

# Variable displacement axial piston pump type V30E

## Product documentation

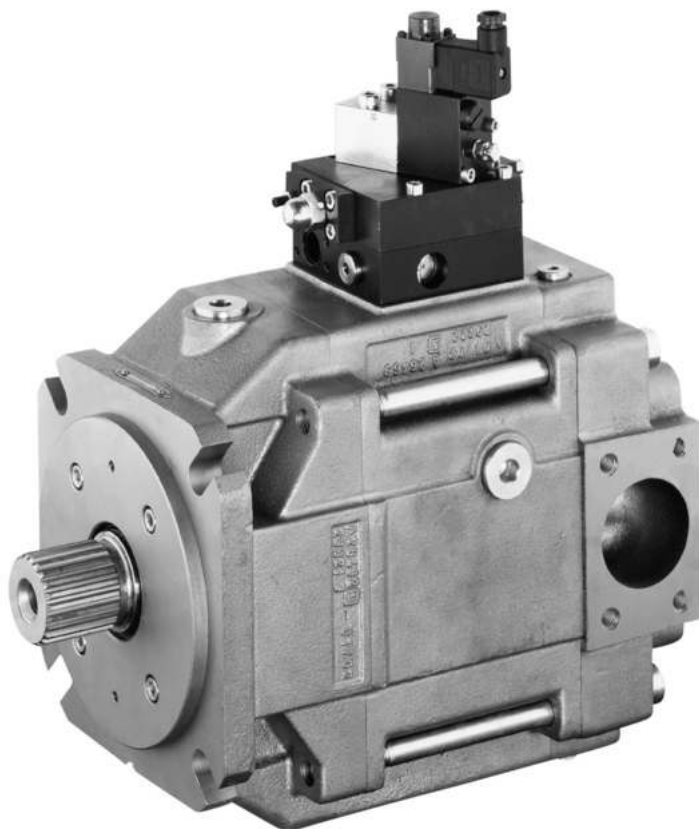


Open circuit

Nominal pressure  $p_{\text{nom max}}$ : 350 bar

Peak pressure  $p_{\text{max}}$ : 420 bar

Displacement volume  $V_{\text{max}}$ : 270 cm<sup>3</sup>/rev



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**1****Overview: variable displacement axial piston pump type V30E**

Variable displacement axial piston pumps adjust the geometric output volume from maximum to zero. As a result they vary the flow rate that is provided to the consumers.

The variable displacement axial piston pump type V30E is designed for open circuits in mobile hydraulics and operates according to the swash plate principle. It is available with the option of a thru-shaft for operating with additional hydraulic pumps in series.

The sturdy pump is particularly suitable for continuous operation in challenging applications. The range of pump controllers allows the axial piston pump to be used in a variety of applications.

**Features and benefits**

- Low-noise
- Broad selection of controllers
- Full torque available at the second pump in tandem pump applications

**Intended applications**

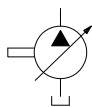
- Machines for forestry and agricultural purposes
- Cranes and lifting equipment
- Construction machines



*Variable displacement axial piston pump type V30E*

## 2 Available versions

### Circuit symbol



### Ordering example

V30E-095	R	D	G	N	-2	-0	-02	/PL	-200	-C 211	-Z 05
											4.4.2 "Combination with gear pump"
											2.9 "Flange version (output side)"
											Pressure setting (nominal pressure) (bar)
											2.8 "Controller"
											Manufacturing series
											2.7 "Swivel angle indicator"
											2.6 "Thru-shaft"
											2.5 "Seals"
											2.4 "Flange version (input side)"
											2.3 "Shaft journal"
											2.2 "Rotation direction"
											2.1 "Basic type and nominal size"

### 2.1 Basic type and nominal size

Type	Displacement volume (cm <sup>3</sup> /rev)	Nominal pressure p <sub>nom</sub> (bar)	Peak pressure p <sub>max</sub> (bar)
V30E-095	98	350	420
V30E-160	160	350	420
V30E-270	270	350	420



#### NOTICE

When using HFC pressure fluid p<sub>max</sub> = 300 bar, see Chapter 2.5, "Seals", coding C.

### 2.2 Rotation direction

Coding	Description
L	Anti-clockwise
R	Clockwise

## 2.3 Shaft journal

Coding	Description	Designation/standard	for	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	Ø40 - 12x8x80 DIN 6885	V30E-095	650
		Ø50 - 14x9x80 DIN 6885	V30E-160	850
		Ø60 - 18x11x100 DIN 6885	V30E-270	1700
S	Spline shaft	SAE-D J 744 13T 8/16 DP 44-4 DIN 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 DIN ISO 3019-1	V30E-270	1200

### ! NOTICE

Coding **K**: For a pressure setting of over 300 bar, a power controller must be used.

## 2.4 Flange version (input side)

Coding	Description	Designation	for
G	Flange	160 B4 HW DIN ISO 3019-2	V30E-095
		180 B4 HW DIN ISO 3019-2	V30E-160, V30E-270
F	Flange	SAE-D 4-hole J 744 152-4 DIN ISO 3019-1	V30E-095, V30E-160
		SAE-E 4-hole J 744 165-4 DIN ISO 3019-1	V30E-270
W	Flange	SAE-D 4-hole J 744 152-4 DIN ISO 3019-1	V30E-270

## 2.5 Seals

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

## 2.6 Thru-shaft

Coding	Description
-1	no thru-shaft
-2	Thru-shaft for tandem pump

## 2.7 Swivel angle indicator

Coding	Description
-0	without display
-1	with display
-2	with swivel angle pick-up (Hall sensor)

## 2.8 Controller

### Load-sensing controller

Coding	Description
LSP	Load-sensing controller with integrated pressure limitation
LSPb	Load-sensing controller with integrated pressure limitation and external pump pressure feedback

### Pressure controller

Coding	Description
P	Pressure controller with remote-control port for external pilot valve
Pb	Pressure controller with remote-control port for external pilot valve and external pump pressure feedback
PMVPS4 -41/G 12 -42/G 24 -43	Pressure range: -41: (5) to 180 bar -42: (5) to 290 bar -43: (5) to 440 bar Additional, directly mounted electro proportional pressure-limiting valve
BVPM1 S /GM 12 R /GM 24	S: NO contact R: N/C contact Additional, directly mounted 2/2-way directional seated valve for one pump direction switching circuit

### Power controller

Coding	Description
L	Power controller
Lf	Hydraulically adjustable power controller with increasing characteristic curve
Lf1	Hydraulically adjustable power controller with decreasing characteristic curve
Lfe	Electrically adjustable power controller with increasing characteristic curve

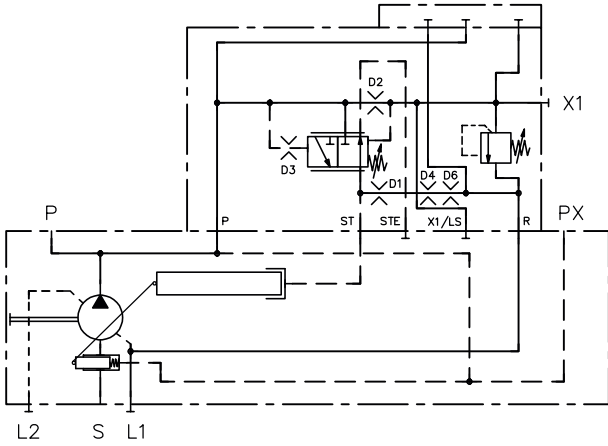
### Delivery flow controller

Coding	Description
V	Electro-proportional delivery flow controller with increasing characteristic curve
EM.CH	Electro-hydraulic flow controller

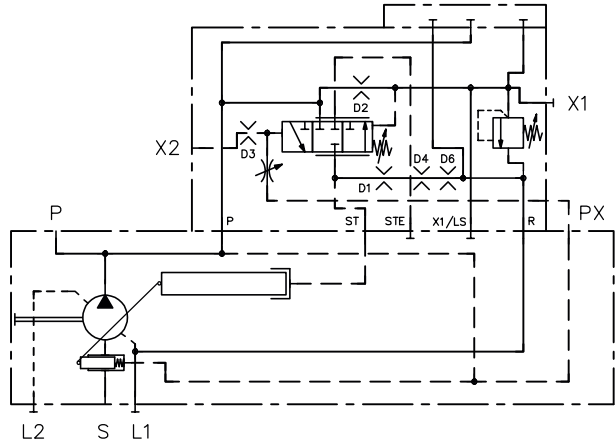
## 2.8.1 Pressure controller P, Pb

P- and Pb-controllers are pressure controllers with fixed pressure setting. As soon as the pump pressure exceeds the set value, the pressure controller reduces the swivel angle of the pump and adjusts the pressure level to a constant value. Depending on the controller type, the pressure is set either using an adjusting screw directly on the controller or using an external pilot valve on port X.

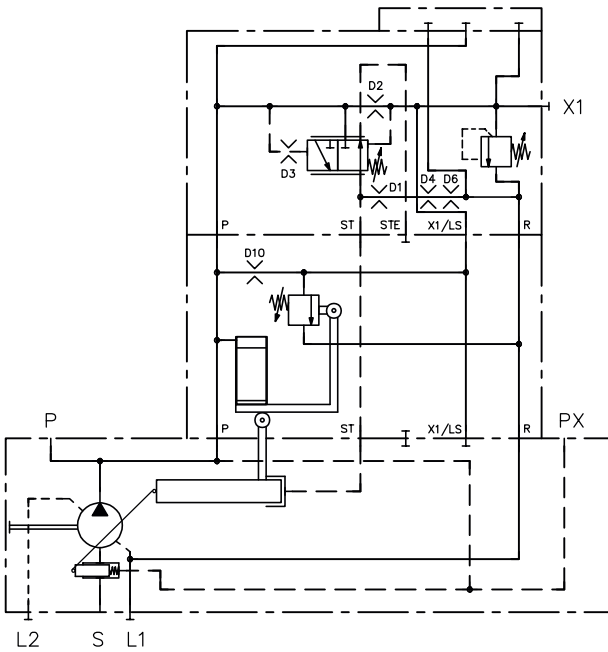
Coding P



Coding Pb



Coding PL



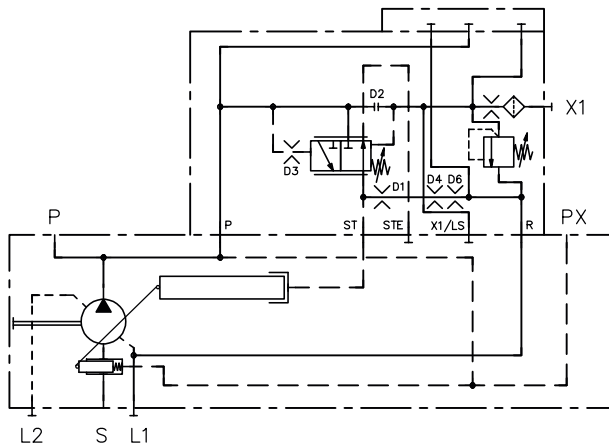
System pressure is tapped within the controller (internal).

The system pressure is tapped externally and signalled to port X2 to compensate any potential pressure losses in the system.

## 2.8.2 Load-sensing controller LSP, LSPb

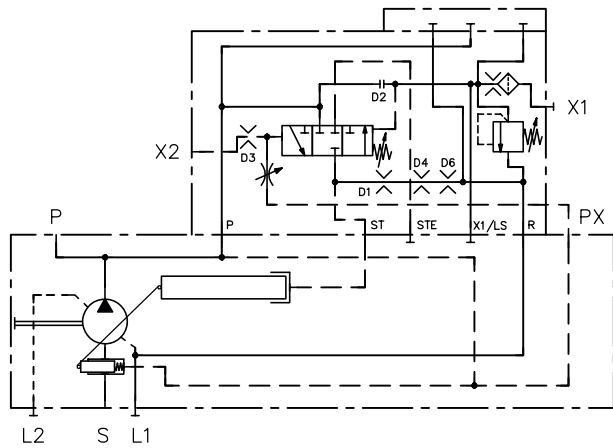
The LSP and LSPb controllers are flow controllers that generate a variable, speed-independent flow rate. The controller adapts the displacement volume of the pump to the required flow rate of the consumer and regulates a constant difference between load pressure and pump pressure.

### Coding LSP



System pressure is tapped within the controller (internal).

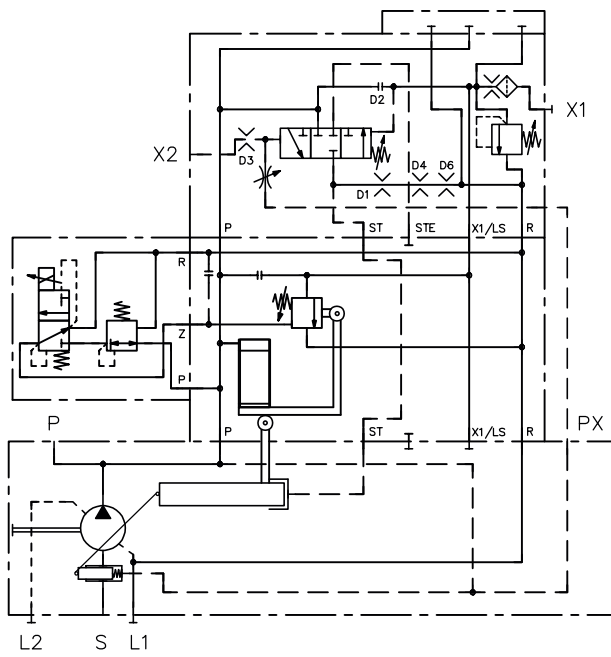
### Coding LSPb



The system pressure is tapped externally and signalled to port X2 to compensate any potential pressure losses in the system.

