TMEiC

We drive industry

High Voltage Induction Motors

21-MII Series

New High Efficiency Design
for High Capacity Applications
Up to 3,550 kW (4,750 HP)

21MII Series: Combining over 100 years of experience with innovative new technology makes the 21-MII series the right choice for the demanding needs of today's industry.

Superior Electrical Performance, Unsurpassed Reliability

The **21-MII** series three-phase high-voltage motors are at the leading edge of motor technology.

- Designs up to 3,550 kW (4,750 hp)
- Designs from 2 pole up to 24 pole
- 2,300 to 11,000 Volts, 50 or 60 Hz
- Wide variety of enclosures
- Rugged, cast iron construction
- Frame sizes from 315 mm ~ 450 mm (shaft height)
- Designed to meet worldwide standards (NEMA, IEC, BS, AS and others)

Features/Benefits:

Excellent Electrical Performance

- Higher efficiency
- Higher power factor
- Superior starting characteristics

Enclosure Options

- ODP, WP1, WP2/IP24
- TEAAC, TEWAC/IP55

New Compact Design Derived Through

- Extensive electrical magnetic field analysis
- Heat transfer analysis
- Improved ventilation

Lower Noise & Less Vibration

- Advanced techniques in core/frame construction

Advanced VPI Insulation System

- Compatible with VFD voltage supplies and effects of surge voltages

Excellent Quality Control

- Low operating and maintenance costs
- High reliability
- Oil-lubricated bearings or anti-friction bearings
- Extended re-greasing intervals

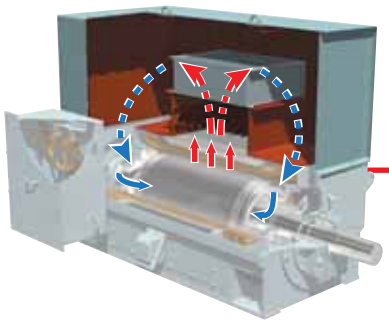
Designed for all Applications and Industries

Compatible with Variable Frequency Drive Applications

Highly Reliable Aluminum Die Cast Rotor

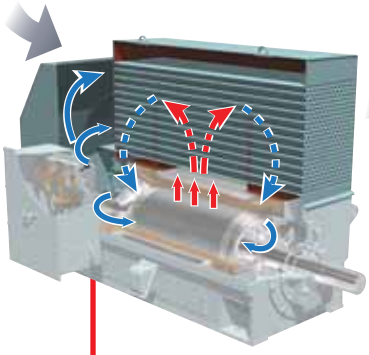
21M-II Series Motor Enclosures

Output: 50 Hz 160 ~ 2,800 KW (210~3,750 HP)
60 Hz 200 ~ 3,550 KW (270~4,750 HP)
Voltages: 2,300 V ~ 11,000 V
Insulation Class: F Class
Standards: IEC, NEMA, BS, AS and others available



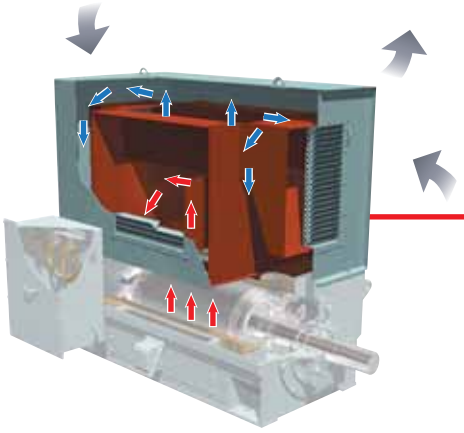
Totally-Enclosed Air-Water-Cooled Type TEWAC/IP55

This type of motor is especially useful in a location where low noise operation is required or where it is desired to remove heat from the area where the motor is located.
The motor includes an air-to-water heat exchanger in the air housing above the motor.
A drain in the air housing protects the motor from damage should any water leakage ever occur.



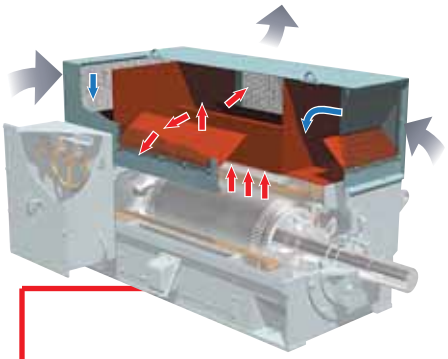
Totally-Enclosed Air-Air Cooled Type TEAAC/IP55

In an environment containing corrosive or harmful gas, a totally-enclosed fan-cooled motor can be applied. An external fan mounted on the opposite drive end shaft directs fresh air through the pipes in the air housing above the motor. The pipes serve as a heat exchanger in which outside fresh air passing through cools the hot air inside.



