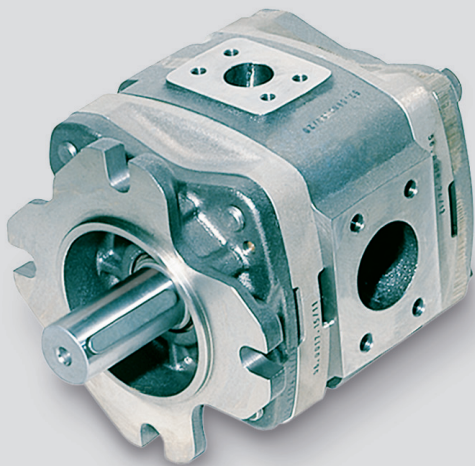
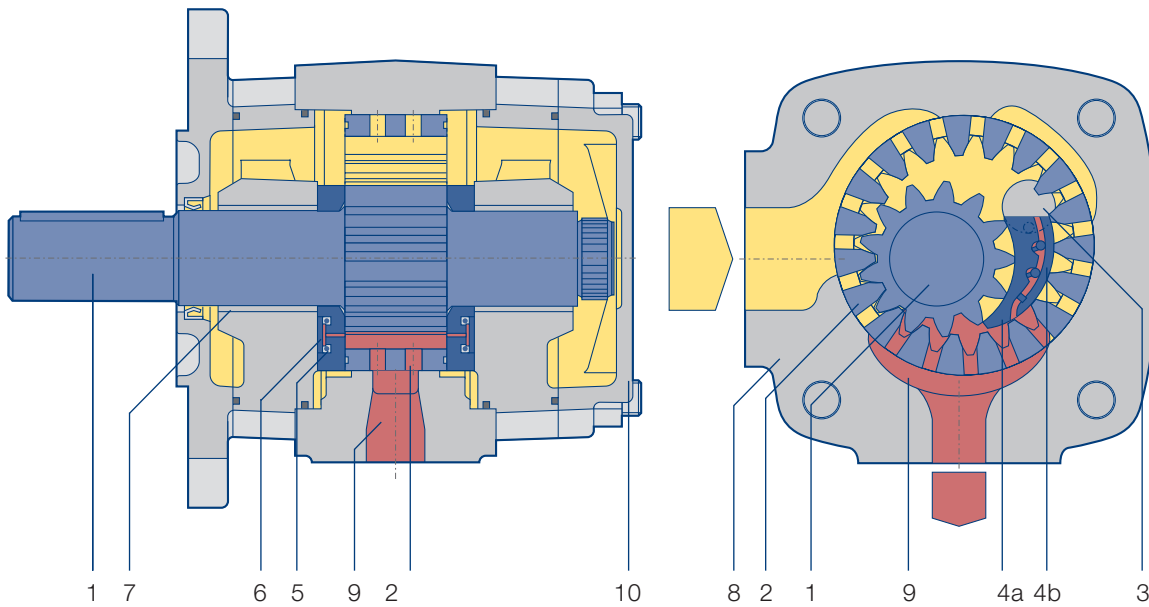


IPV High-pressure Internal Gear Pumps Technical Data Sheet



Function



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

- Suction chamber
- Pressure chamber

By rotation of the gears inside the pump, the pressure fluid (usually hydraulic oil) is drawn into the cavity between the pinion and internal gear. Optimized cross-sectional areas on suction side as well as on pressure side allow operation over a wide range of speed.

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.

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	0.8 ... 3 bar absolute pressure (at start short time 0.6 bar)
Pressure fluid	HLP mineral oils DIN 51524, part 2 or 3
Viscosity range	10 ... 300 mm ² s ⁻¹ (cSt)
Permissible start viscosity	max. 2000 mm ² s ⁻¹ (cSt)
Permissible temperature of the pressure fluid	-20 ... +80 °C
Required purity of the pressure fluid	class 19 / 17 / 14 (ISO 4406), class 8 (NAS 1638)
Filtration	Filtration quotient min. $\beta_{20} \geq 75$, recommended $\beta_{10} \geq 100$ (longer life)
Permissible ambient temperature	-20 ... +60 °C

Calculation

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	Displacment per revolution [cm ³]	Speed		Delivery		Pressures		
		min.	max.	at 1500 min ⁻¹	Continuous	Peak at 1500 min ⁻¹	Peak at n _{max}	Inertia
		[min ⁻¹]	[min ⁻¹]	[l/min]	[bar]	[bar]	[bar]	[kg cm ²]
IPV 3 – 3.5	3.6	400	3600	5.4	330	345	345	0.34
IPV 3 – 5	5.2	400	3600	7.8	330	345	345	0.42
IPV 3 – 6.3	6.4	400	3600	9.6	330	345	345	0.49
IPV 3 – 8	8.2	400	3600	12.3	330	345	345	0.58
IPV 3 – 10	10.2	400	3600	15.3	330	345	345	0.70
IPV 4 – 13	13.3	400	3600	19.9	330	345	345	2.25
IPV 4 – 16	15.8	400	3400	23.7	330	345	345	2.64
IPV 4 – 20	20.7	400	3200	31.0	330	345	345	3.29
IPV 4 – 25	25.4	400	3000	38.1	300	330	330	3.70
IPV 4 – 32	32.6	400	2800	48.9	250	280	280	4.44
IPV 5 – 32	33.1	400	3000	49.6	315	345	315	8.62
IPV 5 – 40	41.0	400	2800	61.5	315	345	315	10.20
IPV 5 – 50	50.3	400	2500	75.4	280	315	280	11.60
IPV 5 – 64	64.9	400	2200	97.3	230	250	250	14.40
IPV 6 – 64	64.1	400	2600	96.1	300	330	300	25.73
IPV 6 – 80	80.7	400	2400	121.0	280	315	280	30.90
IPV 6 – 100	101.3	400	2100	151.9	250	300	270	36.10
IPV 6 – 125	126.2	400	1800	189.3	210	250	250	43.70
IPV 7 – 125	125.8	400	2200	188.7	300	330	300	84.05
IPV 7 – 160	160.8	400	2000	241.2	280	315	280	102.60
IPV 7 – 200	202.7	400	1800	304.0	250	300	270	119.00
IPV 7 – 250	251.7	400	1800	377.5	210	250	250	144.50

The values given apply for:

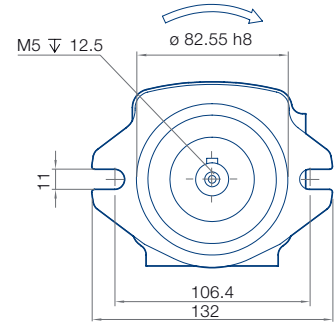
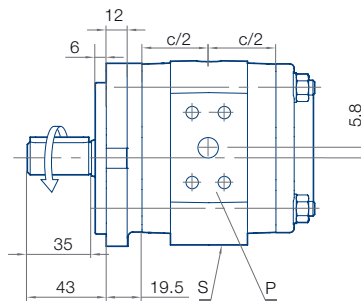
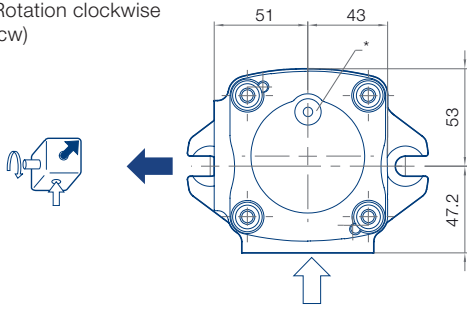
- Pumping of mineral oils with a viscosity of 20... 40 mm² s⁻¹
- An input pressure of 0.8...3.0 bar absolute

Notes:

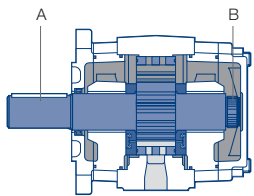
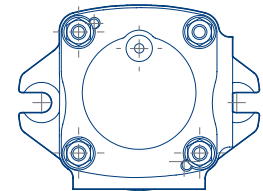
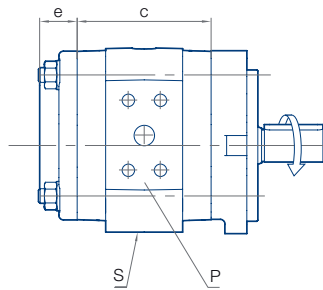
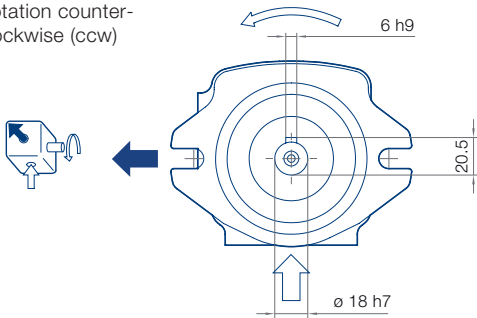
- Peak pressures apply for 15% of operating time with a maximum cycle time of 1 minute
- Please inquire about peak pressures at non-standard speeds
- Due to production tolerances, the pump volume may be reduced by up to 1.5%.

IPV 3, Rotation and Dimensions (mounting flange [0], shaft end [1])

Rotation clockwise
(cw)

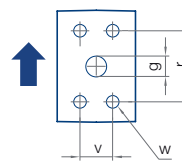


Rotation counter-clockwise
(ccw)

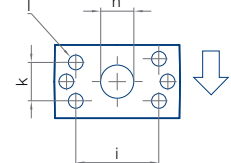


Allowed input torques:
Input shaft A: 160 Nm
Secondary shaft B: 80 Nm

Pressure port (P)



Suction port (S)



Type/ Delivery	Dimensions and Weight										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	17.5	M8x13	38.1	17.5	M8x13	4.2	10	10
IPV 3 – 5	70	20.5	11	14	38.1	17.5	M8x13	38.1	17.5	M8x13	4.4	10	10
IPV 3 – 6.3	73	20.5	11	19	47.6	22.3	M10x15	38.1	17.5	M8x13	4.6	10	11
IPV 3 – 8	77.5	20.5	13	19	47.6	22.3	M10x15	38.1	17.5	M8x13	4.8	10	11
IPV 3 – 10	82.5	20.5	13	21	52.4	26.2	M10x15	38.1	17.5	M8x13	5.0	10	12

* 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.

IPV 3, Design and Dimensions

Rotation, Suction port

Mounting flange

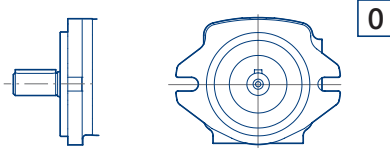
Shaft end

Standard

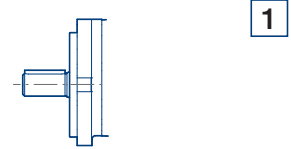
Rotation clockwise,
Suction port pump



SAE 2-hole flange

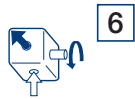


Keyway connection

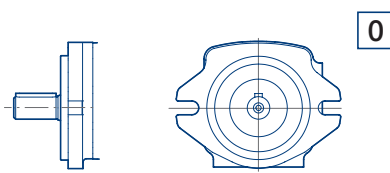


Variants

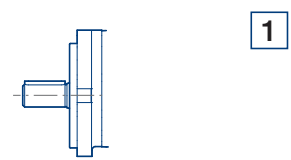
Rotation counterclockwise,
Suction port pump



SAE 2-hole flange



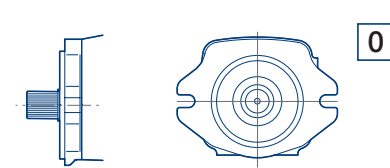
Keyway connection



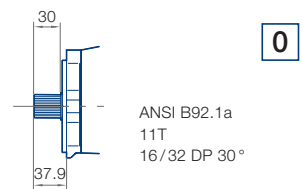
Rotation clockwise*,
Suction port pump



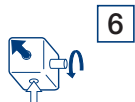
SAE 2-hole flange



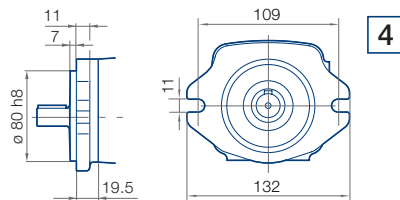
Involute gearing



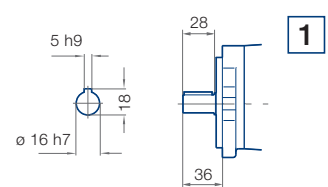
Rotation counterclockwise*,
Suction port pump



VDMA-2-hole flange



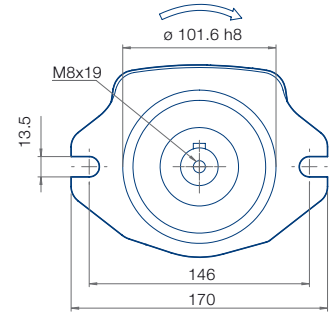
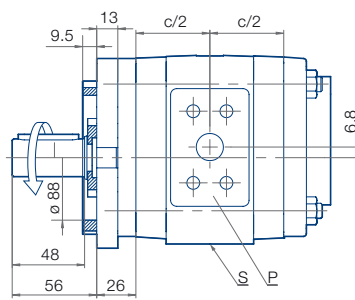
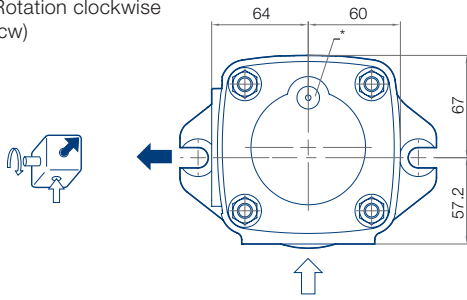
Keyway connection



