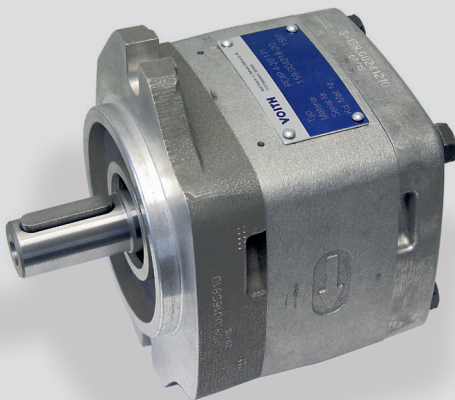
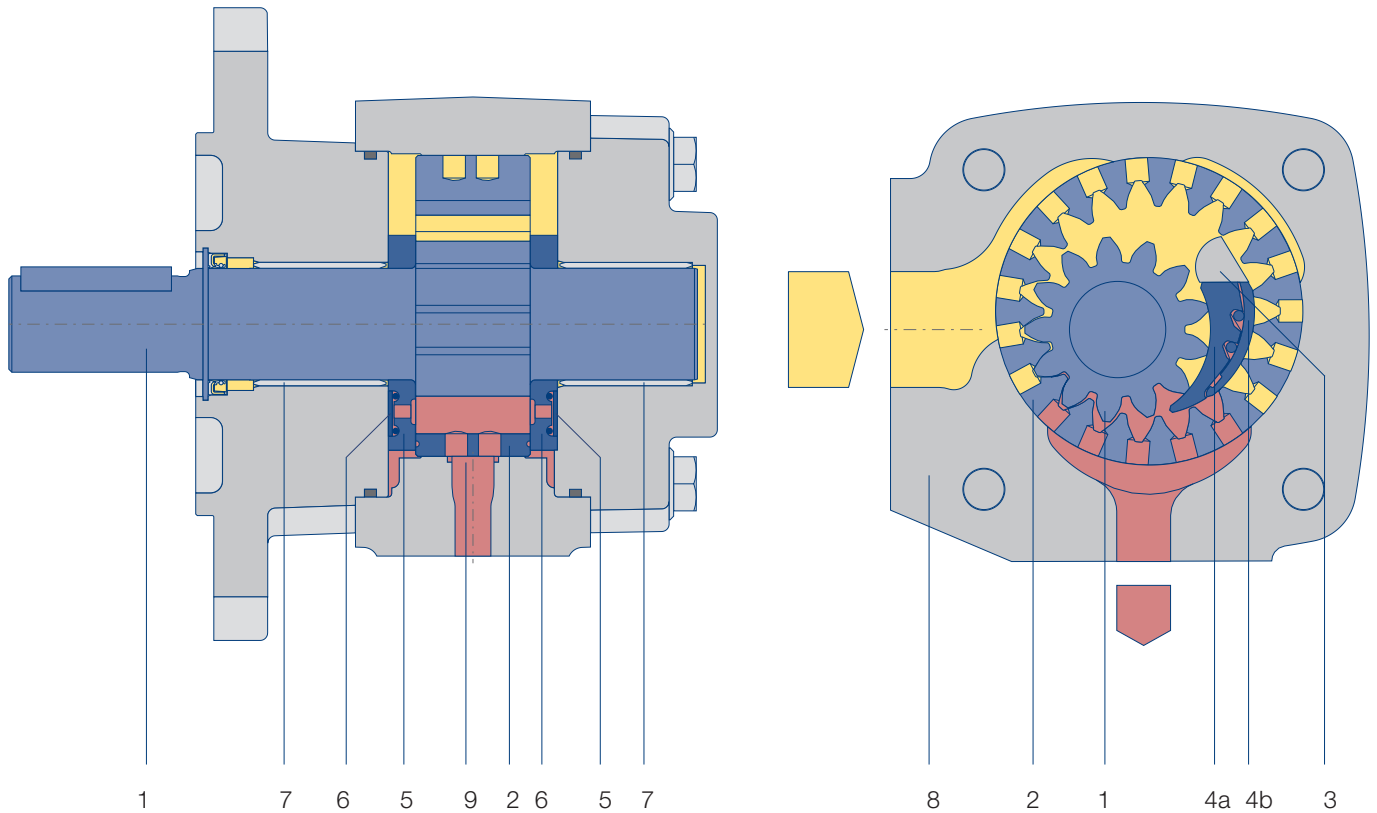


IPCAP Medium-pressure Internal Gear Pumps for Variable Speed Drives Technical Data Sheet



Design and 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 | |
| 5 Axial disc | |

- 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 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	IPCAP
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 min ⁻¹
Permissible start viscosity	10 ... 100 mm ² s ⁻¹ (cSt), up to n _{max}
Permissible temperature of the pressure fluid	-10 ... + 80 °C
Required purity of the pressure fluid according to NAS 1638	Class 20 / 18 / 15 (ISO 4406), Class 9 (NAS 1638)
Filtration	Filtration quotient min. β ₂₀ ≥ 75, recommended β ₁₀ ≥ 100 (longer life)
Permissible ambient temperature	-10 ... + 60 °C

