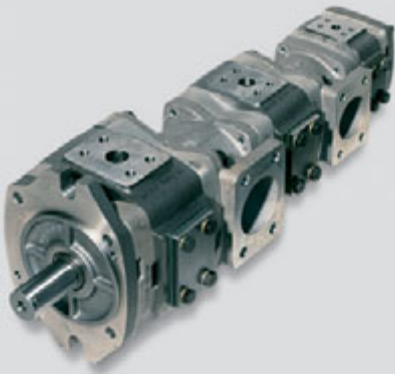


# IPC Catalog

## Medium-pressure internal gear pumps



### **Benefits that impress**

Internal gear pumps from Voith Turbo 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.

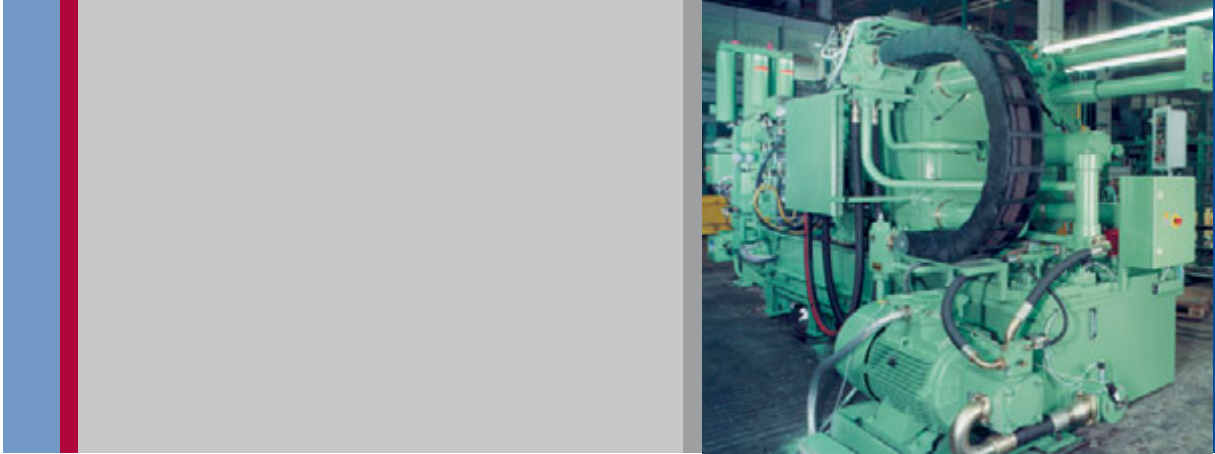
### **Features that count**

The market requires hydraulic pumps that are quiet and compact with minimal pressure and volume pulsation whilst at the same time being highly efficient. Voith Turbo has met these requirements with the IPC pumps. The radial and axial sealing gap compensation with volume-optimized involute gearing contribute in meeting these requirements.

### **Machines that run**

Rarely seen, but hard at work in countless machines, Voith Turbo internal gear pumps reliably provide high pressures. They are mainly used in the plastic and sheet-metal processing sectors, presses as well as conveying and lifting equipment. The pumps are also in demand for shipbuilding, municipal vehicles, power plants and special machine building.

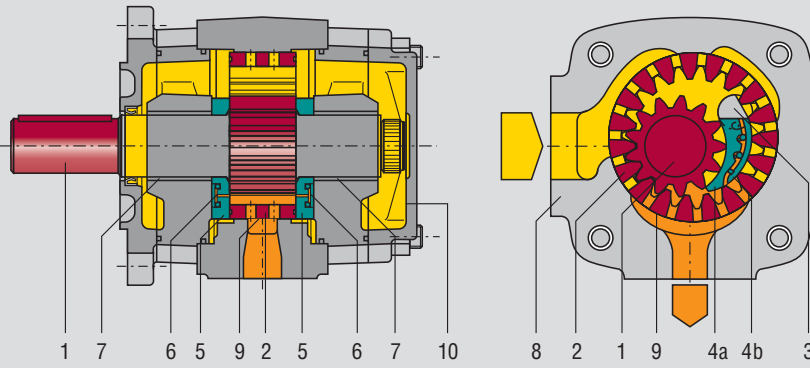
# Contents



*Die-casting machine, pump with variable flow thanks to motor drive 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 relieved bearing
  - 10 End cover  
with bleeder screw
- Suction chamber  
■ Pressure chamber

## Design features

- Internal gear principle
- Plain bearings
- Radial and axial sealing gap compensation
- Volume-optimized involute gearing

## Product characteristics

- Long service life
- High volumetric efficiency
- High overall efficiency
- Very low flow and pressure pulsation
- Low noise levels
- Compact dimensions
- Low weight
- Wide speed range
- Excellent suction properties
- Wide viscosity range
- 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 behavior.

