Industrial Motors

Commercial &
Appliance Motors

Automation

Digital &
Systems

Energy

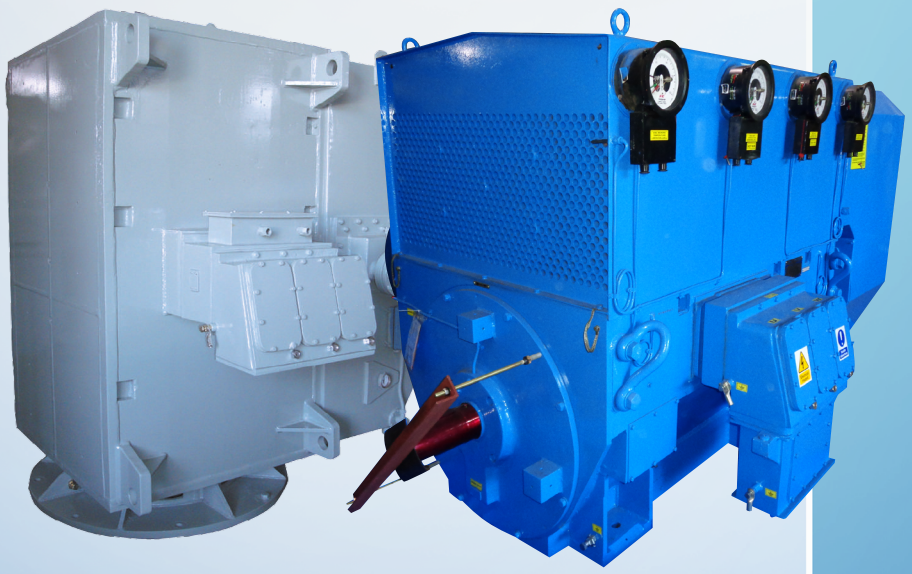
Transmission &
Distribution

Coatings

Unipak II CACA/CACW High Voltage AC Induction Motors

April 2025

India



marathon™ WEG Group

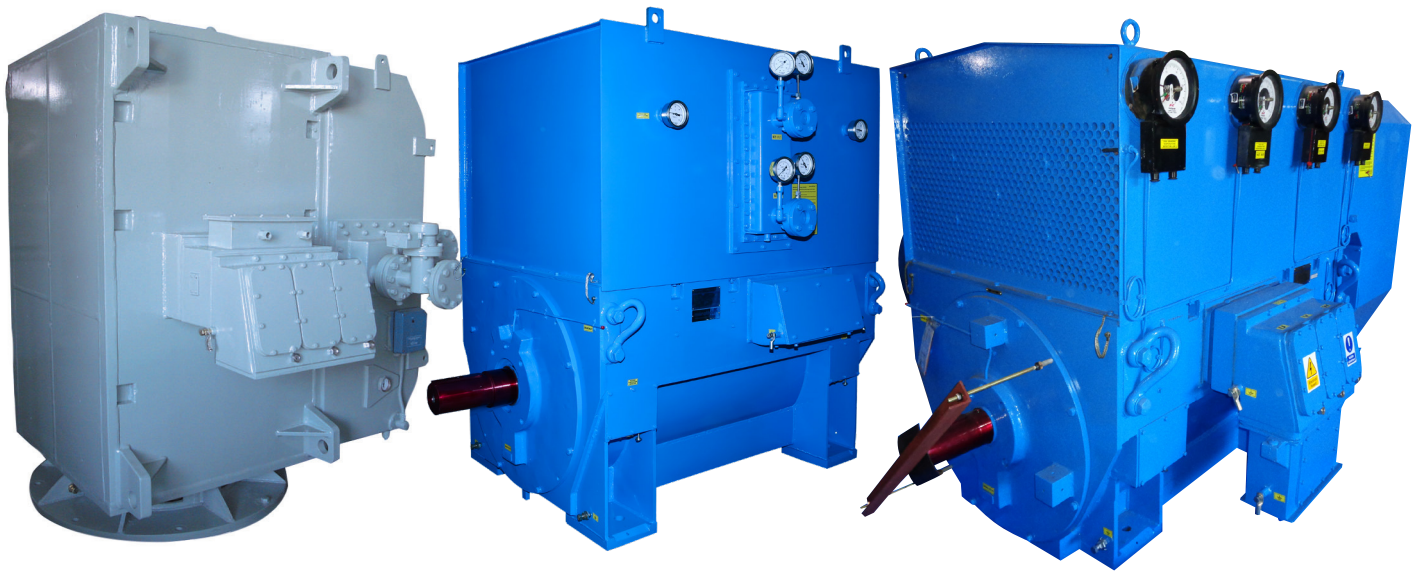
Driving efficiency and sustainability

weg



MARATHON™ UNIPAK II CACA/CACW HIGH VOLTAGE AC INDUCTION MOTORS

One of India's most modern motor factories, incorporating extensive CAD facilities with over 50 years' experience in the design and application of induction motors, enables Marathon to offer the benefits of proven solutions.



