

## IPV Catalog High-pressure Internal Gear Pumps



### **Benefits that convince**

Internal gear pumps from Voith Turbo H + L Hydraulic are working reliably in hundreds of thousands of machines worldwide. Sophisticated technology, robust design and cost-efficient operation have convinced thousands of customers to trust Voith. Based on that trust, we have become the world market leader for high-pressure internal gear pumps with gap compensation.

### **Features that count**

The market requires hydraulic pumps that are quiet and compact with minimal pressure pulsations at simultaneously high efficiencies. Voith Turbo H + L Hydraulic has met these requirements with the IPV pumps, which feature radial and axial sealing gap compensation with volume-optimized involute gearing.

### **Machines that run**

Rarely seen, but hard at work in countless machines, Voith Turbo H + L Hydraulic internal gear pumps reliably provide high pressures. Their main applications are machines in the plastics and sheet-metal processing sectors, presses as well as conveying and lifting equipment. These pumps are also in demand for shipbuilding, municipal vehicles, power plants and special machine building.

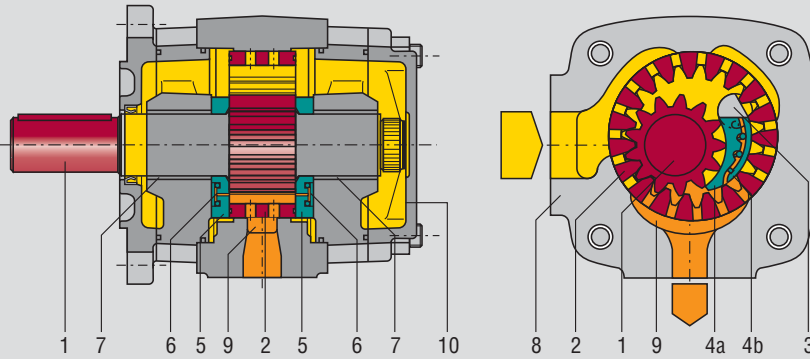
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*Die casting machine, pump with variable flow by speed control*

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# Design and Function



- 1 Pinion shaft
  - 2 Internal gear
  - 3 Filler pin
  - 4a Filler segment carrier
  - 4b Filler sealing segment
  - 5 Axial disc
  - 6 Axial pressure area
  - 7 Plain bearings
  - 8 Housing
  - 9 Hydrostatic bearing
  - 10 End cover with bleeder screw
- Suction chamber  
■ Pressure chamber

## Design features

- Internal gear principle
- Sleeve bearing
- Radial and axial sealing gap compensation
- Volume-optimized involute gearing

## Product characteristics

- Long life
- High volume efficiency
- High overall efficiency
- Very low pump flow and pressure pulsation
- Low noise level
- Compact dimensions
- Low weight
- Large speed range
- Very good suction properties
- High allowed viscosity
- Simple maintenance
- Multiple pumps and pump combinations are possible
- Suitable for variable-speed drives (variable volume flow!)
- Motor operation possible (energy recovery!)

## Function

Rotation of the gears within the pump draws in the pressure fluid (usually hydraulic oil) into the space between the pinion and internal gear. The two smooth running gears help to ensure excellent intake behaviour.

In the radial direction, the gear chambers are closed by gear meshing and the filler piece. In the axial direction, the axial plates seal the pressure chamber with the minimal possible gap. This design minimizes volume losses and increases efficiency.

When the gears rotate, the tooth heads enter the gaps between teeth and displace the pressure fluid.

## Combinations

IPV pumps can be combined to form dual or multi-flow pumps.

Combinations with other Voith Turbo H + L Hydraulic pump series are also possible. Used in conjunction with pumps from the medium and low-pressure series, Voith equipment can handle a wide range of potential applications.

For further information on possible combinations, refer to page 9 and brochure G1714 (Voith multi-flow pumps).

Combinations with third-party products are generally possible. We'll be happy to discuss your needs.

## Variable volume flow

We supply complete hydraulic units with IPV pumps, asynchronous motors and frequency converters (EPA/EPAF system) to generate variable volume flows. For further information, refer to our brochure G1420 (Voith EPA system).

# Performance data

Technical data		Calculations	
<b>Design</b>	Internal gear pump with radial and axial sealing gap compensation	<b>Pump flow</b>	$Q = V_{g\ th} \cdot n \cdot \eta_v \cdot 10^{-3} \text{ [l/min]}$
<b>Type</b>	IPV	<b>Power</b>	$P = \frac{Q \cdot \Delta p}{600 \cdot \eta_g} \text{ [kW]}$
<b>Mounting types</b>	SAE hole flange; ISO 3019/1 or VDMA hole flange; ISO 3019/2	<b><math>V_{g\ th}</math></b>	Pump volume per revolution [cm <sup>3</sup> ]
<b>Line mounting</b>	SAE suction and pressure flange J 518 C Code 61	<b>n</b>	Speed [min <sup>-1</sup> ]
<b>Sense of rotation</b>	Right or left-hand rotation	<b><math>\eta_v</math></b>	Volumetric efficiency
<b>Mounting position</b>	any	<b><math>\eta_g</math></b>	Overall efficiency
<b>Shaft load</b>	For details of radial and axial drive shaft loads please contact your Voith Turbo H + L Hydraulic representative	<b><math>\Delta p</math></b>	Differential pressure [bar]
<b>Input pressure</b>	0,6...3 bar absolute pressure		
<b>Pressure fluid</b>	HLP mineral oils DIN 51524, part 2 or 3		
<b>Viscosity range of the pressure fluid</b>	10...100 mm <sup>2</sup> s <sup>-1</sup> (cSt)		
<b>Permissible start viscosity</b>	max. 2000 mm <sup>2</sup> s <sup>-1</sup> (cSt)		
<b>Permissible temperature of the pressure fluid</b>	-20...+80 °C		
<b>Required purity of the pressure fluid according to NAS 1638</b>	Class 8		
<b>Filtration</b>	Filtration quotient min. $\beta_{20} \geq 75$ , recommended $\beta_{10} \geq 100$ (longer life)		
<b>Permissible ambient temperature</b>	-10...+60 °C		

