAE-A J 744 (16-4 ISO 3019-1) 9T 16/32 DP [1)]	
C 213	C 223	C 233	SAE-A 2-hole J 744 82-2 ISO 3019-1	19-4 ISO 3019-1 11T 16/32 DP	
C 214	C 224	C 234	SAE-B 2-hole J 744 101-2 ISO 3019-1	SAE-B J 744 (22-4 ISO 3019-1) 13T 16/32 DP	V60N-060 .. HX
C 215	C 225	C 235	SAE-B 4-hole J 744 101-4 ISO 3019-1	SAE-B J 744 (22-4 ISO 3019-1) 13T 16/32 DP	V60N-060 .. HZ
C 216	C 226	C 236	SAE-B 2/4-hole 101-2/4 ISO 3019-1	SAE-BB J 744 (25-4 ISO 3019-1) 15T 12/24 DP	V40M
C 217	C 227	C 237	SAE-C 2-hole J 744 127-2 ISO 3019-1	SAE-C J 744 (32-4 ISO 3019-1) 14T 12/24 DP	
C 218	C 228	C 238	SAE-C 4-hole J 744 127-4 ISO 3019-1	SAE-C J 744 (32-4 ISO 3019-1) 14T 12/24 DP	V60N- .. SF
C 219	C 229	C 239	SAE-C 4-hole J 744 127-4 ISO 3019-1	23T 16/32 DP	
C 220	C 230	C 240	SAE-D 4-hole J 744 152-4 ISO 3019-1	SAE-D&E J 744 (44-4 ISO 3019-1) 13T 8/16 DP	V30E-095 ..SF.. /V30E-160 ..SF..
--	--	C 241	SAE-E 4-hole J 744 165-4 ISO 3019-1	17T 8/16 DP	V30E-270 ..SF..
C 247	C 248	C 249	Prepared for thru-shaft (cover)		
C 250	C 255	C 260	160 B4 HW ISO 3019-2	W45x2x21x9g DIN 5480	V30E-095 ..DG..
C 251	C 256	C 261	SAE-D 4-hole J 744 152-4 ISO 3019-1	W45x2x21x9g DIN 5480	V30E-095 ..DF..
--	C 257	C 262	180 B4 HW ISO 3019-2	W50x2x24x9g DIN 5480	V30E-160 ..DG..
--	C 258	C 263	SAE-D 4-hole J 744 152-4 ISO 3019-1	W50x2x24x9g DIN 5480	V30E-160 ..DF..
--	--	C 264	180 B4 HW ISO 3019-2	W60x2x28x9g DIN 5480	V30E-270 ..DG..
--	--	C 266	SAE-E 4-hole J 744 165-4 ISO 3019-1	W60x2x28x9g DIN 5480	V30E-270 ..DF..
C 252	C 259	C 268	180 B4 HW ISO 3019-2	∅25 Key width 8	R size 6014 (D6010) RZ size 6914 (D6910)

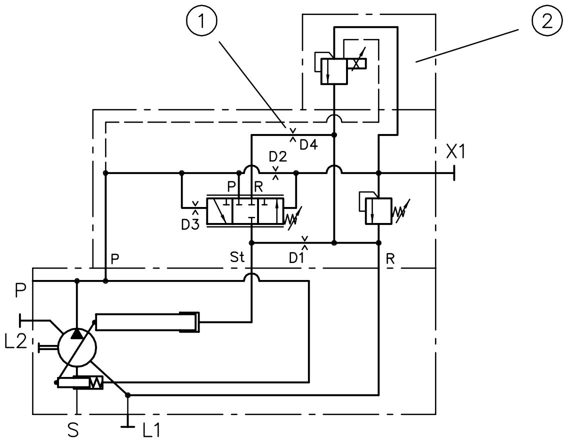
Note
Pay attention to the maximum permissible drive torque, as the flange or shaft may be damaged otherwise.

Note
An additional support is to be provided for pump combinations.
Other versions on request.

1) ANSI B 92.1, FLAT ROOT SIDE FIT, spline width deviating from the standard, s = 2.357-0.03

2.2 Controller switching symbols

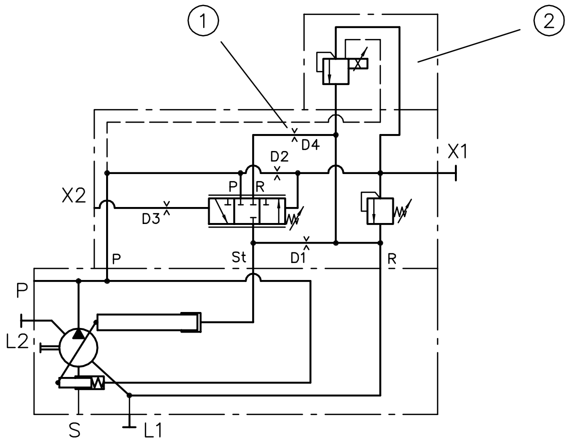
Coding P



1 Optional

2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

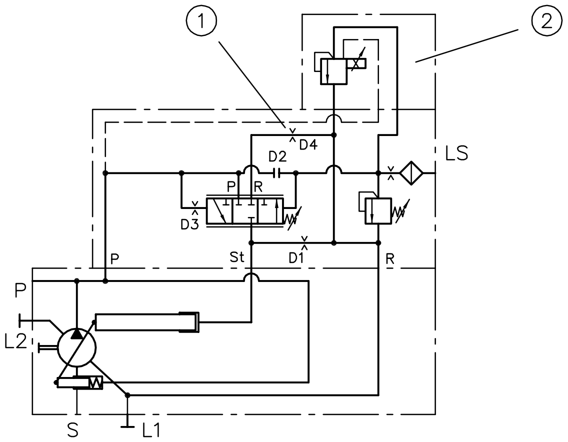
Coding Pb



1 Optional

2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

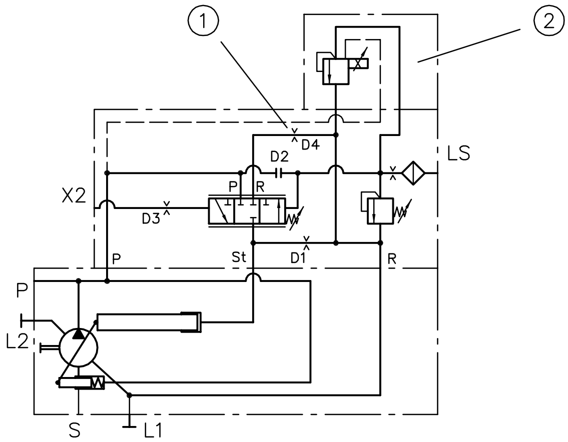
Coding LSP



1 Optional

2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

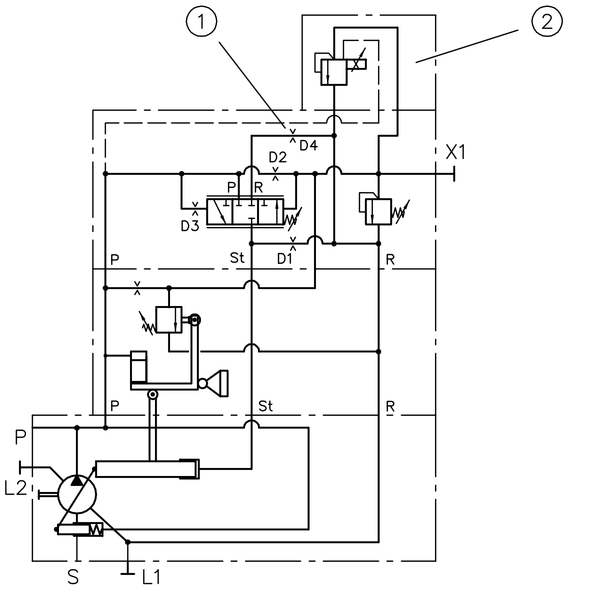
Coding LSPb



1 Optional

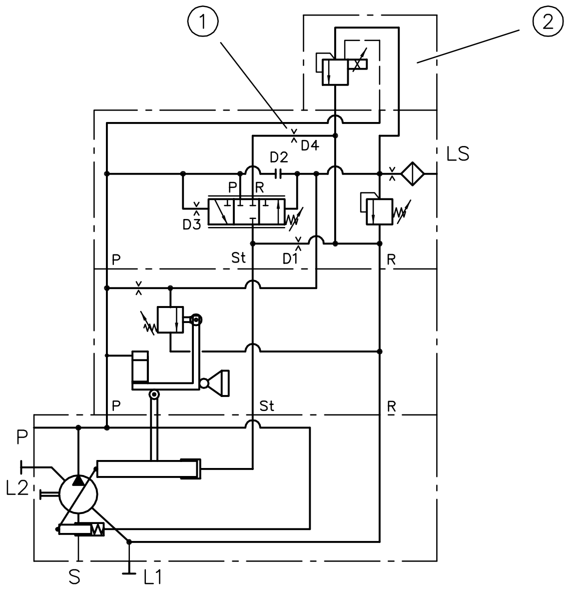
2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

Coding LP



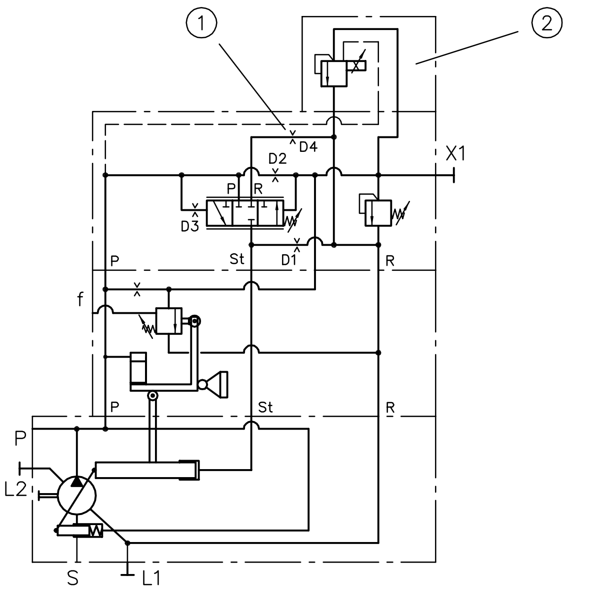
1 Optional
2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

Coding LLSP



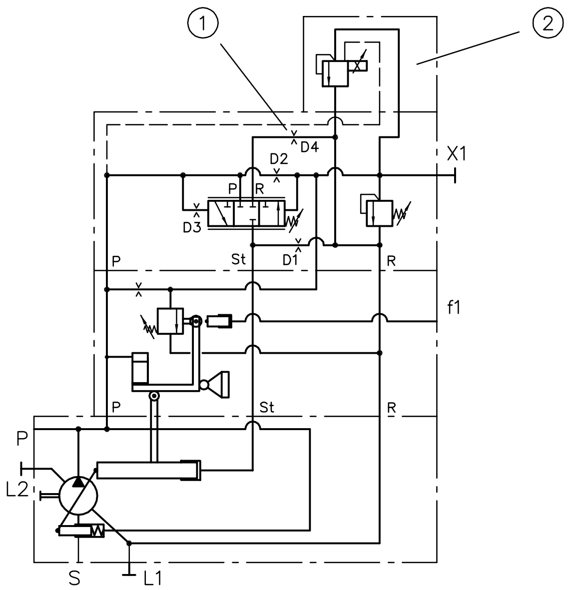
1 Optional
2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

Coding LfP



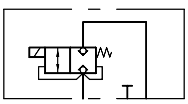
1 Optional
2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

