

CAplus Totally Enclosed Fan Cooled Motor



Introduction

FACT OR FICTION?

Total cost of ownership adds value.

FACT.

Energy consumption and maintenance expenses are important factors for end users. They want a solution that helps them reduce costs. The new CAplus can help reduce yearly energy bills by up to 10% and is virtually maintenance free.



The new CAplus is one of the highest efficiency machines available on the market today

Higher power density and better efficiency make this new addition to our CA series, the perfect choice for your heavy duty industrial applications. Its innovative cooling system dissipates heat more effectively to achieve greater efficiency (more than 97% with a power factor of 0.89). This sturdy machine is at the top of the class in terms of performance. The CAplus is suitable for general purpose duty – **variable torque (quadratic)**. The series is available in four standard configurations – **General Purpose Ultra High Efficiency (IE5), General Purpose High Efficiency (IE4), API® 541 V Edition full compliance** and **Demand Performance** (compliant with challenging specs like Shell® DEP).

IEC Power rating: Up to 2200 kW
NEMA Power rating: Up to 2600 kW
Voltage: Up to 6.6 kV
Frequency: 50 Hz, 60 Hz
Number of Poles: 2-4-6
Frame size: 315 – 500 mm
Type of Cooling: IC411
Protection: IP55
Noise: Less than 80 dBA.

- +97% — EFFICIENCY
- 0.89 — POWER FACTOR
- 4 — STANDARD CONFIGURATIONS



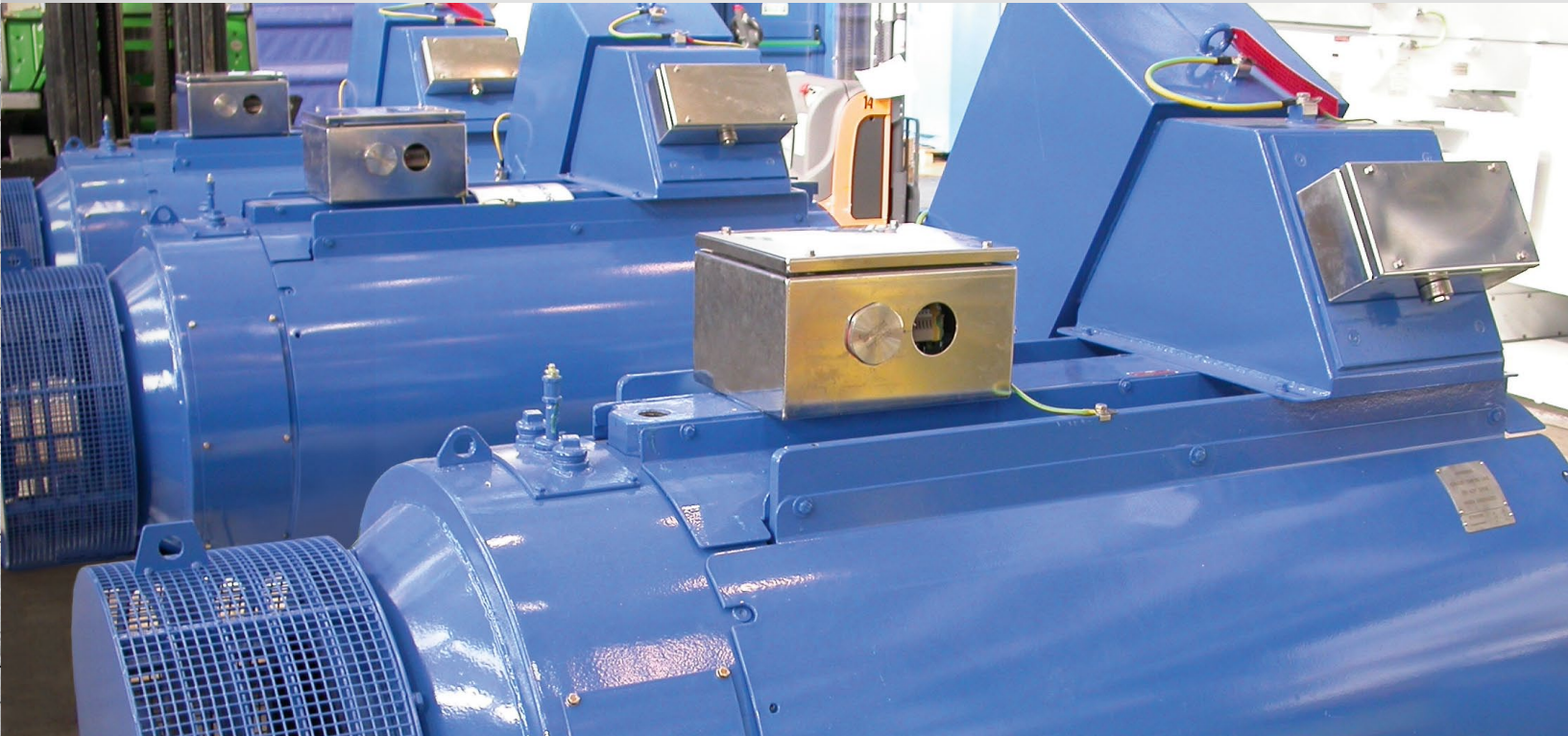
Green By Design

FACT OR FICTION?

Some industries may never be 100% green.

FACT.

But this doesn't mean we shouldn't do our part. Our CAplus was designed to make optimum use of materials for maximum performances.



Circular Economy Committed

The CAplus has been designed with the environment in mind: built using state-of-the-art technology, it achieves maximum performance with minimum environmental impact.

Life Cycle Efficiency

The new CAplus was designed to deliver high performance for its entire lifecycle in terms of power factor and efficiency. It offers efficiencies of more than 97%, putting the machine at the top of the class.

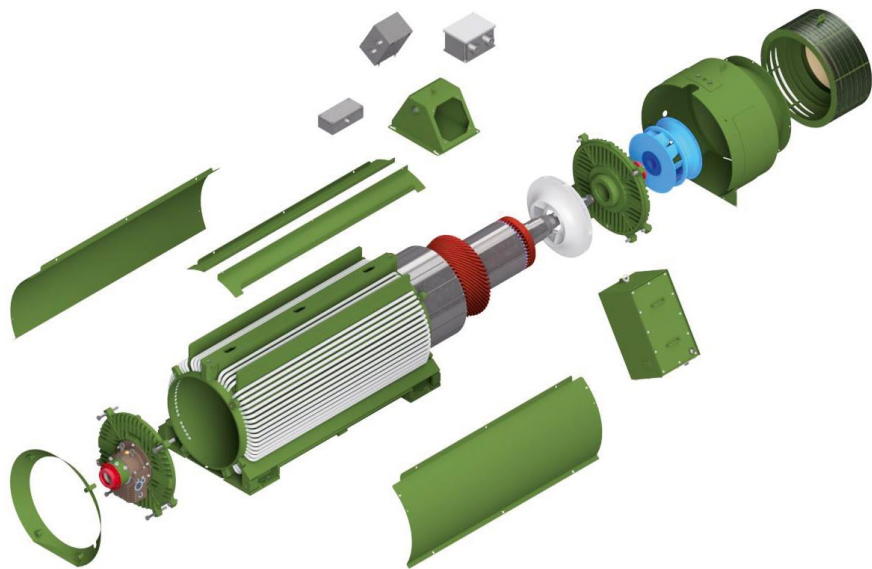
Highest kW/kg

Highest efficiency & power factor

oil-free bearings

very low noise levels (<80 dbA)

> 95% recyclable



Reliable

At the heart of the CAplus is our standard motor design. With over 150 years of experience and one of the highest track records on the market in terms of Mean Time Between Failures (MTBF), this product was built to last.