In the radial direction, the gear chambers are sealed 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 pinion teeth enter the gaps between the internal gear teeth and displace the pressure fluid.

## Combinations

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

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

For further information on possible combinations, refer to page 15 and our brochure No. 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 IPC pumps, asynchronous motors and frequency converters (EPA/EPAF system) to generate variable volume flows. For further information, see our brochure No. G1420 (Voith EPA System).

# Performance data

Technical data		Calculations	
<b>Design</b>	Internal gear pump with radial and axial sealing gap compensation	<b>Delivery</b>	$Q = V_{g\ th} \cdot n \cdot \eta_v \cdot 10^{-3}$ [l/min]
<b>Type</b>	IPC	<b>Power</b>	$P = \frac{Q \cdot \Delta p}{600 \cdot \eta_g}$ [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>Rotation direction</b>	clockwise or anti-clockwise	<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 representative	<b><math>\Delta p</math></b>	Differential pressure [bar]
<b>Input pressure</b>	0.8...3 bar absolute pressure (at start, briefly 0.6...3 bar)		
<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>Necessary purity of the pressure fluid in accordance with NAS 1638</b>	Class 8		
<b>Filtration</b>	Filtration quotient min. $\beta_{20} \geq 75$ , recommended $\beta_{10} \geq 100$ (longer service life)		
<b>Permissible ambient temperature</b>	-10...+60 °C		

Characteristics						
Type, size- delivery	Displacement per revolution	Speed		Delivery at 1500 min <sup>-1</sup>	Pressures within the range n <sub>min</sub> ... n <sub>max</sub>	
		min.	max.		Continuous pressure	Peak pressure
	[cm <sup>3</sup> ]	[min <sup>-1</sup> ]	[min <sup>-1</sup> ]	[l/min]	[bar]	[bar]
IPC 4 – 20	20.7	400	3200	31.0	210	250
IPC 4 – 25	25.4	400	3000	38.1	210	250
IPC 4 – 32	32.6	400	3000	48.9	210	250
IPC 5 – 40	41.0	400	2800	61.5	210	250
IPC 5 – 50	50.3	400	2600	75.4	210	250
IPC 5 – 64	64.9	400	2600	97.3	210	250
IPC 6 – 80	80.7	400	2400	121.0	210	250
IPC 6 – 100	101.3	400	2200	151.9	210	250
IPC 6 – 125	126.2	400	2200	189.3	210	250
IPC 7 – 160	160.8	400	2000	241.2	210	250
IPC 7 – 200	202.7	400	1800	304.0	210	250
IPC 7 – 250	251.7	400	1800	377.5	210	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.

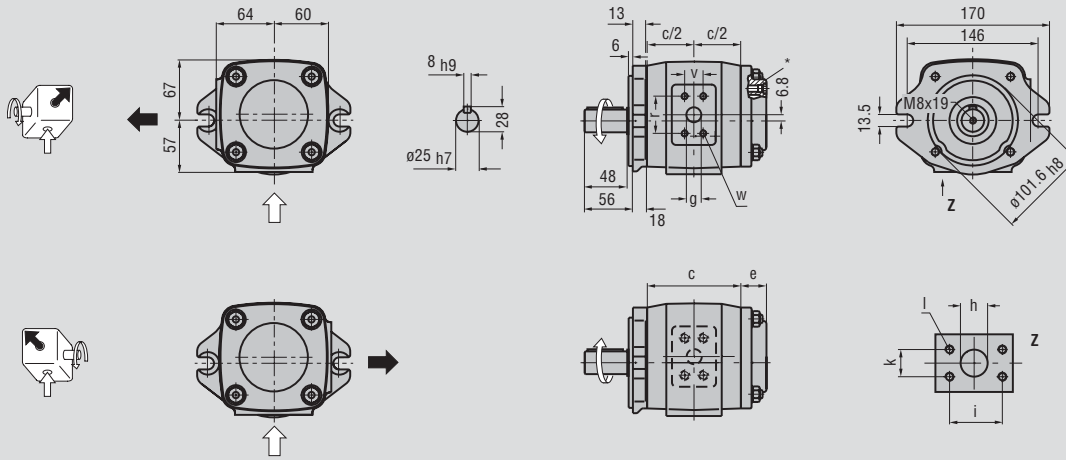
Notes:

- Peak pressures apply for 15% of operating time and a maximum cycle time of 1 minute.
- Please enquire about pressures lower than n<sub>min</sub>.
- Due to production tolerances, the pump volume may be approx. 1.5% lower.

# IPC 4

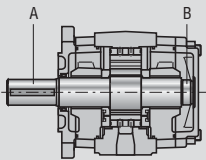
## Standard designs

### Design and dimensions



\* The plug screw must be closed during operation. Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm. Depending on the pump position, filling or ventilation is possible with the M10x1 plug screw prior to commissioning.