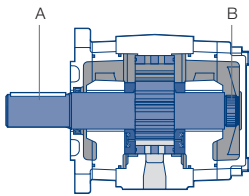
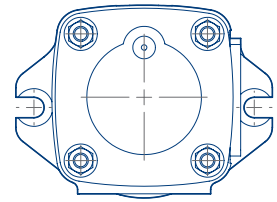
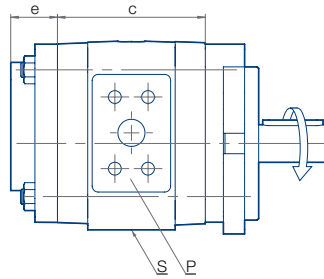
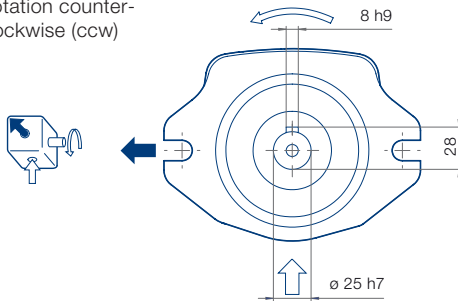
* Direction of rotation free selectable in the illustrated mounting flange / shaft end combination.

IPV 4, Rotation and Dimensions (mounting flange [7], shaft end [1])

Rotation clockwise (cw)

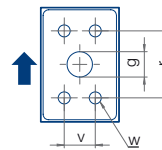


Rotation counter-clockwise (ccw)

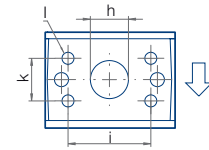


Allowed input torques:
 Input shaft A: 335 Nm
 Secondary shaft B: 190 Nm

Pressure port (P)



Suction port (S)



Type/ Delivery	Dimensions and Weight											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	9.4	10	12
IPV 4 – 16	92.5	31	14	25	52.4	26.2	M10x15	38.1	17.5	M8x13	9.7	10	12
IPV 4 – 20	98	31	18	27	58.7	30.2	M10x15	47.6	22.3	M10x15	10.2	11	13
IPV 4 – 25	104	31	18	30	58.7	30.2	M10x15	47.6	22.3	M10x15	10.7	11	13
IPV 4 – 32	113	31	18	32	58.7	30.2	M10x15	47.6	22.3	M10x15	11.7	11	13

* 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.

IPV 4, Design and Dimensions

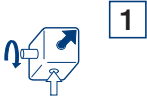
Rotation, Suction port

Mounting flange

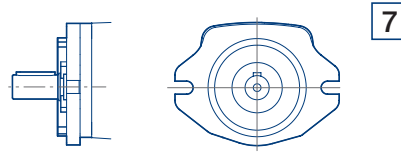
Shaft end

Standard

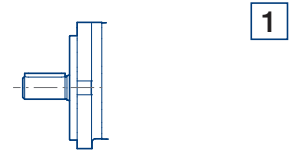
Rotation clockwise,
Suction port pump



SAE 2-hole flange

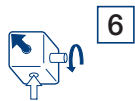


Keyway connection

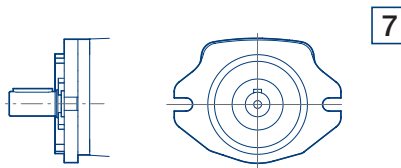


Variant

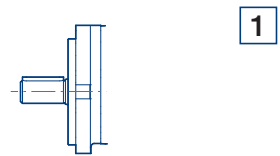
Rotation counterclockwise,
Suction port pump



SAE 2-hole flange



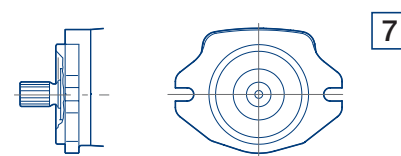
Keyway connection



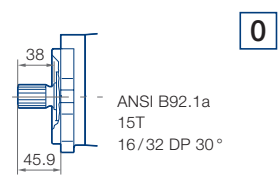
Rotation clockwise*,
Suction port pump



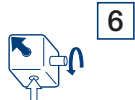
SAE 2-hole flange



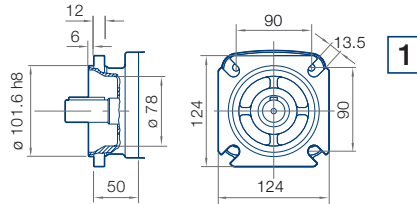
Involute gearing



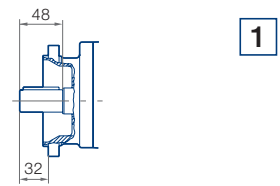
Rotation counterclockwise*,
Suction port pump