- Marathon has over 2500 MW installed world-wide.
- Upto 4000 kW range capability.
- All speeds available.
- Highest available efficiency - rapid pay-back.
- High power factor - low power cost.
- 20 years expected design life at 1000 starts per year
- Resivac VPI insulation system for total winding reliability.
- Highest quality - lowest maintenance costs.
- Low Noise Level - better performance than IS:12065.
- Low vibration level - conforms to IS:12075.
- IP 55 enclosure protection as standard on enclosed machines.
- Factory fixed air gap.
- Compliance with National and International Standards.
- Built to type N requirements.
- Upto 11 kV, 50 or 60 Hz. supply.
- Low starting current design available.
- Variable speed drive compatibility.
- Horizontal mounting.
- Rolling or plain bearings.
- Environmentally friendly motors to meet all drives.
- Slipring version available.

UNIPAK HIGH VOLTAGE AC INDUCTION MOTORS

STANDARDS AND SPECIFICATIONS

Compliance with the International Standard IEC®* 34 ensures that motors also meet the requirements of other aligned International Standards including:

IS:325	INDIA
IS/IEC 60034	BELGIUM
NF C 51-111	France
VDE 05301/1.66	Germany
CEI 2-3, N. 355	Italy
NEN 3173	Netherlands
NEN 41.69	Norway
SEN 2601 01	Sweden
SEV 3009	Switzerland
B5 4999 & 5000	United Kingdom

Please check with our sales department of the address given on the back of this publication for more detailed information.

Cooling Methods
Air-cooled CACA IC 0161, Water-cooled CACW IC 8A1W7, Open Ventillated IC01. Methods of cooling are as recommended by IEC 34-6 (complete system) & IS:6362.

Mounting Arrangements
Horizontal Foot Mounting and Vertical Mounting.

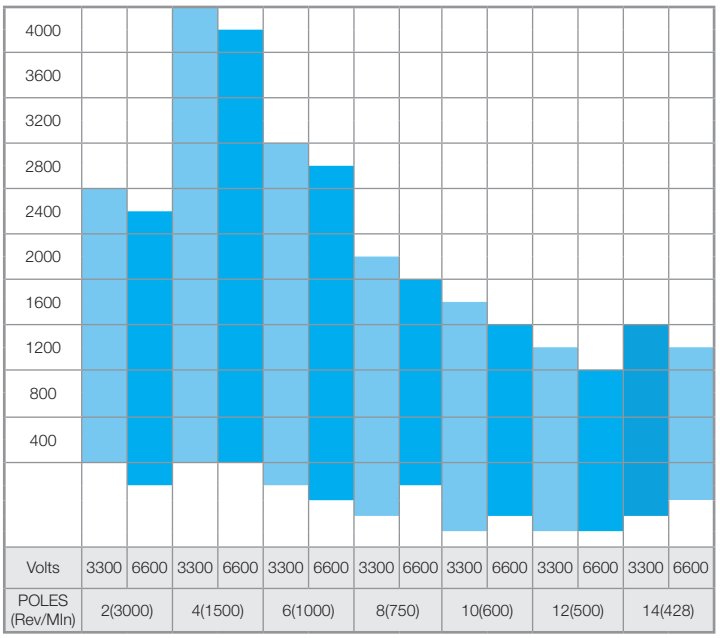
Dimensions
Shaft and fixing dimensions are in accordance with the requirements of IEC 72 and 72A together with BS 4999 part 141 & IS:8223.

Frame Sizes
Shaft centre heights from 315 to 710mm are covered.

Speed
All fixed speed requirements can be met, together with machines for variable speed drive systems. Proven designs exist for most driven equipment needs (e.g. compressors, pumps, fans, crushers and mills).

Electrical Supply
All National and International supply voltages and frequencies are catered for by the Unipak range.

Insulation
The winding insulations system is class F in accordance with IEC 85. More detail information on insulation & vacuum pressure impregnation system (VPI)/ Processes may be provided on request.



Note: For Higher poles, please refer to manufacturer

Degree of Protection by Enclosure
IP 55 as standard for totally enclosed water or air cooled machines. Protection and enclosure types are as recommended by IEC 34-5 & IS:4691.

As per customer requirement we provide Unipak range of motor in IP23 Protection (SPDP) as well.

Ventilation
The designs employ radial ducted ventilation using shaft mounted steel fans to circulate the internal cooling air. CACA (TEAAC) motors are fitted as standard with high efficiency, unidirectional low noise level, shaft mounted steel fans.

Noise Level
Particular attention has been given to all sources of noise generation and Unipak standard designs meet the most stringent modern requirements as per IS 12065.

Vibration
Unipak motors comply with the requirements of API 541 and IS:12075. Rotors are dynamically balanced prior to assembly in two planes. Vibration is then checked on test before and after overspeed tests to prove stability.

Efficiency
Full load efficiencies of our motor are higher ensuring low operating costs.