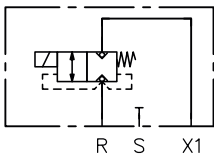


Coding **LSPLfe**

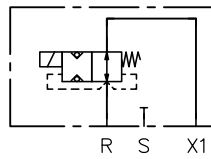


## 2.8.4 Controller BVPM, PM

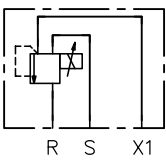
Coding **BVPM1R**



Coding **BVPM1S**



Coding **PMVPS4**



## 2.8.5 Flow controller EM.CH

### EM.CH controller

The electro-hydraulic delivery flow controller EM.CH 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).

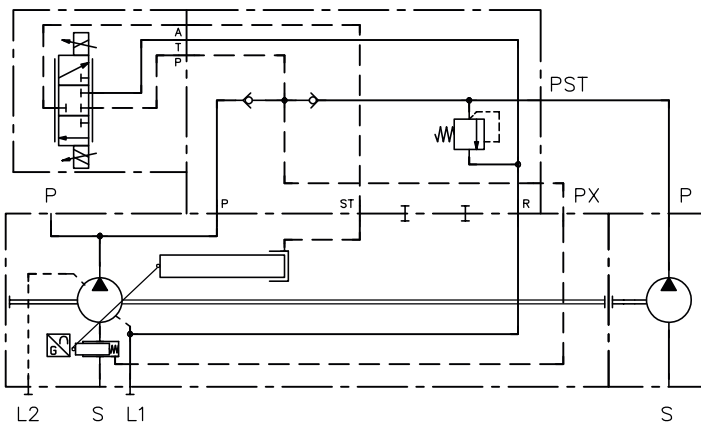
The power for the adjustment is taken from the high-pressure line. System pressures under 50 bar will require an auxiliary pump in addition (thru-shaft).

Associated auxiliary pump: V30E-09S: Z 02-6, V30E-160: Z 02-8, V30E-270: Z 02-11

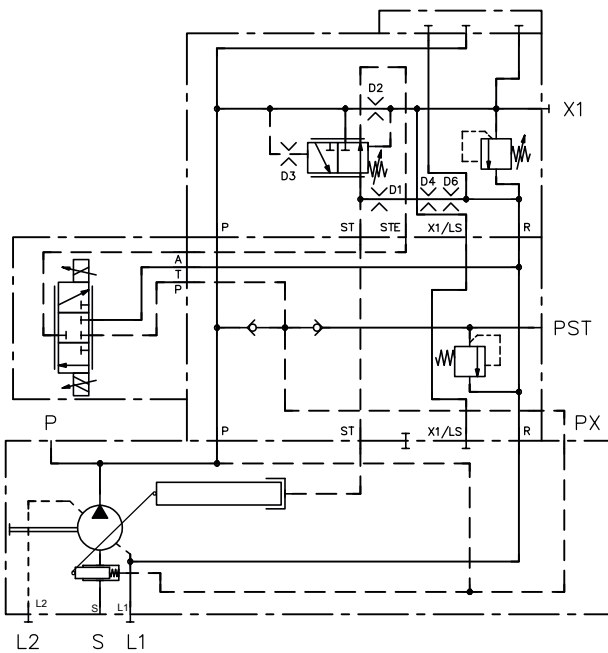
The control system consists of the pump adjustment system, an NG 6 prop. directional valve and a swivel angle pick-up (coding 2) for actual value determination.

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.

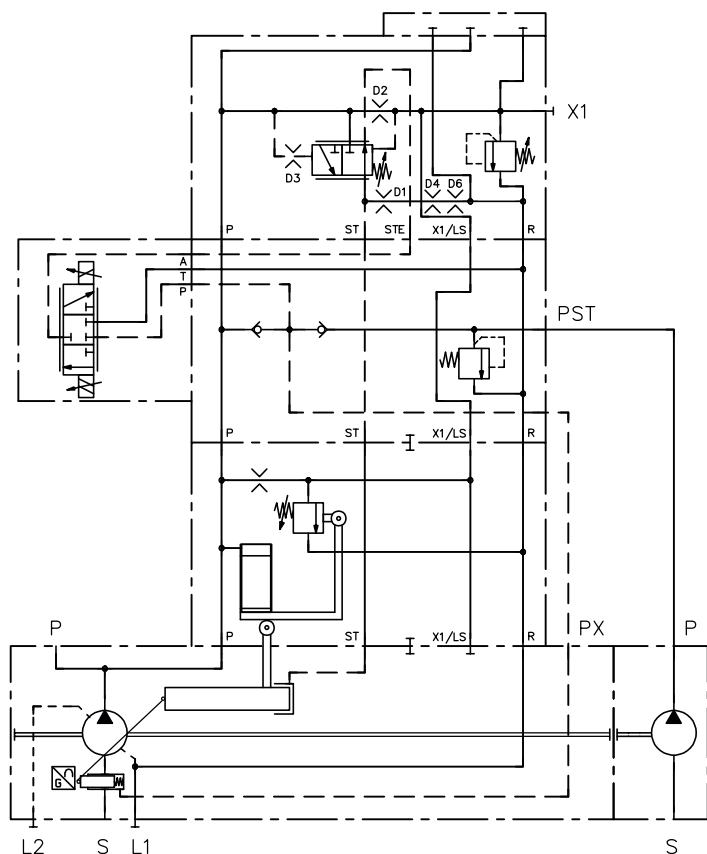
### Coding **EMOCH**



### Coding **EMPCH**



Coding **EMPLCH**



**NOTICE**

The adjustment times are approx. 200 ms.

The EM.CH controller can be combined with pressure, LS and/or power controllers to limit pressure and/or power.

**NOTICE**

Additional, separately laid out overpressure protection (pressure-limiting valve) must be included in the hydraulics circuit in order to prevent pressure peaks.

**Ordering example**

Version without pressure limitation and power controller:

V30E-160 R S F N -1 -1 -XX /EMOCH

Version with pressure and power controller:

V30E-270 L D G N -2 -1 -XX /EMLPCH -350 -2250 -C232 -Z11

## 2.9 Flange version (output side)

### Ordering example:

V30E-160 RDGN-2-0-04/LSP-350- C 222

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 DIN ISO 3019-1	SAE-A J 744 (16-4 DIN ISO 3019-1) 9T 16/32 DP	
C 212	C 222	C 232	SAE-A 2-hole J 744 82-2 DIN ISO 3019-1	SAE-A J 744 (16-4 DIN ISO 3019-1) 9T 16/32 DP <sup>1)</sup>	
C 213	C 223	--	SAE-A 2-hole J 744 82-2 DIN ISO 3019-1	19-4 DIN ISO 3019-1 11T 16/32 DP	
C 214	C 224	C 234	SAE-B 2-hole J 744 101-2 DIN ISO 3019-1	SAE-B J 744 (22-4 DIN ISO 3019-1) 13T 16/32 DP	V60N-060 .. HX
C 215	C 225	C 235	SAE-B 4-hole J 744 101-4 DIN ISO 3019-1	SAE-B J 744 (22-4 DIN ISO 3019-1) 13T 16/32 DP	V60N-060 .. HZ
C 216	C 226	C 236	SAE-B 2/4-hole 101-2/4 DIN ISO 3019-1	SAE-BB J 744 (25-4 DIN ISO 3019-1) 15T 16/32 DP	V40M
--	C 227	C 237	SAE-C 2-hole J 744 127-2 DIN ISO 3019-1	SAE-C J 744 (32-4 DIN ISO 3019-1) 14T 12/24 DP	
C 218	C 228	C 238	SAE-C 4-hole J 744 127-4 DIN ISO 3019-1	SAE-C J 744 (32-4 DIN ISO 3019-1) 14T 12/24 DP	V60N- .. SF
--	C 229	--	SAE-C 4-hole J 744 127-4 DIN ISO 3019-1	23T 16/32 DP	
C 220	C 230	C 240	SAE-D 4-hole J 744 152-4 DIN ISO 3019-1	SAE-D&E J 744 (44-4 DIN ISO 3019-1) 13T 8/16 DP	V30E-095 ..SF.. /V30E-160 ..SF..
--	--	C 241	SAE-E 4-hole J 744 165-4 DIN 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 DIN ISO 3019-2	W45x2x21x9g DIN 5480	V30E-095 ..DG..
--	C 256	C 261	SAE-D 4-hole J 744 152-4 DIN ISO 3019-1	W45x2x21x9g DIN 5480	V30E-095 ..DF..
--	C 257	C 262	180 B4 HW DIN ISO 3019-2	W50x2x24x9g DIN 5480	V30E-160 ..DG..
--	--	C 263	SAE-D 4-hole J 744 152-4 DIN ISO 3019-1	W50x2x24x9g DIN 5480	V30E-160 ..DF..
--	--	C 264	180 B4 HW DIN ISO 3019-2	W60x2x28x9g DIN 5480	V30E-270 ..DG..
--	--	C 266	SAE-E 4-hole J 744 165-4 DIN ISO 3019-2	W60x2x28x9g DIN 5480	V30E-270 ..DF..
C 252	C 259	C 268	180 B4 HW DIN ISO 3019-2	Ø25 wedge width 8	R size 6014 (D 6010) RZ size 6914 (D 6910)
--	C 271	--	DIN ISO 7653 (for HGV)	DIN ISO 14 (for HGV) B8x32x35	V60N-090 ..DY..
C 276	C 277	--	SAE-CS 4-hole J744 127-4 DIN ISO 3019-1	SAE-CS J744 /35-4 DIN ISO 3019-1) 21T 16/32 DP	

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



### NOTICE

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

**!** NOTICE

- An additional support is to be provided for pump combinations.
- Additional versions on request.

## 3 Parameters

### 3.1 General data

<b>Designation</b>	Variable displacement axial piston pump		
<b>Design</b>	Axial piston pump according to the swash plate principle		
<b>Mounting</b>	Flange mounting or foot bracket		
<b>Surface</b>	primed		
<b>Drive/output torque</b>	max. permissible drive/output torque (Nm)		
	<b>Nominal size</b>		
	<b>095</b>	<b>160</b>	<b>270/280</b>
<b>Spline shaft D</b>	1200/600	1700/850	3400/1700
<b>Parallel key K</b>	650/600	850/850	1700/1700
<b>Spline shaft S</b>	1200/600	1200/850	3100/1700
<b>Spline shaft U</b>	--	--	1200/1200
<b>Installation position</b>	any Installation information see Chapter 5, "Installation, operation and maintenance information"		
<b>Rotation direction</b>	Clockwise or anticlockwise		
<b>Ports/connections</b>	<ul style="list-style-type: none"> <li>▪ Suction port</li> <li>▪ Pressure connection</li> <li>▪ Drain port</li> <li>▪ Pressure gauge connection</li> </ul>		
<b>Hydraulic fluid</b>	Hydraulic fluid, according to DIN 51 524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 10 - 1000 mm <sup>2</sup> /s Optimal operating range: approx. 16 - 35 mm <sup>2</sup> /s		
<b>Cleanliness level</b>	<b>ISO 4406</b> 19/17/14		
<b>Temperatures</b>	Environment: approx. -40 to +60 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.		

Designation		Nominal size		
		095	160	270
Max. swash plate angle		15°	15°	15°
Absolute inlet pressure required in open circuit	bar	0.85	0.85	0.85
Minimum operating pressure	bar	15	15	15
Max. permissible housing pressure (static/dynamic)	bar	1/2	1/2	1/2
Max. permissible inlet pressure (static/dynamic)	bar	20/30	20/30	20/30
Max. speed during suction operation and max. swash plate angle at 1 bar abs. Inlet pressure	rpm	2500	2100	1800
Max. speed with zero stroke and 1 bar abs. Inlet pressure	rpm	2900	2500	2000
Min. speed in continuous operation	rpm	500	500	500
Required drive torque at 100 bar	Nm	153	261	414
Drive power at 250 bar and 1450 rpm	kW	66	107	177
Inertia torque	kg m <sup>2</sup>	0.0216	0.03	0,0825
Noise level at 250 bar, 1450 rpm and max. swash plate angle (measured in acoustic measurement chamber according to DIN ISO 4412-1, measuring distance 1 m)	dB(A)	73	74	78

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

**! NOTICE**  
The housing pressure is only allowed to be 1 bar higher than the suction pressure.

### 3.2 Weight

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

### 3.3 Pressure and delivery flow

Operating pressure	see Chapter 2.1, "Basic type and nominal size"
Displacement volume	see Chapter 2.1, "Basic type and nominal size"

### 3.4 Characteristic lines

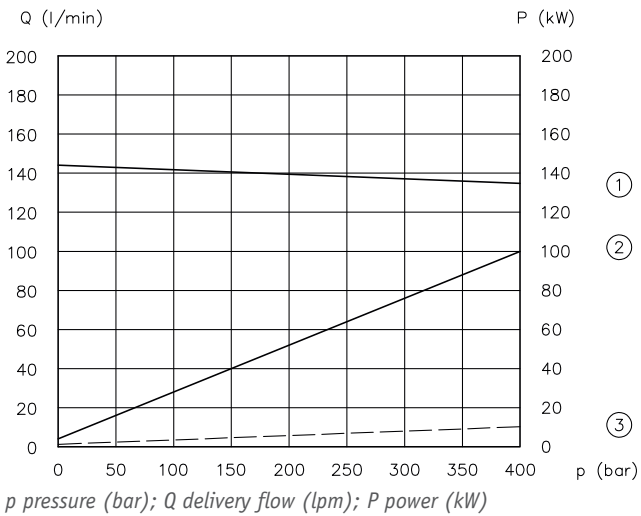
#### 3.4.1 Basic pump

##### Delivery flow and power

The diagram shows

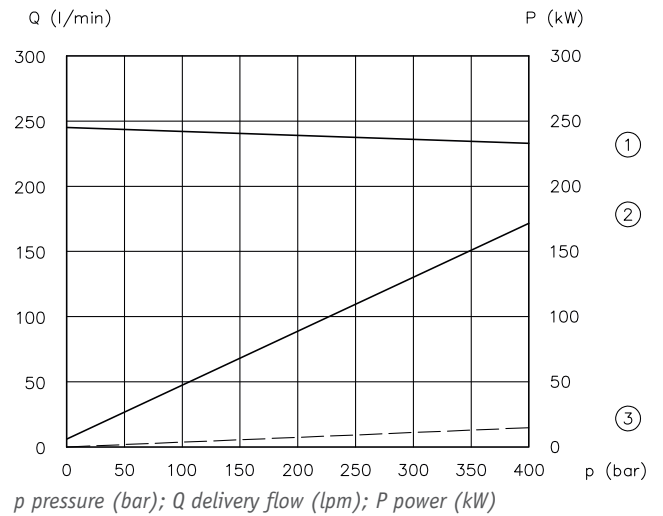
- Delivery flow/pressure (without controller)
- Drive power at max. swash plate angle and drive power at zero stroke and 1500 rpm
- Drive power/pressure at zero stroke and 1500 rpm

