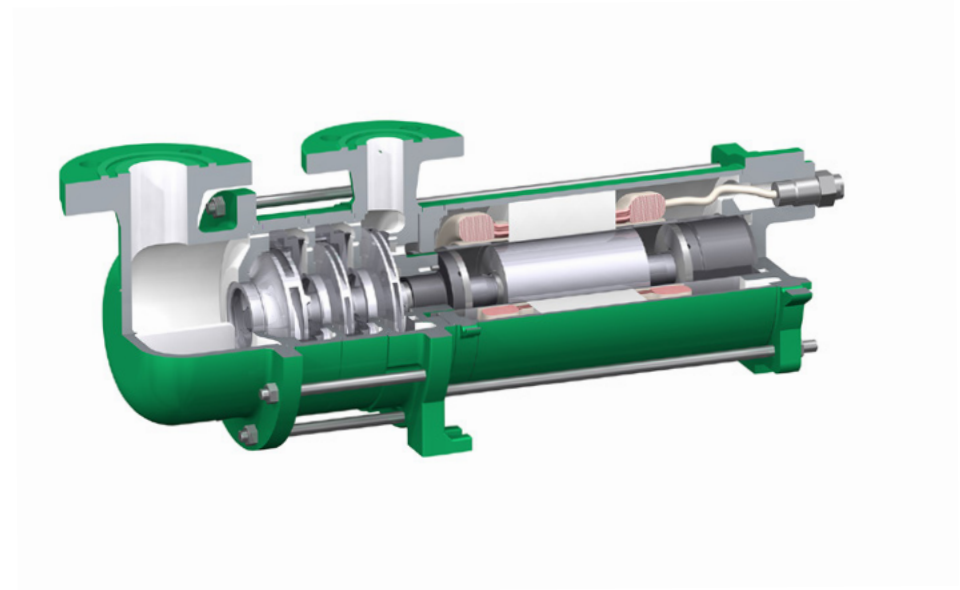
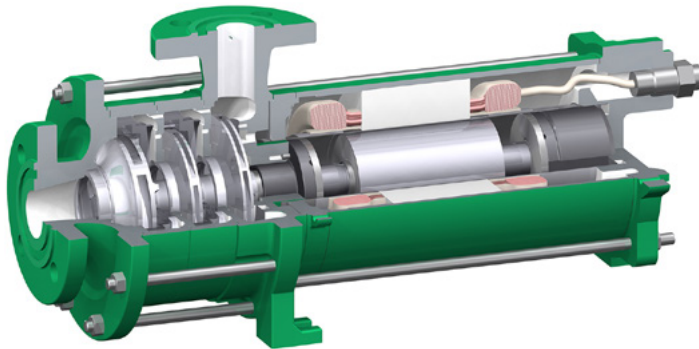


PRODUCT INFORMATION
CANNED MOTOR PUMP TYPE CAM / CAMR

REFRIGERATION ENGINEERING



ZART®

simply best balance

Table of Contents

General information	3	CAM 3	18
Pump and hydraulics designations	4	List of parts CAM 3	18
Function	5	Dimension drawing for motors of size: AGX 8.5 / CKPx 12.0 / CKPx 19.0	19
Operating principle	6	Versions CAM 3	20
Bearings	6	Documentation and tests	21
Characteristic maps	7	Installation	22
2900 rpm 50 Hz	7	Protection and monitoring	23
3500 rpm 60 Hz	8	Orifice and inducer	23
Versions	9	Flow regulation	24
Material version S1 ductile iron	9	Flow regulator	24
Material version A8 stainless steel	10	Design software	27
Materials / pressure stages / flanges	11	Design software / services	27
CAM 1 / CAM 2	12	Benefits of the design software	28
List of parts CAM 1 / CAM 2	12	Contact	29
Dimension drawing for motors of size: AGX 1.0 / AGX 3.0 / AGX 4.5 / AGX 6.5	13		
Versions CAM 1	14		
Versions CAM 2	14		
CAMR 2	15		
List of parts CAMR 2	15		
Dimension drawing for motors of size: AGX 3.0 / AGX 4.5 / AGX 6.5	16		
Versions CAMR 2	17		



Table of Contents

General information
Function
Operating principle
Characteristic maps
Versions
CAM 1 / CAM 2
CAMR 2
CAM 3
Documentation and tests
Installation
Protection and monitoring
Flow regulation
Design software
Contact

Information

Applications

- Food industry: Cooling and deep-freezing with natural and synthetic refrigerants
- Sports and leisure facilities, such as: Bobsled tracks, ice rinks or ice hockey stadiums
- Electronics and power converters: modules in mobile (railway) and stationary (offshore wind turbines) applications
- Cooling modules in the chemical industry (optionally in explosion-proof design)
- Freeze-drying and oil-cooling systems for transformers
- CO₂ cooling for mainframes and server centres
- Absorption refrigeration applications with lithium bromide and NH₃

Pumped media

Liquids and liquefied gases, such as NH₃ (R717), CO₂ (R744), R22, R134a, hydrocarbons, R404a, R11, R12, Baysilone (M3, M5), methanol, silicone oil KT3, Syltherm XLT, water glycol mixtures. In principle, the refrigerant pumps are suitable for conveying all types of refrigerant. However, this must be checked for each case.

Type / design

Horizontal, seal-less section-type pumps with completely closed canned motor, with radial impellers, multi-stage, single-flow.

Canned motor pump type CAM

This pump is suitable for conveying liquids near vapour pressure and for standard applications.

Canned motor pump type CAMR

The CAMR pump with radial suction port is particularly suitable for compact systems with small collecting tanks. Due to the degassing on the suction side, the pump is ready for operation sooner after switching off. The pump can be suspended directly under the tank to save space.

Drive

The rotor lining – one of our core competencies – is manufactured by impact extrusion and, as a nickel-based alloy, is an essential component of the highly efficient canned motor. The liquid-filled canned motor accelerates to operating speed within seconds and operates wear-free and maintenance-free in continuous operation due to the hydrodynamic plain bearings. The canned motor is low-noise and low-vibration and offers double security against leakage.

Materials

S1 material version in ductile iron is used as standard. For low-temperature applications below –50 °C, critical fluids or CO₂ / LCO₂ applications for food industry, the CAM1 and CAM2 series are also available in the material version A8 stainless steel.

Food contact / EC 1935/2004

Declaration of conformity for CO₂ / LCO₂ applications, material version A8 stainless steel necessary.

