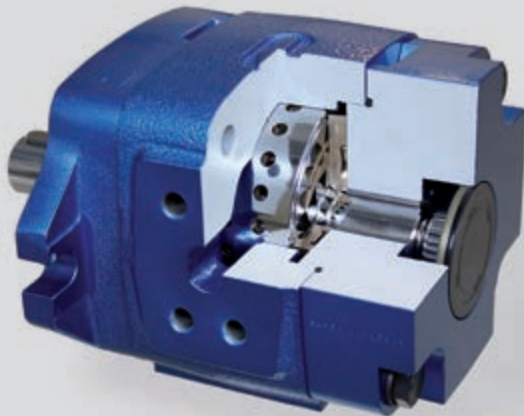
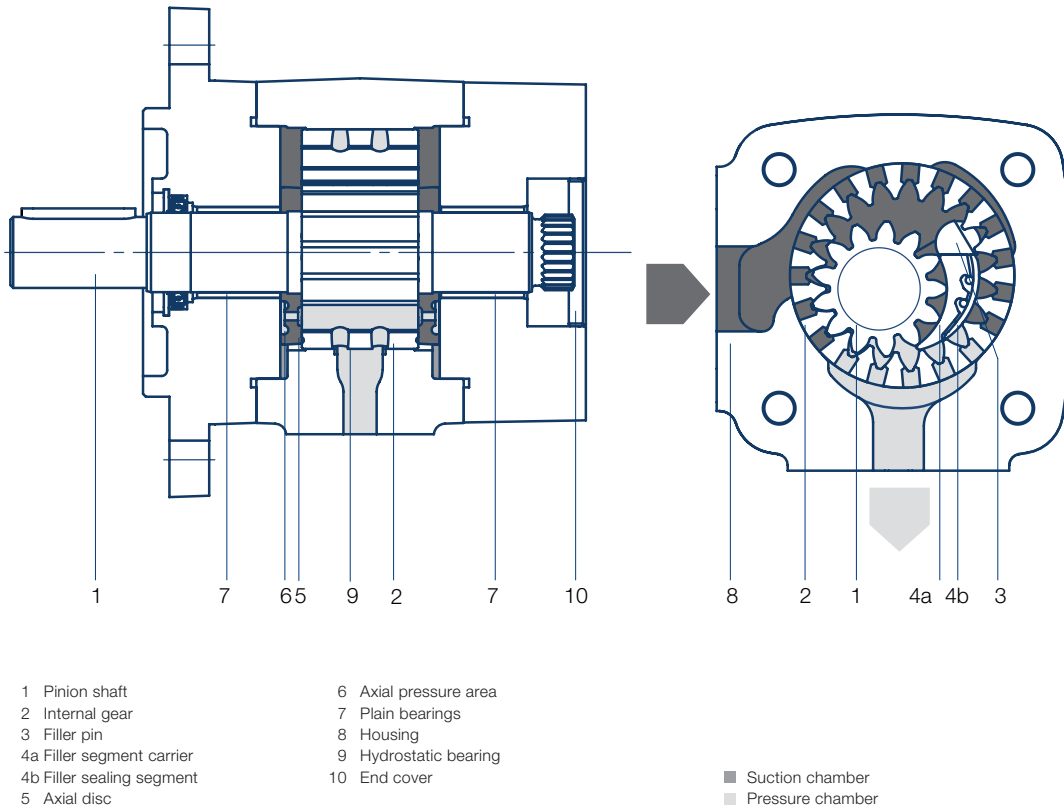


IPVAP High-pressure Internal Gear Pumps for Variable Speed Drives



Design and Function



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 mostly contactlessly 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.

Technical Data

Design	Internal gear pump with radial and axial sealing gap compensation
Type	IPVAP
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 ² s ⁻¹ (cSt), up to n=1800 RPM
Permissible start viscosity	0 ... 100 mm ² s ⁻¹ (cSt), up to n _{max}
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. β ₂₀ ≥ 75, recommended β ₁₀ ≥ 100 (longer life)
Permissible ambient temperature	-20 ... + 60 °C

Calculations

Pump flow	$Q = V_{g\ th} \cdot n \cdot \eta_v \cdot 10^{-3} \text{ [l/min]}$
Power	$P = \frac{Q \cdot \Delta p}{600 \cdot \eta_g} \text{ [kW]}$
$V_{g\ th}$	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	Displace- ment per revolution [cm ³]	Speed		Delivery	Pressures		
		min.	max.	at 1500 min ⁻¹	Continuous pressure	Peak pressure at 1 500 min ⁻¹	Moment of inertia
		[min ⁻¹]	[min ⁻¹]	[l/min]	[bar]	[bar]	[kg cm ²]
IPVAP 3 – 3.5	3.6	400	3 600	5.4	300	320	0.34
IPVAP 3 – 5	5.2	400	3 600	7.8	300	320	0.42
IPVAP 3 – 6.3	6.4	400	3 600	9.6	300	320	0.49
IPVAP 3 – 8	8.2	400	3 600	12.3	300	320	0.58
IPVAP 3 – 10	10.2	400	3 600	15.3	300	320	0.70
IPVAP 4 – 13	13.3	400	3 600	19.9	300	320	2.25
IPVAP 4 – 16	15.8	400	3 600	23.7	300	320	2.64
IPVAP 4 – 20	20.7	400	3 600	31.0	300	320	3.29
IPVAP 4 – 25	25.4	400	3 600	38.1	300	320	3.70
IPVAP 4 – 32	32.6	400	3 600	48.9	250	280	4.44
IPVAP 5 – 32	33.1	400	3 000	49.6	300	320	8.62
IPVAP 5 – 40	41.0	400	3 000	61.5	300	320	10.20
IPVAP 5 – 50	50.3	400	3 000	75.4	280	315	11.60
IPVAP 5 – 64	64.9	400	3 000	97.3	230	250	14.40
IPVAP 6 – 64	64.1	400	2 600	96.1	300	320	25.73
IPVAP 6 – 80	80.7	400	2 600	121.0	280	315	30.90
IPVAP 6 – 100	101.3	400	2 600	151.9	250	300	36.10
IPVAP 6 – 125	126.2	400	2 600	189.3	210	250	43.70

The values given apply for:

- Pumping of mineral oils with a viscosity of 20...40 mm²s⁻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 RPM depends on the pressure.** Please find data on the diagrams on the following pages.