Calculations

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

Characteristic Values

	Displacement per revolution	Speed		Delivery at 1500 min ⁻¹	Continuous pressure	Peak pressure at 1500 min ⁻¹	Moment of inertia
		min.	max.				
	[cm ³]	[min ⁻¹]	[min ⁻¹]	[l/min]	[bar]	[bar]	[kg cm ²]
IPCAP 3 – 3.5	3.6	400	3600	5.4	210	250	0.34
IPCAP 3 – 5	5.2	400	3600	7.8	210	250	0.42
IPCAP 3 – 6.3	6.4	400	3600	9.6	210	250	0.49
IPCAP 3 – 8	8.2	400	3600	12.3	210	250	0.58
IPCAP 3 – 10	10.2	400	3600	15.3	210	250	0.70
IPCAP 4 – 13	13.3	400	3600	19.9	210	250	2.25
IPCAP 4 – 16	15.8	400	3600	23.7	210	250	2.64
IPCAP 4 – 20	20.7	400	3600	31.0	210	250	3.29
IPCAP 4 – 25	25.4	400	3600	38.1	210	250	3.70
IPCAP 4 – 32	32.6	400	3600	48.9	210	250	4.44
IPCAP 5 – 40	41.0	400	3000	61.5	210	250	10.20
IPCAP 5 – 50	50.3	400	3000	75.4	210	250	11.60
IPCAP 5 – 64	64.9	400	3000	97.3	210	250	14.40
IPCAP 6 – 80	80.7	400	2600	121.0	210	250	30.90
IPCAP 6 – 100	101.3	400	2600	151.9	210	250	36.10
IPCAP 6 – 125	126.2	400	2600	189.3	210	250	43.70

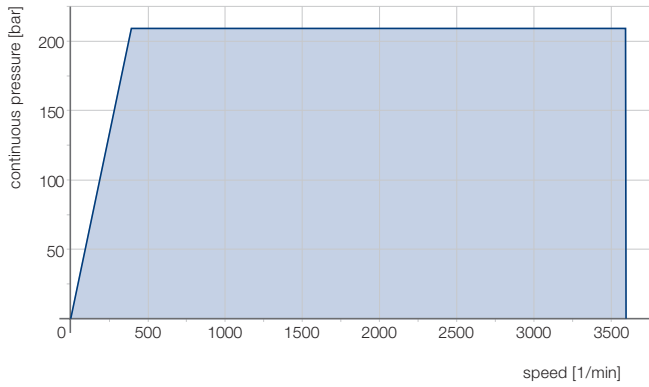
The values given apply for:

- 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 consult us about peak pressures at non-standard speeds.
- Due to production tolerances, the pump volume may be reduced by up to 1.5%.
- **The values for min. and max. speed are dependent on pressure!**
- Please see exact dates on the diagrams from the following pages. At speeds below 400 1/min the pressure must be reduced according to the curve. At high speeds, this may be the case.
- The pump can be temporarily operating below the specified minimum speed in pressure-hold function. The holding time and the rotational speed required for this purpose is obtained in dependence of the viscosity and of the operating pressure levels. For design details, please contact the Voith Turbo H + L Hydraulic technical sales team.

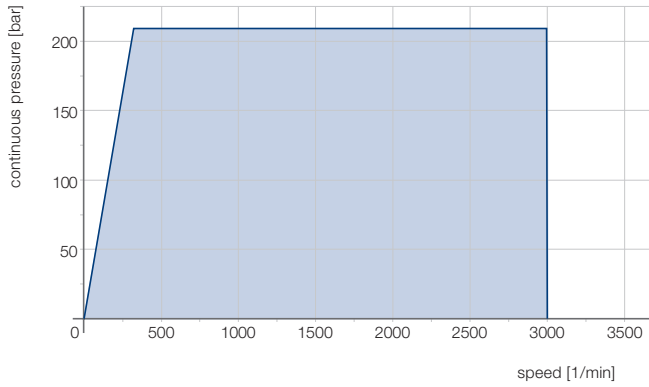
Diagram IPCAP 3, IPCAP 4 - Continuous pressure depending on the speed



Characteristic curve:

