High-voltage motors 2H-L series
**21-L series**: Combining over 100 years experience with innovative new technology makes the 21-L series the right choice for the demanding needs of today’s industry.

**Superior electrical performance benefits, unsurpassed reliability**: The 21-L series three-phase high-voltage motors are at the leading edge of motor technology.
- Designs up to 18,500 KW (25,000HP)
- Wide variety of enclosures
- Rugged, high quality fabricated steel construction
- Frame sizes from 450mm-900mm
- Designed to meet worldwide standards

**Features / Benefits**:

**Excellent electrical performance**
- Higher efficiency
- Higher power factor
- Superior starting characteristics

**Unique Modular Construction**
- Easy motor enclosure conversion
  - ODP, WP1, WP2, CACA (TEAAC), CACW (TEWAC)

**New compact design derived through**
- Extensive electrical magnetic field analysis
- Heat transfer analysis
- Improved ventilation

**Lower noise & lower vibration**
- Advanced techniques in core/frame construction

**Advanced VPI insulation system**
- Higher surge withstanding capability

**Excellent Quality Control**
- Low operating and maintenance costs
- High reliability
- Extended re-greasing intervals

**Design for all applications and industries**

**Compatible on Variable Frequency Drive applications**

**Fabricated copper bar rotor construction**

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**Main terminal box**

**Drawing**

**Accessories**

- RTD’s
- Space Heaters
- Dial thermometer
- Vibratin detector

**Large-sized main terminal box**

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**Features of 21-L Series Motors**
Reliability & Easy Operation / Maintenance

**Main terminal box**
NEMA type terminal box is standard. Braced arrangement for surge protection and differential CTs are readily available. Standard main terminal box is rotatable every 90 degrees. There is enough space below main terminal box for cable connection.

**Stator core**
Made of high-grade electrical steel with low magnetic losses. Stator core can be easily removed from the stator frame if ever necessary.

**Frame**
Increased rigidity of stator frame and low vibration are achieved by a frequency analysis.

**Auxiliary terminal box**
Modular arrangement for accessory connections allow flexibility with standardized mechanical construction.

**Air housing**
NEMA WPII top-hood construction prevents intrusion of rain water and foreign matter. IP 55 protection is standard on CACA and CACW type.

**Stator coil**
Utilizes highly reliable, vacuum pressured impregnation (VPI) insulation system which provides firm bonding of coil ends and ability to withstand most environments.

**Rotor bar**
Copper rotor bars are shaped to provide excellent torque characteristics and mechanical strength and are retained firmly in the slots.

**Bearing**
Antifriction & sleeve bearings have easily maintainable construction with excellent lubrication system.
Enclosures of 21-L Series Motors

21-L Series
- Output: 50Hz: 450~16500KW, 60Hz: 450~18500KW
- Voltage: 2300V~13800V
- Insulation Class: F Class
- Apply Standards: IEC, NEMA, BS, AS...

Drip Proof Type
A drip proof type motor (IP22, IC01) is a common choice for well ventilated rooms. Cooling air intake and hot air exhaust windows are provided at the motor terminals. The ducts are windows provided with separate baffle at inside and screen on outside to prevent intrusion of water drips and other foreign matters into the motor (inside NEMA WP-I requirements).

NEMA Weather-protected Type-II
The open outdoor type motor (IP23, IC01) is a motor used for outdoor that incorporates an air housing in accordance with NEMA WPE. It includes three right angled turns for air inlet and inter-air duct has a section where wind velocity falls below 3 m/sec (600ft/min.), dripping water, dust, and foreign matters. A section is provided in which air may blow through without being forced into the motor.

Fundamental
IEC 230V and 460V per IEC Standard constructions are available in addition to the four type where described here. Main terminal box can be changed every 90 degree angle. Main terminal box is large enough to connect cable easily. Also provided shaft current protection insulator at none drive end bearing portion.

Totally-enclosed Fan-cooled Type (CACA)
In an environment containing corrosive or harmful gas, a totally-enclosed fan-cooled motor (IP44, IC11) is generally used. The external fan is mounted on the opposite drive end and directs fresh air into the pipes of the air housing located on the upper part of the motor. The pipes constitute a heat exchanger in which fresh air passing through the pipes cool motor inside hot air.