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact



Information

Operating data

Temperature

Standard area of application	–50 °C to +30 °C for material version S1 ductile iron –90 °C to +30 °C for material version A8 stainless steel
------------------------------	---

Canned motors

Output	up to 25.0 kW
Speed	2800 rpm or 3500 rpm (frequency control possible – with frequency converter from 1500 rpm to 3500 rpm)
Voltage	230, 400, 480, 500, 575, 690 Volt
Frequency	50 Hz or 60 Hz
Type of protection	IP 55

Pump and hydraulics designations

CAM 2 / 3 AGX 3.0

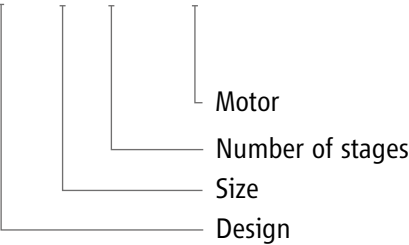


Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

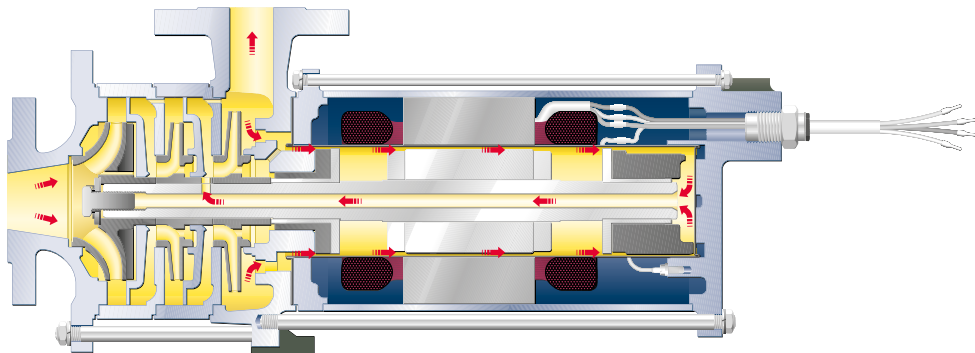
Design software

Contact

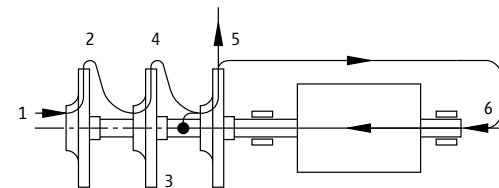


CAM function

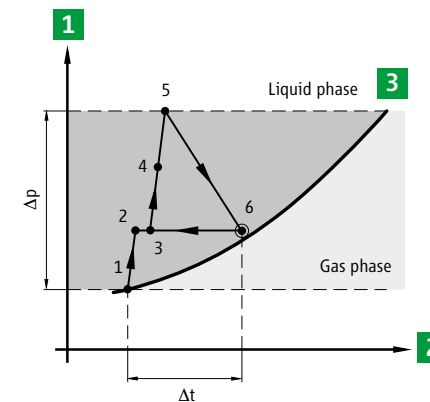
The partial flow for cooling the motor and lubricating the bearing is taken from the pressure side after the last impeller and passed through the motor chamber. The partial flow is not returned to the suction side of the pump through the hollow shaft but to an area with increased pressure between two impellers. Therefore, point 3 in the pressure-temperature diagram that corresponds to the greatest heating has sufficient distance from the vapour pressure curve to prevent gasification within the pump.



Partial flow return between the stages



Pressure-temperature diagram



- 1 Pressure
- 2 Temperature
- 3 Vapour pressure curve

[Table of Contents](#)

[General information](#)

Function

[Operating principle](#)

[Characteristic maps](#)

[Versions](#)

[CAM 1 / CAM 2](#)

[CAMR 2](#)

[CAM 3](#)

[Documentation and tests](#)

[Installation](#)

[Protection and monitoring](#)

[Flow regulation](#)

[Design software](#)

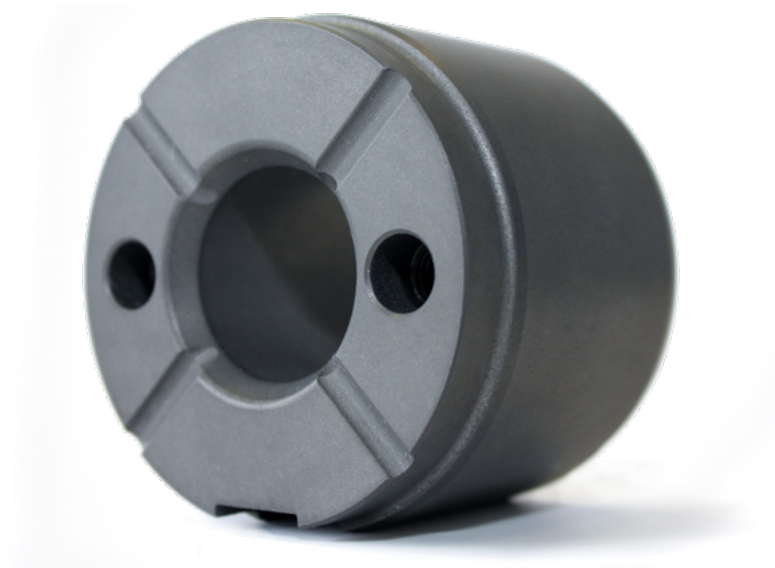
[Contact](#)