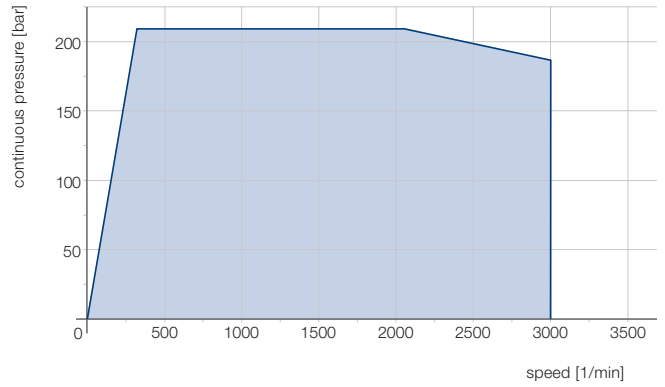
— IPCAP 3 – 3.5; IPCAP 3 – 5; IPCAP 3 – 6.3; IPCAP 3 – 8; IPCAP 3 – 10
 IPCAP 4 – 13; IPCAP 4 – 16; IPCAP 4 – 20; IPCAP 4 – 25; IPCAP 4 – 32

Diagram IPCAP 5 - Continuous pressure depending on the speed



Characteristic curve:

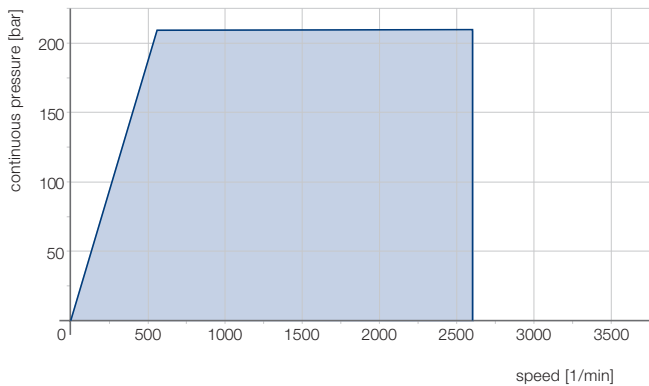
— IPCAP 5 – 32; IPCAP 5 – 40; IPCAP 5 – 50



Characteristic curve:

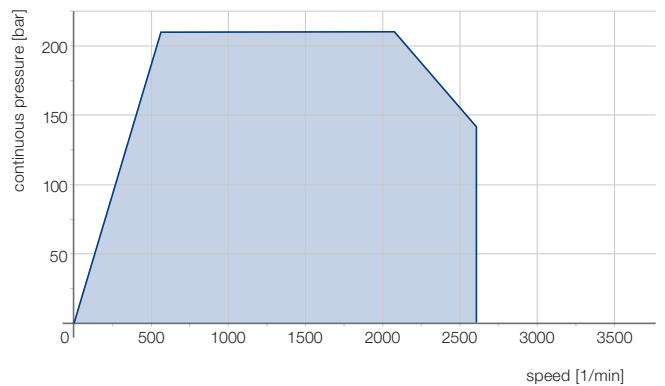
— IPCAP 5 – 64

Diagram IPCAP 6 - Continuous pressure depending on the speed



Characteristic curve:

— IPCAP 6 – 80; IPCAP 6 – 100;