Coding Lf1P

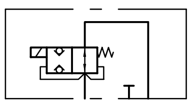


1 Optional
2 Optional prop. pressure-limiting valve type PMVPS or type BVPM

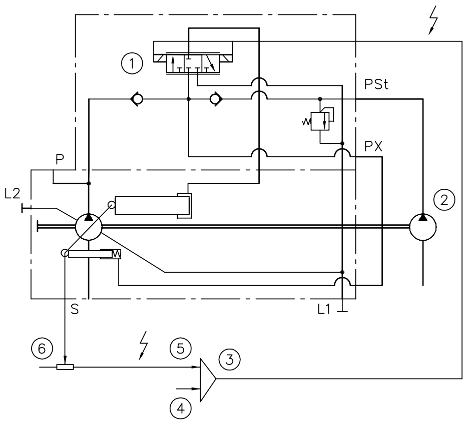
Coding BVPM1R



Coding BVPM1S



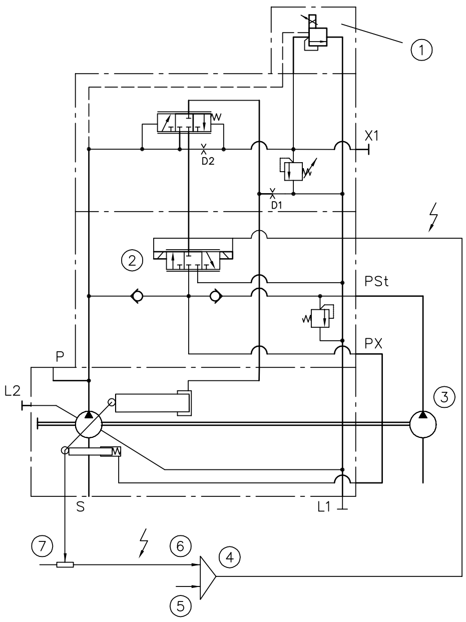
Coding EMOCH



1 Prop. directional valve
2 Auxiliary pump
3 Amplifier card
4 NOMINAL
5 ACTUAL
6 Pivoting angle pick-up

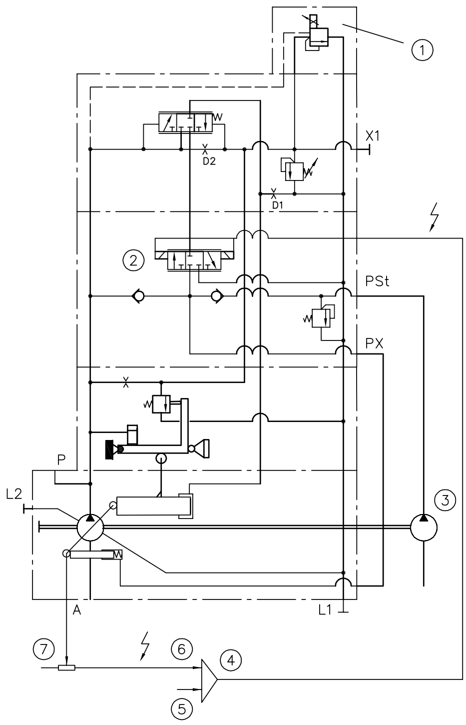
S	Suction port
P	Pressure port
(L1) (L2)	Drain ports
X1	Remote-control port (add. pilot valves)
LS	LS pressure port (load-sensing pressure; downstream of measuring throttle in main circuit)
X2	External system pressure port
D1	Damping orifice
D2	Pilot orifice
D3	Damping orifice, control piston
D4	Orifice for on-stroke velocity

Coding EMPCH



1 Optional prop. pressure-limiting valve type PMVPS or type BVPM
2 Prop. directional valve
3 Auxiliary pump
4 Amplifier card
5 NOMINAL
6 ACTUAL
7 Pivoting angle pick-up

Coding EMLPCH



1 Optional prop. pressure-limiting valve type PMVPS or type BVPM
2 Prop. directional valve
3 Auxiliary pump
4 Amplifier card
5 NOMINAL
6 ACTUAL
7 Pivoting angle pick-up

3 Parameters

3.1 General

Description	Variable displacement axial piston pump
Design	Axial piston pump according to the swash plate principle
Mounting	Flange mounting or foot bracket
Surface	Primed
Drive/output torque	See Chapter 3, "Parameters", under "Additional parameters"
Installation position	Any (for installation information see Chapter 5, "Installation information")
Rotation direction	Clockwise or anti-clockwise
Ports	■ Suction port ■ Pressure port ■ Drain port ■ Pressure gauge port
Hydraulic fluid	Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519 Viscosity range: min. approx. 10; max. approx. 1000 mm ^{2}/s Optimal operating range: 16 to 35 mm^2/s Also suitable for biologically degradable pressure fluids type HEPG (polyalkalene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C. HFC pressure fluids (water glycol); note installation information in Chapter 5, "Installation information".
Purity class	**ISO 4406** 19/17/14
Temperatures	Ambient: approx. -40 to +60°C, oil: -25 to +80°C, pay attention to the viscosity range! Start temperature: down to -40°C is permissible (observe start-viscosity!), as long as the steady-state temperature is at least 20K higher for subsequent operation. Biologically degradable pressure fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

Pressure and delivery flow

Operating pressure	See Chapter 2, "Available versions, main data"
Geometric displacement	See Chapter 2, "Available versions, main data"

Dimensions

Type V30E	Without controller (kg)	With controller (kg)			
		LSP, LSPb, P, Pb	PMVPS 4	L, Lf, Lf1	EM...
095	54	+2.5	+1.1	+2.5	+6.1
160	74	+2.5	+1.1	+2.5	+6.1
270	126	+2.5	+1.1	+2.5	+6.1

Additional parameters

Description	Nominal size	Nominal size	Nominal size
	095	160	270
Max. swash plate angle	15°	15°	15°
Absolute inlet pressure required in open circuit	0.85 bar	0.85 bar	0.85 bar
Minimum operating pressure	15 bar	15 bar	15 bar
Max. permissible housing pressure (static/ dynamic)	1 bar/2 bar	1 bar/2 bar	1 bar/2 bar
Max. speed during suction operation and max. swash plate angle at 1 bar abs. Inlet pressure	2500 rpm	2100 rpm	1800 rpm
Max. speed in supply mode	2900 rpm	2500 rpm	2000 rpm
Min. speed in continuous operation	500 rpm	500 rpm	500 rpm
Required drive torque at 100 bar	153 Nm	261 Nm	414 Nm
Drive power at 250 bar and 1450 rpm	66 kW	107 kW	177 kW
Inertia torque	0.0216 kg m^2	0.03 kg m^2	0.0825 kg m^2
Service life L_h of shaft bearings at 250 bar, 1450 rpm and max. swash plate angle	20000 h	19000 h	20000 h
Noise level at 250 bar, 1450 rpm and max. swash plate angle (measured in acoustic measurement chamber according to DIN ISO 4412, measurement distance 1 m)	73 dB(A)	74 dB(A)	78 dB(A)

Note
The minimum operating pressure in the pump line depends on the speed and the pivoting angle; the pressure must not fall below 15 bar under any circumstances.

Note
The housing pressure is only allowed to be 1 bar higher than the suction pressure.

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Max. permissible drive/output torque

Description		Nominal size		
		095	160	270
Spline shaft D	**Drive/output**	1200 Nm/600 Nm	1700 Nm/850 Nm	3400 Nm/1700 Nm
Parallel key K	**Drive/output**	650 Nm/600 Nm	850 Nm/850 Nm	1700 Nm/1700 Nm
Spline shaft S	**Drive/output**	1200 Nm/600 Nm	1200 Nm/850 Nm	3100 Nm/1700 Nm
Spline shaft U	**Drive/output**	--	--	1200 Nm/1200 Nm

3.2 Planning information

Determination of nominal sizes

Delivery flow	Drive torque	Drive power
$Q = \frac{V_g \cdot n \cdot \eta_V}{1000} (l/\min)$	$M = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} (Nm)$	$P = \frac{2\pi \cdot M \cdot n}{60000} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} (kW)$

V_g	= Geom. delivery volume (cm³/rev)	η_V	= Volumetric efficiency
Δp	= differential pressure	η_{mh}	= Mechanical-hydraulic efficiency
n	= speed (rpm)	η_t	= overall efficiency ($\eta_t = \eta_V \cdot \eta_{mh}$)

3.3 Characteristic curves

Delivery flow and power (basic pump)

The diagrams illustrate the delivery flow/pressure (without controller).
Drive power at max. swash plate angle and drive power at zero stroke and 1500 rpm.
Drive power/pressure at zero stroke and 1500 rpm

Type V30E-095

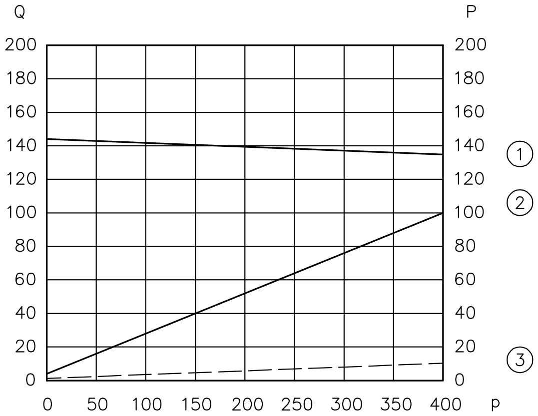


Figure 2: p pressure (bar); Q delivery flow (lpm); P power (kW)

1 Delivery flow/pressure
2 Drive power/pressure
3 Drive power/pressure (zero stroke)

Type V30E-160

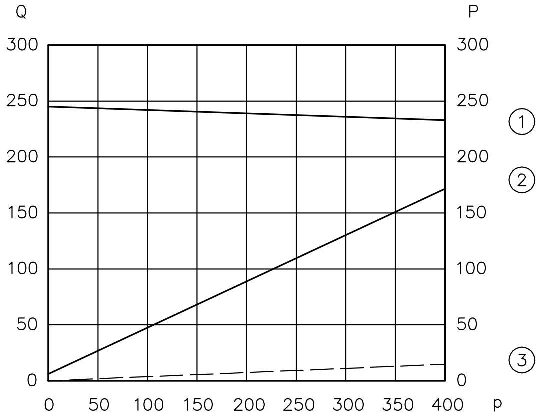


Figure 3: p pressure (bar); Q delivery flow (lpm); P power (kW)

1 Delivery flow/pressure
2 Drive power/pressure
3 Drive power/pressure (zero stroke)

Type V30E-270

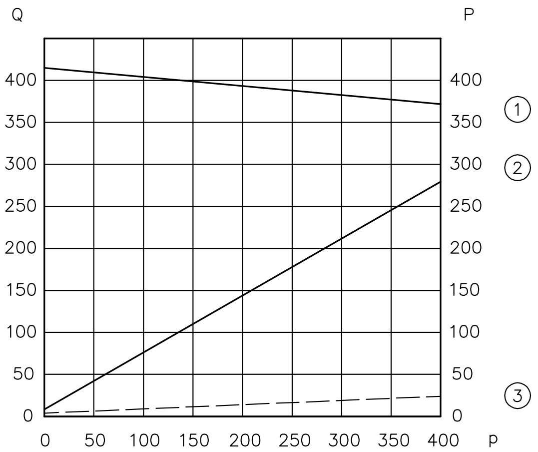


Figure 4: p pressure (bar); Q delivery flow (lpm); P power (kW)

1 Delivery flow/pressure
2 Drive power/pressure
3 Drive power/pressure (zero stroke)

Inlet pressure and self-suction speed

The diagrams show the inlet pressure/speed at the max. swash plate angle and an oil viscosity of 75 mm²/s

