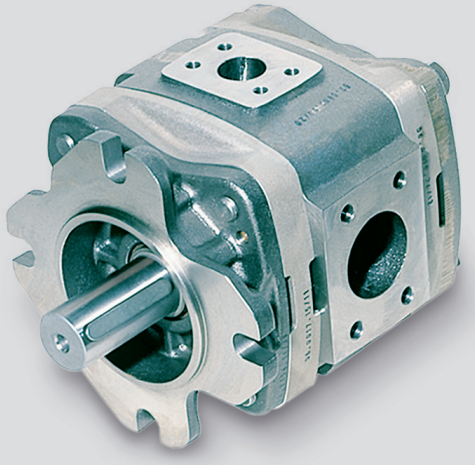
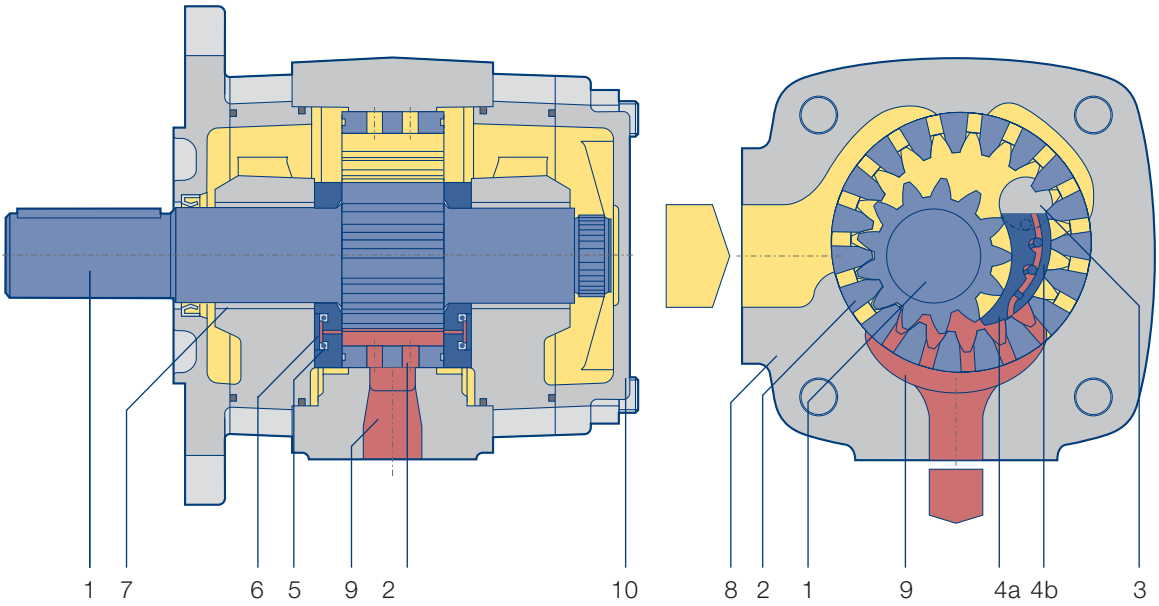
VOITH

IPVP High-pressure Internal Gear Pumps for Variable Speed Drives

Technical Data Sheet



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

Suction chamber
Pressure chamber

Function

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 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	IPVP
Mounting types	SAE hole flange; ISO 3019/1
Line mounting	SAE suction and pressure flange J 518 C Code 61
Sense of rotation	Right 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 up for short time 0.6 bar)
Pressure fluid	HLP mineral oils DIN 51524, part 2 or 3
Viscosity range of the pressure fluid	10…300 mm^2s-1 (cSt)), up to n=1800 min^{-1} 10 ... 100 mm^2s^{-1} (cSt), up to n_{max}
Permissible start viscosity	max. 2 000 mm^2s^{-1} (cSt)
Permissible temperature of the pressure fluid	-20 ... + 80 °C
Required purity of the pressure fluid according to NAS 1638	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

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 1500 min^{-1}	at n_{max}	Continuous pressure	Peak pressure at 1 500 min^{-1}	Moment of inertia
	[cm^3]	[min^{-1}]	[min^{-1}]	[l/min]	[l/min]	[bar]	[bar]	[kg cm^2]
IPVP 3 – 3.5	3.6	400	3600	5.4	13.0	330	345	0.34
IPVP 3 – 5	5.2	400	3600	7.8	18.7	330	345	0.42
IPVP 3 – 6.3	6.4	400	3600	9.6	23.0	330	345	0.49
IPVP 3 – 8	8.2	400	3600	12.3	29.5	330	345	0.58
IPVP 3 – 10	10.2	400	3600	15.3	36.7	330	345	0.70
IPVP 4 – 13	13.3	400	3600	19.9	47.9	330	345	2.25
IPVP 4 – 16	15.8	400	3600	23.7	56.9	330	345	2.64
IPVP 4 – 20	20.7	400	3600	31.0	74.5	330	345	3.29
IPVP 4 – 25	25.4	400	3600	38.1	91.4	300	330	3.70
IPVP 4 – 32	32.6	400	3600	48.9	117.4	250	280	4.44
IPVP 5 – 32	33.1	400	3000	49.6	99.3	315	345	8.62
IPVP 5 – 40	41.0	400	3000	61.5	123.0	315	345	10.20
IPVP 5 – 50	50.3	400	3000	75.4	150.9	280	315	11.60
IPVP 5 – 64	64.9	400	3000	97.3	194.7	230	250	14.40
IPVP 6 – 64	64.1	400	2600	96.1	166.7	300	330	25.73
IPVP 6 – 80	80.7	400	2600	121.0	209.8	280	315	30.90
IPVP 6 – 100	101.3	400	2600	151.9	263.4	250	300	36.10
IPVP 6 – 125	126.2	400	2600	189.3	328.1	210	250	43.70
IPVP 7 – 125	125.8	400	2500	188.7	314.5	300	330	84.05
IPVP 7 – 160	160.8	400	2500	241.2	402.0	280	315	102.60
IPVP 7 – 200	202.7	400	2500	304.0	503.8	250	300	119.00
IPVP 7 – 250	251.7	400	2500	377.5	629.3	210	250	144.50

The values given apply for:

- Pumping of mineral oils with a viscosity of 20…40 mm^{2}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%.
- The maximum speed depends on the pressure.
- **The speed range 0-400 min^{-1} depends on the pressure.** Please find data on the diagrams on the following pages.