Rugged

The CAplus has a fabricated steel frame that was specifically designed to guarantee maximum heat dissipation and optimum performance in terms of vibration and mechanical strength. The integrated feet were designed for high strength and stiffness.

- L10 bearings
- Robust steel fans
- No fan filters
- Very low vibration

Suitable for aggressive environments

Optimum performance is supported by attention for each design detail: the machine undergoes our standard aggressive environment painting system which was specifically studied for harsh environments and is able to resist even the most abrasive atmosphere.



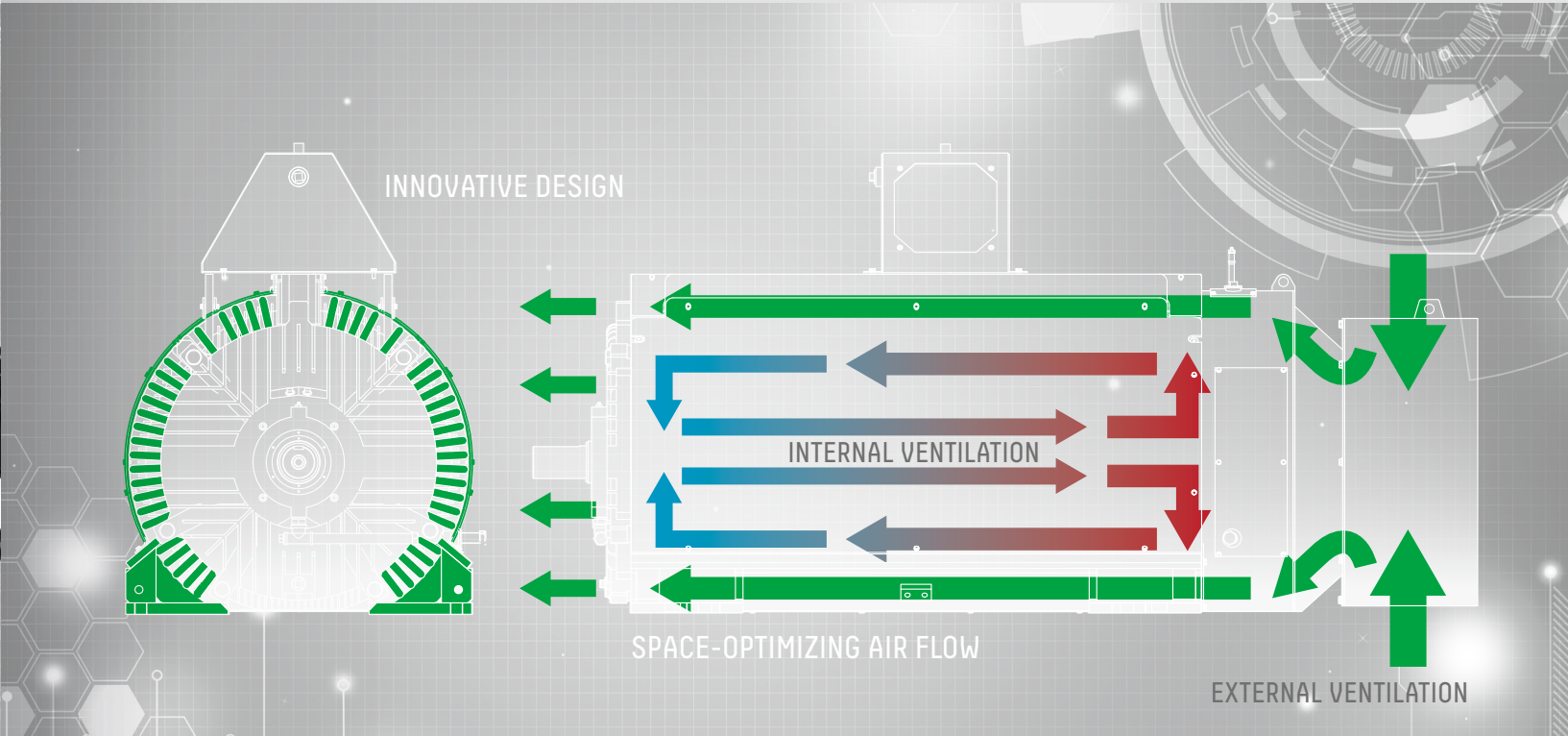
The plus in TEFC performance

FACT OR FICTION?

Lower Power Factor means increased energy cost and possible utility power factor penalties.

FACT.

Some competitors lower the power factor to improve their efficiency rating but optimizing both leads to real savings. You need high efficiency with a high power factor.



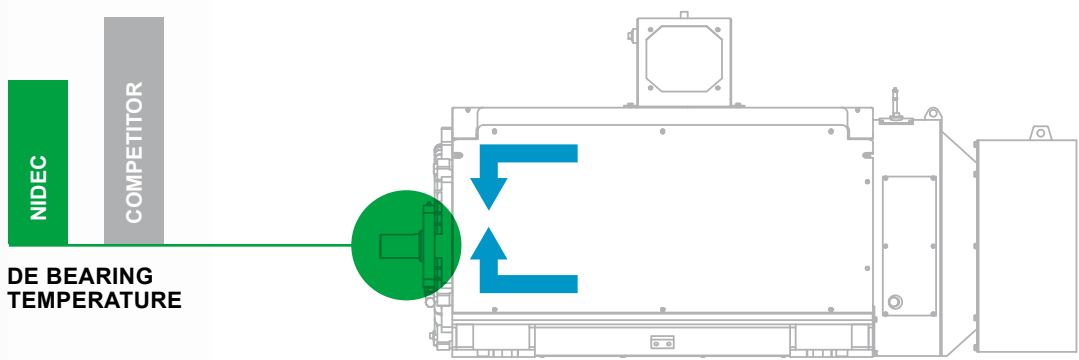
Our new CPlus series uses an innovative cooling shroud and tubing system to increase the performance and extend the life of the motor. The design uses the external fan to cool the traditional cooling fins and the internal air to reduce the motor's temperature and eliminate large internal temperature differentials.

