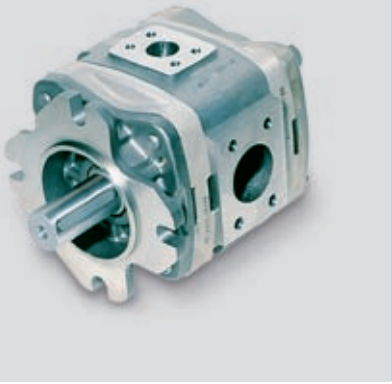
Voith Turbo

VOITH

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.

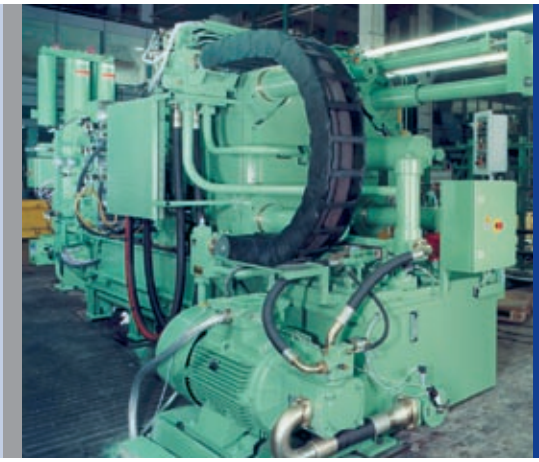
Features that count

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

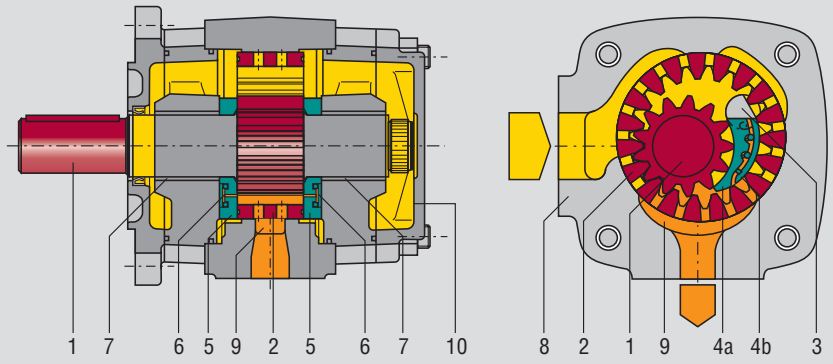
Rarely seen, but hard at work in countless machines, Voith Turbo H + L Hydraulic internal gear pumps reliably provide high pressures. Their main applications are machines in the plastics and sheet-metal processing sectors, presses as well as conveying and lifting equipment. These pumps are also in demand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

Contents



Die casting machine, pump with variable flow by speed control

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	
Design	Internal gear pump with radial and axial sealing gap compensation
Type	IPV
Mounting types	SAE hole flange; ISO 3019/1 or VDMA hole flange; ISO 3019/2
Line mounting	SAE suction and pressure flange J 518 C Code 61
Sense of rotation	Right or left-hand rotation
Mounting position	any
Shaft load	For details of radial and axial drive shaft loads please contact your Voith Turbo H + L Hydraulic representative
Input pressure	0.6…3 bar absolute pressure
Pressure fluid	HLP mineral oils DIN 51524, part 2 or 3
Viscosity range of the pressure fluid	10…100 mm^2s^{-1} (cSt)
Permissible start viscosity	max. 2000 mm^2s^{-1} (cSt)
Permissible temperature of the pressure fluid	-20…+80 °C
Required purity of the pressure fluid according to NAS 1638	Class 8
Filtration	Filtration quotient min. $\beta_{20} \geq 75$, recommended $\beta_{10} \geq 100$ (longer life)
Permissible ambient temperature	-10…+60 °C

Calculations	
Pump flow	$Q = V_{g\,th} \cdot n \cdot \eta_v \cdot 10^{-3}$ [l/min]
Power	$P = \frac{Q \cdot \Delta p}{600 \cdot \eta_g}$ [kW]
$V_{g\,th}$	Pump volume per revolution [cm^3]
n	Speed [min^{-1}]
η_v	Volumetric efficiency
η_g	Overall efficiency
Δp	Differential pressure [bar]

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^3]	[min^{-1}]	[min^{-1}]	[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^2s^{-1}
- An input pressure of 0.8…3.0 bar absolute