Diagram IPVP 3, IPVP 4 - Continuous pressure depending on the speed

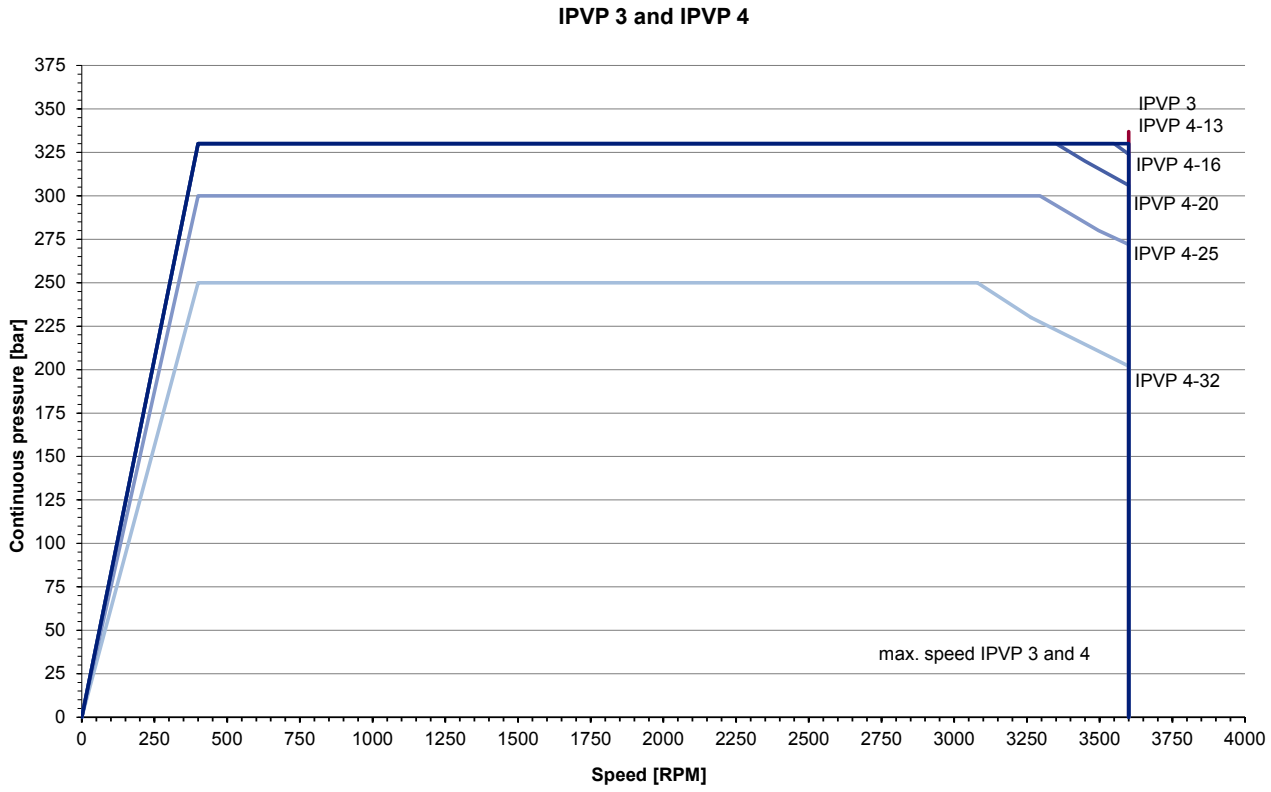


Diagram IPVP 5 - Continuous pressure depending on the speed

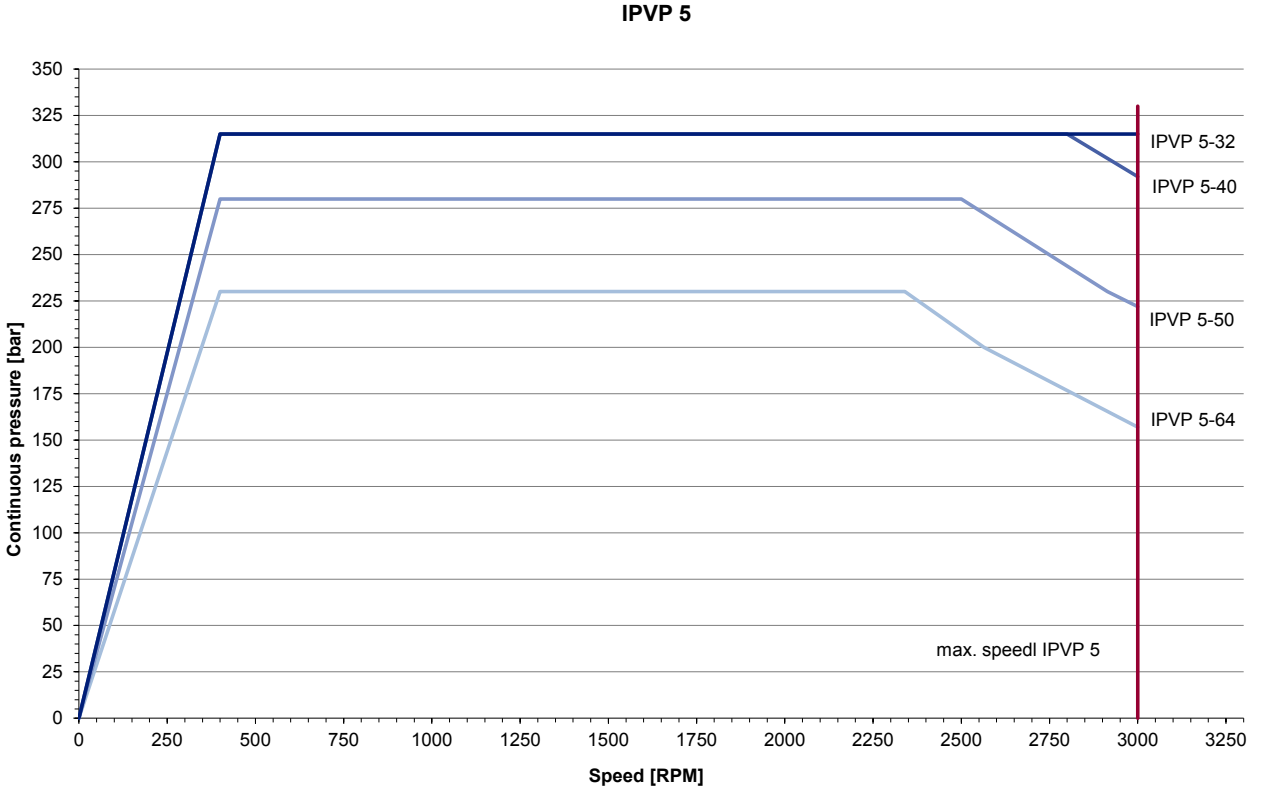