Air flow inside the machine has been optimized, helping to prolong machine life and safety. It also contributes to maximum power performance.

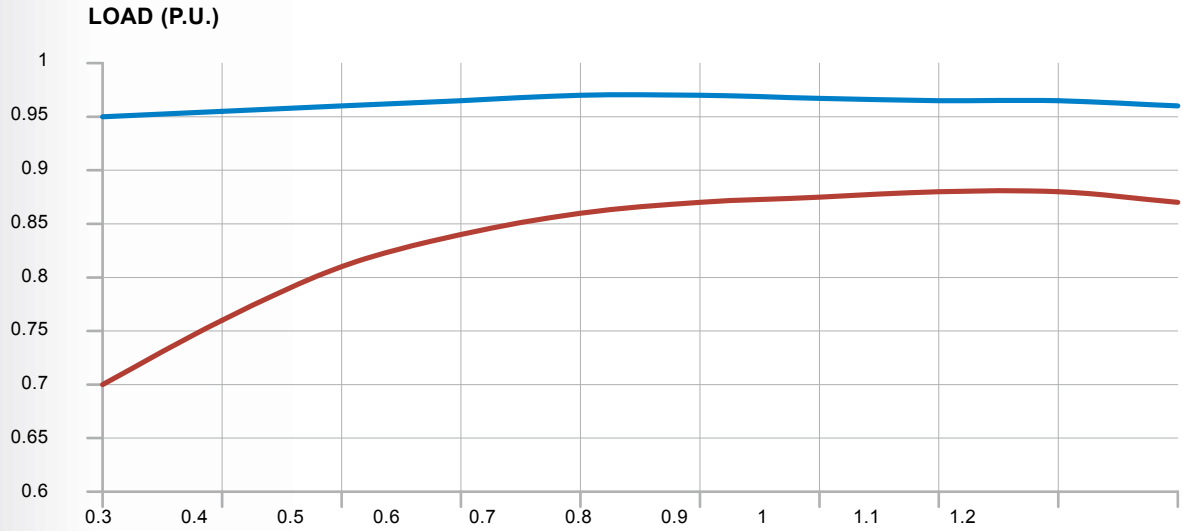
Improved cooling delivers longer machine life. For the CPlus it also reduces vibration and fan noise.

We outperform the competition:

- Lowest noise level
- Lowest vibration level
- Highest efficiency on power factor



Innovative cooling system reduces drive end bearing temperature improving motor performance



The CPlus is designed for industrial applications with variable torque loads. Motor efficiency and Power Factor are constant over a wide range of loads and speeds.

Eff. [%]
Power Factor

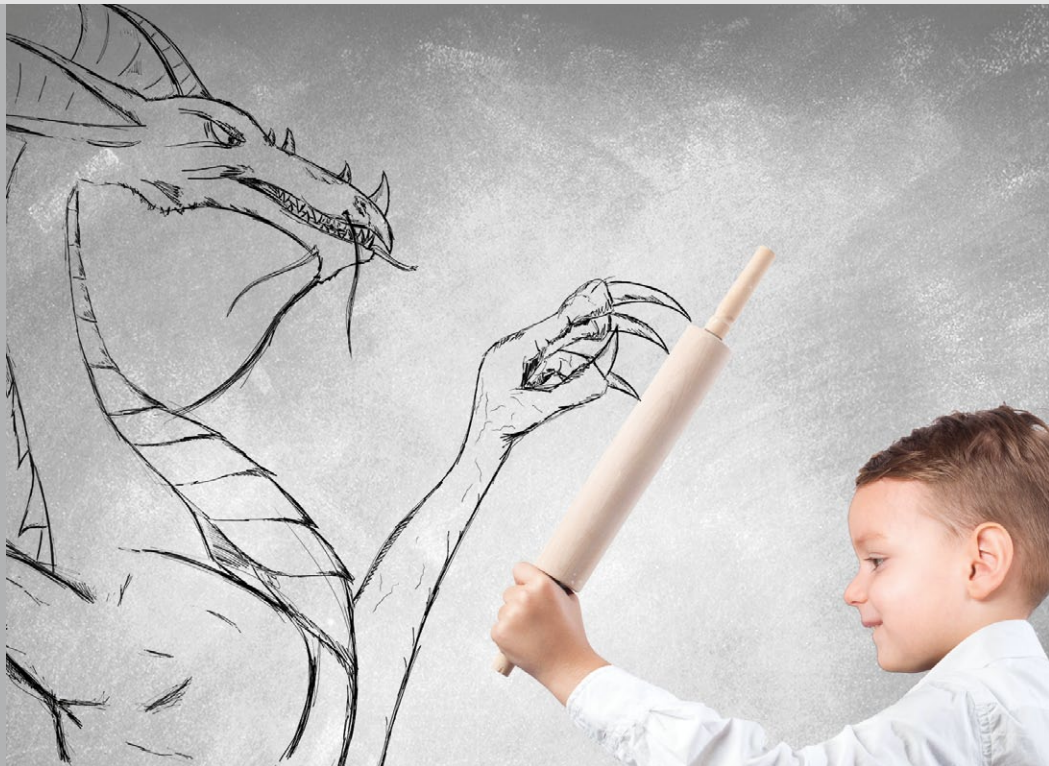
Flexible For a Changing World

FACT OR FICTION?

Projects and plant layouts never change.

FACT.