Drip Proof Type
A drip proof type motor (IP54, IC11) is a common choice for a well ventilated room. Cooling air intake and hot air exhaust windows are located at top hood portion. The ducts are windows provided with separate baffle at inside and screen on outside to prevent intrusion of water drips and other foreign matters into the motor (inside NEMA WP-I requirements).

Totally-enclosed Air-Water-cooled Type (CACW)
This type of motor (IP55, IC81W) is especially useful in a location where low noise operation is required or where it is desired to remove heat from the motor ambient. The motor accommodates an air to water heat exchanger in the air housing in the upper part of the motor. A drain in the air housing protects the motor proper from damage caused by water leakage.

Totally-enclosed Type (CACA)
In an environment containing corrosive or harmful gas, a totally-enclosed fan-cooled motor (IP44, IC11) is generally used. The external fan is mounted on the opposite drive end and directs fresh air into the pipes of the air housing located on the upper part of the motor. The pipes constitute a heat exchanger in which fresh air passing through the pipes cool motor inside hot air.

Fundamental
IEC 230V and 460V per IEC Standard constructions are available in addition to the four type where described here. Main terminal box can be changed every 90 degree angle. Main terminal box is large enough to connect cable easily. Also provided shaft current protection insulator at none drive end bearing portion.
21L Series

Output: 50Hz: 450~18500KW (600~22000HP)
60Hz: 450~18500KW (600~25000HP)
Voltage: 2300V~13800V
Insulation Class: F Class
Apply Standards: IEC, NEMA, BS, AS ...

NEMA Weather-protected Type-II
The open-outdoor type motor (SF24, IC0) is a motor used for outdoor that incorporates an air housing in accordance with NEMA WP-II. It includes three right angled turns for air inlet and inlet air duct has a section where wind velocity falls below 3 m/sec (600ft/min.), dripping water, dust, and foreign matters. A section is provided in which air may blow through without being forced into the motor.

Totally-enclosed Fan-cooled Type (CACA)
In an environment containing corrosive or harmful gas, a totally enclosed fan-cooled motor (SF25, IC0) is generally used. The external fan mounted on the opposite drive end directs fresh air into the pipes of the air housing located on the upper part of the motor. The pipes constitute a heat exchanger in which fresh air passing through the pipes cools motor inside hot air.

Drip Proof Type
A drip proof type motor (SF26, IC0) is a common choice for a well ventilated room. Cooling air intake and hot air exhaust windows are located at top hood portion. The ducts are windows provide with separate braids at inside and screen at outside to prevent intrusion of water drips and other foreign matters into the motor (inside NEMA WP-I requirements).

Totally-enclosed Air-Water-cooled Type (CACW)
This type of motor (SF28, IC81W) is especially useful in a location where low noise operation is required or where it is desired to remove heat from the motor ambient. The motor accommodates an air to water heat exchanger in the air housing in the upper part of the motor. A drain in the air housing protects the motor from damage caused by water leakage.

Fundamental
IEC, NEMA and CEMA Standard constructions are available in addition to the four type where described here.
Main terminal box can be changed every 90 degree angle. Main terminal box size is large enough to connect cable easily. And also provided shaft current protection insulator at none drive and bearing portion.

Enclosures of 21-L Series Motors
Features of 21-L Series Motors
Reliability & Easy Operation / Maintenance

Main terminal box
- NEMA type terminal box in molded drawn arrangement for surge protection and differential CTs are readily available.
- Standard main terminal box is rotatable every 90 degrees. There is enough space below main terminal box for cable connection.

Stator core
- Made of high grade electrical steel with low magnetic losses. Stator assembly is easily removed from the stator frame if ever necessary.

Frame
- Increased rigidity of stator frame and low vibration are achieved by a frequency analysis.

Auxiliary terminal box
- Modular arrangement for accessory connections allow flexibility with standardized mechanical construction.

Air housing
- NEMA WPI top-hood construction prevents intrusion of rain water and foreign matter.
- IP 55 protection is standard on CACA and CACW type.

Stator coil
- Utilizes highly reliable, vacuum pressured impregnation (VPI) insulation system which provides firm fixing of coil ends and ability to withstand most environments.

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- Copper rotor bars are shaped to provide excellent torque characteristics and mechanical strength and are retained firmly in the slots.

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