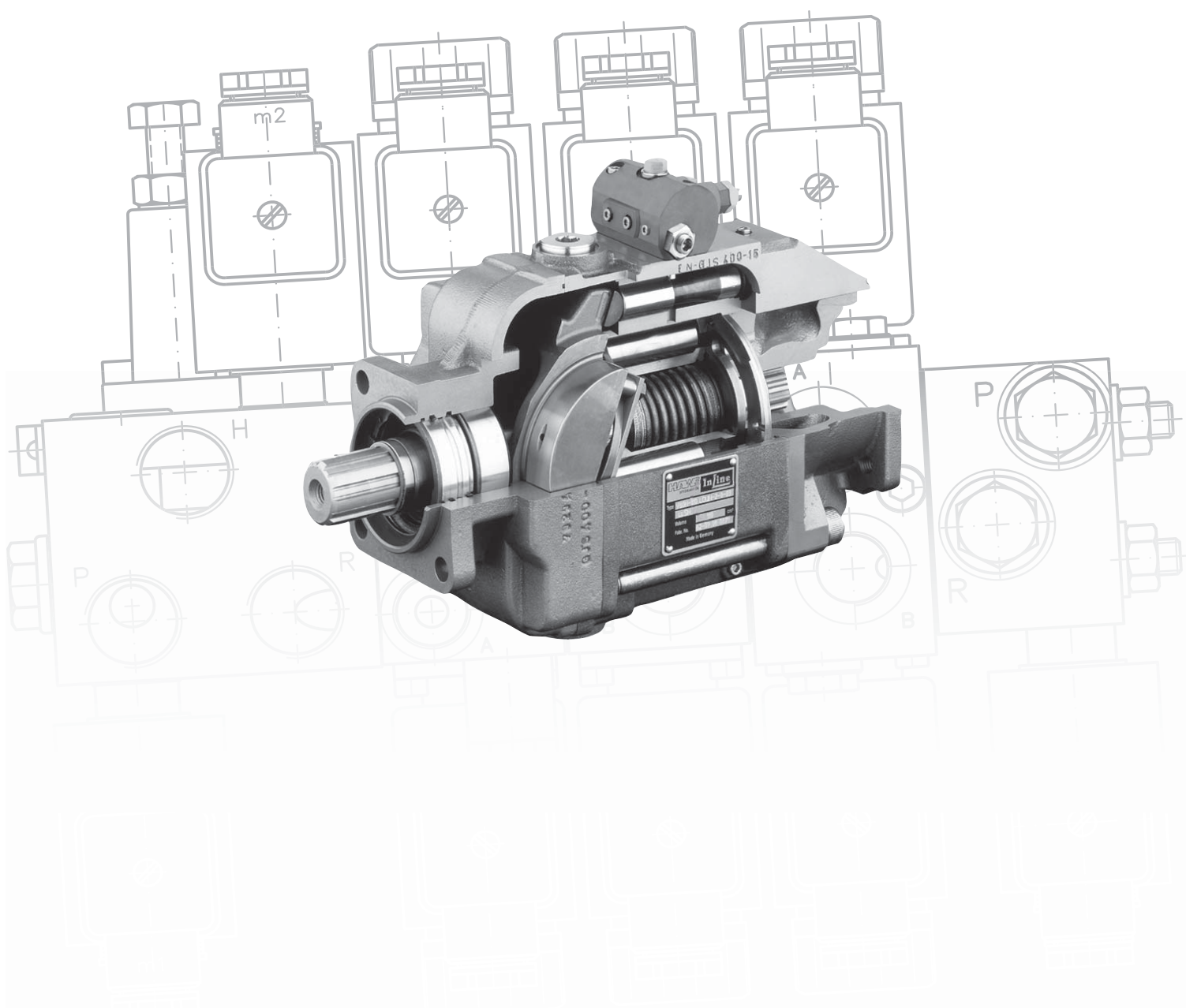
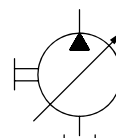


# Variable displacement axial piston pump type V60N

Applications including commercial vehicles, open circuit

Nominal pressure  $p_{\text{nom max}}$ : 400 bar  
Maximum pressure  $p_{\text{max}}$ : 450 bar  
Geometric displacement  $V_{\text{max}}$ : 60 ... 130 cm<sup>3</sup>/rev.

Switching symbol:



Product documentation

D 7960 N

10-2014-2.0

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## 1 Overview: Type V60N variable displacement axial piston pump

Thanks to its sturdy structure, the variable displacement axial piston pump is designed for direct flange mounting to the power take-off on commercial vehicle gearboxes, or for standard connection using an SAE flange. Thanks to benchmark figures of 130 cm<sup>3</sup>/rev. and 450 bar peak pressure, it can be used in a wide range of applications. This is also supported by a high self-suction speed rating and low noise level. Variations with a thru-shaft for flange mounting additional variable displacement axial piston pumps and auxiliary pumps are available. The variety of controllers available offers the user a wide range of application options. Particular advantages with regard to the mutual coordination arise from a combined application of variable displacement axial piston pumps with proportional directional spool valves type PSV and possibly required load-holding valves type LHT and LHDV.

### Features and benefits:

- Optimized power-to-weight ratio
- High self-suction speed
- Different shaft and flange versions

### Intended applications:

- Machines for forestry and agricultural purposes
- Cranes and lifting equipment
- Truck-mounted concrete pumps
- Municipal trucks

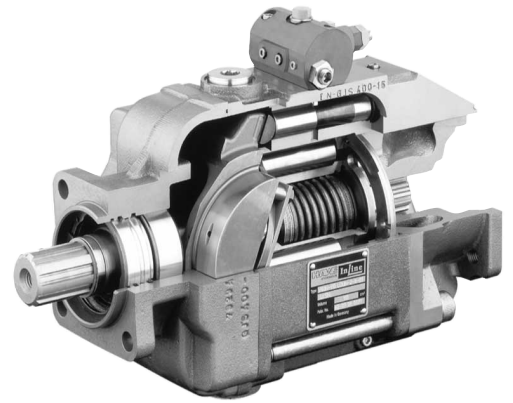


Figure 1: Variable displacement axial piston pump type V60N-110

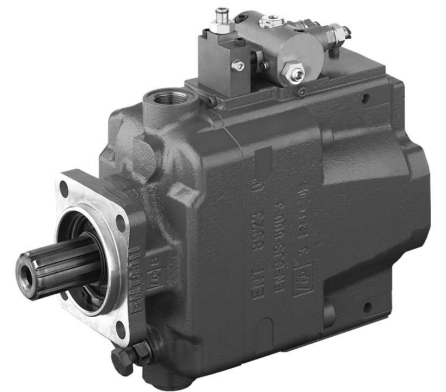
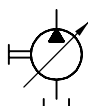


Figure 2: Variable displacement axial piston pump type V60N-130

**Switching symbol:**



V60N	-090	R	D	Z	N	- 2	-0	03	/LSNR/ZL	- 2/65	- 350	-	A00/76	- C 022	
														<b>Flange version</b>	Table 13 Flange versions (output side)
														<b>Suction intakes</b>	Suction intakes: see Section <a href="#">Chapter 7, "Accessories, spare parts and separate components"</a>
														<b>Ports</b>	Table 12 Ports
														<b>Pressure specification (bar)</b>	
														<b>Stroke limitation</b>	Table 11 Stroke limitations
														<b>Controller</b>	Table 8 Controllers; Table 9 Intermediate plates; Table 10 Solenoid voltage and versions
														<b>Release</b>	
														<b>Additional function</b>	Table 7 Additional function
														<b>Housing version</b>	Table 6 Housing versions
														<b>Seal</b>	Table 5 Seals
														<b>Flange version</b>	Table 4 Flange versions (input side)
														<b>Shaft version</b>	Table 3 Shaft versions
														<b>Rotation direction</b>	Table 2 Rotation directions
														<b>Nominal size</b>	Table 1 Nominal sizes

## Basic type

**Table 1 Nominal size**

Coding	Geometric displacement (cm <sup>3</sup> /rev.)	Nominal pressure p <sub>nom</sub> (bar)	Peak pressure p <sub>max</sub> (bar)
060	60	350	400
090	90	350	400
110	110	350	400
130	130	400	450

**Table 2 Rotation directions**

Coding	Description
L	Anti-clockwise
R	Clockwise

When looking at the shaft journal  
(for information on change of rotation  
direction, see [Chapter 3, "Parameters"](#))

**Table 3 Shaft versions**

Coding	Description	Designation/Standard	Max. drive torque (Nm)
D	Parallel key splined shaft	Similar to DIN ISO 14 (trucks)	800
M	Spline shaft	DIN 5480 (only V60N-090, V60N-110)	530
H	Spline shaft	SAE-B J 744 13T 16/32 DP 22-4 ISO 3019-1 (only V60N-060)	210
U	Spline shaft	SAE-B J 744 short 13T 16/32 DP 22-4 ISO 3019-1 short (only V60N-060)	210
T	Spline shaft	SAE-BB J 744 15T 16/32 DP 25-4 ISO 3019-1 (only V60N-060)	340
S	Spline shaft	SAE-C J 744 14T 12/24 DP 32-4 ISO 3019-1	640
Q	Spline shaft	SAE-CS 21T 16/32 DP 35-4 ISO 3019-1 (only V60N-090, V60N-110, V60N-130)	900

**Table 4 Flange versions (input side)**

Coding	Description	Designation
<b>Y</b>	Flange	ISO 7653-1985 (for trucks)
<b>P</b>	Flange	ISO 7653-1985 10° rotated (for trucks) (only V60N-110, V60N-130) <sup>1)</sup>
<b>X</b>	Flange	SAE-B 2-hole J 744 - 45° rotated 101-2 ISO 3019-1 (only V60N-060)
<b>Z</b>	Flange	SAE-B 4-hole J 744 101-4 ISO 3019-1 (only V60N-060)
<b>F</b>	Flange	SAE-C 4-hole J 744 127-4 ISO 3019-1
<b>G</b>	Flange	125 B4 HW ISO 3019-2 (only V60N-090)

**Table 5 Seals**

Coding	Description
<b>N</b>	NBR
<b>V</b>	FKM

**Table 6 Housing versions**

Coding	Description
<b>1</b>	Suction and pressure port axial
<b>2</b>	Suction and pressure port radial, with thru-shaft
<b>3</b>	Suction and pressure port radial
<b>4</b>	Suction and pressure port axial, ports SAE J 518 (only V60N-090)

**Table 7 Additional functions**

Coding	Description
<b>0</b>	None

<sup>1)</sup> For narrow installation spaces, e.g. Mercedes Benz NA 124 gear manufacturing

**Table 8 Controllers**

Coding	Description																																				
LSNR	<p>Load-sensing controller with integrated pressure limitation.</p> <p>The LSNR controller is a delivery flow controller that generates a variable volumetric flow independently of the speed. It sets a constant difference between the load pressure and pump pressure by continuously adapting the geometric displacement of the pump to the quantity required for the consumers.</p> <p>The integrated pressure limitation restricts the maximum pressure to a set value.</p> <p>Coding LSN: Discontinued unit; see <a href="#">Chapter 7.1, "Discontinued controller units"</a></p>																																				
LSNRT	<p>Load-sensing controller with forced LS relief and integrated pressure limitation.</p> <p>As well as the LSNR controller, the LSNRT contains internal LS signal relief. It is suited to hydraulic systems whose LS relief does not take place in proportional directional spool valves.</p> <p>Internal leakage current ≤ 1.5 lpm</p>																																				
NR	<p>Pressure controller, adjustable directly at the pump.</p> <p>The pressure controller maintains a constant system pressure independently of the required delivery flow. It is suited to constant pressure systems where differing delivery flows are required or for efficient pressure limitation of a hydraulic system.</p> <p>Coding N: Discontinued unit; see <a href="#">Chapter 7.1, "Discontinued controller units"</a></p>																																				
NXR	<p>Remote-controlled pressure controller. The pressure is set using an externally piped pressure-limiting valve (not included in the scope of delivery).</p>																																				
QNR/...	<p>Size <b>060, 090, 110</b>: Delivery flow controller with integrated pressure limitation for setting a constant volumetric flow independently of the speed.</p> <p>The quantity controller generates a constant differential pressure via an orifice in the P channel. The differential pressure can be adjusted between 20 and 55 bar; the orifice is available in various gradings.</p> <p>This allows flexible adjustment of the volumetric flow.</p> <table><tr><th>Orifice (mm)</th><th>Volumetric flow at 20 bar differential pressure (lpm)</th><th>Orifice (mm)</th><th>Volumetric flow at 20 bar differential pressure (lpm)</th></tr><tr><td>3</td><td>approx. 23</td><td>7</td><td>approx. 127</td></tr><tr><td>3.5</td><td>approx. 32</td><td>7.5</td><td>approx. 146</td></tr><tr><td>4</td><td>approx. 42</td><td>8</td><td>approx. 166</td></tr><tr><td>4.5</td><td>approx. 53</td><td>8.5</td><td>approx. 188</td></tr><tr><td>5</td><td>approx. 65</td><td>9</td><td>approx. 210</td></tr><tr><td>5.5</td><td>approx. 65</td><td>9.5</td><td>approx. 234</td></tr><tr><td>6</td><td>approx. 94</td><td>10</td><td>approx. 260</td></tr><tr><td>6.5</td><td>approx. 110</td><td></td><td></td></tr></table>	Orifice (mm)	Volumetric flow at 20 bar differential pressure (lpm)	Orifice (mm)	Volumetric flow at 20 bar differential pressure (lpm)	3	approx. 23	7	approx. 127	3.5	approx. 32	7.5	approx. 146	4	approx. 42	8	approx. 166	4.5	approx. 53	8.5	approx. 188	5	approx. 65	9	approx. 210	5.5	approx. 65	9.5	approx. 234	6	approx. 94	10	approx. 260	6.5	approx. 110		
Orifice (mm)	Volumetric flow at 20 bar differential pressure (lpm)	Orifice (mm)	Volumetric flow at 20 bar differential pressure (lpm)																																		
3	approx. 23	7	approx. 127																																		
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4.5	approx. 53	8.5	approx. 188																																		
5	approx. 65	9	approx. 210																																		
5.5	approx. 65	9.5	approx. 234																																		
6	approx. 94	10	approx. 260																																		
6.5	approx. 110																																				
PR	<p>Electric proportional pressure controller with increasing characteristic curve.</p> <p>The maximum pressure and minimum pressure can be adjusted mechanically; in between these values, electrical adjustment is possible.</p>																																				
P1R	<p>Electric proportional pressure controller with decreasing characteristic curve.</p> <p>The controller is specifically developed for fan and generator drives. In the event of a power failure, the pump generates the maximum pressure. The maximum pressure and minimum pressure can be mechanically adjusted at the controller.</p>																																				
/V	<p>Size <b>130</b>: Electric proportional delivery flow controller with increasing characteristic curve.</p> <p>The V controller is an electrically actuated controller that sets an appropriate geometric displacement for the pump in accordance with a current value. Therefore, the pump generates a variable volumetric flow that is dependent on the speed.</p> <p>When used in open-centre systems with operating pressures of &lt; 25 bar, an external supply pump or a pump pre-load valve must be provided in order to ensure reliable adjustment.</p> <p>Only in combination with pressure control (coding NR or NXR)</p>																																				
/V1	<p>Size <b>130</b>: Electric proportional delivery flow controller with decreasing characteristic curve.</p> <p>In contrast to the IV controller, the IV1 controller has a negative characteristic curve, which means that the pump operates at the maximum geometric displacement in the event of a power failure.</p> <p>When used in open-centre systems with operating pressures of &lt; 25 bar, an external supply pump or a pump pre-load valve must be provided in order to ensure reliable adjustment.</p> <p>Only in combination with pressure control (coding NR or NXR)</p>																																				



**Table 9 Intermediate plates**

Intermediate plate version, only in combination with one of the controllers described above

Coding	Description
/ZL	Size <b>060, 090, 110</b> : Intermediate plate with power controller (torque limitation) Product "Pressure x Delivery flow" = constant  Adjustment range: 25 ... 100% max. drive torque Coding LLSN, LN: Discontinued units, see <a href="#">Chapter 7.1, "Discontinued controller units"</a>
/ZW	Angled intermediate plate (45°) mandatory for mounting controllers at pumps with housing version -2, -3
/L	Adjustment range: 200 - 700 Nm Size <b>130</b> : Power controller (standard)
/PR	Electric proportional pressure controller with increasing characteristic curve. The maximum pressure and minimum pressure can be adjusted mechanically; in between these values, electrical adjustment is possible.
/V	Size <b>130</b> : Electric proportional delivery flow controller with increasing characteristic curve. (The V controller acts directly on the set piston spring and makes a pilot-controlled electrical adjustment to the pivoting angle of the pump.)
/V1	Size <b>130</b> : Electric proportional delivery flow controller with decreasing characteristic curve. (The V1 controller acts directly on the set piston spring and makes a pilot-controlled electrical adjustment to the pivoting angle of the pump.)
/ZV	Size <b>060, 090, 110</b> : Electric proportional delivery flow controller with increasing characteristic curve. When used in open-centre systems with operating pressures of < 25 bar, an external supply pump or a pump pre-load valve must be provided in order to ensure reliable adjustment. The ZV controller is designed as an intermediate plate. (It acts on the set piston from above and electrically adjusts the pivoting angle of the pump.)
/ZV1	Size <b>060, 090, 110</b> : Electric proportional delivery flow controller with decreasing characteristic curve. When used in open-centre systems with operating pressures of < 25 bar, an external supply pump or a pump pre-load valve must be provided in order to ensure reliable adjustment. The ZV1 controller is designed as an intermediate plate. (It acts on the set piston from above and electrically adjusts the pivoting angle of the pump.)

**Table 10 Solenoid voltage and version**

Coding	Nominal voltage	Description
G 12	12 V DC	Version with connection DIN EN 301-803 With plug
G 24	24 V DC	
S 12	12 V DC	Version with bayonet connection (bayonet PA 6, SCHLEMMER, suitable for cone with bayonet 10 SL). The delivery does not include a plug.
S 24	24 V DC	

**Table 11 Stroke limitation**

Coding	Description
No designation	No stroke limitation
2	With adjustable stroke limitation (for housing version 1 and 4: all sizes, for housing version 2 and 3: only V60N-090, V60N-130)
2/...	Stroke limitation fixed with specification of the set geometric displacement $V_g$ (cm <sup>3</sup> /rev.)