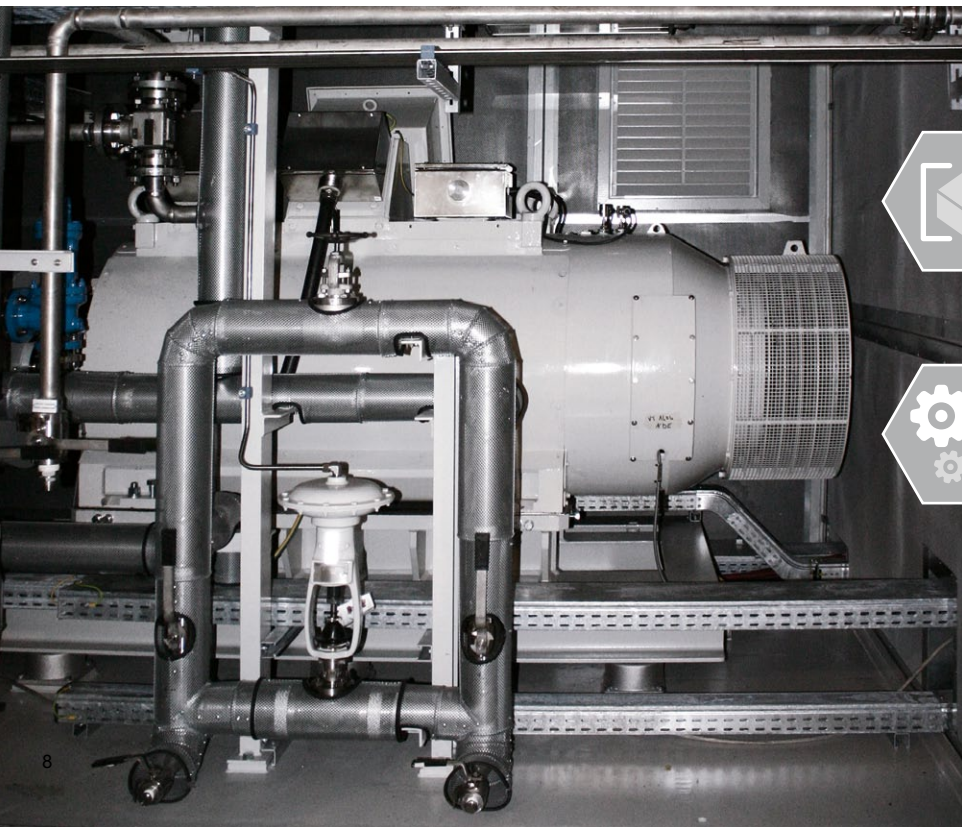
Most projects evolve and this can require changes in the position of the terminal box or the need to reduce the clear area around a motor.



The CAplus was designed to offer the maximum flexibility in skid and plant layout. Completely designed in 3D, the CAPlus is fully adaptable, making last minute changes possible.

This flexible design is the result of 120 years experience in motor installation and complex projects management.

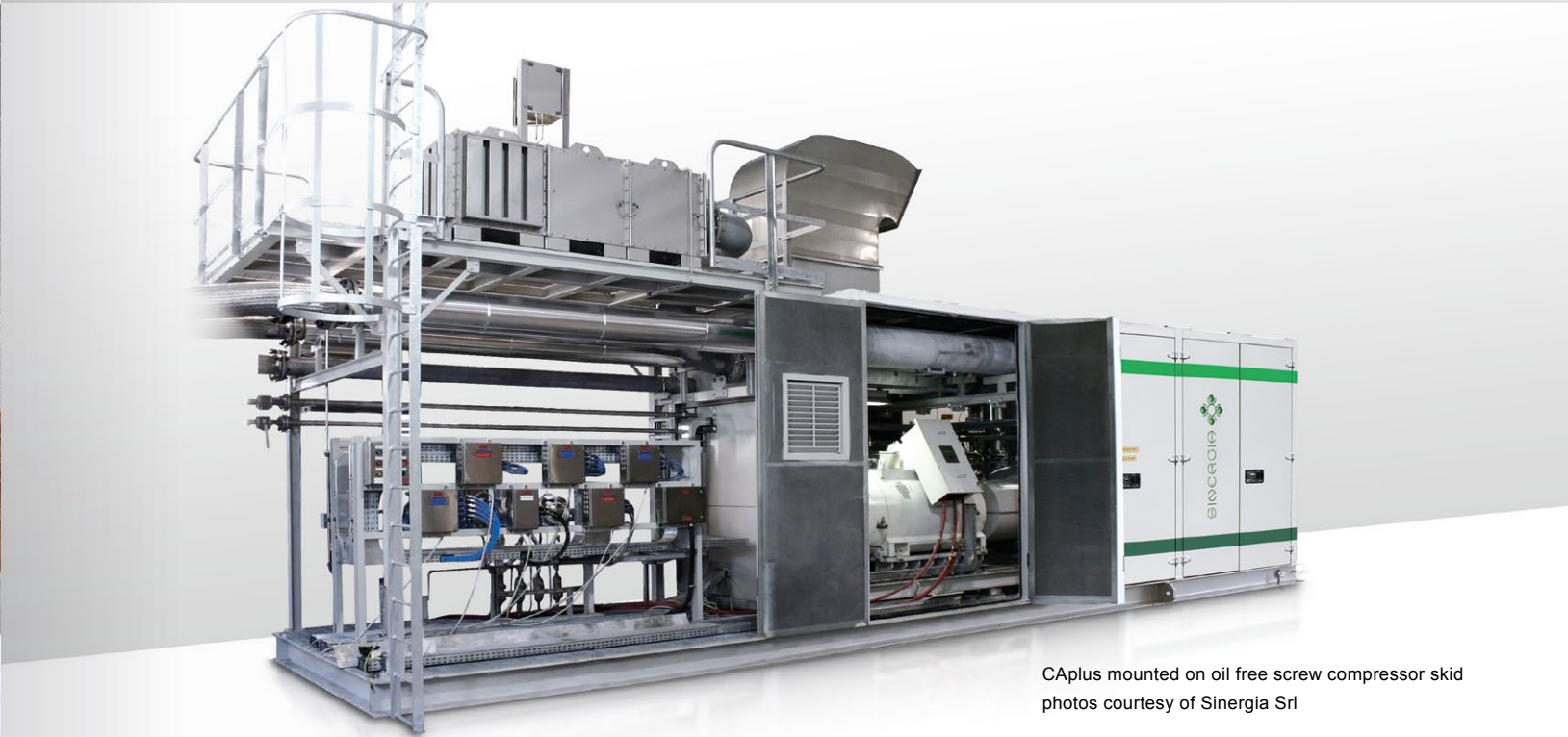
Flexible terminal box mountings and the innovative radial cooling system allow customers to tackle unforeseen constraints that can arise during the execution of a project.



Cooling design for cramped spaces

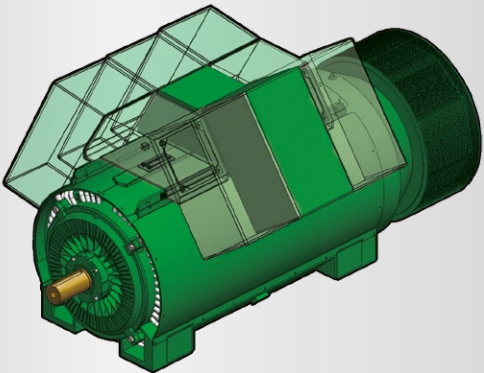


Adaptable thanks to accessories and equipment



CAplus mounted on oil free screw compressor skid
photos courtesy of Sinergia Srl

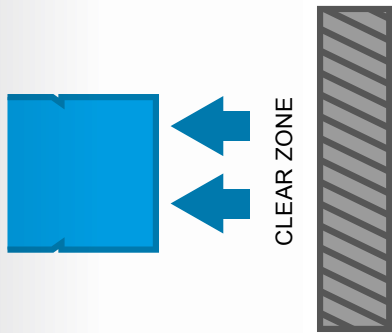
Flexible Mounting



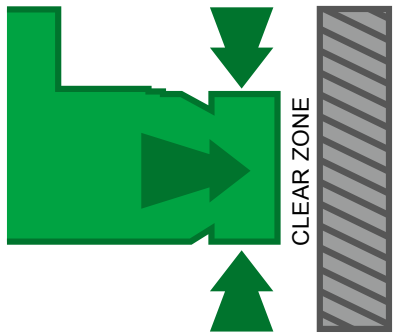
Terminal boxes are designed to facilitate cable connection and shorten installation times. Terminal boxes can be mounted in three different positions: front, middle and back on either side. They are equipped with a pressure relief device as a safety feature.