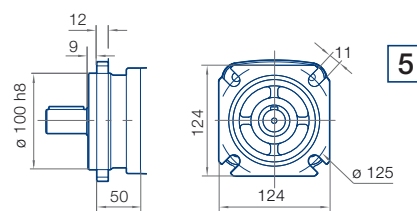
SAE-4-hole flange



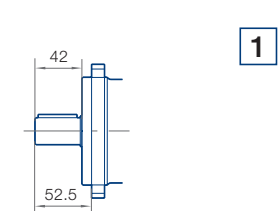
Keyway connection



VDMA-4-hole flange



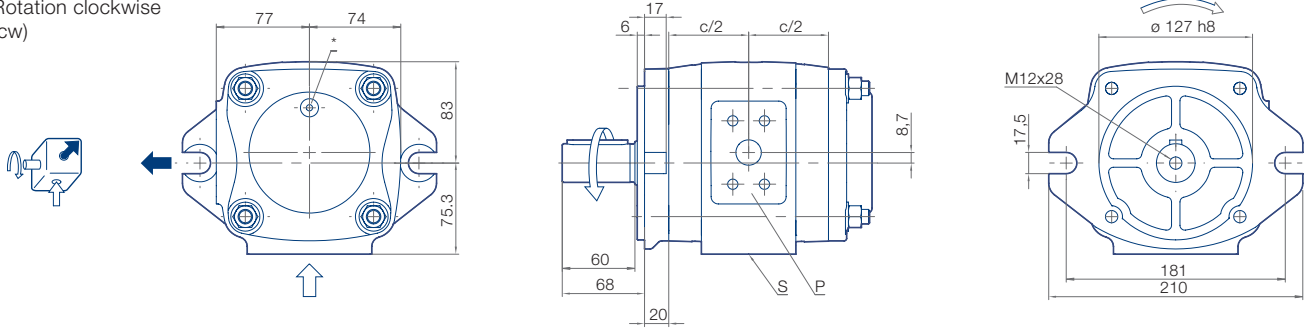
Keyway connection



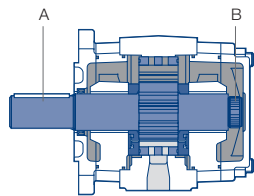
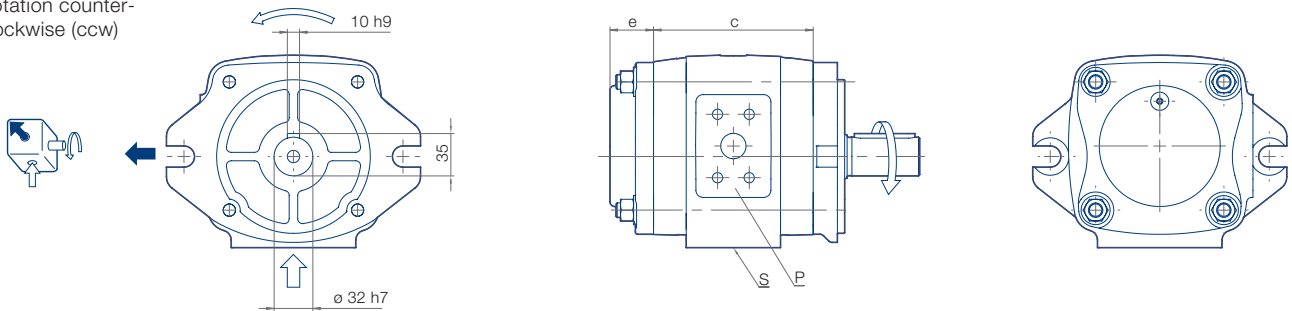
* Direction of rotation free selectable in the illustrated mounting flange / shaft end combination.

IPV 5, Rotation and Dimensions (mounting flange [0], shaft end [1])

Rotation clockwise
(cw)



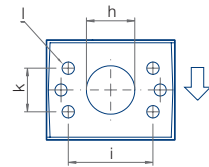
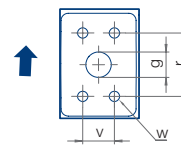
Rotation counter-clockwise
(ccw)



Allowed input torques:
Input shaft A: 605 Nm
Secondary shaft B: 400 Nm

Pressure port (P)

Suction port (S)



Type/ Delivery	Dimensions and Weight										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	47.6	22.3	M10x15	15.6	11	13
IPV 5 – 40	125	36	19	35	69.9	36	M12x20	52.4	26.2	M10x15	16.7	12	30
IPV 5 – 50	132	36	21	40	69.9	36	M12x20	52.4	26.2	M10x15	17.3	12	30
IPV 5 – 64	143	36	23	40	69.9	36	M12x20	52.4	26.2	M10x15	19.1	12	30

* 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.

Note! In case of oil-immersed installation of the oil pump flange variant 0 can not be used. For this special case, the flange version 7 will be used.

IPV 5, Design and Dimensions

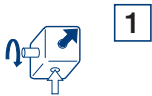
Rotation, Suction port

Mounting flange

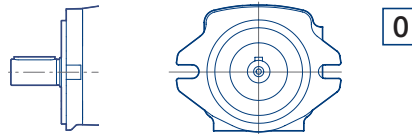
Shaft end

Standard

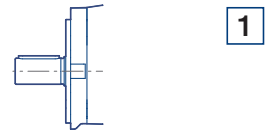
Rotation clockwise, Suction port pump



SAE 2-hole flange

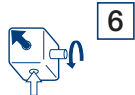


Keyway connection

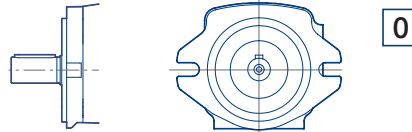


Variant

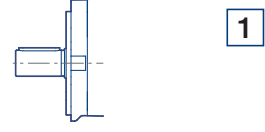
Rotation counterclockwise, Suction port pump



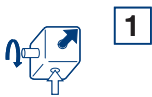
SAE 2-hole flange



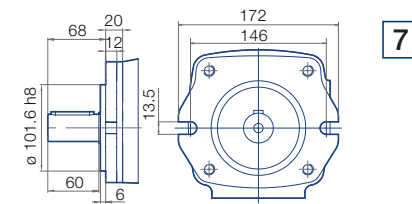
Keyway connection



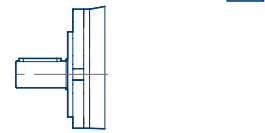
Rotation clockwise*, Suction port pump



SAE 2-hole flange



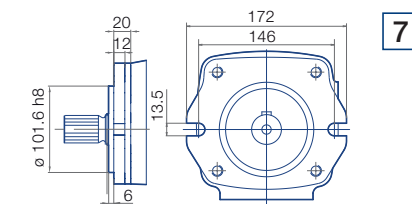
Keyway connection



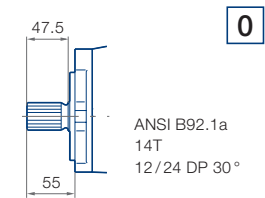
Rotation counterclockwise*, Suction port pump



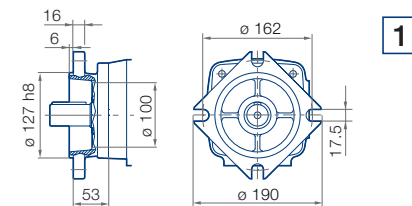
SAE 2-hole flange



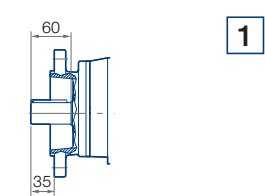
Involute gearing



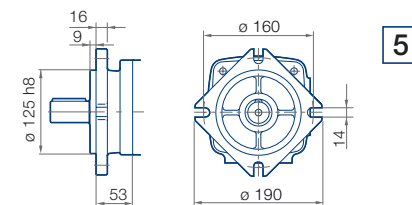
SAE-4-hole flange



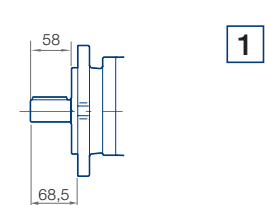
Keyway connection



VDMA-4-hole flange



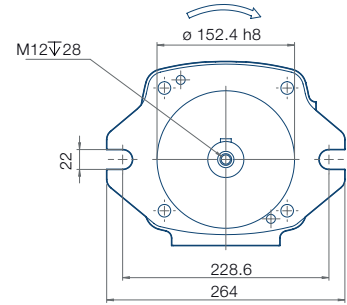
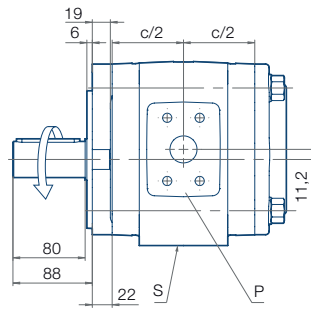
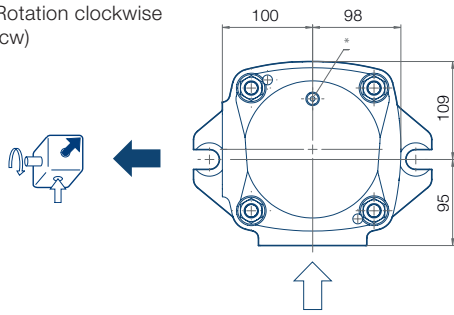
Keyway connection



