# EXPLOSION PROTECTED
## 3-PHASE INDUCTION MOTORS


# ATEX – FLAMEPROOF MOTORS

POWER OF EXPERIENC INDIVIDUAL PROF
PROFESSIONAL AP RGY TOP QUALITY
**DRIVING** PROFES A TURNED INT
INTO **YOUR** ENERG NCE CONTINUOU
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**Product** Catalogue

# Product range

| | | | |
|---|---|---|---|
| **LOW VOLTAGE GENERAL PURPOSE 3-PHASE INDUCTION MOTORS** | Three-phase motors with squirrel-cage rotor series (2)Sg(m), Sh.<br>High efficiency motors series 2SIE, 3SIE and 4SIE (efficiency classes IE2, IE3, IE4) | from 0,04kW up to 2200kW | for general purpose applications like pumps, fans, compressors; complying with the newest efficiency requirements |
| **GENERAL PURPOSE 1-PHASE INDUCTION MOTORS** | Single-phase motors with squirrel-cage rotor series SEh(R), SEMh(R).<br>– motors with standard starting torque<br>– motors with increased starting torque<br>– motors with high starting torque. | from 0,04kW up to 2,2kW | for general purpose applications like pumps, fans, compressors, woodworking machines, devices for food processing, concrete mixers etc. |
| **HIGH VOLTAGE INDUCTION MOTORS UP TO 11kV** | Three-phase squirrel-cage high voltage and high efficiency motors series Sh with cast-iron housing.<br>High voltage motors with module construction (steel/welded housing) series Sf (-E), Sfw, Sfr. | from 160kW up to 6000kW | for general industrial use, drives used for own needs of power plants (pumps, fans, coal mills, conveyors) |
| **BRAKE MOTORS** | Three-phase and single-phase brake motors with AC and DC brakes | from 0,04kW up to 160kW | for applications with high safety requirements or where immediate stopping of the drive is required e.g.: theatres, concert, halls, lifts, platforms, etc. |
| **MOTORS WITH FORCED VENTILATION** | Three-phase induction motors with forced ventilation. | from 0,06kW up to 2500kW | for variable frequency drives with very wide speed regulation |
| **EXPLOSION-PROOF MOTORS** | Increased safety motors | from 0,06kW up to 22kW | adapted for operation in areas endangered by explosion (without methane) |
| | Flameproof motors | from 0,55kW up to 3200kW | for applications in chemical and mining industry where explosive atmosphere of gases, vapours or dust can occur |
| **NEMA MOTORS** | Low voltage NEMA motors SIE series (in compliance with the NEMA PREMIUM requirements). | from 1HP up to 250HP | for general industrial applications like pumps (including JM and JP), fans, compressors also for Hazardous Locations (Class I Div 2, Class II Div 2) with CSA certificate |
| **TRACTION MOTORS** | Traction motors and traction generators. | from 50kW up to 1500kW | various traction vehicles: trams (including low-deck trams), trolleybusses, subway and locomotives |

# Contents

# Efficiency of motors

New efficiency classes for the low-voltage three-phase motors (IE = International Efficiency).

Along with the international discussion on energy efficiency a worldwide harmonized energy efficiency standard classification system has been established for low-voltage three-phase asynchronous motors. For many years low-voltage three-phase motors in the European Union have been sold in three efficiency classes EFF3, EFF2 and EFF1 (CEMEP classification). Aside from this, many different efficiency classification systems have been introduced and well-proven in many countries all over the world.

This was the reason for the International Electrotechnical Commission IEC to develop and publish an energy efficiency standard which replaces all previous national issues. In parallel IEC developed and issued a new standard for determining motor efficiency. The new standard IEC 60034-30-1 defines and harmonizes worldwide the efficiency classes IE1, IE2, IE3 and IE4 for low-voltage three-phase motors in the power range from 0,12 kW to 1000 kW (2p=2, 4, 6, 8).

IE1 = Standard Efficiency

IE2 = High Efficiency

IE3 = Premium Efficiency

**IE4 = Super Premium Efficiency**

Complying with IEC 60034-30-1 standard the efficiency has to be determined in accordance with the new requirements given in the IEC 60034-2-1 standard.

## New EU Commission Regulation 2019/1781 & 2021/341 regarding minimum efficiency of electric motors.

| Motors covered by new Regulation | |
|---|---|
| **Type** | general purpose, geared, with brake, Ex |
| **Voltage** | >50V ÷ 1000V |
| **Frequency** | 50 Hz, 60 Hz or 50/60 Hz |
| **Number of poles** | 2, 4, 6, 8 |
| **Rated power** | 0,12kW ÷ 1000kW |
| **Duty** | continuous (S1, S3≥80 % or S6≥80%) |
| **Motors excluded from new Regulation** | |
| **Type** | • multi-speed, slip-ring and with mechanical commutators<br>• motors completely integrated into a product whose efficiency cannot be tested independently from the product<br>• motors with an integrated variable speed drive (compact drives) whose efficiency cannot be tested independently from the variable speed drive<br>• motors with an integrated brake which forms an integral part of the inner motor construction and can neither be removed nor powered by a separate power source during the testing of the motor efficiency<br>• motors specifically designed and specified to operate wholly immersed in a liquid<br>• motors specifically qualified for the safety of nuclear installations, as defined in Article 3 of Council Directive 2009/71/EURATOM<br>• explosion-protected motors specifically designed and certified for mining, as defined in Annex I, point 1 of Directive 2014/34/EU<br>• motors in cordless or battery-operated equipment and motors in hand-held equipment whose weight is supported by hand during operation<br>• motors in hand-guided mobile equipment moved while in operation<br>• Totally Enclosed Non-Ventilated (TENV) motors<br>• motors placed on the market before 1 July 2029 as substitutes for identical motors integrated in products placed on the market before 1 July 2021 (Annex I.1 (a)) and before 1 July 2023 (Annex I.1 (b)), and specifically marketed as such<br>• motors designed specifically for the traction of electric vehicles |
| **Designed for altitudes** | > 4000 m a.s.l. |
| **Designed for ambient temperatures** | < -30°C or > 60°C |
| **With maximum operating temperatures** | > 400°C |

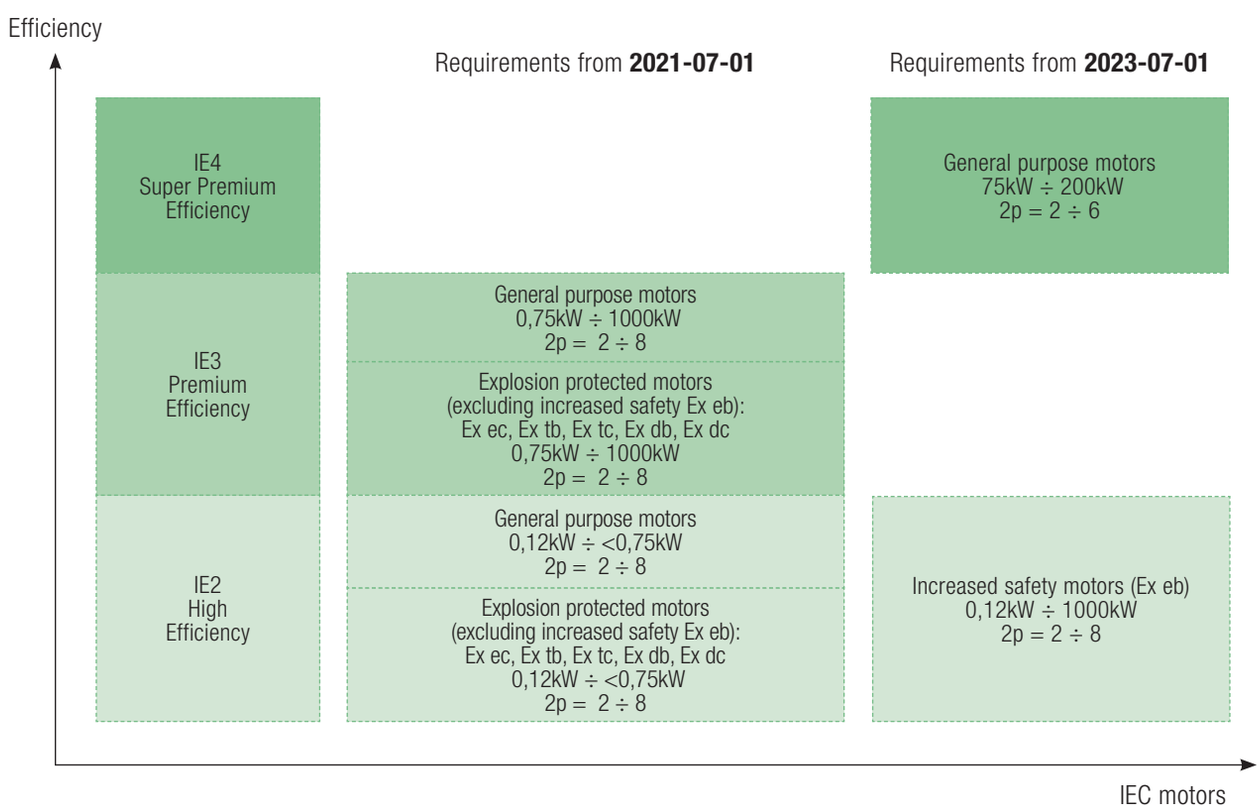
The Commission Regulation (EC) No 2019/1781 & 2021/341 describes efficiency requirements which have been implemented on **2021-07-01** and which will come into force on **2023-07-01**. The required efficiency class of three phase induction motors has to be as follows:

| Required efficiency class of three phase induction motors | General purpose motors | Explosion protected motors except motors dedicated for underground mining | |
|---|---|---|---|
| | | Increased safety (Ex eb) | Others (Ex ec, Ex tb, Ex tc, Ex db, Ex dc) |
| IE2 | 0,12kW ÷ <0,75kW<br>2p = 2 ÷ 8<br>from 2021-07-01 | 0,12kW ÷ 1000kW<br>2p = 2 ÷ 8<br>from 2023-07-01 | 0,12kW ÷ <0,75kW<br>2p = 2 ÷ 8<br>from 2021-07-01 |
| IE3 | 0,75kW ÷ 1000kW<br>2p = 2 ÷ 8<br>from 2021-07-01 | – | 0,75kW ÷ 1000kW<br>2p = 2 ÷ 8<br>from 2021-07-01 |
| IE4 | 75kW ÷ 200kW<br>2p = 2 ÷ 6<br>from 2023-07-01 | – | – |

Cantoni Group pursuing a policy of continuous development of its products, back in the past already took actions to extend offer of high efficiency motors including also explosion-proof motors – we are ready for the new requirements.

Moreover, at this point, **we can deliver to our Customers motors with higher efficiencies or in wider range than defined in Regulation 2019/1781 & 2021/341**.

A graph representation of the above table:



# Ratings – Tolerances

## Tolerances of motor parameters

Permissible deviations between catalogue values and real values are according to the IEC 60034-1:

| | |
|---|---|
| Power factor cos φ | $\Delta\cos\varphi = -1/6\ (1-\cos\varphi_N)$ |
| Efficiency η | $\Delta\eta = -15\%(100-\eta_N)$ for $P_N \leq 150kW$ |
| | $\Delta\eta = -10\%(100-\eta_N)$ for $P_N > 150kW$ |
| Speed n | $\Delta n = \pm 20\%(n_s-n_N)$ for $P_N > 1kW$ |
| | $\Delta n = \pm 30\%(n_s-n_N)$ for $P_N \leq 1kW$ |
| Locked rotor current ratio $I_L/I_N$ | $\Delta(I_L/I_N) = +20\%(I_L/I_N)$ |
| Locked rotor torque ratio $T_L/T_N$ | $\min (T_L/T_N) = -15\%(T_L/T_N)$ |
| | $\max (T_L/T_N) = +25\%(T_L/T_N)$ |
| Breakdown torque ratio $T_B/T_N$ | $\Delta(T_B/T_N) = -10\%(T_B/T_N)$ |
| Moment of inertia J [$kgm^2$] | $\Delta J = \pm 10\%\ J$ |
| Sound pressure level $L_{pA}$ [dB] | $\Delta L_{pA} = +3$ dB /A/ |

## Tolerances of supply voltage value and frequency

Motors comply in standard with voltage value and voltage frequency variations within zone A according to the IEC 60034-1:

| | |
|---|---|
| Voltage value U | $\Delta U = \pm 5\%$ |
| Voltage frequency f | $\Delta f = \pm 2\%$ |

Other extended tolerances of supply voltage and their frequency are available on request.

# Standards

The electric motors are manufactured according to the international standards:

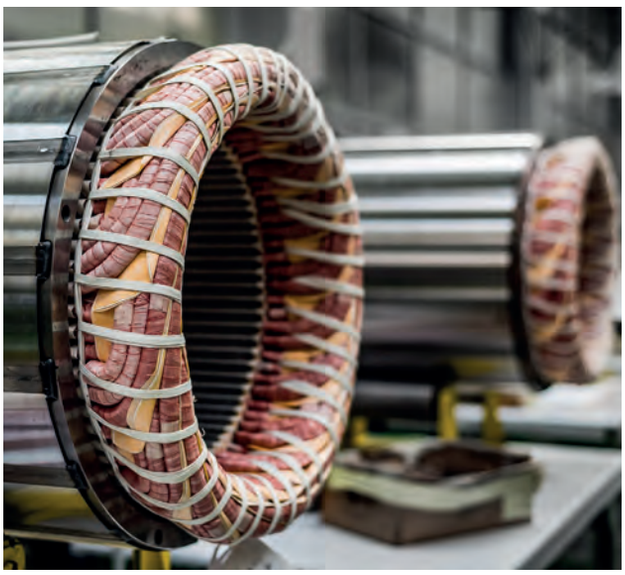
| | |
|---|---|
| Rating and performance | IEC 60034-1 |
| Methods for determining losses and efficiency | IEC 60034-2-1 |
| Classification of degrees of protection | IEC 60034-5 |
| Methods of cooling | IEC 60034-6 |
| Symbols of construction and mounting arrangements | IEC 60034-7 |
| Terminal markings and direction of rotation | IEC 60034-8 |
| Noise limits | IEC 60034-9 |
| Dimensions and output of electric machines | IEC 60072-1 |
| Vibration limits | IEC 60034-14 |
| Explosive atmospheres – Part 0: Equipment – General requirements | IEC 60079-0 |
| Explosive atmospheres – Part 1: Equipment protection by flameproof enclosures "d" | IEC 60079-1 |
| Explosive atmospheres – Part 7: Equipment protection by increased safety "e" | IEC 60079-7 |

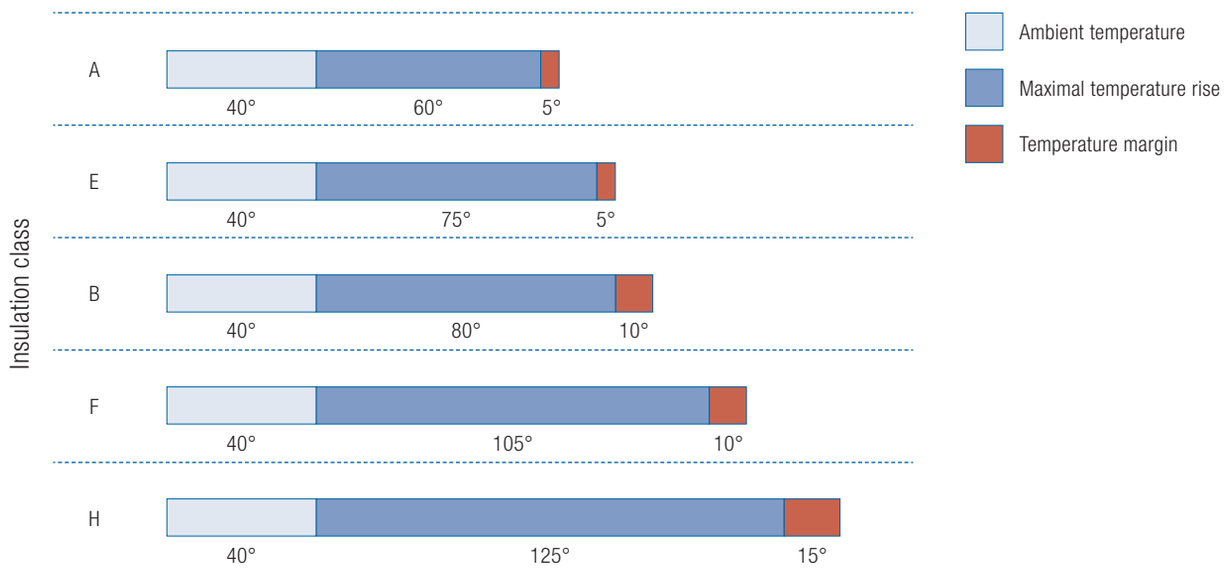
# Insulation classification

The insulation system of an electric motor is determined by a given insulation class on the basis of its thermal resistance. This thermal resistance should be guaranteed by the entire set of electric insulating materials used in the motor insulating system.

Thermal resistance classification is related to the temperature of the hotspot in the insulation occurring during rated operating conditions of the electric motor, allowing for the highest permissible rise in average temperature.

This rise should be selected so that at the highest permissible ambient temperature, the temperature of the hotspot in insulation will not exceed the value assigned to a given thermal resistance class.






Insulation class F in an electric motor means that at ambient temperature of 40°C the temperature rise of the winding may be max. 105°C with the additional temperature margin of 10°C (under specified measuring conditions in accordance with the IEC 60034-1 standard).