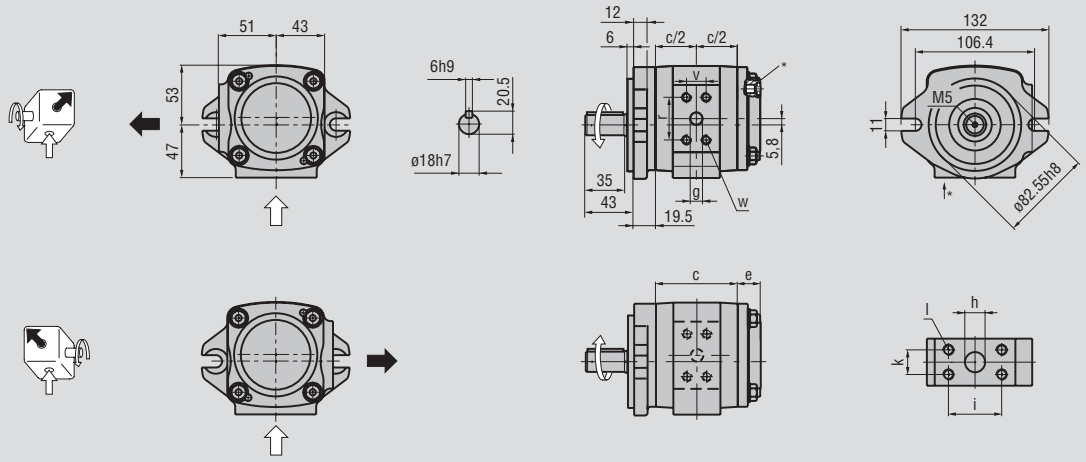
Notes:

- 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

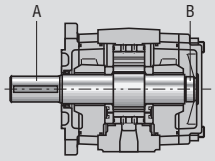
Standard Design

Design and dimensions



* Ensure the M10x1plug 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.

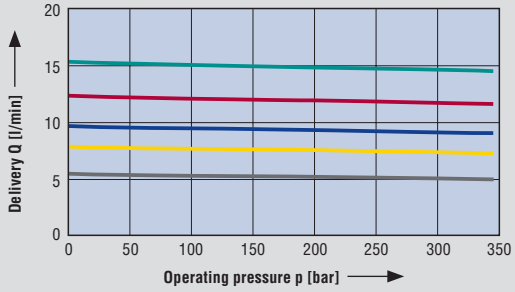
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	⬆	⬇
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPV 3 – 3.5	66	20.5	9	14	38.1	15.5	M8x13	38.1	17.5	M8x13	4.0	10	10
IPV 3 – 5	70	20.5	11	14	38.1	17.5	M8x13	38.1	17.5	M8x13	4.2	10	10
IPV 3 – 6.3	73	20.5	11	19	47.5	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



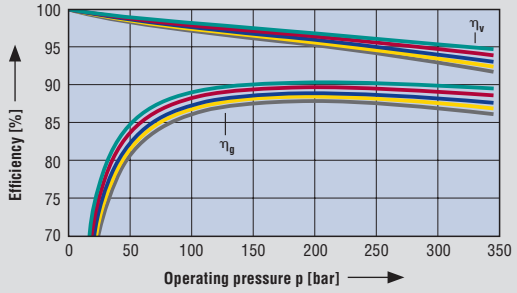
Allowed input torques:

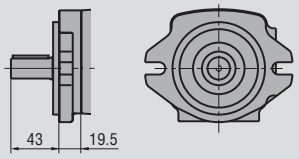
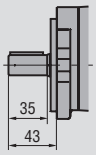
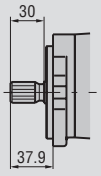
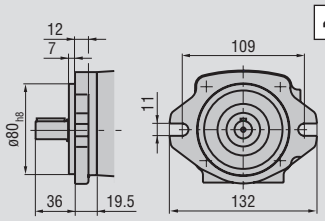
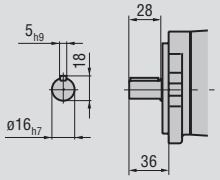
Input shaft A: 160 Nm
Secondary shaft B: 80 Nm

Delivery Q



Efficiency η_v and η_g

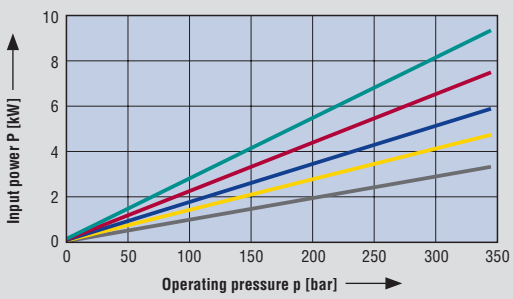


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
		Standard		
IPV 3	3.5	Clockwise rotation, radial suction port **1** 	SAE 2-hole flange, dimensions on left **0** 	Parallel shaft with keyway connection, dimensions on left **1** 
	5			
		Variants		
	6.3	Anti-clockwise rotation, radial suction port **6** 		Involute gearing with SAE 2-hole flange **0** ANSI B92.1a 11T 16/32 DP 30° 
	8			
	10		VDMA 2-hole flange **4** 	**1** 

☐ Designation according to type code

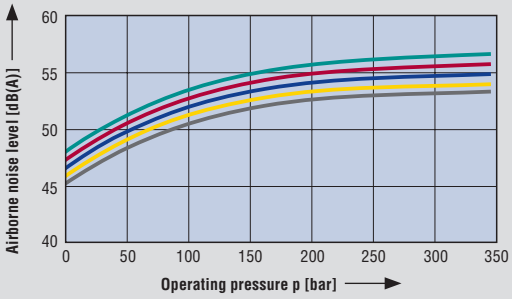
Type code/order designation, see page 17