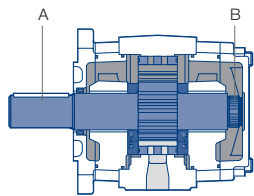
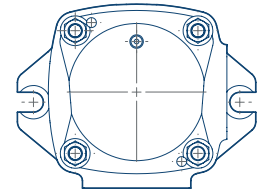
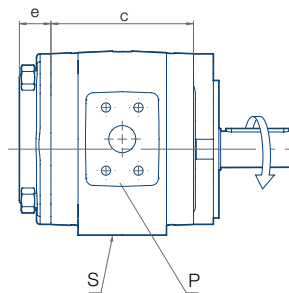
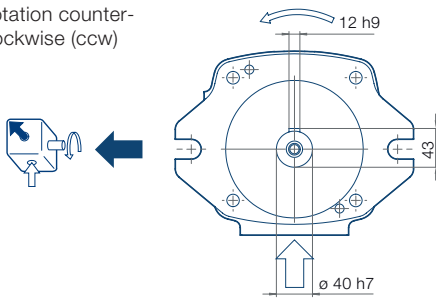
* Direction of rotation free selectable in the illustrated mounting flange / shaft end combination.

IPV 6, Rotation and Dimensions (mounting flange [0], shaft end [1])

Rotation clockwise (cw)

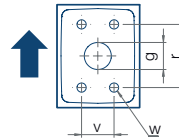


Rotation counter-clockwise (ccw)

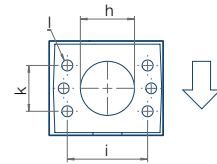


Allowed input torques:
 Input shaft A: 1050 Nm
 Secondary shaft B: 780 Nm

Pressure port (P)



Suction port (S)



Type/ Delivery	Dimensions and Weight										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	69.9	35.7	M12x20	52.4	26.2	M10x15	30.0	12	30
IPV 6 – 80	148	35	23	45	77.8	42.9	M12x20	69.9	35.7	M12x20	31.7	14	15
IPV 6 – 100	158	35	27	50	77.8	42.9	M12x20	69.9	35.7	M12x20	33.0	14	15
IPV 6 – 125	170	40	30	50	77.8	42.9	M12x20	69.9	35.7	M12x20	36.0	14	15

* 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 and Dimensions

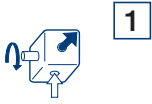
Rotation, Suction port

Mounting flange

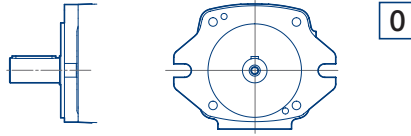
Shaft end

Standard

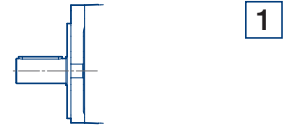
Rotation clockwise, Suction port pump



SAE 2-hole flange

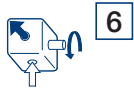


Keyway connection

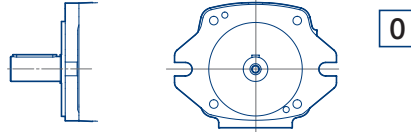


Variant

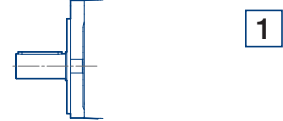
Rotation counterclockwise, Suction port pump



SAE 2-hole flange



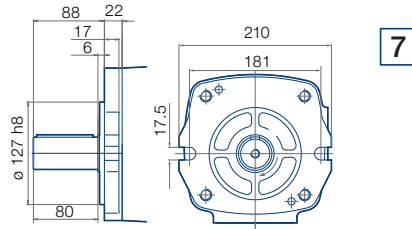
Keyway connection



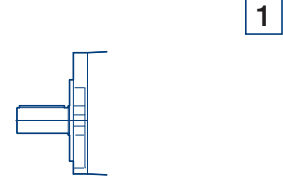
Rotation clockwise*, Suction port pump



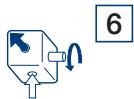
SAE 2-hole flange



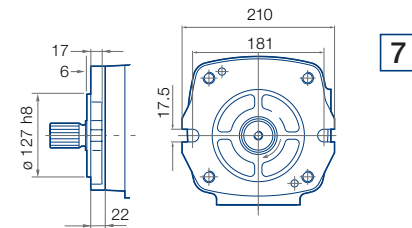
Keyway connection



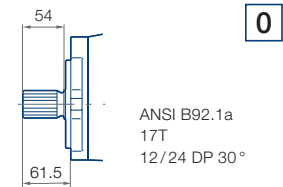
Rotation counterclockwise*, Suction port pump