Different terminal boxes are available, including:

- Star point
- Phase insulated
- Phase separated
- Phase segregated



COMPETITORS



NIDEC

Innovative cooling system

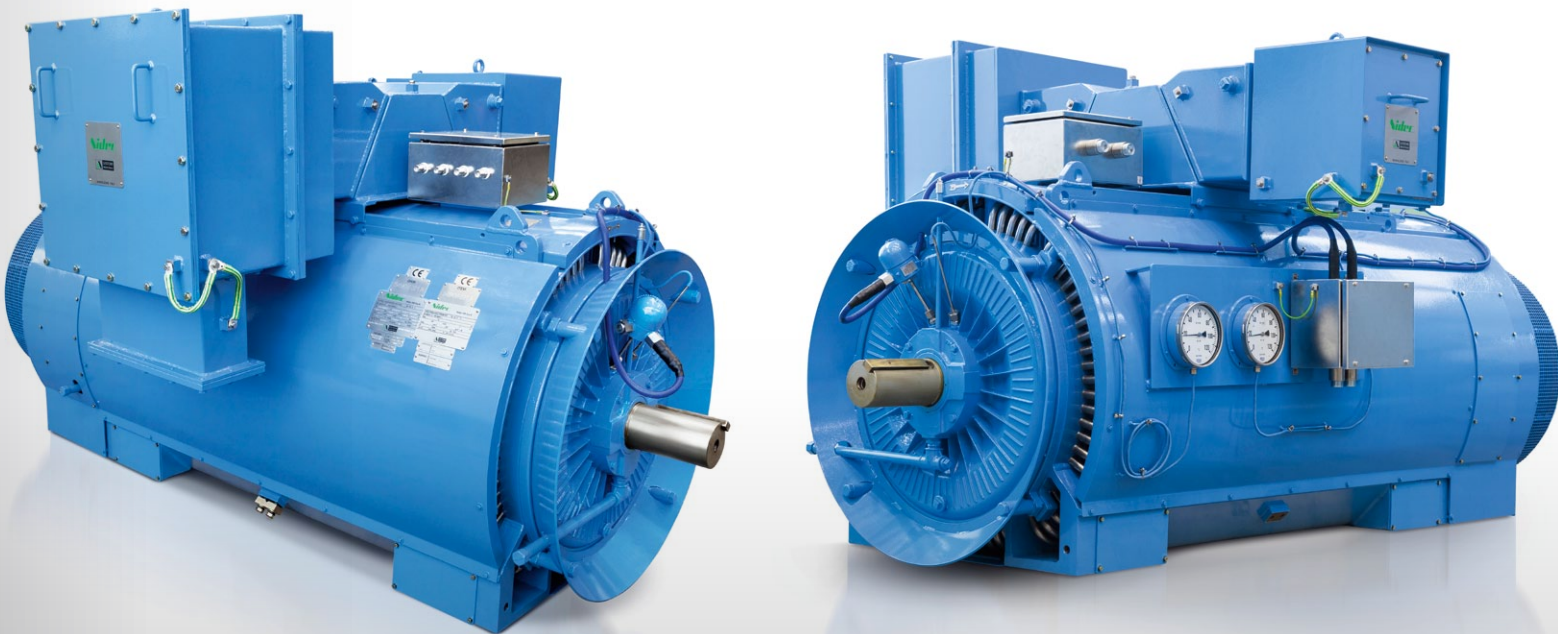
The cooling system uses lateral air intake which means there are no limits in positioning the motors in cramped spaces, even against a wall.

Standard Configurations

- RATED VOLTAGE**
From 3 to 6.6 kV
- FREQUENCY**
50/60 Hz ± 2%
- AMBIENT DESIGN TEMPERATURE**
40 °C
- ALTITUDE**
<= 1000 m above sea level
- INSULATION/TEMPERATURE CLASS**
F/B
- DEGREE OF PROTECTION**
IP55
- MOUNTING ARRANGEMENT**
Horizontal IM1001 & Vertical
- ROTOR**
aluminium or copper fabricated squirrel cage



Technical data



General Purpose

- HIGH EFFICIENCY (IE4)**
- ULTRA HIGH EFFICIENCY (IE5)**

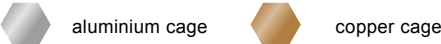
- STANDARD ACCESSORIES INCLUDED**
- RTDs (PT100) on stator windings, 6 pcs 3 wire, single type class B
 - Space heaters
 - Phase insulated line terminal box
 - Bearing insulation NDE only

**PAINTING TYPE C4
ACCORDING TO ISO 12944**

COUPLING IM1001

- OPTIONS:**
- Phase separated line terminal box, Phase segregated line terminal box, Star point terminal box
 - Coupling IM1003 available for Ultra High Efficiency (IE5)
 - Certifications Ex nA / Ex ec II B options for High Efficiency (IE4), included for Ultra High Efficiency (IE5)

(not shown)



API 541 V Edition full compliance

-
- STANDARD ACCESSORIES INCLUDED:**
- RTDs (PT100) on stator windings, 6pcs 3 wire, single type class B
 - RTDs (PT100) in bearing, 2 pcs (1 RTD each bearing), 3 wire, simple type
 - Space heaters
 - Phase insulated line terminal box
 - Bearing insulation on both DE – NDE
 - Provision only for proximitors on both DE and NDE (probes not included)
 - Sleeve bearing self lubricated
 - Vibration: compliance with API 541 V Edition
 - Routine test according to API 541 V Edition
 - Certifications: Ex nA / Ex ec II B
 - Coupling IM1001
 - Painting type C5-M according to ISO 12944

- OPTIONS:**
- Phase separated line terminal box, Phase segregated line terminal box, Star point terminal box, Phase insulated with star point terminal box
 - Coupling IM1003

Demand performance

-
- STANDARD ACCESSORIES INCLUDED:**
- RTDs (PT100) on stator windings, 6 pcs 3 wire, single type class B
 - RTDs (PT100) in bearing, 2 pcs (1 RTD each bearing), 3 or 4 wire, simple type (Sleeve only)
 - Space heaters
 - Phase insulated line terminal box
 - Bearing insulation on both DE - NDE both with short-circuit possibilities (Sleeve only).
 - Provision only for proximitors on sleeve bearings