Input power P



Airborne noise level

Measuring location 1 m axial



Measurement conditions

Speed: 1.500 rpm
Viscosity of pressure fluid: 46 mm^2s^{-1}
Operating temperature: 40 °C

Characteristic curves:

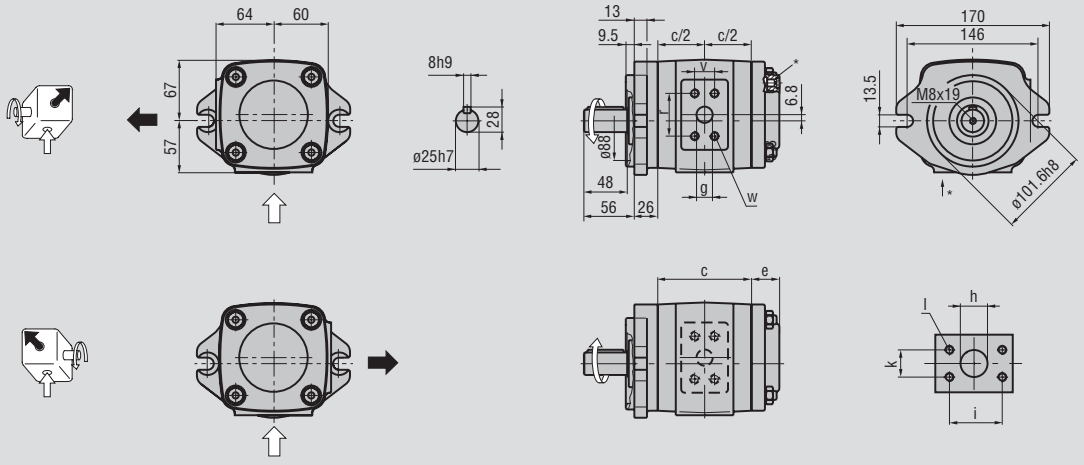
- IPV 3 – 3.5
- IPV 3 – 5
- IPV 3 – 6.3
- IPV 3 – 8
- IPV 3 – 10

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

IPV 4

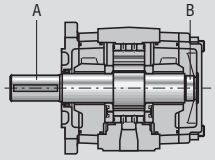
Standard Design

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.

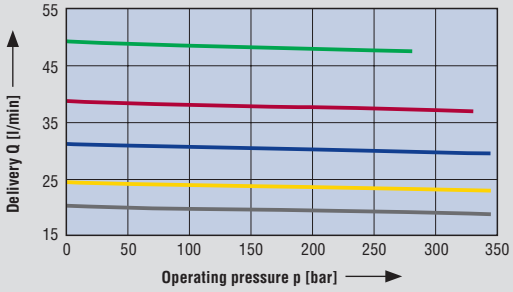
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	⬆	⬇
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPV 4 – 13	88.5	31	13	23	52.4	26.2	M10x15	38.1	17.5	M8x13	8.6	10	12
IPV 4 – 16	92.5	31	14	25	52.4	26.3	M10x15	38.1	17.5	M8x13	9.0	10	12
IPV 4 – 20	98	31	18	27	58.7	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



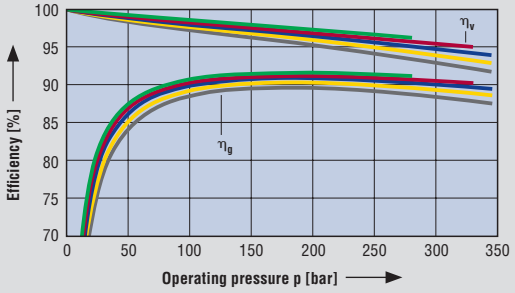
Allowed input torques:

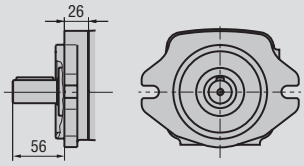
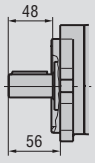
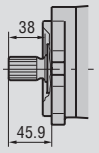
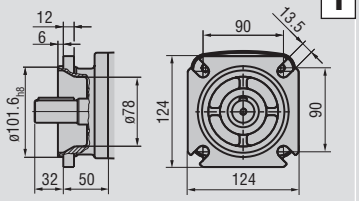
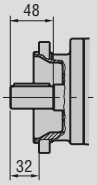
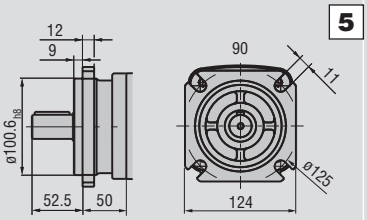
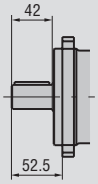
Input shaft A: 335 Nm
Secondary shaft B: 190 Nm