**Table 12 Ports**

Coding	Ports
No designation	ISO 228/1
UNF	SAE J 514

**Order coding example:**

V60N-110 RDYN-2-0-01/LSNR-350-A00/76- C 022

**Table 13 Flange versions (output side)**

Coding V60N			Flange	Shaft
060	090/110	130		
C 010	--	C 030	ISO 7653-1985	DIN ISO 14
C 011	C 021	C 031	SAE-A 2-hole J 744 82-2 ISO 3019-1	SAE-A J 744 (16-4 ISO 3019-1) 9T 16/32 DP
C 012	C 022	C 032	SAE-A 2-hole J 744 82-2 ISO 3019-1	SAE-A J 744 (16-4 ISO 3019-1) <sup>1)</sup> 9T 16/32 DP <sup>1)</sup>
C 013	--	--	SAE-A 2-hole J 744 82-2 ISO 3019-1	19-4 ISO 3019-1 11T 16/32 DP
C 014	C 024	C 034	SAE-B 2-hole J 744 101-2 ISO 3019-1	SAE-B J 744 (22-4 ISO 3019-1) 13T 16/32 DP
--	--	--	SAE-B 2-hole J 744 101-2 ISO 3019-1	SAE-BB J 744 (25-4 ISO 3019-1) 15T 12/24 DP
C 015	C 025	C 035	SAE-B 4-hole J 744 101-4 ISO 3019-1	SAE-B J 744 (22-4 ISO 3019-1) 13T 16/32 DP
--	C 027	C 037	SAE-C 2-hole J 744 127-2 ISO 3019-1	SAE-C J 744 (32-4 ISO 3019-1) 14T 12/24 DP
--	C 028	C 038	SAE-C 4-hole J 744 127-4 ISO 3019-1	SAE-C J 744 (32-4 ISO 3019-1) 14T 12/24 DP


**Note**

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

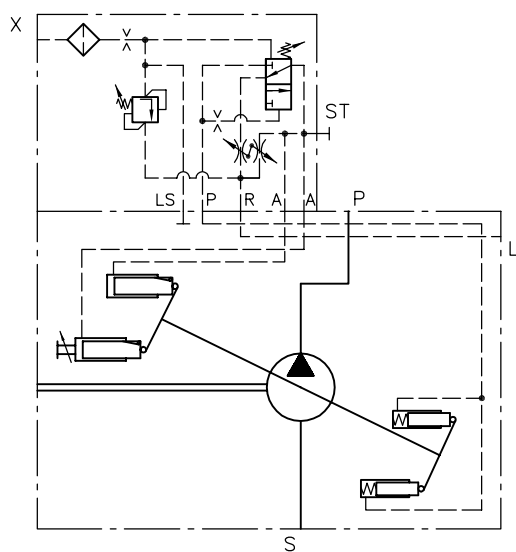

**Note**

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

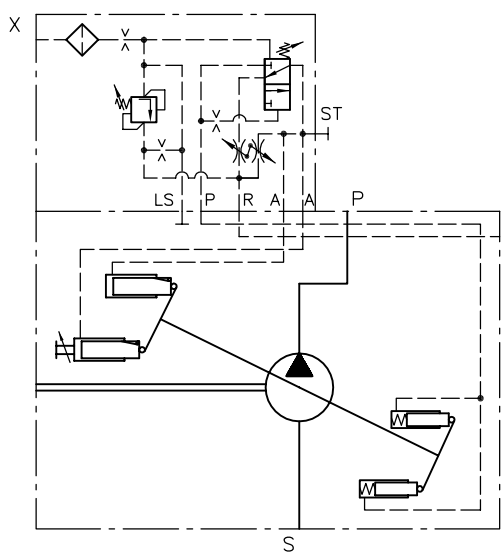
<sup>1)</sup> ANSI B 92.1, FLAT ROOT SIDE FIT, spline width deviating from the standard, s = 2.357-0.03

## 2.2 Controller switching symbols

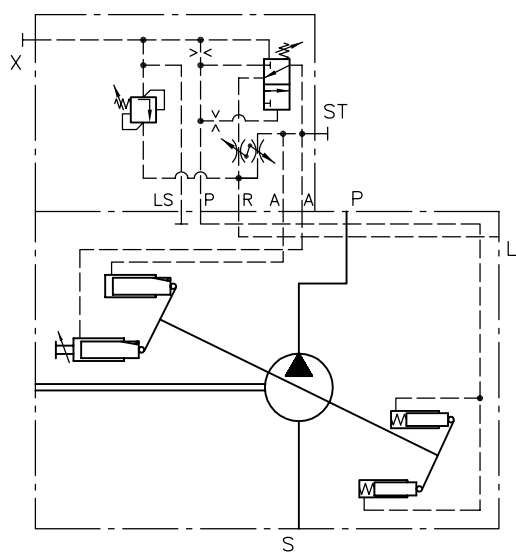
Coding LSNR



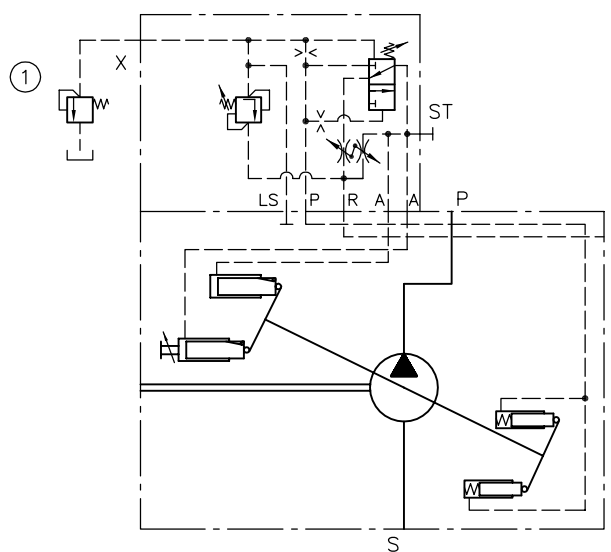
Coding LSNRT



Coding NR

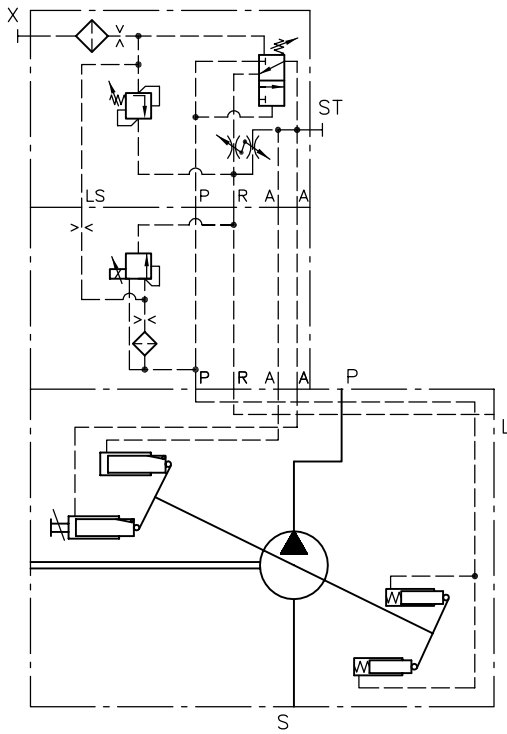


Coding NXR

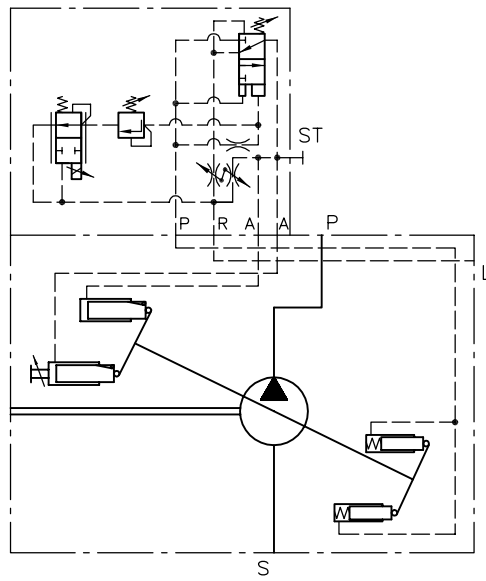


- 1 External pressure-limiting valve  
(not included in scope of delivery)

### Coding PR

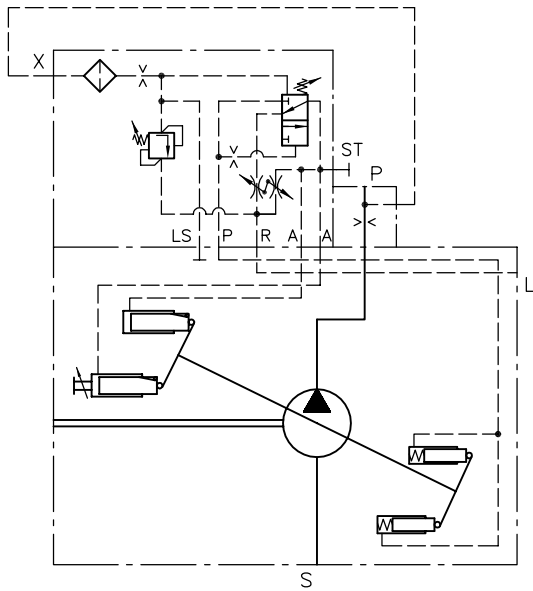


### Coding P1R

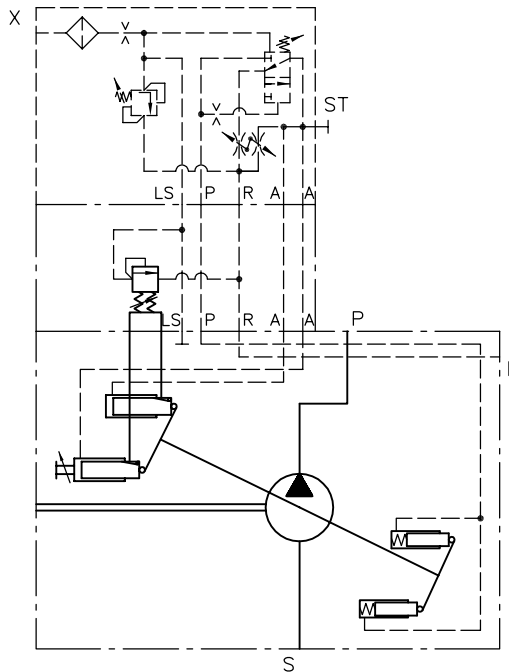


Type V60N-060, V60N-090, V60N-110

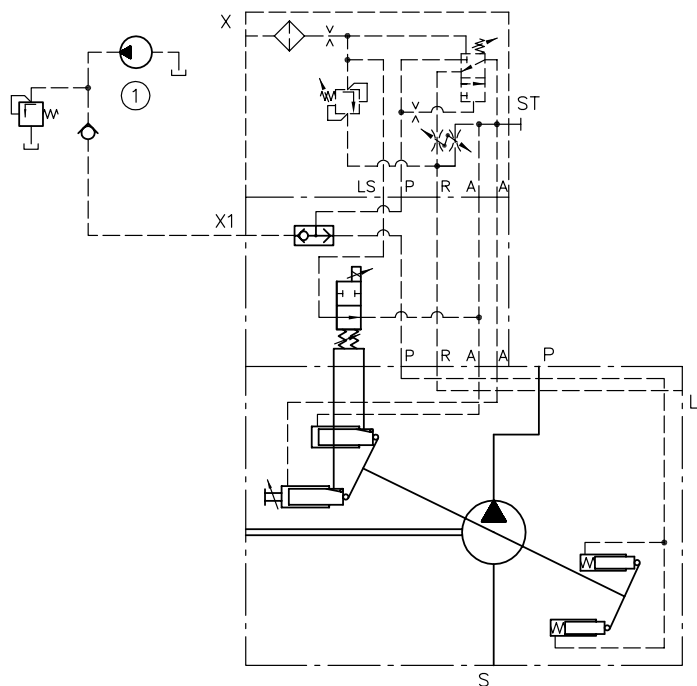
### Coding QNR



### Coding .../ZL

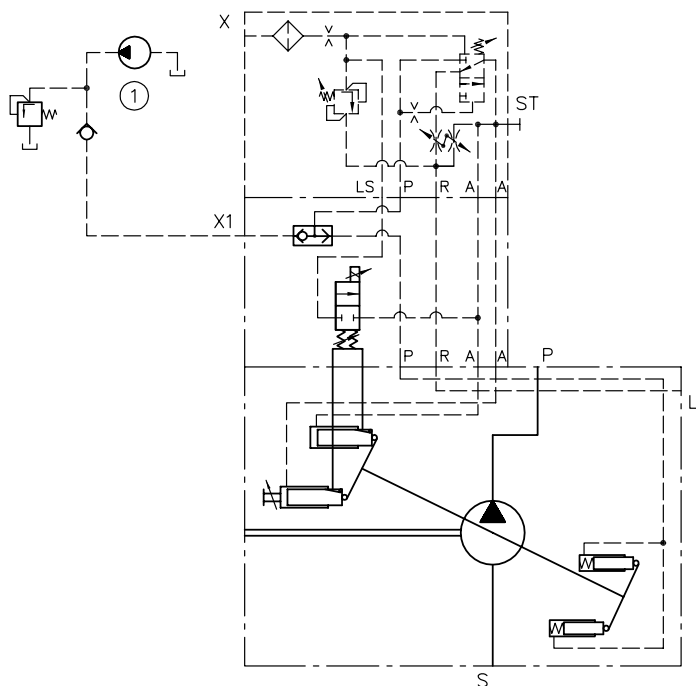


**Coding .../ZV**



- 1 External supply pump with pressure-limiting valve and check valve (not included in scope of delivery)

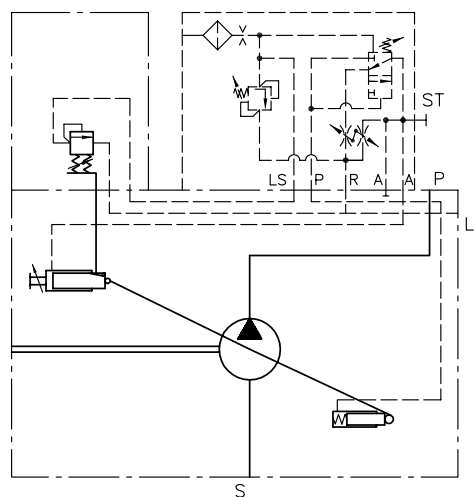
**Coding .../ZV1**



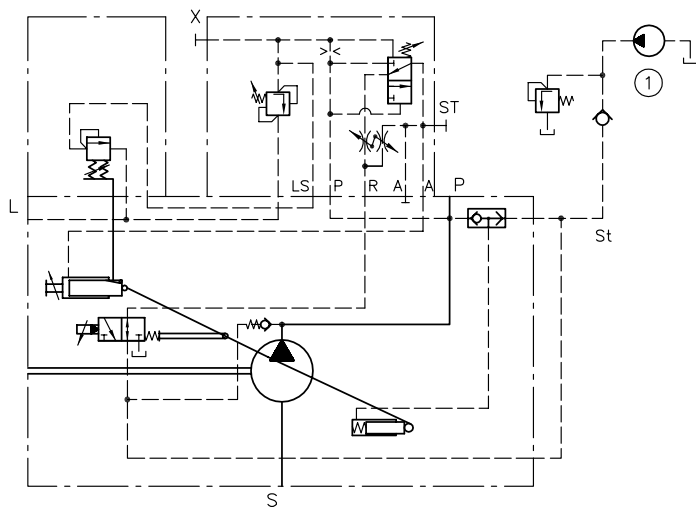
- 1 External supply pump with pressure-limiting valve and check valve (not included in scope of delivery)

**Type V60N-130**

**Coding .../L**

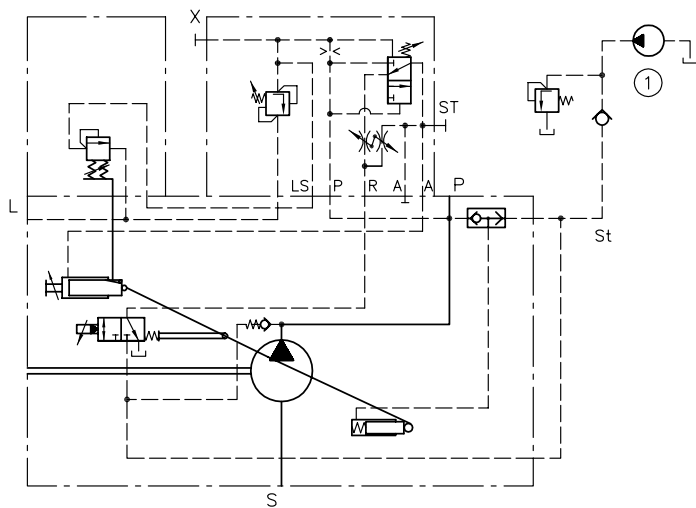


Coding .../V



- 1 External supply pump with pressure-limiting valve and check valve (not included in scope of delivery)

Coding .../V1



- 1 External supply pump with pressure-limiting valve and check valve (not included in scope of delivery)

## 3 Parameters

### 3.1 General

Description	Variable displacement axial piston pump
Design	Axial piston pump according to the swash plate principle
Mounting	Power take-off on commercial vehicle gearboxes (flange ISO 7653-1985 for trucks) or flange mounting
Surface	Primed
Drive/output torque	See <a href="#">Chapter 3, "Parameters"</a> , under "Additional parameters"
Installation position	Any (for installation information see <a href="#">Chapter 5, "Installation information"</a> )
Rotation direction	Clockwise or anti-clockwise
Change of rotation direction	<b>V60N-060...-110:</b> Turn the end plate of the pump (see dimension diagram) and replace the port plate; see also <a href="#">Assembly instructions for variable displacement axial piston pump type V60N: B 7960 N</a>
Ports	<ul style="list-style-type: none"> <li>■ Suction port</li> <li>■ Pressure port</li> <li>■ Drain port</li> <li>■ Pressure gauge port</li> </ul>
Hydraulic fluid	<p>Hydraulic oil: according to DIN 51 524 Part 1 to 3; ISO VG 10 to 68 according to DIN 51 519</p> <p>Viscosity range: min. approx. 10; max. approx. 1000 mm<sup>2</sup>/s</p> <p>Optimal operating range: approx. 20 to 50 mm<sup>2</sup>/s</p> <p>Also suitable for biologically degradable pressure fluids type HEPG (polyalkalene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.</p>
Purity class	<b>ISO 4406</b> <hr/> 19/17/14
Temperatures	<p>Ambient: approx. -40 to +60°C, oil: -25 to +80°C, pay attention to the viscosity range!</p> <p>Start temperature: down to -40°C is permissible (observe start-viscosity!), as long as the steady-state temperature is at least 20K higher for subsequent operation.</p> <p>Biologically degradable pressure fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.</p>

## Pressure and delivery flow

Operating pressure	See <a href="#">Chapter 2, "Available versions, main data"</a>
Geometric displacement	See <a href="#">Chapter 2, "Available versions, main data"</a>

## Mass

Type V60N	With controller (kg)
060	24
090	27
110	30
130	30.8

## Additional parameters

Description	Nominal size	Nominal size	Nominal size	Nominal size
	060	090	110	130
Max. swash plate angle	20.5°	21.5°	21.5°	21.5°
Absolute inlet pressure required in open circuit	0.85 bar	0.85 bar	0.85 bar	0.85 bar
Max. permissible housing pressure (static/dynamic)	2 bar/3 bar	2 bar/3 bar	2 bar/3 bar	2 bar/3 bar
Max. permissible inlet pressure (static/dynamic)	20 bar/30 bar	20 bar/30 bar	20 bar/30 bar	20 bar/30 bar
Max. speed during suction operation and max. swash plate angle at 1 bar abs. Inlet pressure	2500 rpm	2300 rpm	2200 rpm	2100 rpm
Max. speed with zero stroke and 1 bar abs. Inlet pressure	3000 rpm	3000 rpm	3000 rpm	3000 rpm
Min. speed in continuous operation	500 rpm	500 rpm	500 rpm	500 rpm
Required drive torque at 100 bar	100 Nm	151 Nm	184 Nm	230 Nm
Drive power at 250 bar and 2000 rpm	53 kW	79.5 kW	97.2 kW	120 kW
Weight torque	30 Nm	35.5 Nm	40 Nm	40 Nm
Inertia torque	0.005 kg m <sup>2</sup>	0.008 kg m <sup>2</sup>	0.01 kg m <sup>2</sup>	0.011 kg m <sup>2</sup>
Noise level at 250 bar, 1500 rpm and max. swash plate angle (measured in acoustic measurement chamber according to DIN ISO 4412, measurement distance 1 m)	75 dB(A)	75 dB(A)	75 dB(A)	75 dB(A)



## Max. permissible drive/output torque

Description		Nominal size			
		060	090	110	130
Parallel key splined shaft D	Drive/output	430 Nm/100 Nm	530 Nm/530 Nm	800 Nm/600 Nm	800 Nm/700 Nm
Spline shaft M	Drive/output	--	530 Nm/530 Nm	530 Nm/530 Nm	--
Spline shaft H	Drive/output	210 Nm/100 Nm	--	--	--
Spline shaft U	Drive/output	210 Nm/100 Nm	--	--	--
Spline shaft T	Drive/output	340 Nm/100 Nm	--	--	--
Spline shaft S	Drive/output	430 Nm/100 Nm	530 Nm/530 Nm	640 Nm/600 Nm	640 Nm/640 Nm
Spline shaft Q	Drive/output	--	530 Nm/530 Nm	900 Nm/600 Nm	900 Nm/700 Nm

## 3.2 Planning information for parameters

### Determination of nominal sizes

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

### 3.3 Characteristic curves

#### Delivery flow and power (basic pump)

The diagrams illustrate the delivery flow/pressure (without controller).