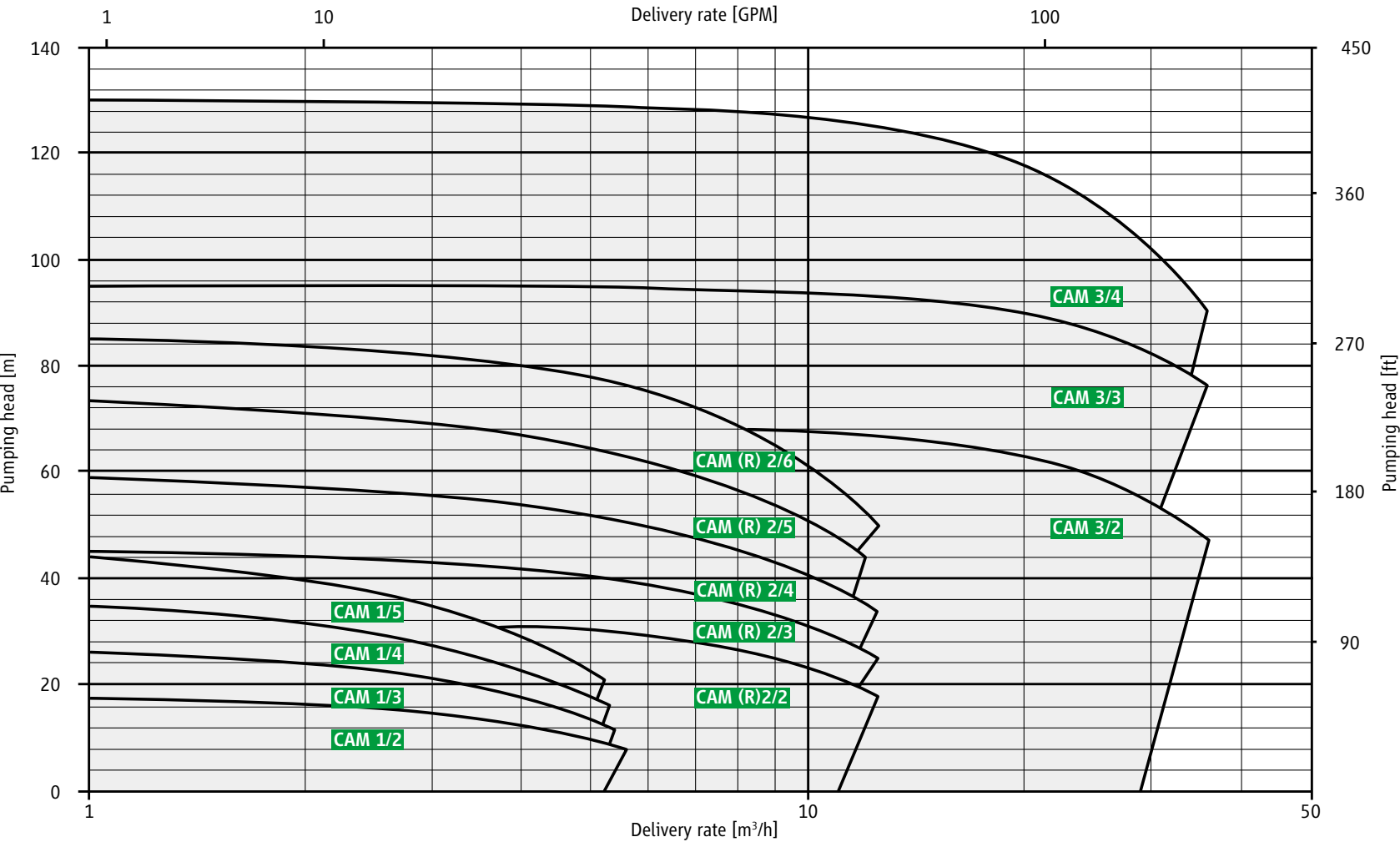
Bearings

The hermetically sealed design requires the arrangement of bearings in the pumped liquid. Therefore, only hydrodynamic plain bearings are used in HERMETIC pumps. With correct operational mode, these bearings have the advantage that there is no contact between the bearing sliding surfaces. As a result, they are wear-free and maintenance-free in continuous operation. A service life of 20 years is common for hermetically sealed pumps.

In refrigeration engineering, carbon graphite is used as the bearing bush material that can withstand particularly high radial and axial loads. In addition, the material has a high resistance to elevated and low temperatures and high fatigue strength.

[Table of Contents](#)[General information](#)[Function](#)[Operating principle](#)[Characteristic maps](#)[Versions](#)[CAM 1 / CAM 2](#)[CAMR 2](#)[CAM 3](#)[Documentation and tests](#)[Installation](#)[Protection and monitoring](#)[Flow regulation](#)[Design software](#)[Contact](#)