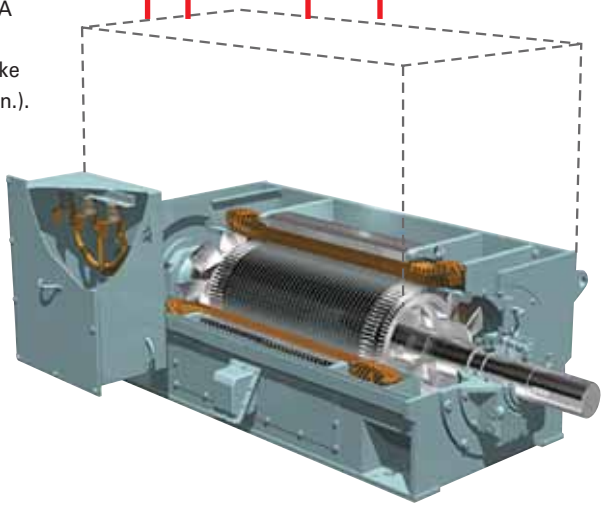
NEMA Weather-Protected WPII/IP24

This motor is designed for outdoor operation. In accordance with NEMA WPII, the housing air path includes right-angled turns, dropping air intake air velocity below 3 m/sec (600 ft/min.). This traps water, dust, and foreign materials. A section is provided that allows air to pass through without being forced into the motor.



Open Drip Proof Type ODP/IP22

A drip-proof type motor is a common choice for a protected, well-ventilated room. Cooling air intake and hot air exhaust windows are located at the top of the hood.
Openings are covered by screens and enclosure is constructed to prevent intrusion of water drips and other foreign materials into the motor meeting NEMA WP-I requirements.



Common Foundation Base

IC01, IC61 and IC81W cooling per IEC Standard construction are available by changing the top-mounted air housing.

The main terminal box can be rotated through 90° angles, and is large enough for easy cable connection.

A shaft current protection insulator in the non-drive end bearing on 450 frame and larger, and all sleeve bearing machines, is included as standard.

Features of 21MII Series Motors

Reliability & Easy Operation/Maintenance

Main Terminal Box

NEMA Type II terminal box is standard. Boxes including surge protection and/or differential CT's are readily available.

Standard main terminal box can be rotated every 90°. Adequate space is allowed below main terminal box for cable connection.

Stator Core

Stators are high-grade electrical steel with low magnetic losses.

Stator core winding is pressed into the center of the frame and locked against rotation and axial displacement.