SLEEVE BEARING SELF LUBRICATED

**ROUTINE TEST ACCORDING
TO SHELL DEP 33.66.05.31-GEN**

CERTIFICATIONS: EX NA / EX EC II B

**PAINTING TYPE C5-M ACCORDING
TO ISO 12944**

**25% SEPARATION MARGIN,
MECHANICAL DESIGN**

**COUPLING IM1001 OR IM1003
(POWER >1MW)**

Standards & Specifications

- **General Purpose Ultra High Efficiency (IE5):**
IE5 Performance/ NEMA Metric
- **General Purpose High Efficiency (IE4):**
EN/IEC/ NEMA Metric
- **API 541 V Edition full compliance:**
EN/IEC, API 541 V edition
- **Demand Performance:**
EN/IEC meets demanding customer requirements like SHELL® DEP

Insulation system and stator winding

Like all of our machines, the CPlus uses our Micasystem® insulation. Micasystem® offers class F protection. With over fifty years of demonstrated field experience, it is one of the most reliable solutions on the market for maximum uptime and availability. The reliability of our insulation system makes these machines particularly suitable for variable torque (quadratic) applications. All stators are form wound.

Rotor cage

The CPlus is available with either an aluminum or copper cage. Flexible bar shape design allows us to right-size the machine for your needs.

Bearings

Nidec uses the top brands in bearings to ensure performance. Below is a general description of the key features of the bearings we use.

Sleeve Bearings

Sleeve bearings are self-lubricated with natural cooling. Highly reliable, with proper care the life of these sleeve bearings is practically unlimited. Standard degree of protection is IP55.

Roller Bearings

Roller bearings are grease lubricated. Depending on the type of application, the basic rated life L 10 h (ISO 281) for standard motors is in the range of 40,000 to 80,000 hours. Standard degree of protection is IP55.

General Purpose High Efficiency

IE4ALUMINIUM CAGE

IEC From 3000 to 6600 V 50 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	315	330	2972	95,3	95,2	0,87	0,86	79	2370	RG	RG
	355	530	2975	95,9	95,9	0,89	0,89	80	3350	RG	RG
	400	750	2984	96,1	95,8	0,89	0,89	81	4320	RG	RG
4 POLE	315	340	1480	95,7	95,7	0,86	0,84	73	2560	RG	RG
	355	560	1484	96,2	96,1	0,86	0,86	75	3580	RG	RG
	400	800	1487	96,5	96,6	0,87	0,87	78	4600	RG	RG

IEC - NEMA metric 4160 V 60 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
4 POLE	315	470	1782	96,1	96,0	0,83	0,82	75	2610	RG	RG
	355	610	1782	96,2	96,1	0,88	0,87	78	3350	RG	RG

IP 55 – IC 411 – Insulation class F, temperature rise class B, ambient temperature 40°C
For ambient temperature higher than 40° C up to 55°C the motors have insulation class F, temperature rise class F
The sound pressure levels are presented at no-load. The magnetic noise level of 2- and 4-pole motors is typically low compared to the fan noise, resulting in no increase in the noise level on-load.

Bearings: RG = Roller Bearings with grease lubrication

General Purpose Ultra High Efficiency

IE5COPPER CAGE

IEC From 3000 to 6600 V 50 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	315	450	2980	96,2	96,1	0,90	0,89	79	2570	RG	RG
	355	600	2984	96,7	96,6	0,90	0,89	80	3550	RG	RG
	400	830	2985	96,7	96,5	0,91	0,90	81	4620	RG	RG
	450	1260	2985	96,8	96,5	0,91	0,90	82	6090	RG	RG
	500	1650	2986	97,1	96,8	0,92	0,91	82	8100	RG	RG
4 POLE	315	470	1487	96,3	96,2	0,86	0,85	73	3460	RG	RG
	355	620	1488	96,5	96,4	0,86	0,86	75	3780	RG	RG
	400	950	1488	96,8	96,7	0,88	0,88	78	4800	RG	RG
	450	1290	1489	97,0	96,9	0,89	0,89	81	6090	RG	RG
	500	2200	1491	97,2	97,2	0,90	0,90	81	8590	RG	RG

IEC - NEMA metric Copper 4160V 60 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	315	420	3579	96,1	96,0	0,90	0,89	83	2180	RG	RG
	355	530	3582	96,0	95,8	0,89	0,88	85	2880	RG	RG
	400	820	3585	96,2	96,0	0,90	0,89	85	3690	RG	RG
	450	1150	3587	96,0	95,8	0,90	0,89	85	4790	RG	RG
4 POLE	315	520	1785	96,4	96,2	0,86	0,85	75	3460	RG	RG
	355	750	1787	96,5	96,4	0,87	0,86	78	3780	RG	RG
	400	1060	1788	96,8	96,7	0,88	0,87	81	4800	RG	RG
	450	1500	1789	96,9	96,9	0,89	0,88	84	6090	RG	RG
	500	2450	1791	97,1	97,0	0,90	0,89	84	8590	RG	RG

IP 55 – IC 411 – Insulation class F, temperature rise class B, ambient temperature 40°C
The sound pressure levels are presented at no-load. The magnetic noise level of 2- and 4-pole motors is typically low compared to the fan noise, resulting in no increase in the noise level on-load.

Bearings: RG = Roller Bearings with grease lubrication

IE5

COPPER CAGE

From 3000 to 6600 V 50 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	355	820	2982	97,0	96,9	0,91	0,90	82	4320	SN	SN
	400	1140	2986	97,3	97,2	0,92	0,91	82	5740	SN	SN
	450	1600	2985	96,9	96,7	0,91	0,91	82	7090	SN	SN
	500	1860	2986	97,0	96,7	0,92	0,92	82	9260	SN	SN
4 POLE	355	620	1488	96,5	96,4	0,87	0,86	75	3880	SN	SN
	400	950	1488	96,8	96,7	0,88	0,87	78	4900	SN	SN
	450	1290	1489	97,0	96,9	0,89	0,89	81	6260	SN	SN
	500	2200	1491	97,2	97,2	0,90	0,90	81	8760	SN	SN

4160 V 60 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	355	850	3584	96,9	96,8	0,91	0,91	85	4030	SN	SN
	400	1250	3585	97,0	96,6	0,91	0,91	85	5140	SN	SN
	450	1450	3585	96,6	96,9	0,91	0,91	85	6480	SN	SN
	500	1690	3585	96,9	97,0	0,92	0,91	85	8180	SN	SN
4 POLE	355	750	1787	96,7	96,4	0,87	0,86	78	3880	SN	SN
	400	1120	1788	96,9	96,7	0,88	0,87	81	4900	SN	SN
	450	1580	1789	97,0	96,9	0,89	0,88	84	6260	SN	SN
	500	1950	1791	97,0	96,7	0,89	0,89	84	7550	SN	SN

IP 55 – IC 411 – Insulation class F, temperature rise class B, ambient temperature 40°C
The sound pressure levels are presented at no-load. The magnetic noise level of 2- and 4-pole motors is typically low compared to the fan noise, resulting in no increase in the noise level on-load.