Diagram IPVP 6 - Continuous pressure depending on the speed

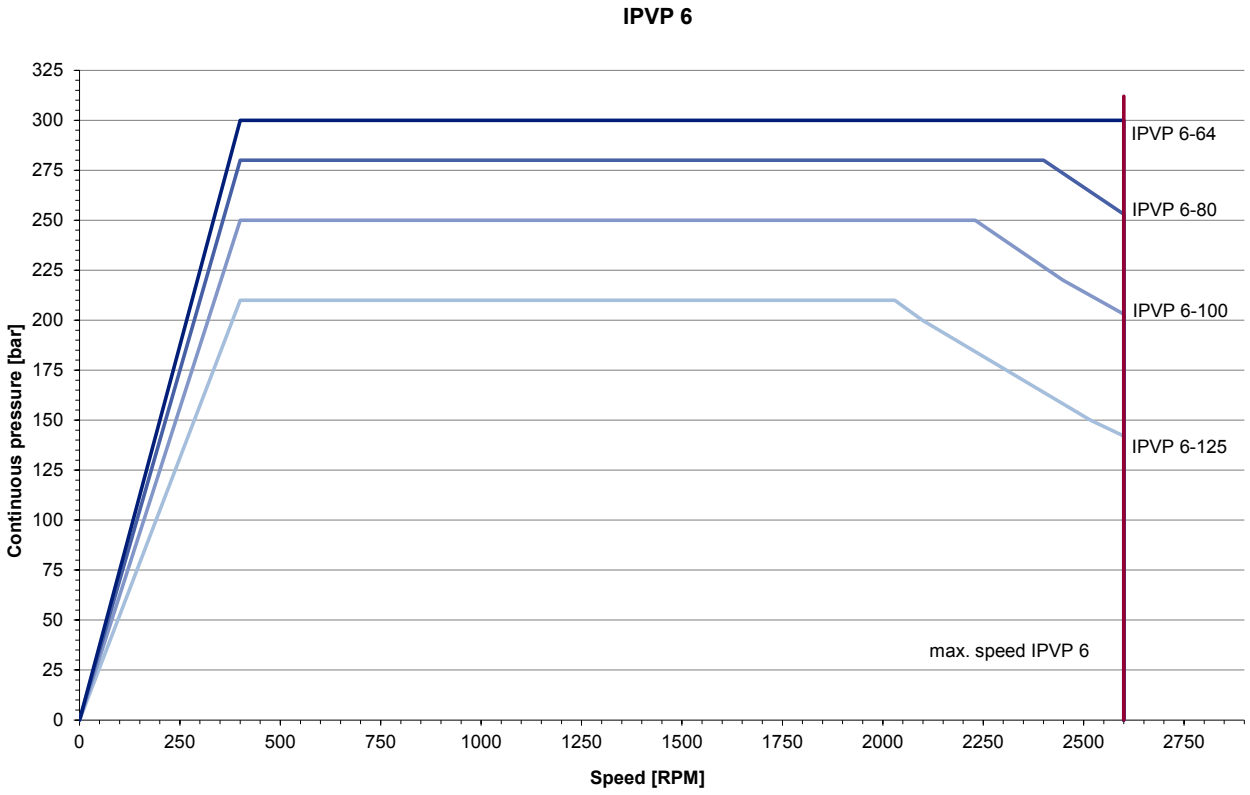
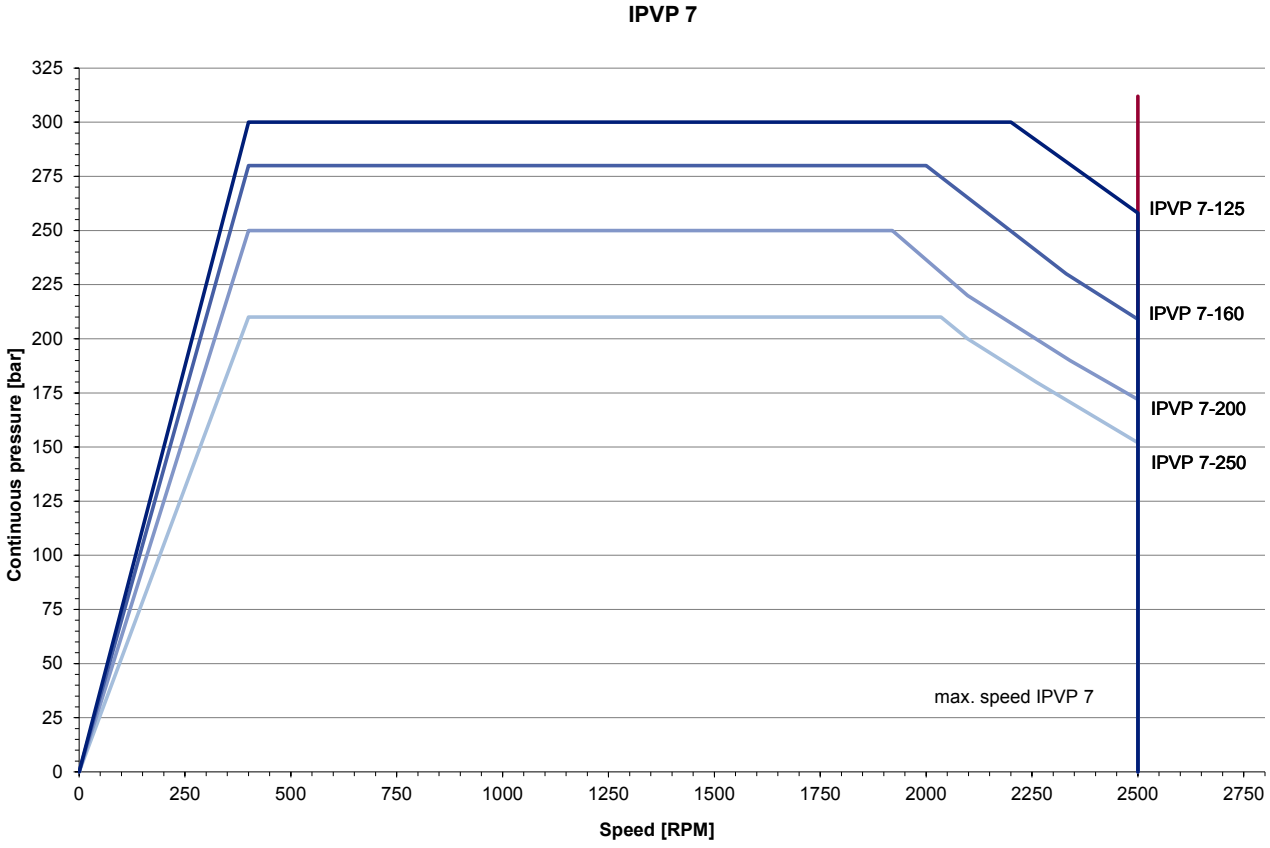
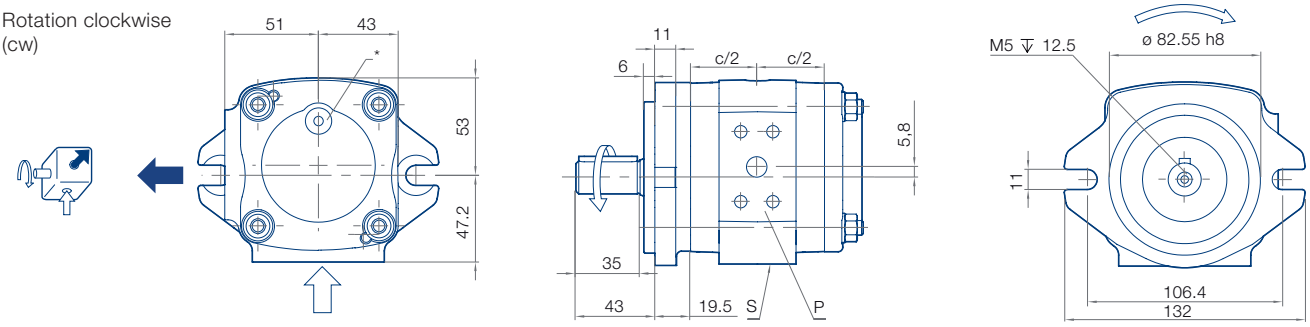