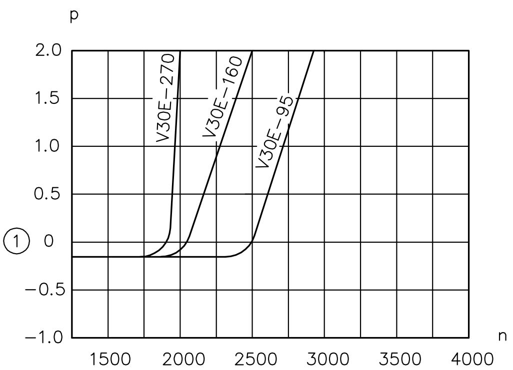
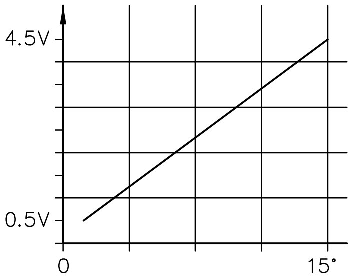


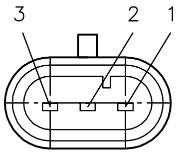
Figure 5: n speed (rpm); p inlet pressure (bar)

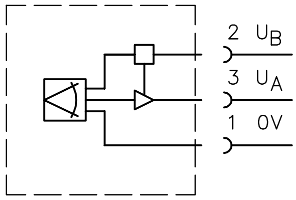
1 0 bar relative = 1 bar absolute

3.4 Pivoting angle pick-up

Pivoting angle pick-up







Operating voltage	U_B 10 to 30 V DC
Output signal	U_A 0.5 to 4.5 V
Tested for automotive field	DIN 40839
Test pulse	1, 2, 3 a/b
Field control	200 V/m
Electrical connection	3-PIN AMP
Superseal	1.5 plug

3.5 Controller characteristic curves

Coding P

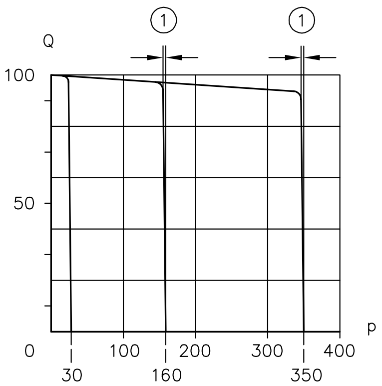


Figure 6: p pressure (bar); Q delivery flow (%)

1 3 bar deviation

Acting times T1

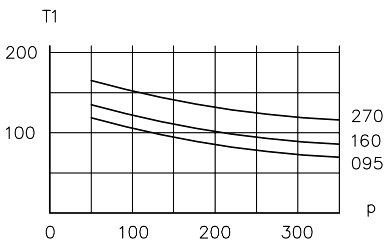


Figure 7: p pressure (bar); T1 acting time (ms)

Acting times T2

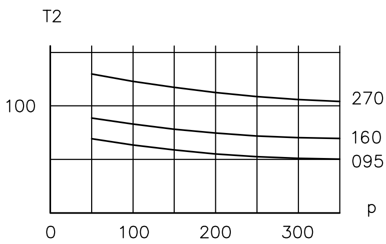


Figure 8: p pressure (bar); T2 acting time (ms)

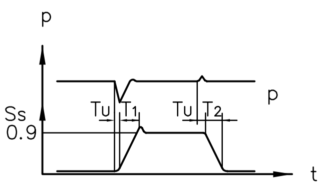


Figure 9: t in ms; p pressure (bar)

S_S	= positioning travel of actuator
T_u	= delay < 3 ms
T_1	= on-stroke time
T_2	= destroke time
p	= pressure

Coding LSP

Drive speed constant

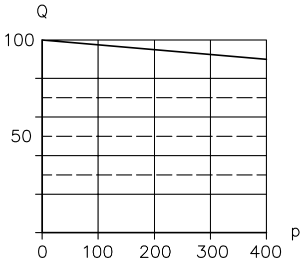


Figure 10: p pressure (bar); Q delivery flow (%)

Drive speed variable

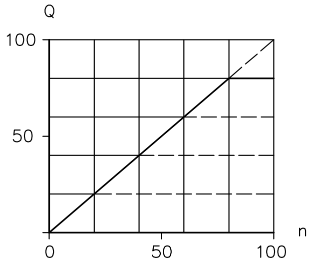


Figure 11: n drive speed (rpm); Q delivery flow (%)

LS line approx. 10% of the volume of the P line

Parameters

Control accuracy in relation to max. delivery flow

a) Speed n constant,
pressure variable between 30 and 350 bar(< 3%)

b) Pressure p constant,
speed variable (< 1%)

Coding L, Lf, Lf1

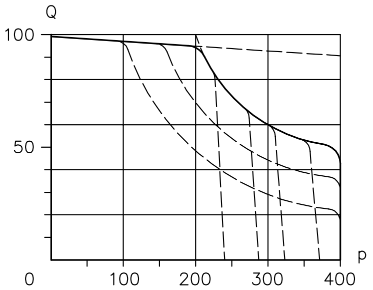


Figure 12: p pressure (bar); Q delivery flow (%)

Note
Smallest recommended nominal torque setting

Coding	Drive torque (Nm)	Corresponds to kW/rpm
095	99	15/1500
160	146	22/1500
270	300	45/1500

Coding EM..CH

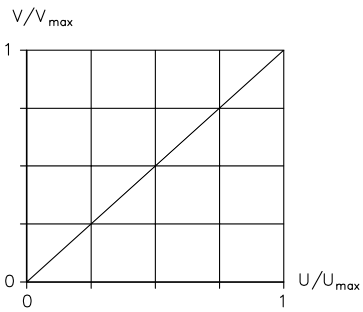


Figure 13: U/U_{max} input signal; V/V_{max} displacement volume

On-stroke time	270 ms ... 180 ms
Destroke time	130 ms ... 100 ms
Hysteresis and linearity	1%
Amplifier card and controller card	Type DAC-4
- Power supply	18 ... 30 V DC, residual ripple < 10%
- Setpoint inputs	0 ... 10 V, 0 ... 20 mA
Prop. directional valve	4/3-way directional valve NG 6

Coding PMVPS 4

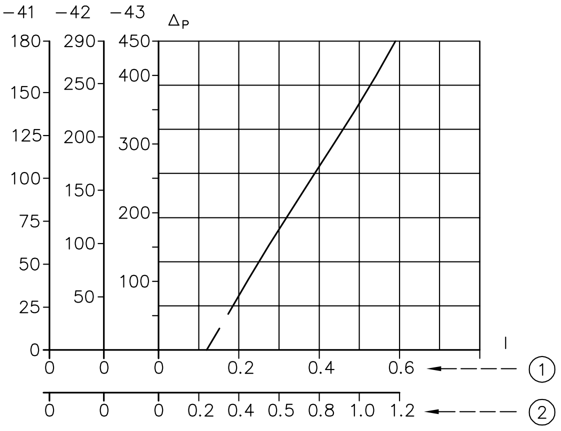
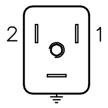


Figure 14: I current (mA); p pressure (bar)

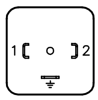
1 At 24 V DC
2 At 12 V DC

Nominal voltage U_N	12 V DC	24 V DC
Nominal current I_N	1.26 A	0.63 A
Nominal power P_N	9.5 W	9.5 W
Protection class	IP 65 (IEC 60529) with connector installed as a precautionary measure	
Required dither frequency	60 ... 150 Hz	
Dither amplitude	30 ... 60% of I_N	
Further information	D 7485/1	
Electrical connection	Industry standard (11 mm)	



Coding BVPM 1

Nominal voltage U_N	12 V DC	24 V DC
Nominal current I_N	2.2 A	1.1 A
Nominal power P_N	29.4 W	27.6 W
Protection class	IP 65 (IEC 60529) with connector installed as a precautionary measure	
Further information	D 7765	
Electrical connection	DIN EN 175 301-803 A	



![HAWE Hydraulik logo]

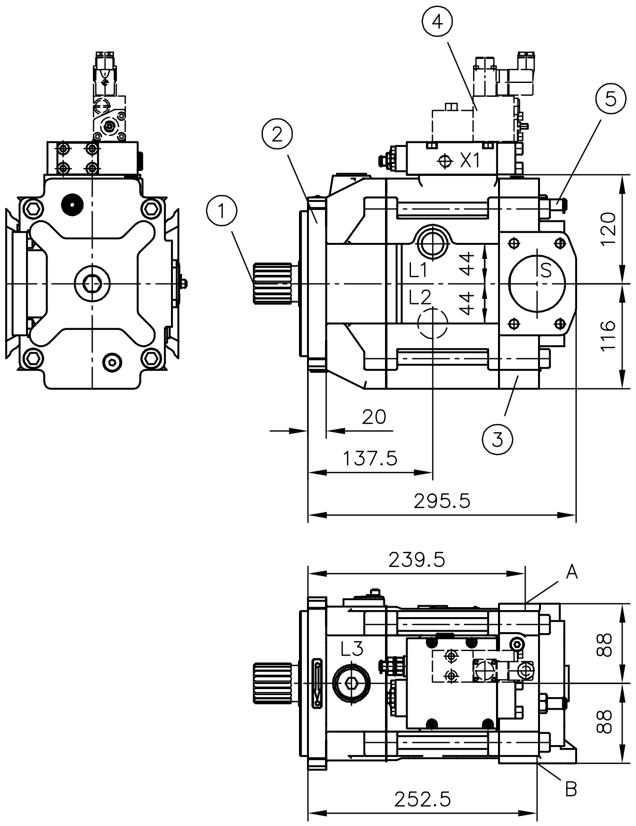
4 Dimensions

All dimensions in mm, subject to change!

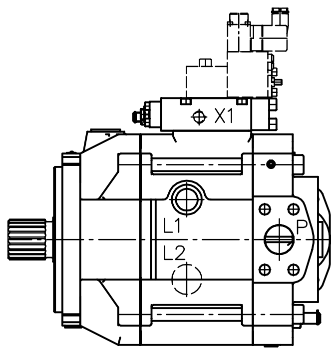
4.1 Basic pump

4.1.1 Type V30E-095

Rotation direction **clockwise** (viewed from shaft journal)



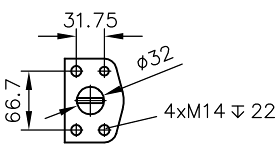
Rotation direction **anti-clockwise** (viewed from shaft journal)



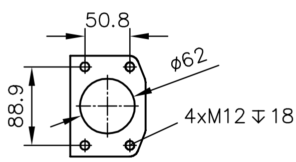
1 Shaft version
2 Flange version
3 Housing version
4 Controller
5 Stroke limitation

Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure port	A = suction port
B = suction port	B = pressure port

Suction port

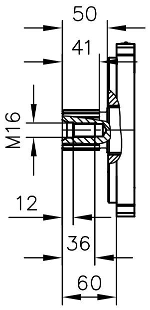


Pressure port

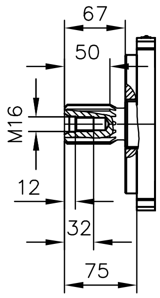


Shaft versions

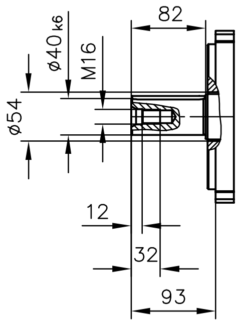
Spline shaft
Coding **D**
(DIN 5480 W45x2x21x9g)