## Characteristics

Type, size-delivery	Displacement per revolution	Speed		Delivery	Pressures		
		min.	max.	at 1.500 rpm	Continuous	Peak at 1.500 rpm	Peak at $n_{max}$
	[cm <sup>3</sup> ]	[min <sup>-1</sup> ]	[min <sup>-1</sup> ]	[l/min]	[bar]	[bar]	[bar]
IPV 3 – 3.5	3.6	400	3,600	5.4	330	345	345
IPV 3 – 5	5.2	400	3,600	7.8	330	345	345
IPV 3 – 6.3	6.4	400	3,600	9.6	330	345	345
IPV 3 – 8	8.2	400	3,600	12.3	330	345	345
IPV 3 – 10	10.2	400	3,600	15.3	330	345	345
IPV 4 – 13	13.3	400	3,600	19.9	330	345	345
IPV 4 – 16	15.8	400	3,400	23.7	330	345	345
IPV 4 – 20	20.7	400	3,200	31.0	330	345	345
IPV 4 – 25	25.4	400	3,000	38.1	300	330	330
IPV 4 – 32	32.6	400	2,800	48.9	250	280	280
IPV 5 – 32	33.1	400	3,000	49.6	315	345	315
IPV 5 – 40	41.0	400	2,800	61.5	315	345	315
IPV 5 – 50	50.3	400	2,500	75.4	280	315	280
IPV 5 – 64	64.9	400	2,200	97.3	230	250	250
IPV 6 – 64	64.1	400	2,600	96.1	300	330	300
IPV 6 – 80	80.7	400	2,400	121.0	280	315	280
IPV 6 – 100	101.3	400	2,100	151.9	250	300	270
IPV 6 – 125	126.2	400	1,800	189.3	210	250	250
IPV 7 – 125	125.8	400	2,200	188.7	300	330	300
IPV 7 – 160	160.8	400	2,000	241.2	280	315	280
IPV 7 – 200	202.7	400	1,800	304.0	250	300	270
IPV 7 – 250	251.7	400	1,800	377.5	210	250	250

The values given apply for:

- Pumping of mineral oils with a viscosity of 20...40 mm<sup>2</sup>s<sup>-1</sup>
- An input pressure of 0.8...3.0 bar absolute

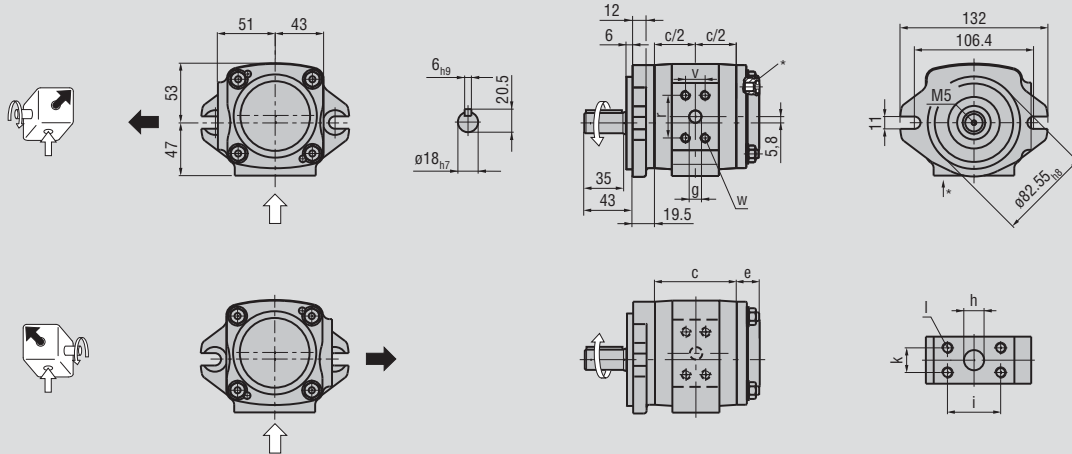
Notes:

- Peak pressures apply for 15% of operating time with a maximum cycle time of 1 minute.
- Please inquire about peak pressures at non-standard speeds.
- Due to production tolerances, the pump volume may be reduced by up to 1.5%.

# IPV 3

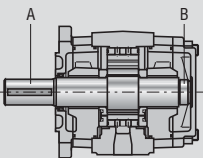
## Standard Design

### Design and dimensions



\* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation.  
Dependent on the pump position, filling or ventilation is possible here prior to commissioning.

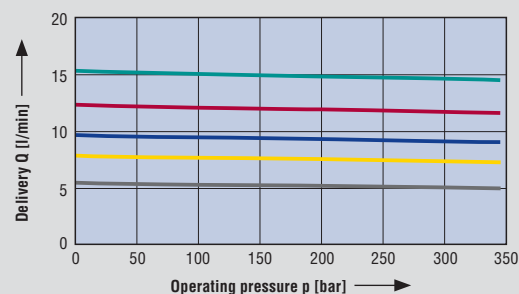
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPV 3 – 3.5	66	20.5	9	14	38.1	15.5	M8x13	38.1	17.5	M8x13	4.0	10	10
IPV 3 – 5	70	20.5	11	14	38.1	17.5	M8x13	38.1	17.5	M8x13	4.2	10	10
IPV 3 – 6.3	73	20.5	11	19	47.5	22	M10x15	38.1	17.5	M8x13	4.4	10	11
IPV 3 – 8	77.5	20.5	13	19	47.5	22	M10x15	38.1	17.5	M8x13	4.6	10	11
IPV 3 – 10	82.5	20.5	13	21	52.4	26.2	M10x15	38.1	17.5	M8x13	4.8	10	12



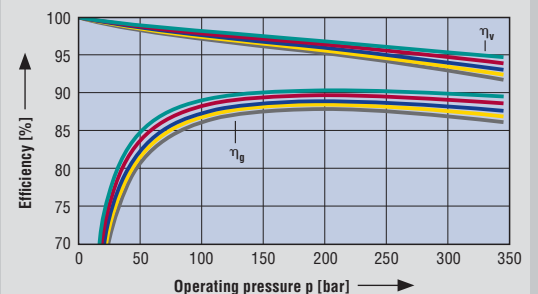
#### Allowed input torques:


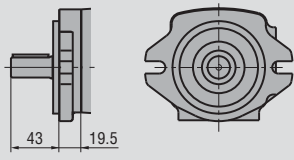
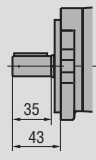

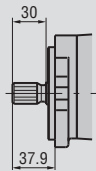
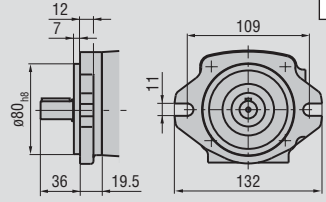
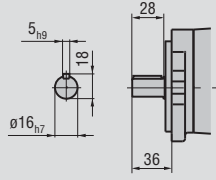
Input shaft A: 160 Nm  
Secondary shaft B: 80 Nm

