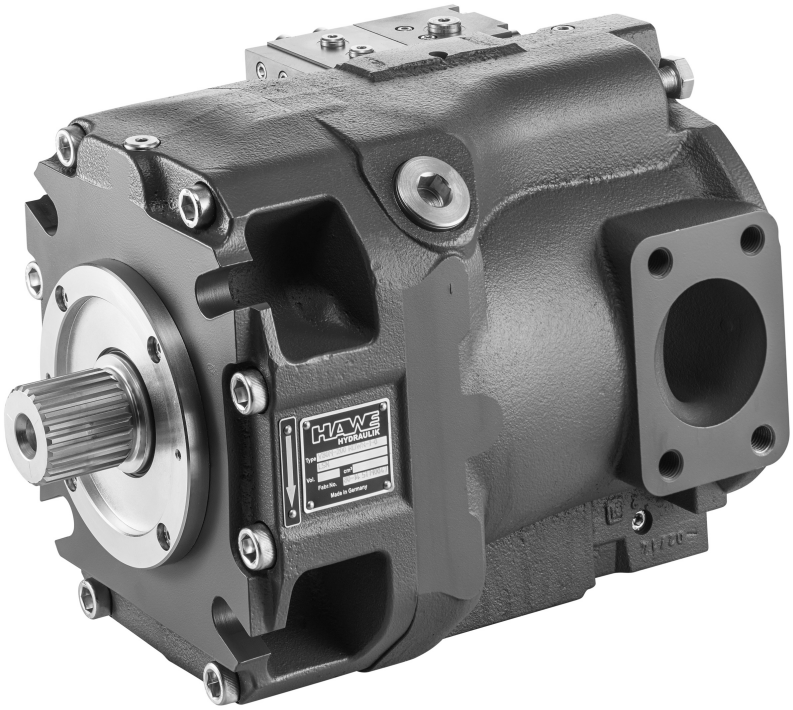
Variable displacement axial piston pump type V80M

Product documentation

Open circuit

Nominal pressure $p_{nom\ max}$:	400 bar
Peak pressure p_{max}:	450 bar
Displacement volume V_{max}:	202 cm^3/rev



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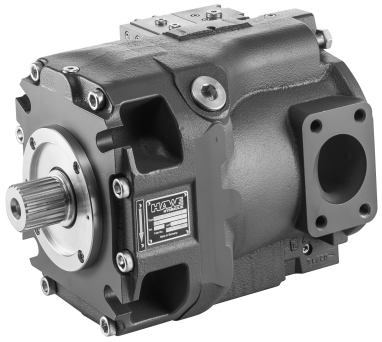
1 Overview: variable displacement axial piston pump type V80M

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 V80M 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.



Variable displacement axial piston pump type V80M

Features and benefits

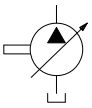
- High speed
- High nominal pressure
- Full torque available at the second pump in tandem pump applications

Intended applications

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

2 Available versions

Circuit symbol



Ordering example

V80ML-200	R	S	F	N	-1	-0	-XX	-2/190	/LSN	-400	C 311	-Z

- -Z: **Combination with gear pump**
- C 311: 2.10 "Flange version (output side)"
- -400: **Pressure setting (nominal pressure) (bar)**
- /LSN: 2.9 "Controller"
- -2/190: 2.8 "Stroke limitation"
- -XX: **Manufacturing series**
- -0: 2.7 "Swivel angle indicator"
- -1: 2.6 "Thru-shaft"
- N: 2.5 "Seals"
- F: 2.4 "Flange version (input side)"
- S: 2.3 "Shaft journal"
- R: 2.2 "Rotation direction"
- V80ML-200: 2.1 "Basic type and nominal size"

2.1 Basic type and nominal size

Type	Description	displacement volume (cm^3/rev)	Nominal pressure p_{nom} (bar)	Peak pressure p_{max} (bar)
V80M-200	--	202	400	450
V80ML-200	with charging pump	202	400	450

2.2 Rotation direction

Coding	Description
L	Anti-clockwise
R	Clockwise

2.3 Shaft journal

Coding	Description	Designation / standard	Max. drive torque (Nm)
D	Spline shaft	W50x2x24x9g DIN 5480	2550
S	Spline shaft	SAE-F J 744 15T 8/16 DP 50-4 DIN ISO 3019-1	2350
U	Spline shaft	SAE-D J 744 13T 8/16 DP 44-4 DIN ISO 3019-1	1200

2.4 Flange version (input side)

Coding	Description	Designation
G	Flange	180 B4 HW DIN ISO 3019-2
F	Flange	SAE-E 4-hole J 744 155-4 DIN ISO 3019-1
W	Flange	SAE-D 4-hole J 744 152-4 DIN ISO 3019-1

2.5 Seals

Coding	Description
N	NBR (nitrile rubber)
V	FKM

2.6 Thru-shaft

Coding	Description
-1	no thru-shaft
-2	with thru-shaft

2.7 Swivel angle indicator

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

2.8 Stroke limitation

Coding	Description
2	Stroke limitation adjustable (Factory setting: 202 cm³/rev)
2/...	Stroke limitation fixed with specification of the set displacement volume Vg (cm³/rev)

2.9 Controller

Load-sensing controller

Coding	Description
LSP	Load-sensing controller with integrated pressure limitation

Pressure controller

Coding		Description	
P		Pressure controller with remote-control port for external pilot valve	
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

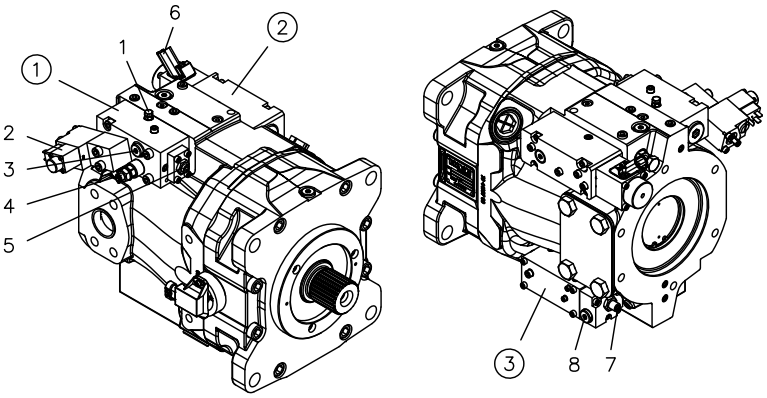
Power controller

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
Lfe1	Electrically adjustable power controller with decreasing characteristic curve