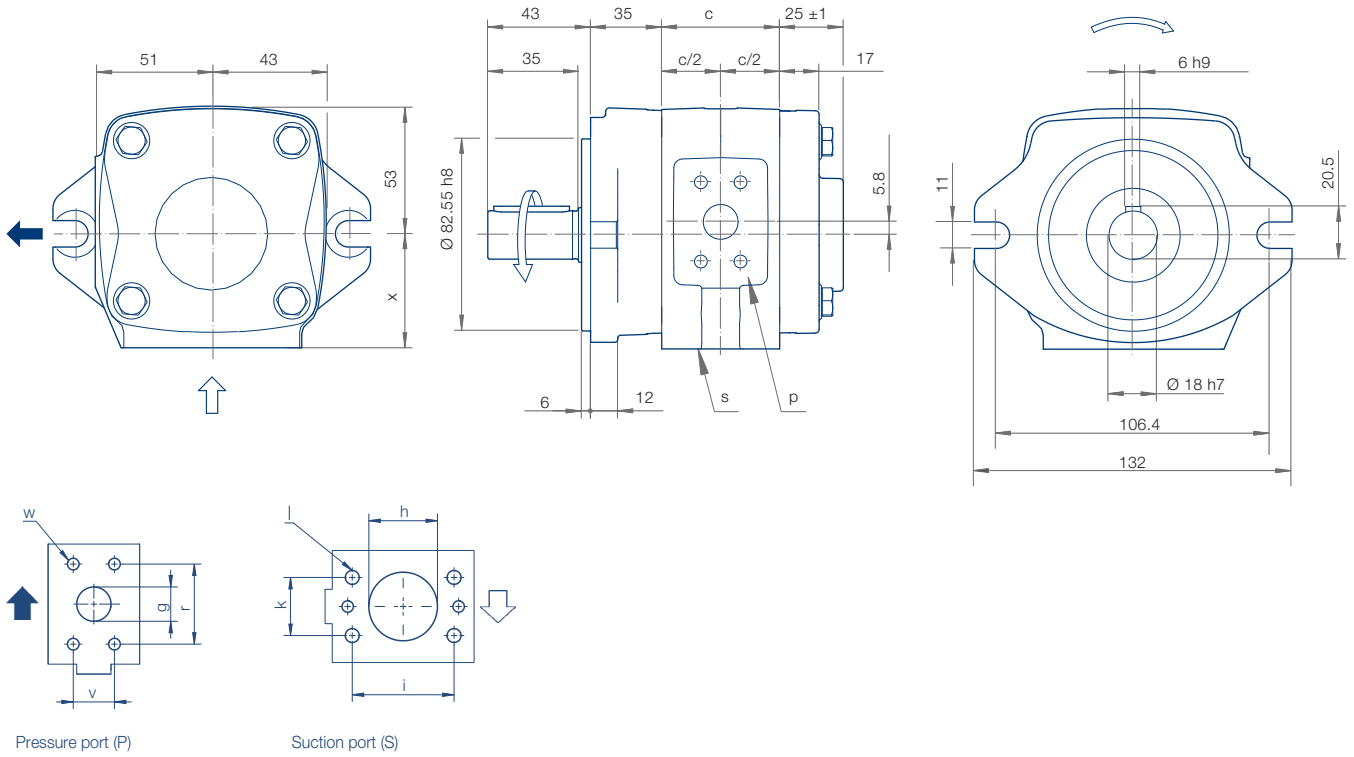


Characteristic curve:

— IPCAP 6 – 125

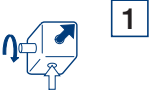
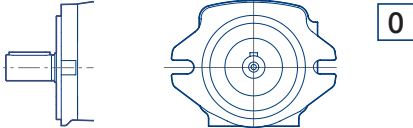
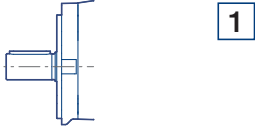
■ range of continuous pump operation