#### Delivery Q



#### Efficiency $\eta_v$ and $\eta_g$

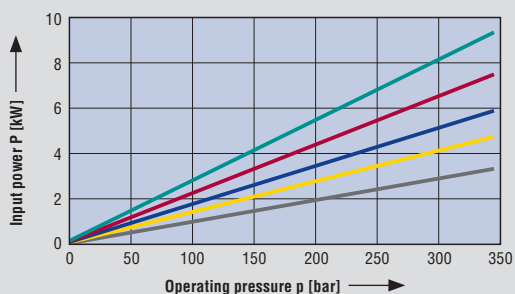


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end	
IPV 3	3.5	Standard			
		Clockwise rotation, radial suction port	SAE 2-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left	
	5		1	0	1
					
	6.3	8	Variants		
			Anti-clockwise rotation, radial suction port		Involute gearing with SAE 2-hole flange
10			6		0
					ANSI B92.1a 16/32 DP 30° 
10			4	1	
			VDMA 2-hole flange 		

Designation according to type code

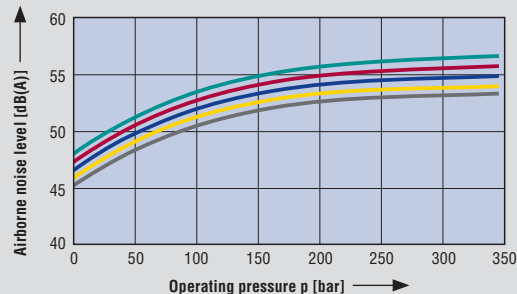
Type code/order designation, see page 17

### Input power P



### Airborne noise level

Measuring location 1 m axial



### Measurement conditions

Speed: 1.500 rpm  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

#### Characteristic curves:

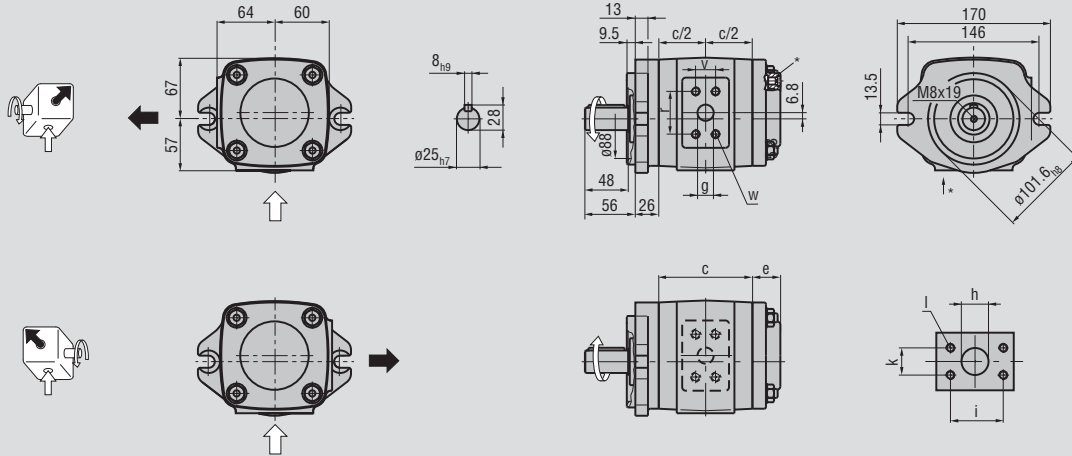
-  IPV 3 – 3.5
-  IPV 3 – 5
-  IPV 3 – 6.3
-  IPV 3 – 8
-  IPV 3 – 10

**Note:** Measurement taken in a low-noise room.  
 In a anechoic room, the measurements are approx. 5 dB(A) lower.

# IPV 4

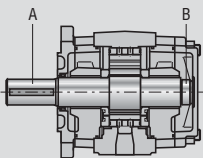
## Standard Design

### Design and dimensions



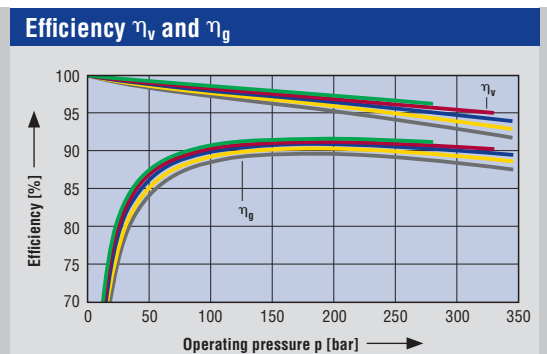
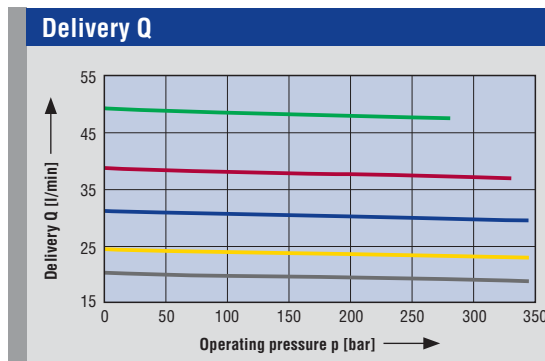
\* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.

Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPV 4 – 13	88.5	31	13	23	52.4	26.2	M10x15	38.1	17.5	M8x13	8.6	10	12
IPV 4 – 16	92.5	31	14	25	52.4	26.3	M10x15	38.1	17.5	M8x13	9.0	10	12
IPV 4 – 20	98	31	18	27	58.7	30.2	M10x15	47.5	22	M10x15	9.6	11	13
IPV 4 – 25	104	31	18	30	58.7	30.2	M10x15	47.5	22	M10x15	10.2	11	13
IPV 4 – 32	113	31	18	32	58.7	30.2	M10x15	47.5	22	M10x15	11.0	11	13


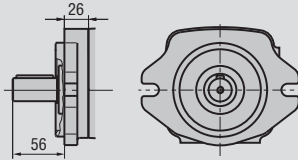
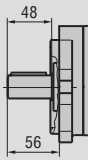