Delivery flow controller

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

Assembly

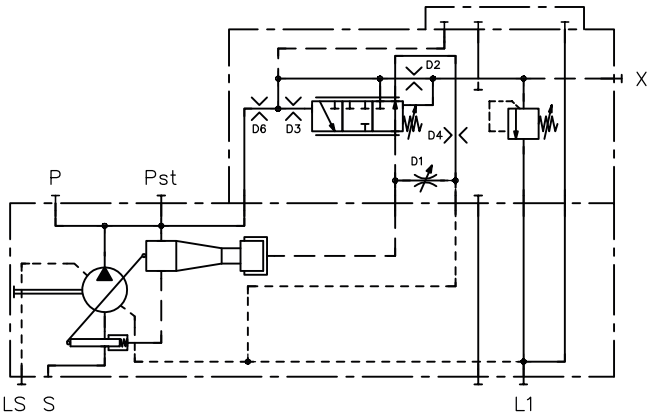


No.	Function	Default setting	Comment	
① **Pressure controller P, LSP**				
1	Bypass orifice	1 revolution outwards		
2	Electro proportional valve		PMVP or BVPM	
3	LS port		G 1/4	
4	pressure limitation	400 bar	50 bar/revolution	
5	standby pressure	27 bar	20 bar/revolution	
② **Delivery flow controller**				
6	Electrical connection	24 V/150 mA to 850 mA	Plug type DT04 2T	
③ **Power controller**				
7	Torque adjusting screw	Adjustable to 20% to 100% of desired max. torque	166 Nm/revolution	
8	L	Sealed		
	Lf	G 1/4	0 to 45 bar pilot pressure	Torque increase
	Lf1	G 1/4	0 to 45 bar pilot pressure	Torque reduction
	Lfe	Electro proportional valve	24 V, 0 to 600 mA	Torque increase
	Lfe1	Electro proportional valve	24 V, 0 to 600 mA	Torque reduction

2.9.1 Pressure controller P

P-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**

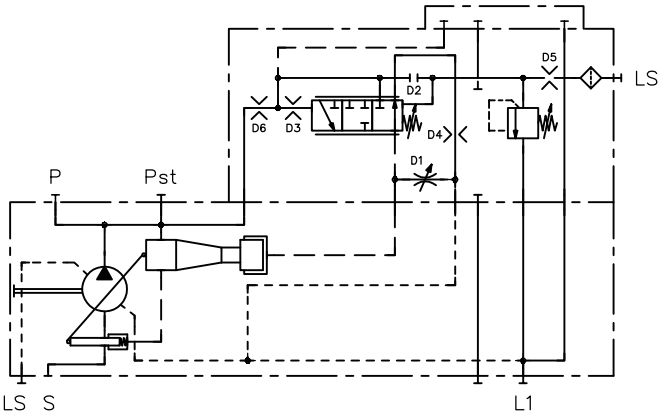


System pressure is tapped within the controller (internal).

2.9.2 Load-sensing controller LSP

The LSP 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**



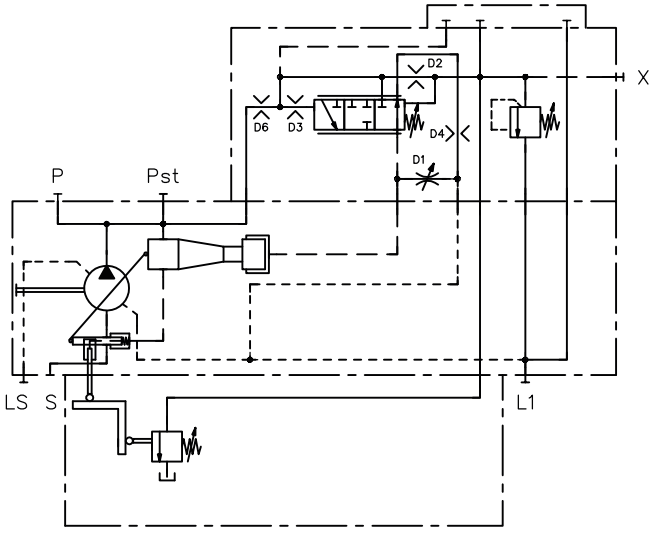
System pressure is tapped within the controller (internal).

2.9.3 Power controller L, Lf, Lf1, Lfe, Lfe1

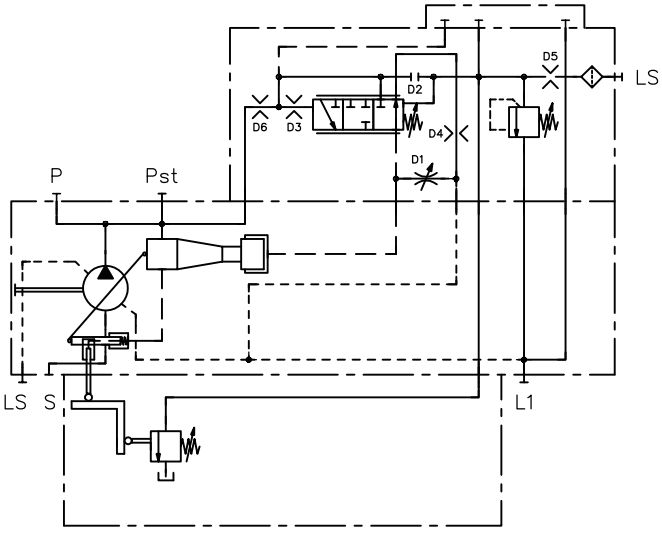
L, Lf, Lf1, Lfe and Lfe1 controllers are power controllers whose characteristic curve is a perfect hyperbola. When the product of displacement volume times pressure exceeds the set value, the controller reduces the pump's swivel angle. This protects the drive shaft, motor or gearbox from overloading (p_B x V_g = constant).

The power controllers are only available in combination with a pressure- or load-sensing controller.