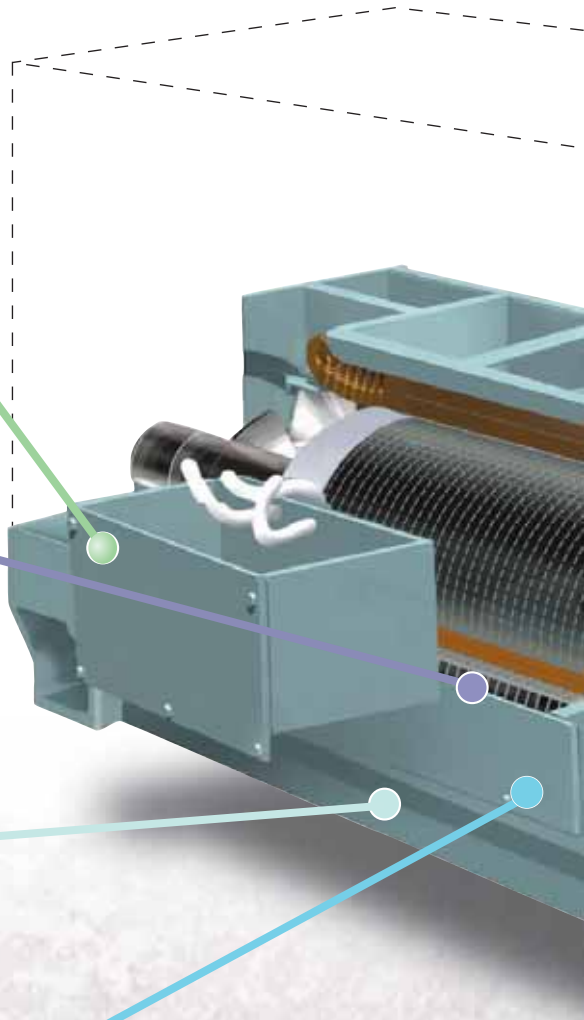
Frame

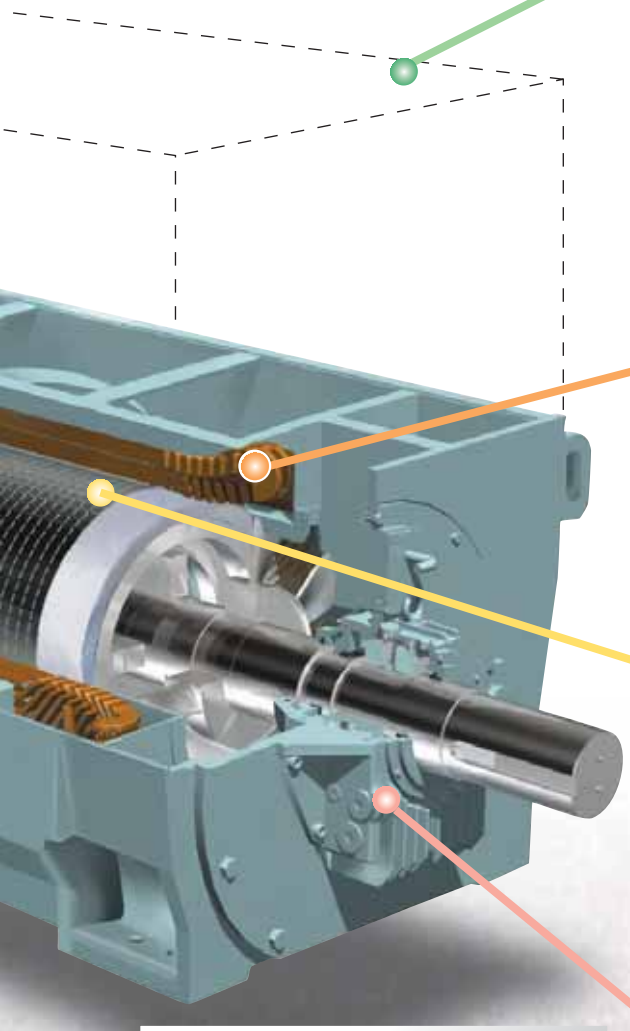
Fabricated steel construction increases the ridigity of the stator frame.

Low vibration is achieved through frequency analysis.

Auxiliary Terminal Box

When applied, the modular arrangement for accessory connections allows flexibility with standardized mechanical construction.





Air Housing

NEMA Open Drip Proof (IP22) construction provides protection from dripping liquids and foreign materials.

NEMA WPII (IP24) top hood construction prevents instrusion of rain water and foreign matter.

IP55 protection is standard on TEAAC (air-cooled) and TEWAC (water-cooled) motors, and isolates the motor interior from environmental contamination.

Stator Coil

Utilizes a highly reliable, vacuum pressurized impregnation (VPI) insulation system providing firmly-fixed coil ends with the ability to withstand most environments.

Bracing ensures long life despite the stresses imposed by starting and duty cycles.

Rotor

Aluminum die cast rotor is standard; copper rotor bars are available as an option.

Aluminum rotor construction results in high capacity, high reliability, better frequent starting duty and lower inertia.

Bearing

Antifriction and sleeve bearings are easily maintainable.

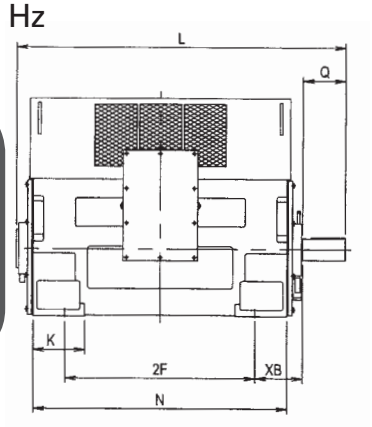
Antifriction (ball, roller) bearings use a refined lubrication design that makes regreasing simple.

Open Drip Proof Induction Motor DP/IP22

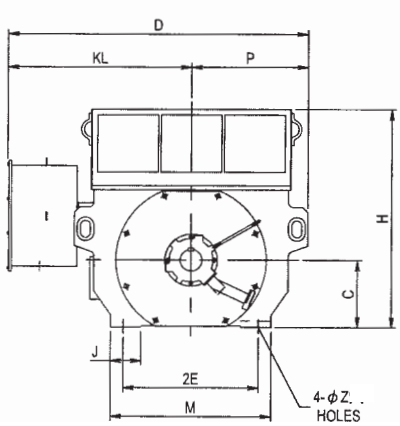
Forced feed lubricated sleeve bearings

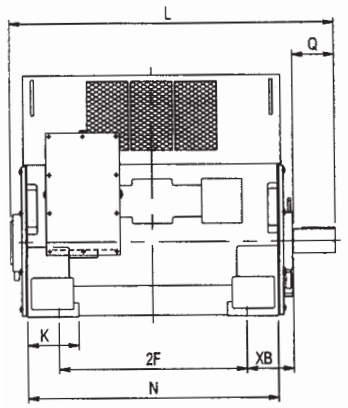
Four Pole, 6.6 kV, 60 Hz

- Example outlines for 4 pole machine specifications shown below.
- 2 pole to 10 pole designs available



Frames 315,355





Frames 400 - 450

*** Example, not for construction**

Frame	Poles	Dimensions (mm)											
		C	D	2E	2F	H	J	K	L	M	N	P	Z
315-1000	4, 6	315	1550	630	1000	1020	140	310	1641	750	1246	575	28
355-1000	4, 6	355	1650	710	1000	1150	160	270	1721	850	1326	625	35
355-1120	4, 6	355	1650	710	1120	1150	160	270	1841	850	1446	625	35
355-1120	4, 6	355	1650	710	1120	1150	160	270	1842	850	1446	625	35
400-1120	4	400	1775	800	1120	1300	180	305	1933	950	1496	670	42
400-1250	4	400	1775	800	1250	1300	180	305	2063	950	1626	670	42
450-1250	4	450	1915	900	1250	1500	200	350	2190	1050	1726	745	48
450-1400	4	450	1915	900	1400	1500	200	350	2340	1050	1876	745	48