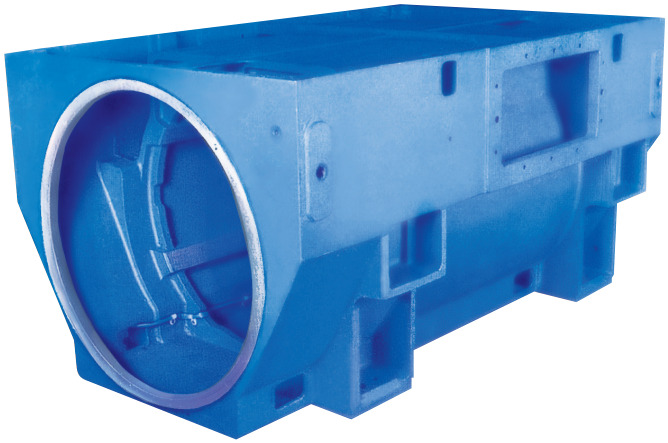
Starting Current
Standard designs are as per IS/IEC 60034-1. Lower starting current designs can be tailored to suit specific supply system limitations where required.

*IEC is a trademark or trade name of International Electrotechnical Commission and is not owned or controlled by Marathon Electric.

GENERAL CONSTRUCTION

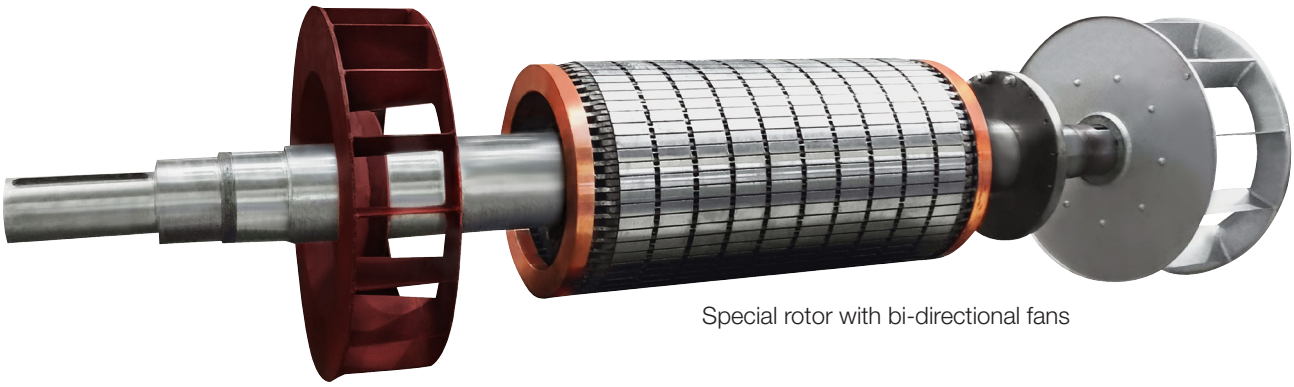
Rotor Cage Windings

Rotor bars are designed and manufactured to maintain a tight fit throughout the slot length and depth, and are connected to the end-rings by means of a specially developed one shot brazing or welding process ensuring total reliability throughout the life of the motor. Cage designs are optimised to ensure a minimum starting capability of 1000 starts per year over a 20-year period.



Frames

Unipak Motor frames are of box configuration, manufactured from cast iron or fabricated steel, thus ensuring an extremely robust and rigid support structure. The top of the frame has a rectangular opening to allow fitment of the air/air or air/water heat exchanger, or alternative ventilation arrangements.



Special rotor with bi-directional fans

Stator and Rotor Cores

Stator core packs are built on expanding mondrels using packets of insulated, low-loss laminated electrical steel, interspersed with I-beam spacer sections which form radial cooling ducts. Cores are hydraulically compressed between substantial steel end-plates and the entire assembly is secured by sequentially welding langitudinal steel core-bars to the back of the laminations and the end-plates to maintain the pressure. The core bars extend beyond the end plates to form rigid anchorages for bracing of the end windings.