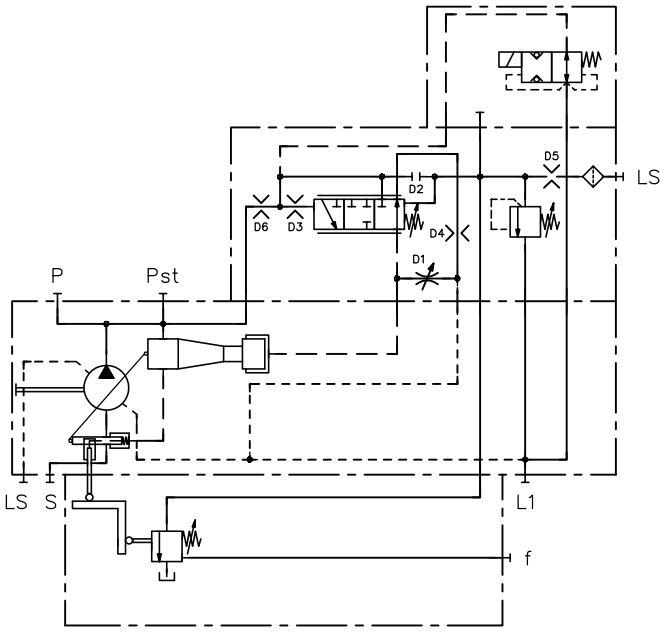
Coding **LP**



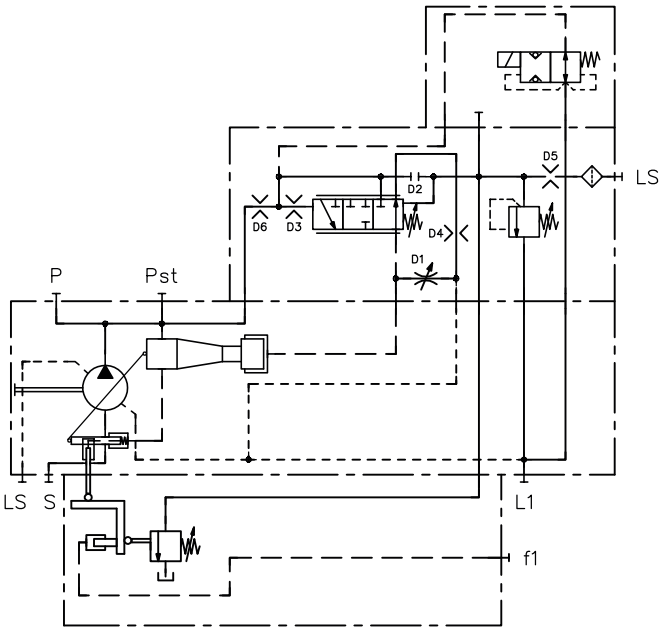
Coding **LLSP**



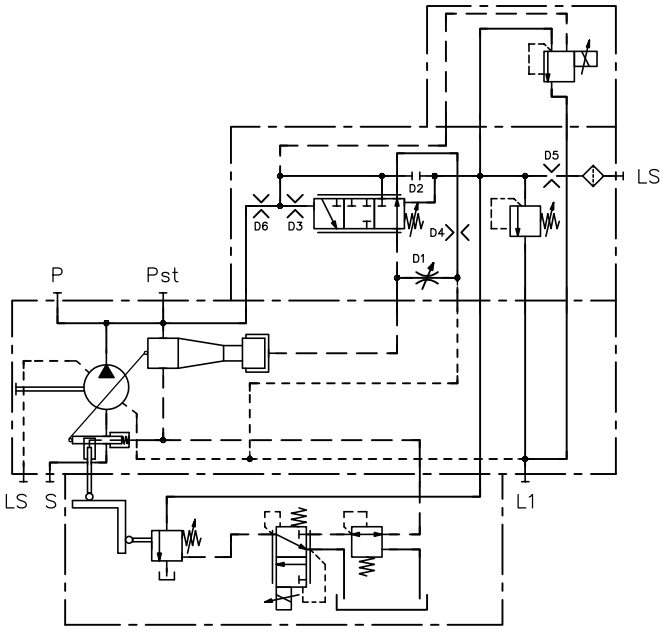
Coding **LfLSP**



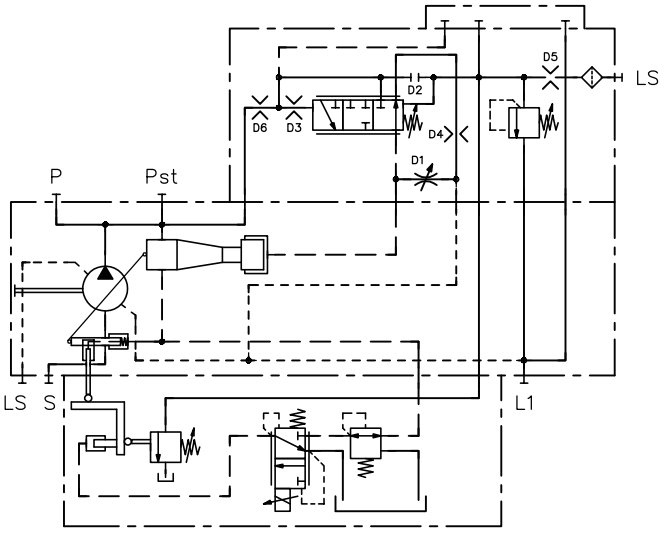
Coding **Lf1LSP**



Coding **LfeLSP**



Coding **Lfe1LSP**



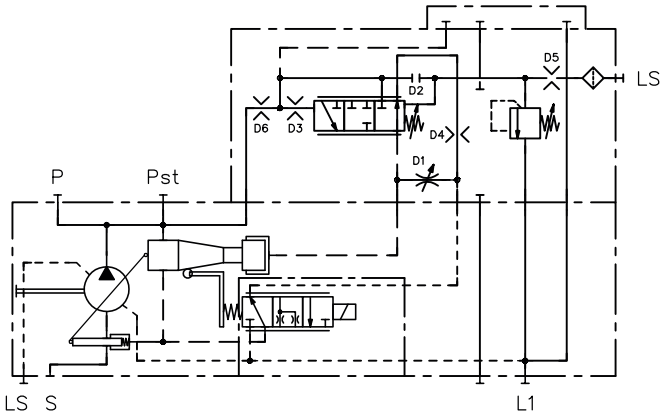
2.9.4 Flow controller V, EM.CH

V controller

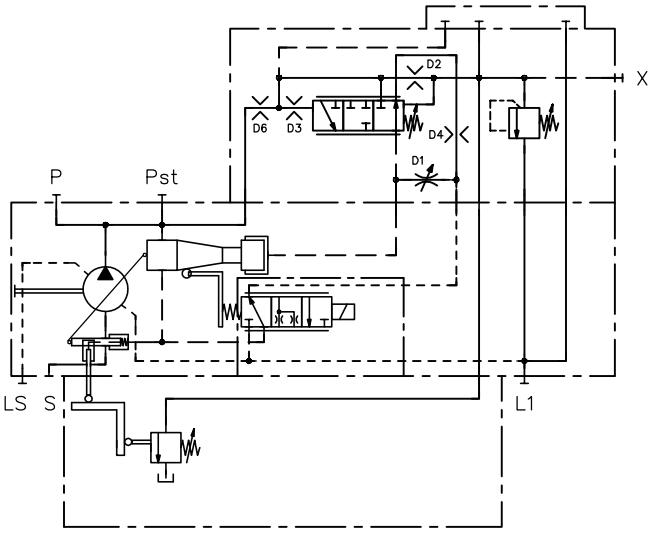
The V controller is an electro-proportional flow controller that generates a variable flow rate depending on the speed. The controller adjusts the pump's displacement volume based on an electrical input signal. The resulting flow rate depends on the displacement volume and speed.

The required pilot pressure for adjusting the swivel angle is tapped internally. An external auxiliary pump or a pre-load valve is required to ensure reliable switching.

Coding **VLSP**



Coding **LVP**



EM.CH controller

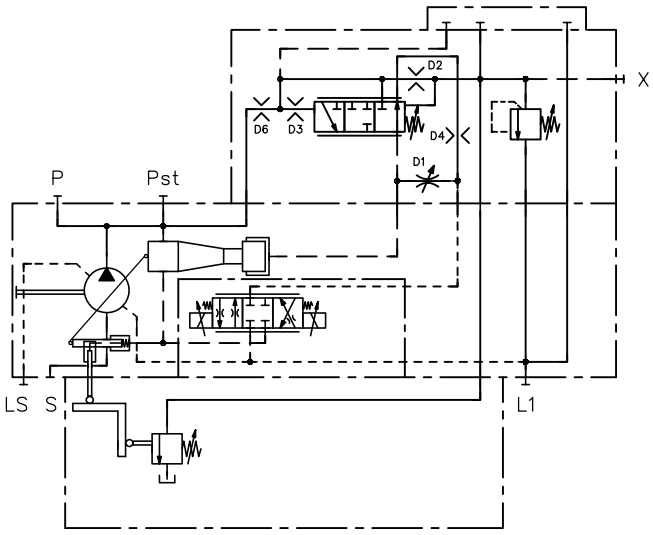
The electro-hydraulic delivery flow controller EM.CH adjusts the displacement volume of the pump between "zero" and "maximum" in proportion to an electrical input signal, (target 0 - 10 V or 0 - 20 mA).

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).

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 **EMPLCH**



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

DAMAGE

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:

V80M-200	R	S	F	N	-1	-0	-XX	/EM0CH