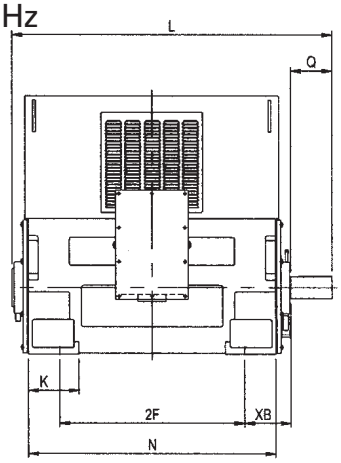
Power (kW)	Frame	Weight (kg)	Speed (rpm)	Current		Torque		Efficiency (%)			Power Factor (%)			Safe Stall Time (SEC)	
				(A) Rated	(%) Starting	(%) Starting	(%) Max.	F.L.	3/4 L	1/2 L	F.L.	3/4 L	1/2 L	Hot	Cold
400	315-1000	2140	1765	44	650	100	200	94.8	94.8	94.3	84.0	81.0	73.0	12	18
450	315-1000	2140	1765	49	650	100	200	94.9	94.9	94.4	85.0	81.0	74.0	12	18
500	315-1000	2240	1765	55	650	100	200	95.0	95.0	94.5	85.0	82.0	75.0	12	18
560	315-1000	2240	1765	61	650	100	200	95.1	95.1	94.6	85.0	82.0	76.0	12	18
630	315-1000	2350	1765	69	650	100	200	95.2	95.2	94.8	85.0	83.0	77.0	12	18
710	315-1000	2410	1765	77	650	100	200	95.3	95.3	94.9	85.0	83.0	78.0	12	18
800	355-1000	2900	1770	86	650	100	200	95.4	95.4	95.0	86.0	83.0	78.0	12	18
900	355-1000	2970	1770	96	650	100	200	95.5	95.5	95.2	86.0	84.0	79.0	12	18
1000	355-1000	2970	1770	107	650	100	200	95.6	95.6	95.3	86.0	84.0	80.0	12	18
1120	355-1000	3180	1770	118	650	100	200	95.8	95.8	95.5	87.0	85.0	80.0	12	18
1250	355-1000	3250	1770	132	650	100	200	95.9	95.9	95.6	87.0	85.0	81.0	12	18
1400	400-1120	3780	1770	147	650	100	200	96.0	96.0	95.8	87.0	86.0	82.0	12	18
1600	400-1250	3970	1770	168	650	100	200	96.2	96.2	96.0	87.0	86.0	82.0	12	18
1800	400-1250	4140	1770	186	650	100	200	96.3	96.3	96.1	88.0	87.0	83.0	12	18
2000	400-1250	4230	1770	207	650	100	200	96.4	96.4	96.2	88.0	87.0	83.0	12	18
2250	400-1250	4600	1775	232	650	80	200	96.5	96.5	96.3	88.0	87.0	84.0	12	18
2500	400-1250	4870	1775	258	650	80	200	96.5	96.5	96.4	88.0	88.0	84.0	12	18
2800	450-1400	4960	1775	285	650	80	200	96.6	96.6	96.5	89.0	88.0	85.0	12	18
3150	450-1400	5230	1775	321	650	80	200	96.7	96.7	96.5	89.0	88.0	85.0	12	18
3550	450-1400	5780	1775	361	650	80	200	96.7	96.7	96.6	89.0	89.0	86.0	12	18

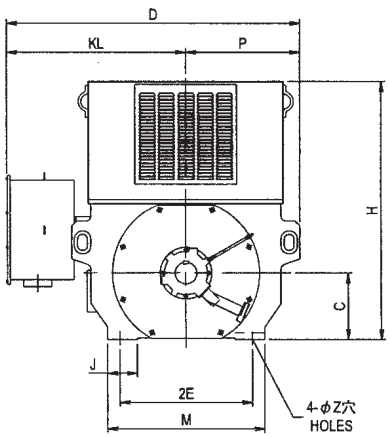
Outdoor Induction Motor WPII/IP24

Anti-friction bearings

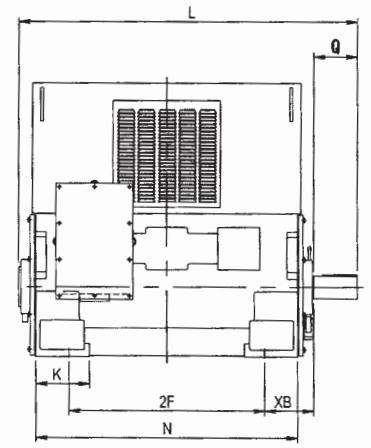
Four Pole, 6.6 kV, 60 Hz

- Example outlines for 4 pole machine specifications shown below.
- 2 pole to pole designs available