##### V30E-095



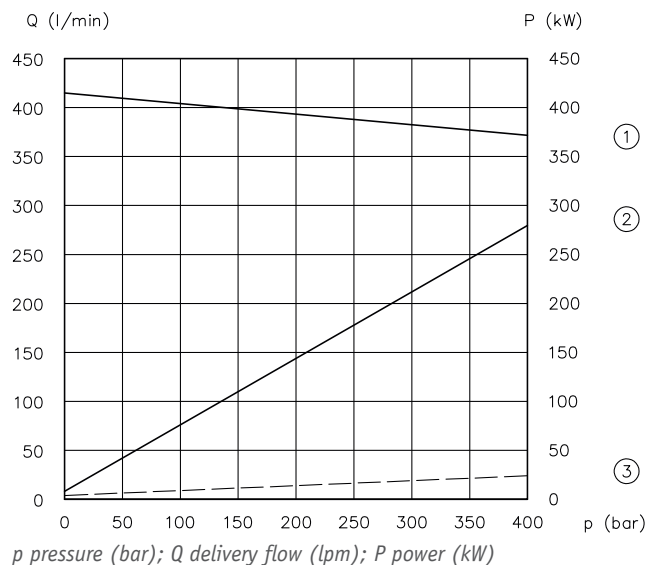
- 1 Delivery flow/pressure
- 2 Drive power/pressure
- 3 Drive power/pressure (zero stroke)

##### V30E-160



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

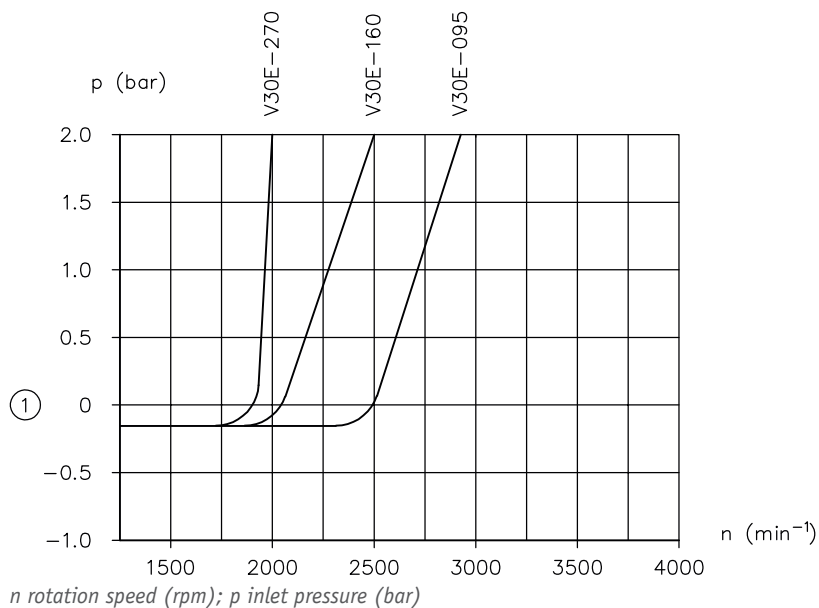
**V30E-270**



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

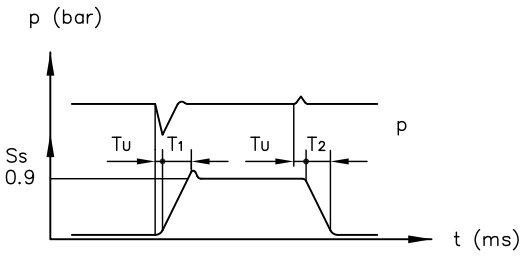
**Inlet pressure and self-suction speed**

The diagram shows the inlet pressure/rotation speed at max. swash plate angle and an oil viscosity of 75 mm<sup>2</sup>/s



- 1 0 bar relative = 1 bar absolute

**Acting times**



*t acting times (ms); p pressure (bar)*

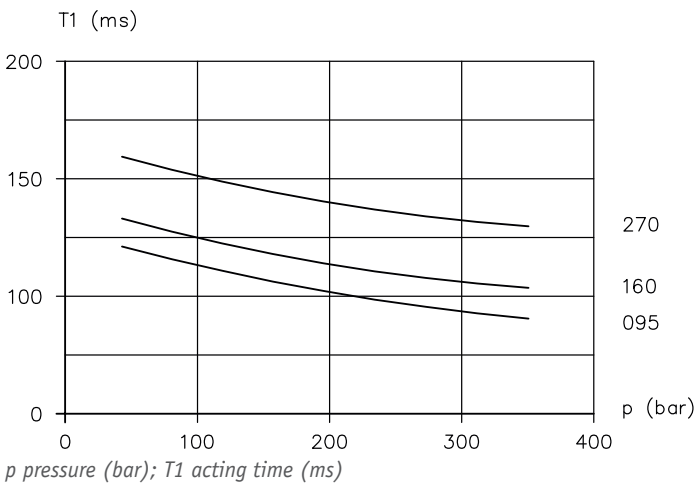
Ss Positioning travel of actuator

Tu Delay < 3 ms

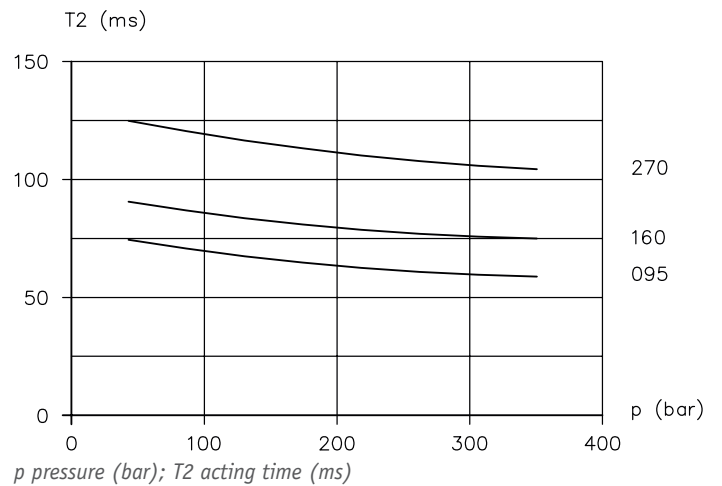
T1 On-stroke time

T2 Destroke time

p Pressure



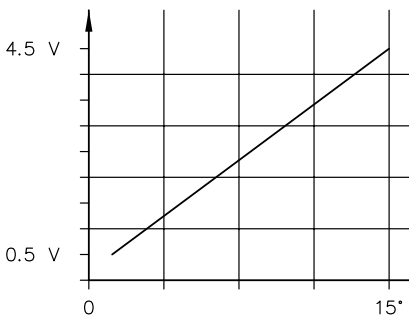
*p pressure (bar); T1 acting time (ms)*



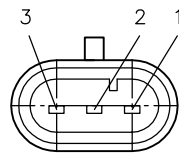
*p pressure (bar); T2 acting time (ms)*

**3.4.2 Swivel angle pick-up**

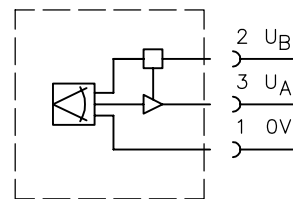
Pivoting angle pick-up



Pivoting angle pick-up



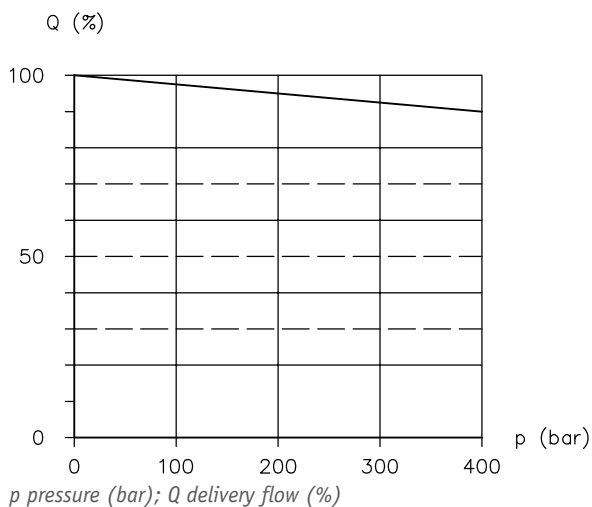
Pivoting angle pick-up



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

### 3.4.3 Controllers

#### Load-sensing controller LSP

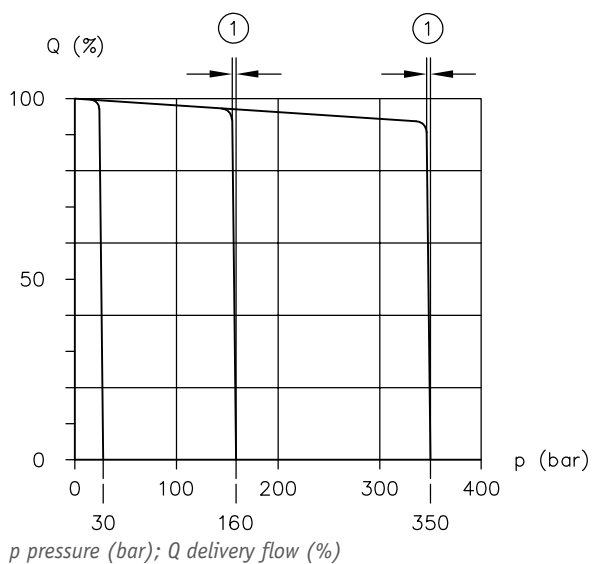


Drive speed constant  
LS line approx. 10 % of the volume of the P line

Control accuracy in relation to max. delivery flow

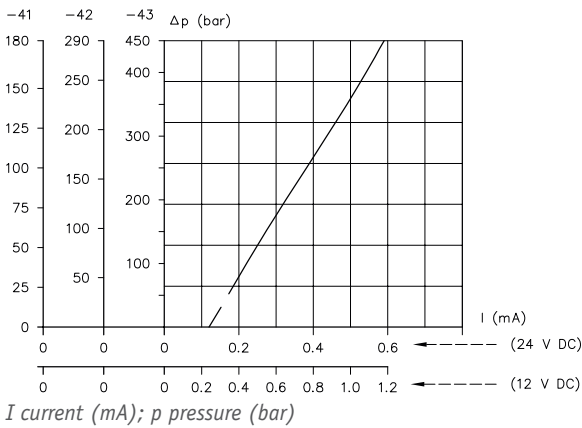
- a) Speed  $n$  constant, pressure variable between 30 and 350 bar (< 3%)
- b) Pressure  $p$  constant, speed variable (< 1%)

#### Pressure controller P, PMVPS, BVPM



1 Approx. 4 bar

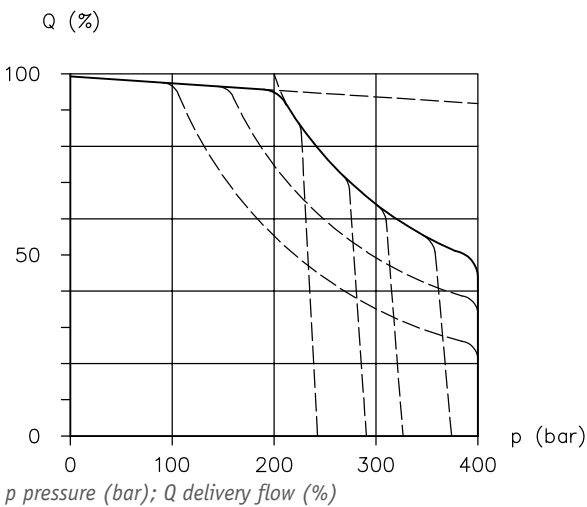
**PMVPS 4**



$I$  current (mA);  $p$  pressure (bar)

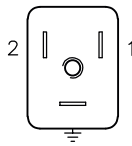
**BVPM 1**

**Power controller L, Lf, Lf1, Lfe**

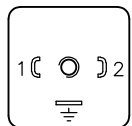


$p$  pressure (bar);  $Q$  delivery flow (%)

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 properly	
Required dither frequency	60 - 150 Hz	
Dither amplitude	30 to 60% of $I_N$	
Further information	<a href="#">D 7485/1</a>	
Electrical connection	Industry standard (11 mm)	
<b>G 12, G 24, X 12, X 24</b>		
Industry standard (similar to EN 175 301-803)		



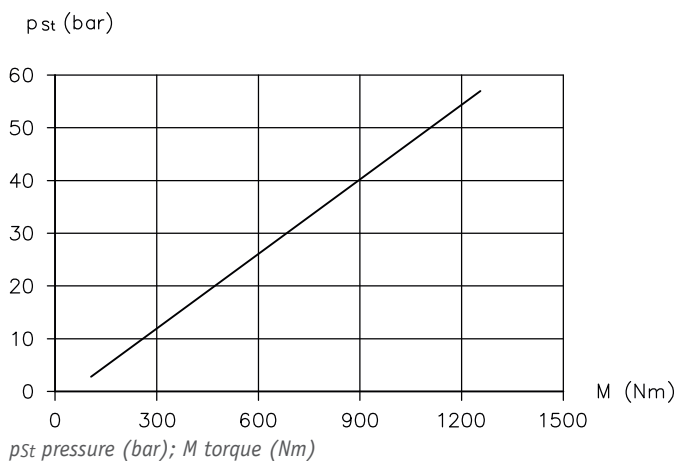
Nominal voltage $U_N$	12 V DC	24 V DC
Nominal current $I_N$	2.2 A	1.1 A
Nominal power $P_N$	29.4 W	27.6 W
Protection class	IP 65 (IEC 60529) with connector installed properly	
Further information	<a href="#">D 7765</a>	
Electrical connection	EN 175 301-803 A	