Symbols of thermal resistance classes (permissible insulation temperatures at 40°C ambient temperature)

| Symbol | Temperature [°C] |
|---|---|
| A | 105 |
| E | 120 |
| B | 130 |
| F | 155 |
| H | 180 |

# Class F/B

The standard motors made by Cantoni Motor in their basic version have the insulation class F while the temperature rise is for class B. This means longer life for motors.

**For special request we can deliver motors equipped with insulation class H.**

Strengthened insulation system gives possibility to safe operation with frequency converters.

# Hazardous Area Classification

Hazardous areas include any area in which explosive atmosphere may occur under specific conditions.

An explosive atmosphere is a mixture of dangerous substances with air, under atmospheric conditions, in the form of gases, vapours, mist or dust in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

**Potentially explosive atmospheres are classified according to the Zone system (defined in European directive 1999/92/EC) on the basis of the frequency and duration of the occurrence of an explosive atmosphere.**

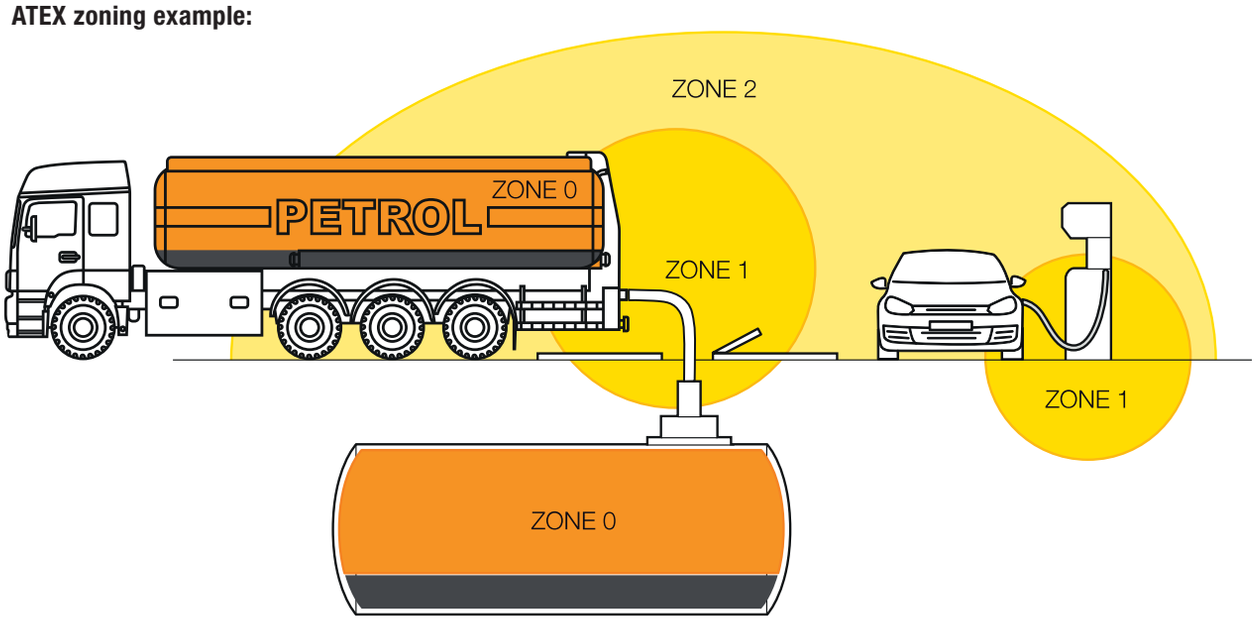
## Zone classification

| European and IEC Classification | | Definition of zone |
|---|---|---|
| GAS, VAPOUR, MIST | Zone 0 | An area in which an explosive mixture is present **continuously** or for long periods or frequently |
| | Zone 1 | An area in which an explosive mixture is **likely** to occur in normal operation occasionally |
| | Zone 2 | An area in which an explosive mixture is **unlikely** to occur in normal operation but, if it does occur, will persist for a short period only |
| DUST | Zone 20 | An area in which an explosive mixture is present **continuously** or for long periods or frequently |
| | Zone 21 | An area in which an explosive mixture is **likely** to occur in normal operation occasionally |
| | Zone 22 | An area in which an explosive mixture is **unlikely** to occur in normal operation but, if it occurs it will persist for a short period only |

**'Normal operation' means the situation when installations are used within their design parameters.**

**Zones are normally determined by the Authorities, but that can also be performed by a third party, a notified body or other experts. It is the owner's responsibility to ensure that the classification of their site is performed before suitable products can be installed at the location.**

**ATEX zoning example:**




REMARK: Electric motors are not used in case of Zone 0 (gases) and Zone 20 (dusts).

# Gas and dust subgroups

Different explosive atmospheres (gases, vapours and dusts) have different properties like for example flame temperature, ignition energy, explosive limits, and molecular weight. These properties will determine the likelihood and severity of an explosion. Taking into consideration above, gases and dusts can be grouped in order to select the right equipment for explosive areas.

| Subgroup | Environment | Typical substance |
|---|---|---|
| IIA | Gases, Vapours and Mists | Propane |
| IIB | | Ethylene |
| IIC | | Hydrogen, Acetylene |
| IIIA | Combustible Dusts | Combustible flyings |
| IIIB | | Non-conductive |
| IIIC | | Conductive |
| **REMARK: Any equipment which is marked as IIC can be used in atmospheres that contain Group IIA and IIB gases** | | |
| **Any equipment which is marked as IIIC can be used in atmospheres that contain Group IIIA and IIIB dusts** | | |

# Temperature classes for gases

Temperature classes (T-rating) are defined for equipment based on its maximum surface temperature. When selecting equipment for a potentially explosive atmosphere, the equipment's maximum surface temperature must be lower than the ignition temperature of the possible potential gas mixture.

| Temperature class | Maximum surface temperature of electrical equipment [°C] |
|---|---|
| T1 | 450 |
| T2 | 300 |
| T3 | 200 |
| T4 | 135 |
| T5 | 100 |
| T6 | 85 |
| **REMARK: Any equipment which is marked as T5 comply with requirements of T1,T2,T3 and T4 classes.** | |

| Example of gases with their ignition temperature | | |
|---|---|---|
| **Subgroup of gases** | **Gas example** | **Ignition temperature °C** |
| IIA | methane | 537 |
| | propane | 470 |
| | n-butane | 365 |
| | n-hexane | 240 |
| | ethyl ether | 160 |
| | ethyl nitrate | 90 |
| IIB | ethylene | 425 |
| | hydrogen sulfide | 270 |
| IIC | hydrogen | 560 |
| | acetylene | 305 |
| | carbon disulphide | 102 |

# Equipment groups, safety categories and level of protection

Electrical equipments are divided into two groups according to ATEX Directive 2014/34/EU:

– Group I: products are intended for use in the underground parts of mines and in those parts of surface installations of such mines that are likely to become endangered by firedamp and/or combustible dust
– Group II: products are intended for use in other environments (other than mines) that are likely to become endangered by explosive atmospheres.

Standard EN IEC 60079-0 defines additional subgroup of mentioned above Group II:

– Group III: products intended for use in other environments (other than mines) that are likely to become endangered by explosive dust atmospheres

| Equipment Group | Definition | According to |
|---|---|---|
| Group I | Electrical equipment intended for use in underground mines susceptible to fire damp and/or combustible dust | ATEX Directive 2014/34/EU |
| Group II | Electrical equipment intended for use in explosive atmospheres (other than mines) | ATEX Directive 2014/34/EU |
| Group III | Electrical equipment intended for use in explosive dust atmospheres (other than mines) | Standard EN IEC 60079-0 |

Equipment groups are divided into equipment safety categories according to ATEX Directive 2014/34/EU with different level of protection EPL according to EN IEC 60079-0:

– category 1 / protection level a: with very high level of protection and thus a very high degree of safety

– category 2 / protection level b: with high level of protection and therefore a high degree of safety

– category 3 / protection level c: with normal level of protection and therefore a conventional degree of safety

| Safety Category | Protection level | Degree of safety |
|---|---|---|
| Category 1 | very high | very high |
| Category 2 | high | high |
| Category 3 | normal | normal |

The table below presents the safety level of the equipment according to EN IEC 60079-0 and ATEX Directive 2014/34/EU.

| EN IEC 60079-0 | | Flammable substances | | Zone | ATEX Directive 2014/34/EU | | |
|---|---|---|---|---|---|---|---|
| EPL | Group | | | | Protection level | Group | Category |
| Ma | I (mine) | methan, coal dust | | N/A | very high | I (mine) | M1 |
| Mb | | | | | high | | M2 |
| Ga | II (others) | G | gas, vapour, mist | 0 | very high | II (others) | 1G |
| Gb | | | | 1 | high | | 2G |
| Gc | | | | 2 | normal | | 3G |
| Da | III (others) | D | dust | 20 | very high | | 1D |
| Db | | | | 21 | high | | 2D |
| Dc | | | | 22 | normal | | 3D |