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

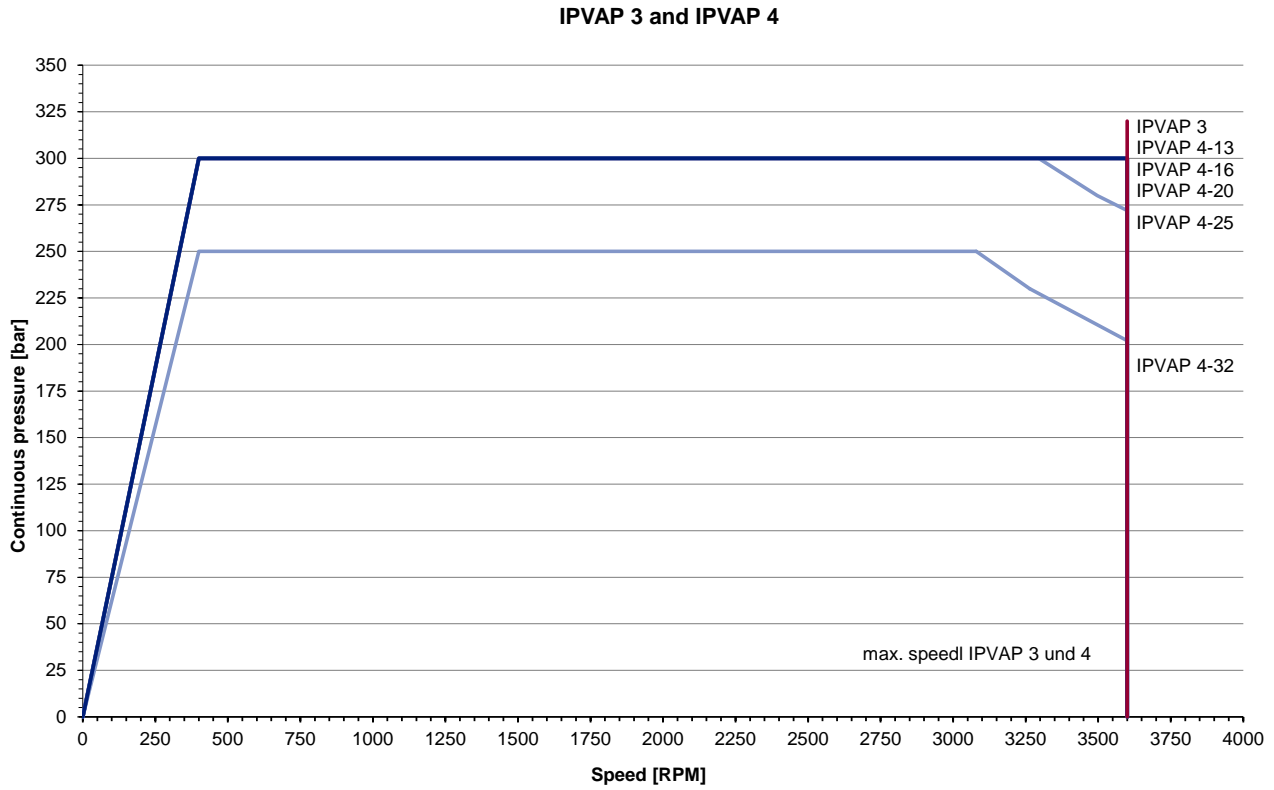


Diagram IPVAP 5 - Continuous pressure depending on the speed