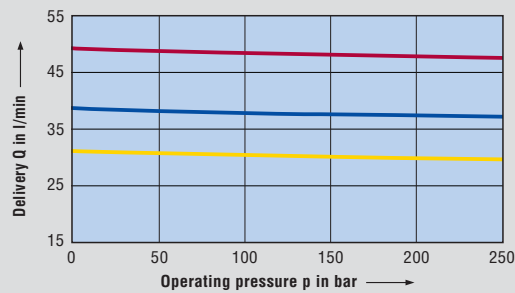
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPC 4 – 20	98	31	18	27	58.7	30.2	M10x15	47.5	22	M10x15	9.6	11	13
IPC 4 – 25	104	31	18	30	58.7	30.2	M10x15	47.5	22	M10x15	10.2	11	13
IPC 4 – 32	113	31	18	32	58.7	30.2	M10x15	47.5	22	M10x15	11.0	11	13



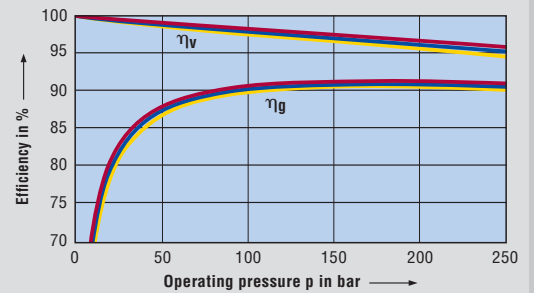
#### Permitted input torques:


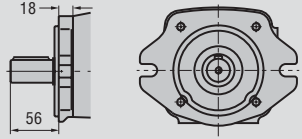
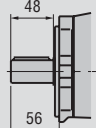

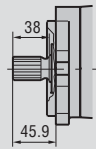
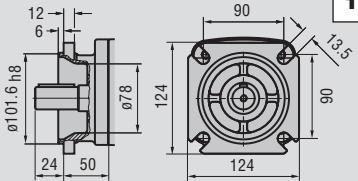
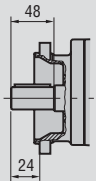
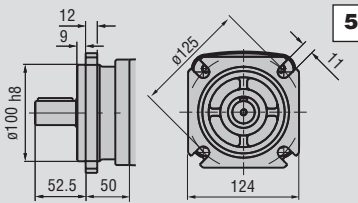
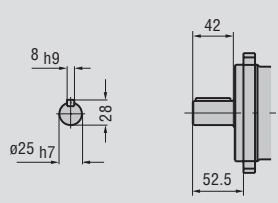
Input shaft A: 335 Nm  
Secondary shaft B: 190 Nm

#### Delivery Q



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

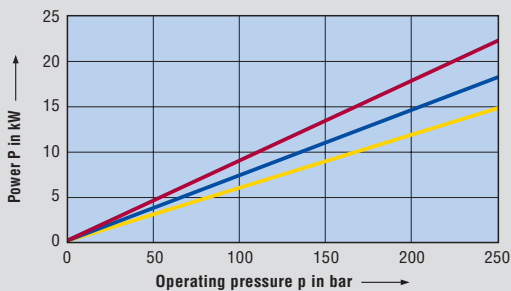


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end	
IPC 4	20	Standard			
		Clockwise rotation, radial suction port  <b>1</b>	SAE 2-hole flange, dimensions on left  <b>0</b>	Parallel shaft with keyway connection, dimensions on left  <b>1</b>	
	25				
	32	Variants			
		Anti-clockwise rotation, radial suction port  <b>6</b>		Involute gearing with 2-hole SAE flange  <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

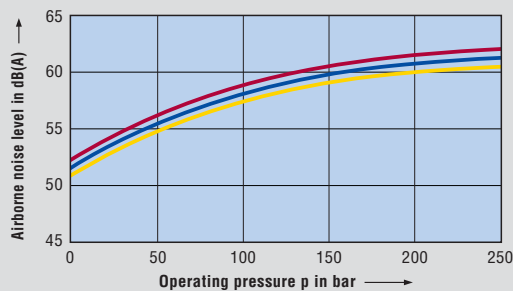
Type code/order designation, see page 17

Input power P



Airborne noise level



Measurement site 1 m axial



Measurement conditions:

Speed: 1500 min<sup>-1</sup>  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

Characteristic curves:

-  IPC 4 – 20
-  IPC 4 – 25
-  IPC 4 – 32

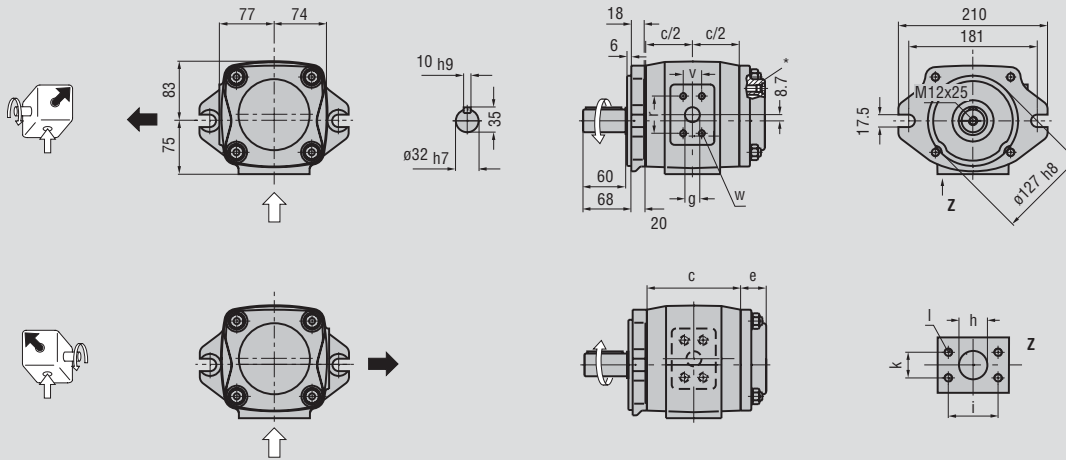
Note: Measurement taken in a low-noise room.

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

# IPC 5

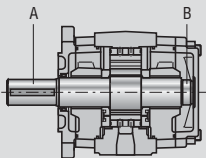
## Standard designs

### Design and dimensions



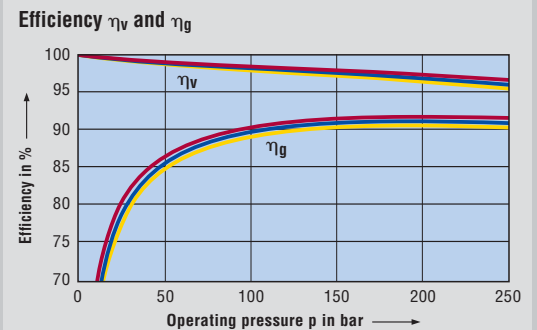
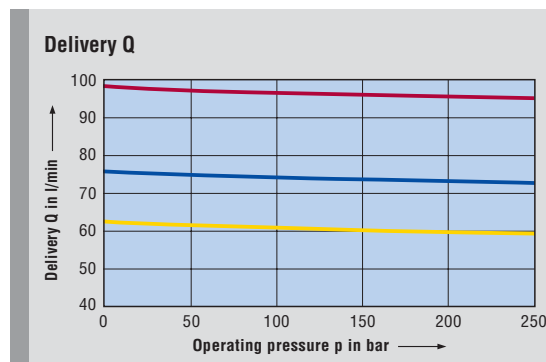
\* The plug screw must be closed during operation. Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm. Depending on the pump position, filling or ventilation is possible with the M10x1 plug screw prior to commissioning.

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>IPC 5 – 40</b>	125	36	19	35	70	36	M12x20	52.4	26.2	M10x15	16.3	12	30
<b>IPC 5 – 50</b>	132	36	21	40	70	36	M12x20	52.4	26.2	M10x15	17.4	12	30
<b>IPC 5 – 64</b>	163	36	23	40	70	36	M12x20	52.4	26.2	M10x16	18.7	12	30



#### Permitted input torques:

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



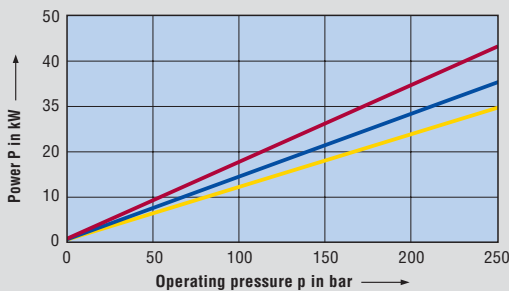


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end	
IPC 5	40	Standard			
		Clockwise rotation, radial suction port	SAE 2-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left	
	50				
	64	Variants	Anti-clockwise rotation, radial suction port	SAE 2-hole flange, variant	Involute gearing
					ANSI B92.1a 14 T 12/24 DP 30°
			SAE 4-hole flange		
			VDMA 4-hole flange		

Designation according to type code

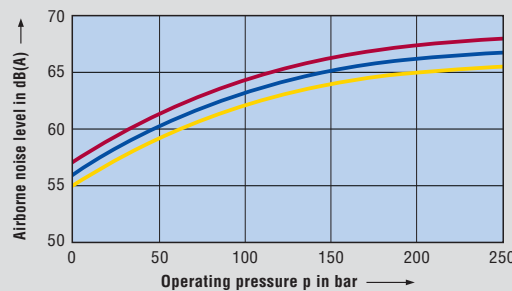
Type code/order designation, see page 17