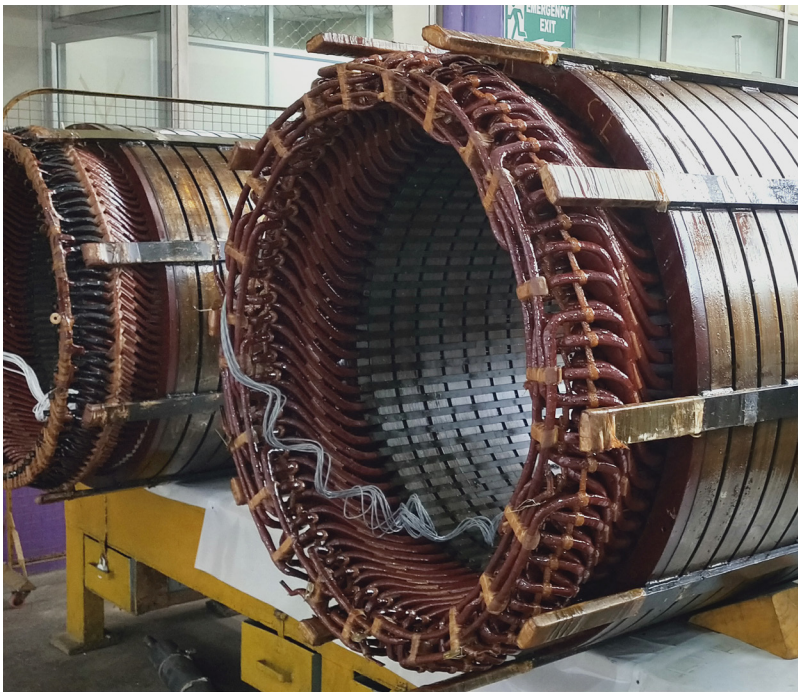
Rotor cores are built against a compression plate utilising packets of insulated laminations in a similar manner to the stator cores. These are then shrunk onto the shaft assembly and retained by circumferential keys.

Stator Coils

All Unipak stator coils are manufactured from annealed copper strip, insulated with mica-paper tape. Loops are formed with the appropriate number of turns, and the coil is then pulled into the required shape in a forming machine. Layers of mica tape insulation are then added, followed by the application of corona shield or semi-conducting tape as appropriate to the supply voltage.

The coils are inserted into their slots in the stator core pack and fixed firmly in position with slot wedges. Endwindings are securely braced, thus ensuring the prevention of movement during starting and service.

High voltage tests are carried out both before and after connection, and again after impregnation in order to check insulation integrity. On completion of the winding process, resistances and impedances are checked for balance and design conformly.



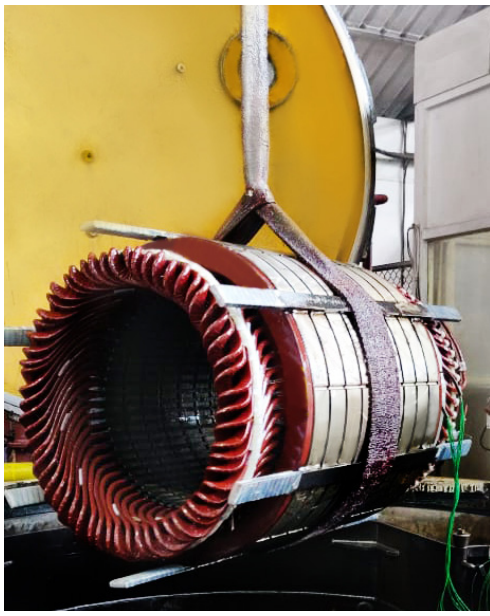
End Winding Bracing

The end winding bracing system is designed to match the rotor capability of a minimum 1000 starts per year for 20 years and to withstand the stresses involved in 180 degrees out-of-phase reswitching.

Winding Impregnation

The RESIVAC (Resin poor) Vacuum Pressure Impregnation System (VPI) is employed on all Unipak Motors. This system ensures global impregnation of the entire wound stator core assembly using a specially developed solventless epoxy resin. The process guarantees that all air and moisture is extracted under vacuum from the winding before pressure then forces resin into every void within the assembly.

Curing of the resin is carried out whilst constantly rotating the assembly in on oven to ensure even distribution. The entire impregnation operation is microprocessor controlled and data logged to ensure total reliability of the windings during service life.



Impregnation Vessel

Shaft

Shafts are manufactured from low or medium carbon manganese steel bar depending on weldability requirement. For motors with radially ventilated rotors, longitudinal arms are generally welded on to the shaft and subsequently stress relieved. Shaft extension diameter is selected on the basis of motor power requirement and application/ load GD2 / number of starts per year. Standard motors have single parallel shaft extension. However, tapered shaft extension and double ended shaft extension are also provided as per requirement. Shaft bars are periodically tested for physical, chemical and mechanical conformance to specification. NDT tests are performed as per internal requirement and/or QAP.

Phase segregated Terminal Box

Bearings and Lubrication

Bearings support the rotor and form the connecting element between rotor and stator of the motor. Selection of proper bearing is essential to low noise and low vibration performance of motor apart from ensuring a minimum of 40,000 hours of L10h bearing life and over 2000 hours of relubrication interval. Relubrication quantity & intervals are mentioned on the rating plate. Open type bearings are provided which are suitable for online grease lubrication. Grease injection ports are provided as a standard to facilitate online relubrication of bearings. Excess grease is collected in a grease collection chamber which can be removed by opening the grease outlet cap. Resistance type bearing temperature detectors are provided as a standard at both drive and non-drive end of motors to monitor bearing temperatures. Gas filled dial type bearing temperature detectors with analog display, directly mounted on the motor body, can also be provided on request.