Delivery Q



Efficiency η_v and η_g

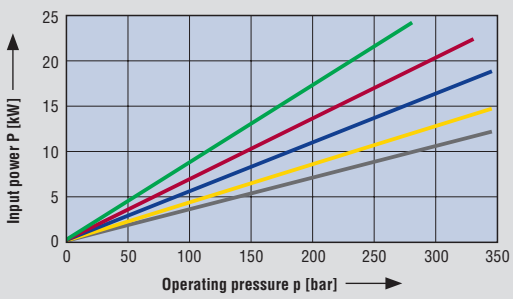


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
		Standard		
IPV 4	13	Clockwise rotation, radial suction port **1** 	SAE 2-hole flange, dimensions on left **7** 	Parallel shaft with keyway connection, dimensions on left **1** 
	16			
		Variants		
	20	Anti-clockwise rotation, radial suction port **6** 		Involute gearing with SAE 2-hole flange **0** ANSI B92.1a 15T 16/32 DP 30° 
	25			
	32		SAE 4-hole flange **1** 	**1** 
			VDMA 4-hole flange **5** 	**1** 

☐ Designation according to type code

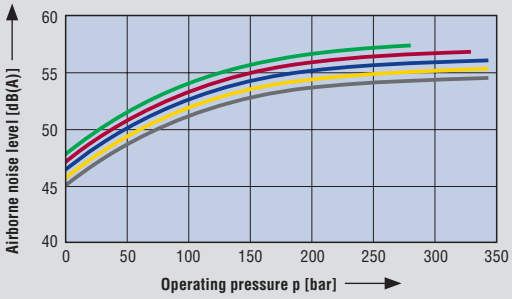
Type code/order designation, see page 17

Input power P



Airborne noise level

Measuring location 1 m axial



Measurement conditions

Speed: 1.500 rpm
Viscosity of pressure fluid: 46 mm^2s^{-1}
Operating temperature: 40 °C

Characteristic curves:

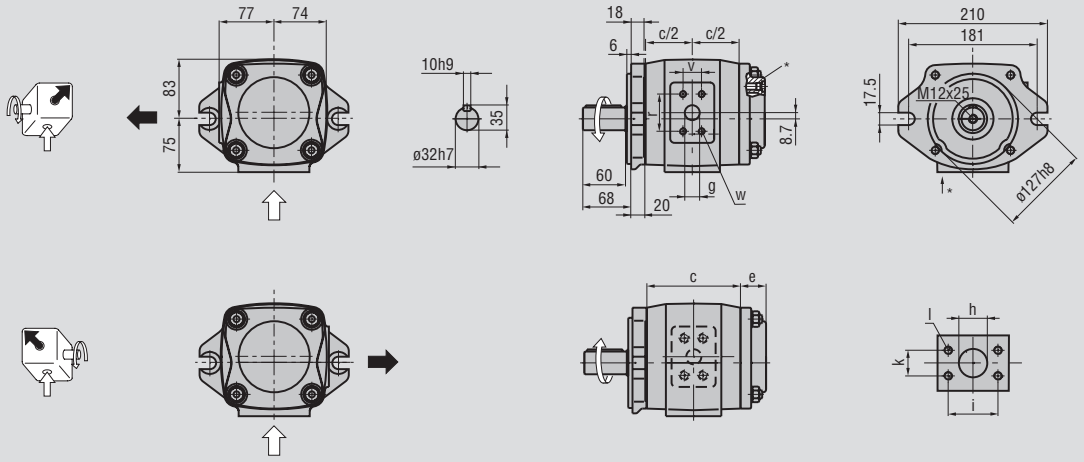
- IPV 4 – 13
- IPV 4 – 16
- IPV 4 – 20
- IPV 4 – 25
- IPV 4 – 32

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

IPV 5

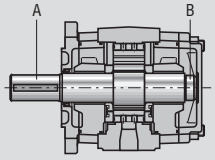
Standard Design

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]		
IPV 5 – 32	**119**	36	18	32	58.7	30.2	M10x15	47.5	22	M10x15	15.5	11	13
IPV 5 – 40	**125**	36	19	35	70	36	M12x20	52.4	26.2	M10x15	16.3	12	30
IPV 5 – 50	**132**	36	21	40	70	36	M12x20	52.4	26.2	M10x15	17.4	12	30
IPV 5 – 64	**163**	36	23	40	70	36	M12x20	52.4	26.2	M10x16	18.7	12	30

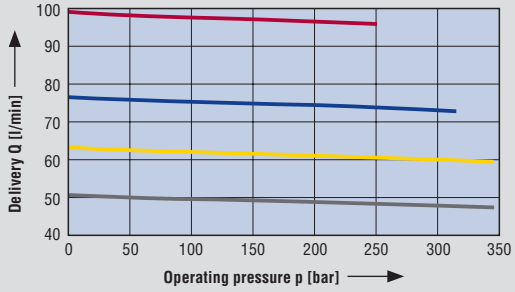


Allowed input torques:

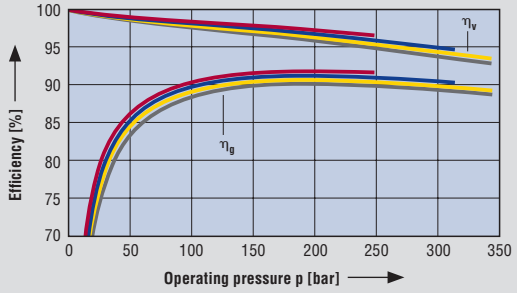
Input shaft A: 605 Nm

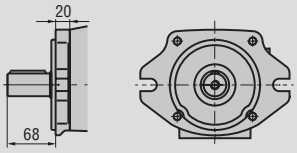
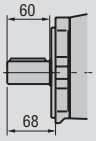
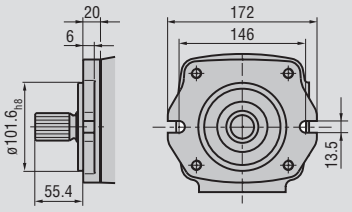
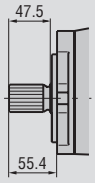
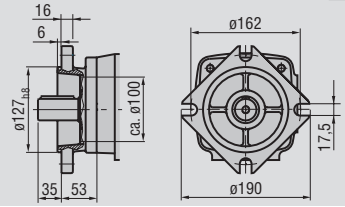
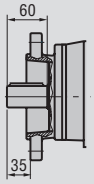
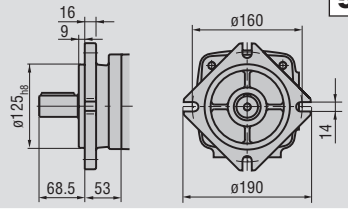
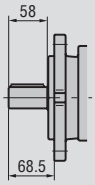
Secondary shaft B: 400 Nm

Delivery Q



Efficiency η_v and η_g

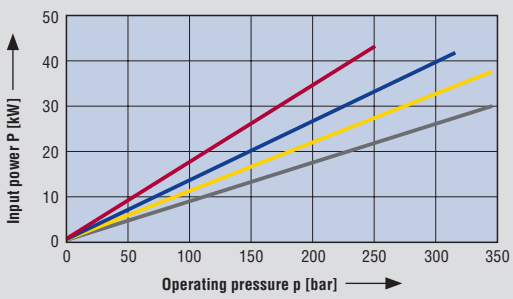


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
		Standard		
IPV 5	32	Clockwise rotation, radial suction port **1** 	SAE 2-hole flange, dimensions on left **0** 	Parallel shaft with keyway connection, dimensions on left **1** 
	40			
		Variants		
	50	Anti-clockwise rotation, radial suction port **6** 	SAE 2-hole flange, variant **7** 	Involute gearing **0** ANSI B92.1a 14T 12/24 DP 30° 
	64		SAE 4-hole flange **1** 	**1** 
			VDMA 4-hole flange **5** 	**1** 

☐ Designation according to type code

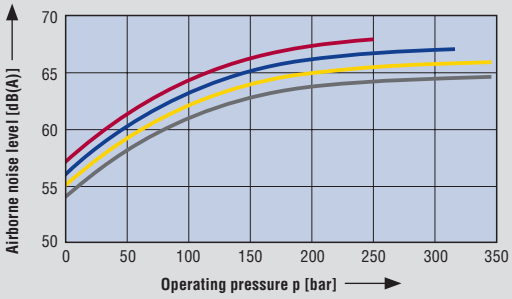
Type code/order designation, see page 17

Input power P



Airborne noise level

Measuring location 1 m axial



Measurement conditions

Speed: 1.500 rpm
Viscosity of pressure fluid: 46 mm^2s^{-1}
Operating temperature: 40 °C

Characteristic curves:

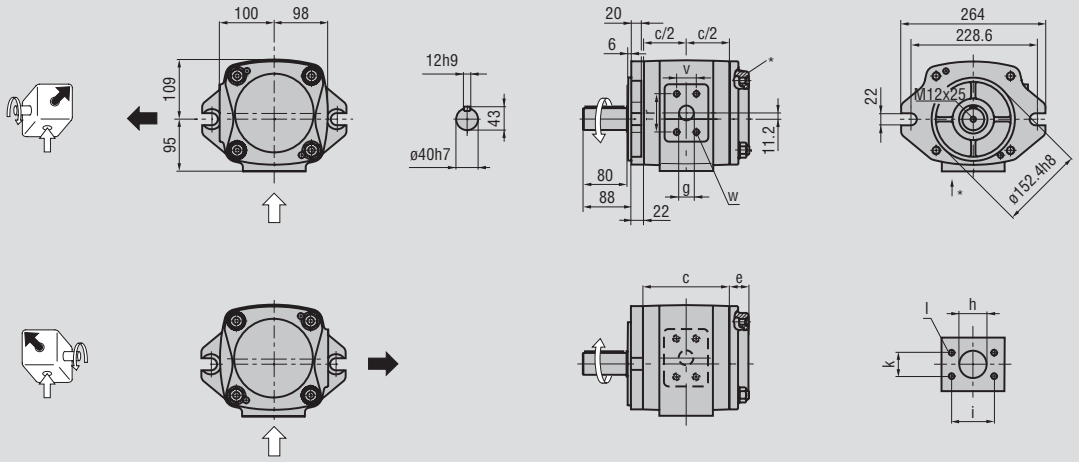
- IPV 5 – 32
- IPV 5 – 40
- IPV 5 – 50
- IPV 5 – 64

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

IPV 6

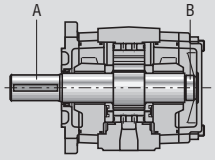
Standard Design

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.