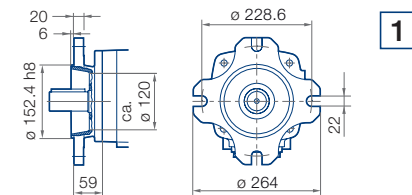
SAE 2-hole flange



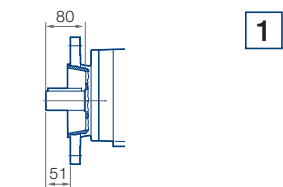
Involute gearing



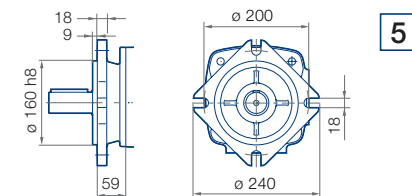
SAE-4-hole flange



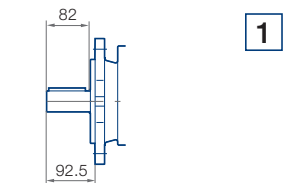
Keyway connection



VDMA-4-hole flange



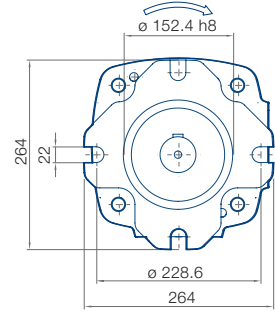
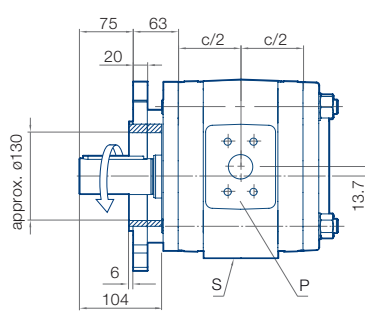
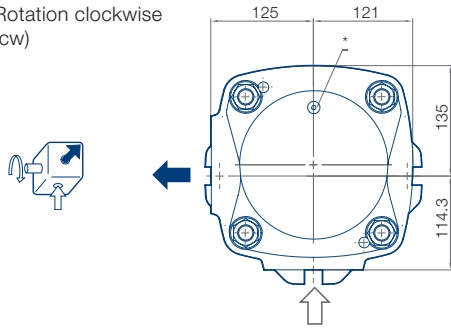
Keyway connection



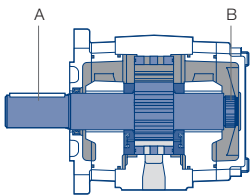
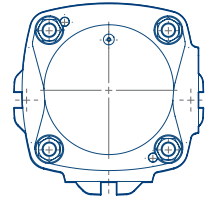
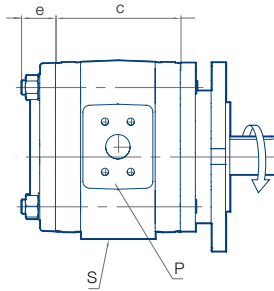
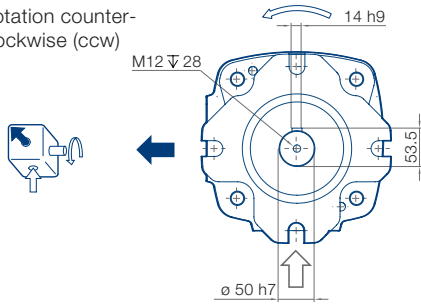
* Direction of rotation free selectable in the illustrated mounting flange / shaft end combination.

IPV 7, Rotation and Dimensions (mounting flange [1], shaft end [1])

Rotation clockwise (cw)

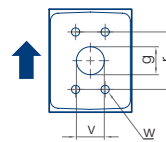


Rotation counter-clockwise (ccw)

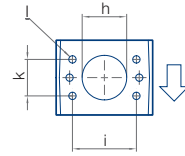


Allowed input torques:
 Input shaft A: 1960 Nm
 Secondary shaft B: 1200 Nm

Pressure port (P)



Suction port (S)



Type / Delivery	Dimensions and Weight										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	69.9	35.7	M12x20	46.5	14	15
IPV 7 – 160	162	48	30	56	88.9	50.8	M12x20	69.9	35.7	M12x20	50	14	16
IPV 7 – 200	174	46	34	62	88.9	50.8	M12x20	69.9	35.7	M12x20	54	14	16
IPV 7 – 250	188	42	38	72	106.4	61.9	M16x25	69.9	35.7	M12x20	59	14	17

* 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 and Dimensions

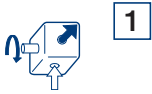
Rotation, Suction port

Mounting flange

Shaft end

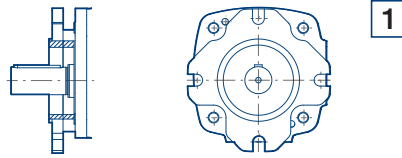
Standard

Rotation clockwise,
Suction port pump



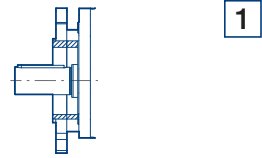
1

SAE-4-hole flange



1

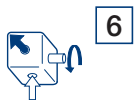
Keyway connection



1

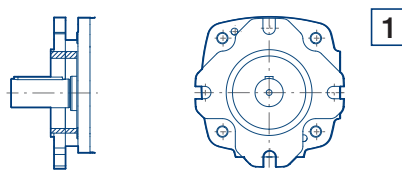
Variant

Rotation counterclockwise,
Suction port pump



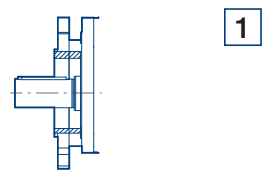
6

SAE-4-hole flange



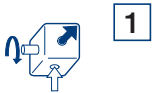
1

Keyway connection



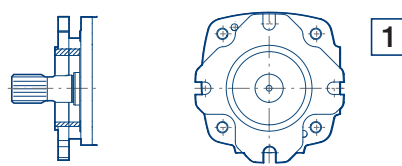
1

Rotation clockwise*,
Suction port pump



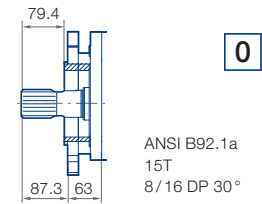
1

SAE-4-hole flange



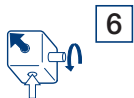
1

Involute gearing



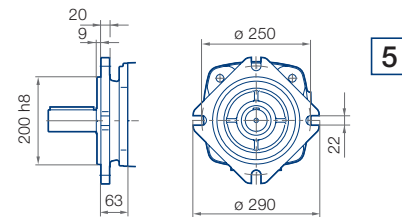
0

Rotation counterclockwise*,
Suction port pump



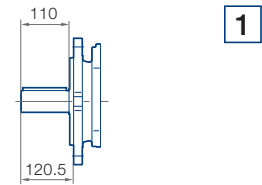
6

VDMA-4-hole flange



5

Keyway connection

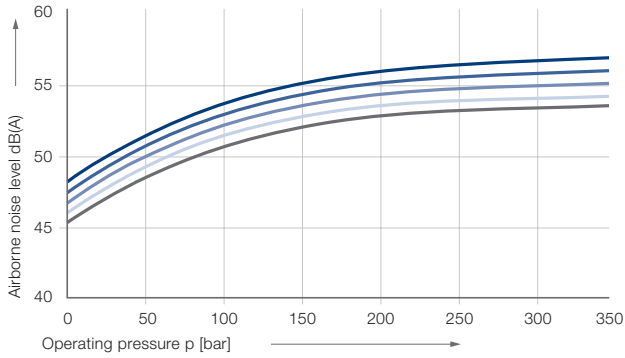


1

ANSI B92.1a
15T
8/16 DP 30°

* Direction of rotation free selectable in the illustrated mounting flange / shaft end combination.