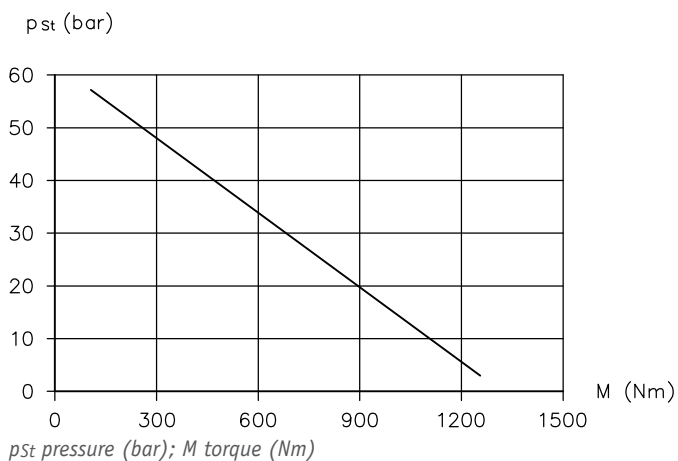
Coding	Drive torque (Nm)	Corresponds to kW/rpm
095	99	15/1500
160	146	22/1500
270	300	45/1500

**i INFORMATION**  
Lowest recommended nominal torque setting.

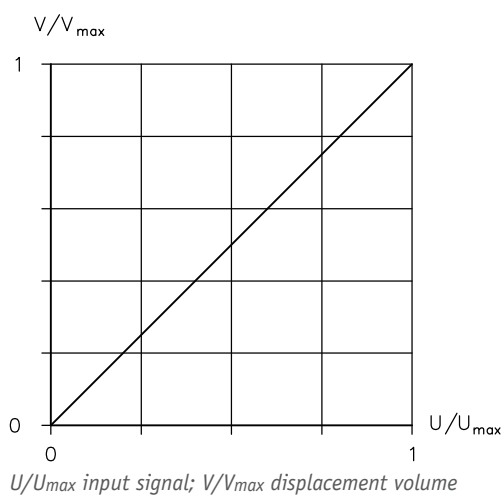
### Lf



### Lf1



## Flow controller EM..CH



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

## 4 Dimensions

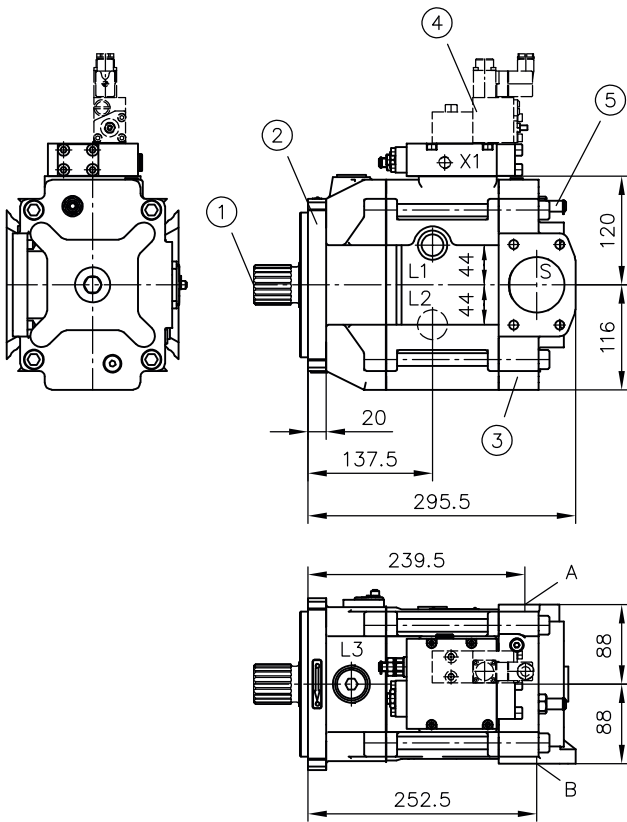
All dimensions in mm, subject to change.

### 4.1 Basic pump

#### 4.1.1 Type V30E-095

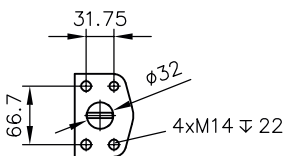
Rotation direction **clockwise** (viewed from shaft journal)

V30E-095, R

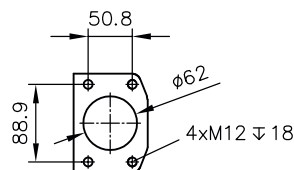


- 1 Shaft journal
- 2 Flange version
- 3 Thru-shaft
- 4 Controller
- 5 Stroke limitation (approx. 7.5 ccm/rev)

#### Pressure connection

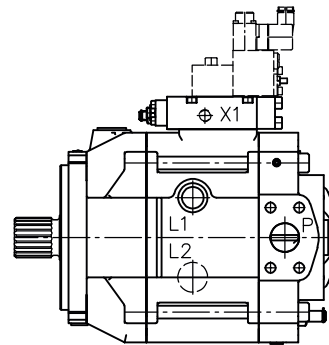


#### Suction port



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

V30E-095 L



#### Drain ports

L1, L2, L3 G 3/4

#### Rotation direction clockwise

A = pressure connection

B = suction port

#### Rotation direction anti-clockwise

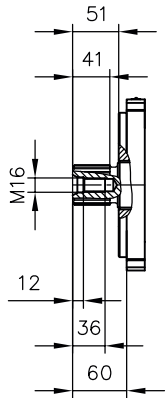
A = suction port

B = pressure connection

**Shaft journal**

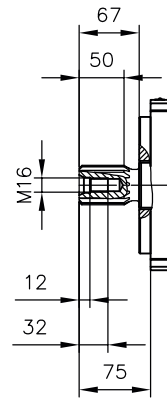
**Spline shaft**

Coding **D**  
(W45x2x21x9g DIN 5480)



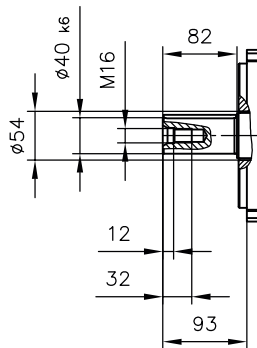
**Spline shaft**

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



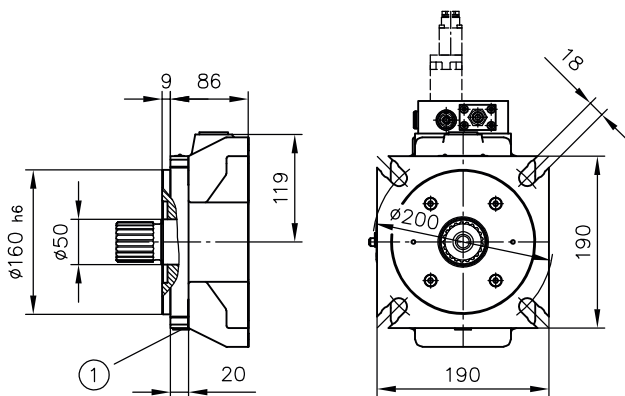
**Parallel key shaft**

Coding **K**  
( $\varnothing 40 - 12 \times 8 \times 80$  DIN 6885)



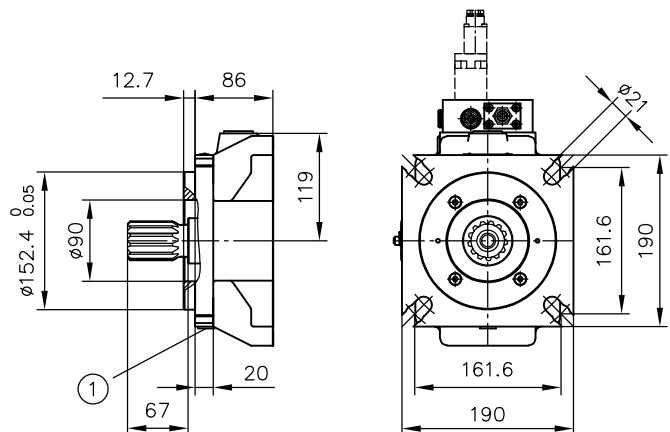
**Flange version (input side)**

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



1 Venting and flushing port G 1/4

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

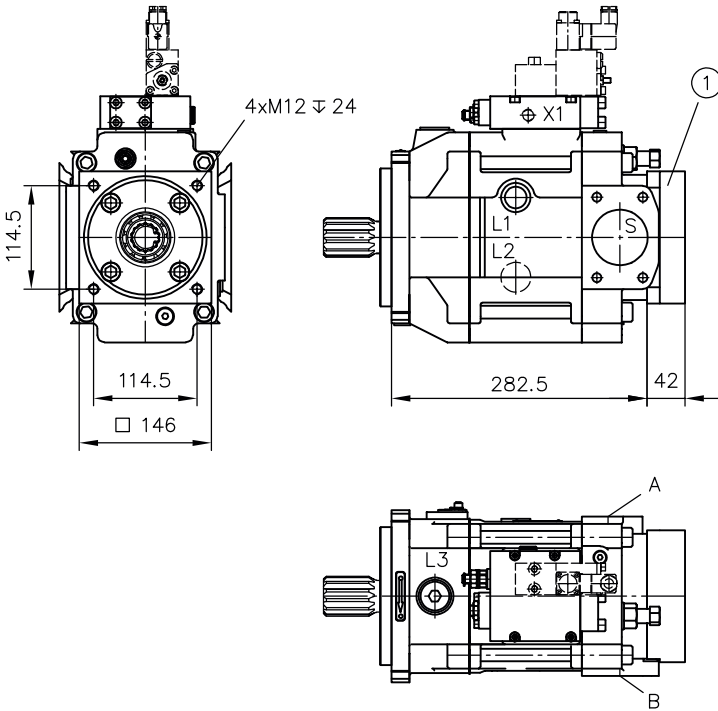


1 Venting and flushing port G 1/4

**Thru-shaft**

Housing version (radial ports, with thru-shaft)

V30E-095 ...-2



1 Flange version (output side)

**Rotation direction  
clockwise**

A = pressure connection

B = suction port

**Rotation direction anti-  
clockwise**

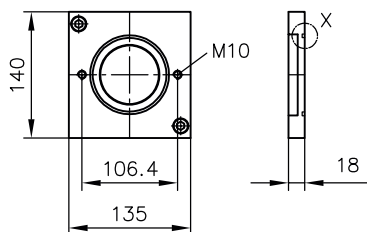
A = suction port

B = pressure connection

**Flange version (output side)**

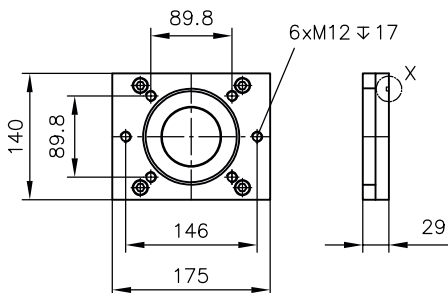
Coding **C 211, C 212**

(SAE-A 2-hole J 744)



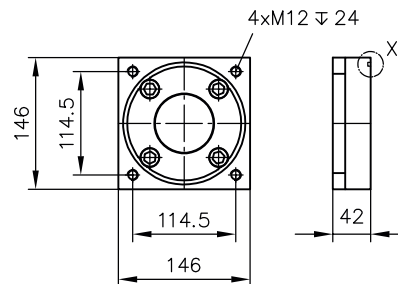
Coding **C 214, C 215**

(SAE-B 2-hole J 744, SAE-B 4-hole J 744)



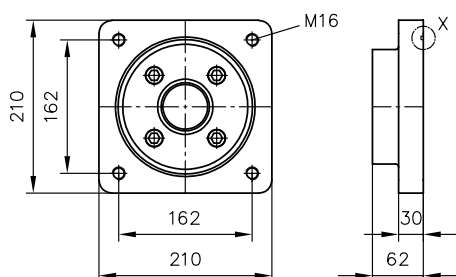
Coding **C 218**

(SAE-C 4-hole J 744)



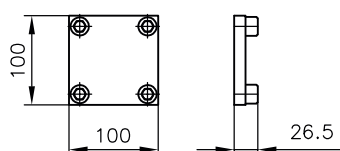
Coding **C 220**

(SAE-D 4-hole J 744)

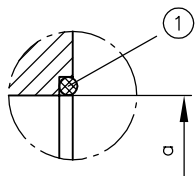


Coding **C 247**

Prepared for thru-shaft (cover)



**Detail X**



V30E-095	O-ring	a
C 211, C 212	Ø 84x2	Ø 82.55 <sup>+0.03</sup> / <sub>+0.01</sub> 7 deep
C 214, C 215	Ø 103x2	Ø 101.6 <sup>+0.03</sup> / <sub>+0.01</sub> 11 deep
C 218, C 219	Ø 132x2	Ø 127 <sup>+0.08</sup> / <sub>+0.04</sub> 14 deep
C 220	Ø 164x3	Ø 152.4 <sup>+0.08</sup> / <sub>+0.04</sub> 14 deep