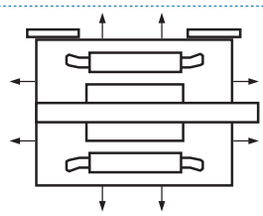
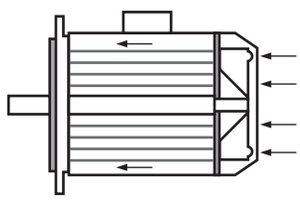
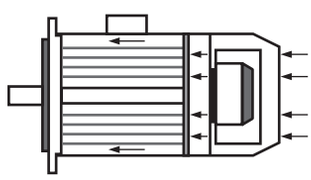
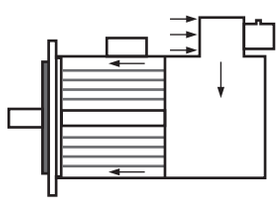
**REMARK: Equipment from higher category (higher protection level) can also be installed instead of equipment from lower category (with lower protection level)**

The table below lists the typical protection methods and basic concepts of protection used in electric motors according to ATEX Directive and EN / IEC standards.

| Symbol | Type of protection | Basic concept of protection | Suitable for Zones | | | | | | Equipment protection level (EPL) | | | | | | EN / IEC Standard |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 20 | 21 | 22 | Ga (very high) | Gb (high) | Gc (normal) | Da (very high) | Db (high) | Dc (normal) | |
| e | Increased safety | No arcs, sparks or hot surfaces, enclosure IP54 or better | | • | • | | | | | • | | | | | 60079-7 |
| n | Type 'n' (non-sparking) | | | | • | | | | | | • | | | | 60079-15 |
| d | Flameproof | Containment of the explosion | | • | • | | | | | • | | | | | 60079-1 |
| px | Pressurised enclosure | Keep the flammable substances out | | • | • | | | | | • | | | | | 60079-2 |
| py | | | | • | • | | | | | • | | | | | |
| pz | | | | | • | | | | | | • | | | | |
| tb | Dust ignition protection by enclosure | Dust-tight enclosure | | | | | • | • | | | | | • | | 60079-31 |
| tc | | | | | | | | • | | | | | | • | |

# Cooling

Flameproof motors from Cantoni Group are equipped with standard IC411 cooling according to IEC 60034-6. Other cooling methods (for example motors with external/separate cooling) are available on request.

| IC code according to IEC 60034-6 | Description | Drawing |
|---|---|---|
| **IC410** | – Enclosed machine<br>– Surface cooled by natural convection and radiation<br>– Without internal or external fan |  |
| **IC411** | – Enclosed machine<br>– Smooth or finned casing<br>– External shaft-mounted fan<br>– Often called TEFC motor |  |
| **IC416A** | – Enclosed machine<br>– Smooth or finned casing<br>– External motorized axial fan integrated with the motor |  |
| **IC416R** | – Enclosed machine<br>– Smooth or finned casing<br>– External motorized radial fan integrated with the motor |  |

# Standard terminal box equipment

| Motor frame size | Number of terminals | Number of cable glands | Optional rotation of terminal box | Temperature sensors in the winding | Thermal protection of bearings |
|---|---|---|---|---|---|
| 80 | 3 | 1 | 4x90° | on request | on request |
| 90 | 3 | 1 | 4x90° | on request | on request |
| 100 | 3 | 1 | 4x90° | on request | on request |
| 112 | 3 | 1 | 4x90° | on request | on request |
| 132 | 3 | 1 | 4x90° | on request | on request |
| 160 | 3 | 1 | 4x90° | on request | on request |
| 180 | 3 | 1 | 4x90° | on request | on request |
| 200 | 3 | 1 | 4x90° | on request | on request |
| 225 | 3 | 1 | 4x90° | on request | on request |
| 250 | 3 | 1 | 4x90° | on request | on request |
| 280 | 3 | 1 | 4x90° | on request | on request |
| 315 | 3 | 1 | 4x90° | on request | on request |

# Vibration level

The rotor balancing method guarantees that a standard vibration level A is maintained in accordance with the IEC 60034-14. On customer's demand the motors can be produced with reduced vibration level (B).

### Limits of maximum vibration velocity (r.m.s.) for shaft height H according to IEC 60034-14

| Vibration level | Shaft height | 56 ≤ H ≤ 132 | H > 132 |
|---|---|---|---|
| | Fitting type | mm/s | mm/s |
| A | Free suspension | 2.8 | 2.8 |
| | Rigid setting | – | 2.3 |
| B | Free suspension | 1.1 | 1.8 |
| | Rigid setting | – | 1.5 |

**Remark:**

*Limits stated in the table mentioned above are applicable for uncoupled (disconnected from the driven machine) and operating at no load motors.*

# Noise level

Motors in standard comply with a permissible sound power level according to IEC 60034-9.

On customer's demand the motors can be delivered with reduced noise level by using special cooling systems or additional external sound-absorbing covers.

# Terminal box

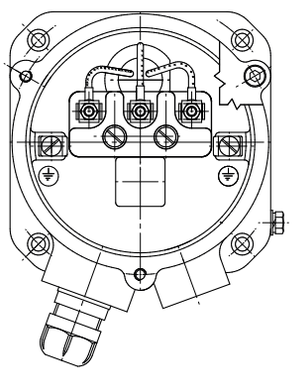
In standard execution main terminal box is in increased safety design (Ex eb) equipped with 3 supply terminals for DOL or VSD ("-f" execution) supply and one cable gland. On request motors can be equipped with fully flameproof main terminal box (Ex db).

If the motor is equipped with temperature sensors or winding heaters, they can be lead out to the main terminal box or to separate auxiliary terminal box.

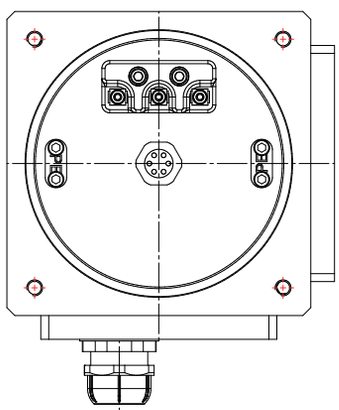
**In standard all motors are equipped with terminal box mounted on top. On request motors size 200...315 can be equipped with terminal box installed on right or left side.**

## Standard terminal box view:

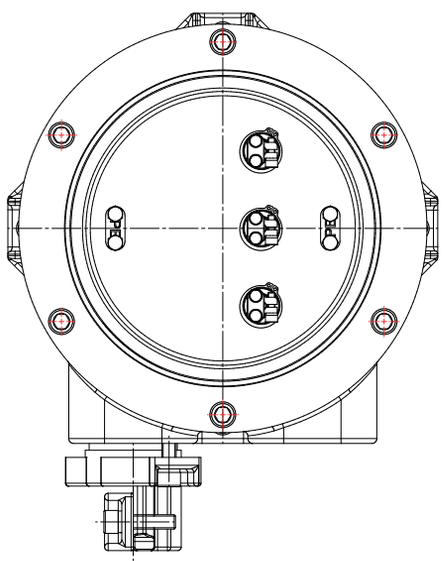
Frame size
(E)cSTe80



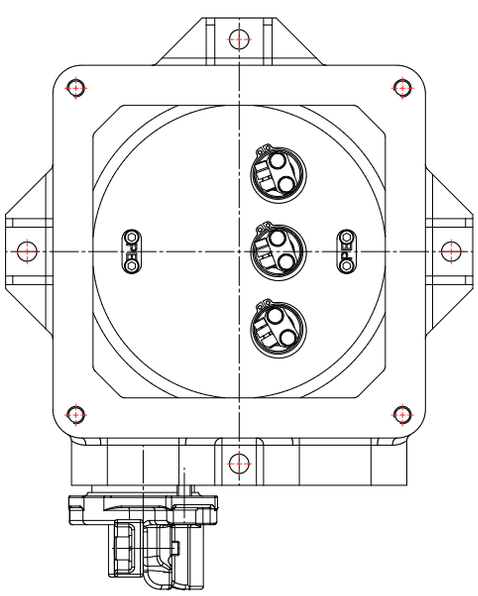
Frame size
(E)cSTe90-132



Frame size
(E)cSTe160-180



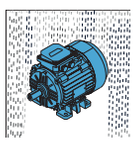
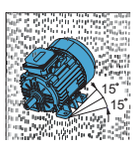
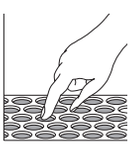
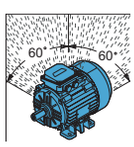
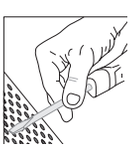
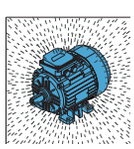
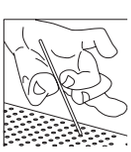
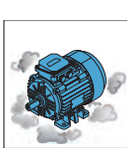
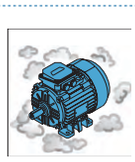
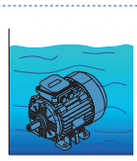
Frame size
(E)cSTe200-315