IPCAP Size 3, Rotation and Dimensions

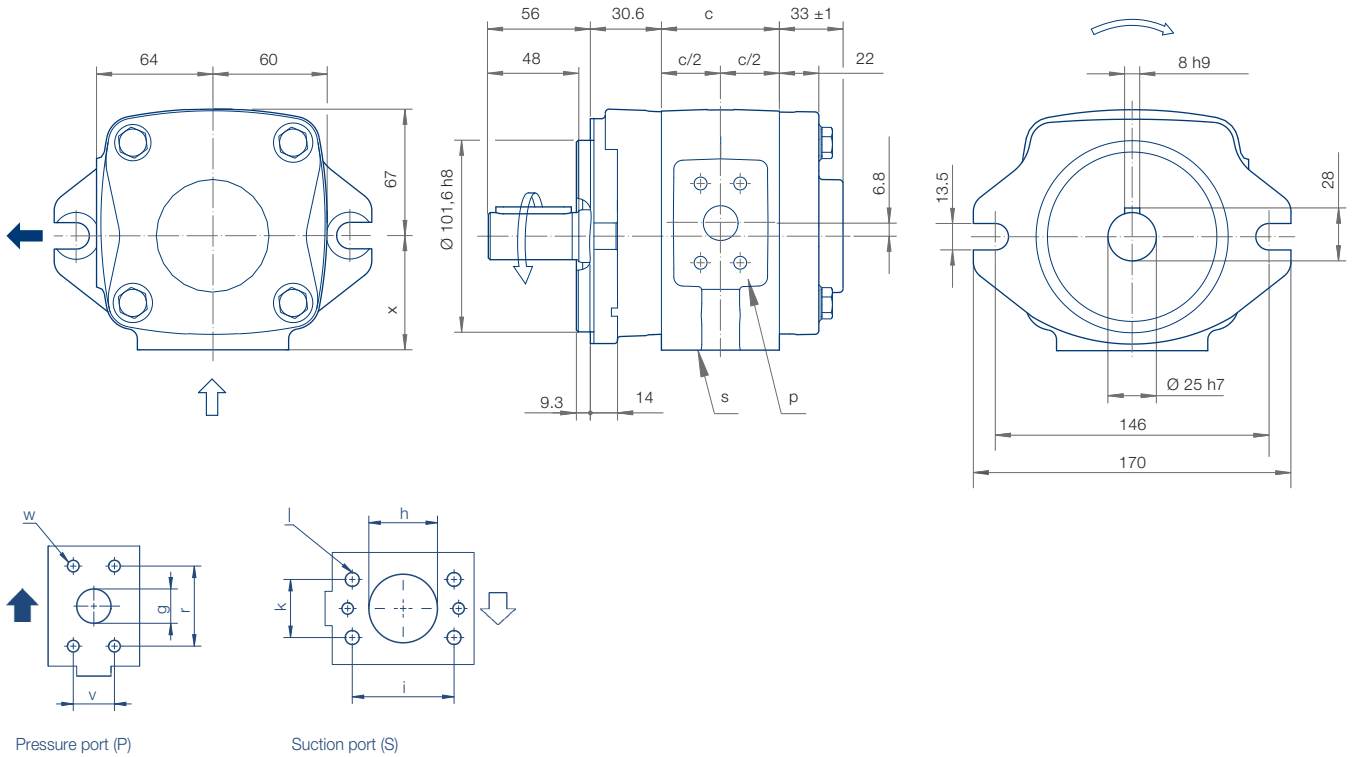


Type/ Delivery	Dimensions										Weight [kg]	SAE-Flange-No.	
	c	x	g	h	i	k	l	r	v	w		↑	↓
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread			
IPCAP 3 – 3.5	35	47.2	9	15	38.1	17.5	M8x13	38.1	17.5	M8x15	2.6	10	10
IPCAP 3 – 5	39	47.2	11	15	38.1	17.5	M8x13	38.1	17.5	M8x15	2.8	10	10
IPCAP 3 – 6.3	42	50.2	11	20	47.6	22.3	M10x15	38.1	17.5	M8x15	2.9	10	11
IPCAP 3 – 8	46.5	50.2	13	25	52.4	26.2	M10x15	38.1	17.5	M8x15	3.0	10	12
IPCAP 3 – 10	51.5	51.2	13	25	52.4	26.2	M10x15	38.1	17.5	M8x15	3.1	10	12

IPCAP 3, Design

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

IPCAP 4, Rotation and Dimensions



Type/ Delivery	Dimensions										Weight [kg]	SAE-Flange-No.	
	c	x	g	h	i	k	l	r	v	w		↑	↓
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread			
IPCAP 4 – 13	48.5	57.2	14	25	52.4	26.2	M10x15	38.1	17.5	M8x15	5.5	10	12
IPCAP 4 – 16	52.5	57.2	18	30	58.7	30.2	M10x15	47.6	22.3	M10x15	5.7	11	13
IPCAP 4 – 20	58	57.2	18	30	58.7	30.2	M10x15	47.6	22.3	M10x15	6.0	11	13
IPCAP 4 – 25	64	63.2	18	40	69.9	35.7	M12x20	47.6	22.3	M10x15	6.2	11	30
IPCAP 4 – 32	73	63.2	18	40	69.9	35.7	M12x20	47.6	22.3	M10x15	6.7	11	30