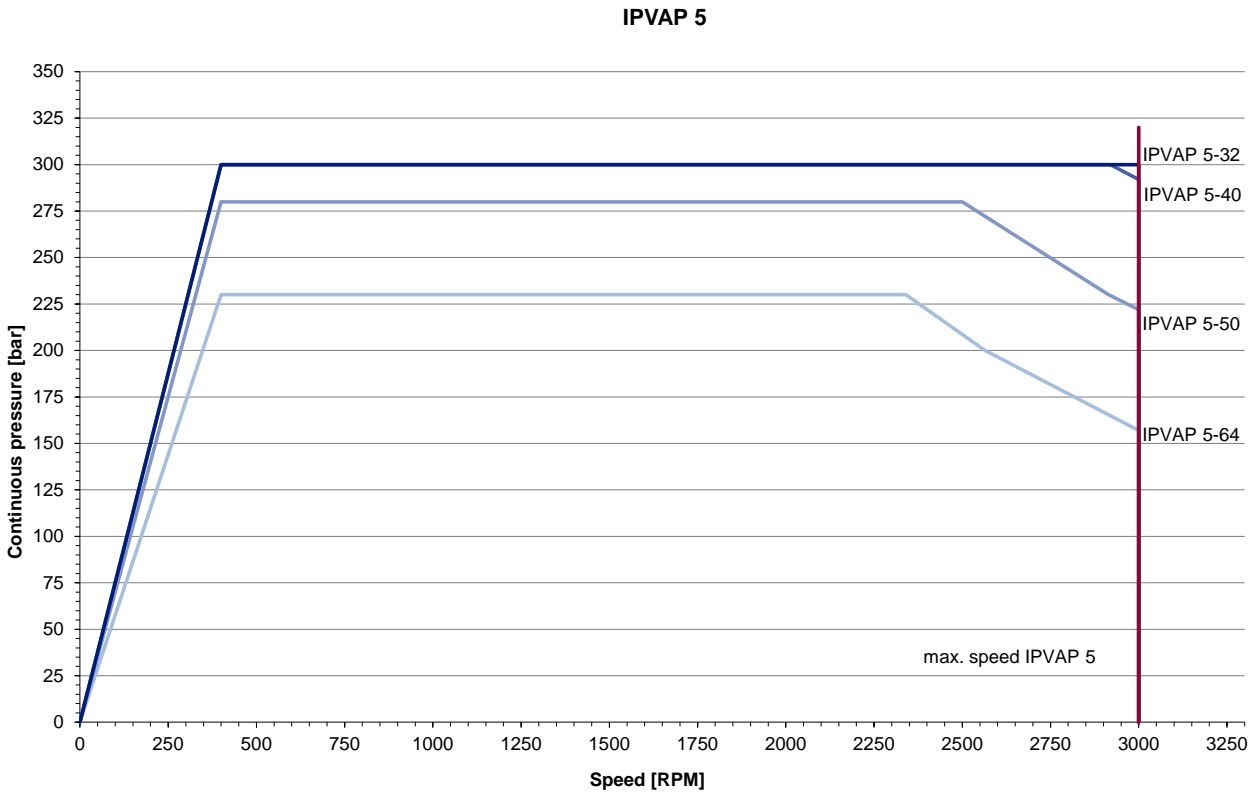
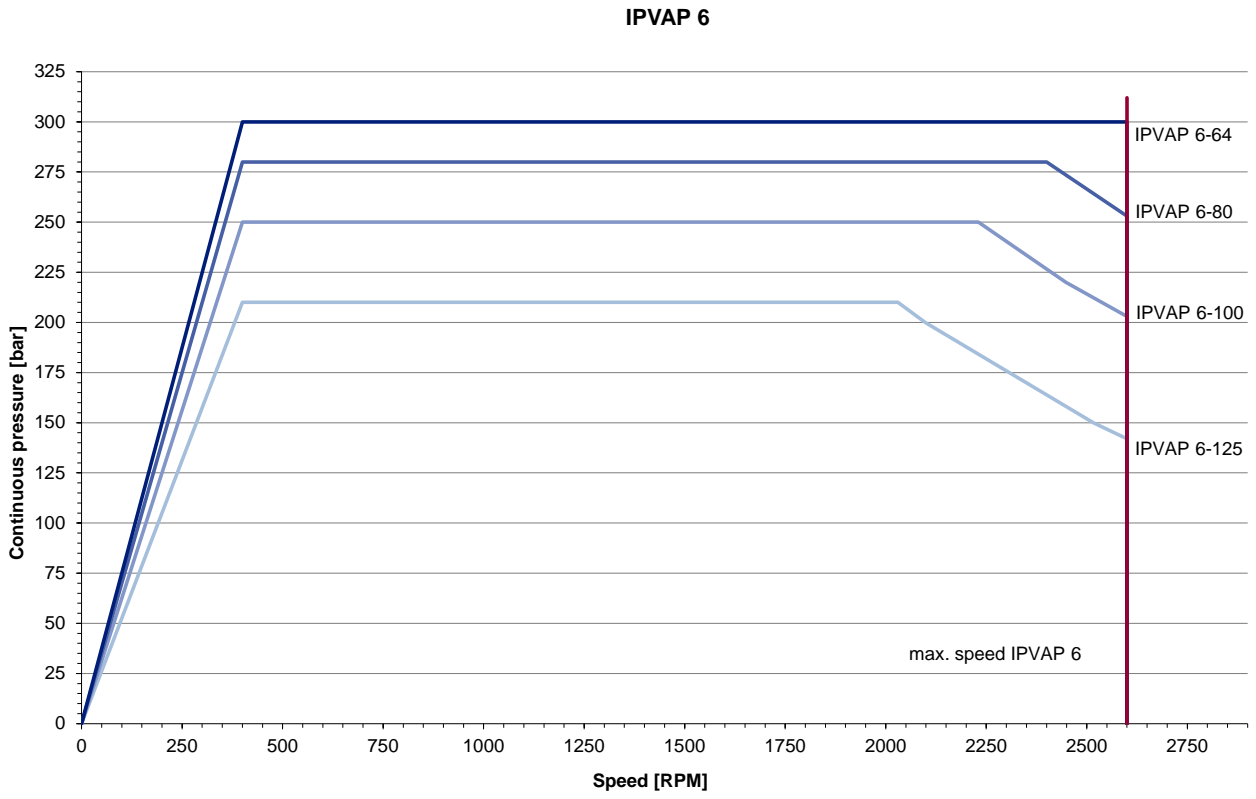
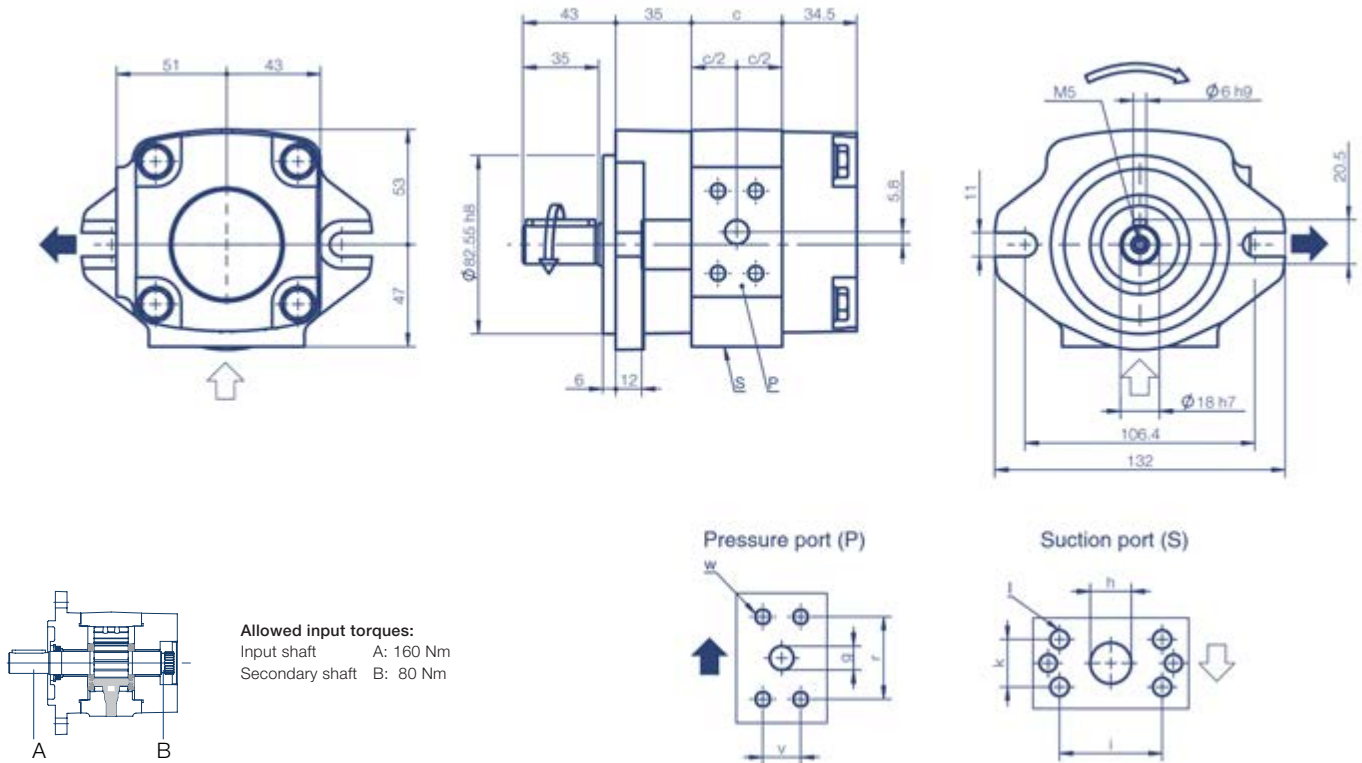