Input power P



Airborne noise level

Measurement site 1 m axial



Measurement conditions:

Speed: 1500 min<sup>-1</sup>  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

Characteristic curves:

- IPC 5 – 40
- IPC 5 – 50
- IPC 5 – 64

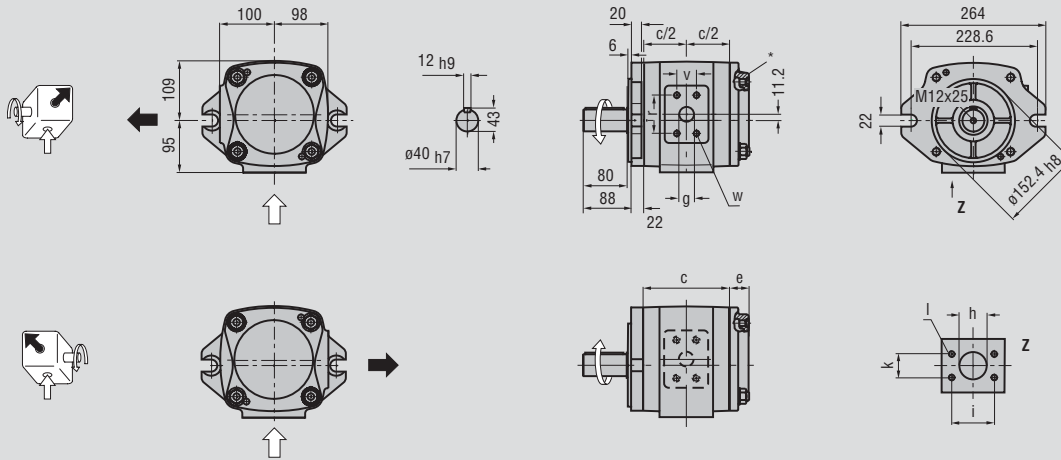
Note: Measurement taken in a low-noise room.

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

# IPC 6

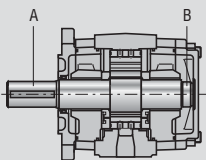
## Standard designs

### Design and dimensions



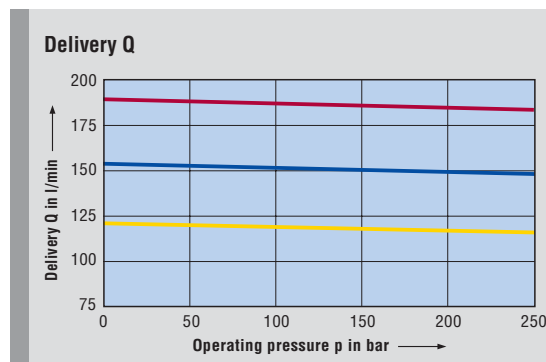
\* The plug screw must be closed during operation. Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm. Depending on the pump position, filling or ventilation is possible with the M10x1 plug screw prior to commissioning.

Design	Dimensions											SAE flange no.	
	c [mm]	e [mm]	g [mm]	h [mm]	i [mm]	k [mm]	l Thread	r [mm]	v [mm]	w Thread	Weight [kg]	▲	▼
IPC 6 – 80	148	35	23	45	77.8	42.9	M12x20	70	36	M12x20	30.7	14	15
IPC 6 – 100	158	35	27	50	77.8	42.9	M12x20	70	36	M12x20	32.6	14	15
IPC 6 – 125	170	40	30	50	77.8	42.9	M12x20	70	36	M12x20	35.0	14	15

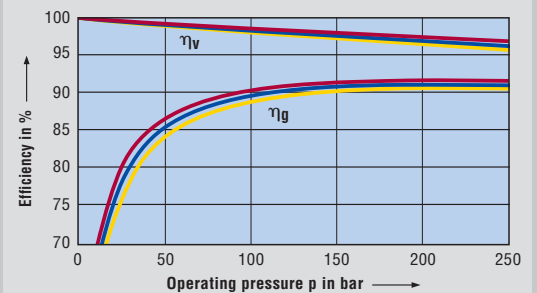



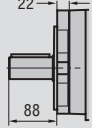


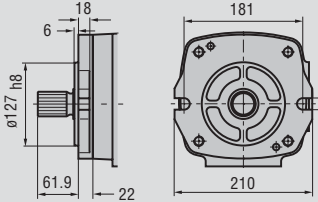
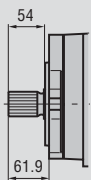
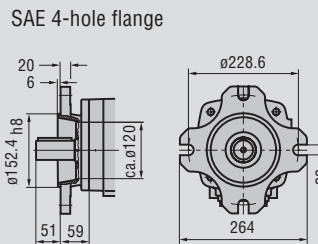
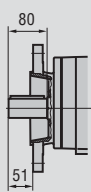
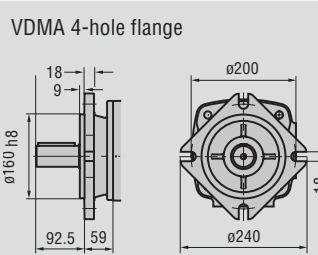
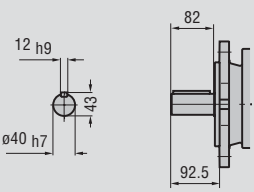
#### Permitted input torques:

Input shaft A: 1050 Nm  
Secondary shaft B: 780 Nm



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

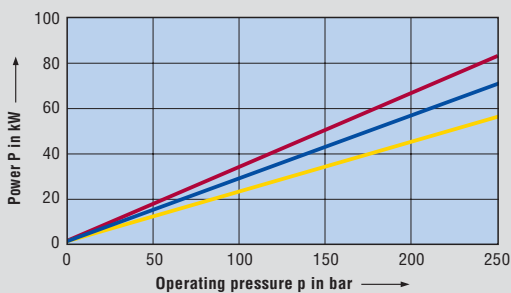


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
IPC 6	80	Standard		
		Clockwise rotation, radial suction port  <b>1</b>	SAE 2-hole flange, dimensions on left  <b>0</b>	Parallel shaft with keyway connection, dimensions on left  <b>1</b>
	100			
	125	Anti-clockwise rotation, radial suction port  <b>6</b>	SAE 2-hole flange, variant  <b>7</b>	Involute gearing ANSI B92.1a 17 T 12/24 DP 30°  <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

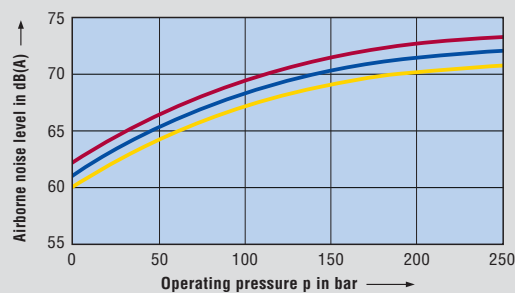
Type code/order designation, see page 17

Input power P



Airborne noise level

Measurement site 1 m axial



**Measurement conditions:**

Speed: 1500 min<sup>-1</sup>  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

**Characteristic curves:**

- IPC 6 – 80
- IPC 6 – 100
- IPC 6 – 125

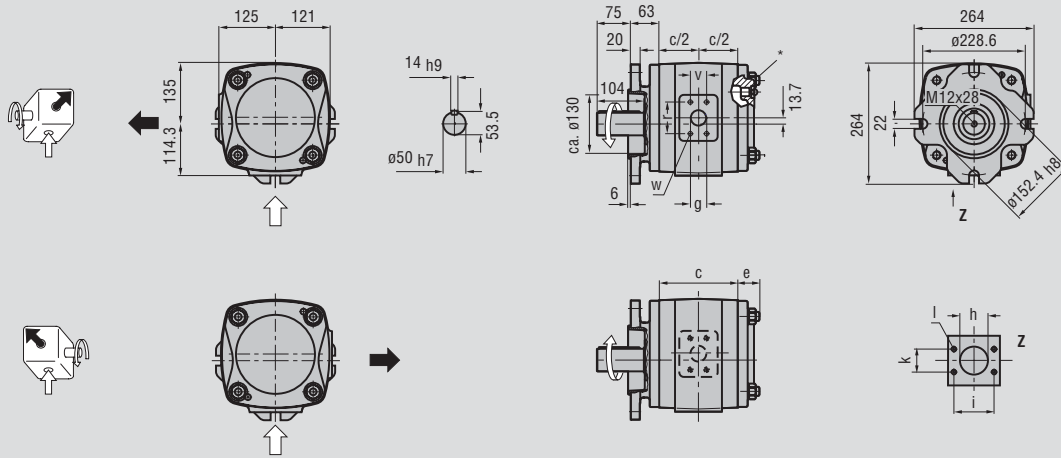
**Note:** Measurement taken in a low-noise room.