Diagram IPVP 7 - Continuous pressure depending on the speed

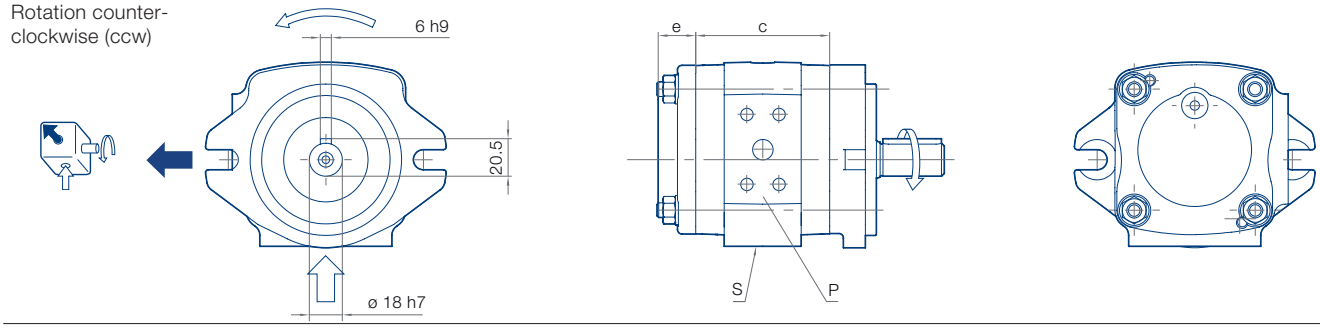


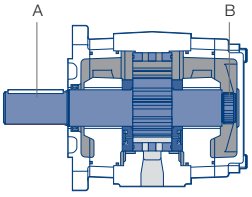
IPVP Size 3, Rotation and Dimensions

Rotation clockwise (cw)



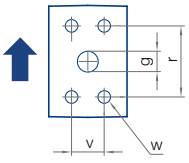
Rotation counter-clockwise (ccw)



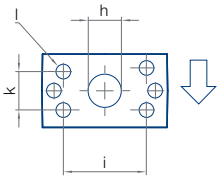


Allowed input torques:
Input shaft A: 160 Nm
Secondary shaft B: 80 Nm

Pressure port (P)



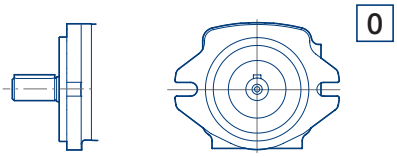
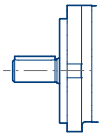
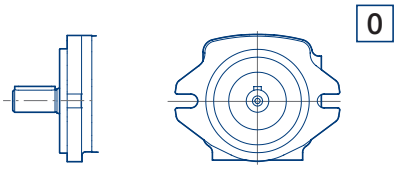
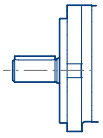
Suction port (S)



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]		
IPVP 3 – 3.5	66	20.5	9	14	38.1	17.5	M8x13	38.1	17.5	M8x13	4.2	10	10
IPVP 3 – 5	70	20.5	11	14	38.1	17.5	M8x13	38.1	17.5	M8x13	4.4	10	10
IPVP 3 – 6.3	73	20.5	11	19	47.6	22.3	M10x15	38.1	17.5	M8x13	4.6	10	11
IPVP 3 – 8	77.5	20.5	13	19	47.6	22.3	M10x15	38.1	17.5	M8x13	4.8	10	11
IPVP 3 – 10	82.5	20.5	13	21	52.4	26.2	M10x15	38.1	17.5	M8x13	5.0	10	12

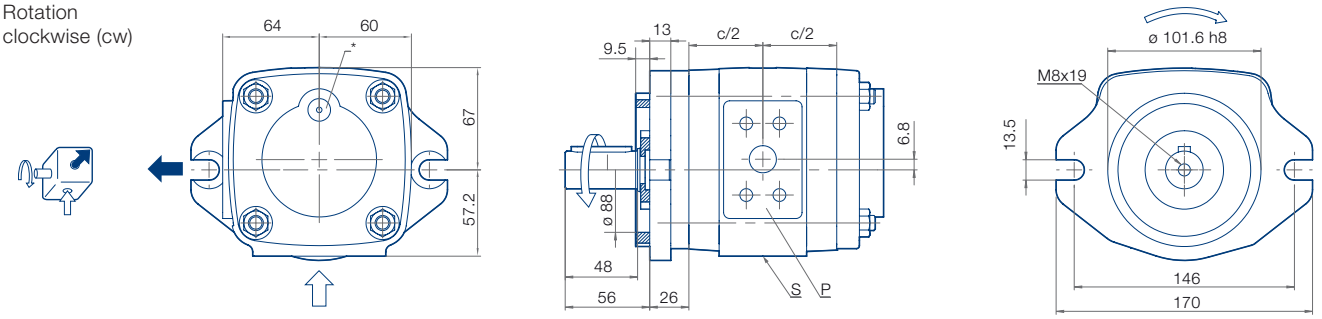
* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.

IPVP Size 3, Designs and Dimensions

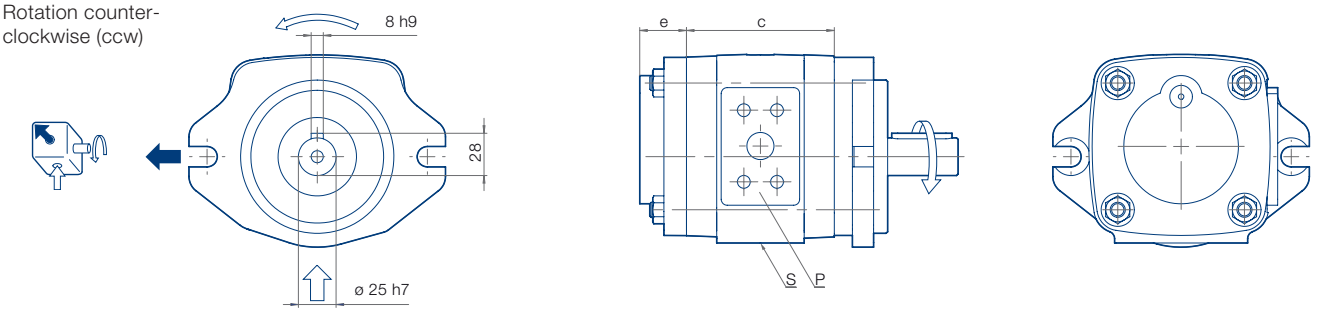
Rotation, Suction port	Mounting flange	Shaft end
Standard		
Rotation clockwise, Suction connection  1	SAE 2-hole flange  0	Parallel shaft with keyway connection  1
Variants		
Rotation counterclockwise, Suction connection  6	SAE 2-hole flange  0	Parallel shaft with keyway connection  1

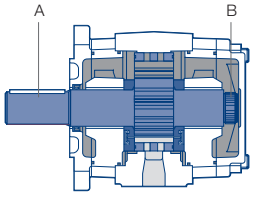
IPVP Size 4, Rotation and Dimensions

Rotation clockwise (cw)



Rotation counter-clockwise (ccw)

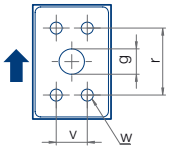




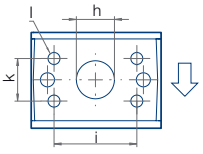
Allowed input torques:

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

Pressure port (P)