Frames 315,355



Frames 400 - 450

*** Example, not for construction**

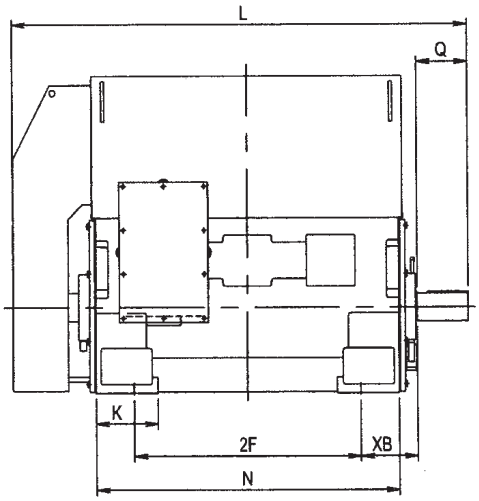
Frame	Poles	Dimensions (mm)											
		C	D	2E	2F	H	J	K	L	M	N	P	Z
315-1000	4, 6	315	1550	630	1000	1320	140	310	1641	750	1246	575	28
355-1000	4, 6	355	1650	710	1000	1450	160	270	1721	850	1326	625	35
355-1120	4, 6	355	1650	710	1120	1450	160	270	1841	850	1446	625	35
355-1120	4, 6	355	1650	710	1120	1450	160	270	1842	850	1446	625	35
400-1120	4	400	1775	800	1120	1555	180	305	1933	950	1496	670	42
400-1250	4	400	1775	800	1250	1555	180	305	2063	950	1626	670	42
450-1250	4	450	1915	900	1250	1935	200	350	2190	1050	1726	745	48
450-1400	4	450	1915	900	1400	1935	200	350	2340	1050	1876	745	48

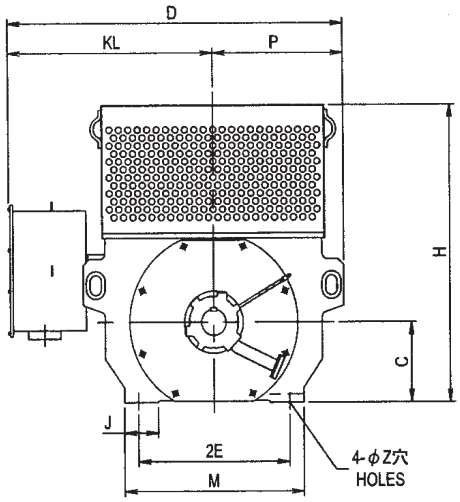
Power (kW)	Frame	Weight (kg)	Speed (rpm)	Current		Torque		Efficiency (%)			Power Factor (%)			Safe Stall Time (SEC)	
				(A) Rated	(%) Starting	(%) Starting	(%) Max.	F.L.	3/4 L	1/2 L	F.L.	3/4 L	1/2 L	Hot	Cold
400	315-1000	2220	1765	44	650	100	200	94.8	94.8	94.3	84.0	81.0	73.0	12	18
450	315-1000	2220	1765	49	650	100	200	94.9	94.9	94.4	85.0	81.0	74.0	12	18
500	315-1000	2320	1765	55	650	100	200	95.0	95.0	94.5	85.0	82.0	75.0	12	18
560	315-1000	2320	1765	61	650	100	200	95.1	95.1	94.6	85.0	82.0	76.0	12	18
630	315-1000	2430	1765	69	650	100	200	95.2	95.2	94.8	85.0	83.0	77.0	12	18
710	315-1000	2490	1765	77	650	100	200	95.3	95.3	94.9	85.0	83.0	78.0	12	18
800	355-1000	2990	1770	86	650	100	200	95.4	95.4	95.0	86.0	83.0	78.0	12	18
900	355-1000	3060	1770	96	650	100	200	95.5	95.5	95.2	86.0	84.0	79.0	12	18
1000	355-1000	3060	1770	107	650	100	200	95.6	95.6	95.3	86.0	84.0	80.0	12	18
1120	355-1000	3270	1770	118	650	100	200	95.8	95.8	95.5	87.0	85.0	80.0	12	18
1250	355-1000	3340	1770	132	650	100	200	95.9	95.9	95.6	87.0	85.0	81.0	12	18
1400	400-1120	3880	1770	147	650	100	200	96.0	96.0	95.8	87.0	86.0	82.0	12	18
1600	400-1250	4080	1770	168	650	100	200	96.2	96.2	96.0	87.0	86.0	82.0	12	18
1800	400-1250	4250	1770	186	650	100	200	96.3	96.3	96.1	88.0	87.0	83.0	12	18
2000	400-1250	4340	1770	207	650	100	200	96.4	96.4	96.2	88.0	87.0	83.0	12	18
2250	400-1250	4770	1775	232	650	80	200	96.5	96.5	96.3	88.0	87.0	84.0	12	18
2500	400-1250	5040	1775	258	650	80	200	96.5	96.5	96.4	88.0	88.0	84.0	12	18
2800	450-1400	5130	1775	285	650	80	200	96.6	96.6	96.5	89.0	88.0	85.0	12	18
3150	450-1400	5400	1775	321	650	80	200	96.7	96.7	96.5	89.0	88.0	85.0	12	18
3550	450-1400	5960	1775	361	650	80	200	96.7	96.7	96.6	89.0	89.0	86.0	12	18