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

# IPC 7

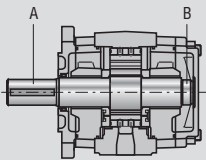
## Standard designs

### Design and dimensions



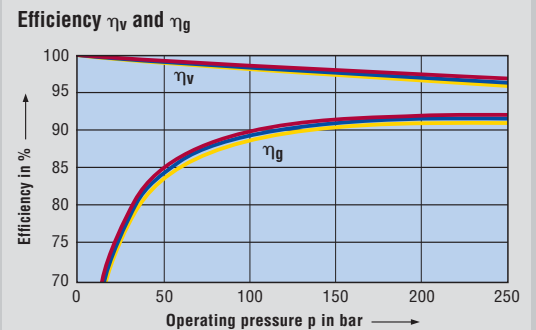
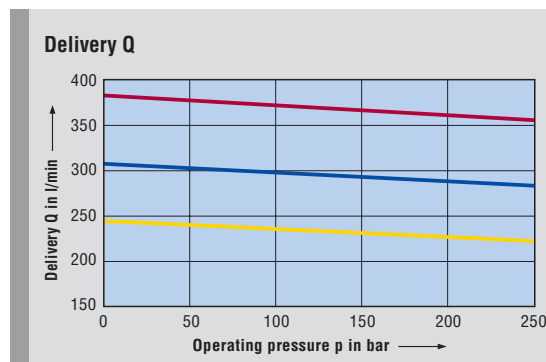
\* The plug screw must be closed during operation. Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm. Depending on the pump position, filling or ventilation is possible with the M10x1 plug screw prior to commissioning.

Design	Dimensions											SAE flange no.	
	c [mm]	e [mm]	g [mm]	h [mm]	i [mm]	k [mm]	l Thread	r [mm]	v [mm]	w Thread	Weight [kg]	▲	▼
IPC 7 – 160	162	48	30	56	89	50.8	M12x20	70	36	M12x20	50	14	16
IPC 7 – 200	174	46	34	62	89	50.8	M12x20	70	36	M12x20	54	14	16
IPC 7 – 250	188	42	38	72	106.3	62	M16x25	70	36	M12x20	59	14	16



#### Permitted input torques:

Input shaft A: 1960 Nm  
Secondary shaft B: 1200 Nm

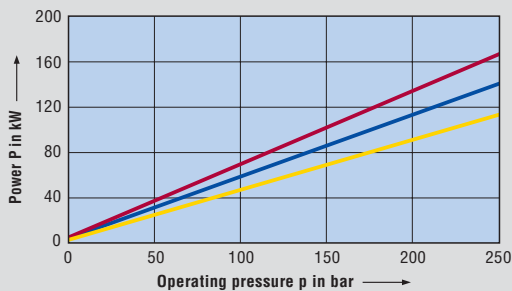


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
IPC 7	160	Standard		
		Clockwise rotation, radial suction port	SAE 4-hole flange, dimensions on left	Parallel shaft with keyway connection, dimensions on left
	200			
	250	Variants		
Anti-clockwise rotation, radial suction port		VDMA 4-hole flange	Involute gearing with 4-hole SAE flange	

☐ Designation according to type code

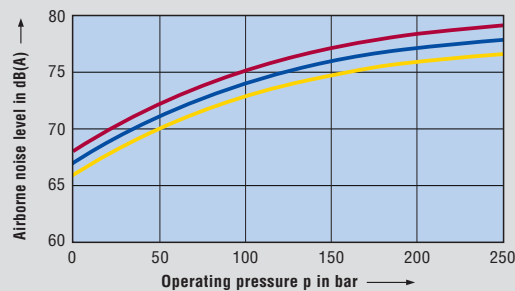
Type code/order designation, see page 17

Input power P



Airborne noise level

Measurement site 1 m axial



Measurement conditions:

Speed: 1500 min<sup>-1</sup>  
 Viscosity of pressure fluid: 46 mm<sup>2</sup>s<sup>-1</sup>  
 Operating temperature: 40 °C

Characteristic curves:

- IPC 7 – 160
- IPC 7 – 200
- IPC 7 – 250

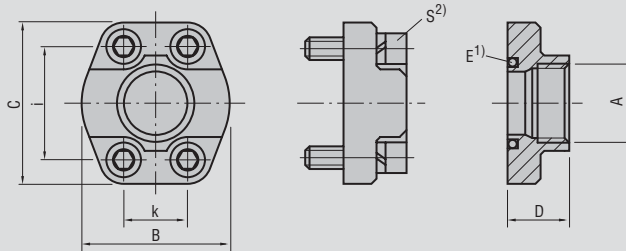
Note: Measurement taken in a low-noise room.

In an 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	E¹)	i	k	S²)	max. pressure
	Thread	[mm]	[mm]	[mm]	Seal ring	[mm]	[mm]	Thread	[bar]
10	G 1/2	46	54	36	18.66 – 3.53	38.1	17.5	M 8	345
11	G 3/4	50	65	36	24.99 – 3.53	47.6	22.2	M 10	345
12	G 1	55	70	38	32.92 – 3.53	52.4	26.2	M 10	345
13	G 1-1/4	68	79	41	37.69 – 3.53	58.7	30.2	M 10	276
14 <sup>3)</sup>	G 1-1/2	82	98	50	47.22 – 3.53	70	36	M 12	345 <sup>3)</sup>
30	G 1-1/2	78	93	45	47.22 – 3.53	70	36	M 12	207
15	G 2	90	102	45	56.74 – 3.53	77.8	42.9	M 12	207
16	G 2-1/2	105	114	50	69.44 – 3.53	89	50.8	M 12	172
17	G 3	124	134	50	85.32 – 3.53	106.3	62	M 16	138
18	G 4	146	162	48	110.72 – 3.53	130	77.8	M 16	34