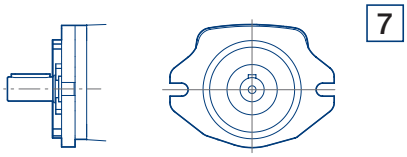
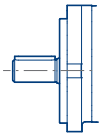
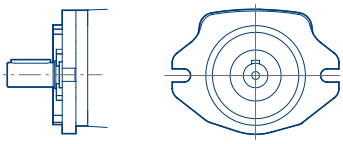
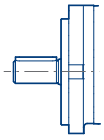
Suction port (S)



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]		
IPVP 4 – 13	88.5	31	13	23	52.4	26.2	M10x15	38.1	17.5	M8x13	9.4	10	12
IPVP 4 – 16	92.5	31	14	25	52.4	26.2	M10x15	38.1	17.5	M8x13	9.7	10	12
IPVP 4 – 20	98	31	18	27	58.7	30.2	M10x15	47.6	22.3	M10x15	10.2	11	13
IPVP 4 – 25	104	31	18	30	58.7	30.2	M10x15	47.6	22.3	M10x15	10.7	11	13
IPVP 4 – 32	113	31	18	32	58.7	30.2	M10x15	47.6	22.3	M10x15	11.7	11	13

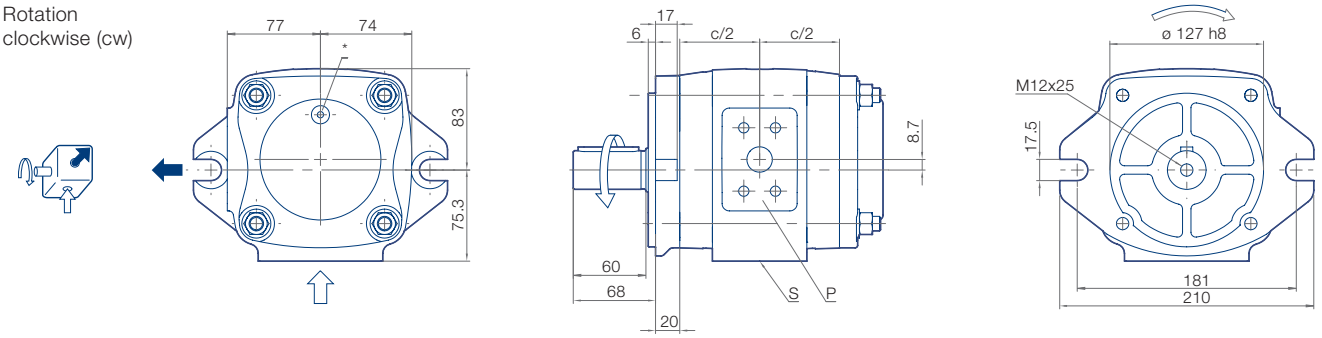
* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.

IPVP Size 4, Designs and Dimensions

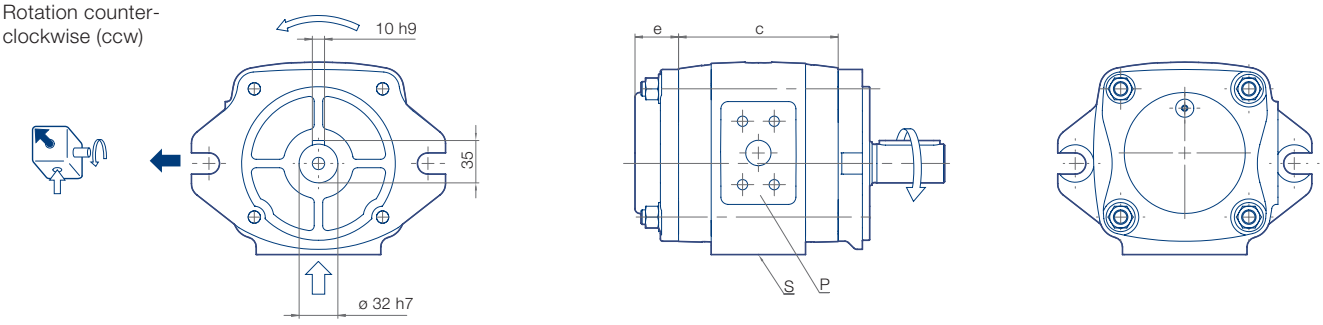
Rotation, Suction port	Mounting flange	Shaft end
Standard		
Rotation clockwise, Suction connection  1	SAE 2-hole flange  7	Parallel shaft with keyway connection  1
Variants		
Rotation counterclockwise, Suction connection  6	SAE 2-hole flange  7	Parallel shaft with keyway connection  1

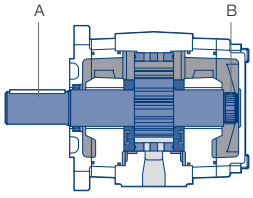
IPVP Size 5, Rotation and Dimensions

Rotation clockwise (cw)



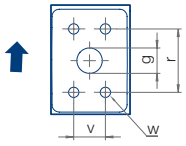
Rotation counter-clockwise (ccw)



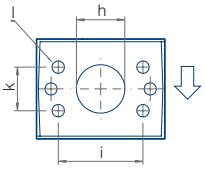


Allowed input torques:
Input shaft A: 605 Nm
Secondary shaft B: 400 Nm

Pressure port (P)



Suction port (S)

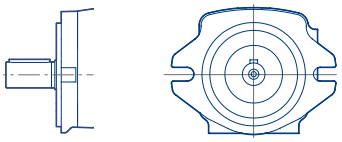
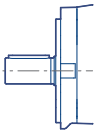
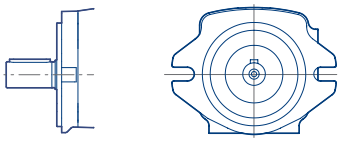
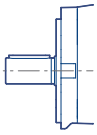


Type / Delivery	Dimensions and Weight											SAE Flange No.	
	c	e	g	h	i	k	l	r	v	w	Weight	⬆	⇩
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPVP 5 – 32	119	36	18	32	58.7	30.2	M10x15	47.6	22.3	M10x15	15.6	11	13
IPVP 5 – 40	125	36	19	35	69.9	35.7	M12x20	52.4	26.2	M10x15	16.7	12	30
IPVP 5 – 50	132	36	21	40	69.9	35.7	M12x20	52.4	26.2	M10x15	17.3	12	30
IPVP 5 – 64	143	36	23	40	69.9	35.7	M12x20	52.4	26.2	M10x16	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.