Spline shaft
Coding **S**
(SAE-D J 744 13T 8/16 DP)

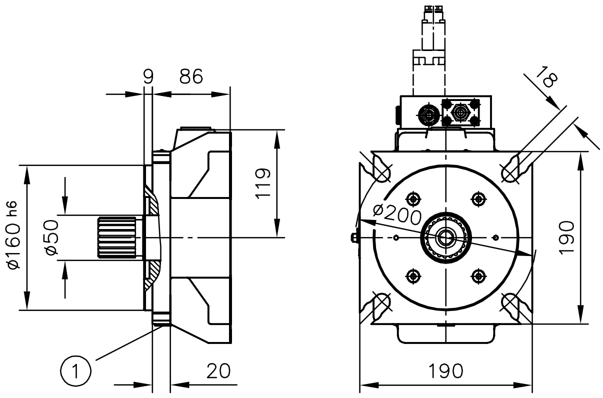


Parallel key shaft
Coding **K**
(DIN 6885 ∅40 - 12x8x80)



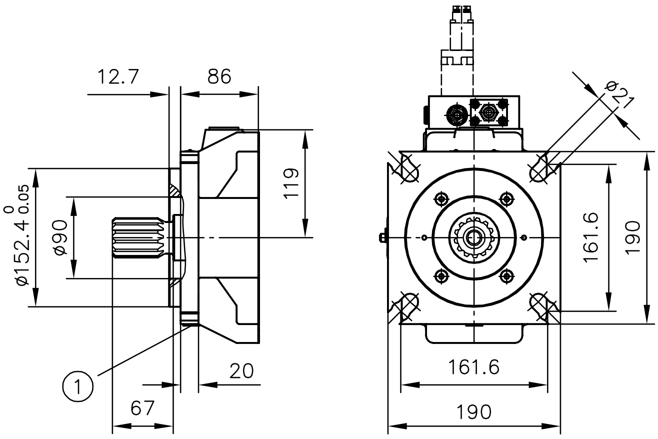
Flange versions

Coding **G**
(160 B4 HW ISO 3019-2)



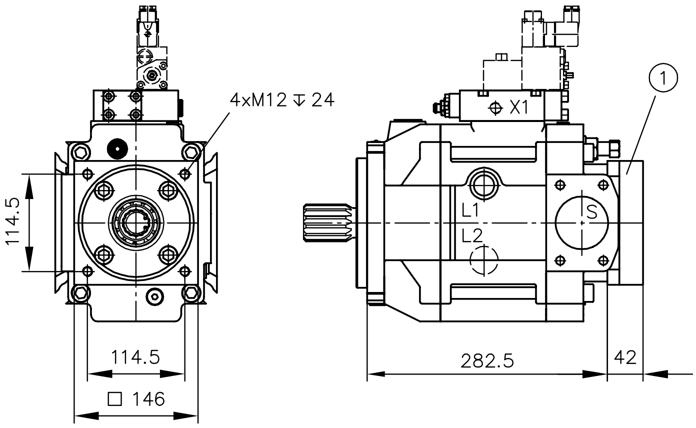
1 Bleeding and flushing port G1/4

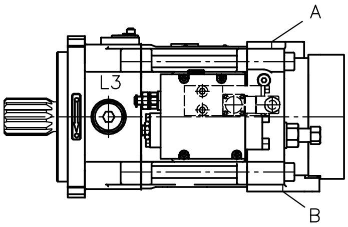
Coding **F**
(SAE-D 4-hole J 744)
(152-4 ISO 3019-1)



1 Bleeding and flushing port G1/4

Housing version -2 (radial ports, with thru-shaft)



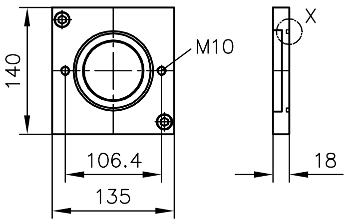


1 Flange version (output side)

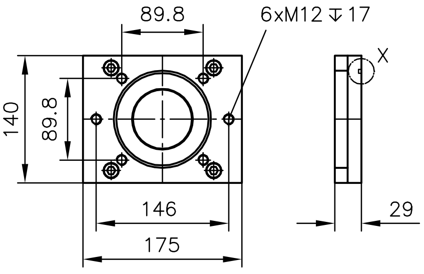
Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure port	A = suction port
B = suction port	B = pressure port

Flange version (output side)

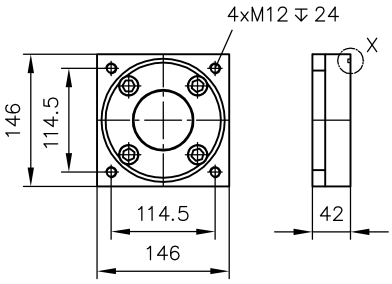
Coding **C211 and C212**
(SAE-A 2-hole)



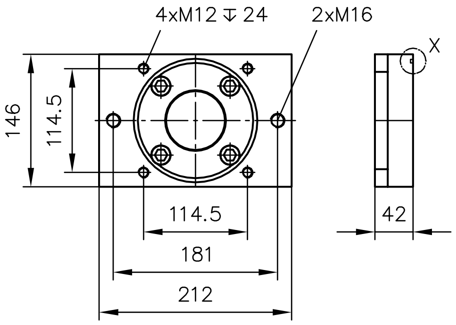
Coding **C214 and C215**
(SAE-B 2-hole and SAE-B 4-hole)



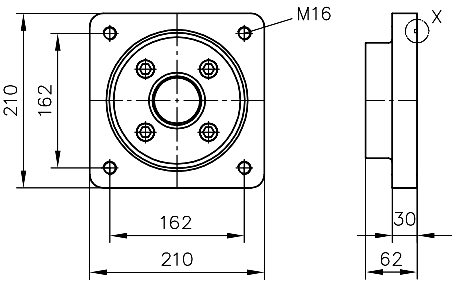
Coding **C218**
(SAE-C 4-hole)



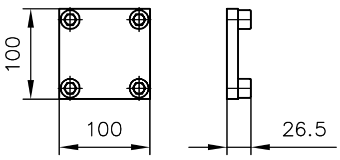
Coding **C219**
(SAE-C 4-hole and SAE-C 2-hole)



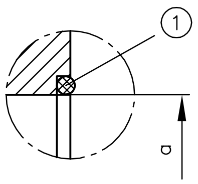
Coding **C220**
(SAE-D 4-hole)



Coding **C247**
(prepared for thru-shaft (cover))



Detail



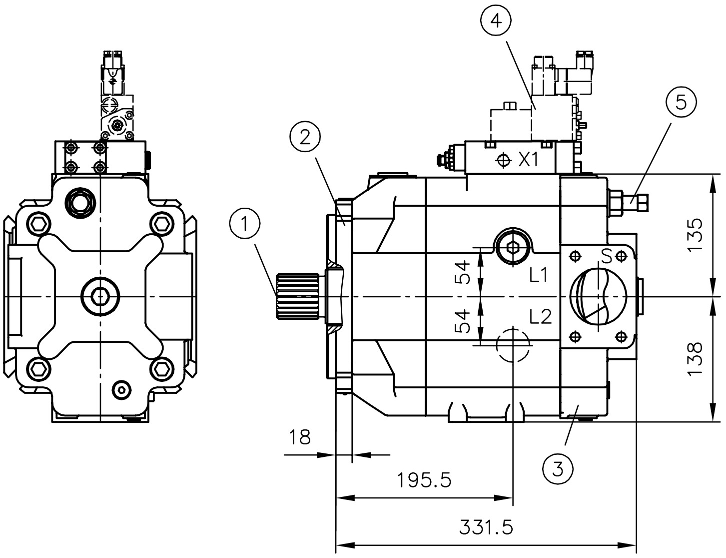
1 O-ring

V30E-095	O-ring	a
C211, C212	∅ 84x2	∅ $82.55^{+0.03}_{+0.01}$ 7 deep
C214, C215	∅ 103x2	∅ $101.6^{+0.03}_{+0.01}$ 11 deep
C218, C219	∅ 132x2	∅ $127^{+0.08}_{+0.04}$ 14 deep
C220	∅ 164x3	∅ $152.4^{+0.08}_{+0.04}$ 14 deep

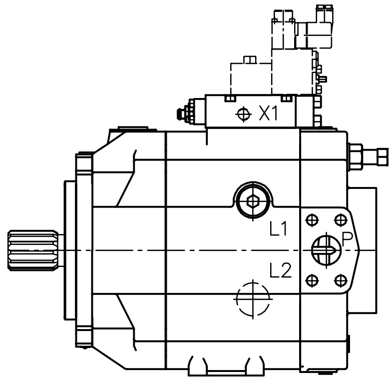
O-ring included in the items supplied

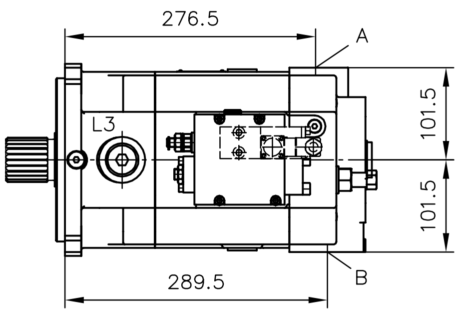
4.1.2 Type V30E-160

Rotation direction **clockwise** (viewed from shaft journal)



Rotation direction **anti-clockwise** (viewed from shaft journal)

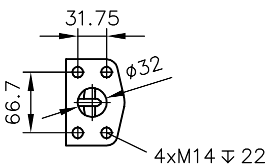




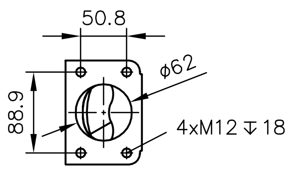
1 Shaft version
2 Flange version
3 Housing version
4 Controller
5 Stroke limitation

Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure port	A = suction port
B = suction port	B = pressure port

Suction port

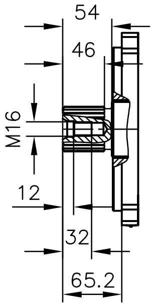


Pressure port

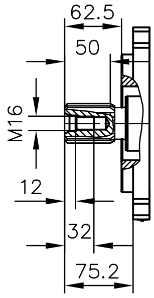


Shaft versions

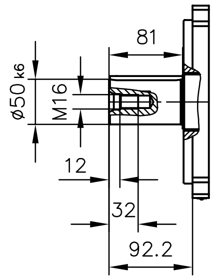
Spline shaft
Coding **D**
(DIN 5480 W50x2x24x9g)



Spline shaft
Coding **S**
(SAE-D J 744 13T 8/16DP)

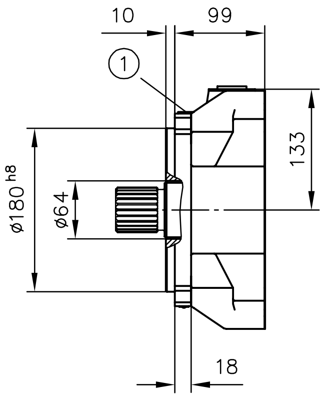


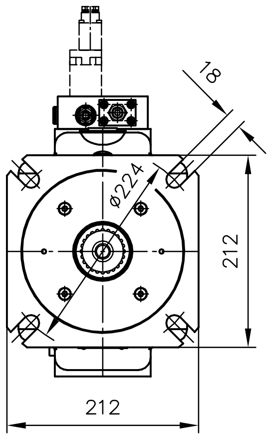
Parallel key shaft
Coding **K**
(DIN 6885 ∅50 - 14x9x80)