Totally Enclosed Air-Air Cooled Type Induction Motor (TEAAC/IP55)

Anti-friction bearings
Four Pole, 6.6 kV, 60 Hz

- Example outlines for 4 pole machine specifications shown below.
- 2 pole to 10 pole designs available





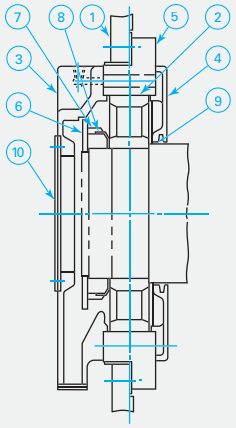
*** Example, not for construction**

Frame	Poles	Dimensions (mm)											
		C	D	2E	2F	H	J	K	L	M	N	P	Z
315-1000	4-10	315	1550	630	1000	1235	140	310	1936	750	1246	575	28
355-1000	4-10	355	1650	710	1000	1365	160	270	2024	850	1326	625	35
355-1120	4-10	355	1650	710	1120	1365	160	270	2144	850	1446	625	35
400-1120	4-10	400	1755	800	1120	1790	180	305	2255	850	1496	670	35
400-1250	4-10	400	1755	800	1250	1490	180	305	2380	950	1626	670	42
400-1250	4-10	450	1915	900	1250	1860	200	350	2585	1050	1726	745	48
450-1400	4-10	450	1915	900	1400	1860	200	350	2735	1050	1876	745	48
450-1400	4-10	450	1915	900	1400	1860	200	350	2735	1050	1876	745	48

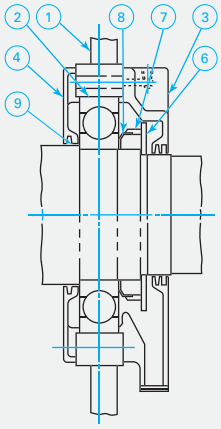
Power (kW)	Frame	Weight (kg)	Speed (rpm)	Current		Torque		Efficiency (%)			Power Factor (%)			Safe Stall Time (SEC)	
				(A) Rated	(%) Starting	(%) Starting	(%) Max.	F.L.	3/4 L	1/2 L	F.L.	3/4 L	1/2 L	Hot	Cold
315	315-1000	2430	1770	34	650	100	200	94.3	94.3	93.1	86.0	84.0	79.0	13	20
355	315-1000	2430	1770	39	650	100	200	94.4	94.4	93.3	86.0	85.0	79.0	13	20
400	315-1000	2490	1770	43	650	100	200	94.5	94.5	93.6	87.0	85.0	80.0	13	20
450	315-1000	2540	1770	48	650	100	200	94.6	94.6	93.8	87.0	85.0	81.0	13	20
500	315-1000	2590	1770	54	650	100	200	94.7	94.7	94.0	87.0	86.0	81.0	13	20
560	315-1000	2650	1770	60	650	100	200	94.8	94.8	94.2	87.0	86.0	82.0	13	20
630	355-1000	3270	1775	66	650	100	200	95.0	95.0	94.4	88.0	86.0	82.0	13	20
710	355-1000	3340	1775	75	650	100	200	95.1	95.1	94.5	88.0	87.0	83.0	13	20
800	355-1000	3340	1775	84	650	100	200	95.3	95.3	94.8	88.0	87.0	84.0	13	20
900	355-1000	3570	1775	94	650	100	200	95.4	95.4	94.9	88.0	88.0	84.0	13	20
1000	355-1120	3710	1775	105	650	100	200	95.5	95.5	95.1	88.0	88.0	84.0	13	20
1120	400-1120	4150	1775	116	650	90	200	95.7	95.7	95.3	89.0	88.0	84.0	13	20
1250	400-1120	4240	1775	129	650	90	200	95.8	95.8	95.4	89.0	88.0	85.0	13	20
1400	400-1250	4550	1775	144	650	90	200	96.0	96.0	95.6	89.0	89.0	85.0	13	20
1600	400-1250	4720	1775	164	650	90	200	96.1	96.1	95.7	89.0	89.0	85.0	13	20
1800	400-1250	5510	1780	184	650	80	200	96.2	96.2	95.8	89.0	89.0	85.0	13	20
2000	450-1250	5690	1780	205	650	80	200	96.3	96.3	95.9	89.0	89.0	85.0	13	20
2250	450-1400	5960	1780	230	650	80	200	96.4	96.4	96.0	89.0	89.0	85.0	13	20
2500	450-1400	6420	1780	255	650	80	200	96.5	96.5	96.2	89.0	89.0	86.0	13	20
2800	450-1400	6690	1780	285	650	80	200	96.7	96.7	96.3	89.0	89.0	86.0	13	20

Bearing Arrangement Details

Rolling Type Bearing (two bearings)