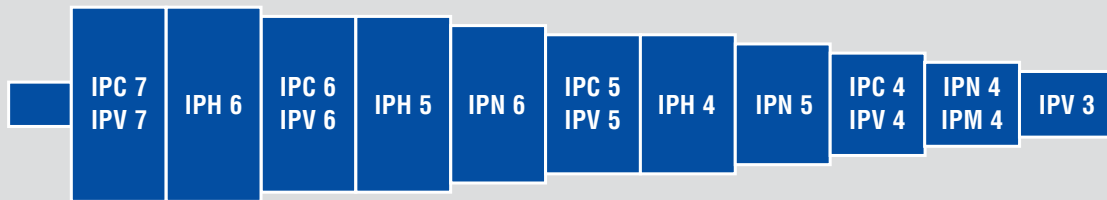
1) Round seal ring (O-ring) ISO-R 1629 NBR

2) Machine screw EN ISO 4762

3) Special design, deviating from SAE J 518 C code 61

# Multi-flow pumps

## Pump combinations



Pump combinations in order of type and size

### Combinations of IPC pumps

- IPC pumps of identical or different sizes can be combined to form multi-flow pumps.
- All sizes with each displacement are available as two or three-flow pumps; four-flow pumps must be designed by Voith Turbo.
- The pumps are arranged in increasing order according to size and delivery.

### Combination of IPC/IP... pumps

- It is possible to combine IPC pumps with other Voith Turbo pump series (e.g. high-pressure pumps IPV or low-pressure pumps IPN).
- The pumps are arranged by type and size, 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.




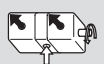









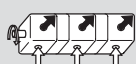





### Selection

1. Identify the pressure ranges and then choose the appropriate pump series.
2. Identify the deliveries, and then select the appropriate size(s).
3. Define the sequence of the pumps.
4. Check the torque.
5. Determine the direction of rotation and suction.
6. Specify the mounting flange and shaft end.

### Connection, assembly

- As a rule, multi-flow pumps are mounted to the drive using a flange. All information on flange designs and shaft ends is contained in the relevant pump series catalog.
- For further relevant information, such as how to determine the adapter housing, see brochure No. G 1714 (Voith Multi-Flow Pumps).

# 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 for the relevant pump series.</p>	<p>For designs and dimensions, see catalog for the relevant pump series.</p>
 <b>3</b> <b>8</b> 	<b>0</b> SAE 2- hole flange	
 <b>3</b> <b>8</b> 	<b>1</b> SAE 4-hole flange	
<p>Special design <b>4</b> <b>9</b> Special design</p>	<b>4</b> VDMA 2-hole flange <b>5</b> VDMA 4-hole flange <b>7</b> SAE 2-hole flange (variant)	



# Type code

## Order designation

IPC

5 -

40

1

0

1

Example: IPC 5 - 40 101

### Shaft end

- 0 Splined gear shaft ANSI B92.1a
- 1 Parallel shaft with keyway

### Mounting flange

- 0 SAE 2-hole
- 1 SAE 4-hole
- 4 VDMA 2-hole
- 5 VDMA 4-hole
- 7 SAE-2-hole, variant

### Rotation, suction port

- 1 Clockwise rotation, radial suction port
- 6 Anti-clockwise rotation, radial suction port
- 4 Clockwise rotation, special design
- 9 Anti-clockwise rotation, special design

### Delivery

Sizes	Available deliveries		
<b>4</b>	20	25	32
<b>5</b>	40	50	64
<b>6</b>	80	100	125
<b>7</b>	160	200	250

### Sizes

4 5 6 7

### Type of internal gear pump

IPC

Voith Turbo GmbH & Co. KG  
Hydrostatics  
Alexanderstr. 2  
89522 Heidenheim, Germany  
Tel. +49 7321 37-4573  
Fax +49 7321 37-7809  
hydrostatik@voith.com  
www.voithturbo.com/hydrostatics.htm

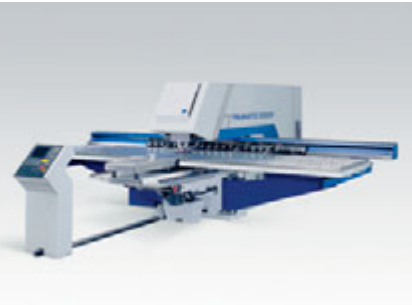
**Voith internal gear pumps**  
used around the world



*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

**VOITH**  
*Engineered reliability.*