# Degree of protection IP

# IP 55

Motors in standard execution comply with IP55 requirements according to IEC 60034-5

| Protection against penetration of solid matter | | | Protection against penetration of fluids | | |
|---|---|---|---|---|---|
| 1st digit | Description | | 2nd digit | Description | |
| 0 |  | Not protected | 0 |  | Not protected |
| | | | 1 | | Protected against vertically falling drops of water |
| 1 |  | Protected against solid bodies larger than 50 mm | 2 |  | Protected against vertically falling drops of water up to 15° |
| 2 |  | Protected against solid bodies larger than 12 mm | 3 |  | Protected against rain up to 60° |
| 3 |  | Protected against solid bodies larger than 2,5 mm | 4 |  | Protected against rain falling from any direction |
| 4 |  | Protected against solid bodies larger than 1 mm | 5 |  | Protected against sprayed water from any direction |
| 5 |  | Protected against deposition of dust | 6 |  | Protected against temporary immersion |
| 6 |  | Totally protected against deposition of dust | 7 |  | Protected against immersion between 0,15 and 1 m |
| | | | 8 | | Protected against immersion at preset pressure and time |

Each size 80 to 132 motor is equipped with V-ring on drive side and on non drive side.
Labyrinth seals protect the motors from size 160 and above.

**Higher degree of protection is available on request.**

# Painting and corrosivity classes

Standard painting system with RAL5010 color used in all our motors comply with C3 corrosion class according to ISO 12944.

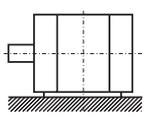
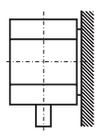
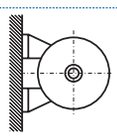
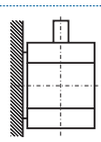
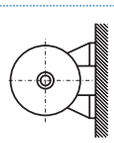
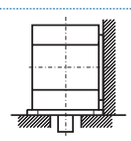
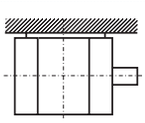
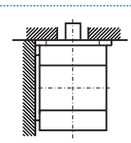
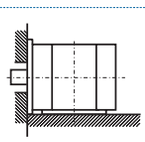
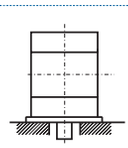
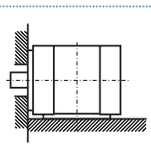
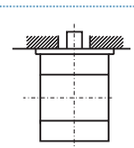
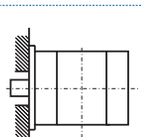
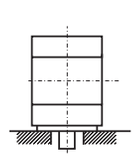
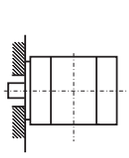
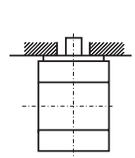
For special request motors can be painted with other colors and with alternative painting systems (up to C5M corrosion class).

**RAL 5010/C3**


| Corrosion class | Environment | |
|---|---|---|
| | Interior | Exterior |
| **C1 (very low)** | Heated buildings with a clean atmosphere such as hotels, offices, shops, schools. | N/A |
| **C2 (low)** | Unheated buildings, where condensation may occur e.g. storehouses, sports halls. | Atmosphere contaminated to a small extent, mostly rural regions. |
| **C3 (medium)** | Production space of high humidity and certain air contamination e.g. foodstuff plants, laundries, breweries, dairies. | Industrial and urban atmosphere with an average Sulphur oxide (IV) contamination level. Inshore areas of low salinity. |
| **C4 (high)** | Chemical plants, swimming pools, ship repair yards. | Industrial areas and inshore areas of medium salinity. |
| **C5I (very high – industrial)** | Buildings and areas of almost constant condensation and high contamination. | Industrial areas of high humidity and aggressive atmosphere. |
| **C5M (very high – marine)** | Buildings and areas of almost constant condensation and high contamination. | Coast and offshore areas with high salt content. |

# Mounting arrangements

**According to the IEC 60034-7 standard**

| Horizontal shaft | | | | Vertical shaft | | | |
|---|---|---|---|---|---|---|---|
| | Designation | | | | Designation | | |
| | Code II | Code I | Frame size | | Code II | Code I | Frame size |
|  | IM 1001 | IM B3 | 80 ÷ 315 |  | IM 1011 | IM V5 | 80 ÷ 315 |
|  | IM 1051 | IM B6 | 80 ÷ 280 |  | IM 1031 | IM V6 | 80 ÷ 315 |
|  | IM 1061 | IM B7 | 80 ÷ 280 |  | IM 2011 or IM 2111 | IM V15 | 80 ÷ 315 |
|  | IM 1071 | IM B8 | 80 ÷ 280 |  | IM 2031 or IM 2131 | IM V36 | 80 ÷ 315 |
|  | IM 2001 | IM B35 | 80 ÷ 315 |  | IM 3011 | IM V1 | 80 ÷ 315 |
|  | IM 2101 | IM B34 | 80 ÷ 132 |  | IM 3031 | IM V3 | 80 ÷ 280 |
|  | IM 3001 | IM B5 | 80 ÷ 315 |  | IM 3611 | IM V18 | 80 ÷ 132 |
|  | IM 3601 | IM B14 | 80 ÷ 132 |  | IM 3631 | IM V19 | 80 ÷ 132 |

*Other mounting arrangements available on special request

# Definitions

### Relation between rated output power and rated torque on motor shaft:

$$T = \frac{9{,}55 \times P}{n}$$

*where:*

- *T [Nm] is rated output torque on motor shaft*
- *P [W] is rated output power on motor shaft*
- *n [rpm] is rated speed of motor shaft*

### Relation between rated output power on shaft and rated consumed power from mains:

$$P_1 = \frac{P}{\eta} \times 100$$

*where:*

- *P1 [kW] is rated consumed power from mains by motor*
- *P [kW] is rated output power on motor shaft*
- *η [%] is rated efficiency of motor*

### Relation between rated consumed power from mains and rated voltage, current, power factor:

$$P_1 = \sqrt{3} \times U \times I \times \cos\varphi$$

*where:*

- *P1 [W] is rated consumed power from mains by motor*
- *U [V] is rated supply voltage of motor*
- *I [A] is rated current consumed from mains by motor*
- *cosφ is rated power factor of motor*



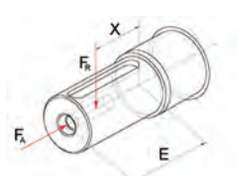
### Units of measurement

| Parameter name | Symbol | Unit name | Symbol |
|---|---|---|---|
| **Frequency** | f | Hertz | Hz |
| **Active power** | P | Watt | W |
| **Voltage** | U | Volt | V |
| **Electric Current** | I | Amper | A |
| **Power factor** | cosφ | N/A | N/A |
| **Resistance** | R | Ohm | Ω |
| **Sound power level** | $L_W$ | decibel | dB |
| **Sound pressure level** | $L_P$ | decibel | dB |