In the operation of an AC induction motor, any imbalance in the phase currents in or around the rotor's magnetic circuit can produce a rotating system flux linkage. When the shaft rotates, these flux chains can generate a potential difference across the shaft. This potential difference is called the shaft voltage. The shaft voltage can excite a circulating current through a loop formed by the two ends of the bearing in the shaft and the casing (closed circuit), which is called the shaft current.
The contact areas between end brackets/housings/bearing outer race/rolling elements/bearing inner race/shaft can act as electrical contacts. Depending on the lubrication regime a bearing may be in a resistive state or capacitive state with a certain breakdown voltage. When the applied field strength in the lubrication film at contact zone of rolling elements and raceways exceeds the threshold value, electrical sparks will occur which can create tiny craters in the rolling elements as well as raceways. Typical damages are characterised by pitting and false brinelling.

The most common countermeasures are one or a combination of the following depending on the type of current viz. shaft earthing current, circulating current or capacitive discharge currents :

- NDE insulated or ceramic rolling elements
- NDE or DE insulated or ceramic rolling elements
- One brush contact, no bearing insulation
- Two brush contacts at DE & NDE, no bearing insulation
- Insulated coupling

However due to ease of availability of non-insulated bearings, we generally provide insulated bearing housing/end-shield with a non-insulated bearing. Plain bearings are also employed either for technical compulsions or customer's preference.

Terminations

Fault rated elastomeric connectors (with or without mechanical protection), steel weatherproof boxes, phase insulated or fault rated phase segregated terminal boxes, and terminal boxes including provision of, or for surge diverters, current transfarmers etc. can be provided where appropriate. Winding neutral terminations may be concealed behind a cover or brought out to an external chamber to allow for the fitting of current transformers etc. where required. Terminal boxes can be provided on either side of the machine. Main Terminal box (PSTB) is suitable to rotate in steps of 180°.

Paint System

Surfaces are degreased, then blast cleaned to ISO 8501 and ISO 8503, which deline surface cleanliness and roughness. Surfaces are then primed using a modified synthetic resin red oxide primer to a dry film. A single finish coat of two pack epoxy point is applied.

Auxillary

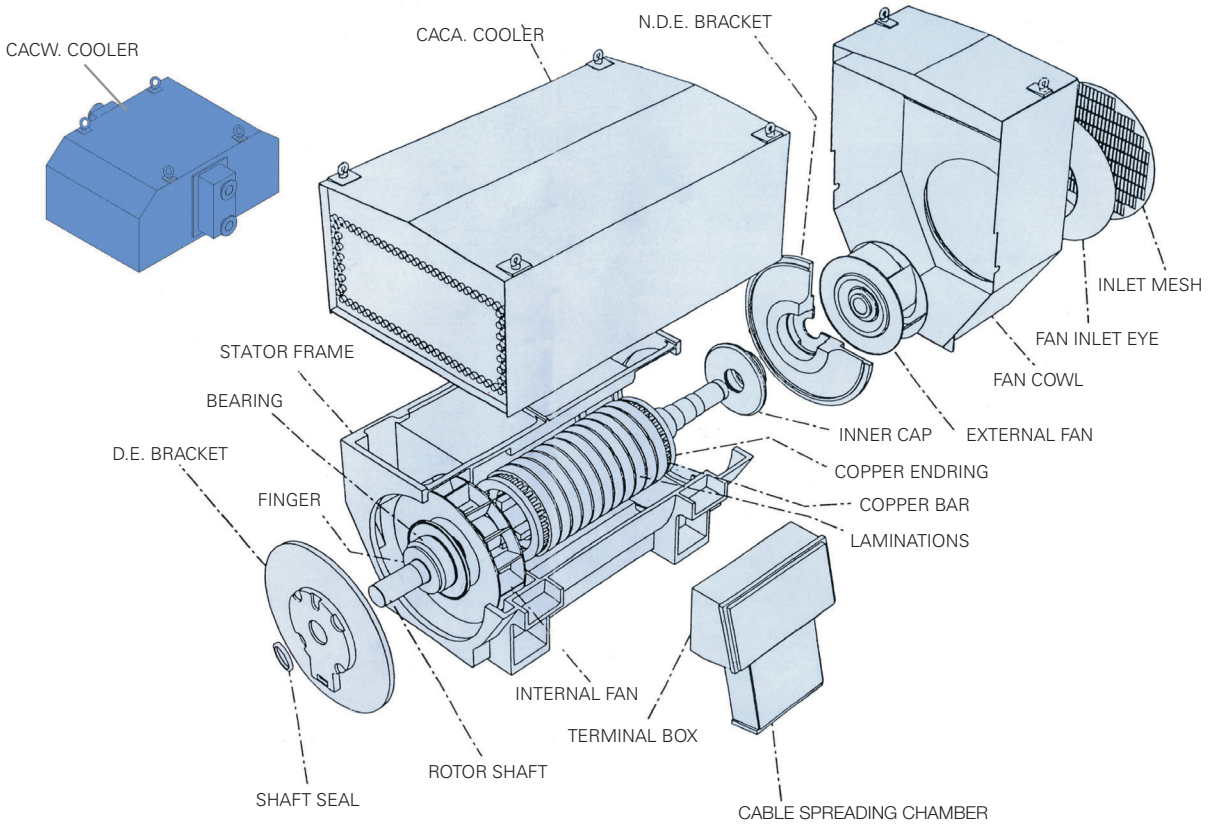
Anti-Condensation heaters are provided in the motor which are easily withdrawable for maintenance without dismantling the motor. Bearing temperature, vibration monitoring, and cooling system performance monitoring are available as required.