Drive power at max. swash plate angle and drive power at zero stroke and 1500 rpm.

Drive power/pressure at zero stroke and 1500 rpm

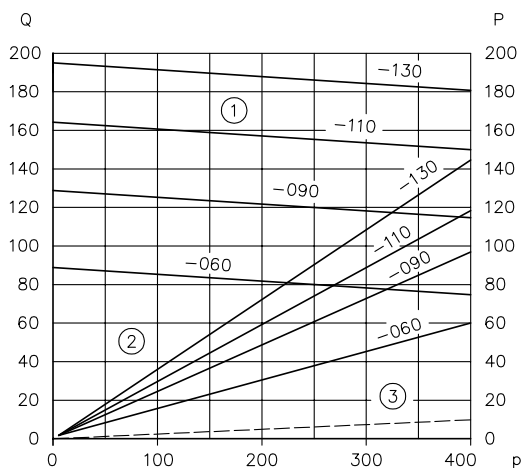


Figure 3: p pressure (bar); Q delivery flow (lpm); P power (kW)

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

#### Inlet pressure and self-suction speed

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

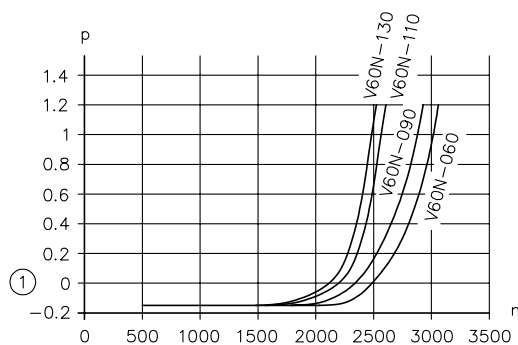


Figure 4: n speed (rpm); p inlet pressure (bar)

- 1 0 bar relative = 1 bar absolute

### 3.4 Controller characteristic curves

#### Coding /ZL, /L

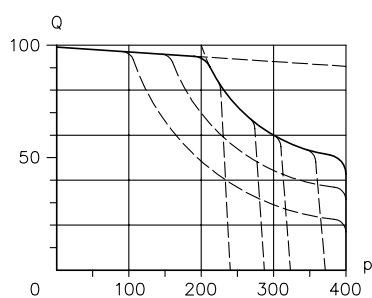


Figure 5: p pressure (bar); Q delivery flow (%)

#### Coding LSNR, PR, P1R

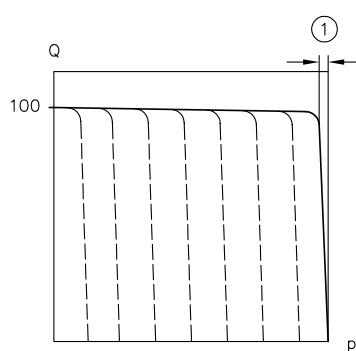


Figure 6:  $p_B$  operating pressure (bar); Q delivery flow (%)

1 Approx. 4 bar

#### Coding V, V1, ZV, ZV1

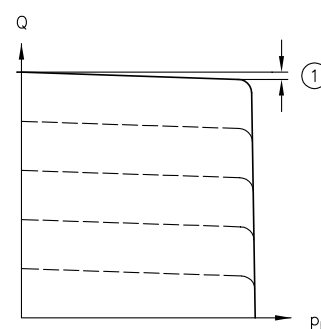


Figure 7:  $p_B$  operating pressure (bar); Q delivery flow (%)

1 Approx. 5%

#### Coding QNR

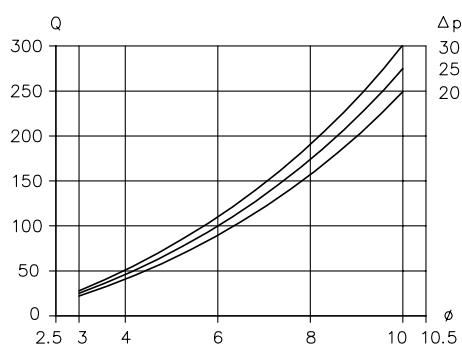


Figure 8: Ø orifice diameter (mm); Q delivery flow (%)

#### Determining delivery flow Q (lpm)

$$Q = 0,55 \cdot d^2 \sqrt{\Delta p}$$

d = orifice diameter (mm)

$\Delta p$  = pressure differential

### Coding PR

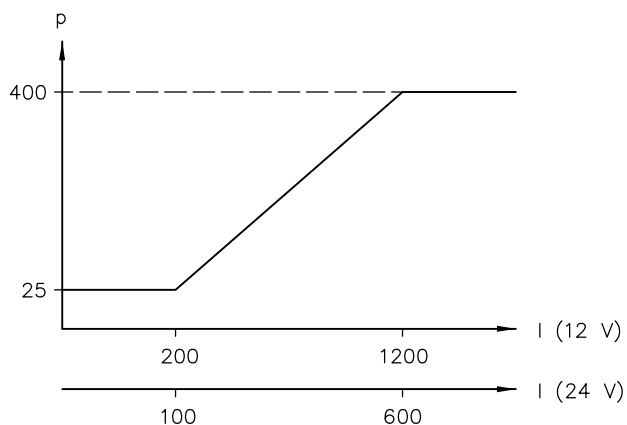


Figure 9: I current (mA); p pressure (bar)

### Coding V

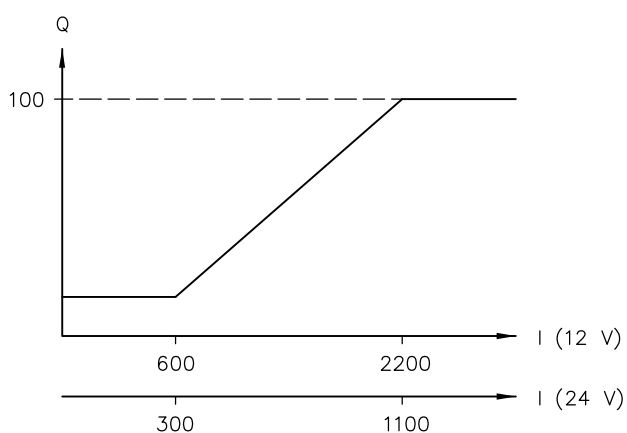


Figure 11: I current (mA); Q delivery flow (%)

### Coding ZV

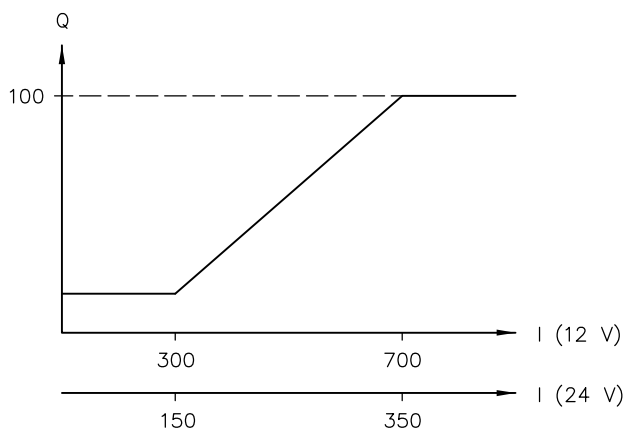


Figure 13: I current (mA); Q delivery flow (%)

### Coding P1R

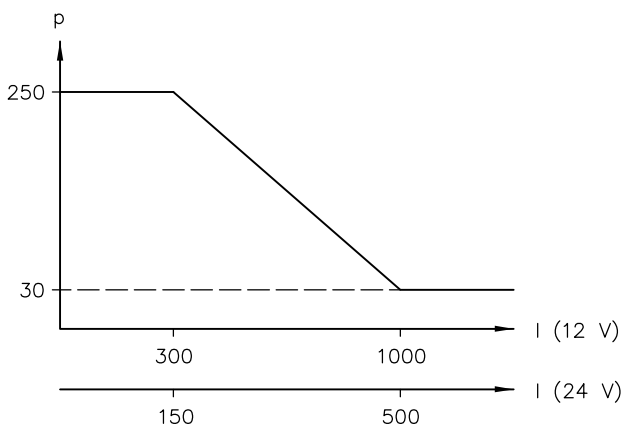


Figure 10: I current (mA); p pressure (bar)

### Coding V1

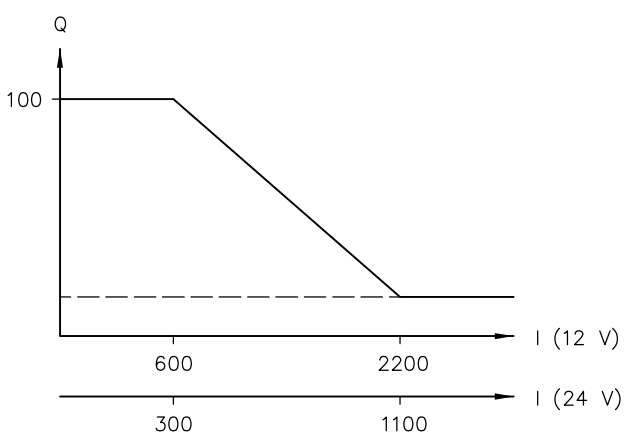


Figure 12: I current (mA); Q delivery flow (%)

### Coding ZV1

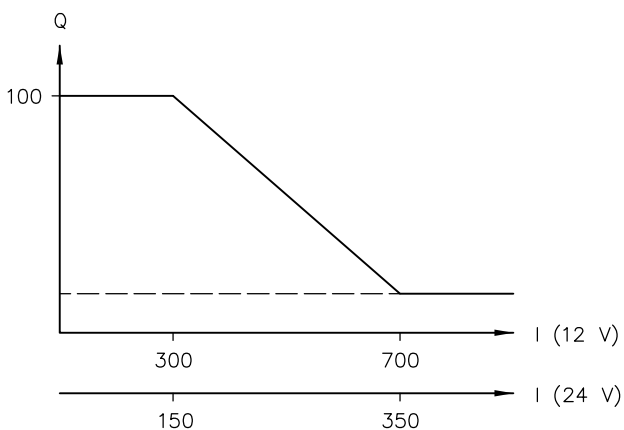


Figure 14: I current (mA); Q delivery flow (%)

### T1 acting times (LSNR controller)

The diagram shows the on-stroke time/pressure for the LSNR controller; i.e. the time that is required to swivel out the pump and adjust from the minimum to the maximum geometric displacement.

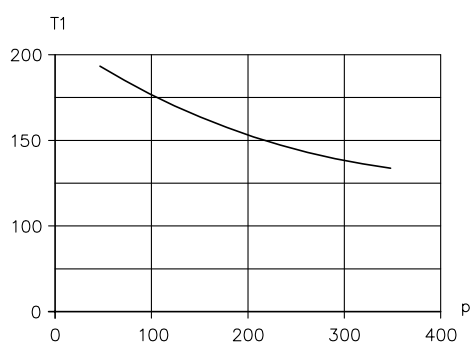


Figure 15:  $p$  pressure (bar);  $T_1$  acting time (ms)

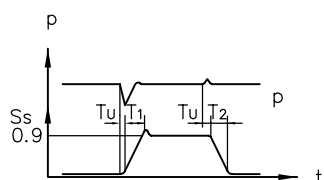


Figure 17:  $t$  in ms;  $p$  pressure (bar)

### T2 acting times (LSNR controller)

The diagram shows the destroke time/pressure for the LSNR controller; i.e. the time that is required to swivel in the pump and adjust from the maximum to the minimum geometric displacement.

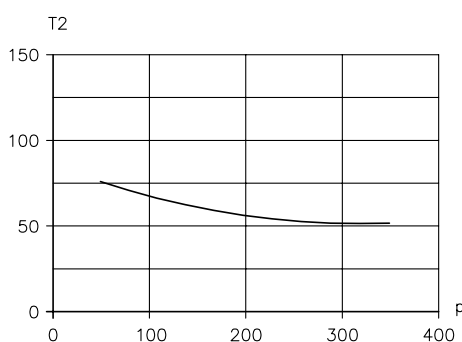


Figure 16:  $p$  pressure (bar);  $T_2$  acting time (ms)

$S_s$	= positioning travel of actuator
$T_u$	= delay < 3 ms
$T_1$	= on-stroke time
$T_2$	= destroke time
$p$	= pressure
LS line approx. 10% of the volume of the P line	

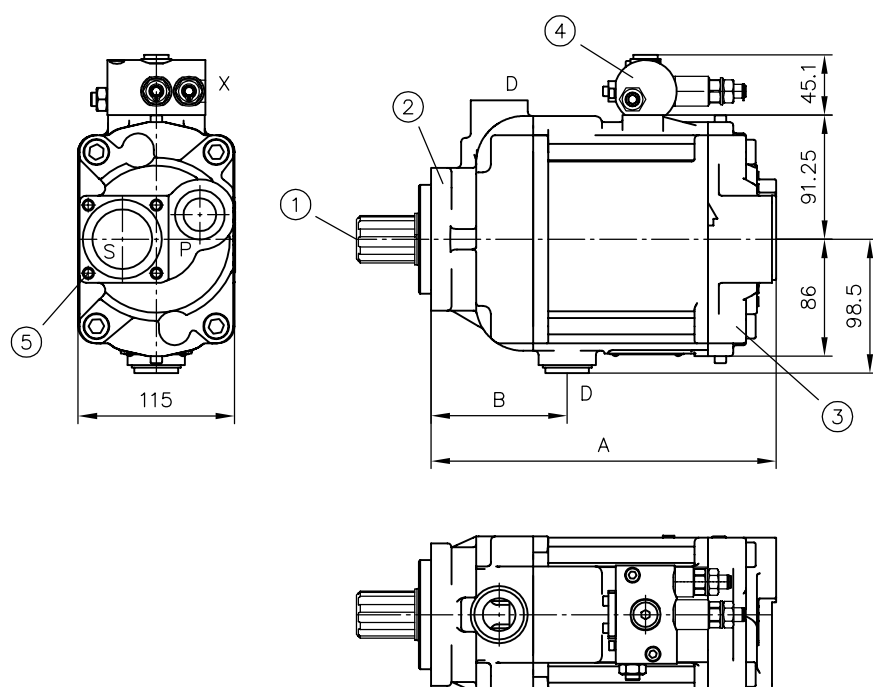
## 4 Dimensions

All dimensions in mm, subject to change!

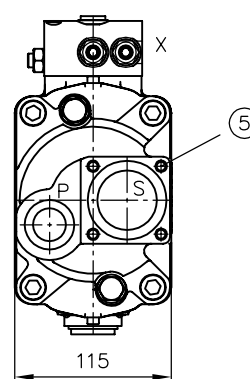
### 4.1 Basic pump

#### 4.1.1 Type V60N-060

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



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



- 1 Shaft version
- 2 Flange version
- 3 Housing version
- 4 Controller and intermediate plates according to Section 4.2
- 5 Delivery includes attachment kit for suction intakes according to Section 7.2

Flange version	Housing version	A	B
Y	-1	253.5	100.0
F, Z, X	-1	249.8	96.3
Y	-2, -3	292.0	100.0
F, Z, X	-2, -3	288.3	96.3

A V60N 060

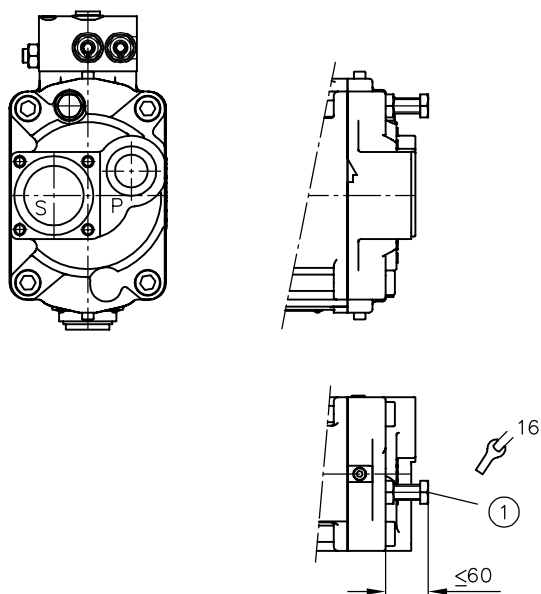
#### Ports P, S and D (ISO 228/1)

P	Pressure port G 3/4
S	Flange suction port
D	Drain port G 3/4
X	G 1/4

#### For coding UNF, ports SAE J 514

P	Pressure port 1/16-12 UN-2B
S	Flange suction port
D	Drain port 1 1/16-12 UN-2B
X	G 1/4 (ISO 228/1) with adapter for 7/16-20 (SAE-4)

## Stroke limitation

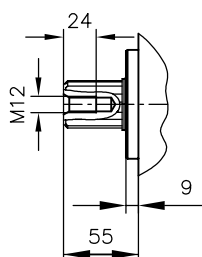


1 Stroke limitation ( $V_g$  approx. 4 cm<sup>3</sup>/rev.)

## Shaft versions

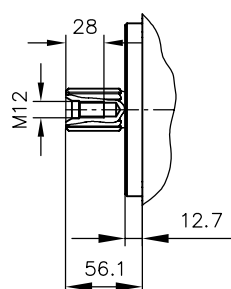
### Parallel key splined shaft

Coding **D**  
 (similar to DIN ISO 14)



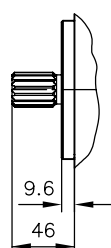
### Spline shaft

Coding **S**  
 (SAE-C 14T 12/24DP)



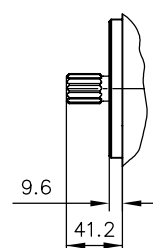
### Spline shaft

Coding **T**  
 (SAE-B-B 15T 16/32)



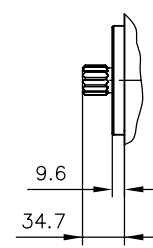
### Spline shaft

Coding **H**  
 (SAE-B 13T 16/32DP)