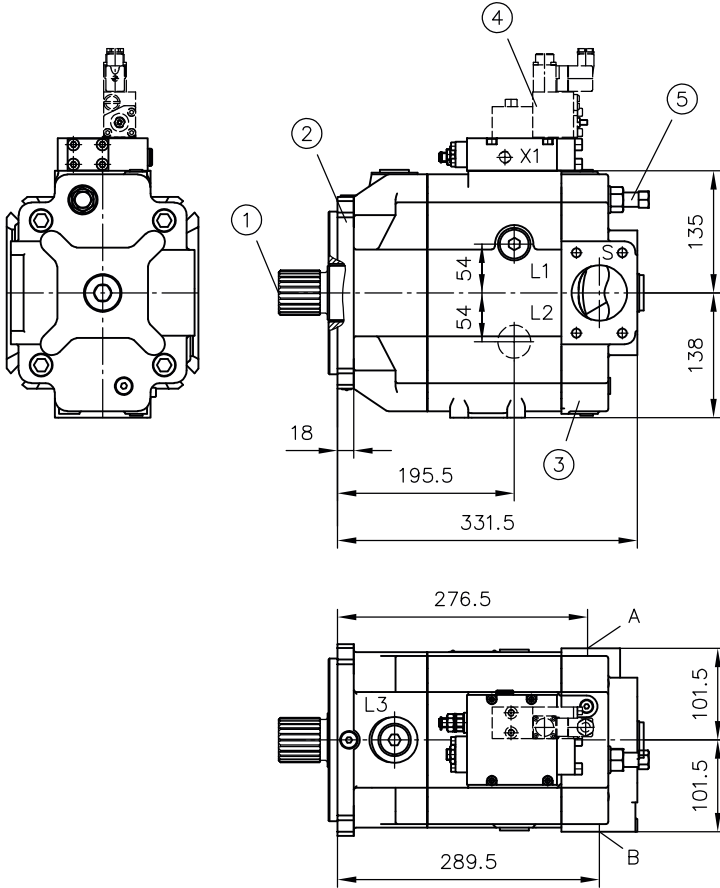
1 O-ring

O-ring included in scope of delivery

### 4.1.2 Type V30E-160

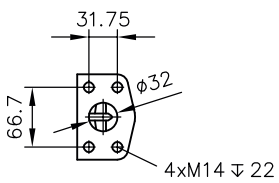
Rotation direction **clockwise** (viewed from shaft journal)

V30E-160, R

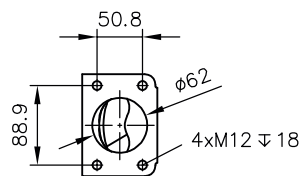


- 1 Shaft journal
- 2 Flange version
- 3 Thru-shaft
- 4 Controller
- 5 Stroke limitation (approx. 10 ccm/rev)

#### Pressure connection

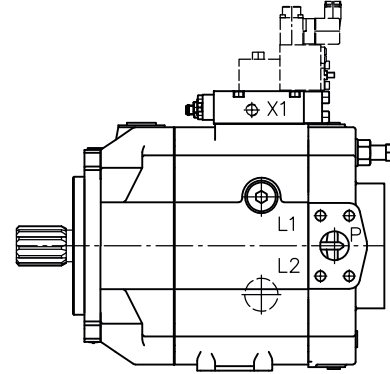


#### Suction port



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

V30E-160 L



#### Drain ports

L1, L2, L3 G 3/4

#### Rotation direction clockwise

A = pressure connection

B = suction port

#### Rotation direction anti-clockwise

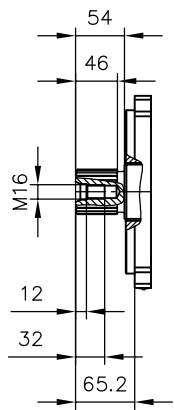
A = suction port

B = pressure connection

**Shaft journal**

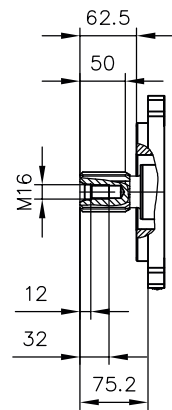
**Spline shaft**

Coding **D**  
(W50x2x24x9g DIN 5480)



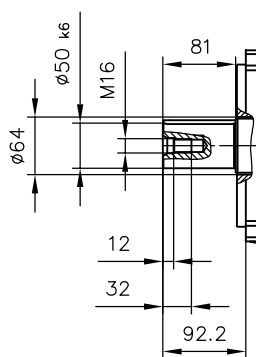
**Spline shaft**

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



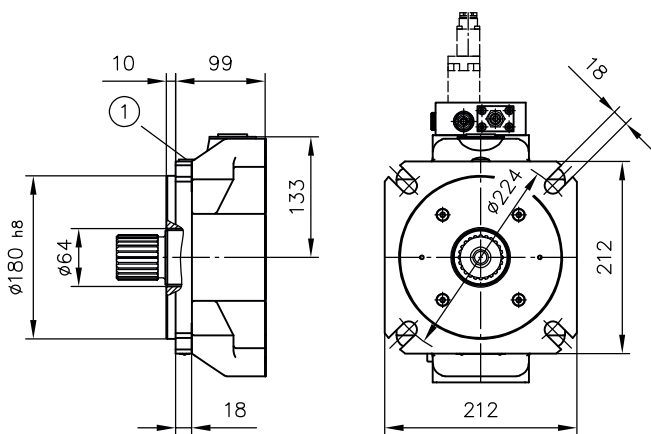
**Parallel key shaft**

Coding **K**  
(Ø50 - 14x9x80 DIN 6885)



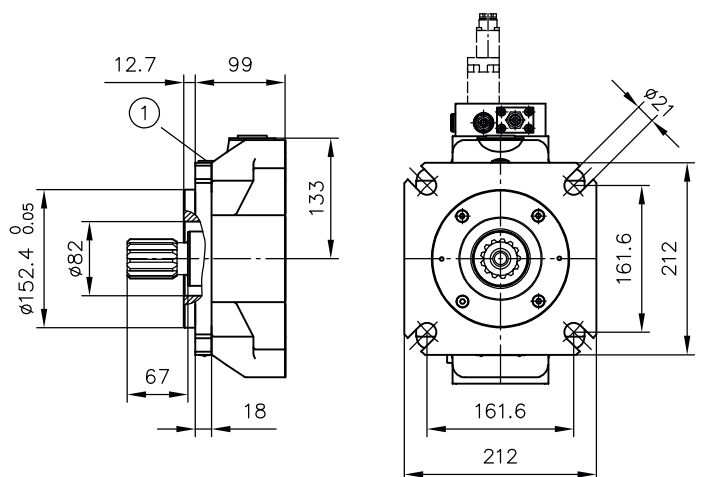
**Flange version (input side)**

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



1 Venting and flushing port G 1/4

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

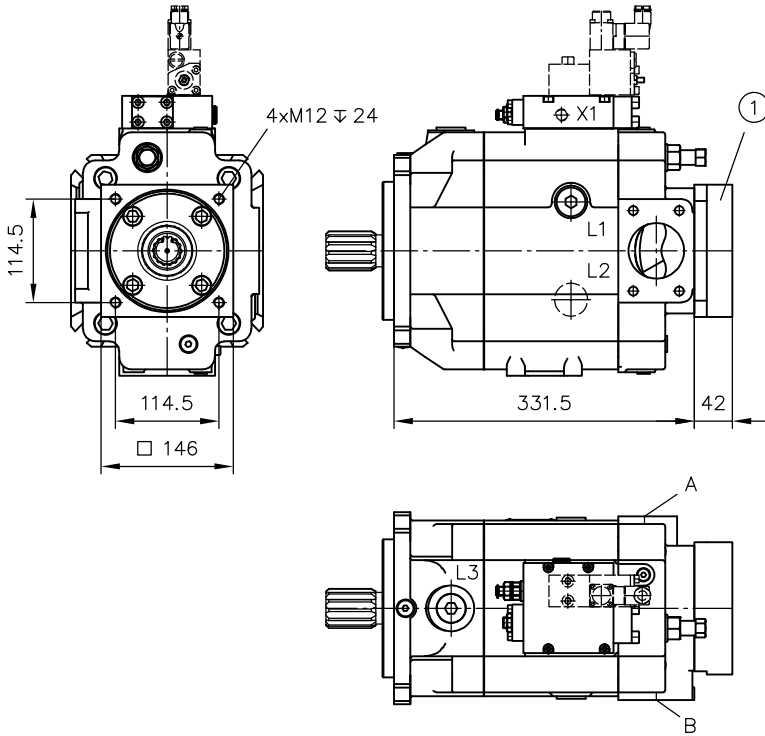


1 Venting and flushing port G 1/4

**Thru-shaft**

Housing version (radial ports, with thru-shaft)

V30E-160 ...-2



1 Flange version (output side)

**Rotation direction  
clockwise**

A = pressure connection

B = suction port

**Rotation direction anti-  
clockwise**

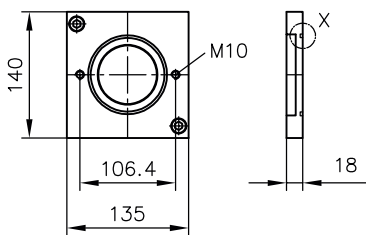
A = suction port

B = pressure connection

**Flange version (output side)**

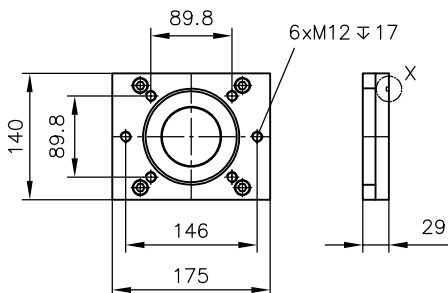
Coding **C 221, C 222**

(SAE-A 2-hole J 744)



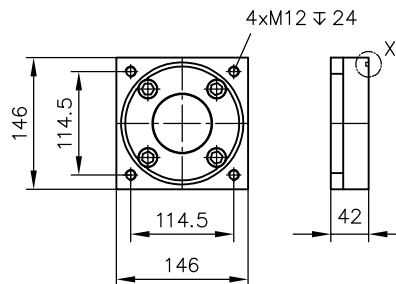
Coding **C 224, C 225**

(SAE-B 2-hole J 744, SAE-B 4-hole J 744)



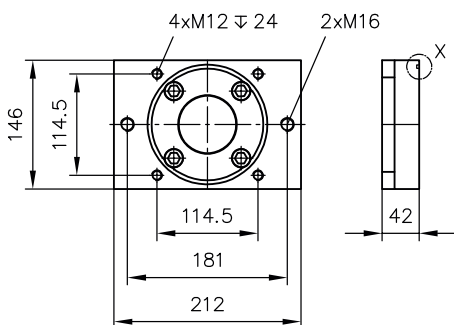
Coding **C 228**

(SAE-C 4-hole J 744)



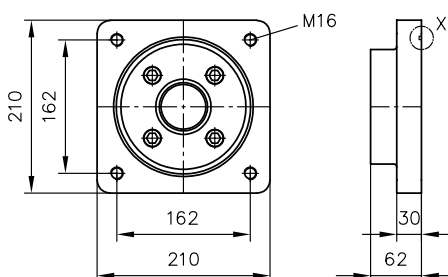
Coding **C 227**

(SAE-C 2-hole J 744)



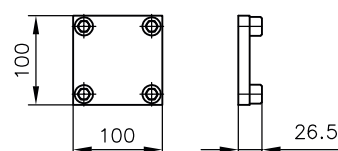
Coding **C 230**

(SAE-D 4-hole J 744)

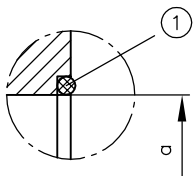


Coding **C 248**

Prepared for thru-shaft (cover)



**Detail X**



1 O-ring

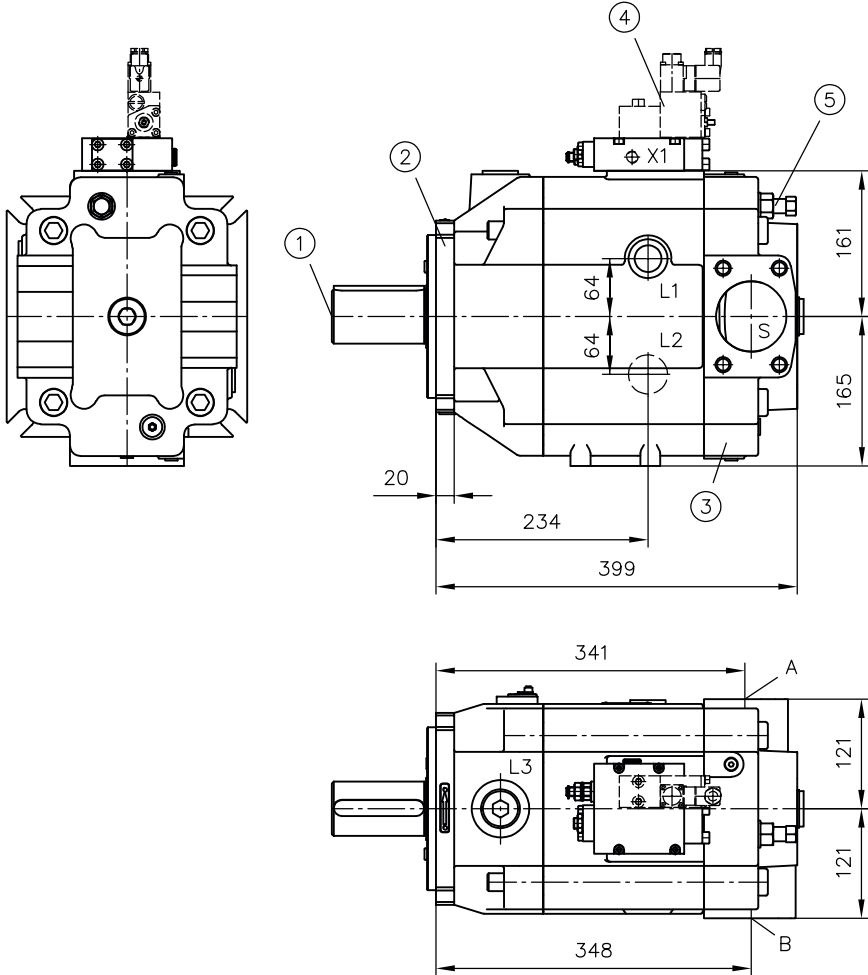
O-ring included in scope of delivery

V30E-160	O-ring	a
C 221, C 222	Ø84x2	Ø 82.55 <sup>+0.03</sup> / <sub>+0.01</sub> 7 deep
C 224, C 225	Ø103x2	Ø 101.6 <sup>+0.03</sup> / <sub>+0.01</sub> 11 deep
C 227, C 228	Ø132x2	Ø 127 <sup>+0.08</sup> / <sub>+0.04</sub> 14 deep
C 230	Ø164x3	Ø 152.4 <sup>+0.08</sup> / <sub>+0.04</sub> 14 deep