Version with pressure and power controller:

V80ML-200	L	D	G	V	-2	-1	-XX	/EMLPCH	-400	-250	-C311L	-Z09

2.10 Flange version (output side)

Coding V80M-		Flange	Shaft	e.g. mounting of HAWE pump with coding
200	L200			
C 312	C 312L	SAE-A 2-hole J 744 82-2 DIN ISO 3019-1	SAE-A J 744 (16-4 ISO 3019-1) 9T 16/32 DP [1)]	
C 313	C 313L	SAE-A 2-hole J 744 82-2 DIN ISO 3019-1	19-4 DIN ISO 3019-1 11T 16/32 DP	
C 314	C 314L	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 315	C 315L	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 316	C 316L	SAE-B 2/4-hole 101-2/4 DIN ISO 3019-1	SAE-BB J 744 (25-4 DIN ISO 3019-1) 15T 12/24 DP	C40V
C 317	C 317L	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 318	C 318L	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 319	C 319L	SAE-C 4-hole J 744 127-4 DIN ISO 3019-1	23T 16/32 DP	
C 320	C 320L	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.. /V80M-200 ..UW..
C 321	C 321L	SAE-E 4-hole J 744 165-4 DIN ISO 3019-1	15T 8/16 DP	V80M-200 ..SF..
C 322	C 322L	Prepared for thru-shaft (cover)		
C323	C323L	160 B4 HW DIN ISO 3019-2	W45x2x21x9g DIN 5480	V30E-095 ..DG..
C324	C324L	SAE-D 4-hole J744 152-4 DIN ISO 3019-1	W45x2x21x9g DIN 5480	V30E-095 ..DF..
C326	C326L	180 B4 HW DIN ISO 3019-2	W50x2x24x9g DIN 5480	V30E-160 ..DG..
C329	C329L	SAE-D 4-hole J744 152-4 DIN ISO 3019-1	W50x2x24x9g DIN 5480	V30E-160 ..DF..
C330	C330L	SAE-E 4-hole J744 165-4 DIN ISO 3019-1	W50x2x24x9g DIN 5480	