IPCAP 4, Design

Rotation

Mounting flange

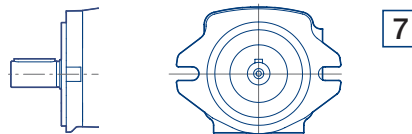
Shaft end

Standard

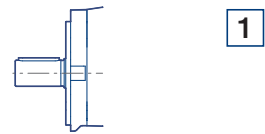
Rotation clockwise



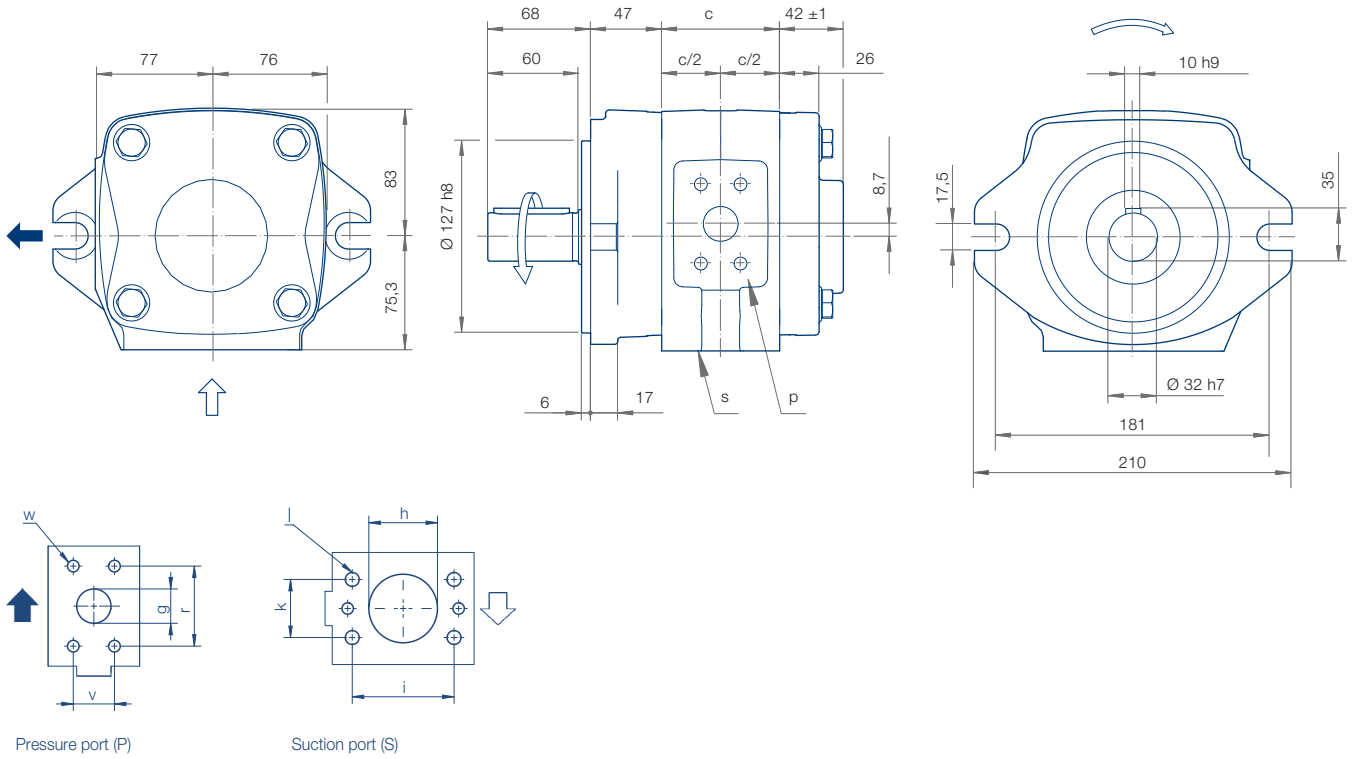
SAE 2-hole flange



Parallel shaft with keyway connection


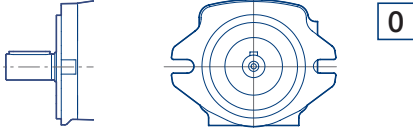
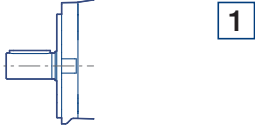