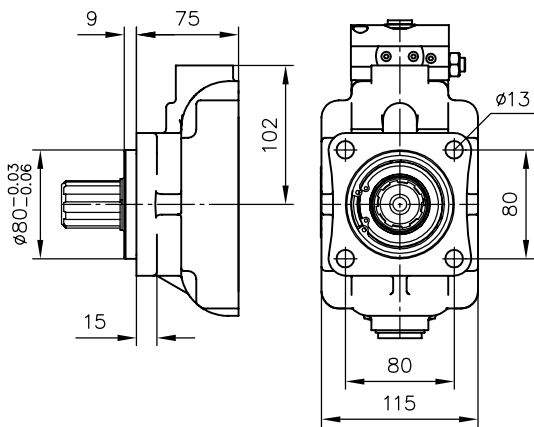
### Spline shaft

Coding **U**  
 (SAE-B 13T 16/32 DP short)

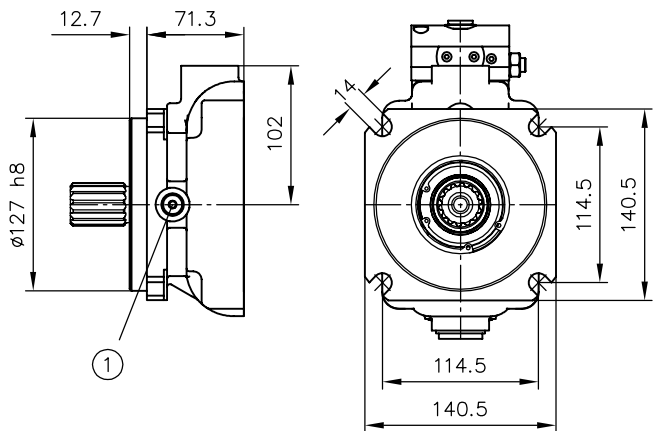


**Flange versions**

**Coding Y**  
(ISO 7653-1985)

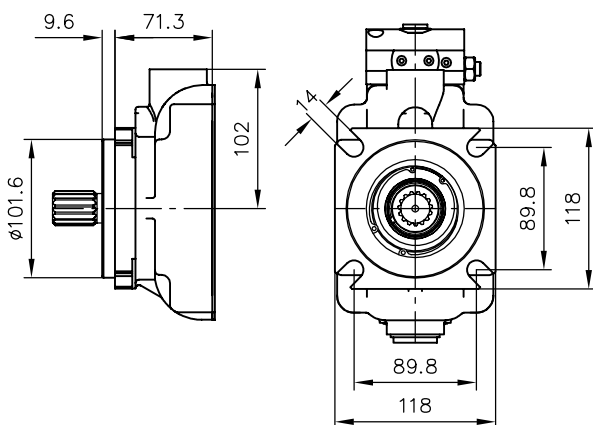


**Coding F**  
(SAE-C 4-hole)  
(127-4 ISO 3019-1)

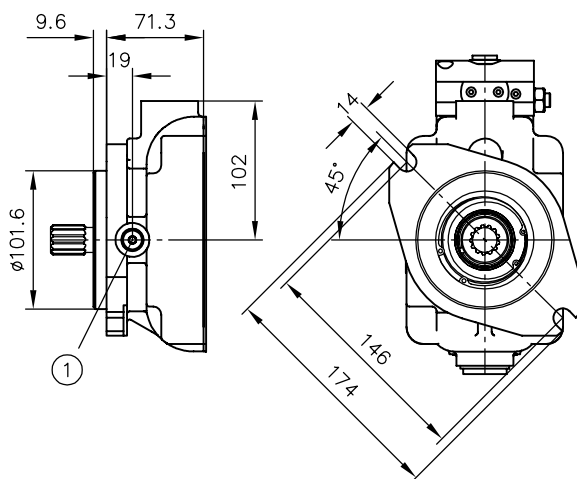


1 Bleeding G 1/8

**Coding Z**  
(SAE-B 4-hole)  
(101-4 ISO 3019-1)



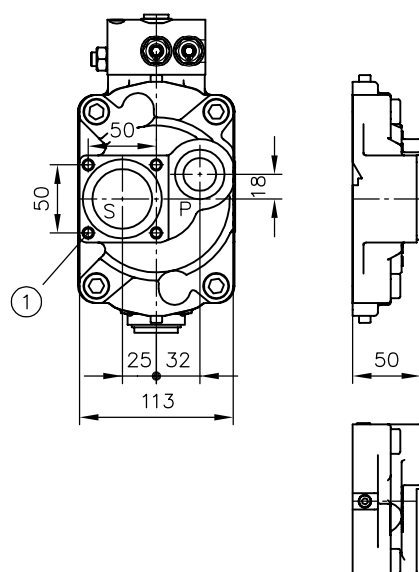
**Coding X**  
(SAE-B 2-hole)  
(101-2 ISO 3019-1)



1 Bleeding G 1/8

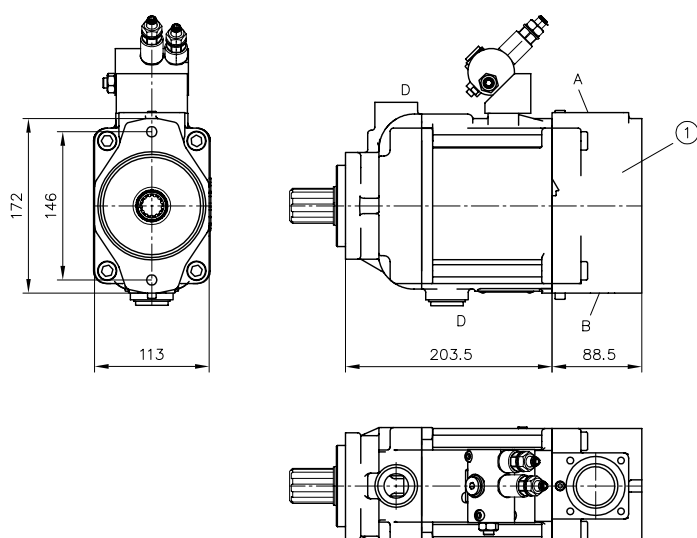


### Housing version -1 (axial ports)



1 Delivery includes attachment kit for suction intakes according to Section 7.2

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

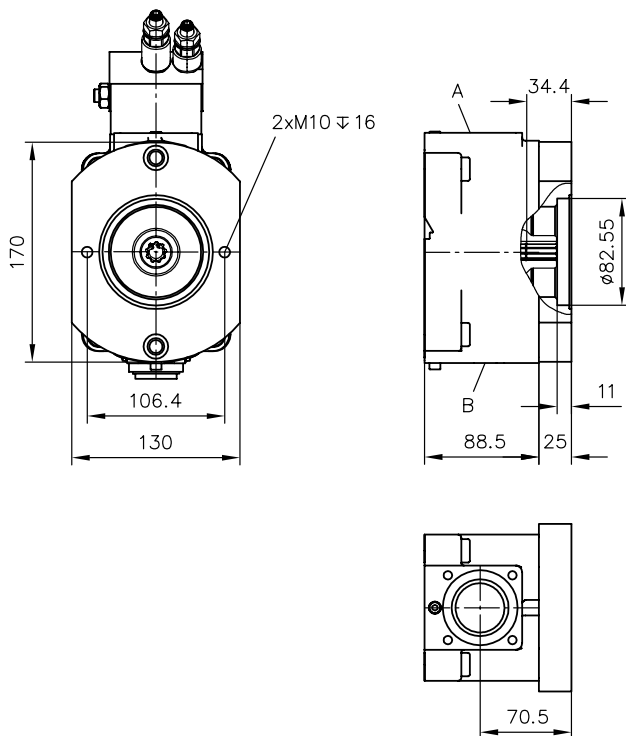


1 Flange version (output side)

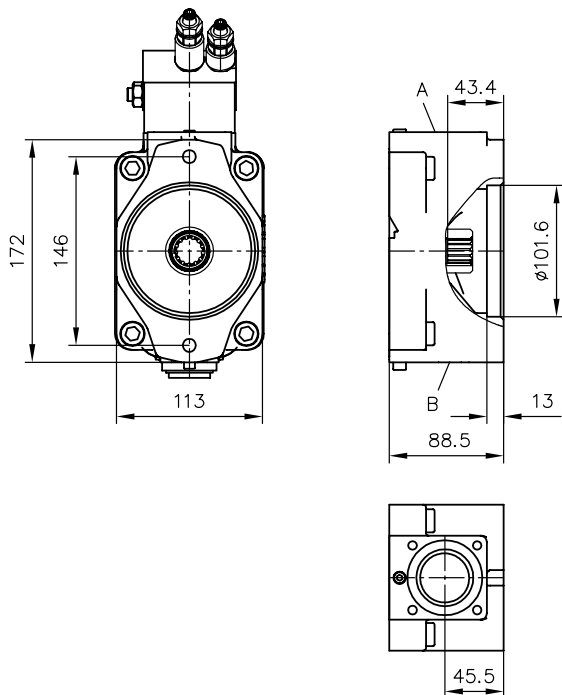
Rotation direction clockwise	Rotation direction anti-clockwise
A = suction port	A = pressure port
B = pressure port	B = suction port

**Flange version (output side)**

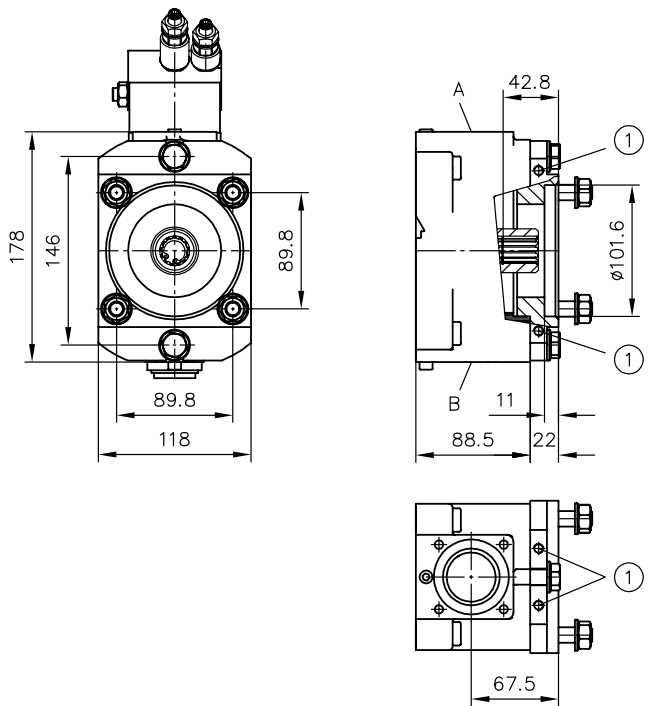
Coding **C 011, C 012**  
(SAE-A 2-hole)



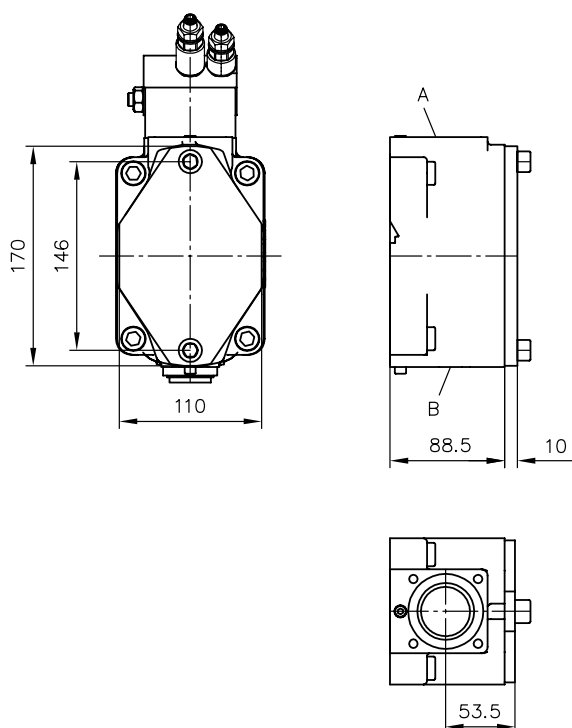
Coding **C 014**  
(SAE-B 2-hole)



Coding **C 015**  
(SAE-B 4-hole)



1 Support 8xM8

**Housing version -3 (radial ports)**

**Rotation direction clockwise**

A = suction port

B = pressure port

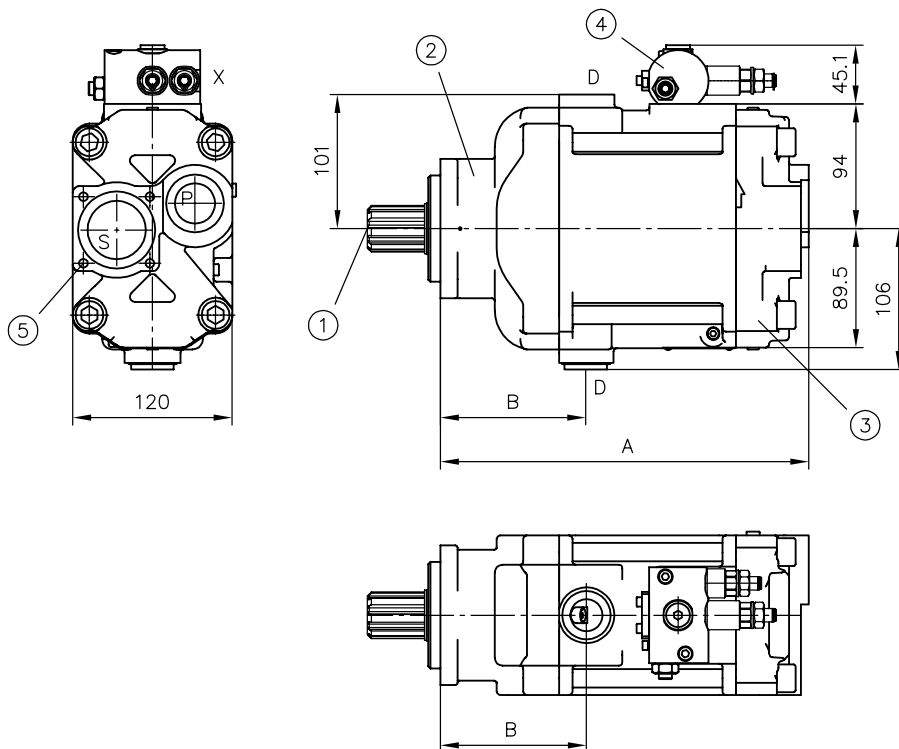
**Rotation direction anti-clockwise**

A = pressure port

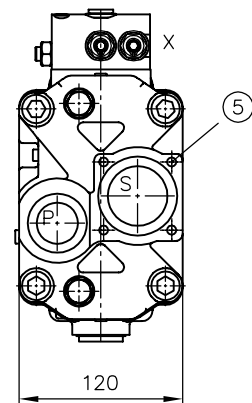
B = suction port

### 4.1.2 Type V60N-090

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



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



- 1 Shaft version
- 2 Flange version
- 3 Housing version
- 4 Controller and intermediate plates according to Section 4.2
- 5 Delivery includes attachment kit for suction intakes according to Section 7.2

Flange version	Housing version	A	B
Y	-1	277.5	110.0
F, G	-1	273.8	106.3
Y	-2, -3	310.5	110.0
F, G	-2, -3	306.8	106.3

A- V60 090 110 130

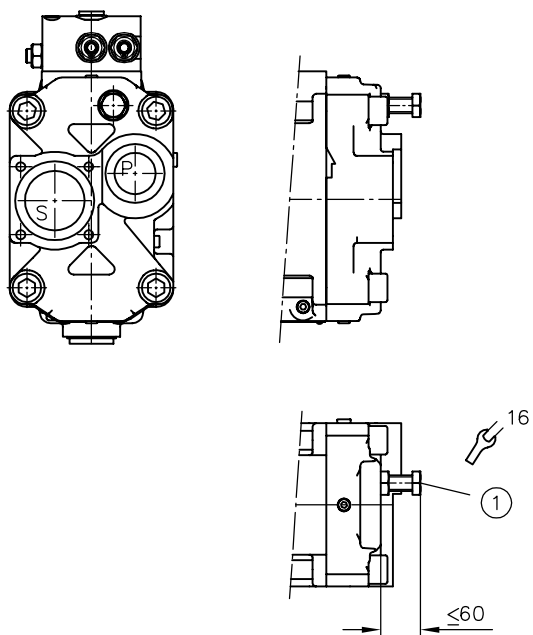
#### Ports P, S and D (ISO 228/1)

P	Pressure port G 1
S	Flange suction port
D	Drain port G 3/4
X	G 1/4

#### For coding UNF, ports SAE J 514

P	Pressure port 1 5/16-12 UN-2B
S	Flange suction port
D	Drain port 1 1/16-12 UN-2B
X	G 1/4 (ISO 228/1) with adapter for 7/16-20 (SAE-4)

## Stroke limitation

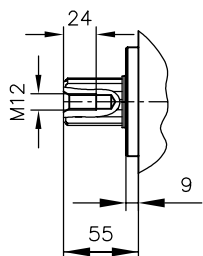


1 Stroke limitation ( $V_g$  approx. 5 cm<sup>3</sup>/rev.)

## Shaft versions

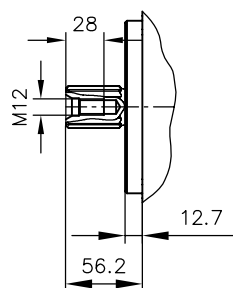
### Parallel key splined shaft

Coding **D**  
 (similar to DIN ISO 14)



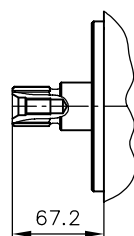
### Spline shaft

Coding **S**  
 (SAE-C 14T 12/24DP)



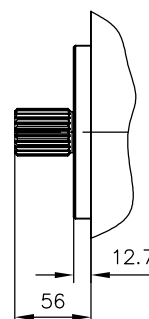
### Spline shaft

Coding **M**  
 (DIN 5480 W30x2x14x9g)



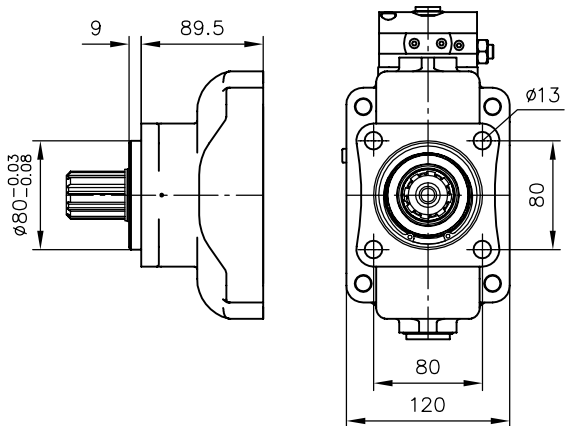
### Spline shaft

Coding **Q**  
 (SAE-CS)

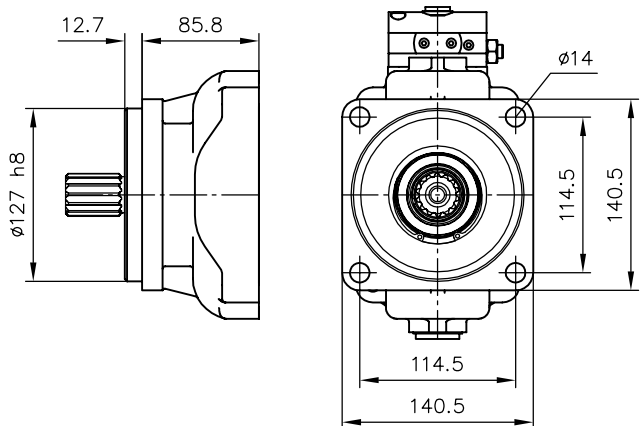


## Flange versions

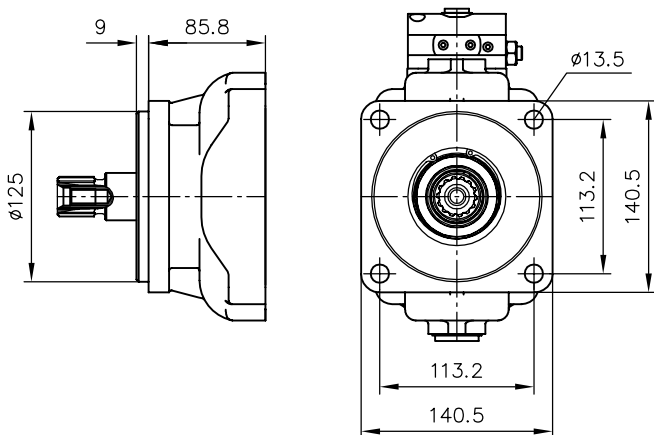
**Coding Y**  
(ISO 7653-1985)