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

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

DAMAGE

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

3 Parameters

3.1 General data

Designation	Variable displacement axial piston pump
Design	Axial piston pump according to the swash plate principle
Mounting	Flange mounting or foot bracket
Surface	temporarily protected
Drive/output torque	max. permissible drive/output torque (Nm) **Nominal size 200** **Spline shaft D** 2550/1800 **Spline shaft S** 2350/1800 **Spline shaft U** 1200/1200
Installation position	any Installation information see Chapter 5, "Installation, operation and maintenance information"
Rotation direction	Clockwise or anticlockwise
Ports/connections	▪ Suction port ▪ Pressure connection ▪ Drain port ▪ Ventilation connection
Hydraulic fluid	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 mm²/s Optimal operating range: approx. 16 - 60 mm²/s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C. Installation information see Chapter 5, "Installation, operation and maintenance information"
Cleanliness level	**ISO 4406** 19/17/14
Temperatures	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	
	200	L200
Max. swash plate angle	16°	16°
Absolute inlet pressure required in open circuit	0.85 bar	0.85 bar
Minimum operating pressure	15 bar	15 bar
Max. permissible housing pressure (static/dynamic)	2 bar / 3 bar	2 bar / 3 bar
Max. permissible inlet pressure (static/dynamic)	20 bar / 30 bar	20 bar / 30 bar
Max. speed during suction operation and max. swash plate angle at 1 bar abs. Inlet pressure	2150 rpm	2500 rpm
Max. speed in supply mode	2500 rpm	2500 rpm
Min. speed in continuous operation	500 rpm	500 rpm
Required drive torque at 100 bar	350 Nm	350 Nm
Drive power at 250 bar and 1450 rpm	133 kW	133 kW
Inertia torque	0.057 kg m²	0.057 kg m²
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)	75 dB(A)	75 dB(A)

DAMAGE
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.

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

3.2 Weight

Type	Without controller	With controller			
		LSP, P, Pb, LSPb	L	V	EM.CH
V80M-200	= 93 kg	+ 3 kg	+ 3.3 kg	+ 3.5 kg	+ 6.1 kg
V80M-200L	= 105 kg				

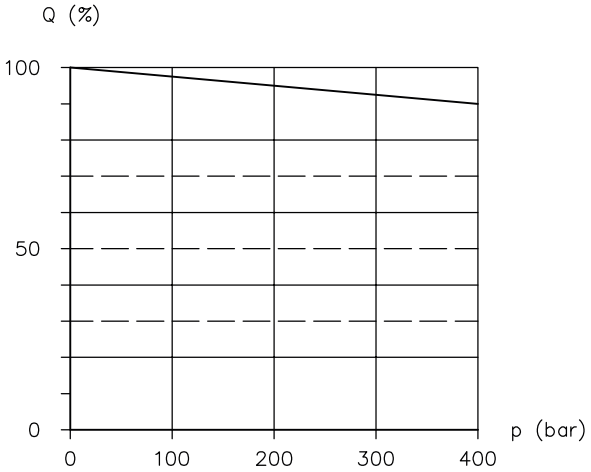
3.3 Pressure and delivery flow

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 Controllers

Load-sensing controller LSP



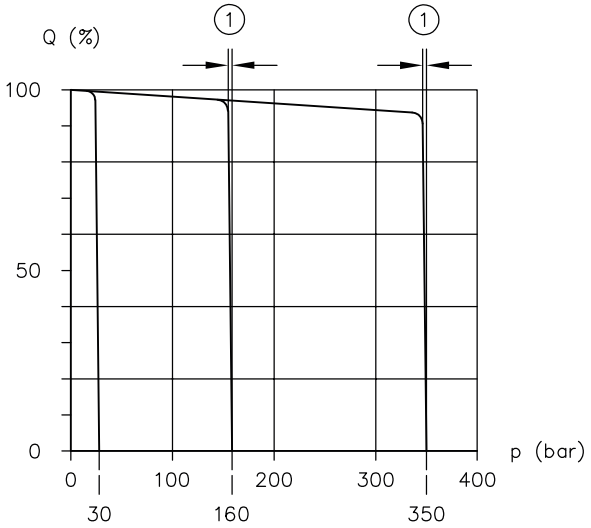
p pressure (bar); Q delivery flow (%)

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%)

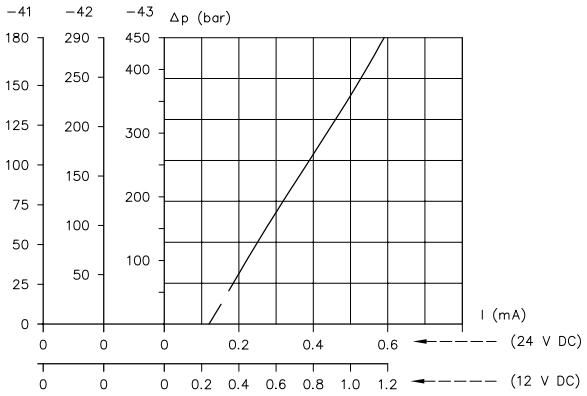
Pressure controller P, PMVPS, BVPM



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

1 Approx. 4 bar

PMVPS 4

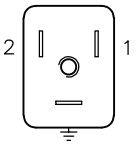


I current (mA); p pressure (bar)

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	D 7485/1	
Electrical connection	Industry standard (11 mm)	

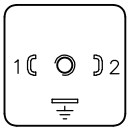
G 12, G 24, X 12, X 24

Industry standard
(similar to EN 175 301-803)

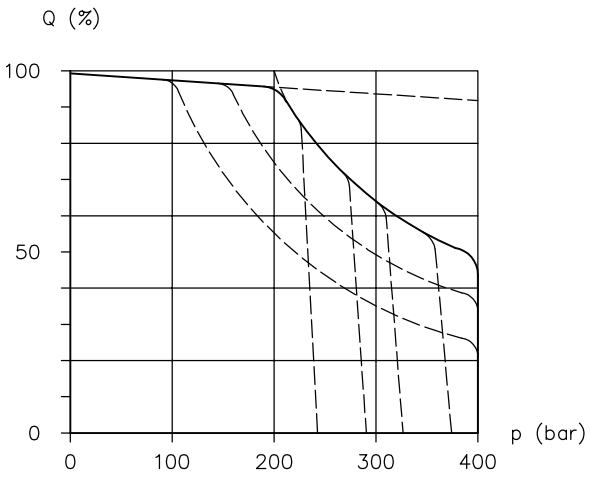


BVPM 1

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 properly	
Further information	D 7765	
Electrical connection	EN 175 301-803 A	



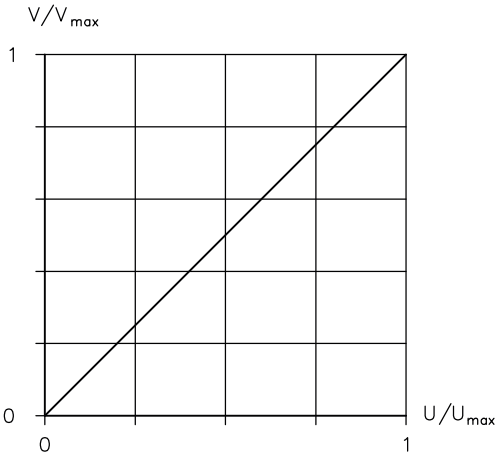
Power controller L, Lf, Lf1, Lfe, Lfe1



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

NOTE

The lowest recommended nominal torque setting. corresponds to 20% of the maximum possible torque with pressure set to maximum.