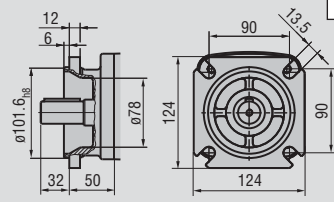
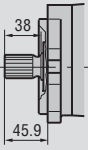
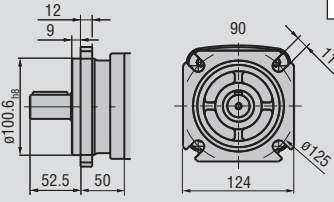



#### Allowed input torques:

Input shaft A: 335 Nm  
Secondary shaft B: 190 Nm



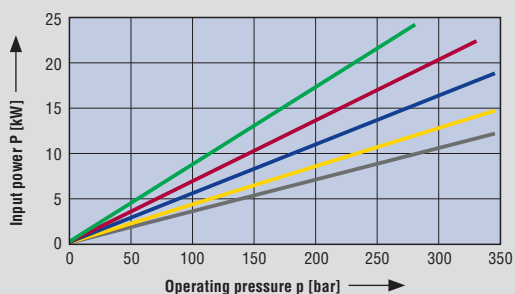


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
IPV 4	13  16	Standard Clockwise rotation, radial suction port	SAE 2-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left
				
	20  25  32	Variants Anti-clockwise rotation, radial suction port	SAE 4-hole flange	Involute gearing with SAE 2-hole flange
				
			ANSI B92.1a 16/32 DP 30°	
			VDMA 4-hole flange	
				

Designation according to type code

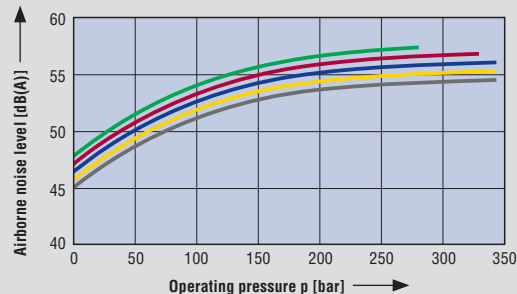
Type code/order designation, see page 17

### Input power P



### Airborne noise level






Measuring location 1 m axial



### Measurement conditions

Speed: 1.500 rpm  
Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
Operating temperature: 40 °C

#### Characteristic curves:

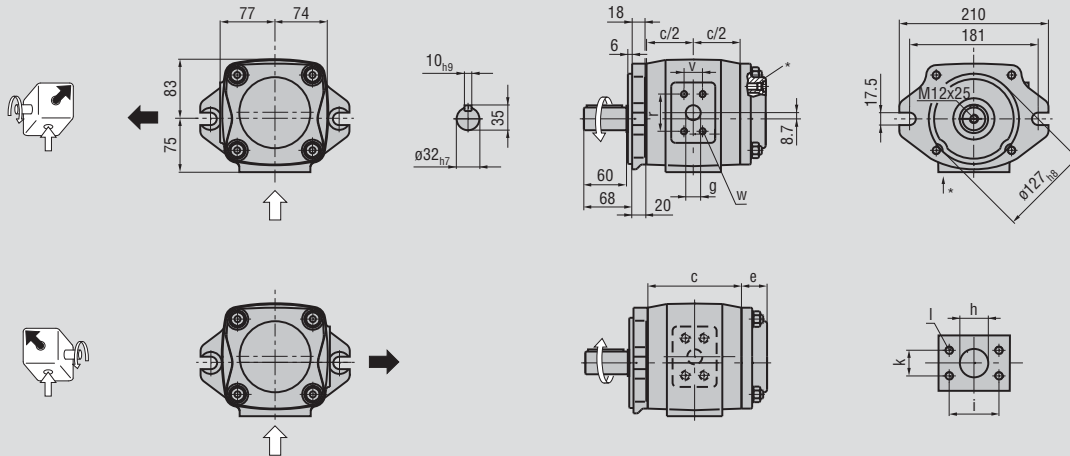
-  IPV 4 – 13
-  IPV 4 – 16
-  IPV 4 – 20
-  IPV 4 – 25
-  IPV 4 – 32

**Note:** Measurement taken in a low-noise room.  
In a anechoic room, the measurements are approx. 5 dB(A) lower.

# IPV 5

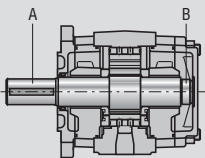
## Standard Design

### Design and dimensions



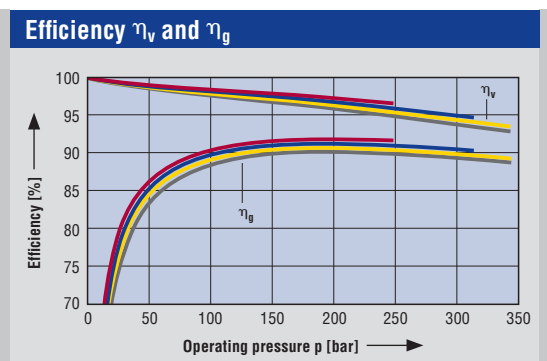
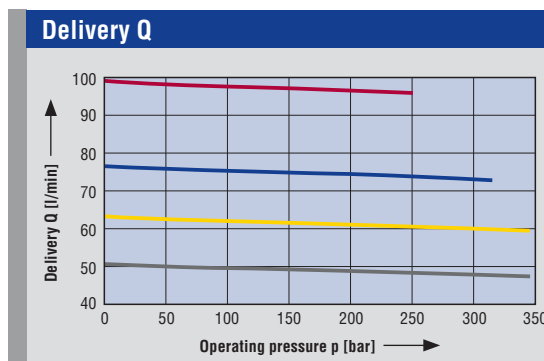
\* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.