Flange versions

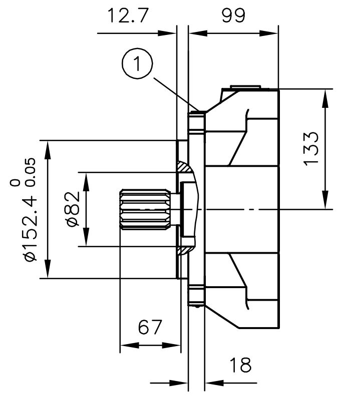
Coding **G**
(180 B4 HW ISO 3019-2)

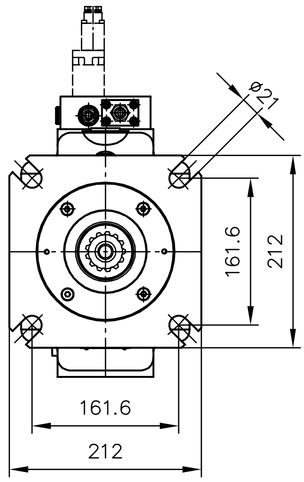




1 Bleeding and flushing port G1/4

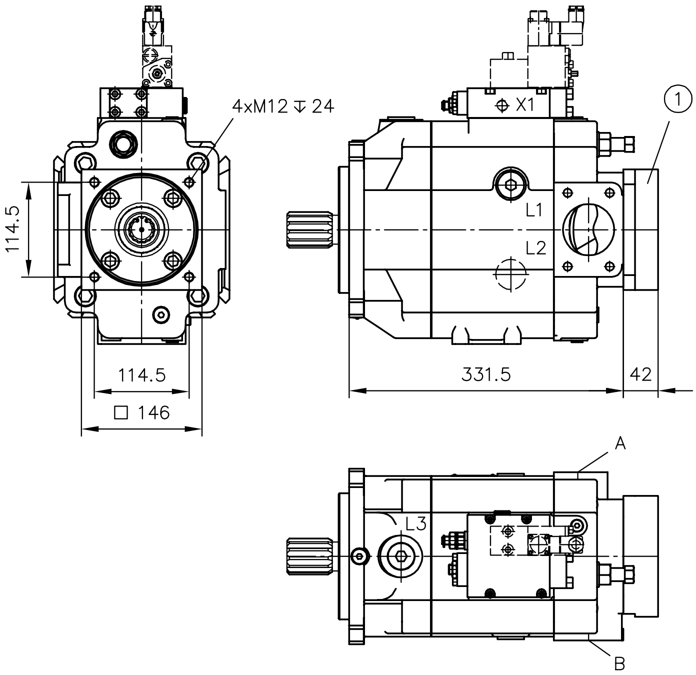
Coding **F**
(SAE-D 4-hole J 744)
(152-4 ISO 3019-1)





1 Bleeding and flushing port G1/4

Housing version -2 (radial ports, with thru-shaft)

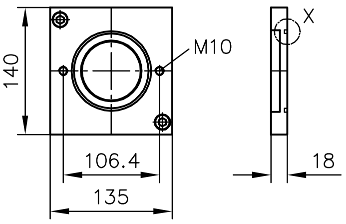


1 Flange version (output side)

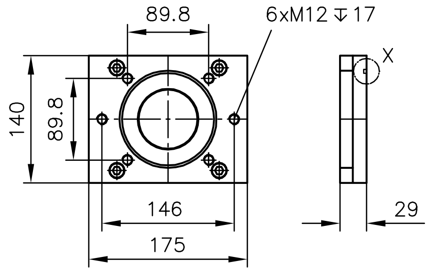
Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure port	A = suction port
B = suction port	B = pressure port

Flange version (output side)

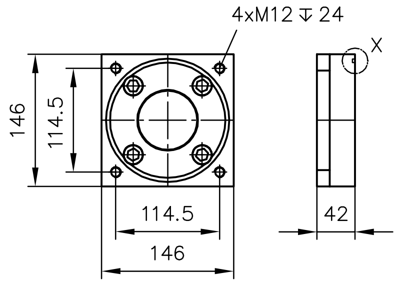
Coding **C221 and C222**
(SAE-A 2-hole)



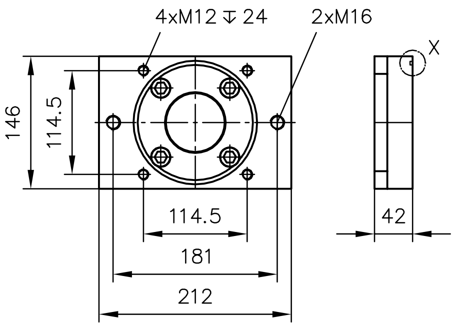
Coding **C224 and C225**
(SAE-B 2-hole and SAE-B 4-hole)



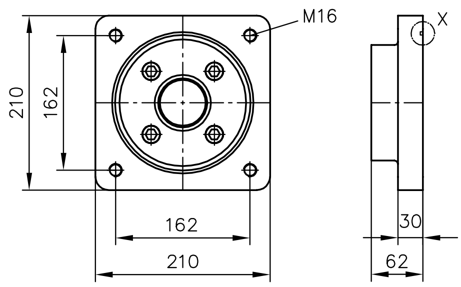
Coding **C228**
(SAE-C 4-hole)



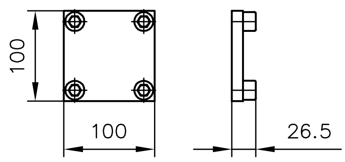
Coding **C227**
(SAE-C 2-hole and SAE-C 4-hole)



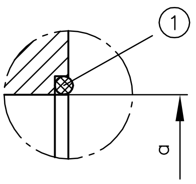
Coding **C230**
(SAE-D 4-hole)



Coding **C248**
(prepared for thru-shaft (cover))



Detail



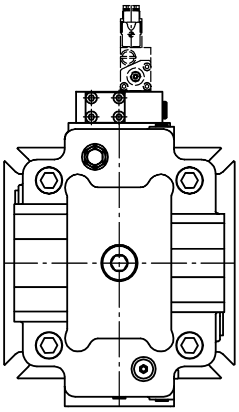
1 O-ring

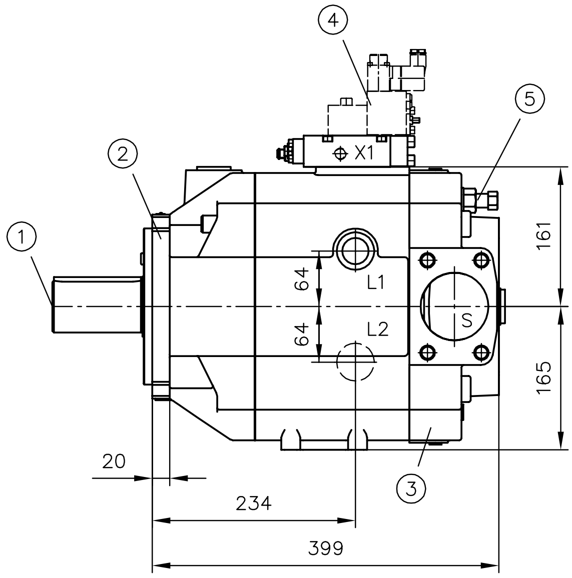
V30E-160	O-ring	a
C221, C222	∅84x2	∅ $82.55^{+0.03}_{+0.01}$ 7 deep
C224, C225	∅103x2	∅ $101.6^{+0.03}_{+0.01}$ 11 deep
C227, 228	∅132x2	∅ $127^{+0.08}_{+0.04}$ 14 deep
C230	∅164x3	∅ $152.4^{+0.08}_{+0.04}$ 14 deep

O-ring included in the items supplied

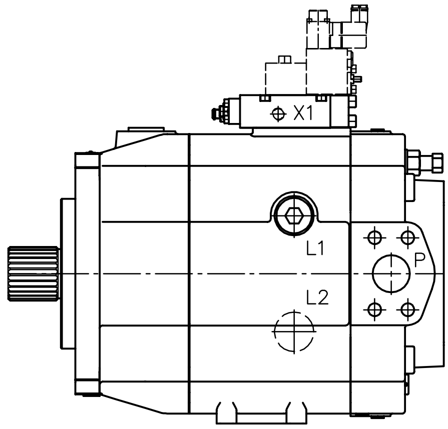
4.1.3 Type V30E-270

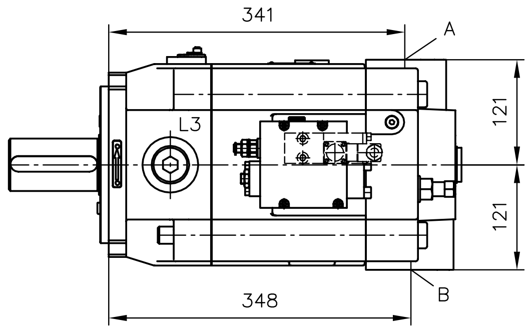
Rotation direction **clockwise** (viewed from shaft journal)





Rotation direction **anti-clockwise** (viewed from shaft journal)

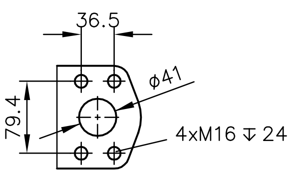




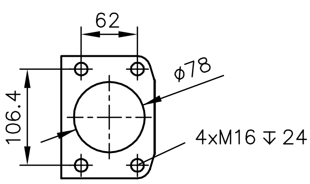
1 Shaft version
2 Flange version
3 Housing version
4 Controller
5 Stroke limitation

Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure port	A = suction port
B = suction port	B = pressure port

Suction port

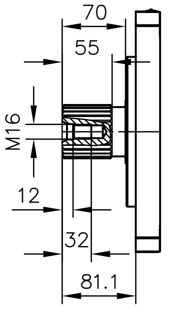


Pressure port

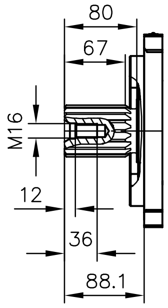


Shaft versions

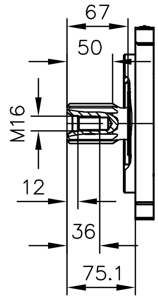
Spline shaft
Coding **D**
(DIN 5480 W60x2x28x9g)



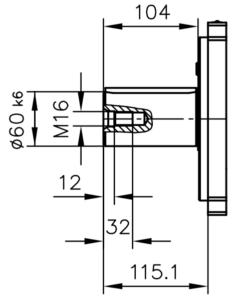
Spline shaft
Coding **S**
(17T 8/16DP)



Spline shaft
Coding **U**
(SAE-D J 744 13T 8/16DP)

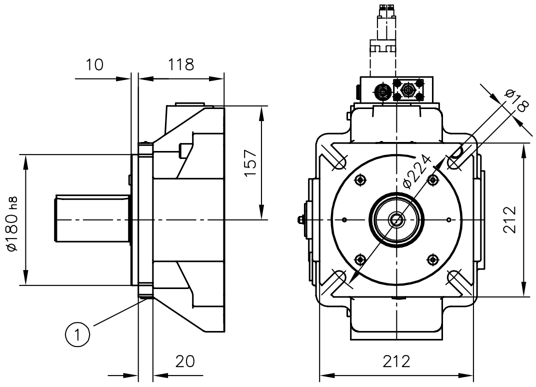


Parallel key shaft
Coding **K**
(DIN 6885 ∅60 - 18x11x100)