U/U$_{max}$ input signal; V/V$_{max}$ displacement volume

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

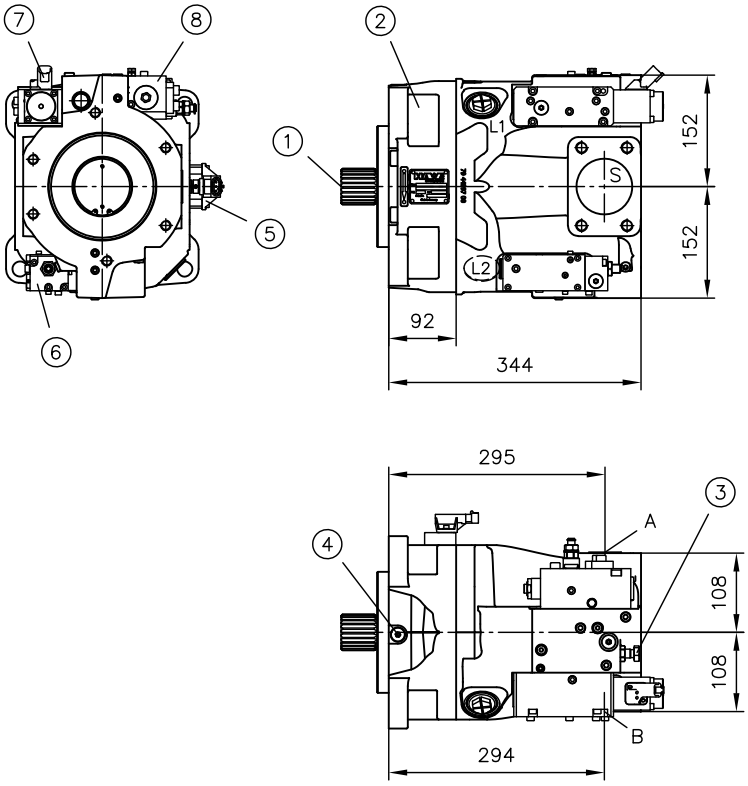
All dimensions in mm, subject to change.

4.1 Basic pump

4.1.1 Type V80M-200

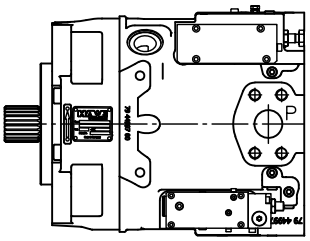
Rotation direction **clockwise** (viewed from shaft journal)

V80M-200, R



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

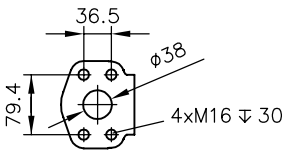
V80M-200 L



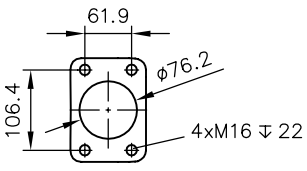
1 Shaft version
2 Flange version
3 Stroke limitation (V_g approx. 10 cm³/rev.)
4 Bleeding port
5 Controller
6 Power controller
7 Pressure controller P, LSP
8 Delivery flow controller

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

Pressure connection



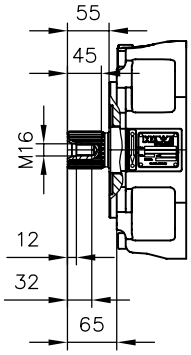
Suction port



Shaft journal

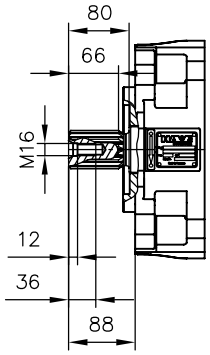
Spline shaft

Coding **D**
(DIN 5480 W50x2x24x9g)



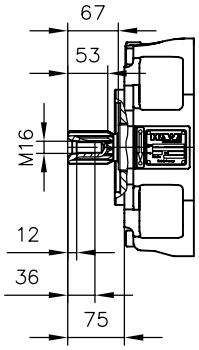
Spline shaft

Coding **S**
(SAE-F J 744 15T 8/16 DP)