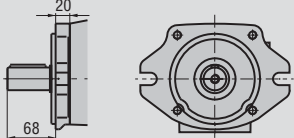
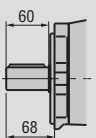

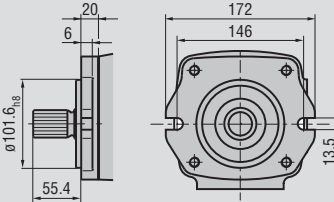
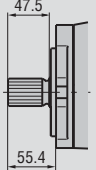
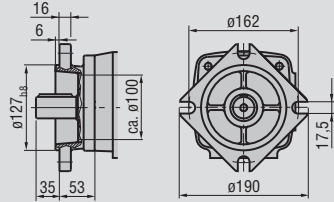
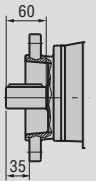
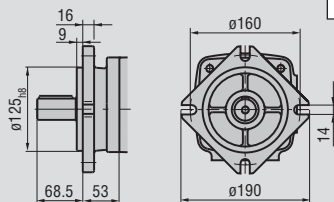
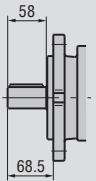
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
<b>IPV 5 – 32</b>	<b>119</b>	36	18	32	58.7	30.2	M10x15	47.5	22	M10x15	15.5	11	13
<b>IPV 5 – 40</b>	<b>125</b>	36	19	35	70	36	M12x20	52.4	26.2	M10x15	16.3	12	30
<b>IPV 5 – 50</b>	<b>132</b>	36	21	40	70	36	M12x20	52.4	26.2	M10x15	17.4	12	30
<b>IPV 5 – 64</b>	<b>163</b>	36	23	40	70	36	M12x20	52.4	26.2	M10x16	18.7	12	30



#### Allowed input torques:

Input shaft A: 605 Nm  
Secondary shaft B: 400 Nm

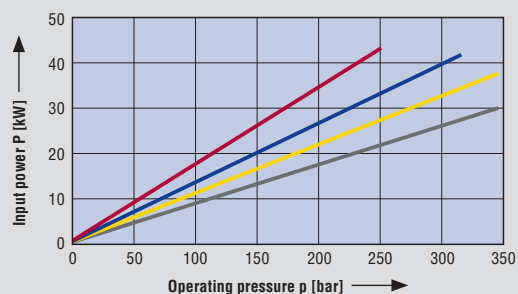


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end	
IPV 5	32  40	Standard Clockwise rotation, radial suction port	SAE 2-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left	
					
			<b>1</b>	<b>0</b>	<b>1</b>
		Variants			
	50  64	Anti-clockwise rotation, radial suction port	SAE 2-hole flange, variant	Involute gearing  ANSI B92.1a 12/24 DP 30°	
					
			<b>6</b>	<b>7</b>	<b>0</b>
			SAE 4-hole flange		
					
			<b>1</b>	<b>1</b>	
			VDMA 4-hole flange		
					
			<b>5</b>	<b>1</b>	

Designation according to type code

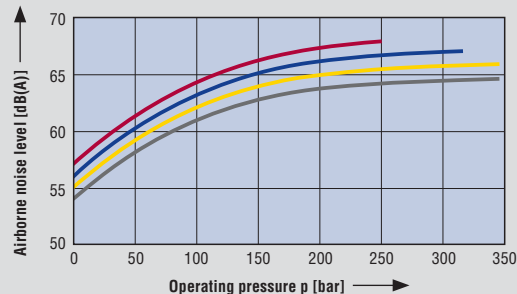
Type code/order designation, see page 17

### Input power P



### Airborne noise level





Measuring location 1 m axial



### Measurement conditions

Speed: 1.500 rpm  
Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
Operating temperature: 40 °C

#### Characteristic curves:

-  IPV 5 - 32
-  IPV 5 - 40
-  IPV 5 - 50
-  IPV 5 - 64

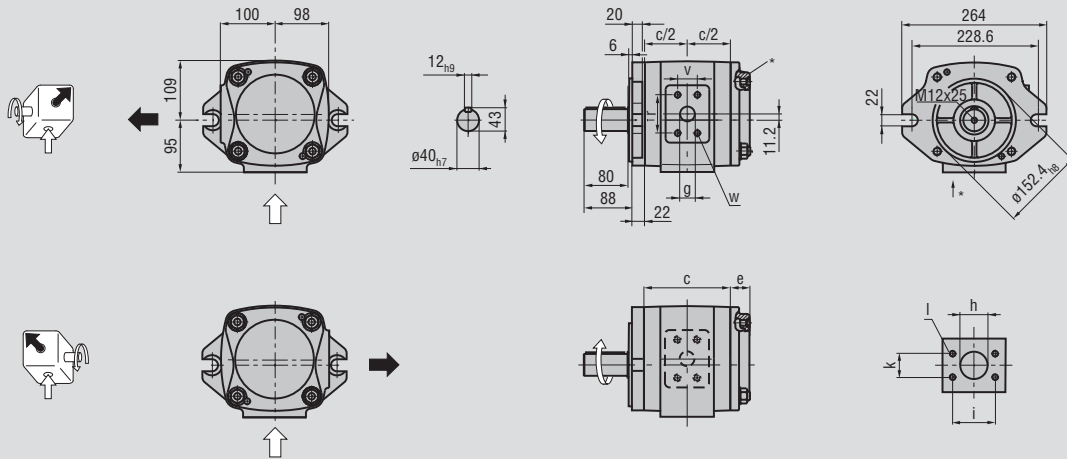
**Note:** Measurement taken in a low-noise room.

In a anechoic room, the measurements are approx. 5 dB(A) lower.

# IPV 6

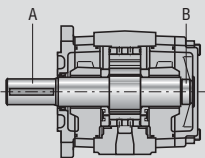
## Standard Design

### Design and dimensions



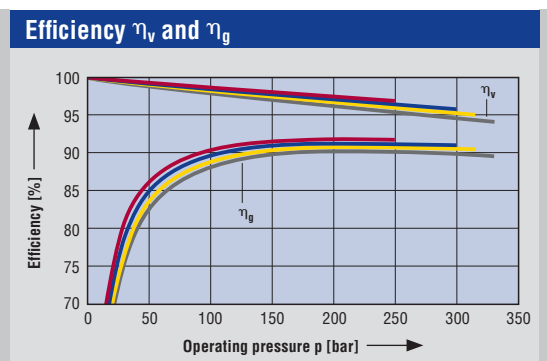
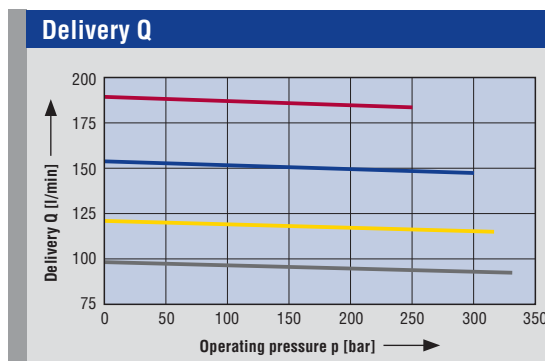
\* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.