Diagram IPVAP 6 - Continuous pressure depending on the speed


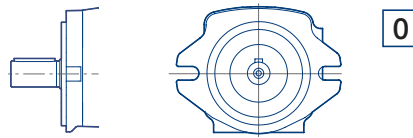
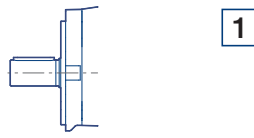


IPVAP Size 3, Rotation and Dimensions

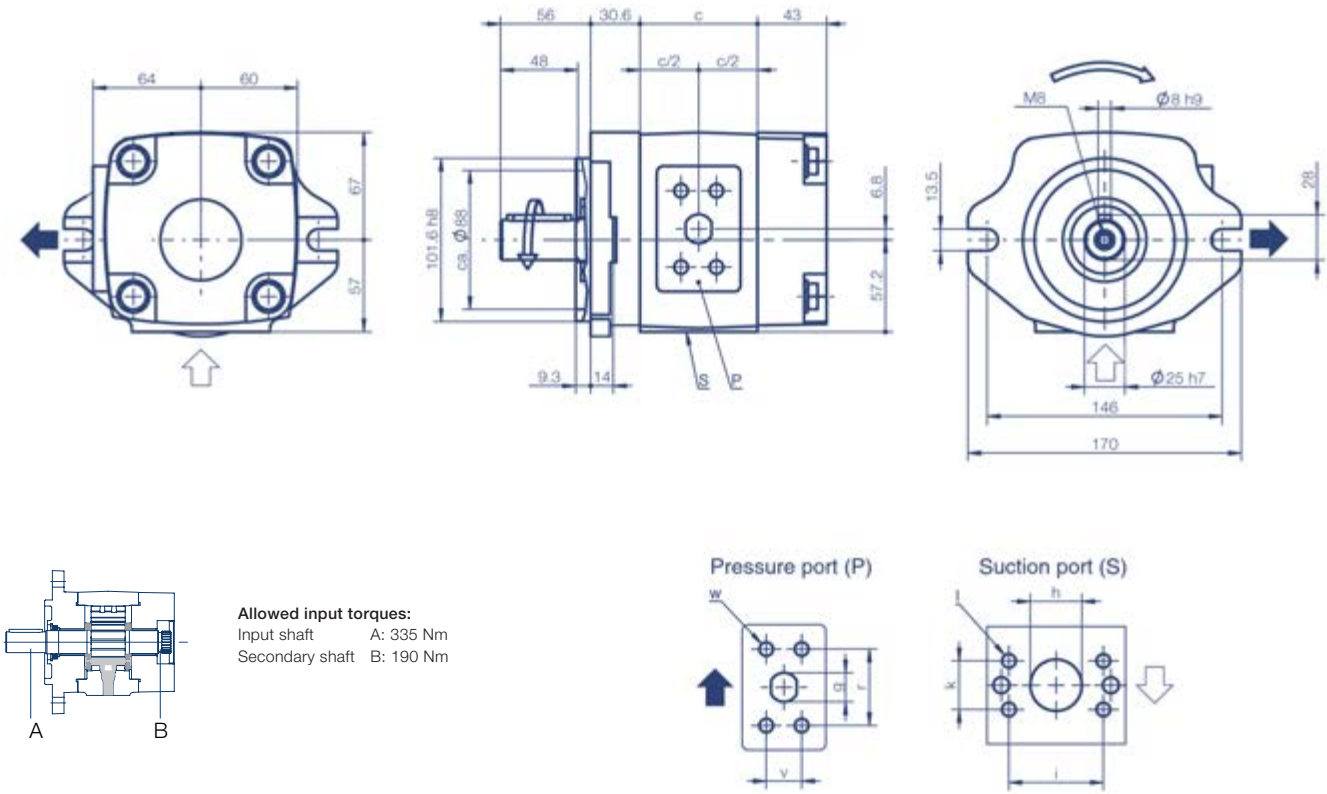


Type/ Delivery	Dimensions and Weight										SAE Flange No.	
	c	g	h	i	k	l	r	v	w	Weight	↑	↓
	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPVAP 3 – 3.5	35	9	14	38.1	17.5	M8x13	38.1	17.5	M8x13	3.6	10	10
IPVAP 3 – 5	39	11	14	38.1	17.5	M8x13	38.1	17.5	M8x13	3.8	10	10
IPVAP 3 – 6.3	42	11	19	47.5	22	M10x15	38.1	17.5	M8x13	4.0	10	11
IPVAP 3 – 8	46.5	13	19	47.5	22	M10x15	38.1	17.5	M8x13	4.2	10	11
IPVAP 3 – 10	51.5	13	21	52.4	26.2	M10x15	38.1	17.5	M8x13	4.4	10	12

IPVAP Size 3, Designs and Dimensions



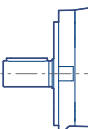
Rotation	Mounting flange	Shaft end
Standard		
Rotation clockwise	SAE 2-hole flange	Parallel shaft with keyway connection
 1	 0	 1