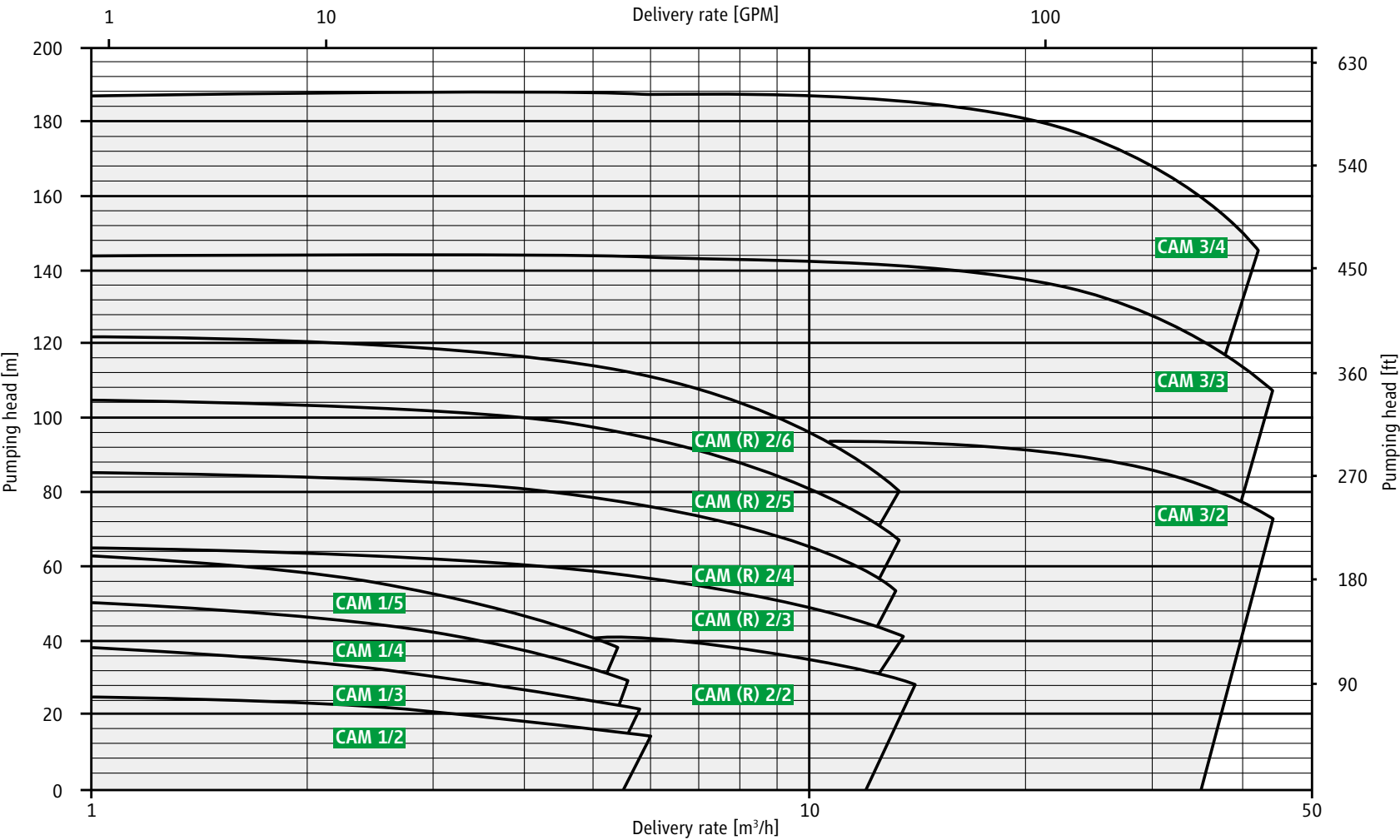
2900 rpm 50 Hz



- Table of Contents
- General information
- Function
- Operating principle
- Characteristic maps**
- Versions
 - CAM 1 / CAM 2
 - CAMR 2
 - CAM 3
- Documentation and tests
- Installation
- Protection and monitoring
- Flow regulation
- Design software
- Contact



3500 rpm 60 Hz



- Table of Contents
- General information
- Function
- Operating principle
- Characteristic maps**
- Versions
 - CAM 1 / CAM 2
 - CAMR 2
 - CAM 3
- Documentation and tests
- Installation
- Protection and monitoring
- Flow regulation
- Design software
- Contact



Versions CAM / CAMR / Material version S1 ductile iron

Type	Motor	Pump data		Motor data 50 Hz / 60 Hz		Standard temperatures	Weight kg (approx.)	PN
		Q _{min} m³/h	Q _{max} m³/h	Output kW [P2]	Rated current at 400 V / 480 V			
CAM 1/2	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−50 °C to +30 °C	27.0	40
CAM 1/3	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−50 °C to +30 °C	28.0	40
CAM 1/4	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−50 °C to +30 °C	29.0	40
CAM 1/5	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−50 °C to +30 °C	30.0	40
CAM (R) 2/2	AGX 3.0	1.0	13.0	3.0 / 3.4	7.1	−50 °C to +30 °C	48.0	40
CAM (R) 2/2	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−50 °C to +30 °C	56.0	40
CAM (R) 2/3	AGX 3.0	1.0	13.0	3.0 / 3.4	7.1	−50 °C to +30 °C	52.0	40
CAM (R) 2/3	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−50 °C to +30 °C	60.0	40
CAM (R) 2/3	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−50 °C to +30 °C	63.0	40
CAM (R) 2/4	AGX 3.0	1.0	14.0	3.0 / 3.4	7.1	−50 °C to +30 °C	56.0	40
CAM (R) 2/4	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−50 °C to +30 °C	68.0	40
CAM (R) 2/4	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−50 °C to +30 °C	71.0	40
CAM (R) 2/5	AGX 3.0	1.0	14.0	3.0 / 3.4	7.1	−50 °C to +30 °C	60.0	40
CAM (R) 2/5	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−50 °C to +30 °C	74.0	40
CAM (R) 2/5	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−50 °C to +30 °C	77.0	40
CAM (R) 2/6	AGX 3.0	1.0	14.0	3.0 / 3.4	7.1	−50 °C to +30 °C	64.0	40
CAM (R) 2/6	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−50 °C to +30 °C	78.0	40
CAM (R) 2/6	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−50 °C to +30 °C	81.0	40
CAM 3/2	AGX 8.5	6.0	30.0	8.5 / 9.7	19.0	−50 °C to +30 °C	120.0	40
CAM 3/2	CKPx 12.0	6.0	30.0	13.5 / 15.7	31.0	−50 °C to +30 °C	150.0	25 / 40
CAM 3/3	AGX 8.5	6.0	30.0	8.5 / 9.7	19.0	−50 °C to +30 °C	138.0	40
CAM 3/3	CKPx 12.0	6.0	30.0	13.5 / 15.7	31.0	−50 °C to +30 °C	168.0	25 / 40
CAM 3/3	CKPx 19.0	6.0	30.0	22.0 / 25.0	49.5	−50 °C to +30 °C	213.0	25 / 40
CAM 3/4	CKPx 12.0	6.0	35.0	13.5 / 15.7	31.0	−50 °C to +30 °C	186.0	25 / 40
CAM 3/4	CKPx 19.0	6.0	35.0	22.0 / 25.0	49.5	−50 °C to +30 °C	231.0	25 / 40

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact



Versions CAM / CAMR / Material version A8 stainless steel

Type	Motor	Pump data		Motor data 50 Hz / 60 Hz		Standard temperatures	Weight kg (approx.)	PN
		Q _{min} m³/h	Q _{max} m³/h	Output kW [P2]	Rated current at 400 V / 480 V			
CAM 1/2	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−90 °C to +30 °C	27.0	40
CAM 1/3	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−90 °C to +30 °C	28.0	40
CAM 1/4	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−90 °C to +30 °C	29.0	40
CAM 1/5	AGX 1.0	0.5	5.0	1.0 / 1.2	2.7	−90 °C to +30 °C	30.0	40
CAM 2/2	AGX 3.0	1.0	13.0	3.0 / 3.4	7.1	−90 °C to +30 °C	48.0	40
CAM 2/2	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−90 °C to +30 °C	56.0	40
CAM 2/3	AGX 3.0	1.0	13.0	3.0 / 3.4	7.1	−90 °C to +30 °C	52.0	40
CAM 2/3	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−90 °C to +30 °C	60.0	40
CAM 2/3	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−90 °C to +30 °C	63.0	40
CAM 2/4	AGX 3.0	1.0	14.0	3.0 / 3.4	7.1	−90 °C to +30 °C	56.0	40
CAM 2/4	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−90 °C to +30 °C	68.0	40
CAM 2/4	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−90 °C to +30 °C	71.0	40
CAM 2/5	AGX 3.0	1.0	14.0	3.0 / 3.4	7.1	−90 °C to +30 °C	60.0	40
CAM 2/5	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−90 °C to +30 °C	74.0	40
CAM 2/5	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−90 °C to +30 °C	77.0	40
CAM 2/6	AGX 3.0	1.0	14.0	3.0 / 3.4	7.1	−90 °C to +30 °C	64.0	40
CAM 2/6	AGX 4.5	1.0	14.0	4.5 / 5.6	10.4	−90 °C to +30 °C	78.0	40
CAM 2/6	AGX 6.5	1.0	14.0	6.5 / 7.5	15.2	−90 °C to +30 °C	81.0	40