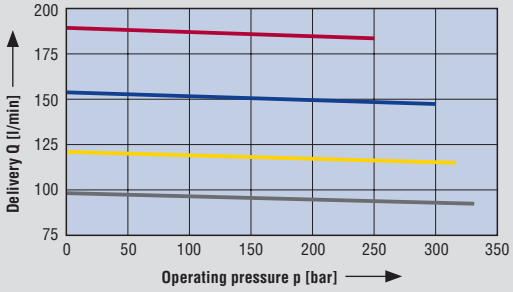
Design	Dimensions											SAE flange no.	
	c	e	g	h	i	k	l	r	v	w	Weight	▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPV 6 – 64	140	40	23	40	70	36	M12x20	52.4	26.2	M10x15	29.2	12	30
IPV 6 – 80	148	35	23	45	77.8	42.9	M12x20	70	36	M12x20	30.7	14	15
IPV 6 – 100	158	35	27	50	77.8	42.9	M12x20	70	36	M12x20	32.6	14	15
IPV 6 – 125	170	40	30	50	77.8	42.9	M12x20	70	36	M10x16	35.0	14	15



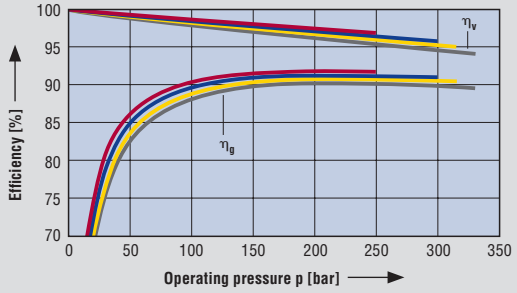
Allowed input torques:

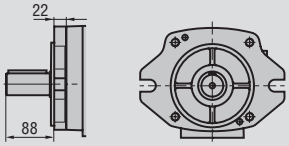
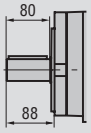
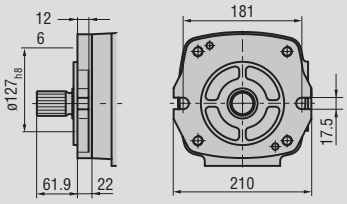
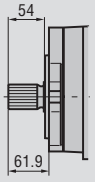
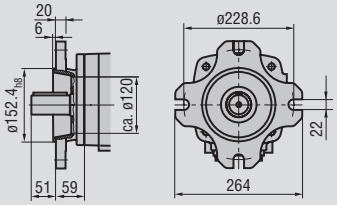
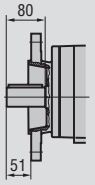
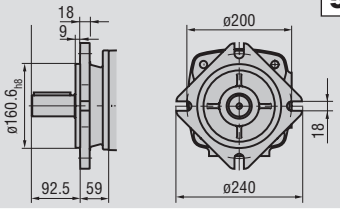
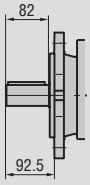
Input shaft A: 1,050 Nm
Secondary shaft B: 780 Nm

Delivery Q



Efficiency η_v and η_g

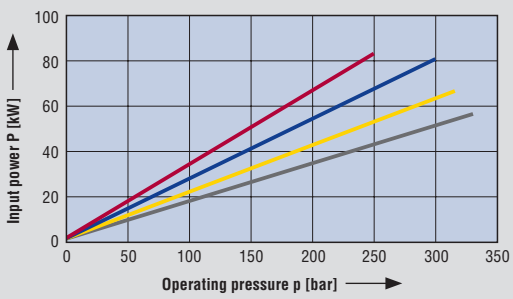


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
		Standard		
IPV 6	64	Clockwise rotation, radial suction port **1** 	SAE 2-hole flange, dimensions on left **0** 	Parallel shaft with keyway connection, dimensions on left **1** 
	80			
		Variants		
	100	Anti-clockwise rotation, radial suction port **6** 	SAE 2-hole flange, variant **7** 	Involute gearing **0** ANSI B92.1a 17T 16/32 DP 30° 
	125		SAE 4-hole flange **1** 	**1** 
			VDMA 4-hole flange **5** 	**1** 