### 4.1.3 Type V30E-270

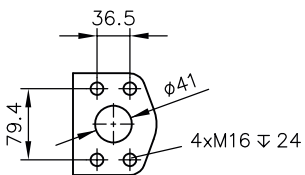
Rotation direction **clockwise** (viewed from shaft journal)

V30E-270, R

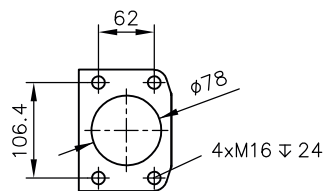


- 1 Shaft journal
- 2 Flange version
- 3 Thru-shaft
- 4 Controller
- 5 Stroke limitation (approx. 15 ccm/rev)

#### Pressure connection

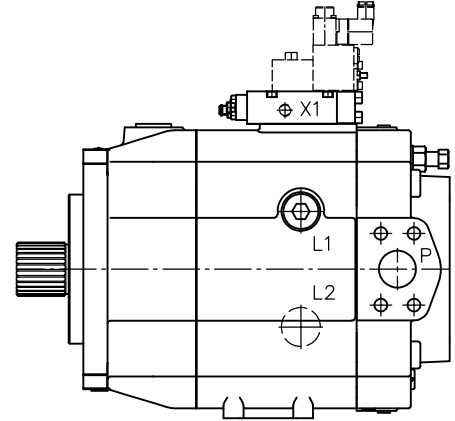


#### Suction port



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

V30E-270 L



#### Drain ports

L1, L2, L3 G 1

Rotation direction  
**clockwise**

Rotation direction  
**anti-clockwise**

A = pressure  
connection

A = suction port

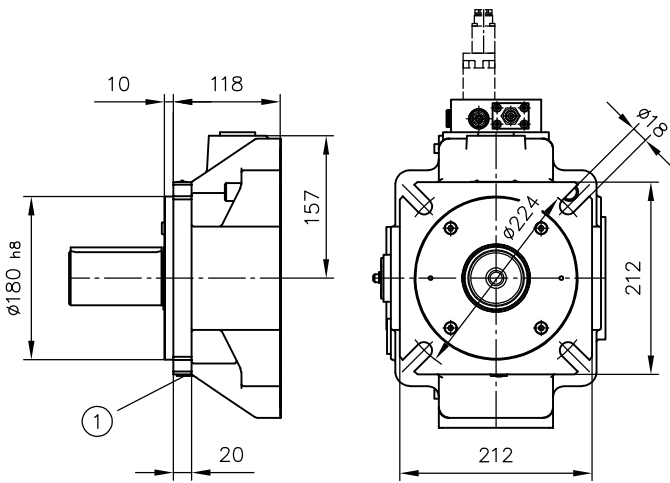
B = suction port

B = pressure  
connection



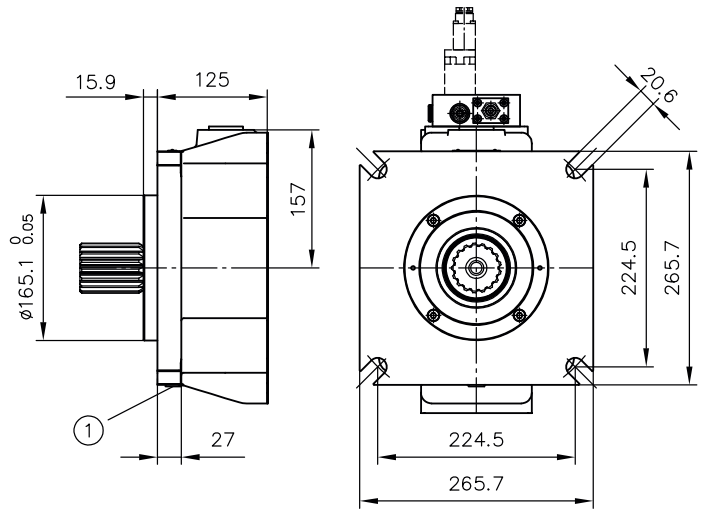
**Flange version (input side)**

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



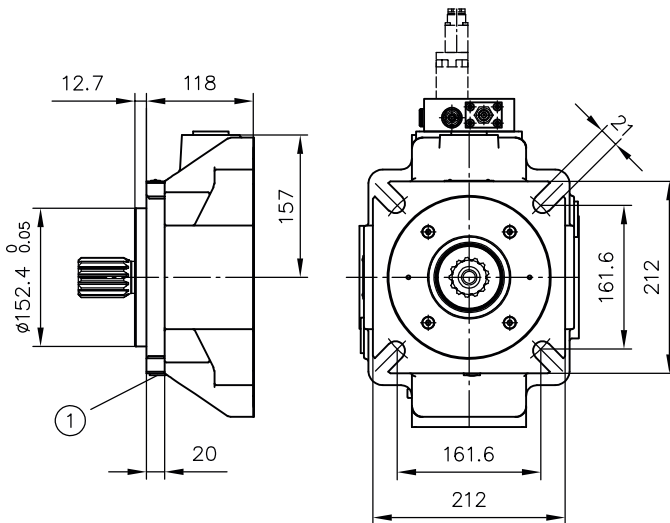
1 Venting and flushing port G 1/4

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



1 Venting and flushing port G 1/4

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

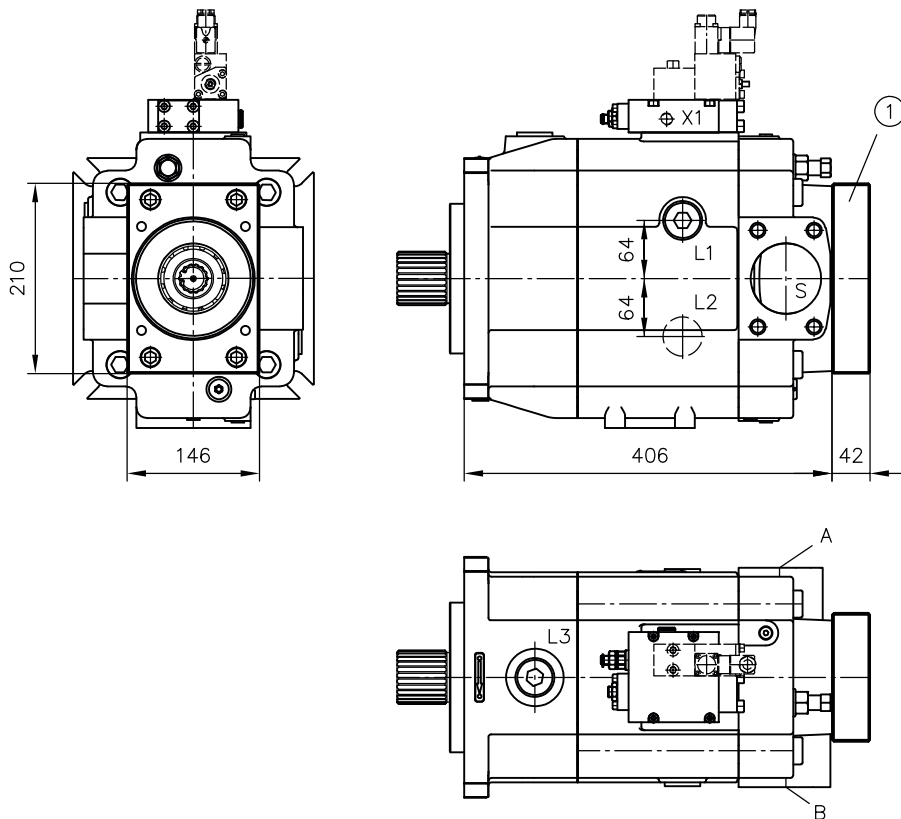


1 Venting and flushing port G 1/4

**Thru-shaft**

Housing version (radial ports, with thru-shaft)

V30E-270 ...-2



1 Flange version (input side)

**Rotation direction  
clockwise**

A = pressure  
connection

B = suction port

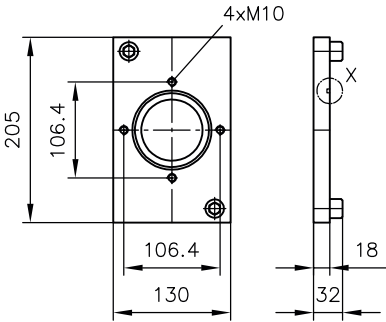
**Rotation direction  
anti-clockwise**

A = suction port

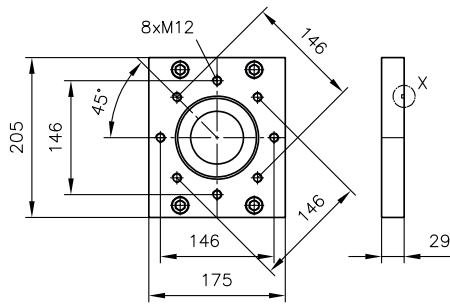
B = pressure  
connection

**Flange version (output side)**

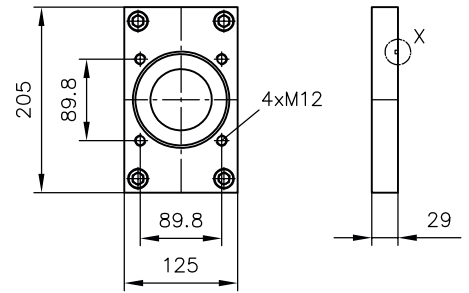
Coding **C 231, C 232**  
(SAE-A 2-hole J 744)



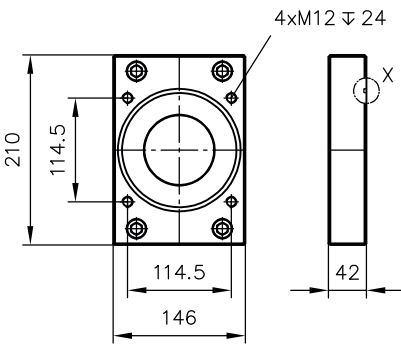
Coding **C 234**  
(SAE-B 2-hole J 744)



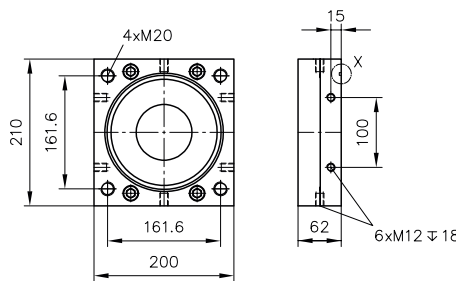
Coding **C 235**  
(SAE-B 4-hole J 744)



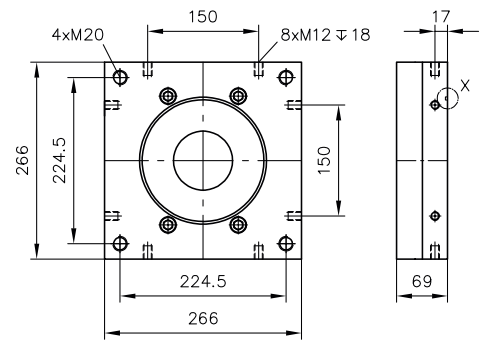
Coding **C 238**  
(SAE-C 4-hole J 744 C 260)



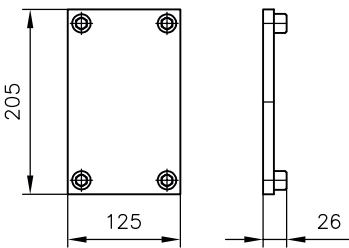
Coding **C 240**  
(SAE-D 4-hole J 744)



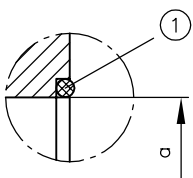
Coding **C 241**  
(SAE-E 4-hole J 744)



Coding **C 249**  
Prepared for thru-shaft (cover)



**Detail X**



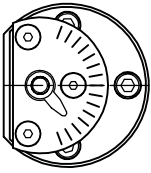
1 O-ring

V30E-270	O-ring	a
C 231, C 212	Ø 84x2	Ø 82.55 +0.03+0.01 7 deep
C 234, C 235	Ø 103x2	Ø 101.6 +0.03+0.01 11 deep
C 228	Ø 132x2	Ø 127+0.08+0.04 13 deep
C 240	Ø 164x3	Ø 152.4 +0.08+0.04 13 deep
C 241	Ø 167x3	Ø 165.1+0.08+0.04 16 deep