[Table of Contents](#)
[General information](#)
[Function](#)
[Operating principle](#)
[Characteristic maps](#)
Versions
[CAM 1 / CAM 2](#)
[CAMR 2](#)
[CAM 3](#)
[Documentation and tests](#)
[Installation](#)
[Protection and monitoring](#)
[Flow regulation](#)
[Design software](#)
[Contact](#)


Materials / pressure stages / flanges

	Material version S1	Material version A8
Pump casing	JS 1025	1.4571
Motor casing	JS 1025	JS 1025 / 1.4571***
Suction cover (suction housing CAMR 2)	JS 1025	Not available
Stage casing (CAM 1, CAM 2, CAMR 2)	1.0460	1.4571
Stage casing (CAM 3)	JS 1025	Not available
Diffuser (guide wheel CAM 3)	JL 1030	1.4581
Impellers	JL 1030	1.4581
Slide bearing	1.4021 / carbon	1 .4021 / carbon
Shaft	1.4021	1 .4021
Rotor lining	1.4571	1 .4571
Seals	AFM 34*	AFM 34*
Pressure rating	PN 40**, PN 25 (for motors CKPx 12.0 and CKPx 19.0)	PN 25**
Flanges	according to DIN EN 1092-1, PN 40 and PN 25 type D	according to DIN EN 1092-1, PN 25 type D

* Asbestos-free aramid fibre, ** Test pressure with 1.5 times nominal pressure, *** Motor casing optional in JS 1025 or 1.4571

Noise expectancy values

Motors	AGX 1.0	AGX 3.0	AGX 4.5	AGX 6.5	AGX 8.5	CKPx 12.0	CKPx 19.0
Output power [P2 at 50 Hz]	1.0 kW	3.0 kW	4.5 kW	6.5 kW	8.5 kW	13.5 kW	22.0 kW
max. expected sound pressure level dB(A) at 50 Hz	48	52	54	56	57	59	61
Output power [P2 at 60 Hz]	1.2 kW	3.4 kW	5.6 kW	7.5 kW	9.7 kW	15.7 kW	25.0 kW
max. expected sound pressure level dB(A) at 60 Hz	48	52	55	56	57	59	61