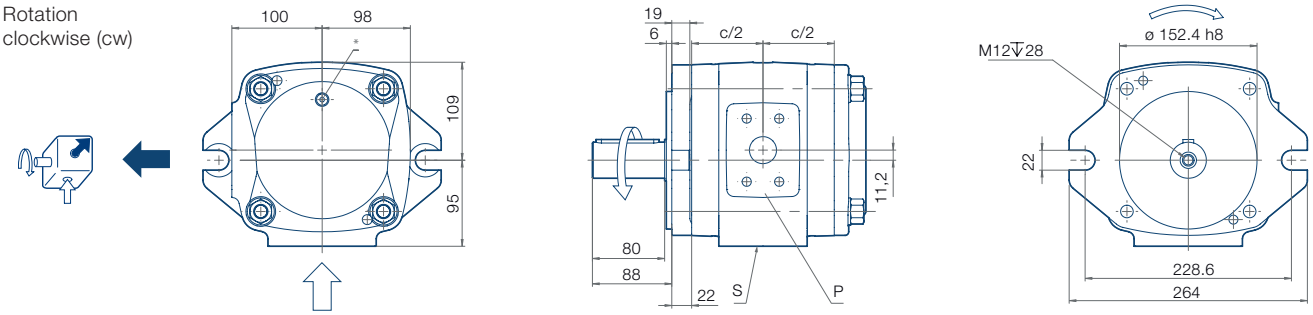
Note! In case of oil-immersed installation of the oil pump please consult us.

IPVP Size 5, Designs and Dimensions

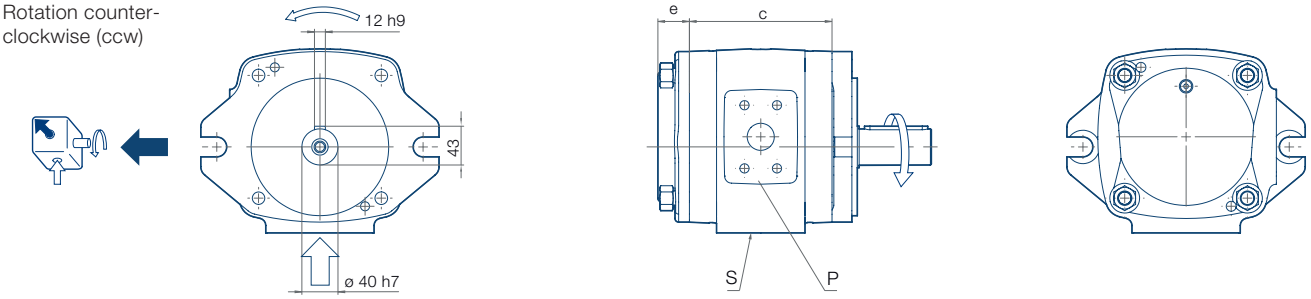
Rotation, Suction port	Mounting flange	Shaft end
Standard		
Rotation clockwise, Suction connection  1	SAE 2-hole flange  0	Parallel shaft with keyway connection  1
Variants		
Rotation counterclockwise, Suction connection  6	SAE 2-hole flange  0	Parallel shaft with keyway connection  1

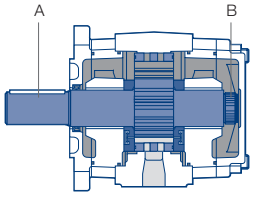
IPVP Size 6, Rotation and Dimensions

Rotation clockwise (cw)



Rotation counter-clockwise (ccw)

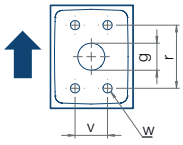




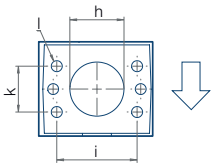
Allowed input torques:

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

Pressure port (P)



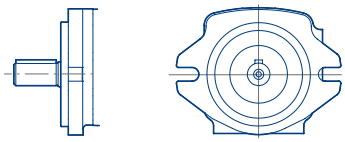
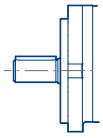
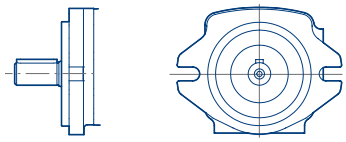
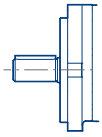
Suction port (S)



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]		
IPVP 6 – 64	140	40	23	40	69.9	35.7	M12 x 20	52.4	26.2	M10 x 15	30.0	12	30
IPVP 6 – 80	148	35	23	45	77.8	42.9	M12 x 20	69.9	35.7	M12 x 20	31.7	14	15
IPVP 6 – 100	158	35	27	50	77.8	42.9	M12 x 20	69.9	35.7	M12 x 20	33.0	14	15
IPVP 6 – 125	170	40	30	50	77.8	42.9	M12 x 20	69.9	35.7	M12 x 20	36.0	14	15

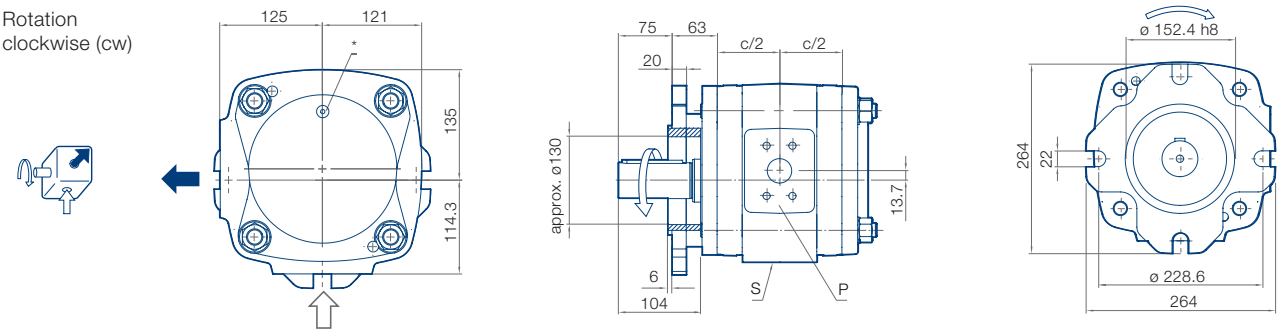
* Ensure the M10x1plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.

IPVP Size 6, Designs and Dimensions

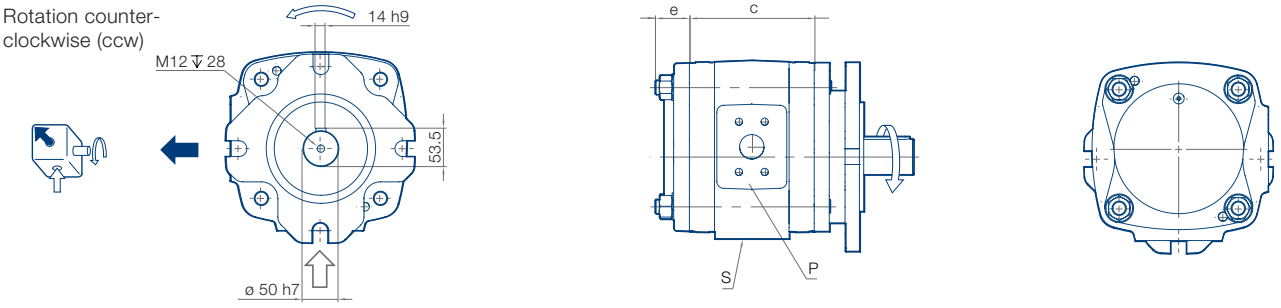
Rotation, Suction port	Mounting flange	Shaft end
Standard		
Rotation clockwise, Suction connection  1	SAE 2-hole flange  0	Parallel shaft with keyway connection  1
Variants		
Rotation counterclockwise, Suction connection  6	SAE 2-hole flange  0	Parallel shaft with keyway connection  1