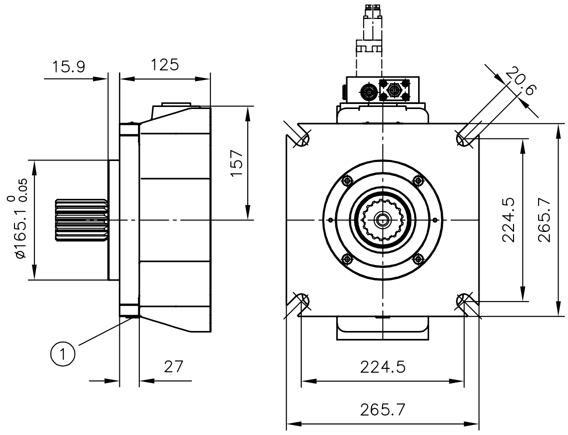
Flange versions

Coding **G**
(180 B4 HW ISO 3019-2)



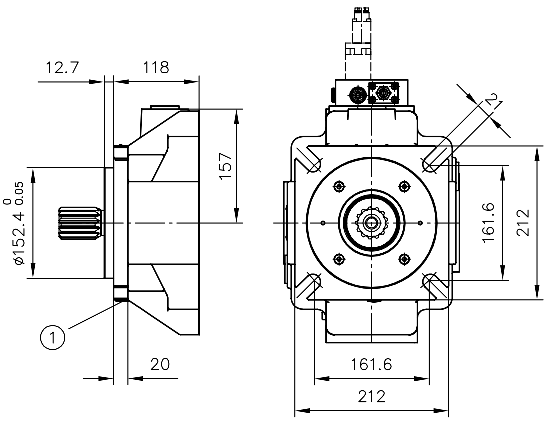
1 Bleeding and flushing port G1/4

Coding **F**
(SAE E-4-hole J 744)
(165-4 ISO 3019-1)



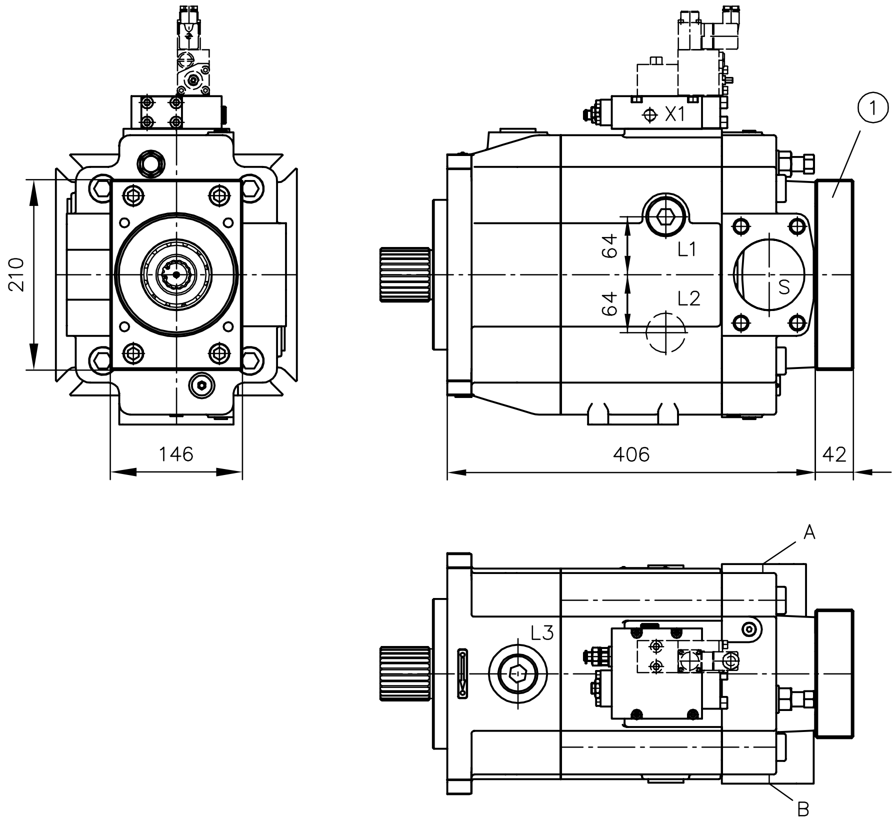
1 Bleeding and flushing port G1/4

Coding **W**
(SAE-D 4-hole J 744)
(152-4 ISO 3019-1)



1 Bleeding and flushing port G1/4

Housing version -2 (radial version, with thru-shaft)

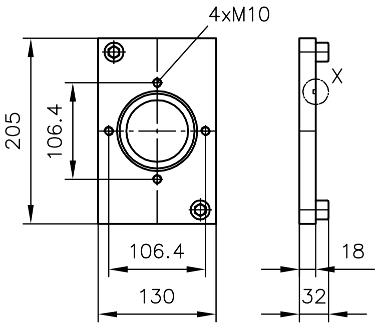


1 Flange version (input side)

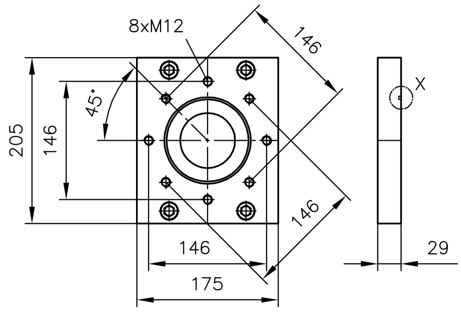
Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure port	A = suction port
B = suction port	B = pressure port

Flange version (output side)

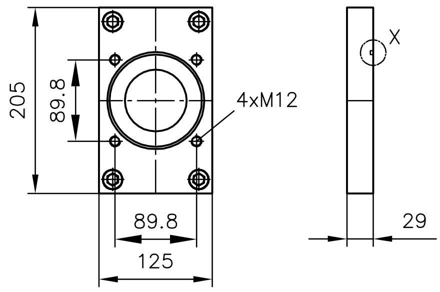
Coding **C231 and C232**
(SAE-A 2-hole)



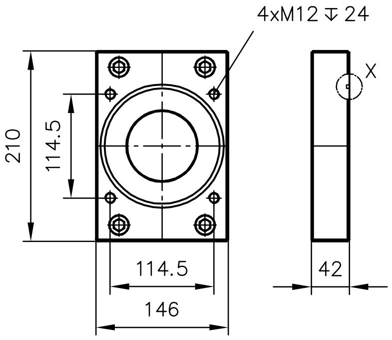
Coding **C234**
(SAE-B 2-hole and SAE-B 4-hole)



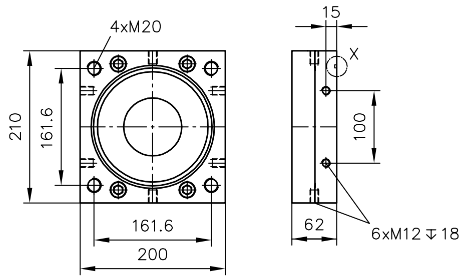
Coding **C235**
(SAE-B 4-hole)



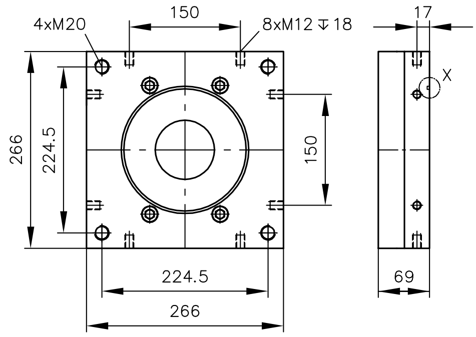
Coding **C238**
(SAE-C 4-hole)



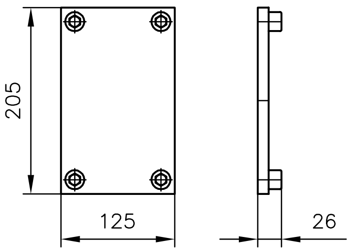
Coding **C240**
(SAE-D 4-hole)



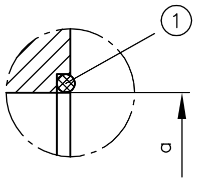
Coding **C241**
(SAE-E 4-hole)



Coding **C249**
(prepared for thru-shaft (cover))



Detail



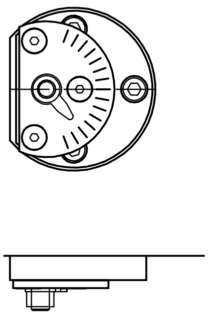
1 O-ring

V30E-270	O-ring	a
C231, C212	∅ 84x2	∅ 82.55 $^{+0.03}_{+0.01}$ 7 deep
C234, C235	∅ 103x2	∅ 101.6 $^{+0.03}_{+0.01}$ 11 deep
C228	∅ 132x2	∅ 127 $^{+0.08}_{+0.04}$ 13 deep
C240	∅ 164x3	∅ 152.4 $^{+0.08}_{+0.04}$ 13 deep
C241	∅ 167x3	∅ 165.1 $^{+0.08}_{+0.04}$ 16 deep

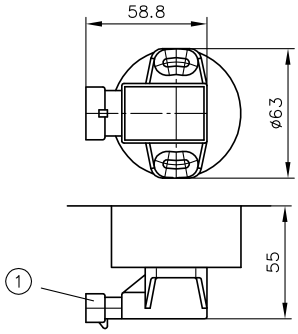
O-ring included in the items supplied

4.2 Pivoting angle indicator

Pivoting angle indicator



Pivoting angle pick-up

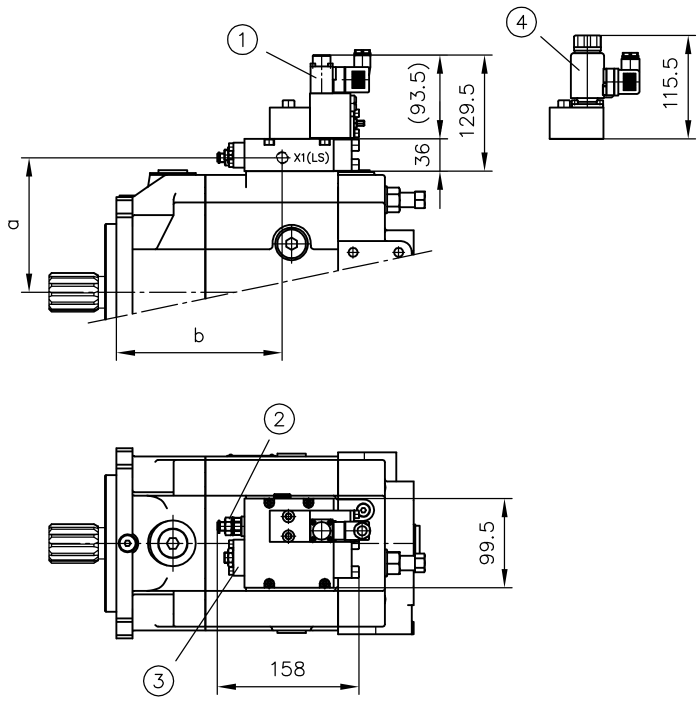


1 3-PIN AMP Superseal

4.3 Controller

Controller

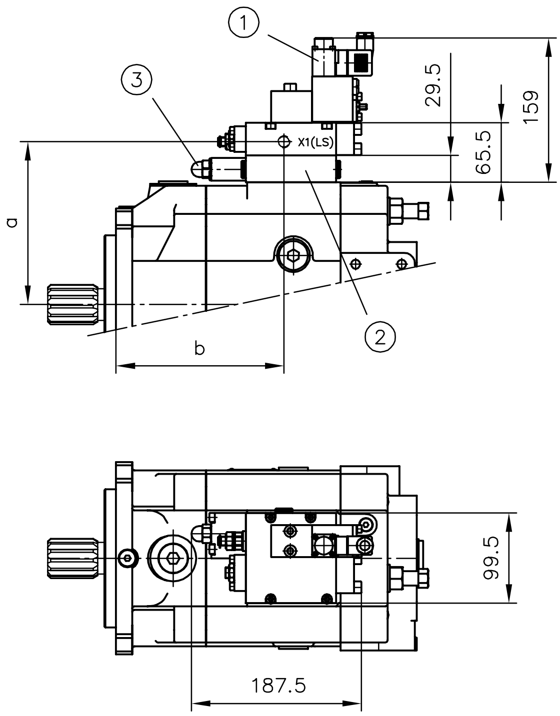
Coding **P** and **LSP**



1 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
2 Pressure setting (pressure controller)
3 LSP: setting of LS stand-by pressure; P: setting of p_{min}
4 2/2-way directional seated valve type BVPM

	a	b	Power change/ revolution
V30E-095	135	151	140 Nm
V30E-160	150	185	237 Nm
V30E-270	176	223.5	400 Nm