Bearings: SN = Self lubricated sleeve bearings (oil)

IE5

COPPER CAGE

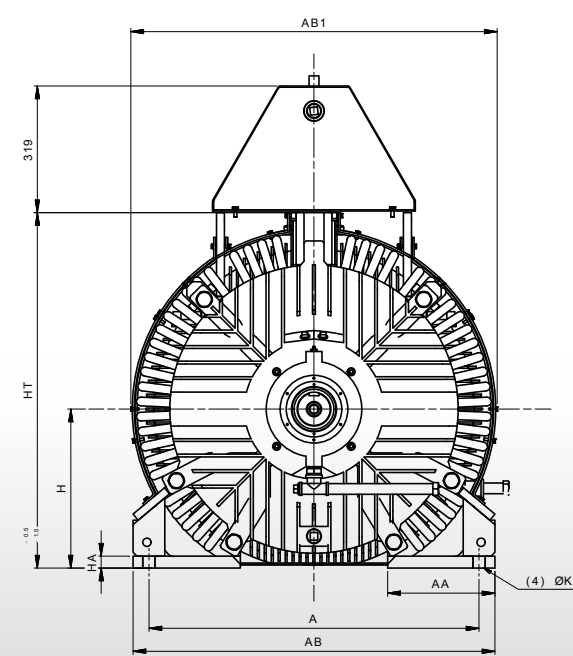
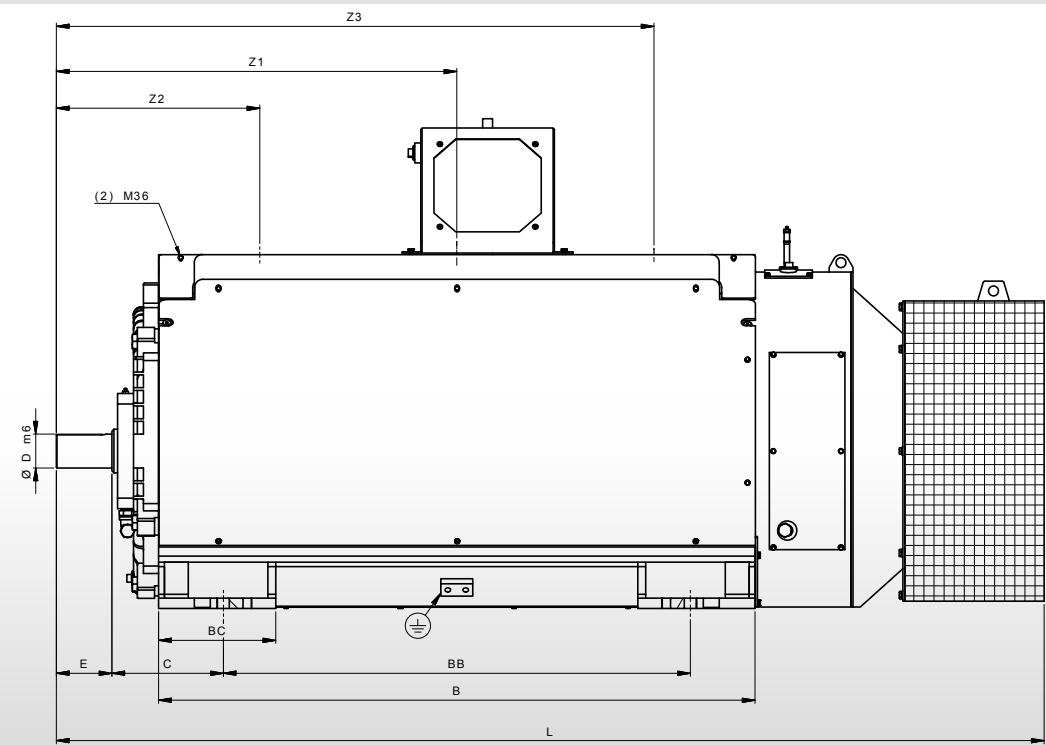
From 3000 to 6600 V 50 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	355	820	2982	97,0	96,9	0,90	0,90	82	4320	SN	SN
	400	1140	2986	97,3	97,2	0,91	0,91	82	5740	SN	SN
	450	1600	2985	96,9	96,7	0,91	0,91	82	7090	SN	SN
	500	1860	2986	97,0	96,7	0,92	0,92	82	9260	SN	SN
4 POLE	355	620	1488	96,5	96,4	0,87	0,86	75	3880	SN	SN
	400	950	1488	96,8	96,7	0,88	0,87	78	4900	SN	SN
	450	1290	1489	97,0	96,9	0,89	0,89	81	6260	SN	SN
	500	2200	1491	97,2	97,2	0,90	0,90	81	8760	SN	SN

4160 V 60 Hz											
	size	kW max	rpm	efficiency max	efficiency max	power factor max	power factor max	noise	mass max	BRG.S CODE	
				4/4	3/4	4/4	3/4	DbA	kg	NDE	DE
2 POLE	355	850	3584	96,9	96,8	0,91	0,91	85	4030	SN	SN
	400	1250	3585	97,0	96,6	0,91	0,91	85	5140	SN	SN
	450	1450	3585	96,6	96,9	0,91	0,91	85	6480	SN	SN
	500	1690	3585	96,9	97,0	0,92	0,91	85	8180	SN	SN
4 POLE	355	750	1787	96,4	96,8	0,87	0,87	78	3880	SN	SN
	400	1120	1788	96,7	96,9	0,88	0,88	81	4900	SN	SN
	450	1580	1789	96,9	97,0	0,89	0,89	84	6260	SN	SN
	500	1950	1791	97,0	97,0	0,89	0,89	84	7550	SN	SN

IP 55 – IC 411 – Insulation class F, temperature rise class B, ambient temperature 40°C
The sound pressure levels are presented at no-load. The magnetic noise level of 2- and 4-pole motors is typically low compared to the fan noise, resulting in no increase in the noise level on-load.