Total Quality

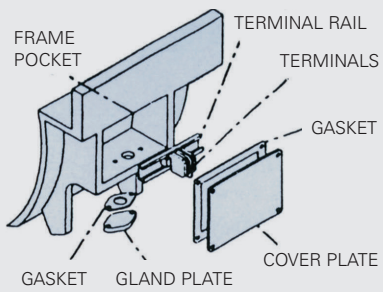
We manufacture a complete range of HT motors with quality assurance plans endorsed by well known consultants. Also we follow the quality plan of Marathon Electric in every stage of production of all motors. Import materials are critically tested inhouse as per National/ International standards to ensure error free end product.

Full range of Unipak motors are routinely tested at rated voltage and power in our test plant. Type testing can be done up to 4000 KW, 11KV, 4 pole.

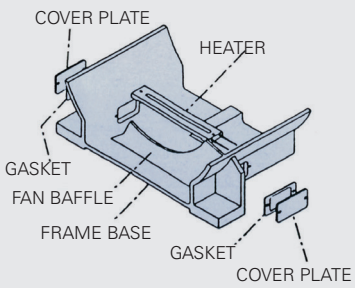
UNIPAK II CACA TYPICAL SECTION



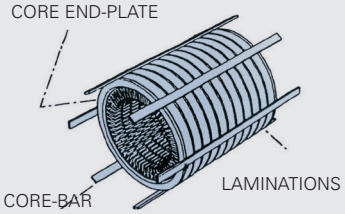
Typical terminal assembly



Heater location at each end of frame

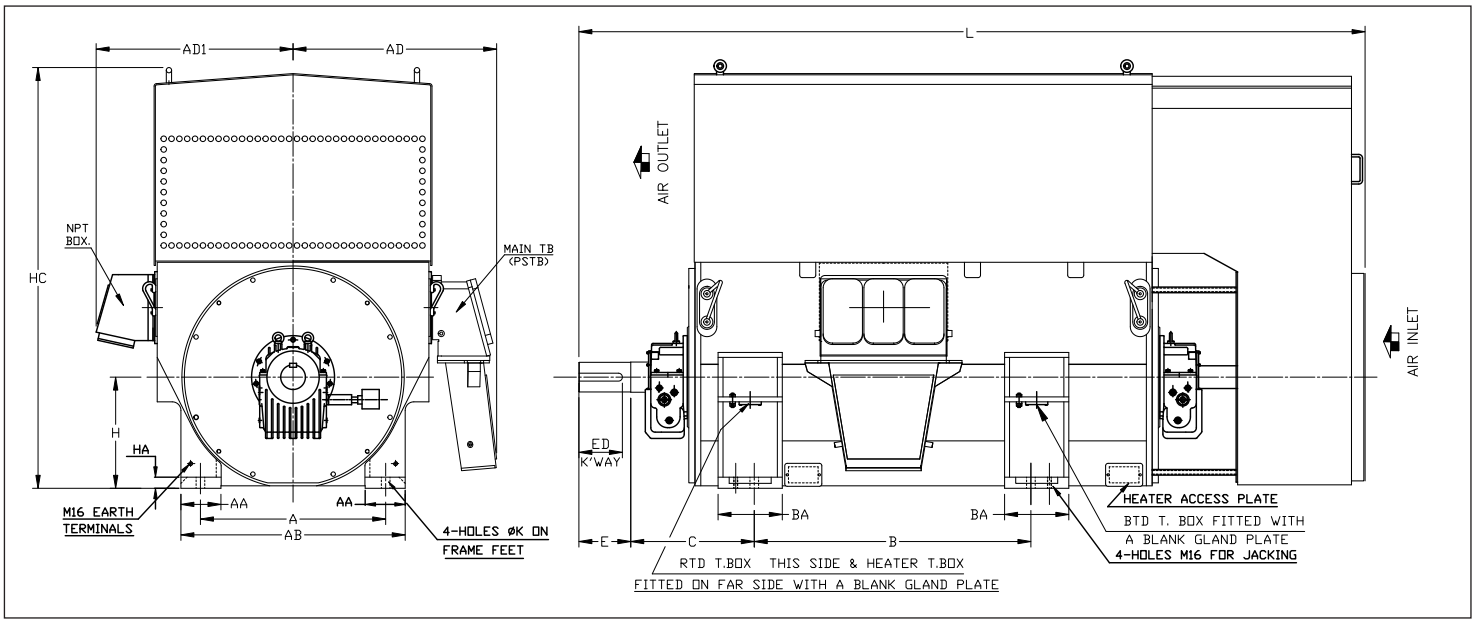