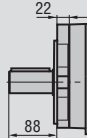
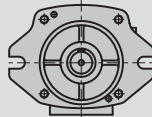

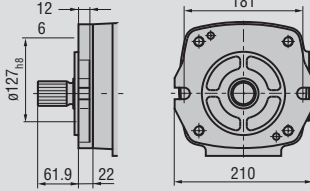
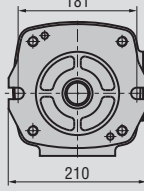
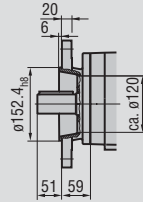
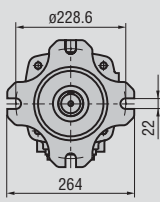
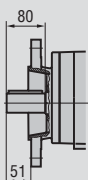
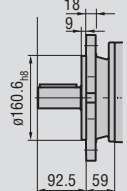
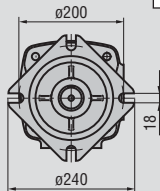
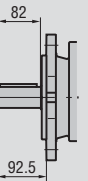
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
<b>IPV 6 – 64</b>	140	40	23	40	70	36	M12x20	52,4	26,2	M10x15	29,2	12	30
<b>IPV 6 – 80</b>	148	35	23	45	77,8	42,9	M12x20	70	36	M12x20	30,7	14	15
<b>IPV 6 – 100</b>	158	35	27	50	77,8	42,9	M12x20	70	36	M12x20	32,6	14	15
<b>IPV 6 – 125</b>	170	40	30	50	77,8	42,9	M12x20	70	36	M10x16	35,0	14	15



#### Allowed input torques:

Input shaft A: 1,050 Nm  
Secondary shaft B: 780 Nm

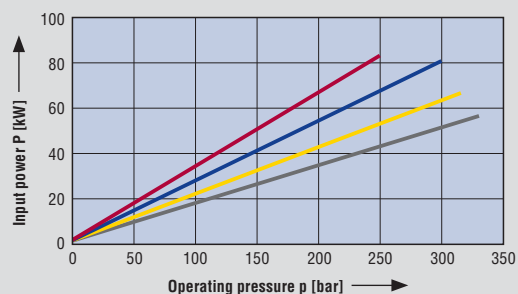


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
IPV 6	64  80	Standard		
		Clockwise rotation, radial suction port	SAE 2-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left
				
	100  125	Variants		
		Anti-clockwise rotation, radial suction port	SAE 2-hole flange, variant	Involute gearing
				
		SAE 4-hole flange	ANSI B92.1a 16/32 DP 30°	
				
			VDMA 4-hole flange	
				

Designation according to type code

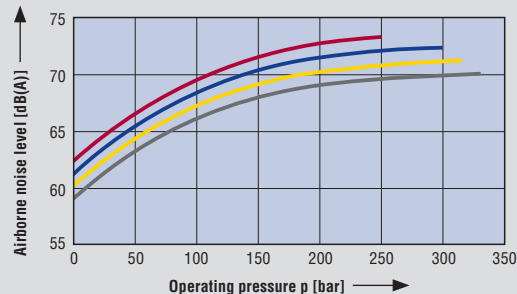
Type code/order designation, see page 17

### Input power P



### Airborne noise level

Measuring location 1 m axial



### Measurement conditions

Speed: 1.500 rpm  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

#### Characteristic curves:

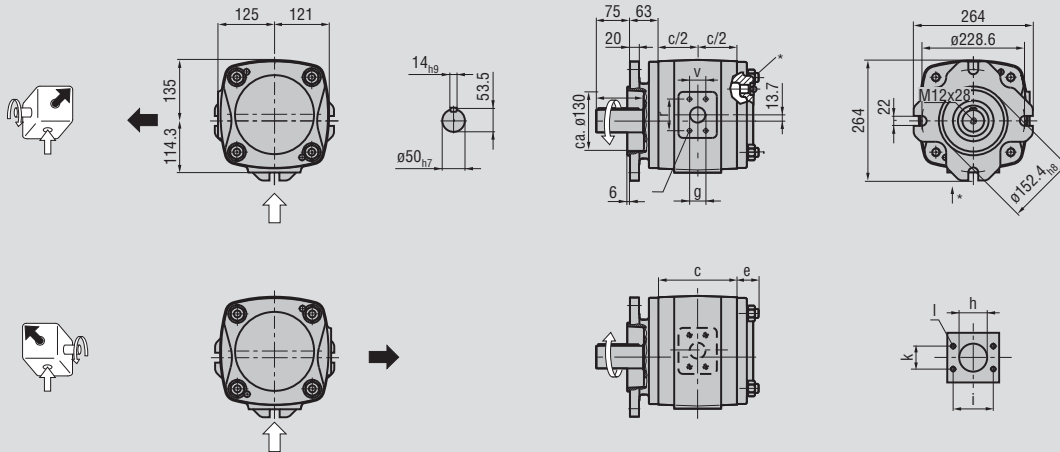
-  IPV 6 - 64
-  IPV 6 - 80
-  IPV 6 - 100
-  IPV 6 - 125

**Note:** Measurement taken in a low-noise room.  
 In a anechoic room, the measurements are approx. 5 dB(A) lower.

# IPV 7

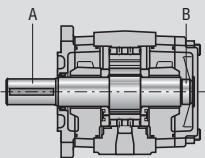
## Standard Design

### Design and dimensions



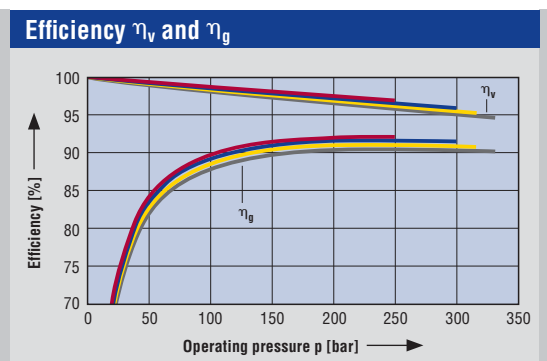
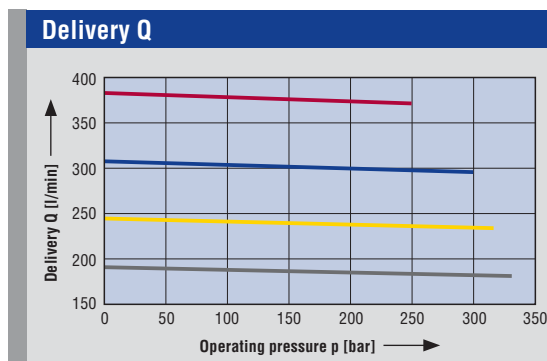
\* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.