☐ Designation according to type code

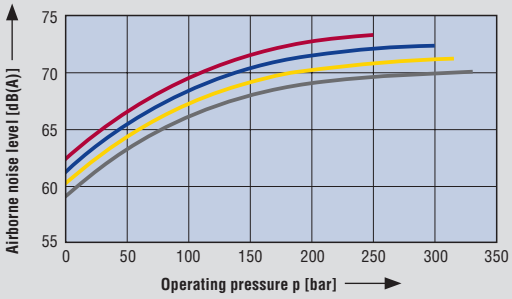
Type code/order designation, see page 17

Input power P



Airborne noise level

Measuring location 1 m axial



Measurement conditions

Speed: 1.500 rpm
Viscosity of pressure fluid: 46 mm^2s^{-1}
Operating temperature: 40 °C

Characteristic curves:

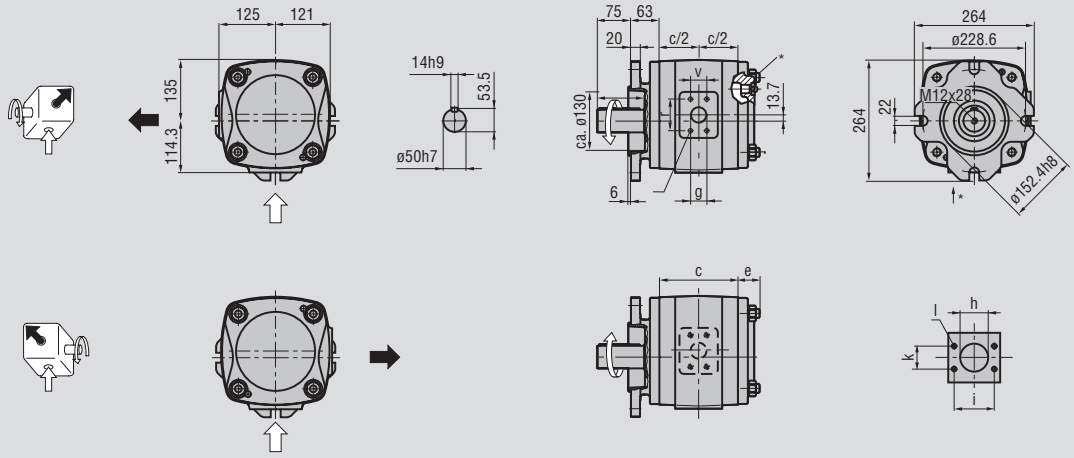
- IPV 6 – 64
- IPV 6 – 80
- IPV 6 – 100
- IPV 6 – 125

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

IPV 7

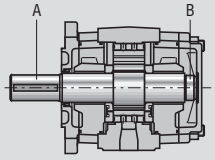
Standard Design

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]		
IPV 7 – 125	152	48	30	50	77.8	42.9	M12x20	70	36	M12x20	46.5	14	15
IPV 7 – 160	162	48	30	56	89	50.8	M12x20	70	36	M12x20	50	14	16
IPV 7 – 200	174	46	34	62	89	50.8	M12x20	70	36	M12x20	54	14	16
IPV 7 – 250	188	42	38	72	106.3	62	M16x25	70	36	M12x20	59	14	17

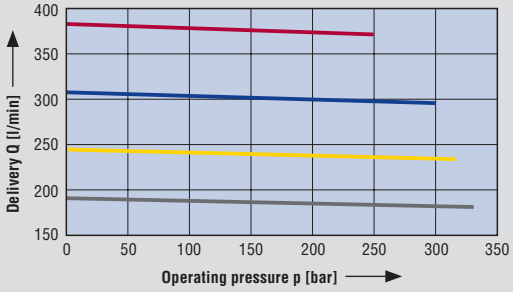


Allowed input torques:

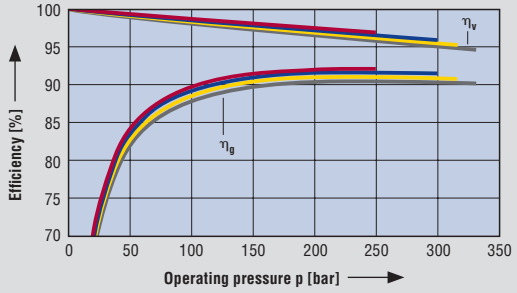
Input shaft A: 1,960 Nm

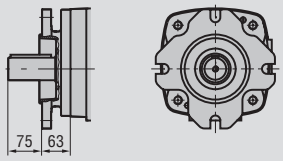
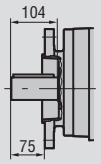
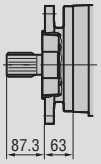
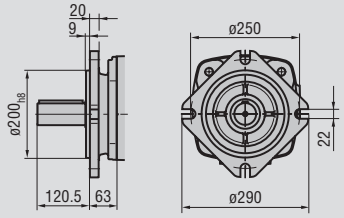
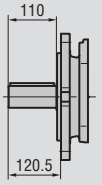
Secondary shaft B: 1,200 Nm