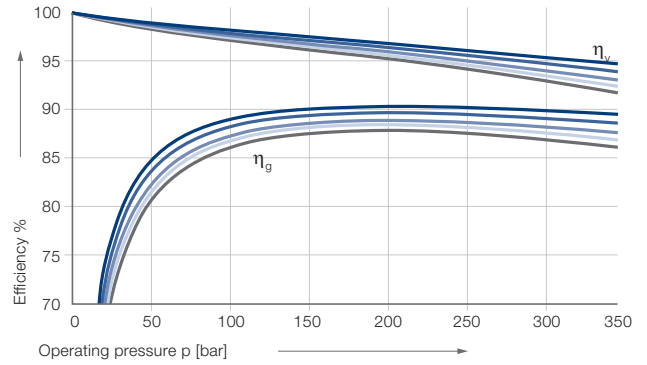
IPV 3 – Airborne noise level (measuring location 1 m axial)



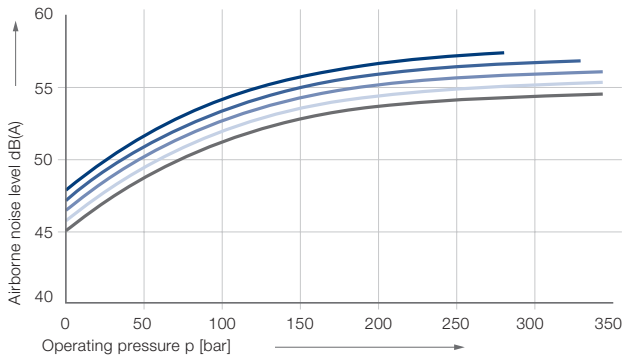
Characteristic curves:

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

IPV 3 – Efficiency η_v and η_g



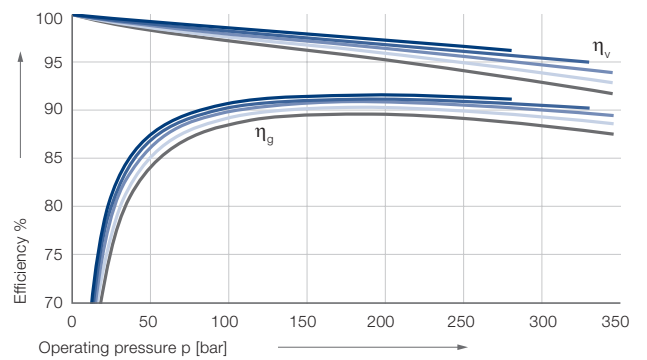
IPV 4 – Airborne noise level (measuring location 1 m axial)



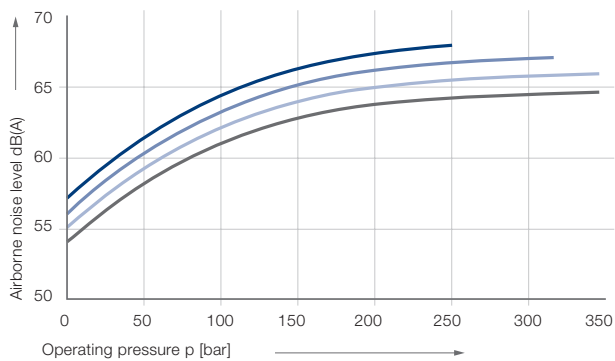
Characteristic curves:

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

IPV 4 – Efficiency η_v and η_g



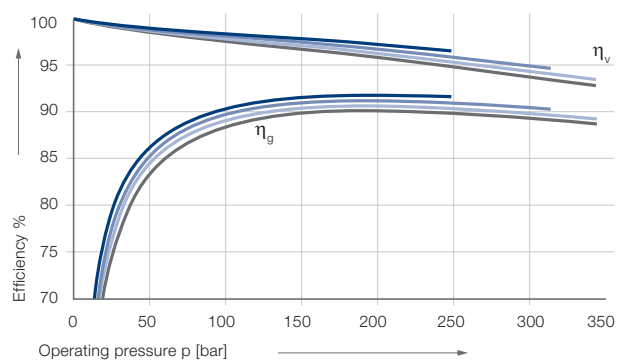
IPV 5 – Airborne noise level (measuring location 1 m axial)



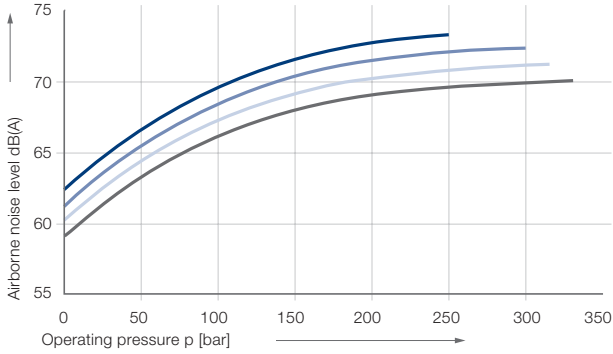
Characteristic curves:

— IPV 5 – 64 — IPV 5 – 50 — IPV 5 – 40 — IPV 5 – 32

IPV 5 – Efficiency η_v and η_g



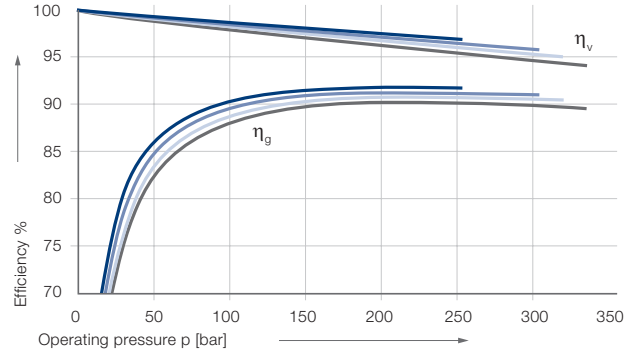
IPV 6 – Airborne noise level (measuring location 1 m axial)



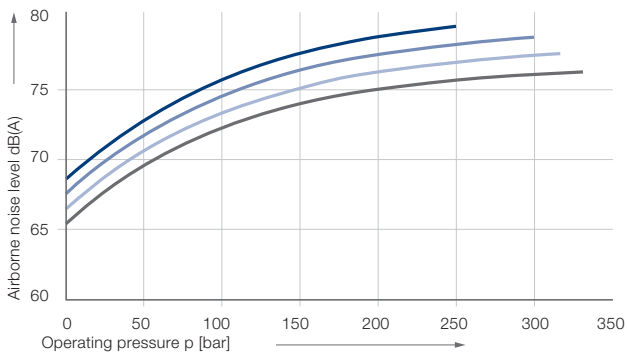
Characteristic curves:

— IPV 6 – 125 — IPV 6 – 100 — IPV 6 – 80 — IPV 6 – 64

IPV 6 – Efficiency η_v and η_g



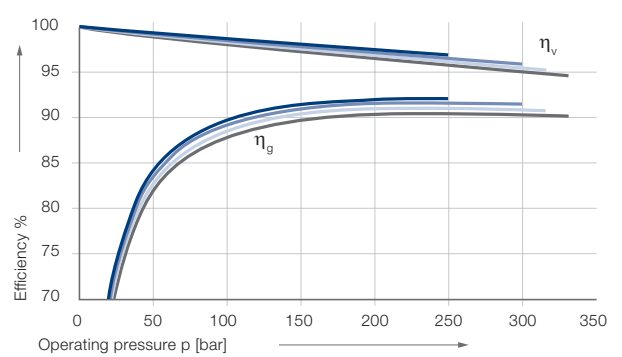
IPV 7 – Airborne noise level (measuring location 1 m axial)



Characteristic curves:

— IPV 7 – 250 — IPV 7 – 200 — IPV 7 – 160 — IPV 7 – 125

IPV 7 – Efficiency η_v and η_g



Measurement conditions:

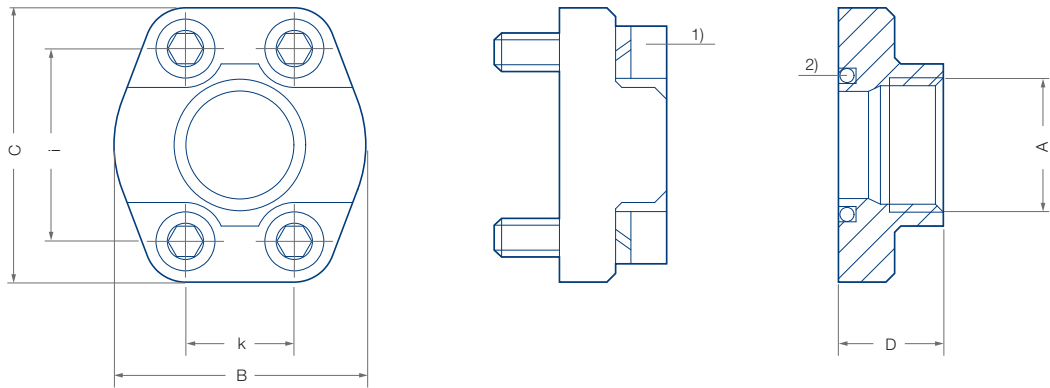
Speed: 1500 min⁻¹ / Viscosity of pressure fluid: 46 mm²s⁻¹ / Operating temperature: 40 °C

Note:

Measurement taken in a low-noise room.

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

SAE-Saug- und Druckflansche nach SAE J 518 C Code 61, einteilig



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 ½	46	54	36	18.66 – 3.53	38.1	17.5	M 8	345
11	G ¾	50	65	36	24.99 – 3.53	47.6	22.3	M 10	345
12	G 1	55	70	38	32.92 – 3.53	52.4	26.2	M 10	345
13	G 1-¼	68	79	41	37.69 – 3.53	58.7	30.2	M 10	276
14 ³⁾	G 1-½	82	98	50	47.22 – 3.53	69.9	35.7	M 12	345 ³⁾
30	G 1-½	78	93	45	47.22 – 3.53	69.9	35.7	M 12	207
15	G 2	90	102	45	56.74 – 3.53	77.8	42.9	M 12	207
16	G 2-½	105	114	50	69.44 – 3.53	88.9	50.8	M 12	172
17	G 3	124	134	50	85.32 – 3.53	106.4	61.9	M 16	138
18	G 4	146	162	48	110.72 – 3.53	130.2	77.8	M 16	34

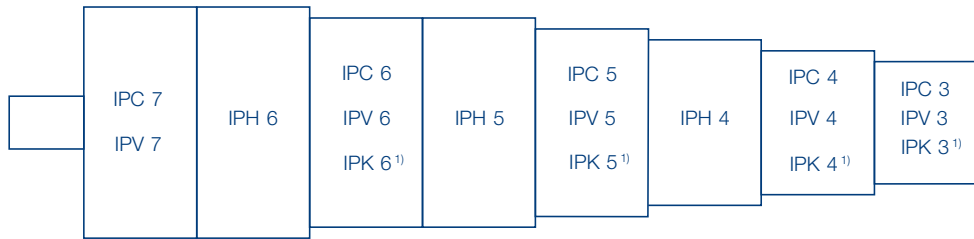
Wrench torque for screws according to ISO 6162

¹⁾ Screw EN ISO 4762

²⁾ Round seal ring (O-Ring) ISO-R 1629 NBR

³⁾ Special design, deviation from SAE J 518 C Code 61

Multiple-Flow Pumps, Pump Combinations in order of type and size



¹⁾ Following an IPK pump it is not possible to fit a pump of the series IPV, IPC or IPH.

Combinations of IPV pumps

- IPV pumps of identical or different sizes can be combined in multiflow 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.

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.

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.





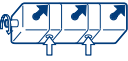







Mounting, assembly

- Multi-flow pumps are generally mounted to the drive by means of a flange. All information about the flange design and shaft end 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

clockwise (cw)   counterclockwise (ccw)

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

Mounting flange



0	1
4	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 (variant)

Shaft end

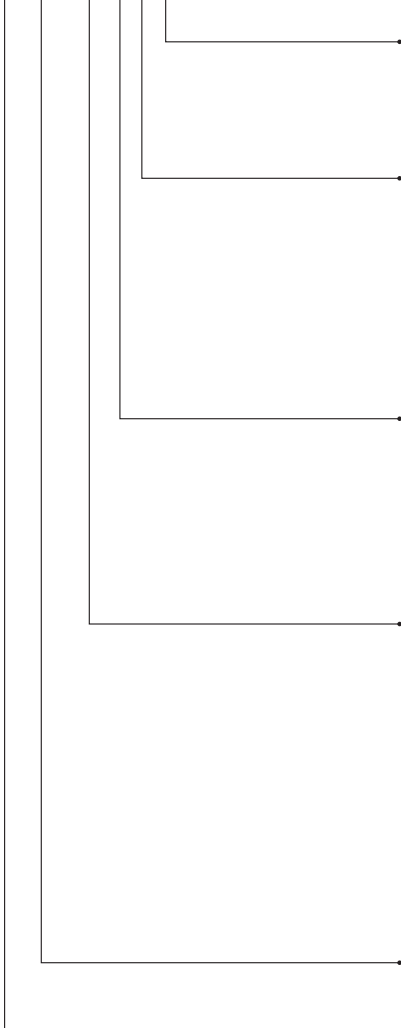


1	0
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For designs and dimensions, see catalog of the relevant pump series.

Type Code

IPV 3 - 3.5 1 0 1



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

Delivery

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	

Size

Type

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