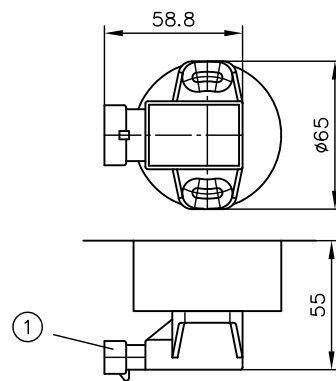
O-ring included in scope of delivery

## 4.2 Swivel angle indicator

Swivel angle indicator



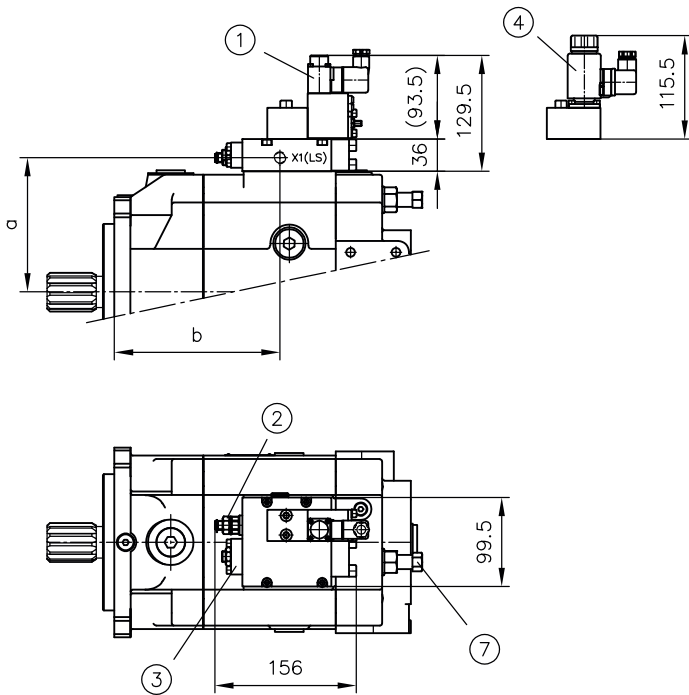
Swivel angle pick-up



1 3-PIN AMP Superseal

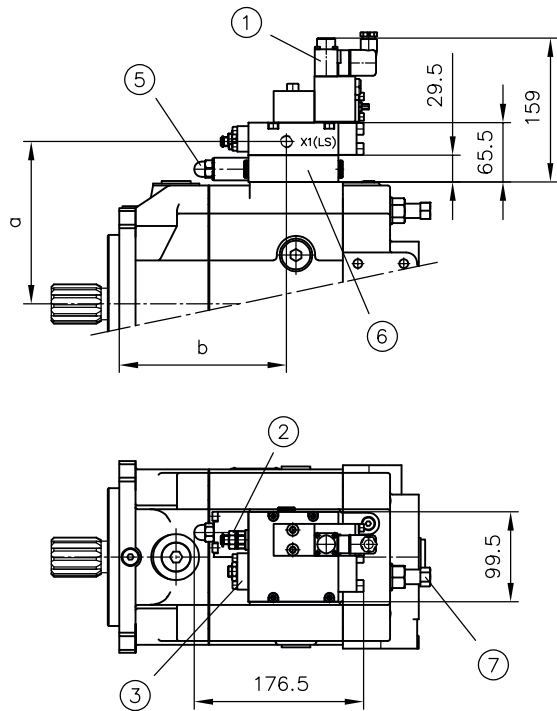
## 4.3 Controllers

### Coding P, LSP



- 1 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
- 2 Pressure controller setting
- 3 LSP: setting of LS stand-by pressure; P: setting of p<sub>min</sub>
- 4 2/2-way directional seated valve type BVPM

### Coding PL, LSPL



- 5 Power controller setting
- 6 Power controller (intermediate plate)
- 7 Stroke limitation setting

#### Connections

LS, X1      G 1/4

#### ⑤ Power controller setting:

	a	b	Power change (Nm)/revolution		a	b	Power change (Nm)/revolution
V30E-095	135	151	approx. 140	V30E-095	164,5	151	approx. 140
V30E-160	150	185	approx. 237	V30E-160	179,5	185	approx. 240
V30E-270	176	223,5	approx. 400	V30E-270	205,5	223,5	approx. 400

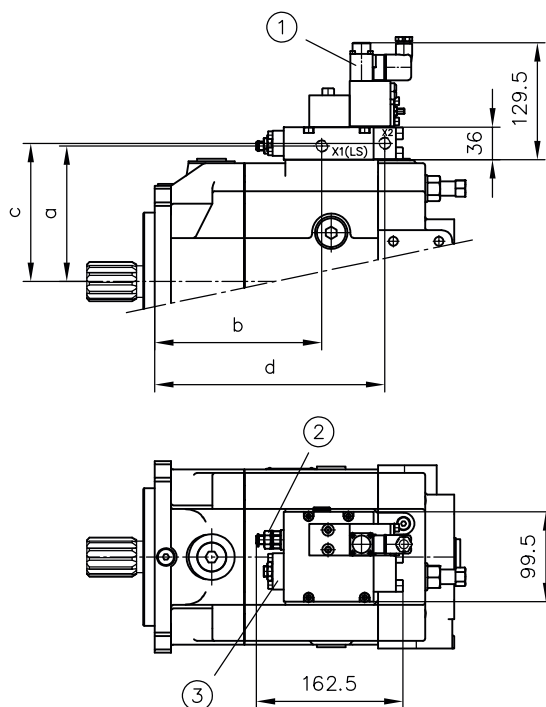
#### ②③ Pressure controller setting:

Pressure adjustment	Pressure range (bar)	Δ p (bar)/revolution	Factory-set pressure setting (bar)
Maximum pressure p <sub>max</sub>	20-350	approx. 50	300
Differential pressure Δ p	20-55	approx. 20	27

⑦ Stroke limitation setting:

	Stroke limitation (cm <sup>3</sup> )/revolution
V30E-095	approx. 7.5
V30E-160	approx. 10.5
V30E-270	approx. 15

Coding **Pb, LSPb**



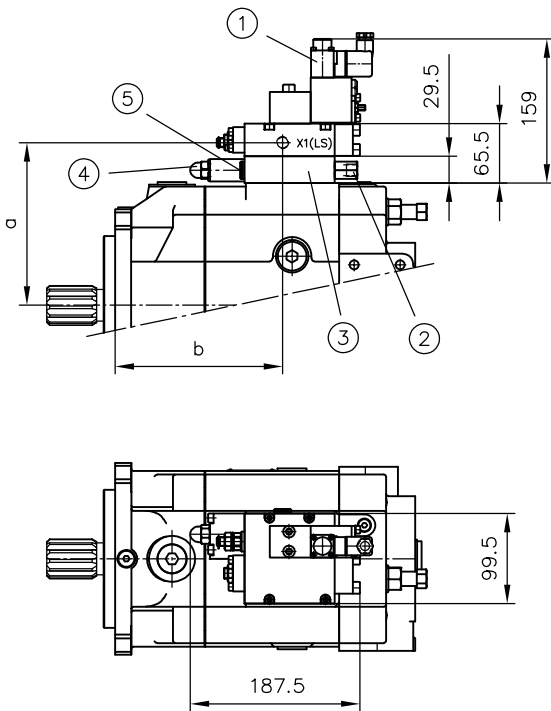
- 1 Prop. pressure-limiting valve type PMVPS 4 according to D 7485/1
- 2 Pressure controller setting
- 3 LSP: Adjustment of the LS stand-by pressure; N: setting of pmin

	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

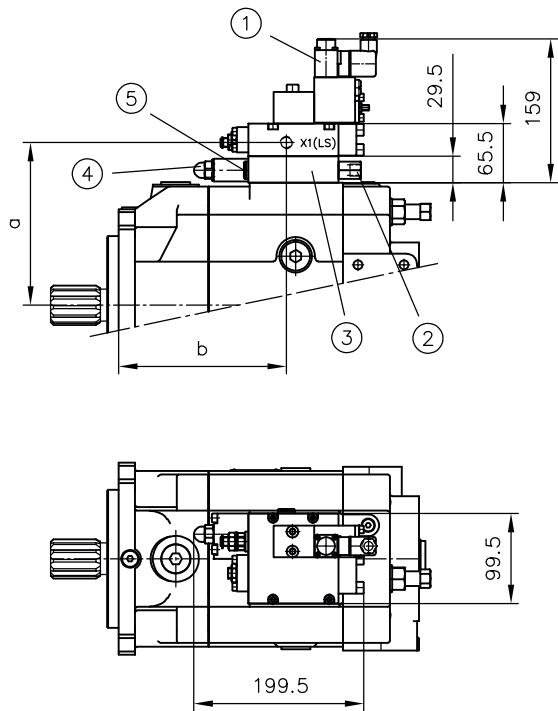
**Connections**

LS, X1, X2	G 1/4
------------	-------

Coding Lf, Lf1



Coding Lfe



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

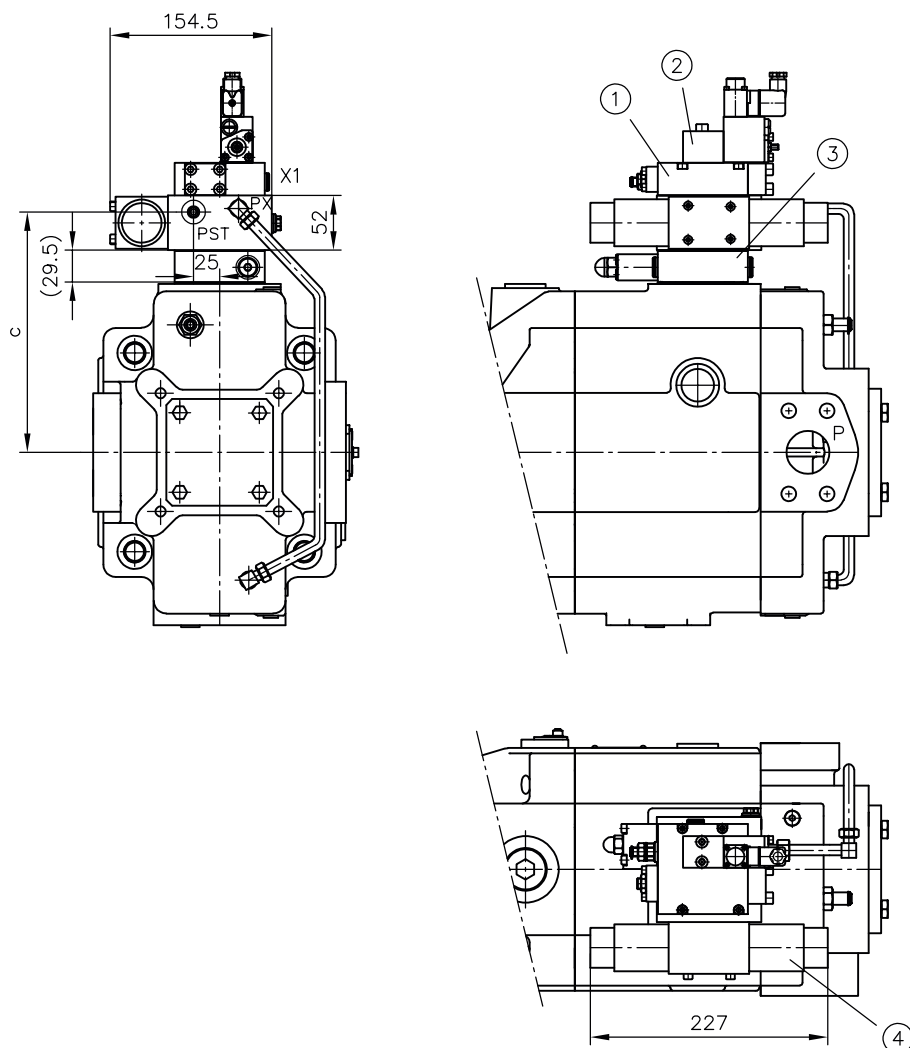
**Connections**

LS, X1      G 1/4

⑤ **Power controller setting:**

	a	b	Power change (Nm)/revolution
V30E-095	164,5	151	140
V30E-160	179,5	185	240
V30E-270	205,5	223,5	400

Coding EM..., 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

Value "c": for version with power controller + 30 mm



**CAUTION**

**Overloading components due to incorrect pressure settings.**

Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

## 4.4 Pump combinations

### 4.4.1 Tandem pumps

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 dimensioning of the shafts also permits the transmission of the full torque to the second pump.

All controller combinations are possible in the same way as for the single pumps.

Shaft versions "D" and "S" are available.

Available flange versions for tandem pumps, see?

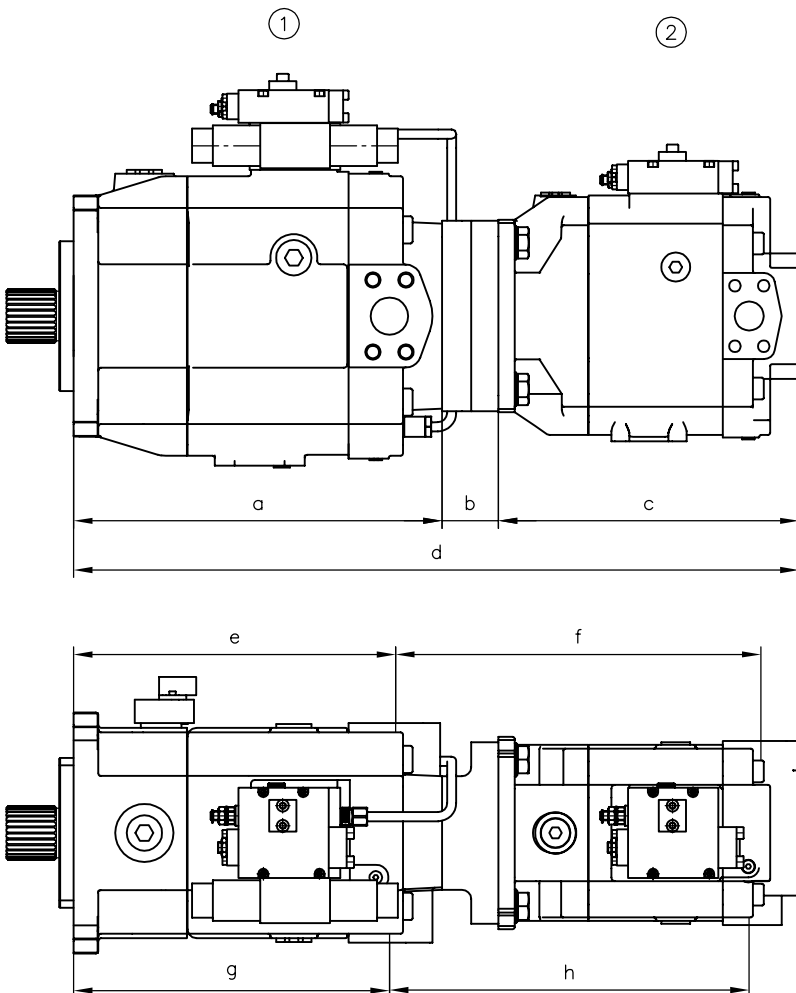
#### Ordering example

V30E-270 RDFN-2-2-02/EMP/120-200-C257-

(1st pump)

V30E-160 RDGN-1-1-02/P/120-200

(2nd pump)



- 1 1st pump
- 2 2nd pump

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 250	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
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 255	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 257	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
1st pump	Coding	V30E-270 ..DG..-2-..-02								V30E-270 ..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 260	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 gear pump

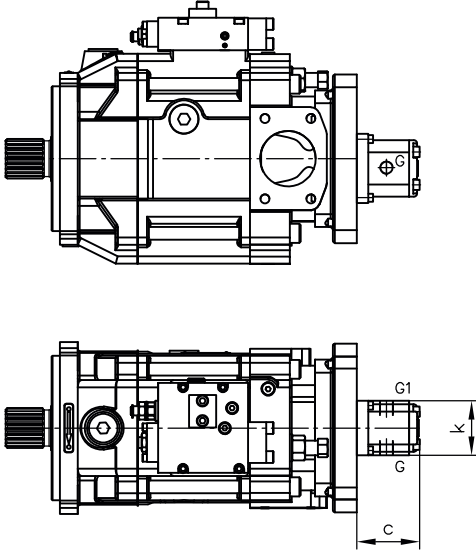
A gear pump can be added in the factory as an auxiliary or additional pump.