Stator corepack prior to winding



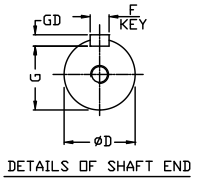
UNIPAK II OVERALL DIMENSIONS

General arrangement of 2 pole motor with sleeve bearings



FRAME	A	B	C	BA	AB	AA	H -1,5	HC Max.	AD Max.	AD1 Max.	øD		E	ED	F	GD	G	øK	L MAX.
											NOM.	TOL.							
DC450U1120	750	1120	500	260	908	162	450	1750	925	875	100	+.035 +.013	210	174	28	16	90	35	3250
DC500U1000	850	1000	530	260	1042	203	500	1920	950	900	120	+.035 +.013	210	175	32	18	109	35	3150
DC500U1250	850	1250	560	260	1042	203	500	1920	950	900	140	+.040 +.015	210	194	36	20	128	35	3600
DC560U1400	950	1400	560	320	1180	230	560	2250	1100	1050	140	+.040 +.015	200	185	36	20	128	42	3800

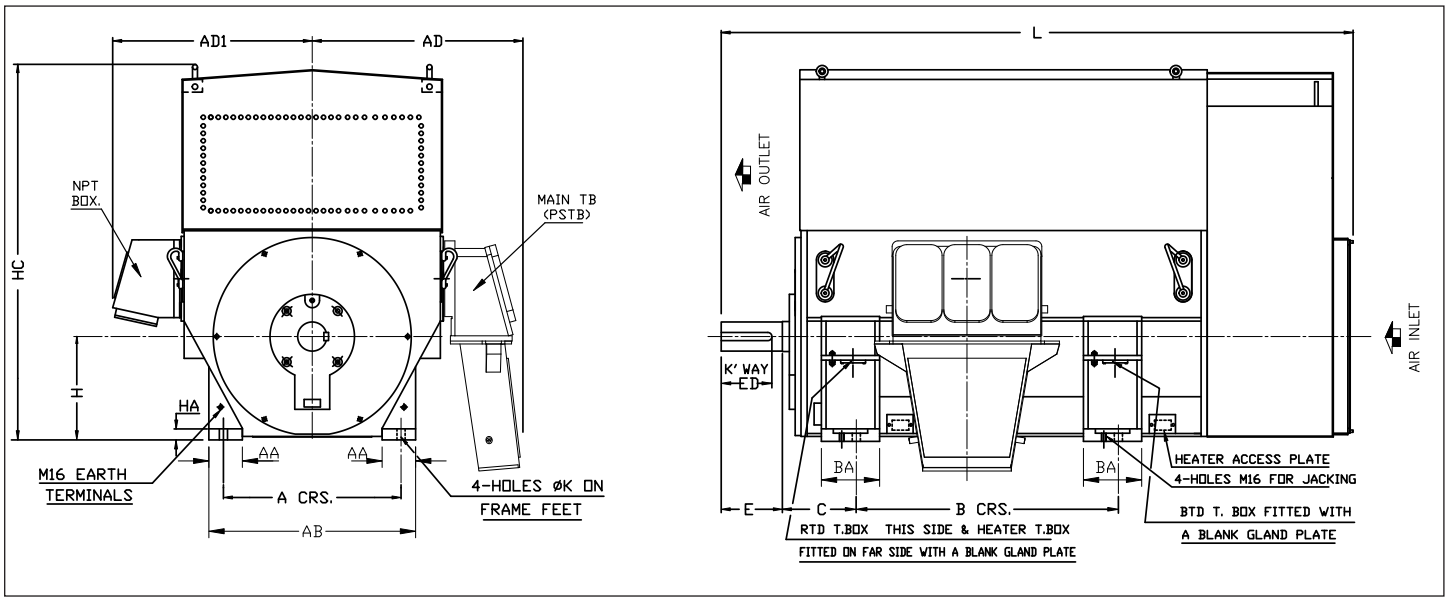
All dimensions are in mm
For more information, refer to manufacturer.