# Permissible shaft end loads

| Size | Max radial force | | Max axial force | | | Weight of rotor |
|---|---|---|---|---|---|---|
| | x=0 | x=E | Horizontal | Vertical | | |
| | [N] | [N] | [N} | Down [N] | Up [N] | [kg] |
| 80-2A | 500 | 410 | 420 | 390 | 450 | 3 |
| 80-2B | 490 | 420 | 410 | 380 | 460 | 4 |
| 80-4A | 630 | 530 | 530 | 500 | 560 | 3 |
| 80-4B | 630 | 540 | 530 | 490 | 570 | 4 |
| 90S2 | 590 | 520 | 420 | 380 | 480 | 5 |
| 90S4 | 740 | 650 | 590 | 540 | 660 | 6 |
| 90S6 | 880 | 770 | 680 | 630 | 750 | 6 |
| 90S8 | 1010 | 890 | 770 | 720 | 820 | 5 |
| 90L2 | 570 | 500 | 410 | 360 | 480 | 6 |
| 90L2A | 550 | 480 | 410 | 360 | 480 | 6 |
| 90L4 | 700 | 610 | 570 | 520 | 660 | 7 |
| 90L4A | 650 | 570 | 560 | 480 | 660 | 9 |
| 90L6 | 850 | 740 | 670 | 610 | 750 | 7 |
| 90L6A | 790 | 700 | 650 | 590 | 750 | 8 |
| 90L8 | 970 | 850 | 750 | 700 | 820 | 6 |
| 100L2 | 820 | 710 | 580 | 520 | 660 | 7 |
| 100L2A | 780 | 680 | 570 | 500 | 660 | 8 |
| 100L4A | 1010 | 870 | 800 | 720 | 920 | 10 |
| 100L4B | 970 | 830 | 790 | 700 | 920 | 11 |
| 100L4C | 890 | 770 | 760 | 640 | 920 | 14 |
| 100L6 | 1210 | 1050 | 940 | 850 | 1050 | 10 |
| 100L6A | 1170 | 1010 | 920 | 830 | 1050 | 11 |
| 100L8A | 1390 | 1200 | 1050 | 980 | 1160 | 9 |
| 100L8B | 1310 | 1140 | 1030 | 930 | 1150 | 11 |
| 112M2 | 1210 | 1050 | 850 | 780 | 960 | 9 |
| 112M2A | 1190 | 1040 | 850 | 770 | 950 | 9 |
| 112M2B | 1130 | 980 | 830 | 730 | 950 | 11 |
| 112M4 | 1490 | 1290 | 1180 | 1080 | 1320 | 12 |
| 112M4A | 1390 | 1200 | 1150 | 1020 | 1320 | 15 |
| 112M6 | 1770 | 1540 | 1370 | 1270 | 1510 | 12 |
| 112M6A | 1740 | 1510 | 1360 | 1250 | 1510 | 13 |
| 112M8 | 1980 | 1720 | 1520 | 1420 | 1660 | 12 |
| 132S2A | 1750 | 1470 | 1210 | 1100 | 1300 | 13 |
| 132S2B | 1680 | 1420 | 1190 | 1060 | 1380 | 16 |
| 132S4 | 2130 | 1800 | 1670 | 1490 | 1910 | 21 |
| 132S6 | 2540 | 2140 | 1950 | 1770 | 2190 | 21 |
| 132S8 | 2900 | 2440 | 2180 | 2040 | 2380 | 17 |
| 132M2 | 1640 | 1390 | 1180 | 1030 | 1370 | 17 |
| 132M2A | 1620 | 1370 | 1170 | 1020 | 1380 | 18 |
| 132M4 | 2100 | 1770 | 1660 | 1470 | 1910 | 22 |
| 132M4A | 2060 | 1740 | 1650 | 1440 | 1920 | 24 |
| 132M4B | 2030 | 1710 | 1640 | 1420 | 1920 | 25 |
| 132M6A | 2450 | 2070 | 1920 | 1720 | 2200 | 24 |
| 132M6B | 2420 | 2040 | 1910 | 1700 | 2200 | 25 |
| 132M6C | 2380 | 2010 | 1890 | 1660 | 2200 | 27 |
| 132M8 | 2820 | 2380 | 2160 | 1980 | 2400 | 21 |
| 160M2A | 2090 | 1760 | 1500 | 1290 | 1770 | 24 |
| 160M2B | 2030 | 1710 | 1490 | 1260 | 1780 | 26 |
| 160M4 | 2540 | 2140 | 2070 | 1780 | 2460 | 34 |
| 160M6 | 2960 | 2490 | 2390 | 2070 | 2810 | 37 |
| 160M8A | 3530 | 2970 | 2710 | 2490 | 3010 | 26 |

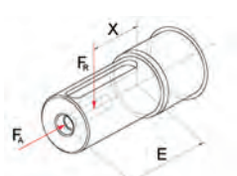
1. Permissible load as a function of X is linear in the range from X=0 to X=E.
2. $L_h$ – calculated lifetime of bearings 30000h
3. For calculated lifetime $L_h$ = 40000h above permissible load decrease by 20%



# Permissible shaft end loads

| Size | Max radial force | | Max axial force | | | Weight of rotor |
|---|---|---|---|---|---|---|
| | x=0 | x=E | Horizontal | Vertical | | |
| | [N] | [N] | [N} | Down [N] | Up [N] | [kg] |
| 160M8B | 3440 | 2890 | 2690 | 2420 | 3040 | 31 |
| 160L2 | 1990 | 1670 | 1470 | 1230 | 1790 | 28 |
| 160L4 | 2410 | 2030 | 2030 | 1690 | 2490 | 40 |
| 160L6 | 2850 | 2400 | 2360 | 1990 | 2830 | 42 |
| 160L8 | 3310 | 2780 | 2650 | 2330 | 3070 | 37 |
| 180M2 | 2630 | 2220 | 1980 | 1610 | 2450 | 42 |
| 180M4 | 3350 | 2830 | 2780 | 2330 | 3370 | 52 |
| 180L4 | 3240 | 2740 | 2750 | 2260 | 3400 | 57 |
| 180L6 | 3770 | 3180 | 3160 | 2590 | 3930 | 67 |
| 180L8 | 4360 | 3670 | 3550 | 3010 | 4250 | 62 |
| 200L2A | 3010 | 2590 | 2270 | 1750 | 2950 | 60 |
| 200L2B | 2940 | 2530 | 2250 | 1700 | 2960 | 63 |
| 200L2C | 2910 | 2500 | 2240 | 1680 | 2980 | 65 |
| 200L2D | 2780 | 2390 | 2210 | 1590 | 3010 | 71 |
| 200L4 | 3720 | 3200 | 2840 | 2140 | 3740 | 80 |
| 200L4C | 3720 | 3200 | 2840 | 2140 | 3740 | 80 |
| 200L4D | 3440 | 2960 | 2760 | 1930 | 3850 | 96 |
| 200L6A | 4440 | 3820 | 3670 | 2950 | 4630 | 84 |
| 200L6B | 4180 | 3600 | 3580 | 2730 | 4710 | 99 |
| 200L8 | 5080 | 4370 | 4090 | 3400 | 5020 | 81 |
| 225S4 | 4240 | 3530 | 3200 | 2430 | 4210 | 89 |
| 225S8 | 5570 | 4630 | 4550 | 3780 | 5580 | 90 |
| 225M2 | 3360 | 2900 | 2540 | 1940 | 3320 | 69 |
| 225M2C | 3150 | 2720 | 2480 | 1780 | 3380 | 80 |
| 225M4 | 4020 | 3350 | 3140 | 2260 | 4280 | 101 |
| 225M4C | 3900 | 3240 | 3110 | 2160 | 4320 | 108 |
| 225M6 | 4630 | 3860 | 4000 | 2960 | 5380 | 121 |
| 225M6C | 4330 | 3600 | 3910 | 2680 | 5520 | 142 |
| 225M8 | 5500 | 4580 | 4530 | 3640 | 5720 | 104 |
| 250M2 | 4140 | 3500 | 3120 | 2270 | 4210 | 97 |
| 250M2C | 4140 | 3500 | 3120 | 2270 | 4210 | 97 |
| 250M4 | 5070 | 4280 | 3820 | 2610 | 5430 | 141 |
| 250M4C | 4770 | 4030 | 3800 | 2460 | 5540 | 154 |
| 250M6 | 6030 | 5090 | 4990 | 3770 | 6630 | 143 |
| 250M6C | 5690 | 4800 | 4880 | 3450 | 6790 | 167 |
| 250M8 | 6750 | 5700 | 5530 | 4240 | 7260 | 151 |
| 280S2 | 4120 | 3470 | 5410 | 4370 | 6870 | 125 |
| 280S4 | 6510 | 5480 | 5000 | 3610 | 6750 | 157 |
| 280S6 | 7670 | 6450 | 6440 | 5010 | 8270 | 163 |
| 280S8 | 8730 | 7340 | 7180 | 5820 | 8900 | 154 |
| 280M2 | 4020 | 3380 | 5310 | 4220 | 6900 | 134 |
| 280M2C | 3860 | 3250 | 5130 | 3920 | 6960 | 152 |
| 280M4 | 6190 | 5210 | 4770 | 3080 | 6980 | 195 |
| 280M6 | 7530 | 6330 | 6360 | 4800 | 8360 | 178 |
| 280M6C | 7230 | 6080 | 6100 | 4250 | 8590 | 217 |
| 280M8 | 8480 | 7130 | 7050 | 5490 | 9050 | 178 |
| 315S2 | 4510 | 3880 | 3570 | 2150 | 5410 | 163 |
| 315S4 | 7600 | 6330 | 6020 | 3890 | 8750 | 243 |
| 315S6 | 9510 | 7920 | 7020 | 5010 | 9650 | 232 |
| 315S8 | 10630 | 8850 | 8630 | 6570 | 11390 | 241 |
| 315M2A | 3970 | 3410 | 3480 | 1790 | 5650 | 193 |

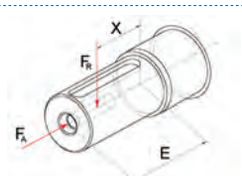
1. Permissible load as a function of X is linear in the range from X=0 to X=E.
2. $L_h$ – calculated lifetime of bearings 30000h
3. For calculated lifetime $L_h$ = 40000h above permissible load decrease by 20%