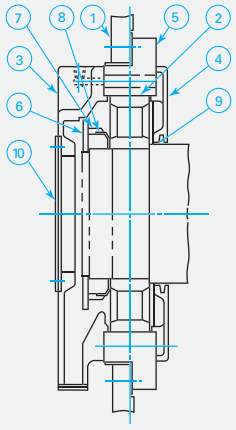
Non-drive end



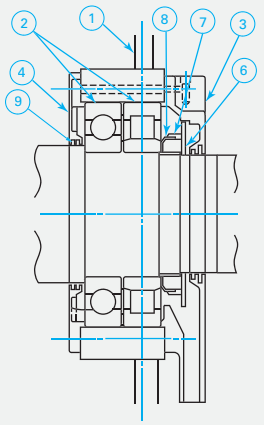
Drive end

Part No.	Part Name
1	Bearing Bracket
2	Bearing
3	Outside Oil Seal
4	Inside Oil Seal
5	Insulated Bearing Seat
6	Grease Valve
7	Bearing Nut
8	Bearing Washer
9	Packing
10	Cover

Rolling Type Bearing (three bearings)



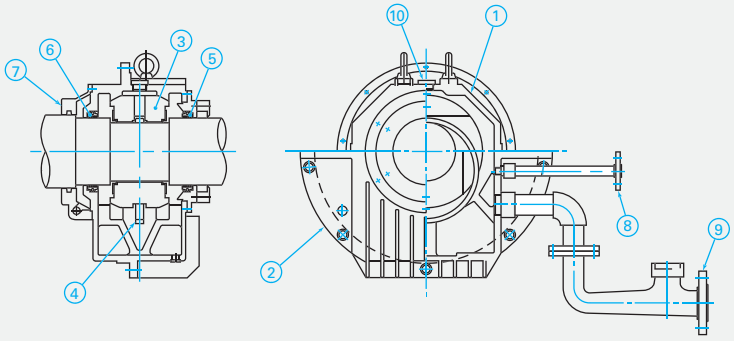
Non-drive end



Drive end

Part No.	Part Name
1	Bearing Bracket
2	Bearing
3	Outside Oil Seal
4	Inside Oil Seal
5	Insulated Bearing Seat
6	Grease Valve
7	Bearing nut
8	Bearing washer
9	Packing
10	Cover

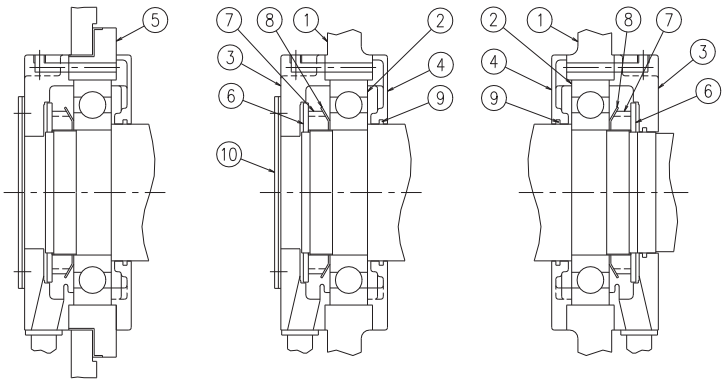
Forced Lubricated Sleeve Bearing



Part No.	Part Name
1	Bearing Housing
2	Bearing Bracket
3	Bearing Metal
4	Oil Ring
5	Outside Oil Seal
6	Inside Oil Seal
7	Machine Seal
8	Oil Inlet Pipe
9	Oil Outlet Pipe
10	Sight Glass

Bearing Arrangement Details

Grease Lubricating Type Antifriction Bearings



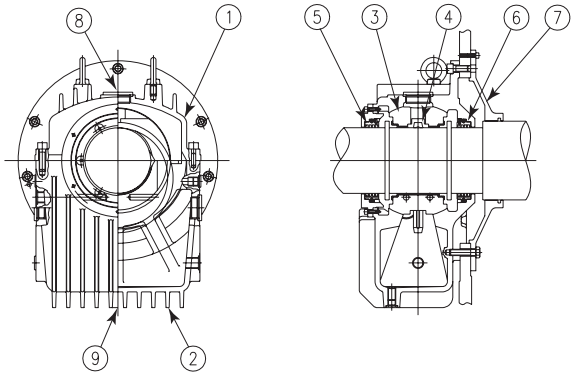
Non-drive end
Frame 450

Non-drive end
Frame up to 400

Drive end

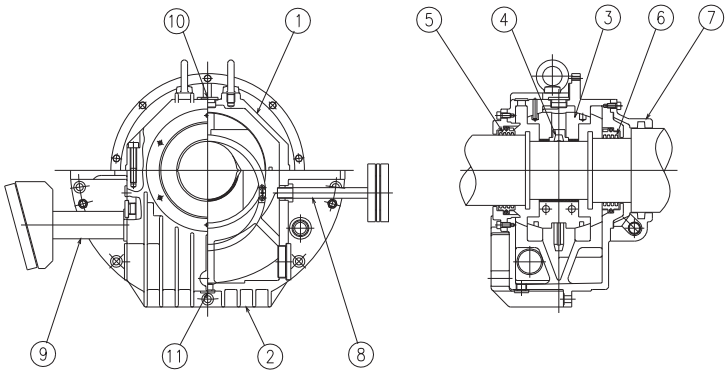
Part No.	Part Name
1	Bearing Bracket
2	Bearing
3	Outside Oil Seal
4	Inside Oil Seal
5	Insulated Bearing Seat
6	Grease Valve
7	Bearing Nut
8	Bearing Washer
9	Packing
10	Cover