Bearings: SN = Self lubricated sleeve bearings (oil)

Dimensions 2- 4 Poles, Roller Bearings



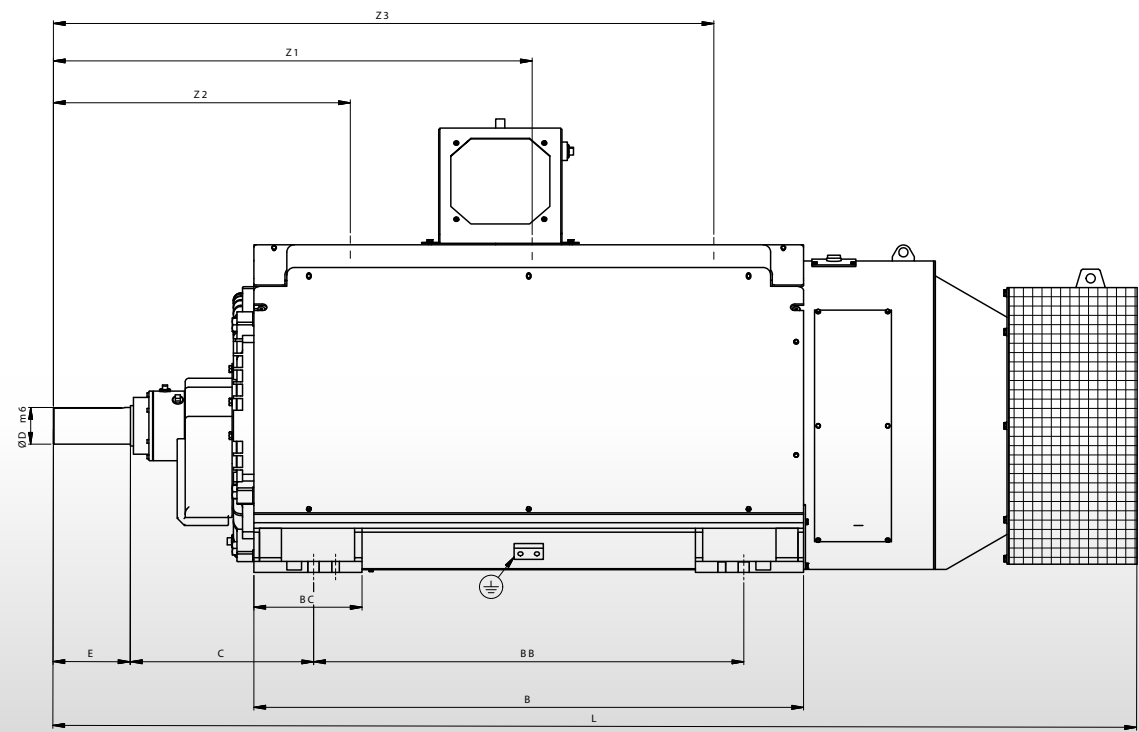
Motor type CAplus		B mm	BB mm	BC mm	C mm	H mm	HT mm	L mm	E mm	A mm	AA mm
Shaft Height	Poles										
315	2	1340	1120	295	224	315	739	2160	115	710	235
315	4	1340	1120	295	224	315	739	2160	190	710	235
355	2	1400	1125	295	254	355	819	2310	115	745	257
355	4	1400	1125	295	254	355	819	2310	190	745	257
400	2	1500	1175	295	280	400	899	2485	140	830	270
400	4	1500	1175	295	280	400	899	2485	210	830	270
450	2	1354	1680	315	280	450	999	2745	140	880	270
450	4	1354	1680	315	280	450	999	2745	210	880	270
500	2	1470	1760	345	290	500	1095	2940	160	1000	300
500	4	1470	1760	345	290	500	1095	2940	230	930	300

Dimensions referred to all available versions.

Motor type CAplus		AB mm	AB1 mm	Z1 mm	Z2 mm	Z3 mm	HA mm	ØD mm	F mm	GA mm	LP Min mm	LP Max mm
Shaft Height	Poles											
315	2	780	772	**	650	1150	25	70	20	73	370	570
315	4	780	772	**	725	1225	25	85	22	90	430	730
355	2	825	848	935	555	1315	30	75	20	80	540	630
355	4	825	848	1010	630	1390	30	85	22	90	590	730
400	2	910	921	1010	630	1390	30	90	25	95	560	690
400	4	910	921	1075	695	1455	30	100	28	106	620	750
450	2	960	1032	1100	700	1500	30	95	25	100	580	780
450	4	960	1032	1170	770	1570	30	110	28	117	710	780
500	2	1070	1142	1185	735	1635	45	100	28	106	700	850
500	4	1070	1142	1255	805	1705	45	120	32	127	630	950

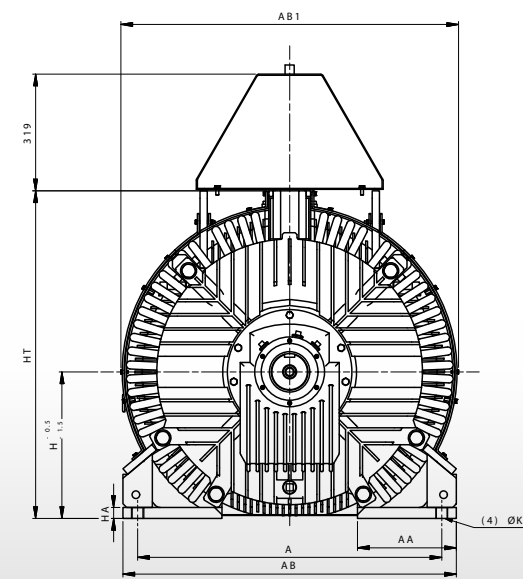
Dimensions referred to all available versions.

Dimensions 2- 4 Poles, Sleeve Bearings



Motor type CAplus		Length	B mm	BB mm	BC mm	C mm	H mm	L mm	E mm	A mm	AA mm
Shaft Height	Poles										
355	2	Z	1440	1720	295	500	355	3019	115	745	257
355	4	L	1120	1400	295	500	355	2772	190	745	257
400	2	Z	1544	1940	295	500	400	2871	140	830	270
400	4	L	1174	1500	295	500	400	2931	210	830	270
450	2	Z	1660	1950	315	500	450	3318	140	880	270
450	4	L	1355	1680	315	560	450	3240	210	880	270
500	2	Z	1670	2010	345	530	500	3400	160	1000	300
500	4	L	1420	1760	345	530	500	3346	230	1000	300

Dimensions referred to all available versions.



Motor type CAplus		Length	AB mm	AB1 mm	Z1 mm	Z2 mm	Z3 mm	HA mm	ØD mm	F mm	GA mm
Shaft Height	Poles										
355	2	Z	825	849	1410	930	1890	30	75	25	80
355	4	L	825	849	1225	845	1605	30	85	25	90
400	2	Z	910	922	1412	912	1912	30	85	25	90
400	4	L	910	922	1297	917	1677	30	100	28	106
450	2	Z	960	1032	1460	1060	1860	30	95	28	101
450	4	L	960	1032	1447	1047	1847	30	110	32	116
500	2	Z	1070	1142	1495	995	1995	45	100	28	106
500	4	L	1070	1142	1470	1020	1920	45	120	32	127

Dimensions referred to all available versions.



INDUSTRIAL SOLUTIONS