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact



List of parts CAM 1 / CAM 2

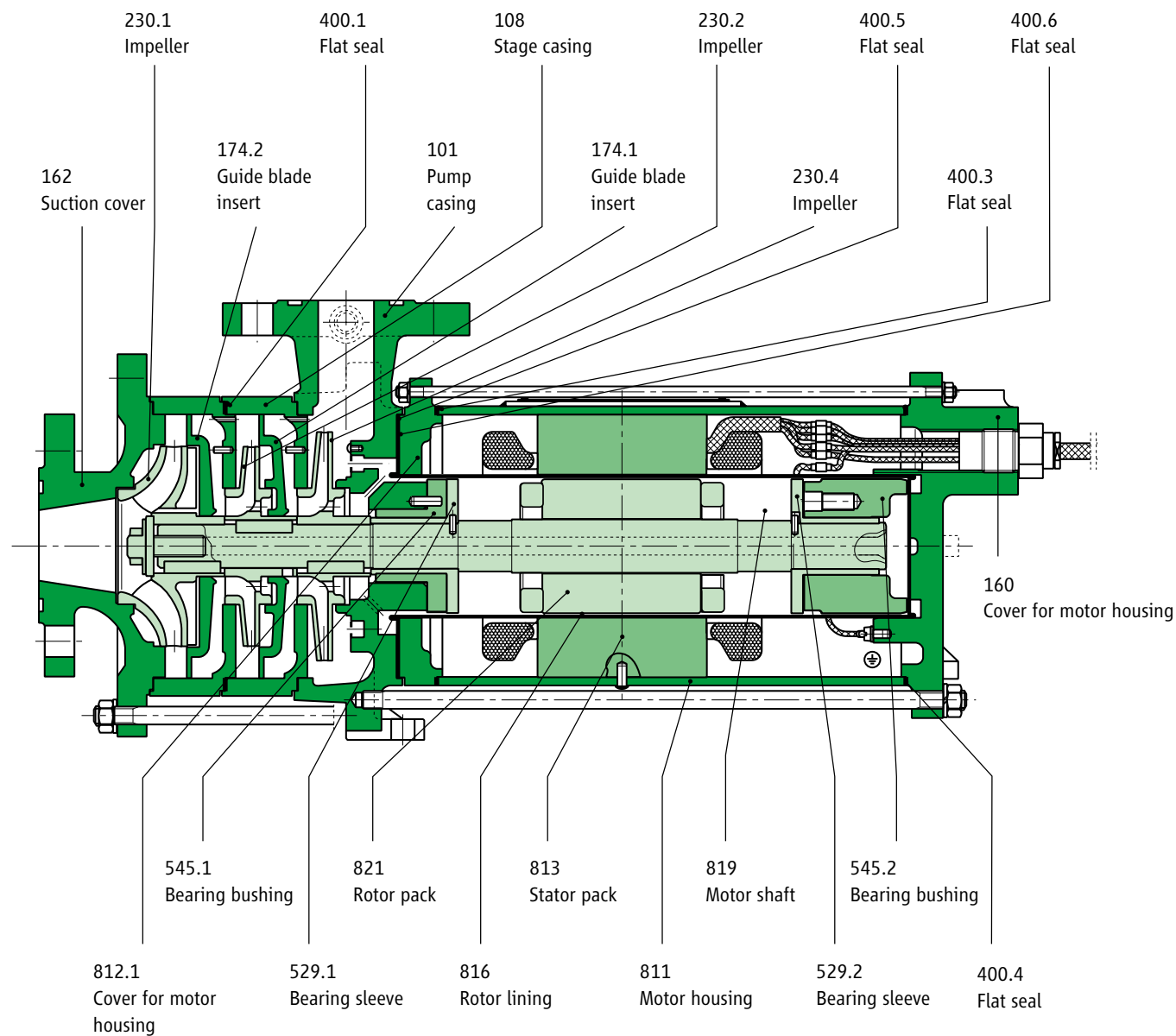


Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

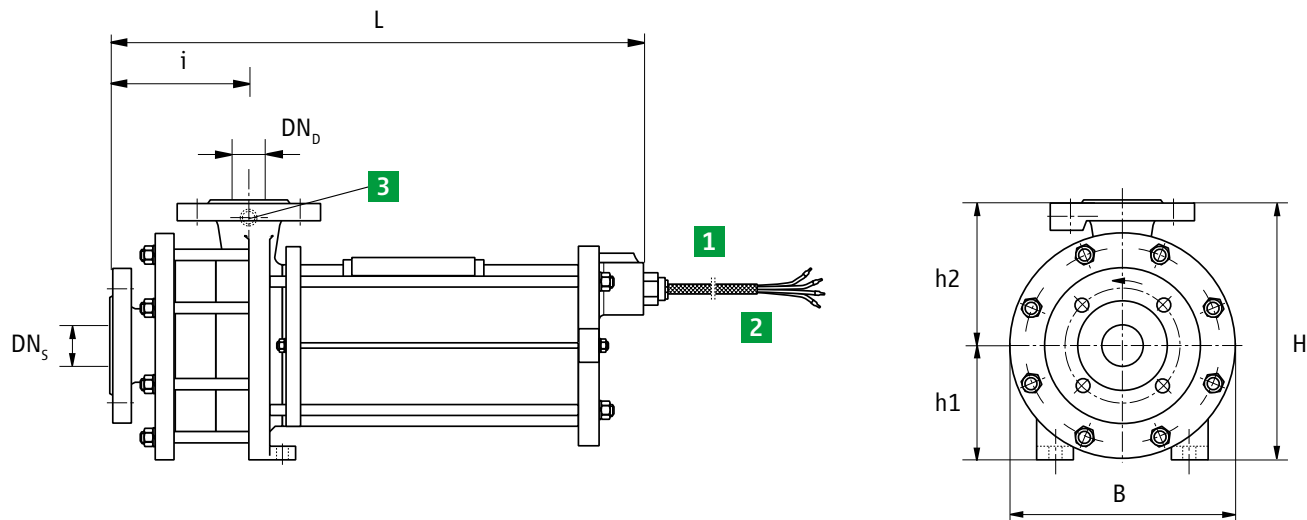
Flow regulation

Design software

Contact



Dimension drawing for motors of size: AGX 1.0 / AGX 3.0 / AGX 4.5 / AGX 6.5



1 Cable U1, V1, W1 + protective conductor ⊕

AGX 1.0: 4 x 1.5 mm²

AGX 3.0: 4 x 1.5 mm²

AGX 4.5: 4 x 2.5 mm²

AGX 6.5: 4 x 4 mm²

Cable length 2.5 m

2 Cable for PTC thermistor

2 x 1.0 mm², cable 5 + 6,

Cable length 2.5 m

3 Pressure gauge connection G 1/4

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact

Versions CAM 1

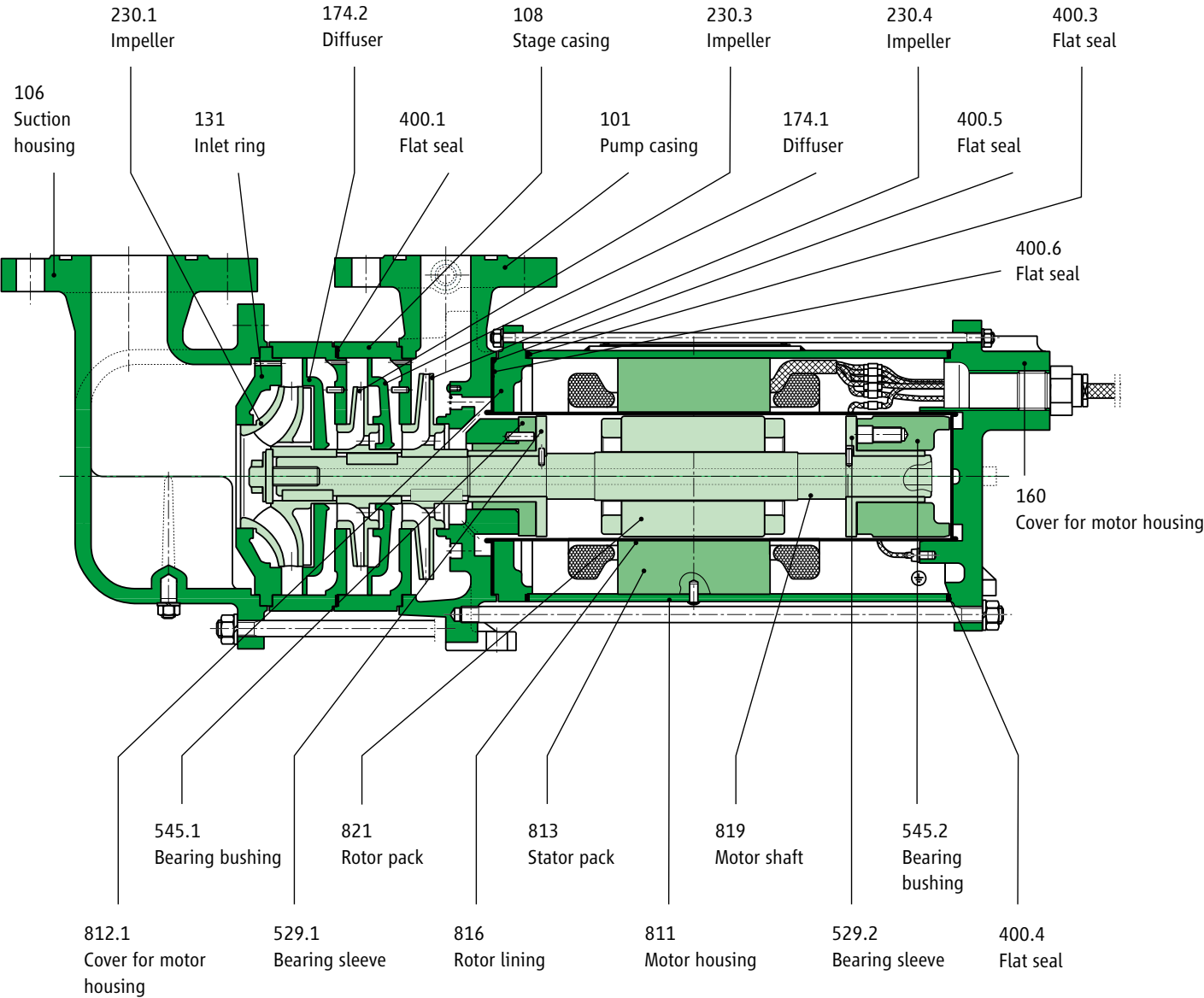
Dimensions	CAM 1 / 2-stage	CAM 1 / 3-stage	CAM 1 / 4-stage	CAM 1 / 5-stage
	AGX 1.0	AGX 1.0	AGX 1.0	AGX 1.0
Length / L	419	447	475	503
Width / W	160	160	160	160
Height / H	10	210	210	210
h1	90	90	90	90
h2	120	120	120	120
i	112	140	168	196
DN _s	25	25	25	25
DN _d	20	20	20	20