# Permissible shaft end loads

| Size | Max radial force | | Max axial force | | | Weight of rotor |
|---|---|---|---|---|---|---|
| | x=0 | x=E | Horizontal | Vertical | | |
| | [N] | [N] | [N} | Down [N] | Up [N] | [kg] |
| 315M2B | 3720 | 3240 | 3340 | 1470 | 5790 | 216 |
| 315M2C | 3460 | 3020 | 3040 | 1070 | 5570 | 225 |
| 315M4A | 7480 | 6350 | 5900 | 3650 | 8830 | 259 |
| 315M4B | 7210 | 6120 | 5820 | 3380 | 9000 | 281 |
| 315M4C | 6420 | 5520 | 5670 | 2740 | 9460 | 336 |
| 315M6A | 9030 | 7520 | 6880 | 4540 | 9940 | 270 |
| 315M6B | 8550 | 7250 | 6740 | 4010 | 10310 | 315 |
| 315M6C | 7750 | 6670 | 6620 | 3420 | 10760 | 367 |
| 315M6D | 7590 | 6530 | 6580 | 3250 | 10870 | 381 |
| 315M8A | 10470 | 8720 | 8580 | 6390 | 11510 | 256 |
| 315M8B | 9870 | 8370 | 7560 | 4860 | 11080 | 311 |
| 315M8C | 8930 | 7690 | 7390 | 4120 | 11620 | 375 |
| 315M8D | 8780 | 7560 | 7360 | 3990 | 11710 | 386 |

1. Permissible load as a function of X is linear in the range from X=0 to X=E.
2. $L_h$ – calculated lifetime of bearings 30000h
3. For calculated lifetime $L_h$ = 40000h above permissible load decrease by 20%




Value of radial force FR acting on the shaft end for a given belt pulley diameter is calculated according to the following formula:

$$F_R = \frac{19\,600 \times P \times k}{D_K \times n}\ [N]$$

where: P – motor output [kW]
$D_K$ – belt pulley diameter [m]
n – speed [rpm]
k – belt tension factor:
for V-belts k=2,2
for flat belts k=3

Value of force FR acting on any point of the shaft end (between points X=max and X=0) may be calculated according to the following formula:

$$F_R = F_{X0} - \frac{X}{E} \times (F_{X0} - F_{XMAX})\ [N]$$

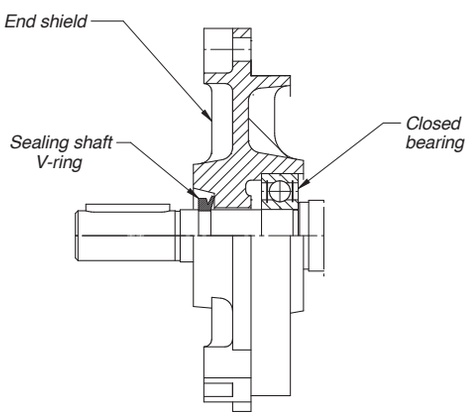
where: $F_{X0}$ – value of $F_R$ force acting on the beginning of the shaft end
$F_{XMAX}$ – value of $F_R$ force acting on the end of the shaft end
E – lenght of the shaft end

# Bearing types and bearing nodes

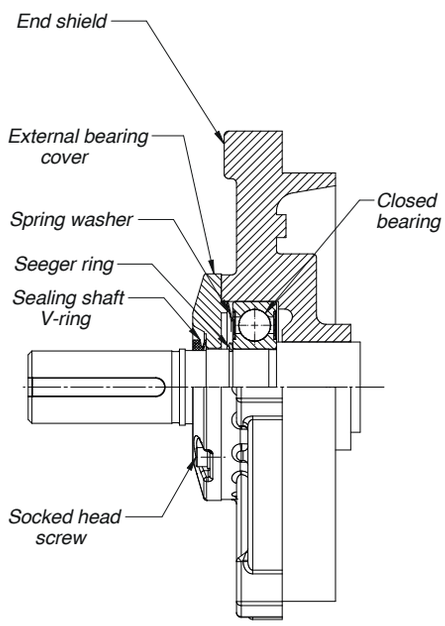
| Frame size | Number of poles | Bearings | |
|---|---|---|---|
| | | DE | NDE |
| 80 | 2÷8 | 6204 2Z C3 | 6204 2Z C3 |
| 90 | 2÷8 | 6205 2Z C3 | 6205 2Z C3 |
| 100 | 2÷8 | 6206 2Z C3 | 6206 2Z C3 |
| 112 | 2÷8 | 6306 2Z C3 | 6306 2Z C3 |
| 132 | 2÷8 | 6308 2Z C3 | 6308 2Z C3 |
| 160 | 2÷8 | 6309 2Z C3 | 6309 2Z C3 |
| 180 | 2÷8 | 6311 2Z C3 | 6311 2Z C3 |
| 200 | 2÷8 | 6312C3 | 6312C3 |
| 225 | 2÷8 | 6313C3 | 6313C3 |
| 250 | 2÷8 | 6315C3 | 6315C3 |
| 280 | 2 | 6315C3 | 6315C3 |
| 280 | 4÷8 | 6317C3 | 6317C3 |
| 315 | 2 | 6317C3 | 6317C3 |
| 315 | 4÷8 | 6320C3 | 6320C3 |

# Bearing types and bearing nodes

Frame size
(E)cSTe80

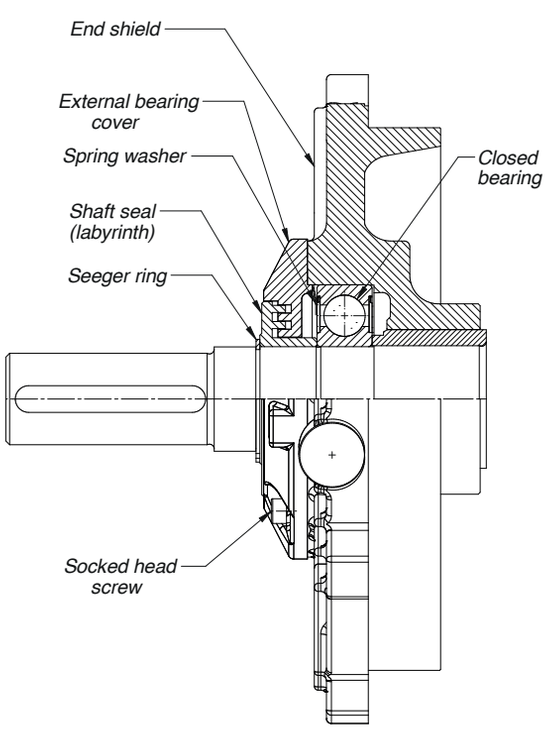



Frame size
(E)cSTe90-132

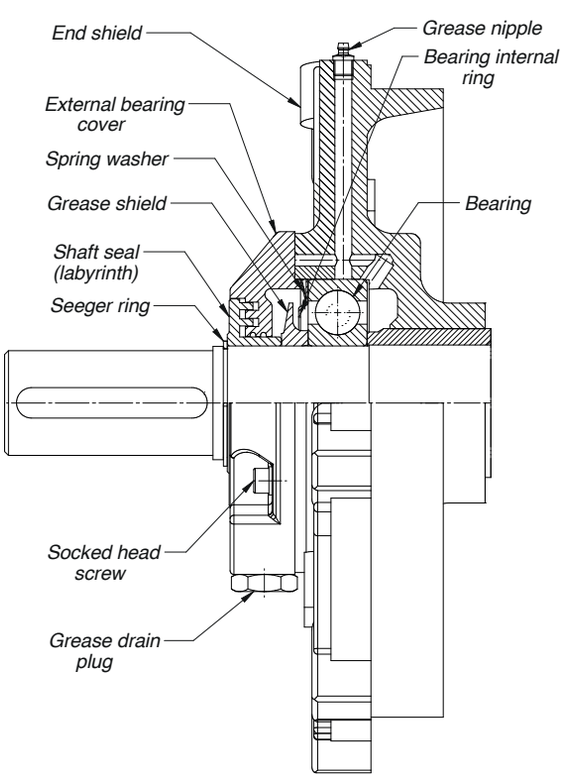



| Motor frame size | Bearings lubrication on the run |
|---|---|
| 80 | no |
| 90 | no |
| 100 | no |
| 112 | no |
| 132 | no |
| 160 | on request |
| 180 | on request |
| 200 | yes |
| 225 | yes |
| 250 | yes |
| 280 | yes |
| 315 | yes |