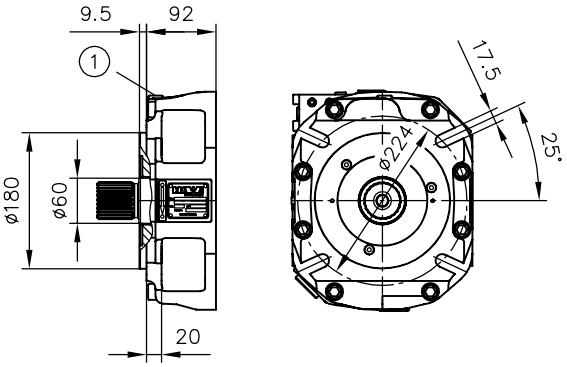
Spline shaft

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



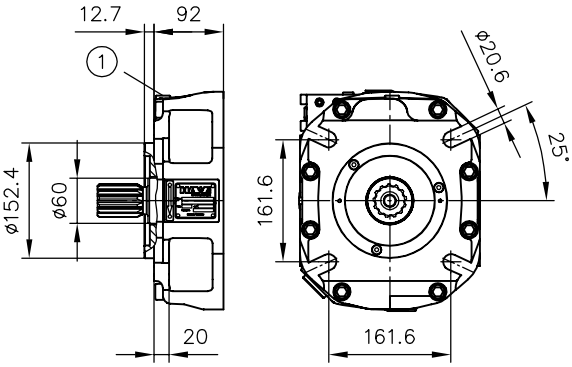
Flange version

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



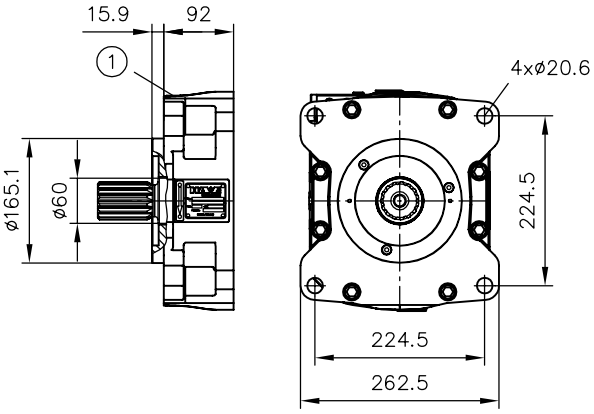
1 Bleeding and flushing port G1/4

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



1 Bleeding and flushing port G1/4

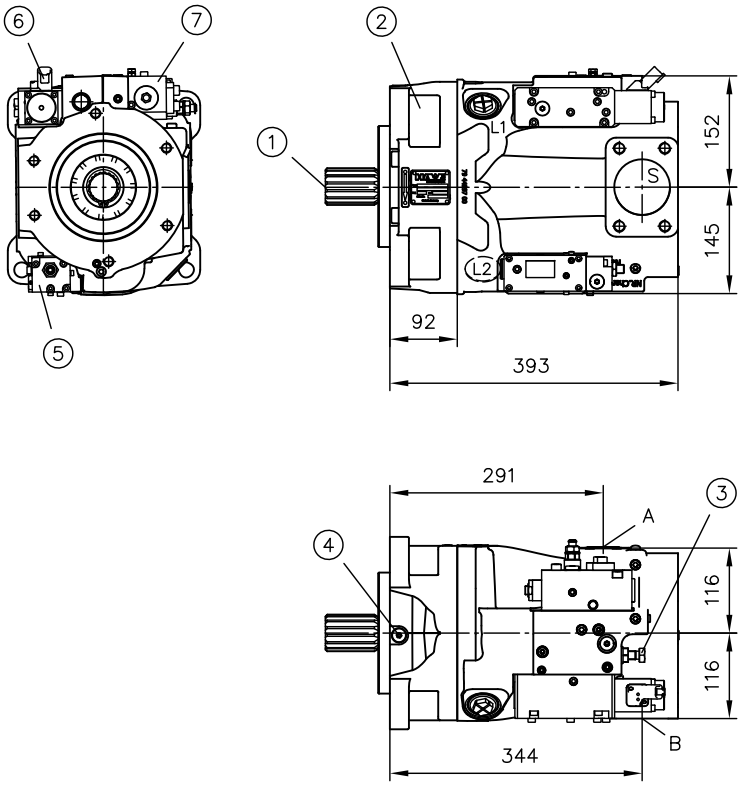
Coding **F**
(SAE-E 4-hole J 744)
(165-4 DIN ISO 3019-1)



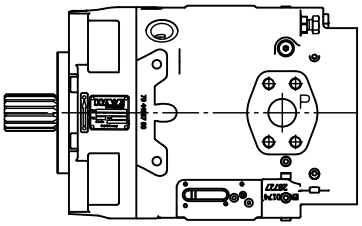
1 Bleeding and flushing port G1/4

4.1.2 Type V80ML-200

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



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

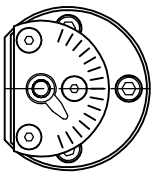


1 Shaft version
2 Flange version
3 Stroke limitation (V_g approx. 10 cm³/rev.)
4 Bleeding port
5 Power controller
6 Pressure controller P, LSP
7 Delivery flow controller

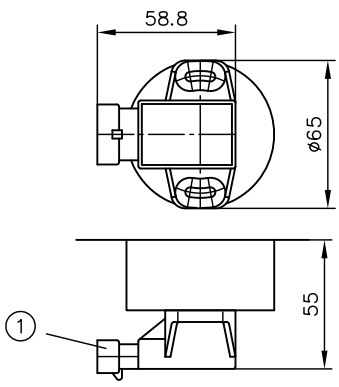
Rotation direction clockwise	Rotation direction anti-clockwise
A = pressure connection	A = suction port
B = suction port	B = pressure connection