DETAILS OF SHAFT END

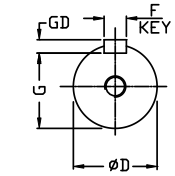
UNIPAK II OVERALL DIMENSIONS

General arrangement of 4 to 12 pole motor with rolling element bearings



FRAME	A	B	C	BA	AB	AA	H	HC Max.	AD Max.	AD1 Max.	øD		E	ED	F	GD	G	øK	L MAX.
											NOM.	TOL.							
DC315U800	508	800	216	150	635	140	315	1200	800	750	85	+.035 +.013	170	165	22	14	76	28	2100
DC355U900	610	900	254	200	710	125	355	1350	825	775	100	+.035 +.013	210	174	28	16	90	28	2175
DC400U800	686	800	280	240	826	156	400	1500	850	800	100	+.035 +.013	210	194	28	16	90	35	2300
DC400U1000	686	1000	280	240	826	156	400	1500	900	850	100	+.035 +.013	210	194	28	16	90	35	2450
DC450U900	750	900	315	260	908	162	450	1750	925	875	120	+.o35 +.013	210	176	32	18	109	35	2525
DC450U1120	750	1120	315	260	908	162	450	1750	925	875	120	+.o35 +.013	210	176	32	18	109	35	2800
DC500U1000	850	1000	335	260	1042	203	500	1920	950	900	130	+.040 +.015	250	216	32	18	119	35	2850
DC500U1250	850	1250	335	260	1042	203	500	1920	950	900	140	+.040 +.015	250	216	36	20	128	35	3050
DC560U1400	950	1400	355	320	1180	230	560	2250	1075	1025	180	+.040 +.015	300	280	45	25	165	42	3450

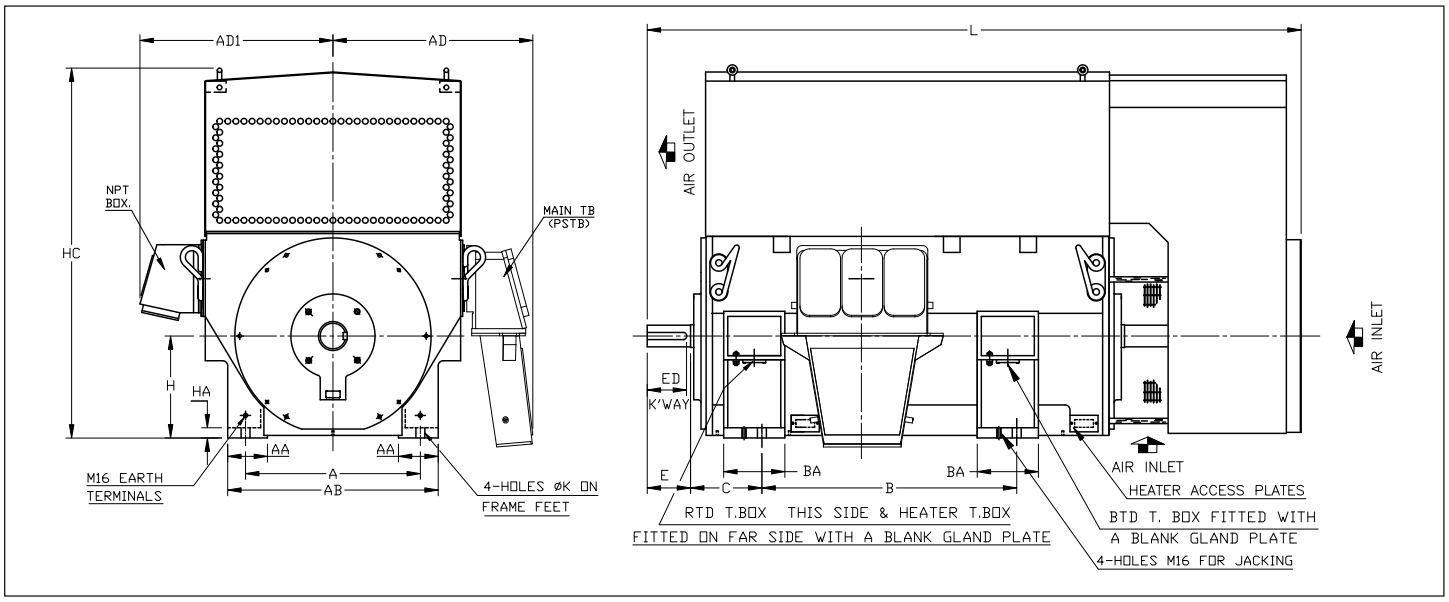
All dimensions are in mm
For more information, refer to manufacturer.



DETAILS OF SHAFT END

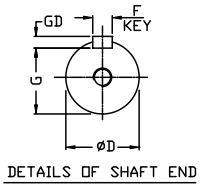
UNIPAK II OVERALL DIMENSIONS

General arrangement of 2 pole motor with Anti-friction Bearings



FRAME	A	B	C	BA	AB	AA	H -1	HC Max.	AD Max.	AD1 Max.	øD		E	ED	F	GD	G	øK	L MAX.
											NOM.	TOL.							
DC355U900	610	900	254	200	710	125	355	1350	800	750	65	+.030 +.011	140	119	20	12	57,5	28	2400
DC400U800	686	800	280	240	826	156	400	1500	850	800	85	+.03S +.013	170	155	22	14	76	35	2550
DC400U1000	686	1000	280	240	826	156	400	1500	850	800	85	+.035 +.013	170	155	22	14	76	35	2600
DC450U900	750	900	315	260	908	162	450	1750	925	875	85	+.035 +.013	170	155	22	14	76	35	2800

All dimensions are in mm
For more information, refer to manufacturer.



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