Delivery Q



Efficiency η_v and η_g

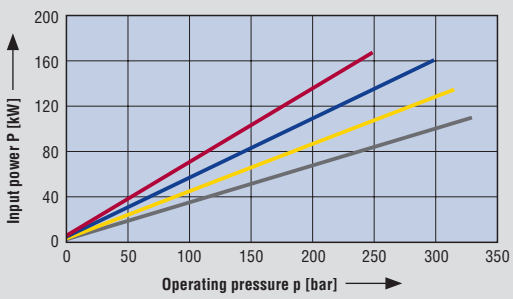


Type	Pump sizes	Rotation, suction connection	Mounting flange	Shaft end
		Standard		
IPV 7	125	Clockwise rotation, radial suction port **1** 	SAE 4-hole flange, dimensions on left **1** 	Parallel shaft with keyway connection, dimensions on left **1** 
	160			
		Variants		
	200	Anti-clockwise rotation, radial suction port **6** 		Involute gearing with SAE 4-hole flange **0** ANSI B92.1a 15T 8/16 DP 30° 
	250		VDMA 4-hole flange **5** 	**1** 

☐ Designation according to type code

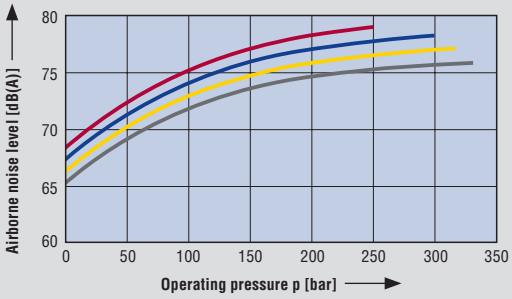
Type code/order designation, see page 17

Input power P



Airborne noise level

Measuring location 1 m axial



Measurement conditions

Speed: 1.500 rpm
Viscosity of pressure fluid: 46 mm^2s^{-1}
Operating temperature: 40 °C

Characteristic curves:

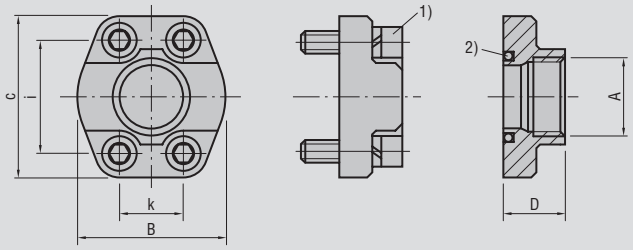
- IPV 7 – 125
- IPV 7 – 160
- IPV 7 – 200
- IPV 7 – 250

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[1)]	i	k	S[2)]	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[3)]	G 1-1/2	82	98	50	47.22 – 3.53	70	36	M 12	345[3)]
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

Type Code

Order Designation

IPV	3 –	3.5	1	0	0	Example: IPV – 3.5 100

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

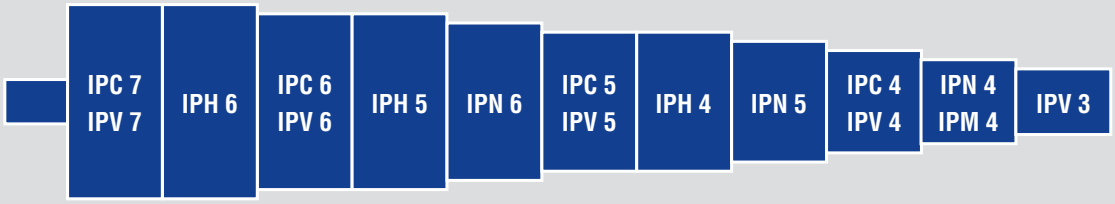
Frame size	delivery				
3	3.5	5	6.3	8	10
4	13	16	20	25	32
5	32	40	50	64	
6	64	80	100	125	
7	125	160	200	250	

Frame size
3 4 5 6 7

Type of internal gear pump
IPV

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.

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).

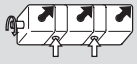
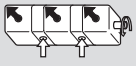
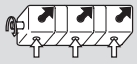
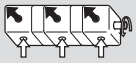
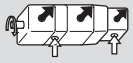
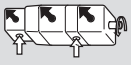
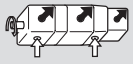
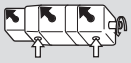
Selection

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.

Designs

Rotation and suction

clockwise anti-clockwise

	2	7	
	1	6	
	2	7	
	1	6	
	3	8	
	3	8	
Special design	4	9	Special design

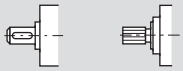
Mounting flange

0	1	1
4	5	5
7		

For designs and dimensions, see catalog of the relevant pump series.

- **0** SAE 2-hole-flange
- **1** SAE 4-hole-flange
- **4** VDMA 2-hole-flange
- **5** VDMA 4-hole-flange
- **7** SAE 2-hole-flange

Shaft end



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For designs and dimensions, see catalog of the relevant pump series.

Voith Turbo H + L Hydraulic GmbH & Co. KG
Schuckertstr. 15
71277 Rutesheim, Germany
Tel. +49 7152 992-3
Fax +49 7152 992-400
sales-rut@voith.com
www.voithturbo.com/hydraulic-systems

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