4.2 Swivel angle indicator

Swivel angle indicator



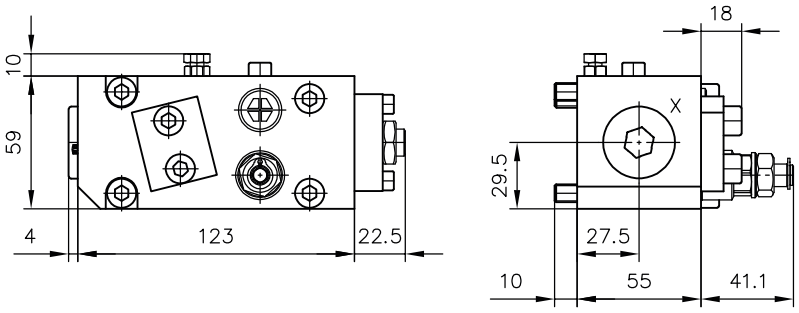
Swivel angle pick-up



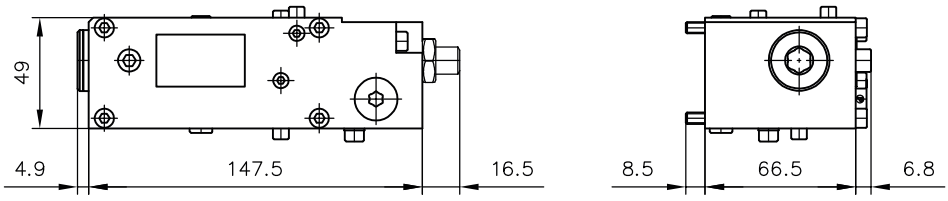
1 3-PIN AMP Superseal

4.3 Controllers

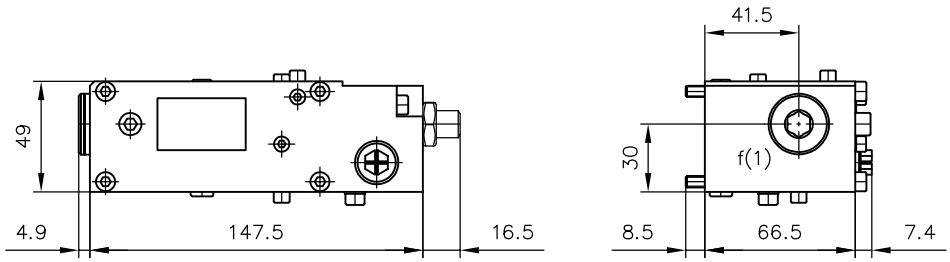
Coding **P, LSP**



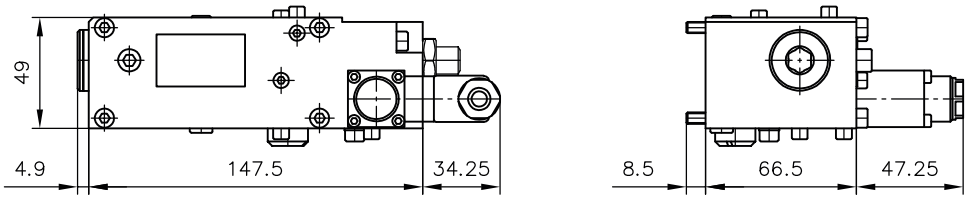
Coding **L**



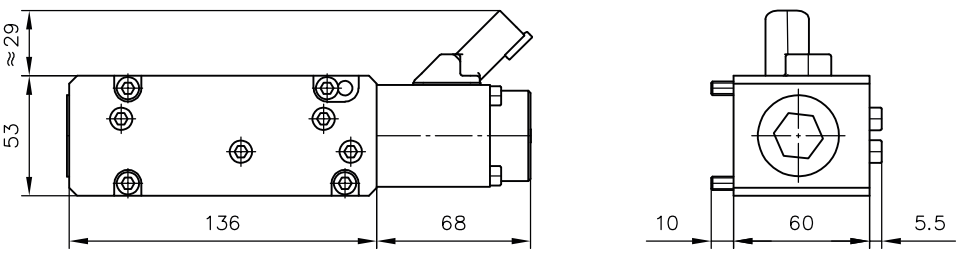
Coding **Lf, Lf1**



Coding **Lfe, Lfe1**



Coding **V**



⚠ CAUTION

Overloading components due to incorrect pressure settings.

Risk of minor injury.

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

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 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.

Bleeding and flushing port	▪ 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.
Pressure connection	▪ The pressure connection is established via SAE ports, see Chapter 4, "Dimensions". Metric mounting threads are used in deviation from the standard. ▪ Observe the fitting manufacturers' specified tightening torques.
Suction port	▪ The suction port uses SAE ports, see Chapter 4, "Dimensions". Metric mounting threads are used in deviation from the standard. ▪ 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". ▪ The absolute suction pressure must not fall below 0.85 bar.
Drain port	▪ The pump features 2 drain ports G 1". ▪ 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. ▪ Integrate the leakage 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 leakage line from the controller to the tank is not required. Observe the notes on installation see Chapter 5.2.3, "Installation positions". ▪ The top drain port can 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 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. ▪ When the proportional directional spool valve is in a neutral position, the LS line must always be fully relieved!

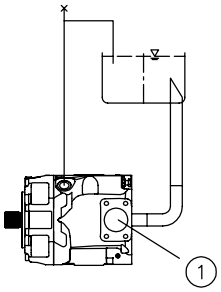
5.2.3 Installation positions

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

Horizontal installation

Pump below the min. fill level

► For horizontal installation, use the uppermost drain port.



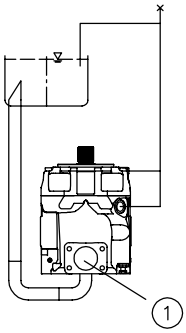
1 Suction port open

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.

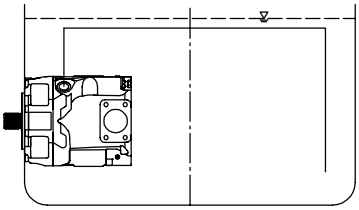


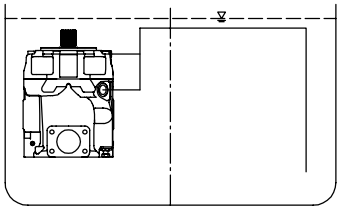
1 Suction port open

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.





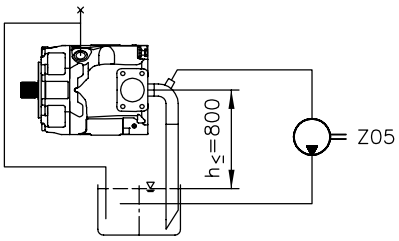
Pump above the fill level

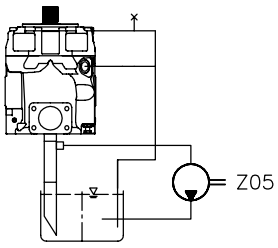
DAMAGE

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.

DAMAGE

- 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 and the valves.
- 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

DAMAGE

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

5.4 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	$Q = \frac{V_g \cdot n \cdot \eta_V}{1000} (l/\min)$
Drive torque	$M = \frac{1{,}59 \cdot V_g \cdot \Delta p}{100 \cdot \eta_{mh}} (Nm)$
Drive power	$P = \frac{2\pi \cdot M \cdot n}{60000} = \frac{M \cdot n}{9549} = \frac{Q \cdot \Delta p}{600 \cdot \eta_t} (kW)$

Q	= Flow rate (lpm)
M	= Torque (Nm)
P	= Power (kW)
V_g	= Geom. output volume (cm^3/rev.)
Δp	= Differential pressure
n	= Speed (rpm)
η_V	= Volumetric efficiency
η_{mh}	= Mechanical-hydraulic efficiency
η_t	= Overall efficiency ($\eta_t = \eta_V \cdot \eta_{mh}$)

References

Additional versions

- Variable displacement axial piston pump type V60N: D 7960 N
- Variable displacement axial piston pump type V30E: D 7960 E
- 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

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