IPVAP Size 4, Rotation and Dimensions

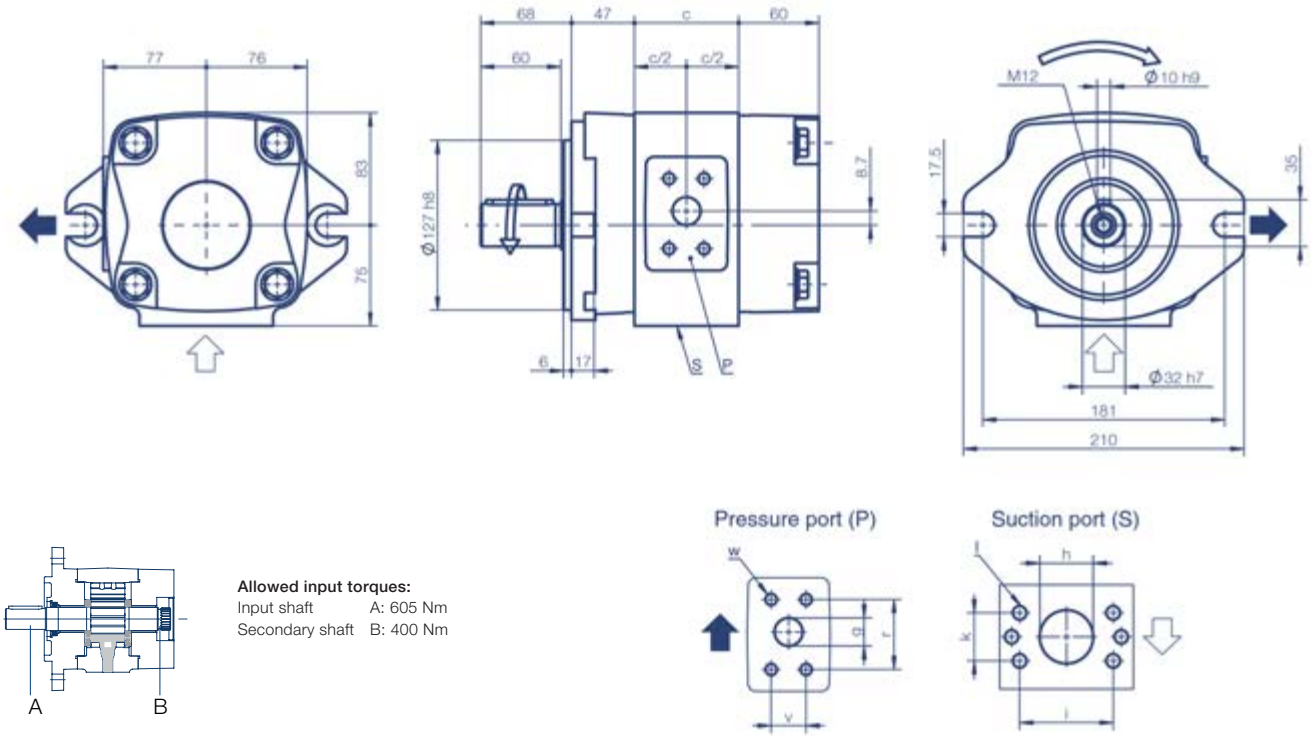


Type/ Delivery	Dimensions and Weight										SAE Flange No.	
	c	g	h	i	k	l	r	v	w	Weight	↑	↓
	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPVAP 4 – 13	48.5	13	23	52.4	26.2	M10x15	38.1	17.5	M8x13	6.8	10	12
IPVAP 4 – 16	52.5	14	25	52.4	26.3	M10x15	38.1	17.5	M8x13	7.2	10	12
IPVAP 4 – 20	58	18	27	58.7	30.2	M10x15	47.5	22	M10x15	7.8	11	13
IPVAP 4 – 25	64	18	30	58.7	30.2	M10x15	47.5	22	M10x15	8.4	11	13
IPVAP 4 – 32	73	18	32	58.7	30.2	M10x15	47.5	22	M10x15	9.2	11	13

IPVAP Size 4, Designs and Dimensions


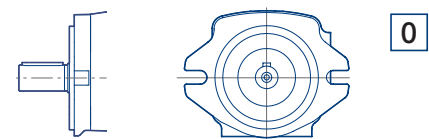
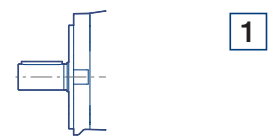
Rotation	Mounting flange	Shaft end
Standard		
Rotation clockwise	SAE 2-hole flange	Parallel shaft with keyway connection
 1	 7	 1

IPVAP Size 5, Rotation and Dimensions