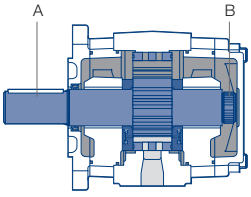
IPVP Size 7, Rotation and Dimensions

Rotation clockwise (cw)



Rotation counter-clockwise (ccw)

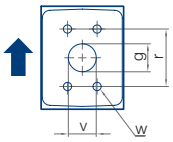




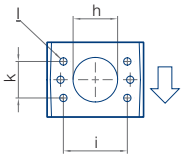
Allowed input torques:

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

Pressure port (P)



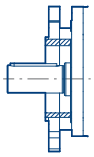
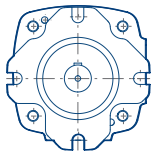
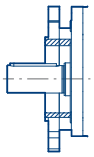
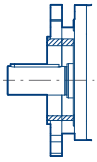
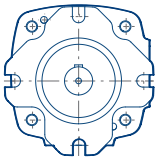
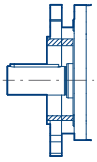
Suction port (S)



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]		
IPVP 7 – 125	152	48	30	50	77.8	42.9	M12 x 20	69.9	35.7	M12 x 20	46.5	14	15
IPVP 7 – 160	162	48	30	56	88.9	50.8	M12 x 20	69.9	35.7	M12 x 20	50	14	16
IPVP 7 – 200	174	46	34	62	88.9	50.8	M12 x 20	69.9	35.7	M12 x 20	54	14	16
IPVP 7 – 250	188	42	38	72	106.4	62	M16 x 25	69.9	35.7	M12 x 20	59	14	17

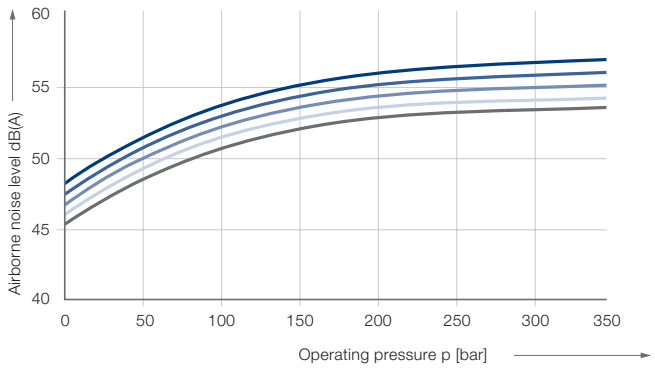
* Ensure the M10x1 plug screw, hexagon socket SW5, is tightened to a torque of 10 Nm during pumping operation. Dependent on the pump position, filling or ventilation is possible here prior to commissioning.

IPVP Size 7, Designs and Dimensions

Rotation, Suction port	Mounting flange	Shaft end
Standard		
Rotation clockwise, Suction connection  1	SAE-4-hole flange   1	Parallel shaft with keyway connection  1
Variants		
Rotation counterclockwise, Suction connection  6	SAE-4-hole flange   1	Parallel shaft with keyway connection  1

Measurement Values - Airborne Noise Level, Efficiency

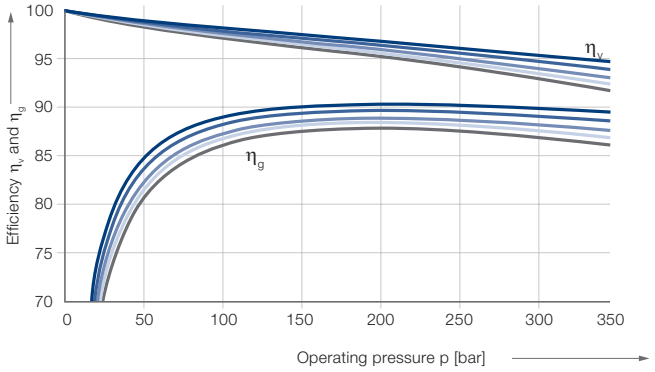
IPVP 3 – Airborne noise level (measuring location 1 m axial)



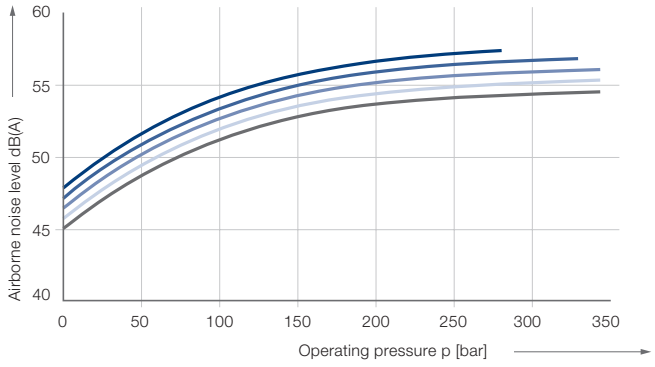
Characteristic curves:

IPVP 3 – 10 IPVP 3 – 8 IPVP 3 – 6.3 IPVP 3 – 5 IPVP 3 – 3.5

IPVP 3 – Efficiency η_v and η_g



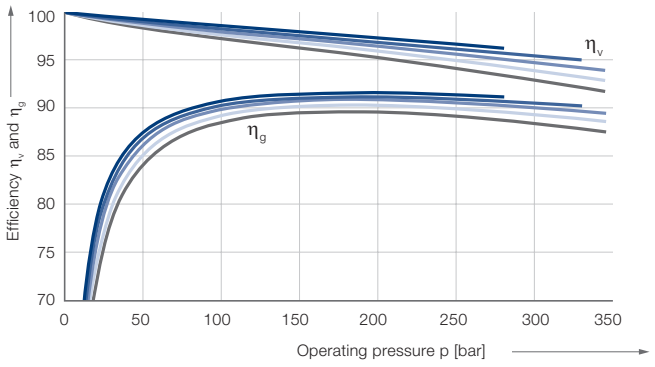
IPVP 4 – Airborne noise level (measuring location 1 m axial)



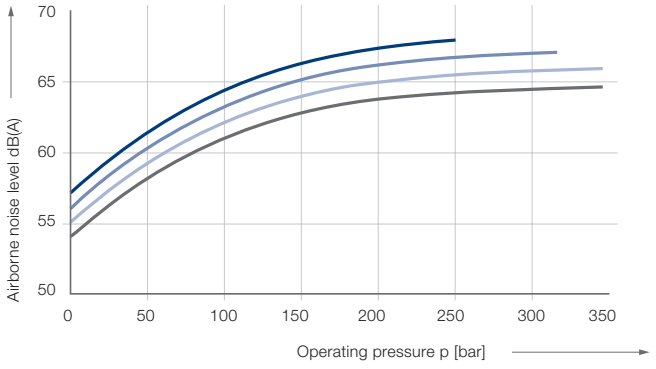
Characteristic curves:

IPVP 4 – 32 IPVP 4 – 25 IPVP 4 – 20 IPVP 4 – 16 IPVP 4 – 13

IPVP 4 – Efficiency η_v and η_g



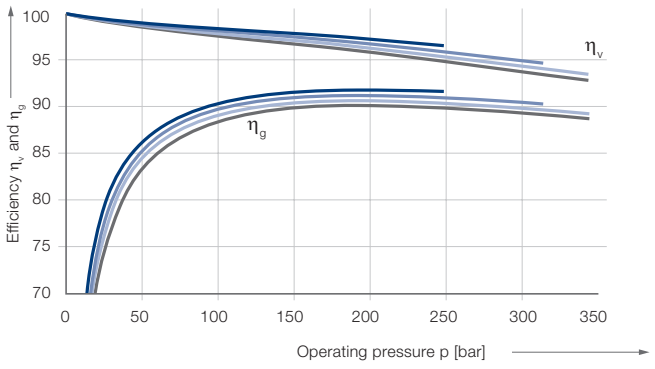
IPVP 5 – Airborne noise level (measuring location 1 m axial)



Characteristic curves:

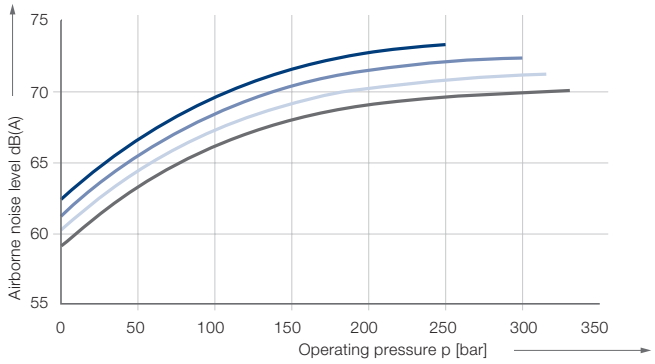
IPVP 5 – 64 IPVP 5 – 50 IPVP 5 – 40 IPVP 5 – 32

IPVP 5 – Efficiency η_v and η_g

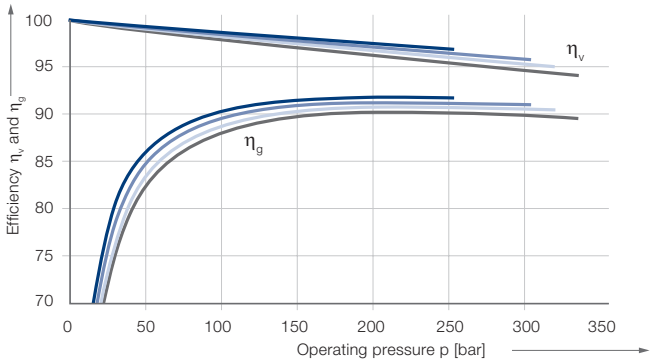


Measurement Values - Airborne Noise Level, Efficiency

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



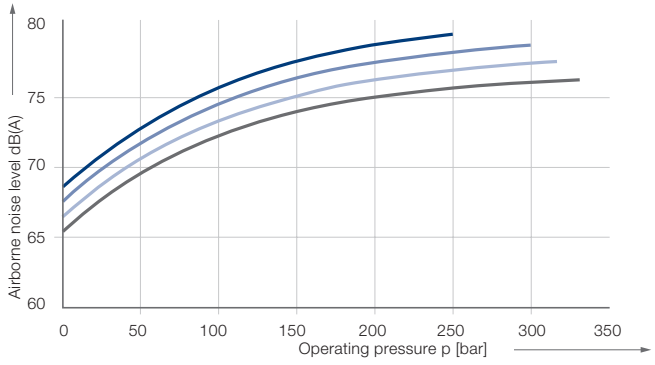
IPVP 6 – Efficiency η_v and η_g



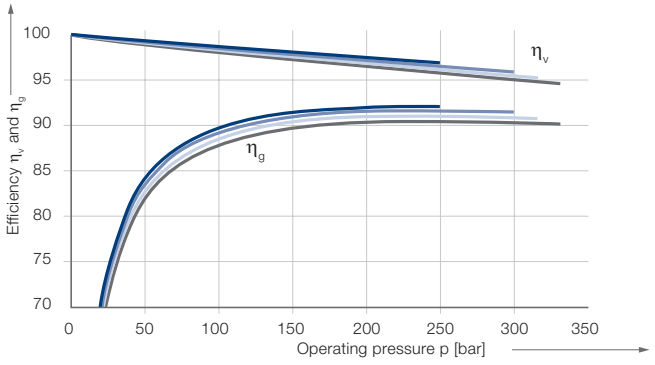
Characteristic curves:

IPVP 6 – 125 IPVP 6 – 100 IPVP 6 – 80 IPVP 6 – 64

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



IPVP 7 – Efficiency η_v and η_g

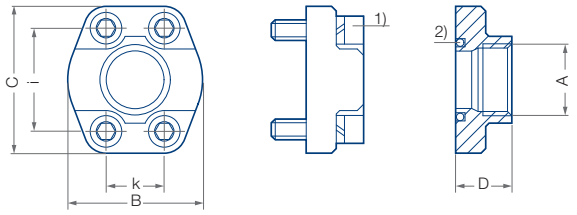


Characteristic curves:

IPVP 7 – 250 IPVP 7 – 200 IPVP 7 – 160 IPVP 7 – 125

Measurement Conditions:
Speed: 1.500 rpm / Viscosity of pressure fluid: 46 mm^2s^{-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-Flange, SAE J 518 C Code 61, single-piece

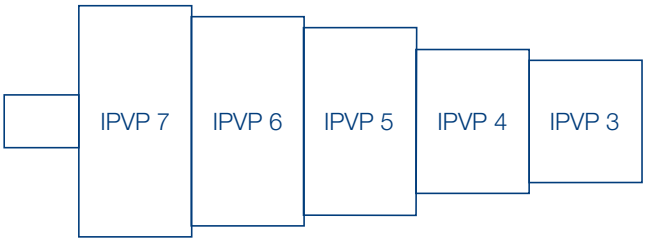


Wrench torque for screws according to ISO 6162

[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

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

Multi-flow Pumps, Pump Combinations, Pump Combinations in Order of Type and Size



Pump combinations

- IPVP 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

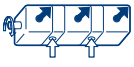
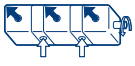
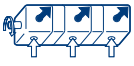
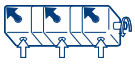
1. Determine pressure ranges and define the appropriate pump serie(s).
2. Determine pump volume and select the appropriate size
3. Define sequence of the pumps.
4. Check the torques.
5. Determine rotation and suction.
6. Specify mounting

Mounting, assembly

- Multi-flow pumps are generally mounted to the drive by means of a flange.

Rotation and suction

clockwise (cw) counterclockwise (ccw)

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

Mounting flange


- 0
- 1
- 4
- 7

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

- 0 SAE-2-hole-flange
- 7 SAE-2-hole-flange (variant)
- 1 SAE-4-hole-flange

Shaft end

- 1

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

Type Code

IPVP 3 - 3.5 1 0 1

Shaft end
1 Parallel shaft with keyway

Mounting flange
0 SAE 2-hole
1 SAE 4-hole
7 SAE 2-hole, variant

Rotation, suction port
1 Clockwise rotation, radial suction port radial
6 Counterclockwise rotation, radial suction port radial
4 Clockwise rotation, special design
9 Counterclockwise 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

90107-IPVP-DSH-D-EN-1601 | VTHL | Dimensions and illustrations non-committal, subject to change.

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hydraulic

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