Versions CAM 2

Dimensions	CAM 2 / 2-stage	CAM 2 / 3-stage	CAM 2 / 4-stage	CAM 2 / 5-stage	CAM 2 / 6-stage
	AGX 3.0 / 4.5	AGX 3.0 to 6.5	AGX 3.0 to 6.5	AGX 3.0 to 6.5	AGX 3.0 to 6.5
Length / L	536	577	618	659	700
Width / W	218	218	218	218	218
Height / H	250	250	250	250	250
h1	110	110	110	110	110
h2	140	140	140	140	140
i	135	176	217	258	299
DN _s	40	40	40	40	40
DN _d	32	32	32	32	32

[Table of Contents](#)
[General information](#)
[Function](#)
[Operating principle](#)
[Characteristic maps](#)
[Versions](#)
[CAM 1 / CAM 2](#)
[CAMR 2](#)
[CAM 3](#)
[Documentation and tests](#)
[Installation](#)
[Protection and monitoring](#)
[Flow regulation](#)
[Design software](#)
[Contact](#)

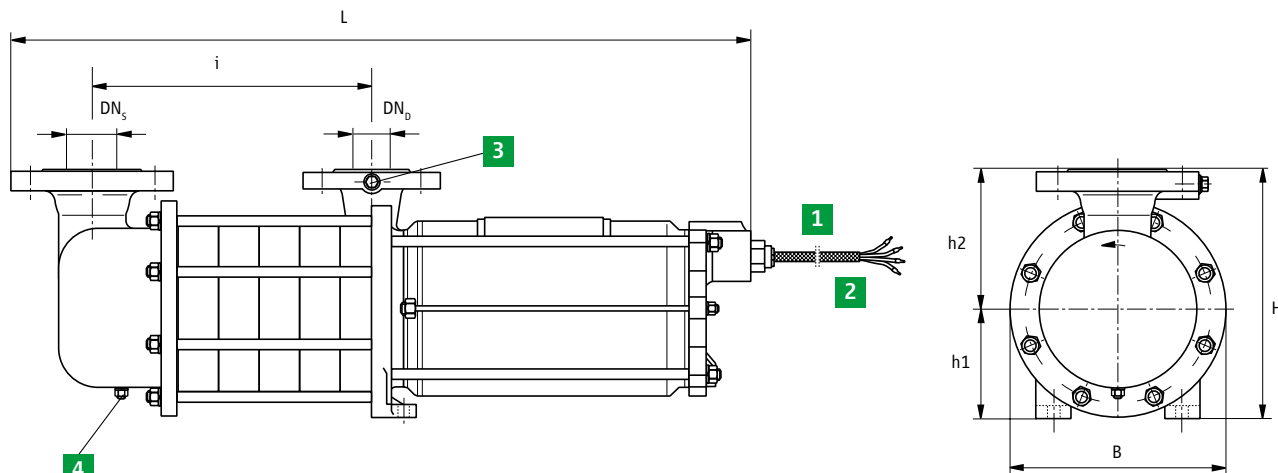

List of parts CAMR 2



- Table of Contents
- General information
- Function
- Operating principle
- Characteristic maps
- Versions
 - CAM 1 / CAM 2
 - CAMR 2**
 - CAM 3
- Documentation and tests
- Installation
- Protection and monitoring
- Flow regulation
- Design software
- Contact



Dimension drawing for motors of size: AGX 3.0 / AGX 4.5 / AGX 6.5



1 Cable U1, V1, W1 +
protective conductor $\oplus$
AGX 3.0: 4 x 1.5 mm²
AGX 4.5: 4 x 2.5 mm²
AGX 6.5: 4 x 4 mm²
Cable length 2.5 m

2 Cable for PTC thermistor
2 x 1.0 mm²,
Cable 5 + 6,
Cable length 2.5 m

3 Pressure gauge connection
G 1/4

4 Drain with screw plug G 1/4 on
the suction housing (optional)

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact

Versions CAMR 2

Dimensions	CAMR 2 / 2-stage	CAMR 2 / 3-stage	CAMR 2 / 4-stage	CAMR 2 / 5-stage	CAMR 2 / 6-stage
	AGX 3.0 / 4.5	AGX 3.0 to 6.5	AGX 3.0 to 6.5	AGX 3.0 to 6.5	AGX 3.0 to 6.5
Length / L	649	690	731	772	813
Width / W	218	218	218	218	218
Height / H	250	250	250	250	250
h1	110	110	110	110	110
h2	140	140	140	140	140
i	160	201	242	283	324
DN _s	50	50	50	50	50
DN _d	32	32	32	32	32

[Table of Contents](#)
[General information](#)
[Function](#)
[Operating principle](#)
[Characteristic maps](#)
[Versions](#)
[CAM 1 / CAM 2](#)
[CAMR 2](#)
[CAM 3](#)
[Documentation and tests](#)
[Installation](#)
[Protection and monitoring](#)
[Flow regulation](#)
[Design software](#)
[Contact](#)