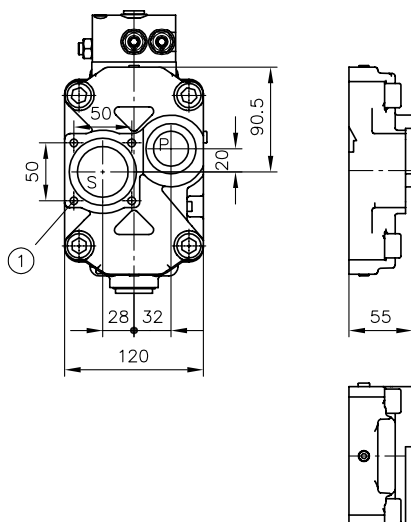
**Coding F**  
(SAE-C 4-hole)  
(127-4 ISO 3019-1)



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

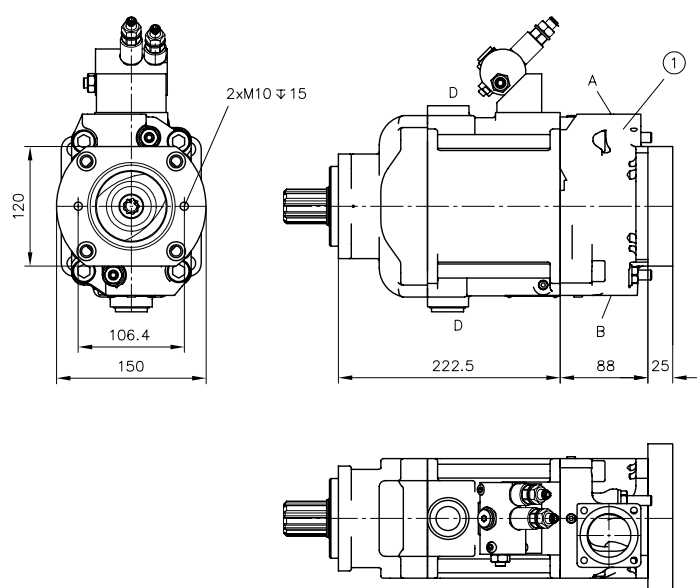


## Housing version -1 (axial ports)



1 Delivery includes attachment kit for suction intakes according to Section 7.2

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

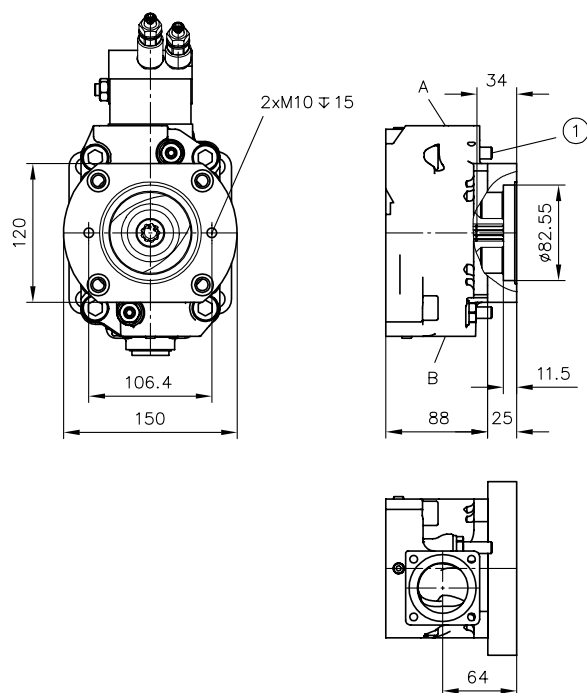


1 Flange version (output side)

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

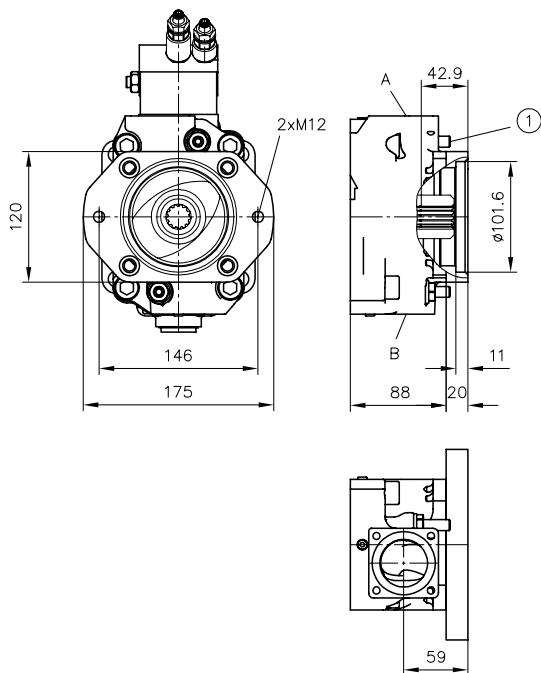
**Flange version (output side)**

Coding **C 021, C 022**  
(SAE-A 2-hole)



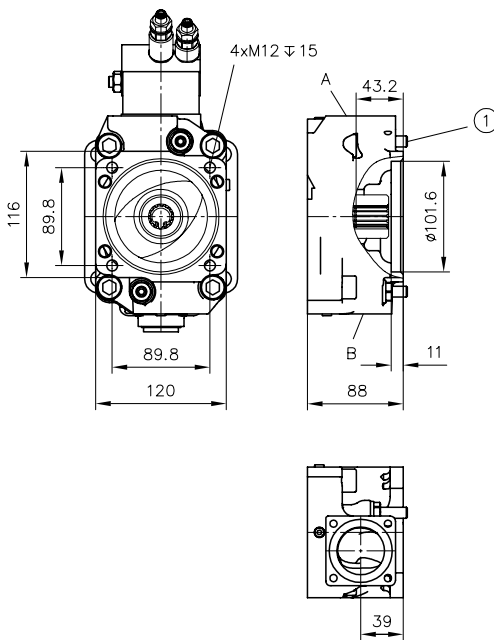
1 Stroke limitation

Coding **C 024**  
(SAE-B 2-hole)



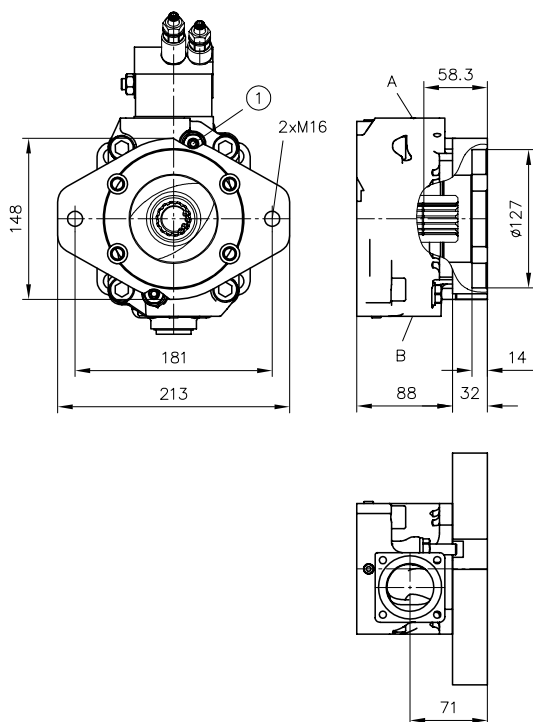
1 Stroke limitation

Coding **C 025**  
(SAE-B 4-hole)



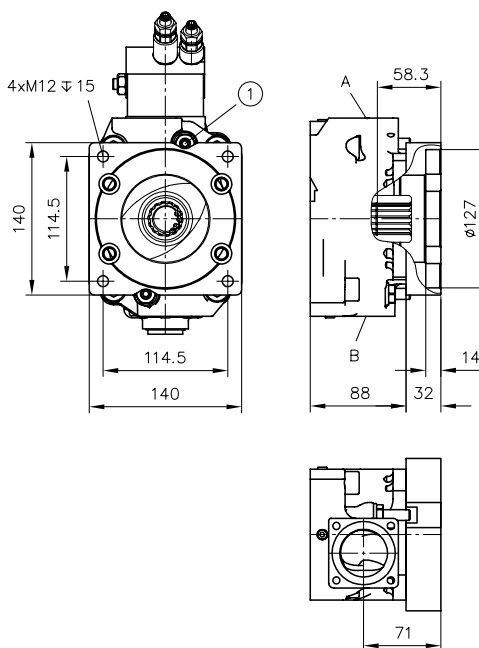
1 Stroke limitation

Coding **C 027**  
(SAE-C 2-hole)



1 Stroke limitation

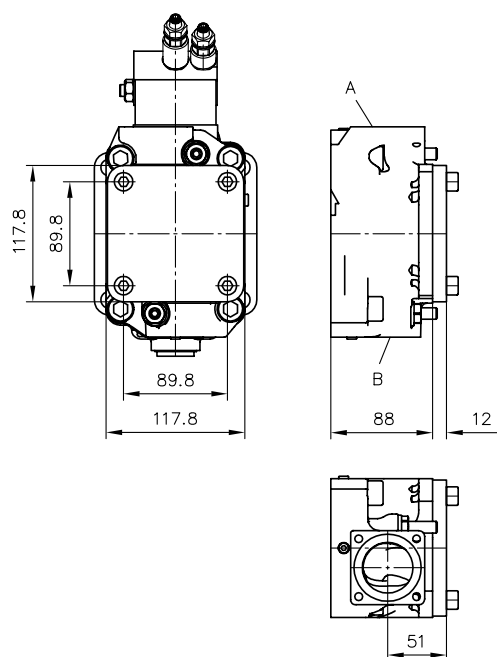
Coding **C 028**  
(SAE-C 4-hole)



1 Stroke limitation



### Housing version -3 (radial ports)



#### Rotation direction clockwise

A = suction port

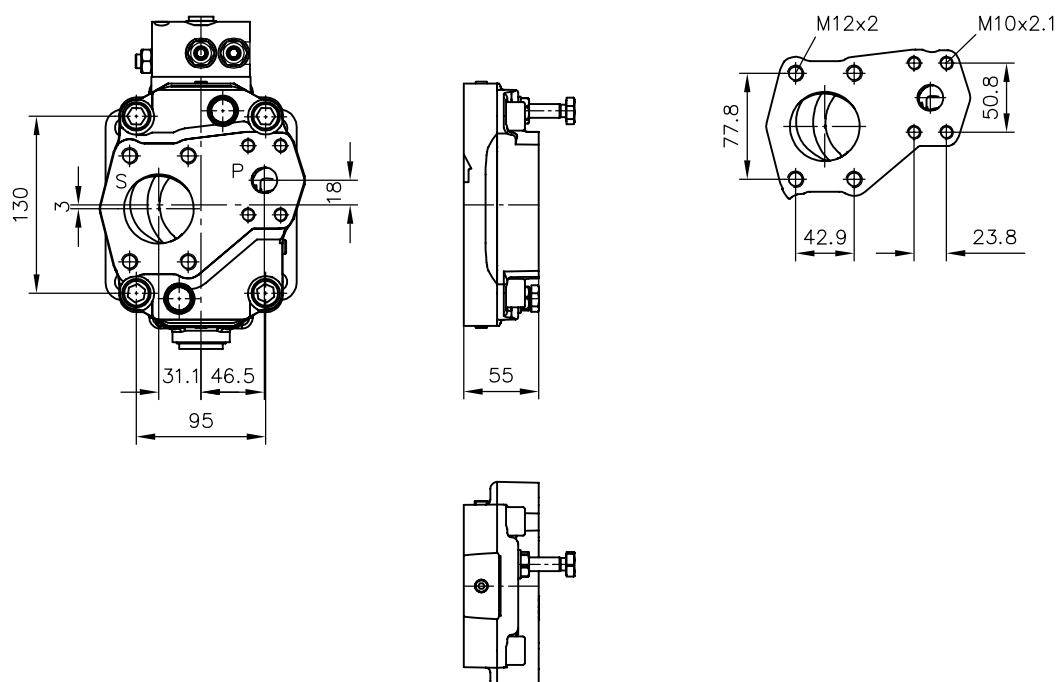
B = pressure port

#### Rotation direction anti-clockwise

A = pressure port

B = suction port

### Housing version -4 (axial ports)



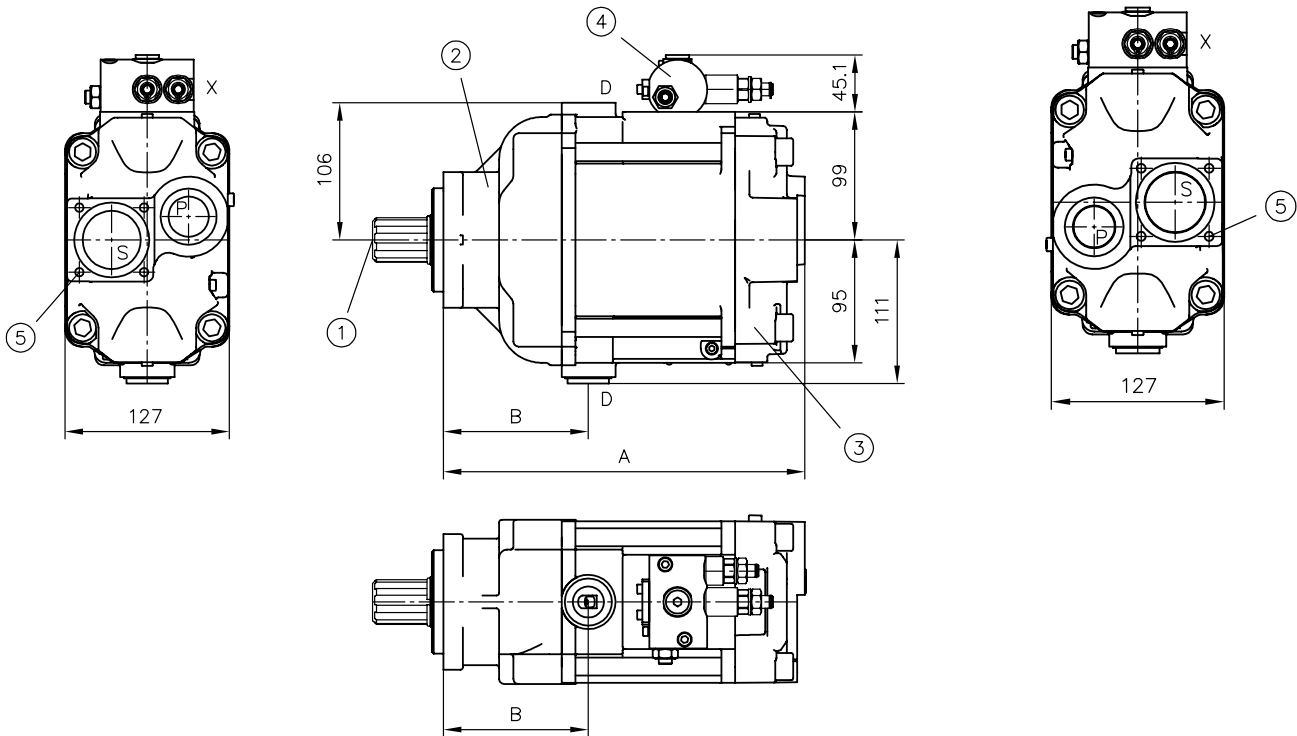
### Ports P, S (SAE J 518)

P	Pressure port SAE 3/4"	(6000 psi)
S	Suction port SAE 2"	(3000 psi)

### 4.1.3 Type V60N-110

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

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



- 1 Shaft version
- 2 Flange version
- 3 Housing version
- 4 Controller and intermediate plates according to Section 4.2
- 5 Delivery includes attachment kit for suction intakes according to Section 7.2

Flange version	Housing version	A	B
Y	-1	279.5	112.0
F	-1	275.7	108.7
P	-1	278.5	111.0
Y	-2, -3	313.5	112.0
F	-2, -3	309.7	108.2
P	-2, -3	312.5	111.0

A- V60 090 110 130

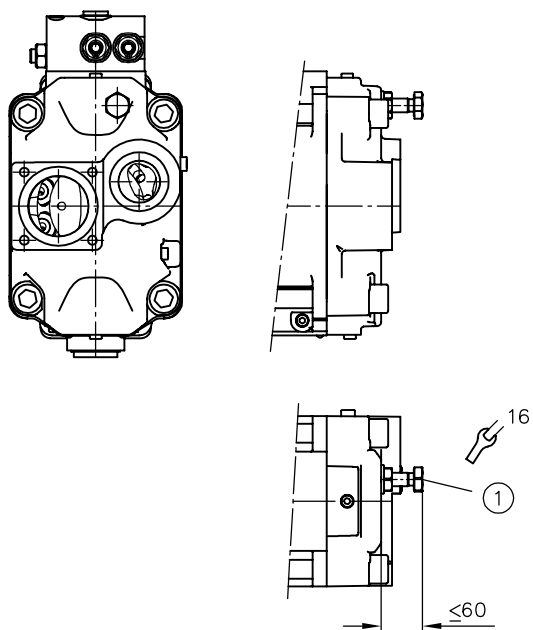
#### Ports P, S and D (ISO 228/1)

P	Pressure port G 1
S	Flange suction port
D	Drain port G 3/4
X	G 1/4

#### For coding UNF, ports SAE J 514

P	Pressure port 1 5/16-12 UN-2B
S	Flange suction port
D	Drain port 1 1/16-12 UN-2B
X	G 1/4 (ISO 228/1) with adapter for 7/16-20 (SAE-4)

## Stroke limitation

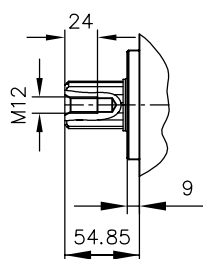


1 Stroke limitation ( $V_g$  approx. 6 cm<sup>3</sup>/rev.)

## Shaft versions

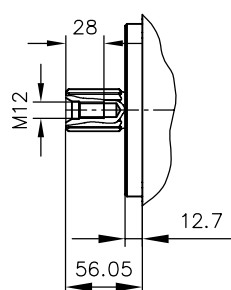
### Parallel key splined shaft

Coding **D**  
(similar to DIN ISO 14)



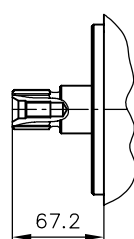
### Spline shaft

Coding **S**  
(SAE-C 14T 12/24DP)



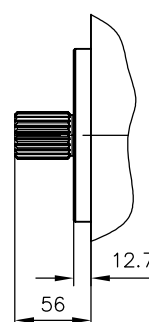
### Spline shaft

Coding **M**  
(DIN 5480 W30x2x14x9g)