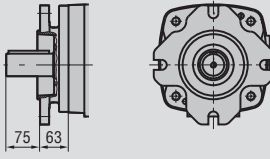
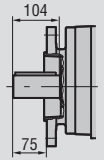

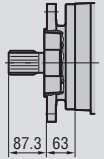
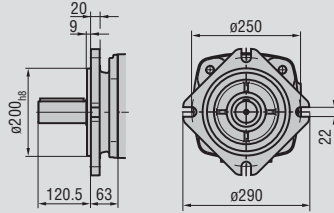
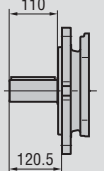
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
<b>IPV 7 – 125</b>	152	48	30	50	77,8	42,9	M12x20	70	36	M12x20	46,5	14	15
<b>IPV 7 – 160</b>	162	48	30	56	89	50,8	M12x20	70	36	M12x20	50	14	16
<b>IPV 7 – 200</b>	174	46	34	62	89	50,8	M12x20	70	36	M12x20	54	14	16
<b>IPV 7 – 250</b>	188	42	38	72	106,3	62	M16x25	70	36	M12x20	59	14	17



#### Allowed input torques:

Input shaft A: 1,960 Nm  
 Secondary shaft B: 1,200 Nm

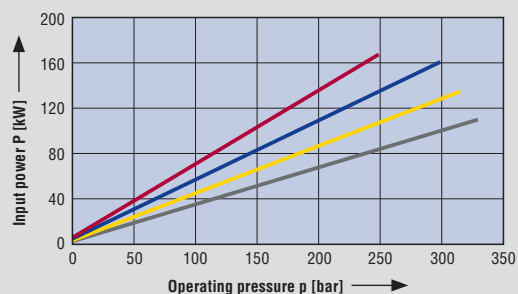


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end	
IPV 7	125	Standard			
		Clockwise rotation, radial suction port	SAE 4-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left	
	160				
		200	Variants		
250	Anti-clockwise rotation, radial suction port			Involute gearing with SAE 4-hole flange	
			ANSI B92.1a 8/16 DP 30°		
			VDMA 4-hole flange		
					

Designation according to type code

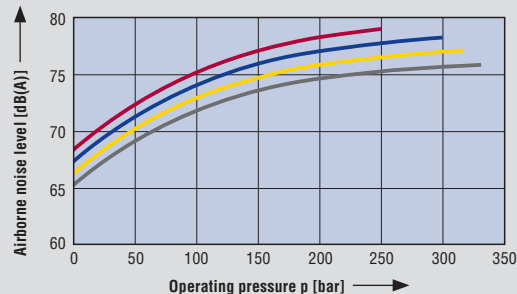
Type code/order designation, see page 17

### Input power P



### Airborne noise level

Measuring location 1 m axial



### Measurement conditions

Speed: 1.500 rpm  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

#### Characteristic curves:

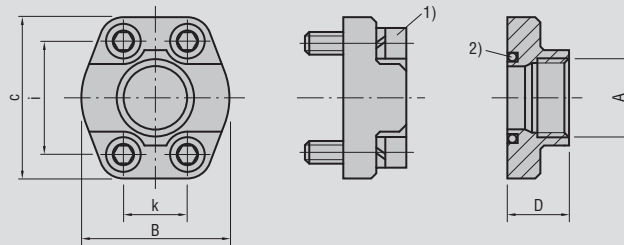
-  IPV 7 – 125
-  IPV 7 – 160
-  IPV 7 – 200
-  IPV 7 – 250

**Note:** Measurement taken in a low-noise room.  
 In a anechoic room, the measurements are approx. 5 dB(A) lower.

# SAE Suction and Pressure Flanges

## according to SAE J 518 C Code 61

### SAE flange, single-piece



SAE flange no.	A	B	C	D	E <sup>1)</sup>	i	k	S <sup>2)</sup>	max. pressure
	Thread	[mm]	[mm]	[mm]	Seal ring	[mm]	[mm]	Thread	[bar]
10	<b>G 1/2</b>	46	54	36	18,66 – 3,53	38.1	17.5	M 8	345
11	<b>G 3/4</b>	50	65	36	24,99 – 3,53	47.6	22.2	M 10	345
12	<b>G 1</b>	55	70	38	32,92 – 3,53	52.4	26.2	M 10	345
13	<b>G 1-1/4</b>	68	79	41	37,69 – 3,53	58.7	30.2	M 10	276
14 <sup>3)</sup>	<b>G 1-1/2</b>	82	98	50	47,22 – 3,53	70	36	M 12	345 <sup>3)</sup>
30	<b>G 1-1/2</b>	78	93	45	47,22 – 3,53	70	36	M 12	207
15	<b>G 2</b>	90	102	45	56,74 – 3,53	77.8	42.9	M 12	207
16	<b>G 2-1/2</b>	105	114	50	69,44 – 3,53	89	50.8	M 12	172
17	<b>G 3</b>	124	134	50	85,32 – 3,53	106.3	62	M 16	138
18	<b>G 4</b>	146	162	48	110,72 – 3,53	130	77.8	M 16	34