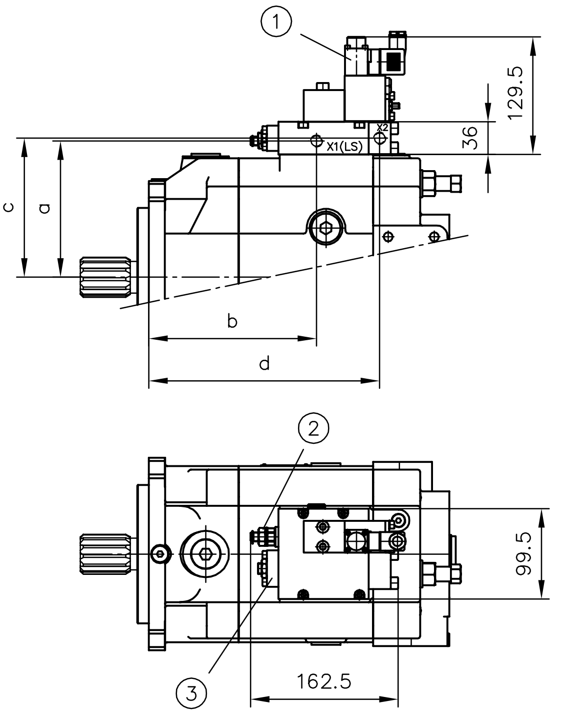
Coding **LP** and **LLSP**



1 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
2 Power controller (intermediate plate)
3 Power setting

	a	b	Power change/ revolution
V30E-095	164.5	151	140 Nm
V30E-160	179.5	185	240 Nm
V30E-270	205.5	223.5	400 Nm

Coding **Pb** and **LSPb**

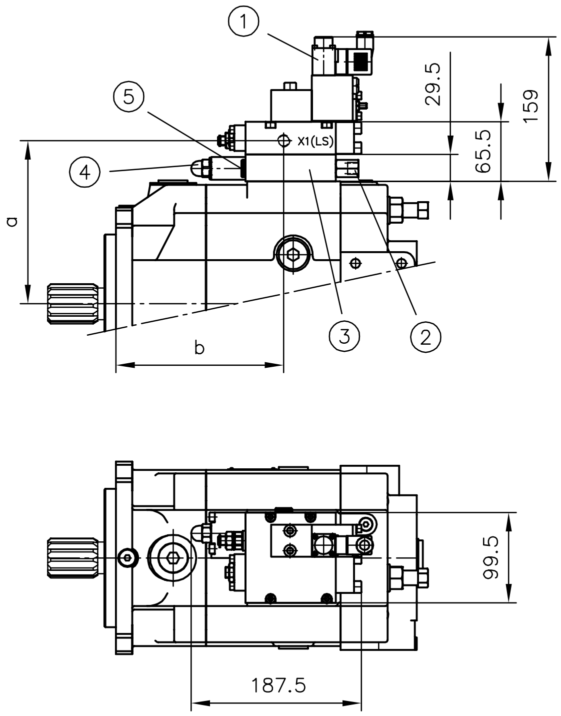


1 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
2 Pressure setting (pressure controller)
3 LSP: setting of LS stand-by pressure; N: setting of p_{min}

	a	b	c	d
V30E-095	135	151	138	220.75
V30E-160	150	185	153	254.75
V30E-270	176	223.5	179	293.25

	Ports (ISO 228/1)
LS, X1, X2	= G 1/4

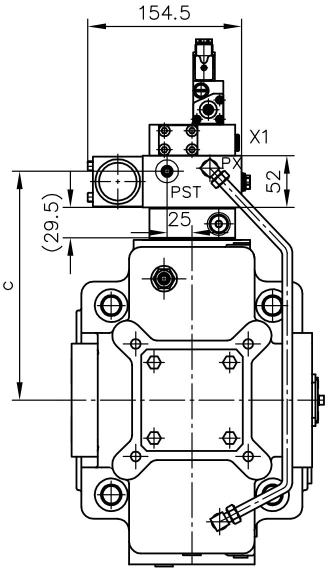
Coding **Lf** and **Lf1**

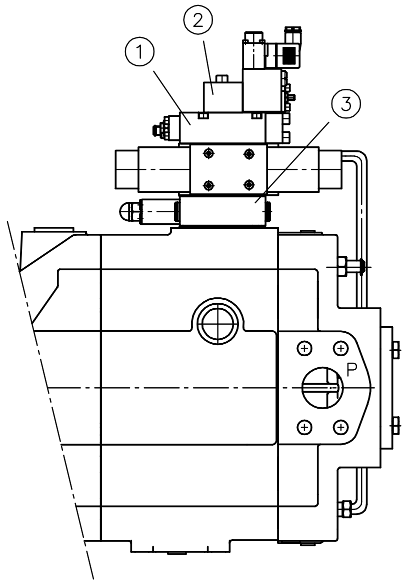


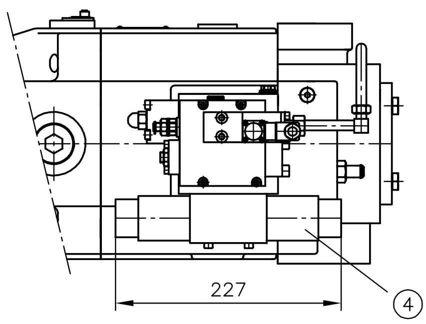
1 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
2 Port f1 closed in case of Lf
3 Power controller (intermediate plate)
4 Power setting
5 Port f closed in case of Lf1

	a	b	Power change/ revolution
V30E-095	164.5	151	140 Nm
V30E-160	179.5	185	240 Nm
V30E-270	205.5	223.5	400 Nm

Coding **EM...** and **EML...**







1 Pressure controller (option)
2 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
3 Power controller (option)
4 Prop. directional spool valve

	c
V30E-095	156
V30E-160	169
V30E-270	197

Dimension "c" in version with power controller + 30 mm

Caution
Risk of injury on overloading components due to incorrect pressure settings!
- Always monitor the pressure gauge when setting or changing the pressure.

4.4 Pump combinations

4.4.1 Pump combinations

A support is to be provided for pump combinations installed horizontally.

Two variable displacement axial piston pumps can be coupled together using an intermediate flange. The sizing of the shafts also permits the transmission of the full torque to the second pump.

Same controller range as for individual pumps.

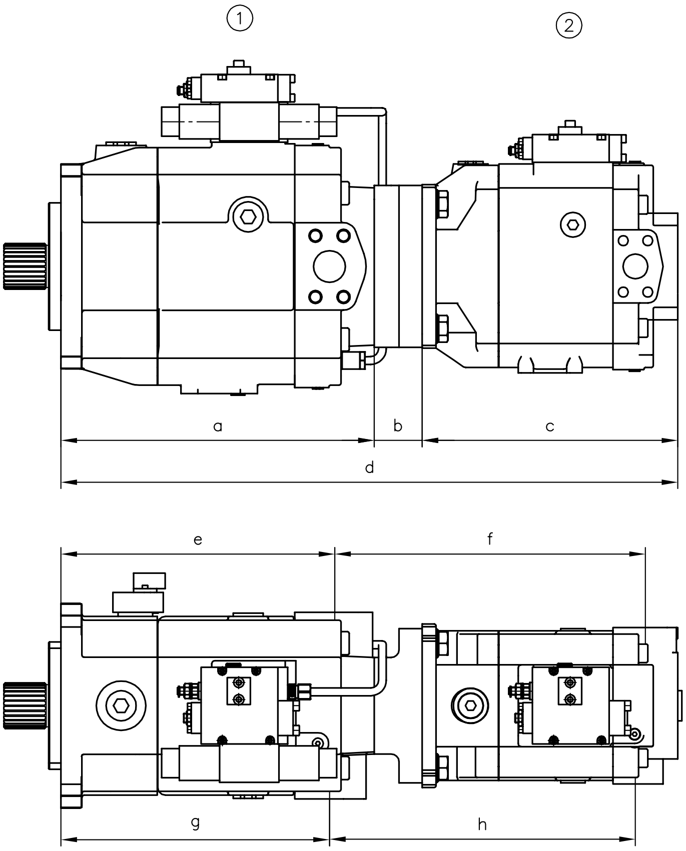
Available shaft designs: "D" and "S".

Flange versions available for tandem pumps, see Chapter 2, "Available versions, main data", Table 11

Order coding example: **V30E-270 RDFN-2-2-02/EMP/120-200-C257-V30E-160 RDGN-1-1-02/P/120-200**

(1. Pump) (2. Pump)

(For type coding key, see Chapter 2, "Available versions, main data")



1 1st pump

2 2nd pump

Table of dimensions

1st pump	Coding	V30E-095 ..DG..-2-..-02								V30E-095 ..SF..-2-..-02							
2nd pump		**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**
V30E-095 ..DG..-1-..-02	C 251	282.5	47	296.5	625	252.5	329.5	239.5	329.5								
V30E-095 ..SF..-1-..-02	C 220									282.5	62	296.5	640	252.5	344.5	239.5	344.5

Table of dimensions

1st pump	Coding	V30E-160 ..DG..-2-..-02								V30E-160 ..SF..-2-..-02							
2nd pump		**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**
V30E-095 ..DG..-1-..-02	C 261	331.5	47	296.5	675	289.5	341.5	276.5	341.5								
V30E-095 ..SF..-1-..-02	C 230									331.5	62	296.5	690	289.5	356.5	276.5	256.5
V30E-160 ..DG..-1-..-02	C 263	331.5	52	344	727.5	289.5	383.5	276.5	383.5								
V30E-160 ..SF..-1-..-02	C 230									331.5	62	344	737.5	289.5	393.5	276.5	393.5

Table of dimensions

1st pump	Coding	V30E-270 ..DG..-2-..-02								V30E-270 ..SF..-2-..-02							
1st pump		**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**
V30E-095 ..DG..-1-..-02	C 271	399	47	296.5	742.5	348	350.5	341	344.5								
V30E-095 ..SF..-1-..-02	C 240									406	62	296.5	764.5	355	365.5	348	359.5
V30E-160 ..DG..-1-..-02																	
V30E-160 ..SF..-1-..-02	C 240									406	62	344	812	355	402.5	348	396.5
V30E-270 ..DG..-1-..-02																	
V30E-270 ..SF..-1-..-02	C 241									406	69	413	888	355	475	348	475

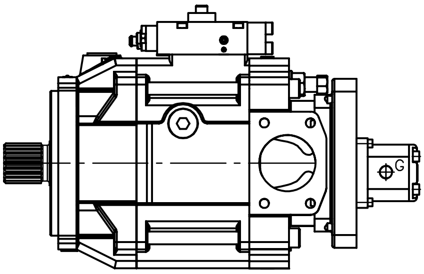
4.4.2 Combination with dent pump

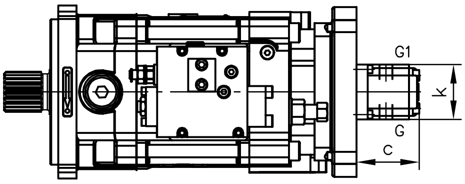
A directly mounted auxiliary or additional gear pump is available.