List of parts CAM 3

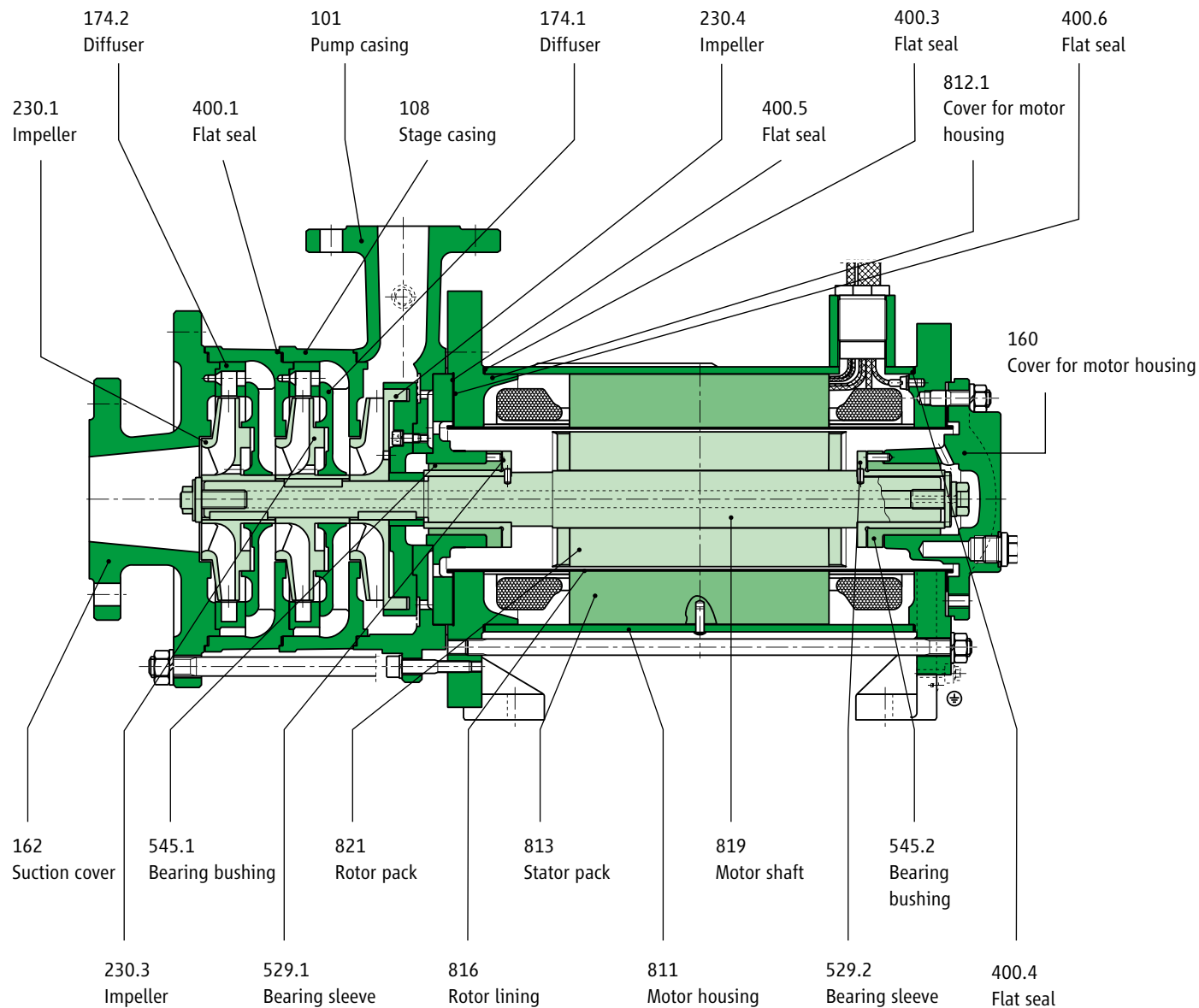


Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

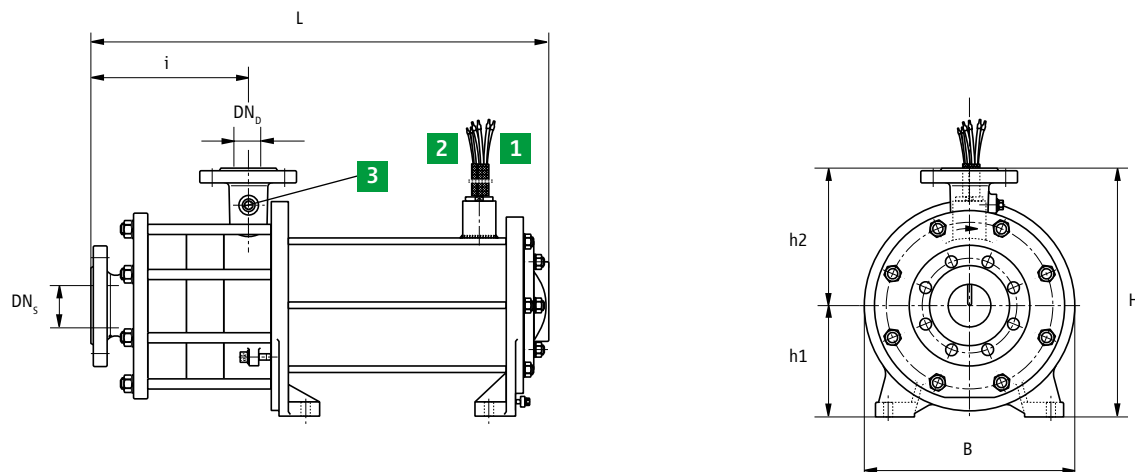
Flow regulation

Design software

Contact



Dimension drawing for motors of size: AGX 8.5 / CKPx 12.0 / CKPx 19.0



1 Cable U1, V1, W1 + protective conductor ⊕
 AGX 8.5: 4 x 6 mm²
 CKPx 12.0: 4 x 6 mm²
 CKPx 19.0: 4 x 6 mm²
 Cable length 2.5 m

2 Cable for PTC thermistor
 2 x 1.0 mm², cable 5 + 6,
 Cable length 2.5 m
3 Pressure gauge connection G 1/4

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact

Versions CAM 3

Dimensions	CAM 3 / 2-stage	CAM 3 / 2-stage	CAM 3 / 3-stage	CAM 3 / 3-stage	CAM 3 / 3-stage	CAM 3 / 4-stage	CAM 3 / 4-stage
	AGX 8.5	CKPx 12.0	AGX 8.5	CKPx 12.0	CKPx 19.0	CKPx 12.0	CKPx 19.0
Length / L	597	642	654	699	764	756	821
Width / W	250	290	250	290	340	290	340
Height / H	355	380	355	380	380	380	380
h1	145	170	145	170	170	170	170
h2	210	210	210	210	210	210	210
i	184	184	241	241	241	298	298
DN _s	65	65	65	65	65	65	65
DN _d	40	40	40	40	40	40	40

Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact



PRODUCT INFORMATION

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Table of Contents

General information

Function

Operating principle

Characteristic maps

Versions

CAM 1 / CAM 2

CAMR 2

CAM 3

Documentation and tests

Installation

Protection and monitoring

Flow regulation

Design software

Contact