<sup>1)</sup> Round seal ring (O-ring) ISO-R 1629 NBR

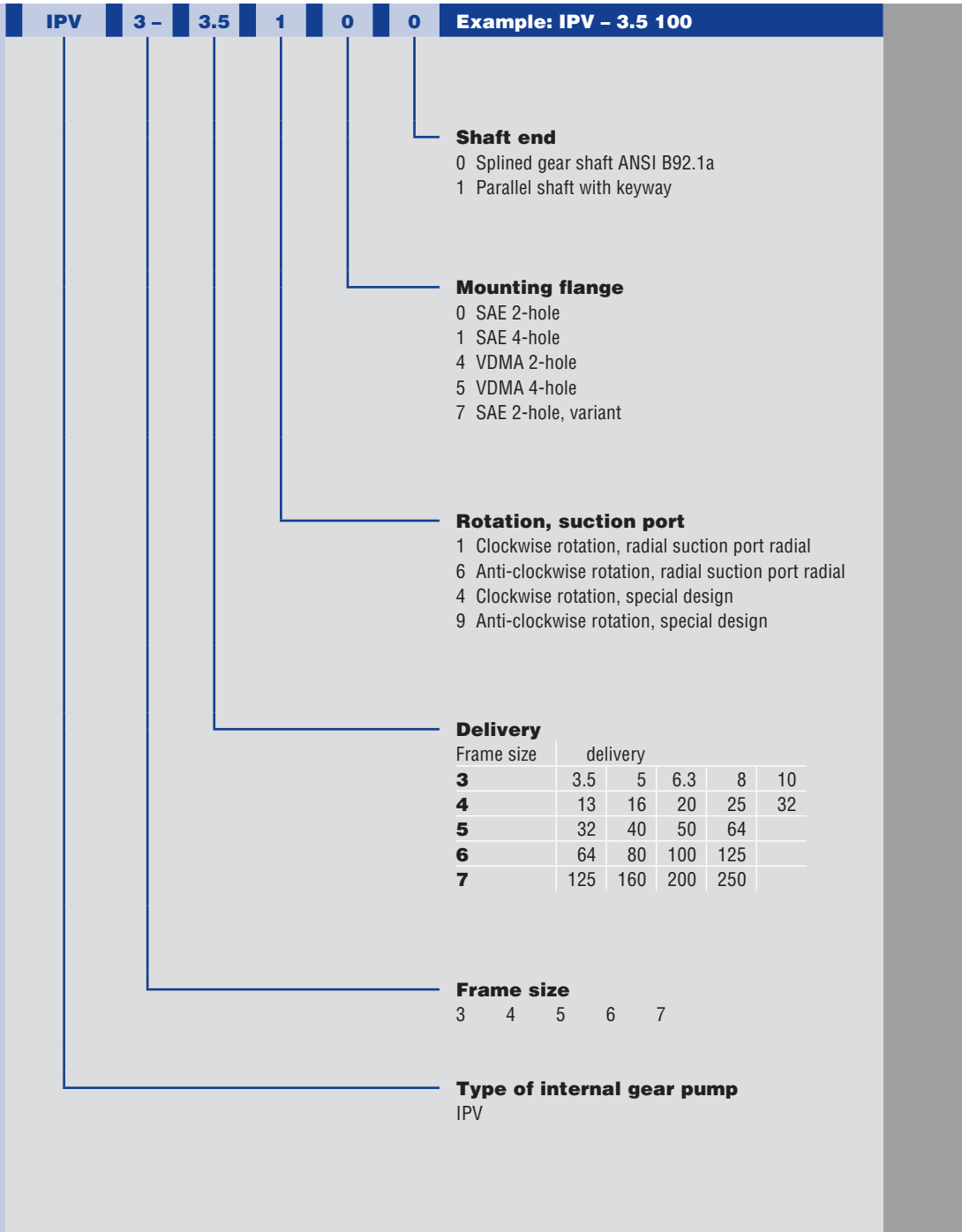
<sup>2)</sup> Machine screw EN ISO 4762

<sup>3)</sup> Special design, deviating from SAE J 518 C Code 61



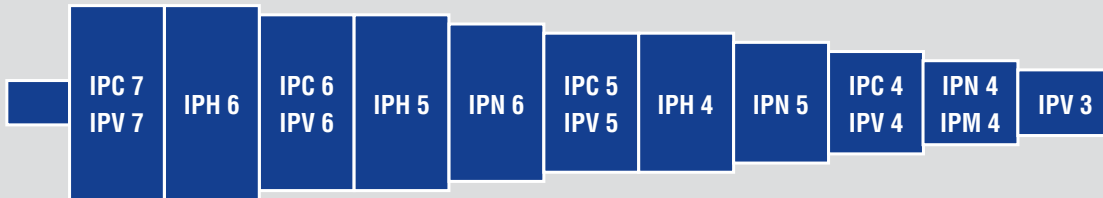
# Type Code

## Order Designation



# Multi-flow Pumps

## Pump Combinations



Pump combinations in order of type and size

### Combinations of IPV pumps

- IPV pumps of identical or different sizes can be combined in multi-flow pumps.
- All sizes of the relevant pump volume are available as two- or three-flow pumps; four-flow pumps must be designed by Voith Turbo H + L Hydraulic.
- The pumps are arranged in increasing order according to frame size and delivery.

### Combinations of IPV/IP...-pumps

- It is possible to combine IPV pumps with other Voith Turbo H + L Hydraulic pump series (e.g. medium-pressure pumps IPC or low-pressure pumps IPN).
- The pumps are arranged by types and sizes as shown in the illustration above.
- If identical types or identical sizes follow each other, the pump with the higher pump flow is placed closer to the drive.












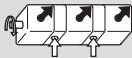
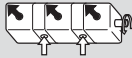






### Selection

1. Determine pressure ranges and define the appropriate pump serie(s).
2. Determine pump volume and select the appropriate size(s).
3. Define sequence of the pumps.
4. Check the torques.
5. Determine rotation and suction.
6. Specify mounting flange and shaft end.

### Mounting, assembly

- Multi-flow pumps are generally mounted to the drive by means of a flange. All information about the flange designs and shaft ends is found in the catalog of the relevant pump series.
- For more information, for example about definition of the adapter housings, refer to brochure G 1714 (Voith multi-flow pump).

# Designs

Rotation and suction	Mounting flange	Shaft end
<p>clockwise   anti-clockwise</p>  <b>2</b> <b>7</b> 	  	 
 <b>1</b> <b>6</b> 	<b>0</b> <b>1</b> <b>1</b>	<b>1</b> <b>0</b>
 <b>2</b> <b>7</b> 	<b>4</b> <b>5</b> <b>5</b> <b>7</b>	
 <b>1</b> <b>6</b> 	<p>For designs and dimensions, see catalog of the relevant pump series.</p>	<p>For designs and dimensions, see catalog of the relevant pump series.</p>
 <b>3</b> <b>8</b> 	<b>0</b> SAE 2-hole-flange <b>1</b> SAE 4-hole-flange	
 <b>3</b> <b>8</b> 	<b>4</b> VDMA 2-hole-flange <b>5</b> VDMA 4-hole-flange	
<p>Special design <b>4</b> <b>9</b> Special design</p>	<b>7</b> SAE 2-hole-flange	

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*Plastics injection molding machine*



*Folding press*



*Punching press*



*Hydraulic unit*



*Lifting platform*



*Marine applications*

**Additional applications:**

- Die casting machines
- Packing presses
- Shears
- Ground drilling machines
- Test rigs
- Hydraulic presses
- Crane building
- Lifting devices
- Garbage collection vehicles

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