IPCAP 5, Rotation and Dimensions

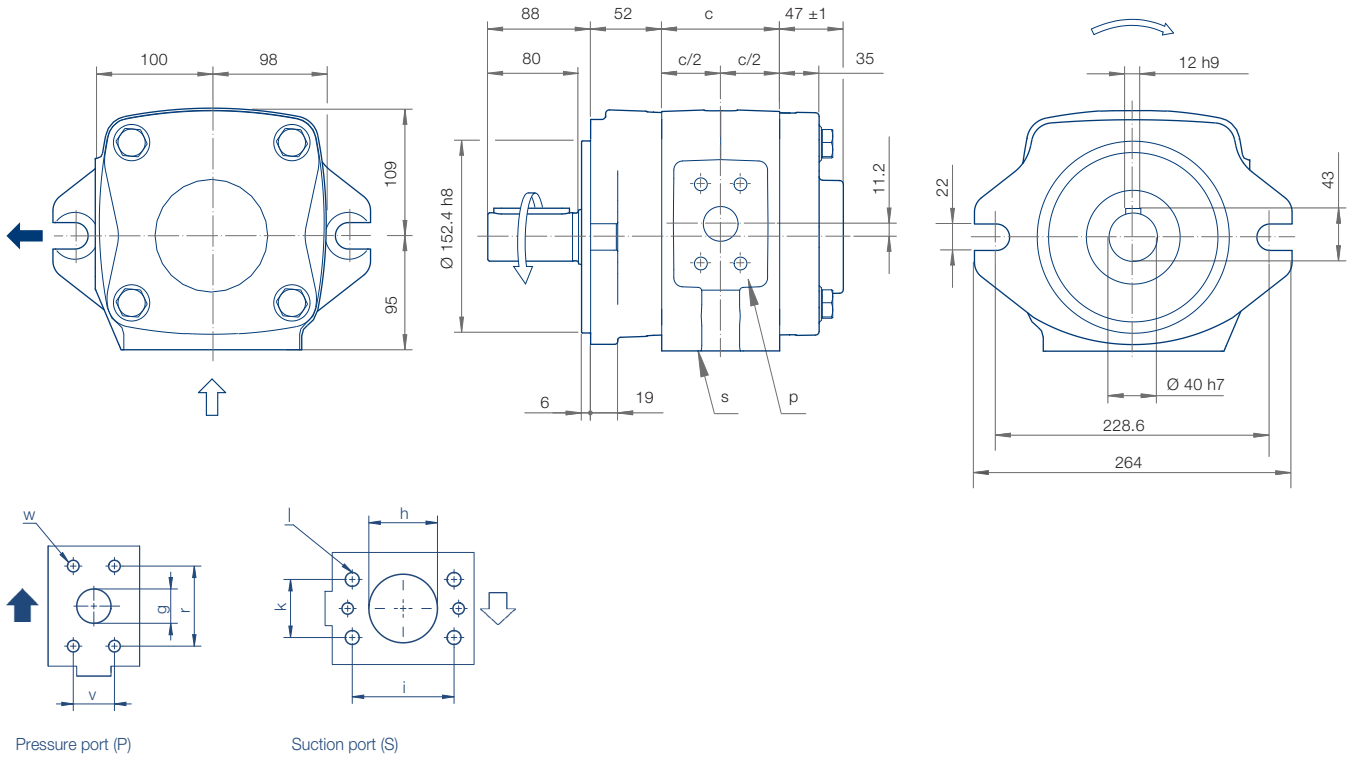


Type/ Delivery	Dimensions									Weight [kg]	SAE-Flange-No.	
	c [mm]	g [mm]	h [mm]	i [mm]	k [mm]	l Thread	r [mm]	v [mm]	w Thread		▲	▼
IPCAP 5 – 40	71	19	40	69.9	35.7	M12x20	52.4	26.2	M10x15	11.6	12	30
IPCAP 5 – 50	78	23	45	77.8	42.9	M12x20	52.4	26.2	M10x15	12.2	12	15
IPCAP 5 – 64	89	23	45	77.8	42.9	M12x20	52.4	26.2	M10x15	13.1	12	15

IPCAP 5, Design


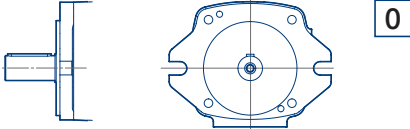
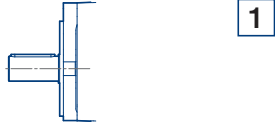
Rotation	Mounting flange	Shaft end
Standard		
Rotation clockwise	SAE 2-hole flange	Parallel shaft with keyway connection
		

IPCAP 6, Rotation and Dimensions

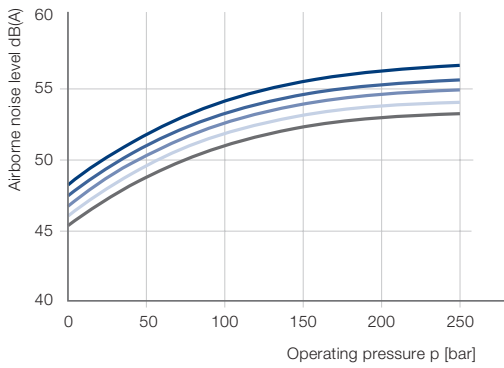


Type/ Delivery	Dimensions									Weight [kg]	SAE-Flange-No.	
	c	g	h	i	k	l	r	v	w		▲	▼
	[mm]	[mm]	[mm]	[mm]	[mm]	Thread	[mm]	[mm]	Thread			
IPCAP 6 – 80	88	25	50	77.8	42.9	M12 x 20	69.9	35.7	M12 x 20	22.2	14	15
IPCAP 6 – 100	98	30	60	88.9	50.8	M12 x 20	69.9	35.7	M12 x 20	23.2	14	16
IPCAP 6 – 125	110	30	60	88.9	50.8	M12 x 20	69.9	35.7	M12 x 20	24.7	14	16

IPCAP 6, Design

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

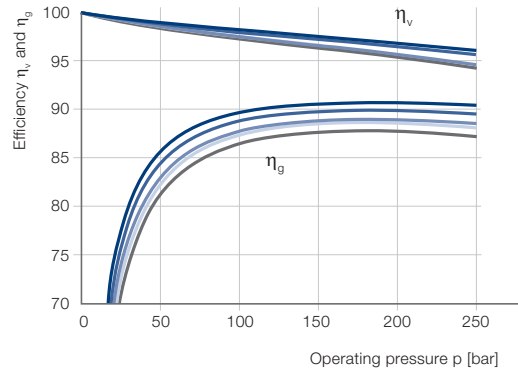
IPCAP 3 – Airborne noise level (measuring location 1 m axial)



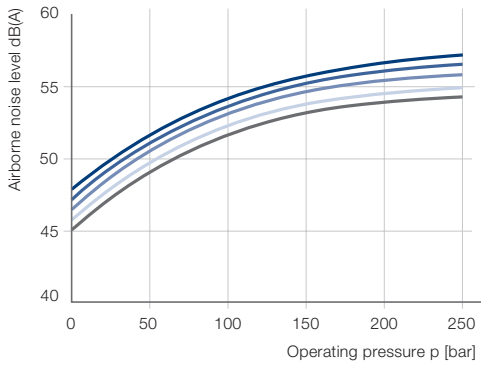
Characteristic curves:

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

IPCAP 3 – Efficiency η_v and η_g



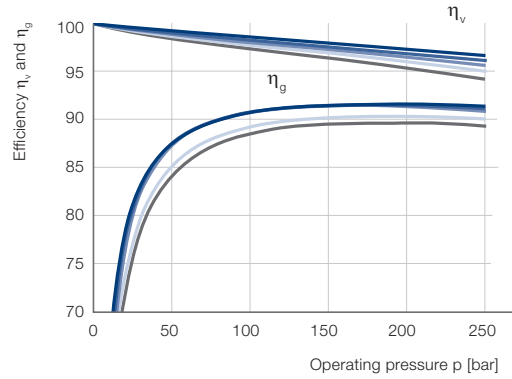
IPCAP 4 – Airborne noise level (measuring location 1 m axial)