In the case of a pump with electro-hydraulic prop. adjustment (coding EM...) and an auxiliary pump, the piping is contained in the scope of delivery.

### Ordering example

V30E-160 RKGN 2 -1 - XX / LSP / 280 - C 221 - Z 02-5

### V30E basic pump



Coding	Displacement volume $V_g$ (cm <sup>3</sup> /rev)	Auxiliary pump for	G	G1	c	k
Z 02-6	6,0	V30E-095	LK40/M6	LK35/M6	91	86
Z 02-9	8,40	V30E-160	LK40/M6	LK35/M6	95	86
Z 02-11	10,80	V30E-270	LK40/M6	LK35/M6	99	86

#### **i** INFORMATION

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

#### **i** INFORMATION

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

#### **i** INFORMATION

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

Further key figures on request!

# 5

## Installation, operation and maintenance information

Observe the document B 5488 "General operating instructions for assembly, commissioning, and maintenance."

### 5.1 Intended use

This product is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this document.

#### Essential requirements for the product to function correctly and safely:

- ▶ All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- ▶ The product must only be assembled and put into operation by specialist personnel.
- ▶ The product must only be operated within the specified technical parameters described in detail in this document.
- ▶ All components must be suitable for the operating conditions when using an assembly.
- ▶ The operating instructions for the components, assemblies and the specific complete system must also always be observed.

#### If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly.
  - ✓ It is then not permitted to continue using or operating the product.

### 5.2 Assembly information

The product must only be installed in the complete system with standard and compliant connection components (screw fittings, hoses, pipes, fixtures etc.).

The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).



#### **DANGER**

#### **Sudden movement of the hydraulic drives when disassembled incorrectly**

Risk of serious injury or death

- ▶ Depressurise the hydraulic system.
- ▶ Perform safety measures in preparation for maintenance.

#### 5.2.1 General information

The variable displacement axial piston pump is suitable for use in an open circuit.

The pump 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.

#### During assembly, note the following principles:

- Only trained persons are allowed to mount or remove the pump.
- Always ensure absolute cleanliness to prevent contamination from affecting the pump.
- Remove all plastic plugs before operation.
- Avoid installation above the tank (see Chapter 5.2.3, "Installation positions").
- Observe the electric reference values.
- Before initial use, fill the pump with hydraulic fluid and bleed. Automatic pump filling via the suction line by opening the drain ports is not possible.
- Always supply the pump with hydraulic fluid from the start. Even just a short period with insufficient hydraulic fluid can damage the pump. Such damage is not immediately visible once the pump is put into operation.
- Never drain the pump.
- Hydraulic fluid which flows back into the tank must not be sucked back in immediately (install baffles!).

- Before first use, run the pump for approx. 10 minutes at max. 50 bar after initial start-up.
- Do not use the entire pressure range of the pump until it has been thoroughly bled and flushed.
- From the start, always keep the temperature within the specified range (see Chapter 3, "Parameters"). Never exceed the maximum temperature.
- Always comply with the cleanliness level of the hydraulic fluid. In addition, filter the hydraulic fluid appropriately (see Chapter 3, "Parameters").
- Self-installed filters in the suction line must be approved beforehand by HAWE Hydraulik.
- A system pressure-limiting valve must be installed in the pressure line so that the maximum system pressure is not exceeded.

## 5.2.2 Connections

The connecting lines' nominal width depends on:

- the given usage conditions
- viscosity of the hydraulic fluid
- start-up and operating temperature
- pump speed

HAWE recommends: Use hose lines (improved damping characteristics) instead of rigid pipelines.

<b>Bleeding and flushing port</b>	<ul style="list-style-type: none"> <li>▪ The pump is fitted with a G 1/4" bleeding and flushing port. This is used to bleed and flush the front shaft bearing in the case of vertical installation.</li> </ul>
<b>Pressure connection</b>	<ul style="list-style-type: none"> <li>▪ The pressure connection is established via SAE ports, see Chapter 4, "Dimensions". Metric mounting threads are used in deviation from the standard.</li> <li>▪ Observe the fitting manufacturers' specified tightening torques.</li> </ul>
<b>Suction port</b>	<ul style="list-style-type: none"> <li>▪ The suction port uses SAE ports, see Chapter 4, "Dimensions". Metric mounting threads are used in deviation from the standard.</li> <li>▪ If possible, route the suction line to the tank on a rising gradient. This allows trapped air to escape. Observe the notes on installation see Chapter 5.2.3, "Installation positions".</li> <li>▪ The absolute suction pressure must not fall below 0.85 bar.</li> </ul>
<b>Drain port</b>	<ul style="list-style-type: none"> <li>▪ The pump features 3 drain ports G 3/4" or G 1".</li> <li>▪ The nominal width of the leakage line must not be less than 16 mm. The cross-section is determined by the max. permissible housing pressure.</li> <li>▪ Integrate the leakage line in the system in such a way as to prevent direct connection with the suction line of the pump.</li> <li>▪ All drain ports can be used simultaneously.</li> <li>▪ A separate leakage line from the controller to the tank is not required. Observe the notes on installation see Chapter 5.2.3, "Installation positions".</li> <li>▪ The top drain port can be used to fill the housing.</li> </ul>
<b>LS port for version LSP</b>	<ul style="list-style-type: none"> <li>▪ The LS line is connected to the controller via a G 1/4" threaded connection.</li> <li>▪ The nominal width of the line depends on the mounting 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 connection.</li> <li>▪ When the proportional directional spool valve is in a neutral position, the LS line must always be fully relieved!</li> </ul>
<b>For operation with HFC (35 - 50% water content) the following restrictions apply</b>	<ul style="list-style-type: none"> <li>▪ tank located above pump</li> <li>▪ temperature does not exceed 50°C</li> <li>▪ fluid rate in suction line is less than 1 m/s</li> <li>▪ pump pressure no more than 200 bar</li> <li>▪ each of a pump's two shaft bearings are flushed by their own separate, cool oil, at 3 lpm per bearing (V30E-095), 4 lpm per bearing (V30E-160) and 5 lpm per bearing (V30E-270)</li> </ul>

For operation with liquids with a water content  $\leq 20$  % the following restrictions apply

- tank located above pump
- tank temperature does not exceed 70°C
- fluid rate in suction line is less than 1 m/s
- pump pressure no more than 300 bar
- possible without bearing flushing

### 5.2.3 Installation positions

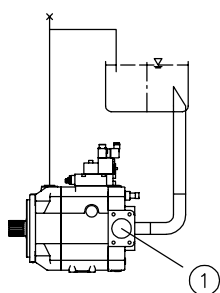
The variable displacement axial piston pump can be mounted in any installation position.

A support is required for tandem pumps or multiple hydraulic pumps mounted in series (see Chapter 5.2.1, "General information").

#### Horizontal installation

Pump below the min. fill level

- ▶ For horizontal installation, use the uppermost drain port.



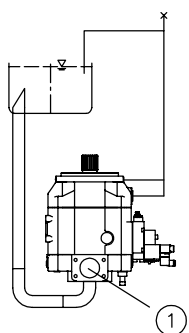
1 Suction port open

#### 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 1/8" bleeding port to the pump flange (see Chapter 4, "Dimensions").
- ▶ Take appropriate measures to ensure continuous venting of this line (line routing/venting).

For installation with pump flange facing downwards: Get in touch with HAWE Hydraulik SE.

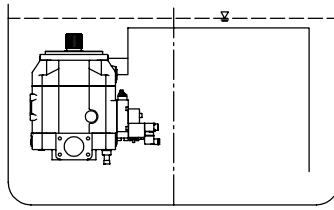
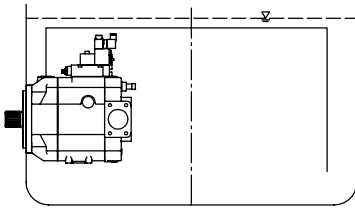


1 Suction port open

### 5.2.4 Tank installation

#### Pump below the min. fill level

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



### Pump above the fill level

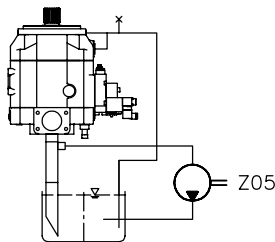
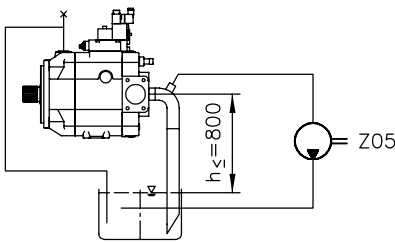
**NOTICE**

The pump must not run dry via the pressure, intake, drain, venting or control lines. This applies in particular to long periods of downtime.

- ▶ The leakage line must be installed in the tank in such a way that it ends below the oil level.
- ▶ Facilitate venting of connecting lines via separate vent openings.
- ▶ Adjust the venting sequence to suit the specific installation.
- ▶ If necessary, a gear pump should be provided in order to draw air from the suction line.

Contact form for special consultation on axial piston pump design:

Checklist for variable displacement axial piston pump design: B 7960 checklist



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

## 5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.

The instructions for the complete technical system must also always be followed.

**NOTICE**

- ▶ Read the documentation carefully before usage.
- ▶ The documentation must be accessible to the operating and maintenance staff at all times.
- ▶ Keep documentation up to date after every addition or update.

**CAUTION**

**Overloading components due to incorrect pressure settings.**

Risk of minor injury.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

### Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

**Examples of fine contamination include:**

- Swarf
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

**! NOTICE**

**New hydraulic fluid from the manufacturer may not have the required purity.**

Damage to the product is possible.

- ▶ Filter new hydraulic fluid to a high quality when filling.
- ▶ Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level see Chapter 3, "Parameters").

Additionally applicable document: [D 5488/1](#) Oil recommendations

### 5.3.1 Limitations

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

- tank located above pump
- temperature does not exceed 50°C
- fluid rate in suction line is less than 1 m/s
- pump pressure no more than 200 bar
- each of a pump's two shaft bearings are flushed by their own separate, cool oil, at 3 lpm per bearing (V30E-095), 4 lpm per bearing (V30E-160) and 5 lpm per bearing (V30E-270)

**For operation with liquids with a water content  $\leq 20\%$  the following restrictions apply**

- tank located above pump
- tank temperature does not exceed 70°C
- fluid rate in suction line is less than 1 m/s
- pump pressure no more than 300 bar
- possible without bearing flushing

### 5.4 Maintenance information

This product is largely maintenance-free.

Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the surface of the device regularly (at least once a year) (dust deposits and dirt).

## 6 Other information

### 6.1 Planning information

#### Determination of nominal sizes

Delivery flow	$Q = \frac{V_g \cdot n \cdot \eta_v}{1000} (l/min)$	Q = Flow rate (lpm)
Drive torque	$M = \frac{V_g \cdot \Delta p}{20 \cdot \pi \cdot \eta_{mh}} (Nm)$	M = Torque (Nm)
Drive power	$P = \frac{2\pi \cdot M \cdot n}{60000} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} (kW)$	P = Power (kW)
		$V_g$ = Geom. output volume (cm <sup>3</sup> /rev.)
		$\Delta p$ = Differential pressure
		n = Speed (rpm)
		$\eta_v$ = Volumetric efficiency
		$\eta_{mh}$ = Mechanical-hydraulic efficiency
		$\eta_t$ = Overall efficiency ( $\eta_t = \eta_v \cdot \eta_{mh}$ )

## References

### Additional versions

- Variable displacement axial piston pump type V80M: D 7962 M
- Variable displacement axial piston pump type V60N: D 7960 N
- Variable displacement axial piston pump type V30D: D 7960
- variable displacement axial piston pump type C40V: D 7964
- Fixed displacement axial piston pump type K60N: D 7960 K
- Axial piston motor type M60N: D 7960 M
- Proportional directional spool valve type EDL: D 8086
- Proportional directional spool valves types PSL, PSV size 2: D 7700-2
- Proportional directional spool valves types PSL/PSV/PSM, 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 and PSVF size 7: D 7700-7F
- Load-holding valve type LHT: D 7918
- Load-holding valve type CLHV: D 7918-VI-C
- Load-holding valve type CLHV: D 7918-VI-PIB
- Load-holding valve type LHDV: D 7770
- Proportional amplifier type EV1M3: D 7831/2
- Proportional amplifier type EV1D: D 7831 D
- Proportional amplifier type EV2S: D 7818/1

### observe operating instructions

- General operating manual for the assembly, initial operation and maintenance of hydraulic components and systems: B 5488