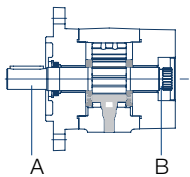
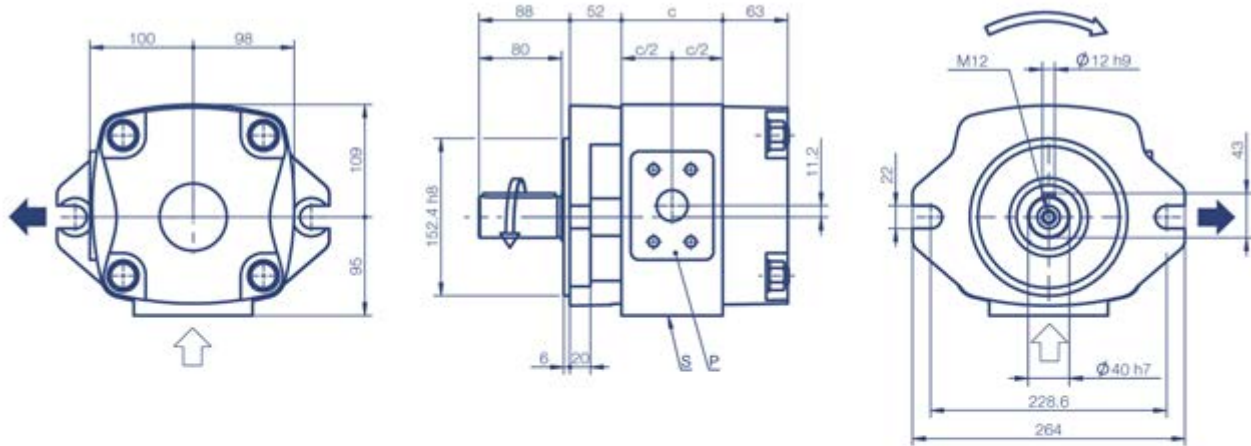


Type/ Delivery	Dimensions and Weight										SAE Flange No.	
	c	g	h	i	k	l	r	v	w	Weight	↑	↓
	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPVAP 5 – 32	65	18	32	58.7	30.2	M10x15	47.5	22	M10x15	14.3	11	13
IPVAP 5 – 40	71	19	35	70	36	M12x20	52.4	26.2	M10x15	15.1	12	30
IPVAP 5 – 50	78	21	40	70	36	M12x20	52.4	26.2	M10x15	16.2	12	30
IPVAP 5 – 64	89	23	40	70	36	M12x20	52.4	26.2	M10x16	17.5	12	30

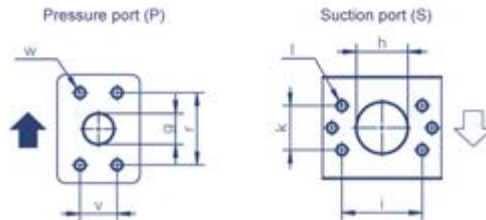
IPVAP Size 5, Designs and Dimensions

Rotation	Mounting flange	Shaft end
Standard		
Rotation clockwise	SAE 2-hole flange,	Parallel shaft with keyway connection
		

IPVAP Size 6, Rotation and Dimensions

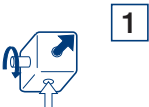
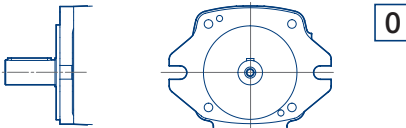
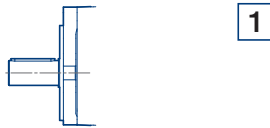