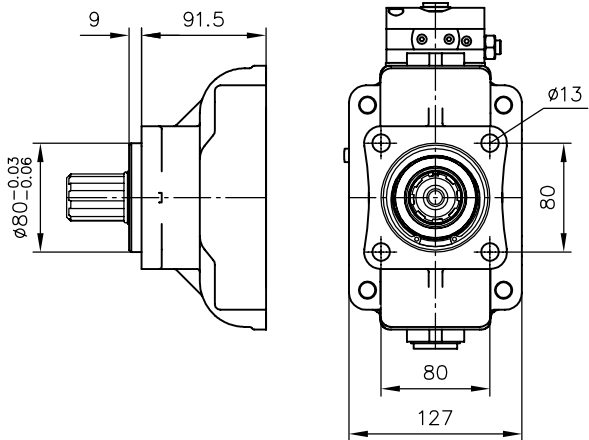
### Spline shaft

Coding **Q**  
(SAE-CS)

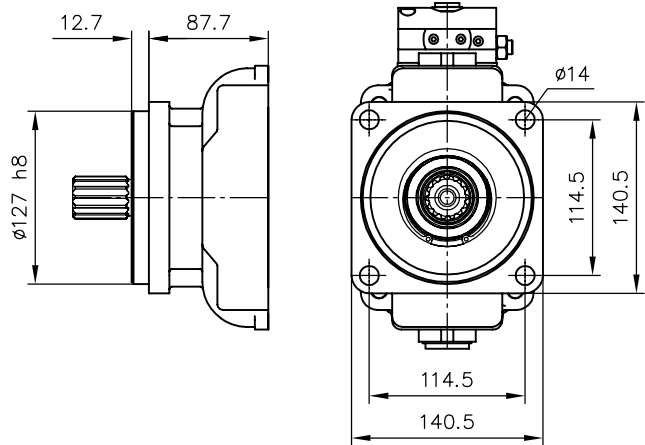


**Flange versions**

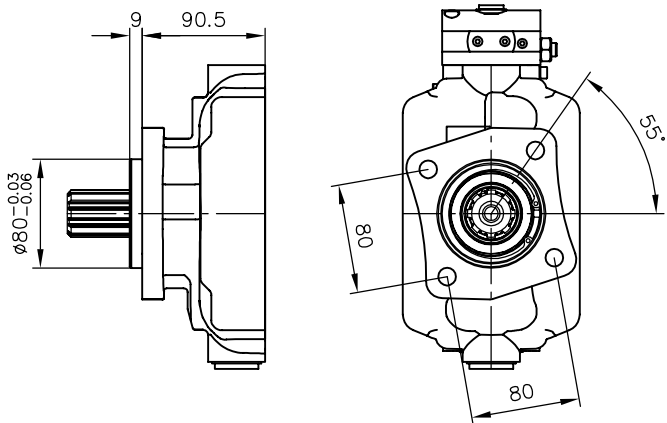
**Coding Y**  
(ISO 7653-1985)



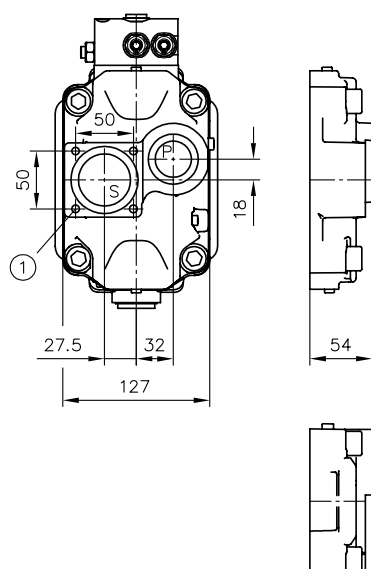
**Coding F**  
(SAE-C 4-hole)  
(127-4 ISO 3019-1)



**Coding P**  
(ISO 7653-1985)

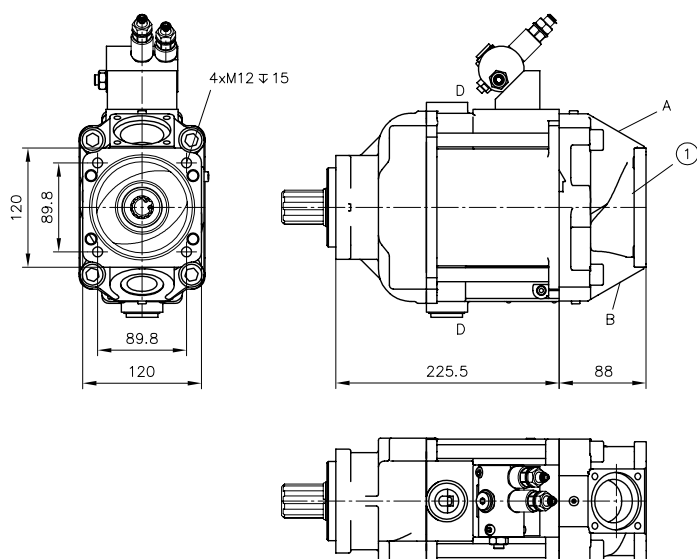


### Housing version -1 (axial ports)



1 Delivery includes attachment kit for suction intakes according to Section 7.2

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

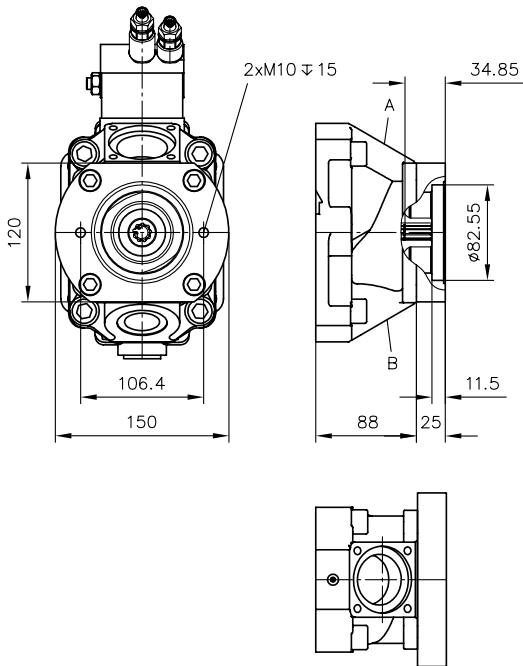


1 Flange version (output side)

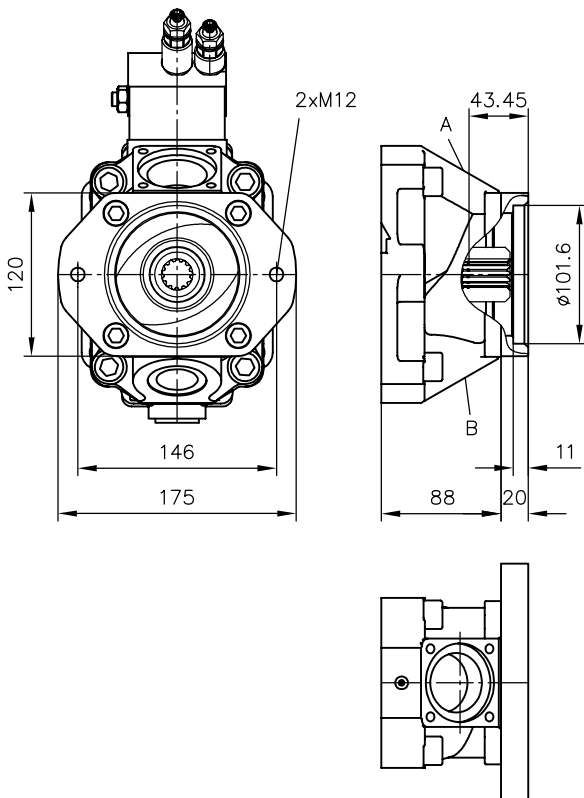
Rotation direction clockwise	Rotation direction anti-clockwise
A = suction port	A = pressure port
B = pressure port	B = suction port

**Flange version (output side)**

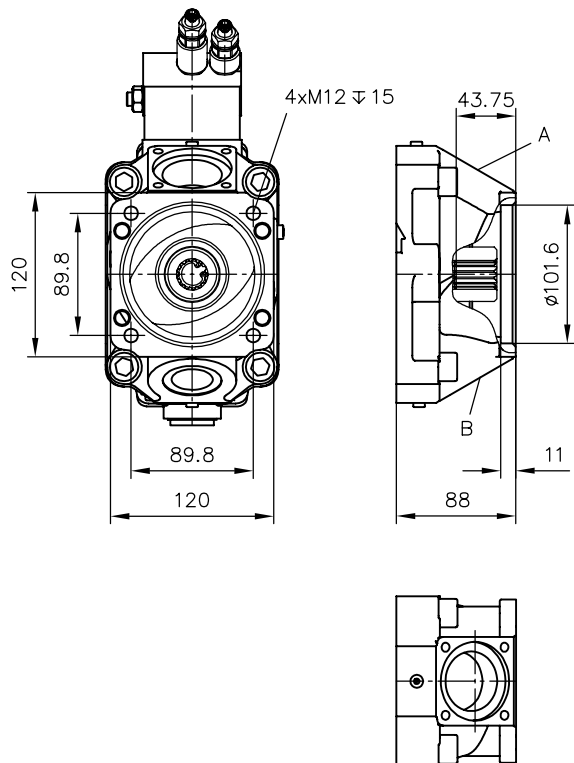
Coding **C 021, C 022**  
(SAE-A 2-hole)



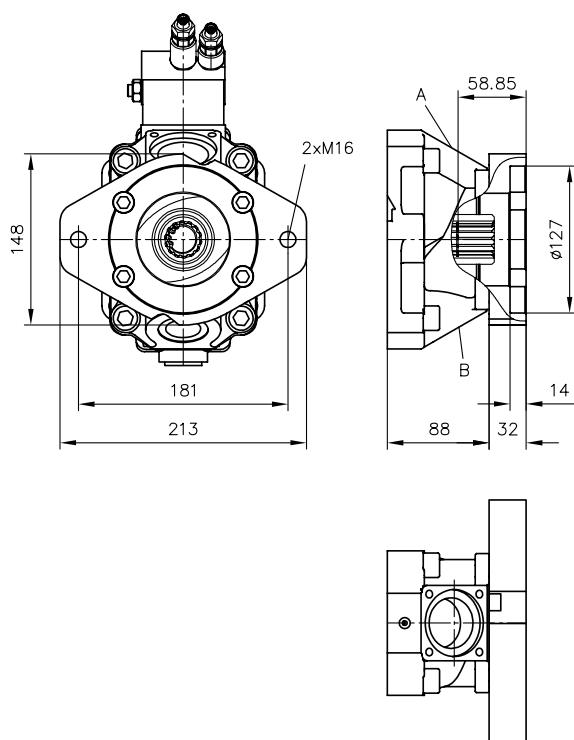
Coding **C 024**  
(SAE-B 2-hole)



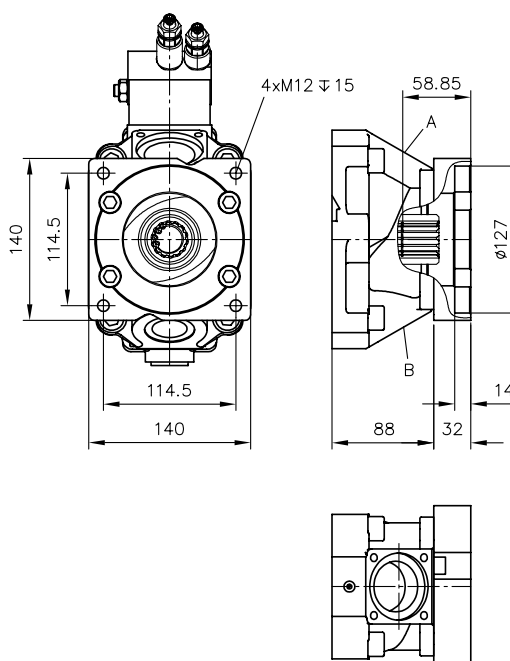
Coding **C 025**  
(SAE-B 4-hole)



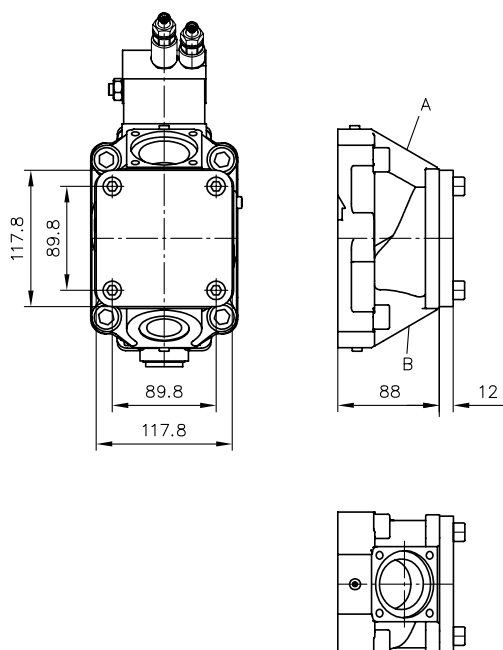
Coding **C 027**  
 (SAE-C 2-hole)



Coding **C 028**  
 (SAE-C 4-hole)



### Housing version -3 (radial ports)



#### Rotation direction clockwise

A = suction port

B = pressure port

#### Rotation direction anti-clockwise

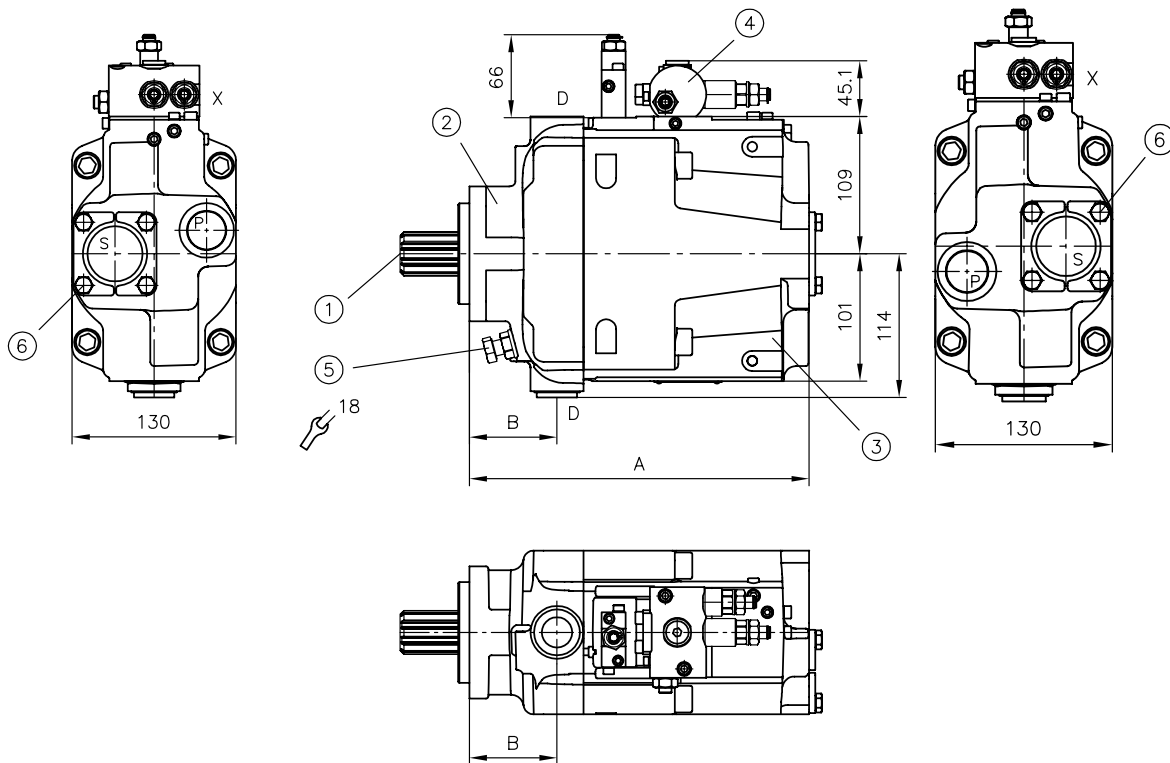
A = pressure port

B = suction port

#### 4.1.4 Type V60N-130

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

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



- 1 Shaft version
- 2 Flange version
- 3 Housing version
- 4 Controller and intermediate plates according to Section 4.2
- 5 Stroke limitation (13 cm<sup>3</sup>/rev.)
- 6 Delivery includes attachment kit for suction intakes according to Section 7.2

Flange version	Housing version	A	B
Y, P	-1	269.5	69.5
F	-1	266.8	66.8
Y, P	-2	323.5	69.5
F	-2	320.8	66.8

A- V60 090 110 130

#### Ports P, S and D (ISO 228/1)

P	Pressure port G 1
S	Flange suction port
D	Drain port G 3/4
X	G 1/4

#### For coding UNF, ports SAE J 514

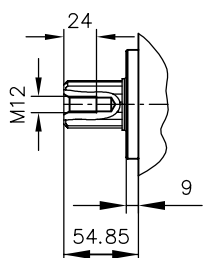
P	Pressure port 1 5/16-12 UN-2B
S	Flange suction port
D	Drain port 1 1/16-12 UN-2B
X	G 1/4 (ISO 228/1) with adapter for 7/16-20 (SAE-4)



## Shaft versions

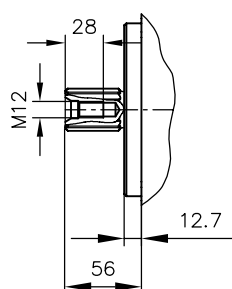
### Spline shaft

Coding **D**  
 (similar to DIN ISO 14)



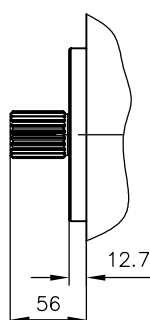
### Spline shaft

Coding **S**  
 (SAE-C 14T 12/24DP)



### Spline shaft

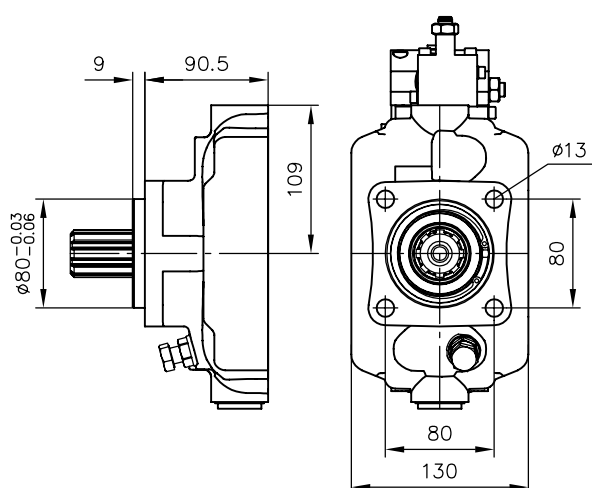
Coding **Q**  
 (SAE-CS)



## Flange versions

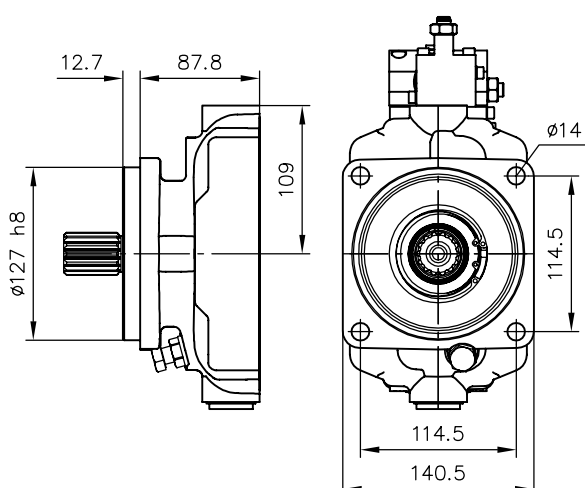
### Coding **Y**

(ISO 7653-1985)