All pipe work is fitted when a pump with electro-hydraulic prop. adjustment together with directly mounted auxiliary pump is ordered.

Order coding example: V30E-160 RKGN 2 -1 - XX / LSP / 280 - **C 221 - Z 02-5**

Basic pump V30E





Coding	Geometric displacement V_g (cm³/rev.)	Auxiliary pump for	G	G1	c	k
Z 02-6	6.0	V30E-095	G 3/8	G 3/8	77	68
Z 02-9	8.40	V30E-160	G 3/8	G 3/8	87	68
Z 02-11	10.80	V30E-270	G 3/8	G 3/8	98	89

Note
Auxiliary pump is required for the electro-hydraulic pump adjustment coding EM...

Note
With EM a gear pump twice as large as the auxiliary pump can be used on tandem pumps.

Note
Values "c" and "k" are reference values only.

Further characteristic values on request!

5 Installation information

5.1 General information

The V30E is designed for use in an open circuit.

It can be mounted using a flange in accordance with specifications.

The various controllers can be fitted as intermediate plate versions or as separate devices as required.

The following essential points must be noted when installing the pump:

Mounting and removal of the pump and attached components may be performed by trained persons only. Ensure absolute cleanliness during all work. Contamination may have an adverse effect on the function and service life of the pump.

- Remove all plastic plugs prior to initial operation.
- Avoid installing the motor above the tank (see "Installation positions" in Chapter 5.3, "Installation positions").
- When selecting the connecting lines, observe the reference values in .
- Prior to initial operation, fill the pump with oil and bleed. Automatic pump filling via the suction line by opening the drain ports is not possible.
- Prevent the pump and suction line from running dry.
- Always ensure a constant supply of oil. Even a brief shortage in the supply of hydraulic fluid to the pump may damage internal parts. This may not be immediately evident after initial operation.
- The hydraulic oil returning to the tank from the system must not be sucked back in immediately (baffles).
- Run the pump for approx. 10 minutes at max. 50 bar after initial operation.
- Thorough bleeding/flushing of the entire system is recommended before the full pressure range is used.
- Observe the max. permissible operating range temperatures (see Chapter 3, "Parameters") at all times.
- Always comply with the specified oil purity classes (see Chapter 3, "Parameters"); provide appropriate hydraulic fluid filtering.
- Use of a filter in the intake line must be approved by HAWE Hydraulik.
- Include a main pressure-limiting valve in the pressure line to limit the max. system pressure.

5.2 Ports

The nominal diameter of the connecting lines depends on the specified operating conditions, the viscosity of the hydraulic fluid, the start-up and operating temperatures and the speed of the pump. In principle we recommend the use of hose lines due to the superior damping characteristics.

Bleeding and flushing port

V30E pumps are fitted with a G1/4 bleeding and flushing port. This is used to bleed and flush the front shaft bearing in the case of vertical installation.

Pressure port

The pressure port connection on type V30E is established via SAE ports; see Section 5 Device measurements.

Observe the tightening torque specified by the part manufacturer.

Suction port

Where necessary, the suction port on all pumps can be established via SAE ports; see Chapter 4, "Dimensions".

If possible, route the suction line to the tank in such a way that it is steadily rising. This allows trapped air to escape. Observe the specifications in "Installation positions", Chapter 5.3, "Installation positions". The absolute intake pressure must not fall below 0.85 bar. A hose line should generally be used in preference to a rigid pipe.

Drain port

The V30E pumps have 3 drain ports G 3/4" or G 1".

The nominal diameter of the overflow oil line must not be less than 16 mm. The cross-section is determined by the max. permissible housing pressure.

Integrate the overflow oil line in the system in such a way as to prevent direct connection with the suction line of the pump.

All drain ports can be used simultaneously.

A separate overflow oil line from the controller to the tank is not required. Observe the specifications in the "Installation positions" section, Chapter 5.3, "Installation positions".

The top drain port can also be used to fill the housing.

LS port for version LSP

The LS line is connected to the controller via a G 1/4 threaded connection.

The nominal diameter of the line depends on the installation position of the pump and should be 10 % of the pressure line capacity. A hose line should generally be used in preference to a rigid pipe.

- When the proportional directional spool valve is in a neutral position, the LS line must be fully relieved (only controller type LSNR, LSN). In the case of controller type LSNRT, relief takes place internally in the controller.

For operation with HFC (35 - 50 % water content) the following restrictions apply

- The tank is above the pump
- The temperature does not exceed 50°C
- The fluid velocity in the suction line is below 1m/s
- Pump pressure maximum 200 bar
- The two shaft bearings on a pump are flushed with cool oil via separate feeds, each bearing with 3 lpm (V30E-095), 4 lpm (V30E-160) and 5 lpm (V30E-270)

For operation with liquids with a water content ≤ 20 % the following restrictions apply

- The tank is above the pump
- The tank temperature does not exceed 70°C
- The fluid velocity in the suction line is below 1 m/s
- Pump pressure maximum 300 bar
- Possible without bearing flushing

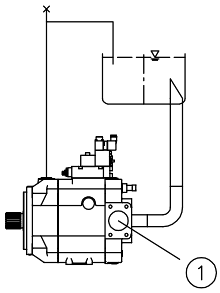
5.3 Installation positions

The V30E can be installed in any installation position.

A support is required for tandem pumps or multiple hydraulic pumps mounted in series. The following points must be observed:

Horizontal installation: (pump below the min. fill level)

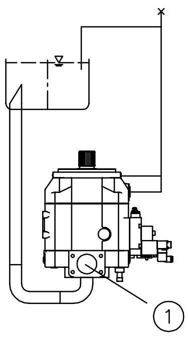
For horizontal installation, use the uppermost drain port.



1 Suction port open

Vertical installation: (pump below the min. fill level)

Mount the pump so that the pump mounting flange is facing upwards. For vertical installation, use the uppermost drain port. Also connect the G 1/4" bleeding port on the pump flange. Take appropriate measures to ensure continuous bleeding of this line (line routing/bleeding).
For installation with the pump flange facing downwards, please contact HAWE Hydraulik.

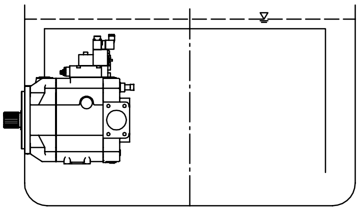


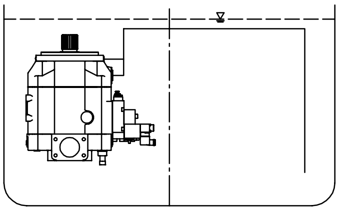
1 Suction port open

5.4 Tank installation

Tank installation (pump below the min. fill level)

The pump can be operated either with or without a suction tube. Using a short suction intake is recommended.



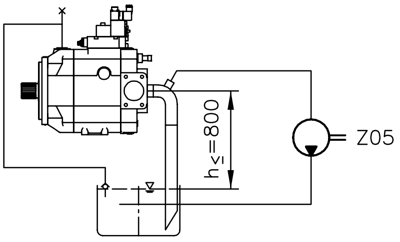


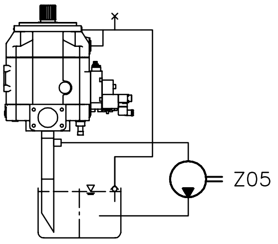
Additional notes regarding installation above the fill level

Special measures are required if the pump is installed above the fill level. The pump must not run dry via the pressure, intake, drain/bleed or control lines. This applies in particular to long periods of downtime.

- A check valve (opening pressure approx. 0.5 to 0.6 bar) in the overflow oil line can prevent the pump housing from being emptied.
- Facilitate bleeding of connecting lines via separate bleed openings.
- Adjust the bleeding sequence to the specific installation.
- A gear pump must be provided in order to fill the suction line.

For specialist advice on designing axial piston pumps, the following contact form is available:
Checklist for designing variable displacement axial piston pumps: B 7960 checklist.





For further information on installation, operation and maintenance, see the relevant assembly instructions:
B 7960, B 5488.

6 Installation, operation and maintenance information

6.1 Designated use

This fluid-power product has been designed, manufactured and tested acc. to standards and regulations generally applicable in the European Union and left the plant in a safe and fault-free condition.

To maintain this condition and ensure safe operation, operators must observe the information and warnings in this documentation.

This fluid-power product must be installed and integrated in a hydraulic system by a qualified staff who is familiar with and observes the general engineering principles and relevant applicable regulations and standards.

In addition, application-specific features of the system or installation location must be taken into account if relevant.

This product may only be used as a pump within oil-hydraulic systems.

The product must be operated within the specified data. This documentation contains the technical parameters for various product versions.

Note
Non-compliance will void any warranty claims made against HAWE Hydraulik.

6.2 Assembly information

The hydraulic accumulator must be integrated in the system via state of the art connection components (screw fittings, hoses, pipes, etc.). The hydraulic system must be shut down as a precautionary measure prior to dismounting; this applies in particular to systems with hydraulic accumulators.

6.3 Operating instructions

Product, pressure and/or flow settings

All statements in this documentation must be observed for all product, pressure and/or flow settings on or in the hydraulic system.

Caution
Risk of injury on overloading components due to incorrect pressure settings!
- Always monitor the pressure gauge when setting or changing the pressure.

Filtering and purity of the hydraulic fluid

Soiling in the fine range, e.g. abraded material and dust, or in the macro range, e.g. chips, rubber particles from hoses and seals, can cause significant malfunctions in a hydraulic system. It is also to be noted that new hydraulic fluid “from the drum” does not necessarily meet the highest purity requirements.

For trouble-free operation pay attention to the purity of the hydraulic fluid (see also purity class in Chapter 3, "Parameters").

6.4 Maintenance information

This product is largely maintenance-free.

Conduct a visual inspection to check the hydraulic connections for damage at regular intervals, but at least once per year. If external leaks are found, shut down and remedy.

Check the device surfaces for dust deposits at regular intervals (but at least annually) and clean the device if required.

Additional versions

- General operating manual for the assembly, initial operation and maintenance of hydraulic components and systems: B 5488
- Variable displacement axial piston pump type V60N: D 7960 N
- Variable displacement axial piston pump type V40M: D 7961
- Variable displacement axial piston pump type V30D: D 7960
- Fixed displacement axial piston pump type K60N: D 7960 K
- Axial piston motors type M60N: D 7960 M
- Proportional directional spool valve, type PSL and PSV size 2: D 7700-2
- Proportional directional spool valve, type PSL, PSM and PSV size 3: D 7700-3
- Proportional directional spool valve, type PSL, PSM and PSV size 5: D 7700-5
- Proportional directional spool valve type PSLF, PSVF and SLF size 3: D 7700-3F
- Proportional directional spool valve type PSLF, PSVF and SLF size 5: D 7700-5F
- Proportional directional spool valve banks, type PSLF, PSVF and SLF size 7: D 7700-7F
- Load-holding valve type LHT: D 7918
- Load-holding valve type LHDV: D 7770
- Proportional amplifier type EV1M3: D 7831/2
- Proportional amplifier type EV1D: D 7831 D

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