Allowed input torques:
 Input shaft A: 1 050 Nm
 Secondary shaft B: 780 Nm

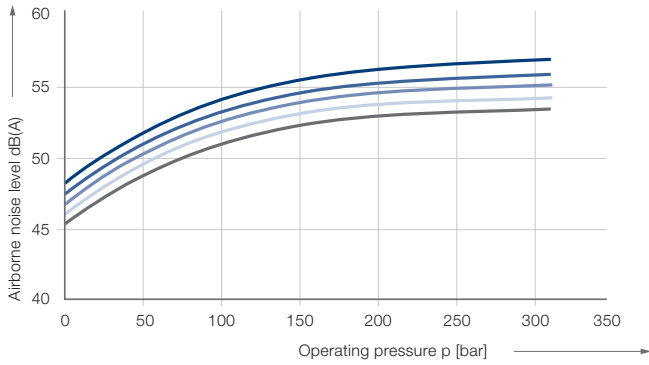


Type/ Delivery	Dimensions and Weight										SAE Flange No.	
	c	g	h	i	k	l	r	v	w	Weight	↑	↓
	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread	[kg]		
IPVAP 6 – 64	80	23	40	70	36	M12x20	52.4	26.2	M10x15	28.1	12	30
IPVAP 6 – 80	88	23	45	77.8	42.9	M12x20	70	36	M12x20	29.6	14	15
IPVAP 6 – 100	98	27	50	77.8	42.9	M12x20	70	36	M12x20	31.5	14	15
IPVAP 6 – 125	110	30	50	77.8	42.9	M12x20	70	36	M12x20	33.9	14	15

IPVAP Size 6, Designs and Dimensions

Rotation	Mounting flange	Shaft end
Standard		
Rotation clockwise	SAE 2-hole flange	Parallel shaft with keyway connection
		

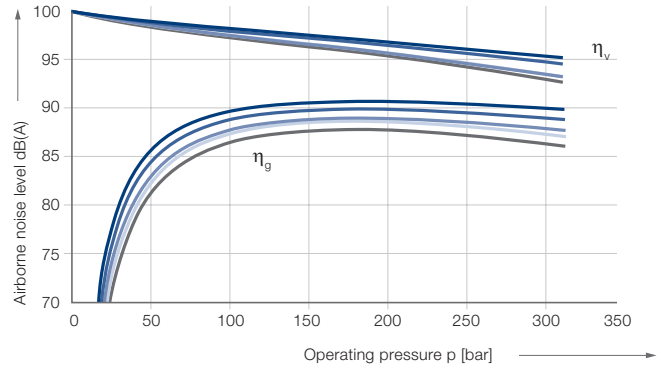
IPVAP 3 – Airborne noise level (measuring location 1 m axial)



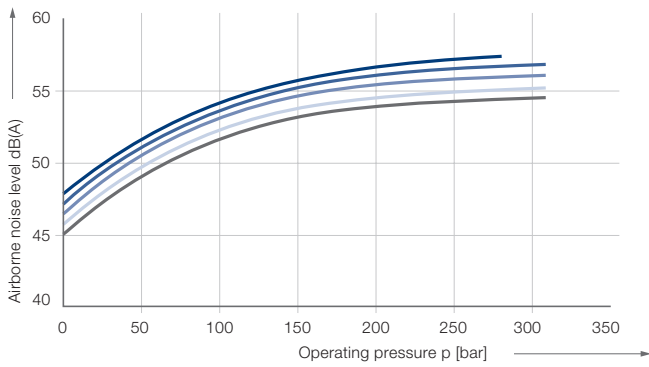
Characteristic curves:

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

IPVAP 3 – Efficiency η_v and η_g



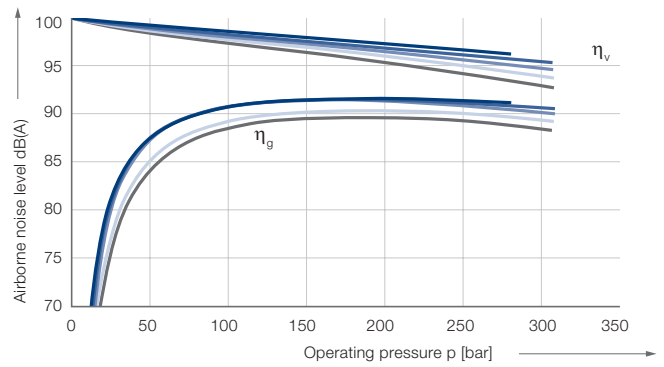
IPVAP 4 – Airborne noise level (measuring location 1 m axial)



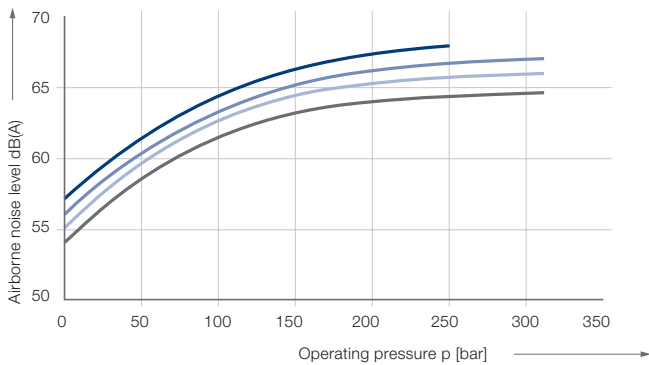
Characteristic curves:

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

IPVAP 4 – Efficiency η_v and η_g



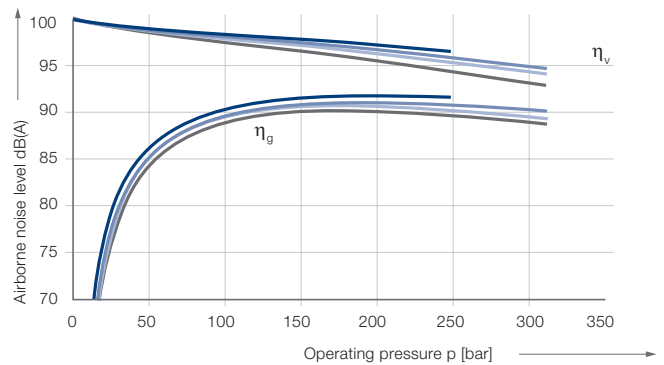
IPVAP 5 – Airborne noise level (measuring location 1 m axial)



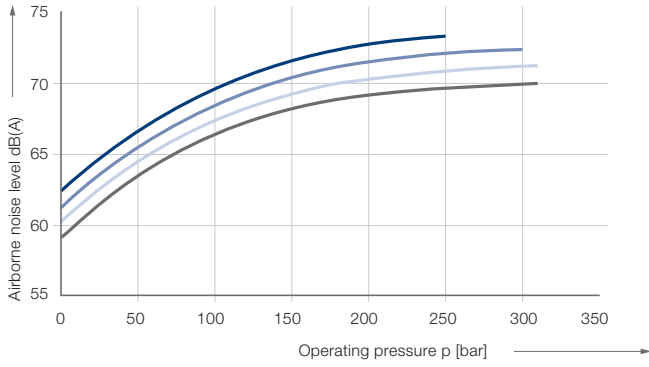
Characteristic curves:

— IPVAP 5 – 64 — IPVAP 5 – 50 — IPVAP 5 – 40 — IPVAP 5 – 32

IPVAP 5 – Efficiency η_v and η_g



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



Characteristic curves:

— IPVAP 6 – 125 — IPVAP 6 – 100 — IPVAP 6 – 80 — IPVAP 6 – 64

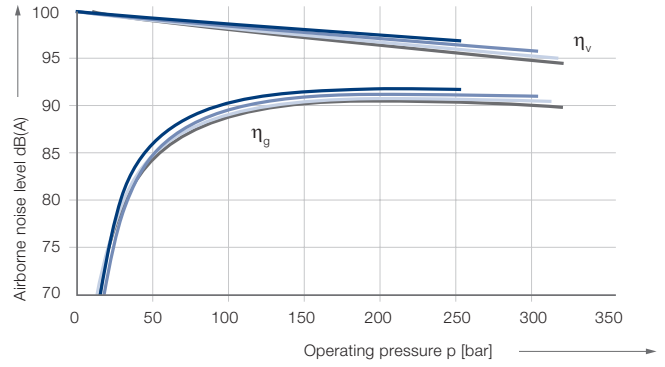
Measurement Conditions:

Speed: 1.500 rpm / Viscosity of pressure fluid: 46 mm²s⁻¹ / Operating temperature: 40 °C

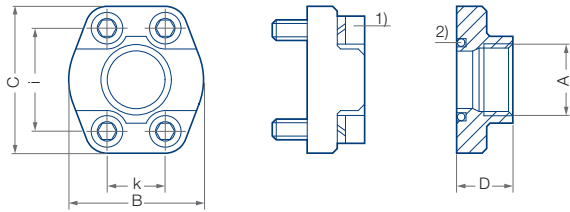
Note:

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

IPVAP 6 – Efficiency η_v and η_g



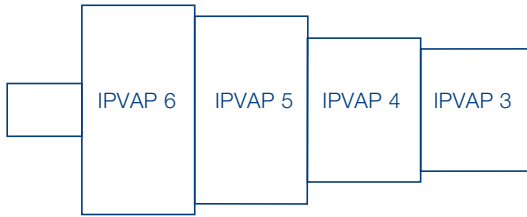
SAE-Flange, SAE J 518 C Code 61, single-piece



Wrench torque for screws according to ISO 6162

- ¹⁾ Round seal ring (O-Ring) ISO-R 1629 NBR
- ²⁾ Screw EN ISO 4762
- 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	22.2	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	70	36	M 12	345 ³⁾
30	G 1-½	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 2-½	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



Pump combinations

- IPVAP 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.

Mounting, assembly

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

Rotation and suction

Mounting flange

Shaft end

clockwise (cw)



1



1

Special design

4



0 SAE-2-hole-flange

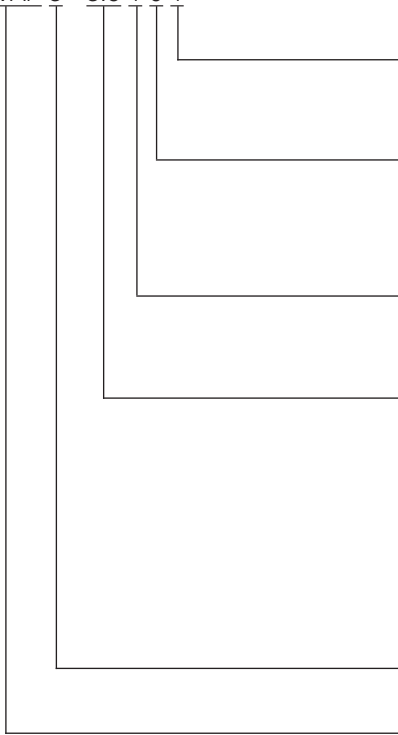
7 SAE-2-hole-flange (variant)



1

Type Code

IPVAP 3 - 3.5 1 0 1



Shaft end

1 Parallel shaft with keyway

Mounting flange

0 SAE 2-hole

7 SAE 2-hole, variant

Rotation, suction port

1 Clockwise rotation, radial suction port radial

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	

Size

Type

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