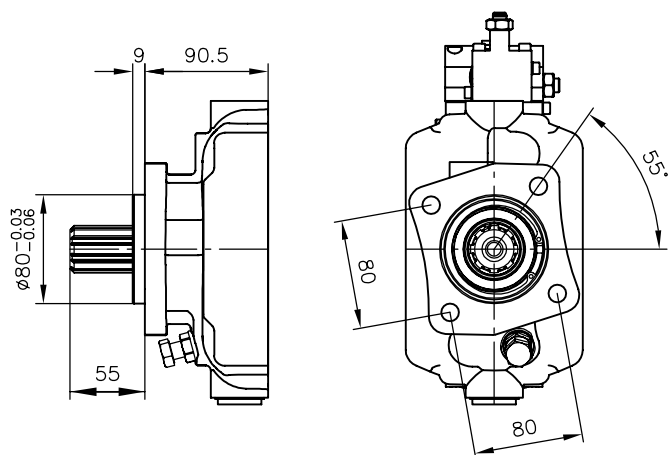
### Coding **F**

(SAE-C 4-hole)  
 (127-4 ISO 3019-1)

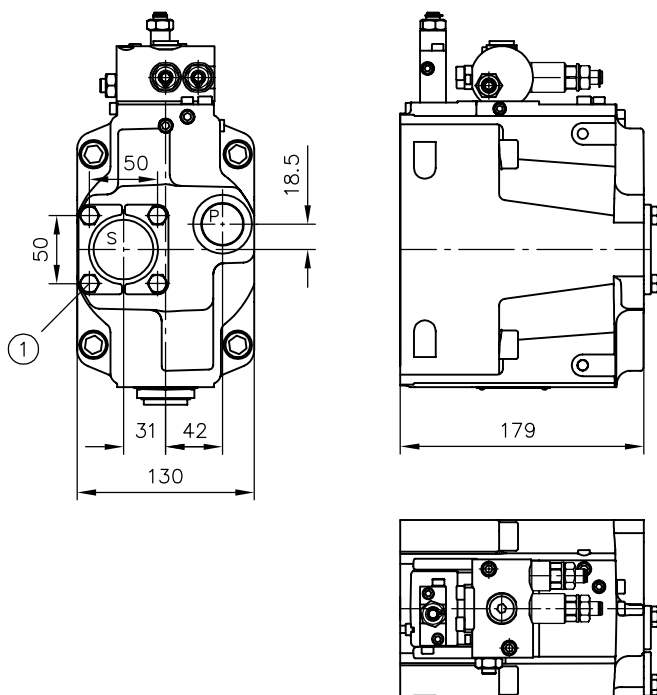


### Coding **P**

(ISO 7653-1985)



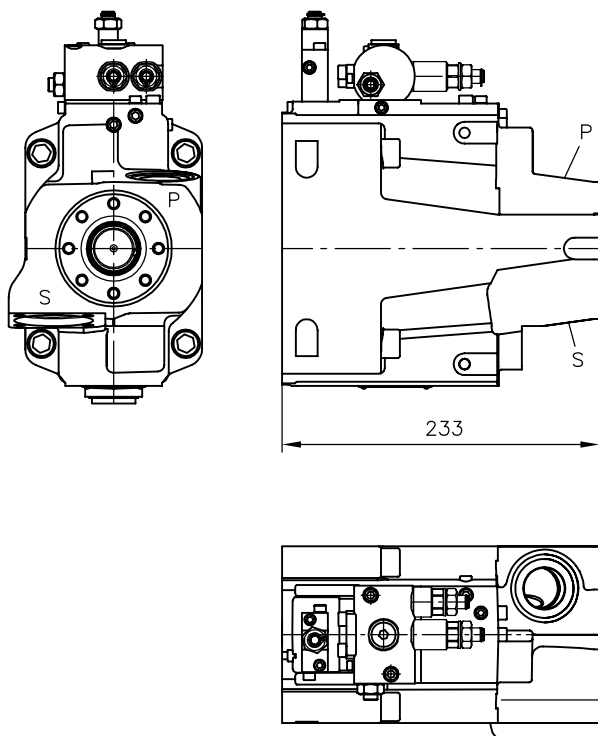
**Housing version -1 (axial ports)**



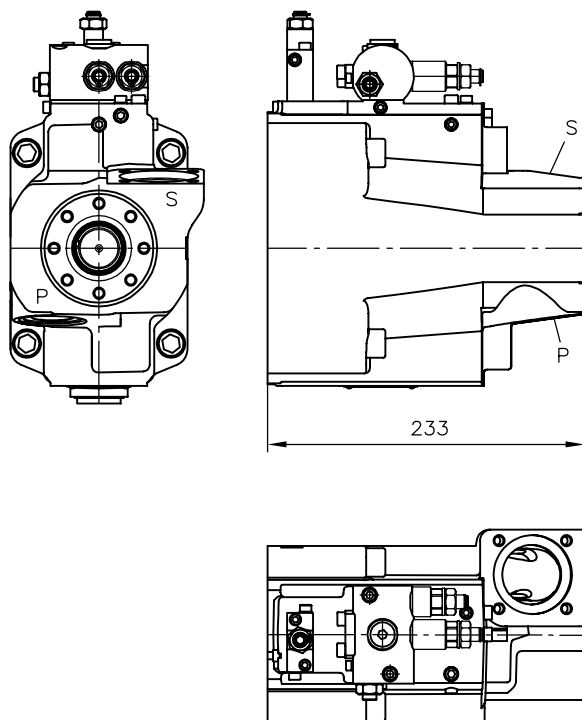
1 Delivery includes attachment kit for suction intakes according to Section 7.2

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

Rotation direction **clockwise**

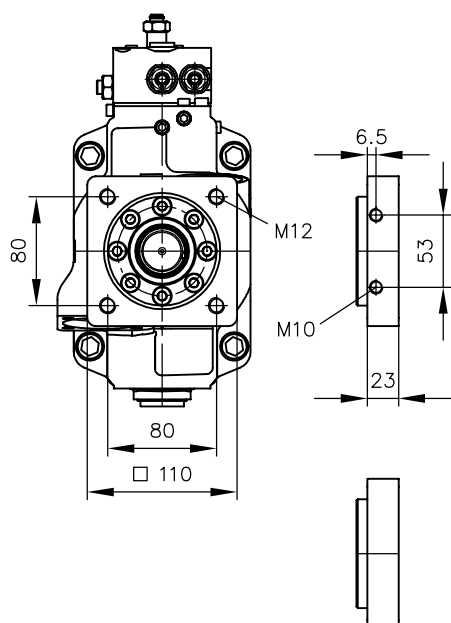


Rotation direction **anti-clockwise**

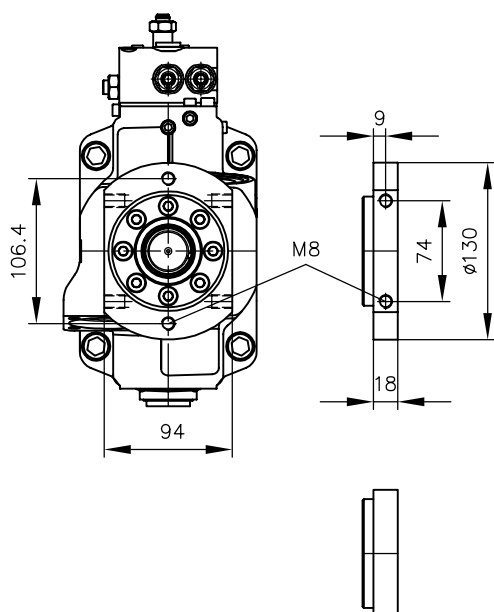


**Flange version (output side)**

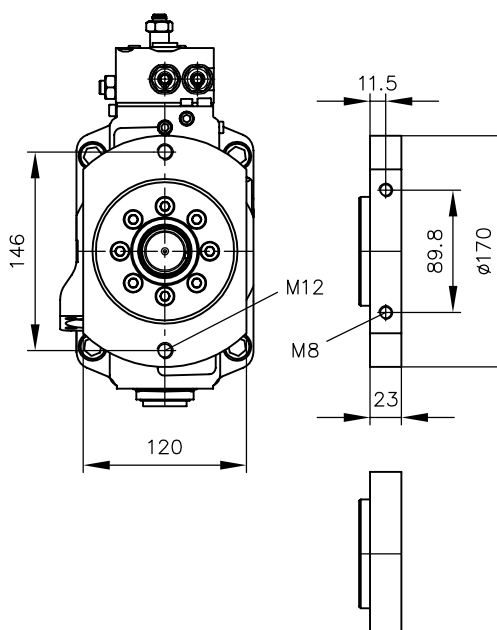
Coding **C 030**  
(ISO 7653-1985)



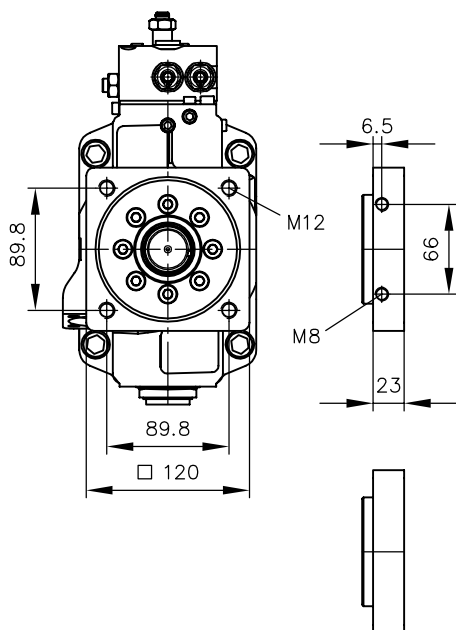
Coding **C 031, C 032**  
(SAE-A 2-hole)



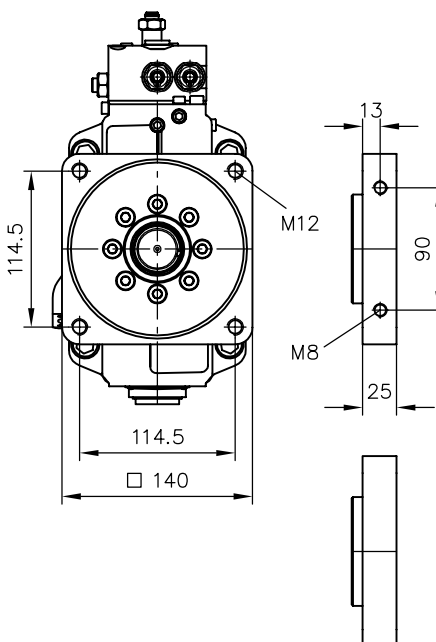
Coding **C 034**  
(SAE-B 2-hole)



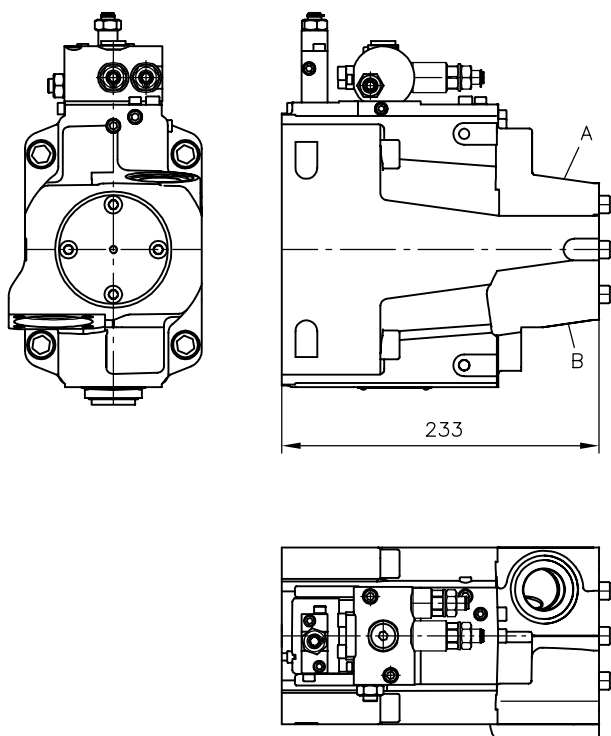
Coding **C 035**  
(SAE-B 4-hole)



Coding **C 038**  
(SAE-C 4-hole)



**Housing version -3 (radial ports)**



**Rotation direction clockwise**

A = pressure port  
B = suction port

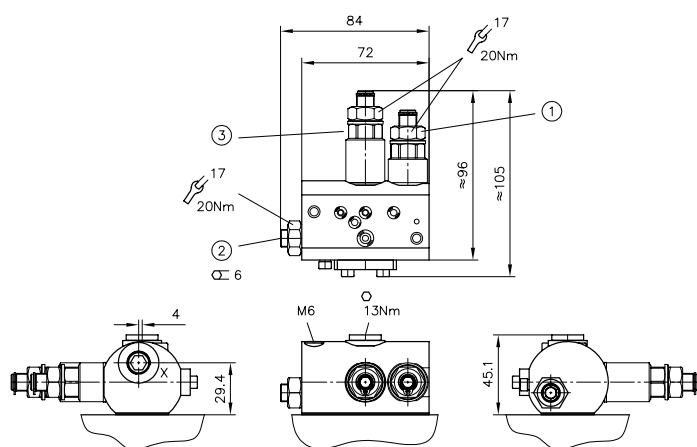
**Rotation direction anti-clockwise**

A = suction port  
B = pressure port

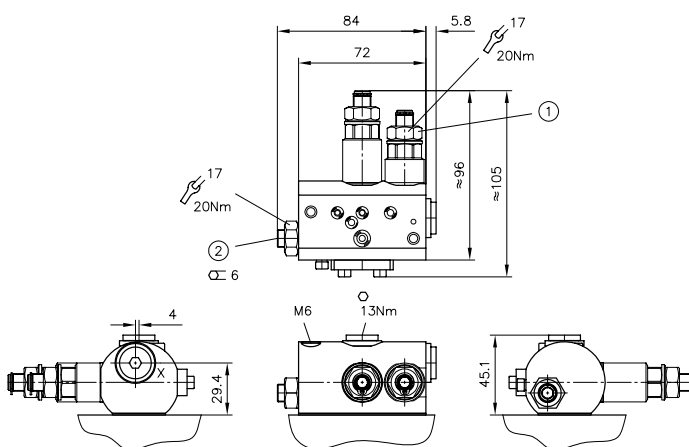
## 4.2 Controllers and intermediate plates

Coding **LSNR, LSNRT, NXR**

Coding **NR**



- 1 Pressure limitation
- 2 Dynamic throttle
- 3 Differential pressure  $\Delta p$  (only coding LSNR) (stand-by pressure)



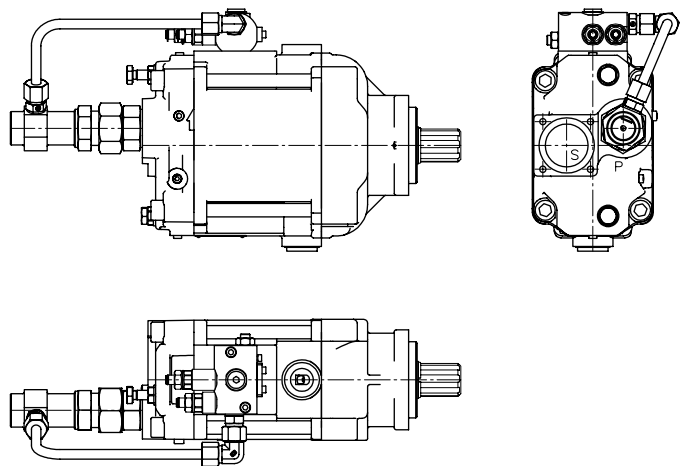
- 1 Pressure limitation
- 2 Dynamic throttle

Port X (ISO 228/1): G 1/4

LS signal port, order reference for adapter for UNF thread 79.93 245

Adjustment range for ② and ③ restricted by retaining ring

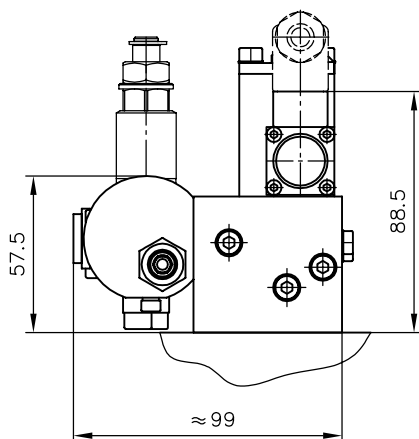
Coding **QNR**



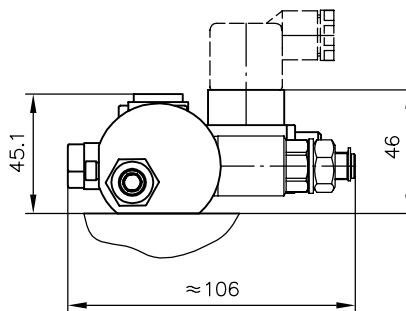
**Note**

The piping varies according to the size.

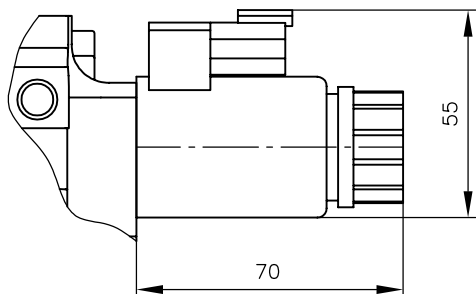
Coding /PR



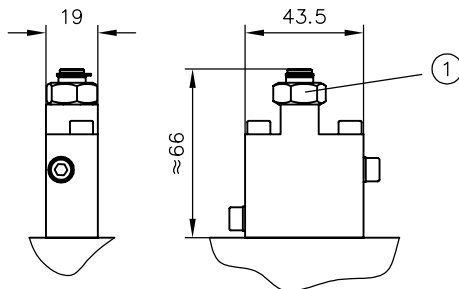
Coding /P1R



Coding /V, /V1



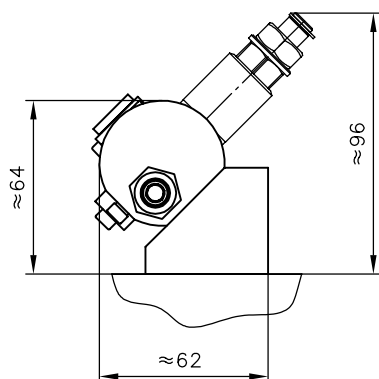
Coding /L (only for type V60N-130)

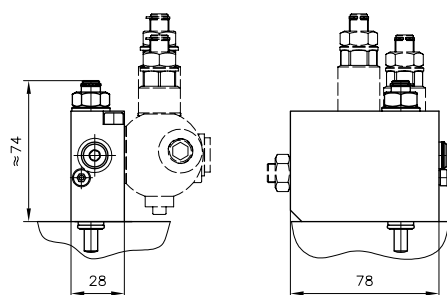


1 Power setting

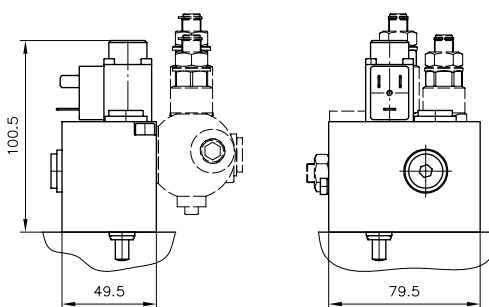
### Intermediate plate

Version with thru-shaft, coding /ZW



Coding /ZL  
 Intermediate plate version


Coding /ZV, /ZV1



### Pressure adjustment

	Pressure range (bar)	$\Delta p$ (bar) /revolution	Default pressure setting (bar)
Pressure limitation	20 ... 400	approx. 50	300
Differential pressure $\Delta p$ (only type LSNR)	20 ... 55	approx. 10	27
Differential pressure $\Delta p$ (only type QNR)	20 ... 55	approx. 10	20

### Torque setting

	$\Delta M$ (Nm) /revolution	Default torque setting $\Delta(Nm)/$ revolution
Power controller /ZL or /L	approx. 190 Nm	200 Nm



#### Caution

**Risk of injury on overloading components due to incorrect pressure settings!**

- Always monitor the pressure gauge when setting or changing the pressure.