Self-Cooled Sleeve Bearings



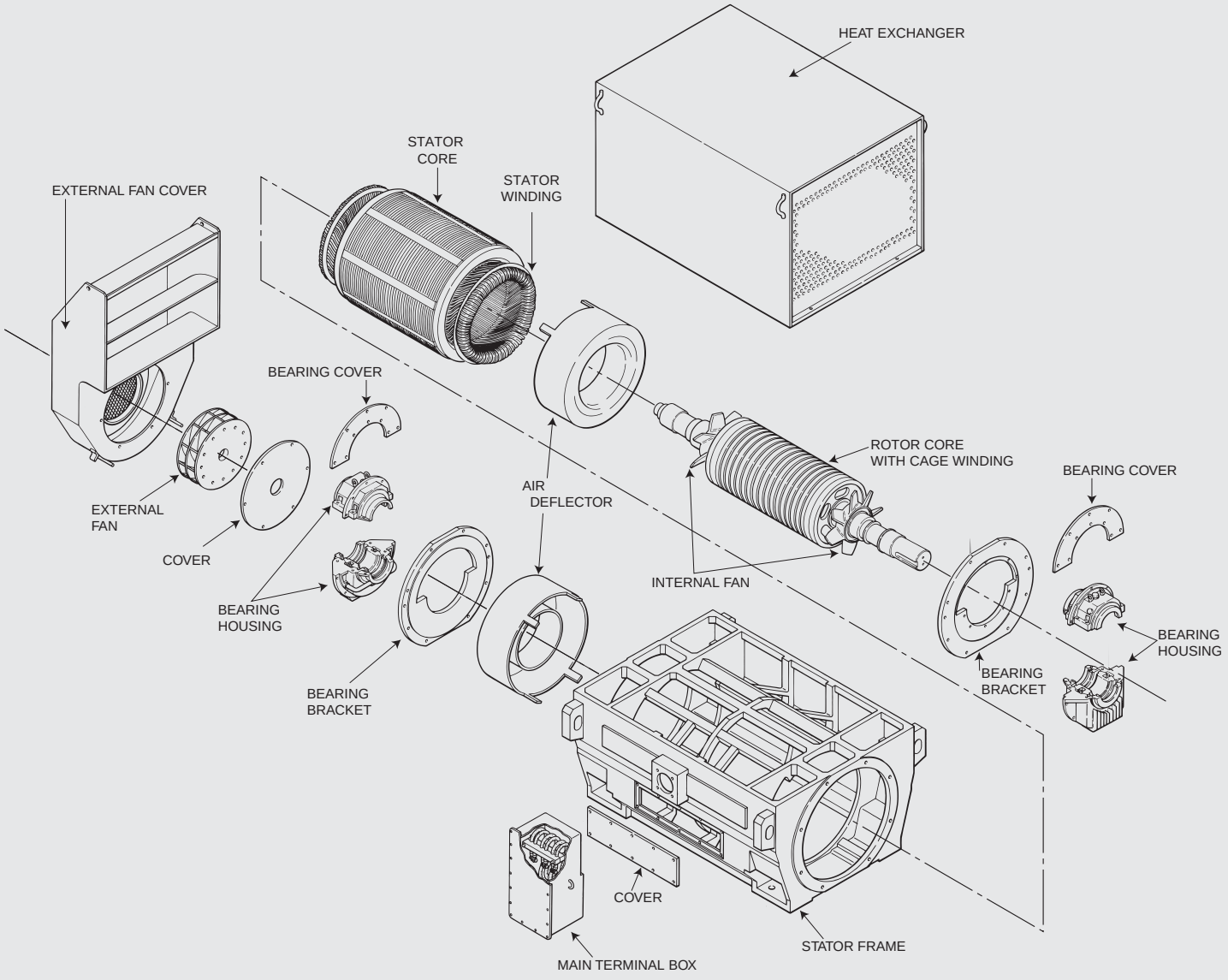
Part No.	Part Name
1	Bearing Housing
2	Bearing Bracket
3	Bearing Metal
4	Oil Ring
5	Outside Oil Seal
6	Inside Oil Seal
7	Machine Seat
8	Sight Glass
9	Drain Plug

Forced-Feed Lubricated Sleeve Bearings



Part No.	Part Name
1	Bearing Housing
2	Bearing Bracket
3	Bearing Metal
4	Oil Ring
5	Outside Oil Seal
6	Inside Oil Seal
7	Machine Seal
8	Oil Inlet Pipe
9	Oil Outlet Pipe
10	Sight Glass
11	Drain Plug

21-MII Series Internal Details



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