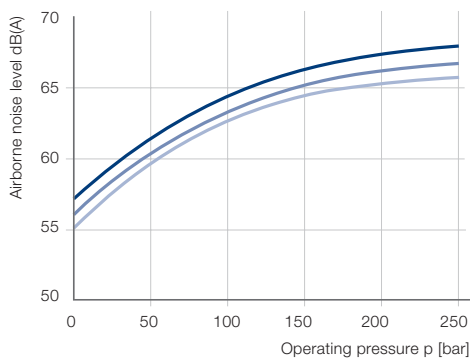
Characteristic curves:

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

IPCAP 4 – Efficiency η_v and η_g



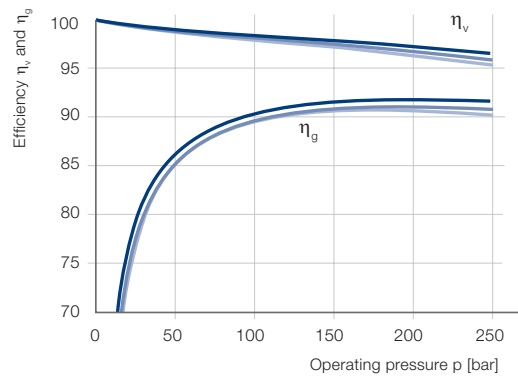
IPCAP 5 – Airborne noise level (measuring location 1 m axial)



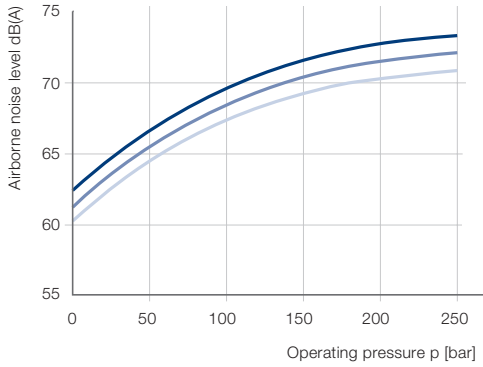
Characteristic curves:

— IPCAP 5 – 64 — IPCAP 5 – 50 — IPCAP 5 – 40

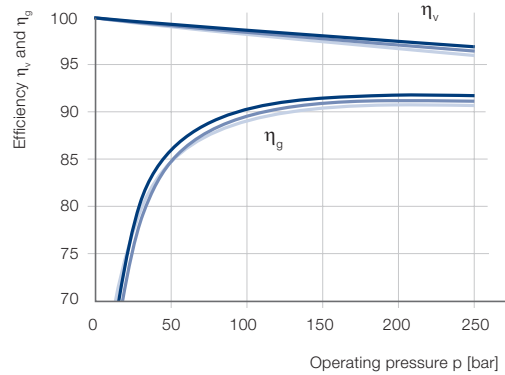
IPCAP 5 – Efficiency η_v and η_g



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



IPCAP 6 – Efficiency η_v and η_g



Characteristic curves:

— IPCAP 6 – 125 — IPCAP 6 – 100 — IPCAP 6 – 80

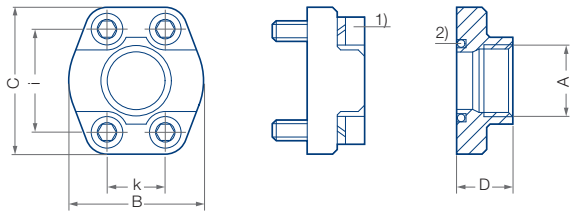
Measurement Conditions:

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.

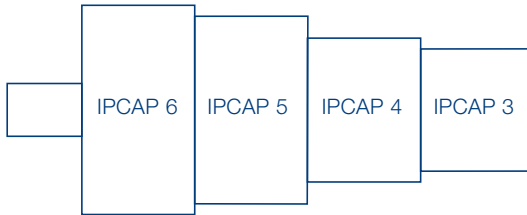
SAE-Flange, SAE J 518 C Code 61, single-piece



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 1/2	46	54	36	18.66 – 3.53	38.1	17.5	M 8	345
11	G 3/4	50	65	36	24.99 – 3.53	47.6	22.3	M 10	345
12	G 1	55	70	38	32.92 – 3.53	52.4	26.2	M 10	345
13	G 1-1/4	68	79	41	37.69 – 3.53	58.7	30.2	M 10	276
14 ³⁾	G 1-1/2	82	98	50	47.22 – 3.53	69.9	35.7	M 12	345 ³⁾
30	G 1-1/2	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 2-1/2	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



Pump combinations

- IPCAP 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

clockwise (cw) 



1



1

Special design

4

Mounting flange



0 SAE-2-hole-flange

7 SAE-2-hole-flange (variant)

Shaft end



1

Type Code

IPCAP 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	40	50	64		
6	80	100	125		

Size

Type

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Legally binding language version of document: german.

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