### 5.1 General information

The V60N is designed for use in an open circuit.

It can be mounted directly on a truck power take-off (PTO) using a flange in accordance with ISO 7653-1985 or using a flange in accordance with specifications.

Further connection options are available with a propshaft and suitable coupling sleeves (see [Chapter 7, "Accessories, spare parts and separate components"](#))

Rotation direction changing is available for type V60N-060, V60N-090 and V60N-110 pumps. For conversion instructions, please contact HAWE Hydraulik.

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

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

- Remove all plastic plugs prior to initial operation.
- Avoid installing the motor above the tank (see "Installation positions" in [Chapter 5.3, "Installation positions"](#)).
- When selecting the connecting lines, observe the reference values in [Chapter 7, "Accessories, spare parts and separate components"](#).
- Prior to initial operation, fill the pump with oil and bleed. Automatic pump filling via the suction line by opening the drain ports is not possible.
- Prevent the pump and suction line from running dry.
- Always ensure a constant supply of oil. Even a brief shortage in the supply of hydraulic fluid to the pump may damage internal parts. This may not be immediately evident after initial operation.
- The hydraulic oil returning to the tank from the system must not be sucked back in immediately (baffles).
- Run the pump for approx. 10 minutes at max. 50 bar after initial operation.
- Thorough bleeding/flushing of the entire system is recommended before the full pressure range is used.
- Observe the max. permissible operating range temperatures (see [Chapter 3, "Parameters"](#)) at all times.
- Always comply with the specified oil purity classes (see [Chapter 3, "Parameters"](#)); provide appropriate hydraulic fluid filtering.
- Use of a filter in the intake line must be approved by HAWE Hydraulik.
- Include a main pressure-limiting valve in the pressure line to limit the max. system pressure.



## 5.2 Ports

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

### Pressure port

The pressure port connection on type V60N-060 is established via a threaded connection G 3/4"; on type V60N-090/110/130 via a threaded connection G 1".

Observe the tightening torque specified by the part manufacturer.

### Suction port

The suction port on all pumps is established via standardised suction intakes with a size that is dependent on the max. delivery flow of the pump.

The specification of the max. delivery flow  $Q_{max}$  must be observed. This can be found in the following table.

Nominal width (N)	38 (1 1/2")	42	50 (2")	64 (2 1/2")	74 (3")	6 (G 1 1/4)	7 (G 1 1/2)
$Q_{max}$ (lpm)	75	90	125	190	250	90	125

The suction intakes can be ordered as an option with the pump.

If possible, route the suction line to the tank in such a way that it is steadily rising. This allows trapped air to escape. Observe the specifications in "Installation positions", [Chapter 5, "Installation information"](#). The absolute intake pressure must not fall below 0.85 bar. A hose line should generally be used in preference to a rigid pipe.

### Drain port

The V60N pumps have 2 drain ports G 3/4" or 1 1/16-12-UN-2B. A G 1/8" threaded connection is also available for the flange version SAE-B2, SAE-B4 and SAE-4. This is used for bleeding in the case of vertical installation positions.

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

Integrate the overflow oil line in the system in such a way as to prevent direct connection with the suction line of the pump. Both drain ports can be used simultaneously.

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

### LS port for version LSNR, LSNRT, NXR

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

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

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

## 5.3 Installation positions

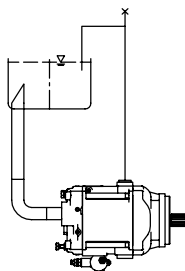
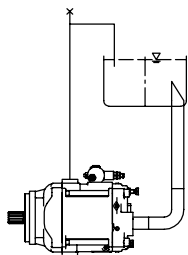
The V60N can be installed in any installation position.

Observe the truck manufacturer's specifications if installing the pump directly on a truck power take-off.

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

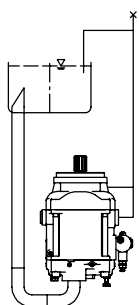
### Horizontal installation: (pump below the min. fill level)

For horizontal installation, use the uppermost drain port.



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

Mount the pump so that the pump mounting flange is facing upwards. Only pumps with mounting flanges of type SAE-B2, SAE-B and SAE-C are approved for vertical installation. For vertical installation, use the uppermost drain port. Also connect the G 1/4" bleeding port on the pump flange. Take appropriate measures to ensure continuous bleeding of this line (line routing/bleeding). For installation with the pump flange facing downwards, please contact HAWE Hydraulik.



## 5.4 Tank installation

### Tank installation (pump below the min. fill level)

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



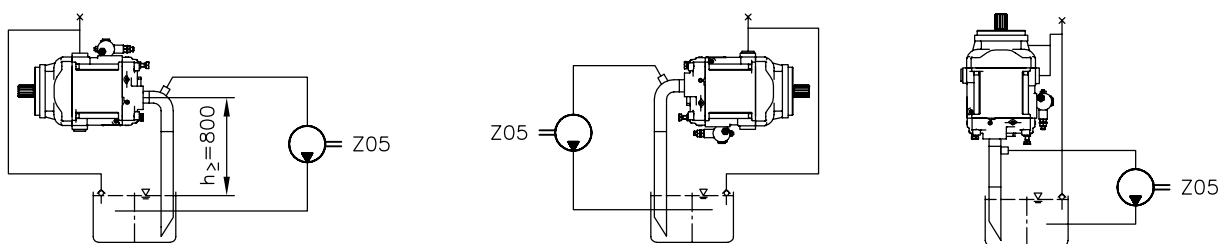
### Additional notes regarding installation above the fill level

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

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

For specialist advice on designing axial piston pumps, the following contact form is available:

[Checklist for designing variable displacement axial piston pumps: B 7960 checklist.](#)



For further information on installation, operation and maintenance, see the relevant assembly instructions:

[B 7960](#), [B 5488](#).

**6****Installation, operation and maintenance information****6.1 Designated use**

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

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

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

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

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

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

**Note**

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

**6.2 Assembly information**

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

**6.3 Operating instructions****Product, pressure and/or flow settings**

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

**Caution**

**Risk of injury on overloading components due to incorrect pressure settings!**

- Always monitor the pressure gauge when setting or changing the pressure.

**Filtering and purity of the hydraulic fluid**

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

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

For further information on installation, operation and maintenance, see the relevant assembly instructions:

[B 7960](#), [B 5488](#).

## 7 Accessories, spare parts and separate components

### 7.1 Discontinued controller units

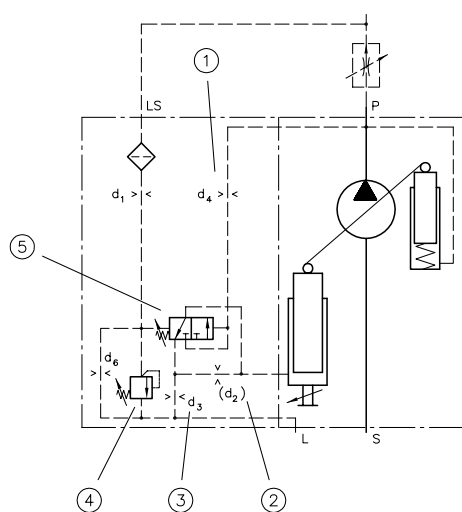
#### 7.1.1 Available versions

##### Controller

Coding	Description
<b>LSN</b>	Load-sensing controller with integrated pressure limitation
<b>N</b>	Pressure controller, adjustable directly at the pump. The pressure controller automatically maintains a constant system pressure independently of the required delivery flow. Therefore it is suited to constant pressure systems where differing delivery flows are required or for efficient pressure limitation of the hydraulic system.
<b>LLSN</b>	Power controller (torque limitation) in combination with LSN Product "Pressure x Delivery flow" = constant Adjustment range: 25 ... 100% max. drive torque
<b>LN</b>	Power controller (torque limitation) in combination with pressure controller N Adjustment range: 25 ... 100% max. drive torque

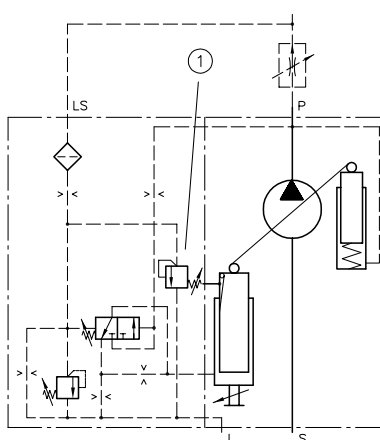
##### Switching symbols

Coding **LSN**



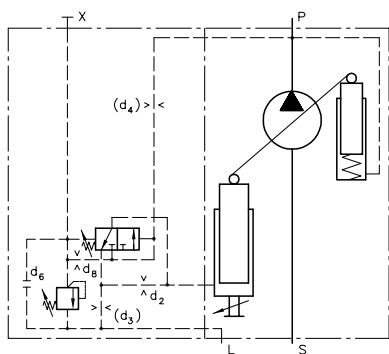
- 1 Inflow orifice
- 2 By-pass orifice (option)
- 3 Outflow orifice
- 4 Pressure limitation  $p_{max}$
- 5 Differential pressure  $p$

Coding **LLSN**

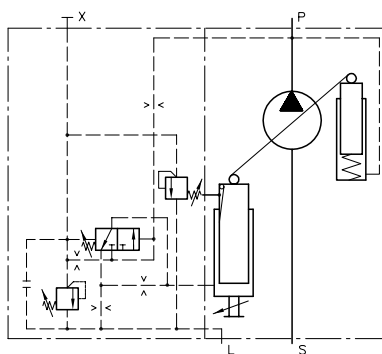


- 1 Power controller

## Coding N



## Coding LN

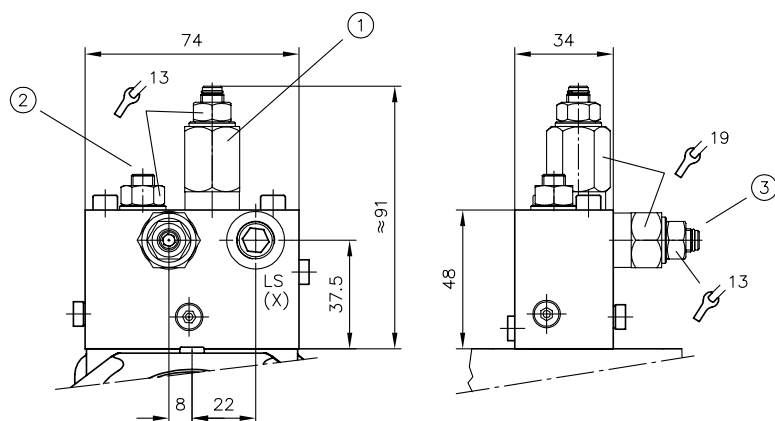


## Fitted orifices (standard)

Controller	$\varnothing d_1$	$\varnothing d_2$	$\varnothing d_3$	$\varnothing d_4$	$\varnothing d_6$	$\varnothing d_8$
LSN LLSN	0.9	-	0.7	1.2	2x0.4	-
N LN	-	0.7	-	-	-	0.7

## Unit dimensions

### Type LSN, LN, N and LLSN



LS signal port  
Port (ISO 228/1):  
LS = G 1/4

Order reference for adapter  
for UNF thread 79.93 245

- 1 Pressure differential  $\Delta p$  (only controller LSN and LLSN)
- 2 Power setting
- 3 Pressure limitation

## Pressure adjustment

	Pressure range (bar)	$\Delta p$ (bar) /revolution	Default pressure setting (bar)
Pressure limitation	50 ... 400	100	300
Differential pressure $\Delta p$ (type LSN and LLSN)	18 ... 45	10	27



### Caution

**Risk of injury on overloading components due to incorrect pressure settings!**

- Always monitor the pressure gauge when setting or changing the pressure.

## 7.2 Suction intakes

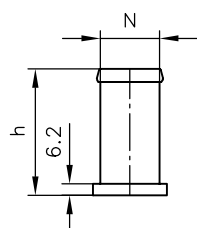
Order coding example:

V60N - 090 R DZ N - 1 - 0 - 01/LSNR - 350 - **A00/76**

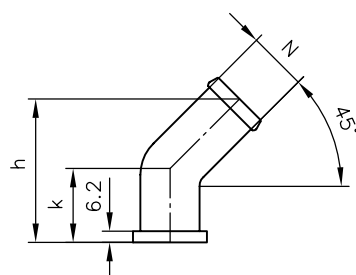
**Table of suction intakes (including attachment kit)**

Nominal width (N)	Flow Q <sub>max</sub> (lpm)	Geometric shape									
		Straight A00/.. h	Order number	45°		Order number	90°		Order number	Thread	Order number
				A45/..			A90/..			A.	
				h	k		h	k		h	
38 (1 1/2")	75	65	79 93336 00	-	-	-	53	70	79 93344 00	-	-
42	90	-	-	85	40	79 93340 00	-	-	-	-	-
50 (2")	125	65	79 93337 00	96	40	79 93341 00	53	84	79 93345 00	-	-
64 (2 1/2")	190	90	79 93338 00	96	40	79 93342 00	109	129	79 93346 00	-	-
76 (3")	250	106	79 93339 00	106	40	79 93343 00	-	-	-	-	-
7 (1 1/2")	125	-	-	-	-	-	-	-	-	28.5	79 40717 00
7 UNF (7/8-12 UN-2B)	125	-	-	-	-	-	-	-	-	28.5	79 41595 00

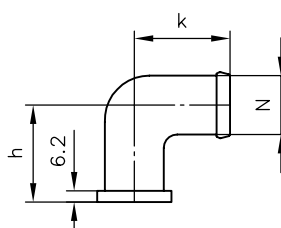
**A00/...**



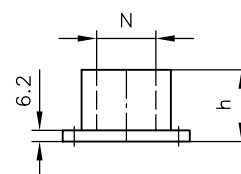
**45/...**



**A90/...**



**A6  
A7**



Delivery includes attachment kit for suction intakes, comprising:

- 4x hex bolt M8x16-8.8
- O-ring 44.2x3 NBR 70 Sh
- 2 mounting flange halves

(Order no. 79 93355 00)



**Note**

Use nominal width 38 (1 1/2") for reduced displacement volume only!

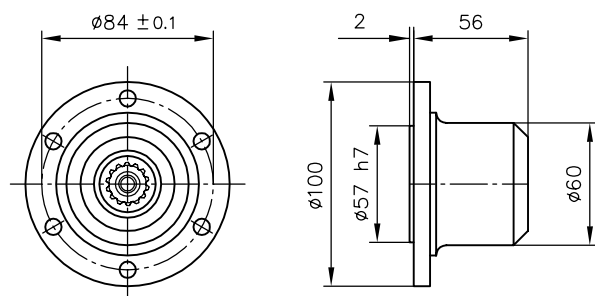
Observe installation information in [Chapter 5, "Installation information"](#).

## 7.3 Coupling flange for propshafts

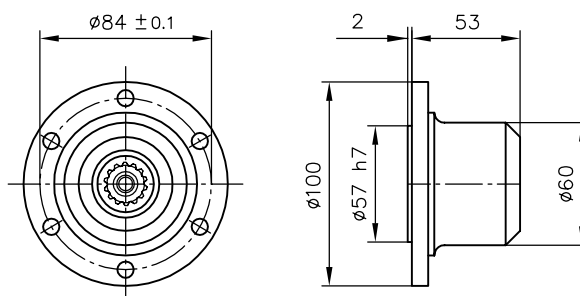
Special coupling flanges for propshafts ( $\varnothing 100$ -6- $\varnothing 8$ ) according to ISO 7646.

For telescopic propshafts also with spacer ring and connecting screw for attachment to the drive shaft of the pump.

### Coding SAE-C, SAE-CS



### Coding DIN ISO 014

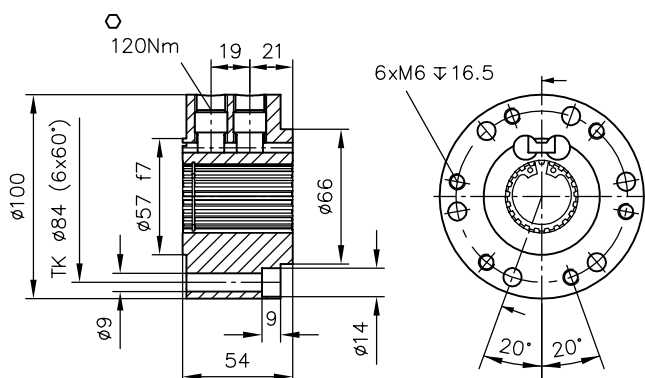


Coding	Spline profile	Order number
SAE C	14T 12/24 DP	79 29555 00
SAE CS	21T 16/32 DP	79 42793 00
DIN ISO 14	B8x32x36	79 29709 00

Special clampable coupling flanges for propshafts ( $\varnothing 100$ -6- $\varnothing 8$ ) according to ISO 7646.

Coding	Spline profile	Order number
SAE-C	14T 12/24 DP	79 94495 00
SAE-CS	21T 16/32 DP	79 94479 00
DIN ISO 14	B8x32x36	79 94496 00

### Coding SAE-C, SAE-CS, DIN ISO 014







#### **Additional versions**

- [General operating manual for the assembly, initial operation and maintenance of hydraulic components and systems: B 5488](#)
- [Variable displacement axial piston pump type V40M: D 7961](#)
- [Variable displacement axial piston pump type V30D: D 7960](#)
- [Variable displacement axial piston pump type V30E: D 7960 E](#)
- [Fixed displacement axial piston pump type K60N: D 7960 K](#)
- [Axial piston motors type M60N: D 7960 M](#)
- [Proportional directional spool valve, type PSL and PSV size 2: D 7700-2](#)
- [Proportional directional spool valve, type PSL, PSM and PSV size 3: D 7700-3](#)
- [Proportional directional spool valve, type PSL, PSM and PSV size 5: D 7700-5](#)
- [Proportional directional spool valve type PSLF, PSVF and SLF size 3: D 7700-3F](#)
- [Proportional directional spool valve type PSLF, PSVF and SLF size 5: D 7700-5F](#)
- [Proportional directional spool valve banks, type PSLF, PSVF and SLF size 7: D 7700-7F](#)
- [Load-holding valve type LHT: D 7918](#)
- [Load-holding valve type LHDV: D 7770](#)
- [Proportional amplifier type EV1M3: D 7831/2](#)
- [Proportional amplifier type EV1D: D 7831 D](#)

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