Frame size
(E)cSTe160-180



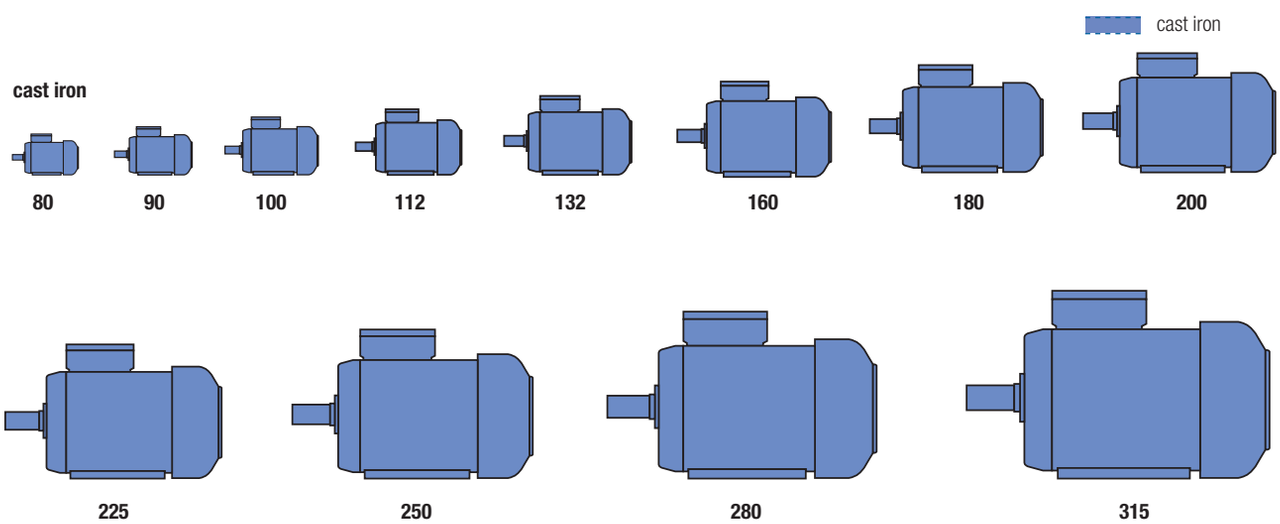

Frame size
(E)cSTe200-315



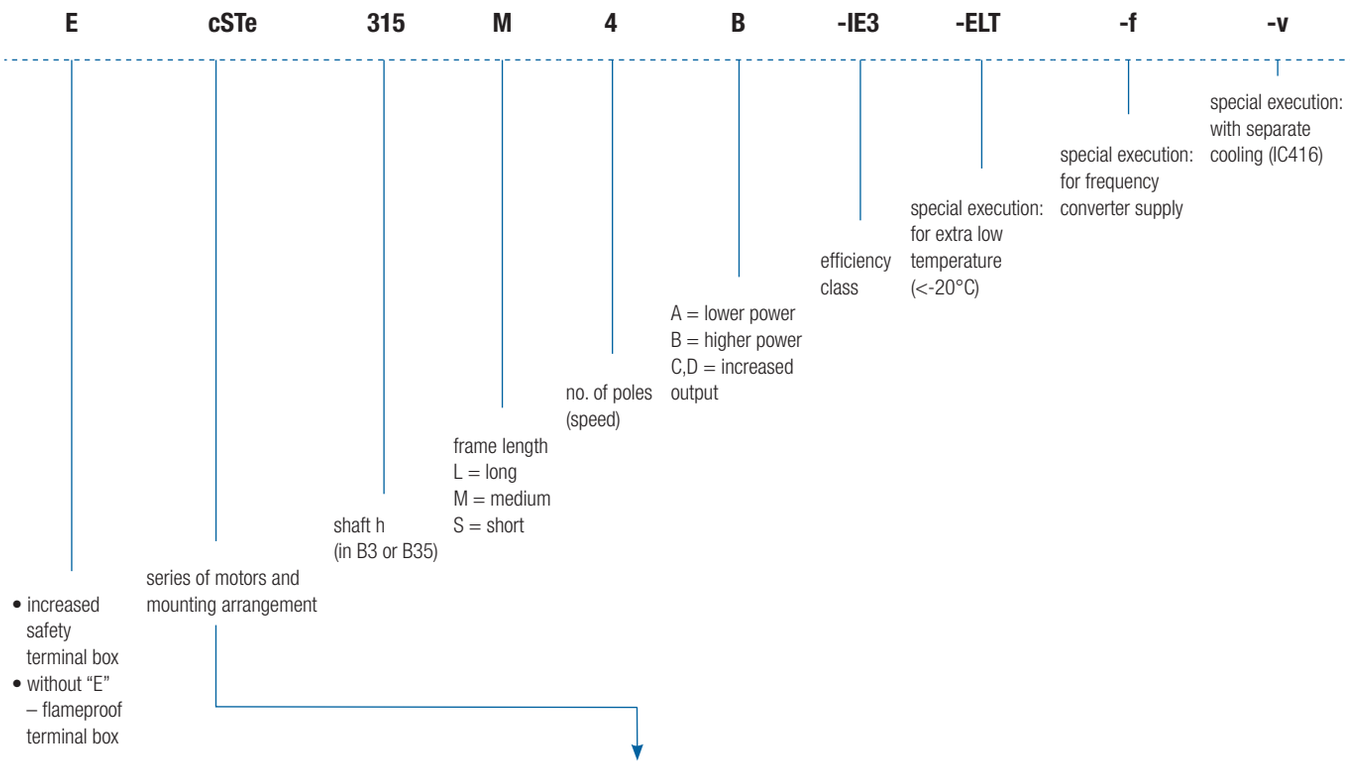

Flameproof paths/joints on shaft in motors size 90...315 are placed inside of motor housing (assures very high lifetime of flameproof path/joint).

# Material of housing, end shields and feet

| Frame size [mm] | Motor housing | End shields | Feet |
|---|---|---|---|
| (E)cSTe80 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe90 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe100 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe112 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe132 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe160 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe180 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe200 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe225 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe250 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe280 | Cast iron | Cast iron | Cast iron – screwed |
| (E)cSTe315 | Cast iron | Cast iron | Cast iron – screwed |



# Nomenclature




**(E)cSTe**

**(E)cSTKe**

**(E)cSTLe**

# Ex marking

| Type of motor | Frame size 80 | Frame size 90 ÷ 315 |
|---|---|---|
| **EcST(K,L)e…** | **Motor with flame-proof enclosure and with increased safety terminal box** | |
| | II 2G Ex **db eb** IIC T5 Gb (-20°C ÷ +40°C) | |
| **cST(K,L)e…** | **Motor and terminal box with flame-proof enclosure** | |
| | II 2G Ex **db** IIB+$H_2$ T5 Gb (-20°C ÷ +40°C) | II 2G Ex **db** IIC T5 Gb (-20°C ÷ +40°C) |

# Frequency converter operation (VSD)

Electronic speed control is carried out using a frequency converter (VSD) that adjusts the speed of the motor – and therefore the torque produced – based on the energy needed.
Our flameproof motors can be ordered in special execution designed for the frequency converter supply ("-f"). Permissible output parameters of frequency converter and speed control range have to be established individually.

# Totally Enclosed Motors IP 55 f=50Hz RPM=3000 min$^{-1}$

| Item | Type | Rated output | | Rated speed | Rated torque | Efficiency | Power factor | Full load current | | Locked rotor torque ratio | Locked rotor current ratio | Breakdown torque ratio | Moment of Inertia | Weight (IMB3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $P_N$ | | $n_N$ | $T_N$ | $\eta_N$ | cos φ | $I_N$ at rated voltage [A] | | $T_L/T_N$ | $I_L/I_N$ | $T_B/T_N$ | J | |
| | | [kW] | [HP] | [min$^{-1}$] | [Nm] | [%] | [-] | 400V | 500V | [-] | [-] | [-] | [kgm$^2$] | [kg] |
| | | | | | **2p=2** | | **$n_s$=3000 rpm** | | | | | | | |
| 1 | (E)cSTe80-2A-IE3 | 0,75 | 1 | 2890 | 2,48 | 82,0 | 0,79 | 1,7 | 1,3 | 4,0 | 7,5 | 4,2 | 0,001 | 33 |
| 2 | (E)cSTe80-2B-IE3 | 1,1 | 1,5 | 2890 | 3,63 | 83,0 | 0,77 | 2,5 | 2,0 | 5,1 | 9,5 | 4,8 | 0,00142 | 32 |
| 3 | (E)cSTe90S2-IE3 | 1,5 | 2 | 2925 | 4,9 | 84,2 | 0,85 | 3,0 | 2,4 | 2,4 | 7,3 | 3,5 | 0,0014 | 46 |
| 4 | (E)cSTe90L2-IE3 | 2,2 | 3 | 2910 | 7,2 | 85,9 | 0,86 | 4,3 | 3,4 | 2,7 | 8,0 | 4,0 | 0,0019 | 50 |
| 5 | (E)cSTe90L2A-IE3 | 3 | 4 | 2920 | 9,81 | 87,1 | 0,85 | 5,8 | 4,7 | 2,6 | 9,0 | 3,9 | 0,0019 | 53 |
| 6 | (E)cSTe100L2-IE3 | 3 | 4 | 2915 | 9,8 | 87,1 | 0,85 | 5,8 | 4,7 | 3,1 | 8,5 | 4,1 | 0,0039 | 69 |
| 7 | (E)cSTe100L2A-IE3 | 4 | 5,5 | 2920 | 13,1 | 88,1 | 0,85 | 7,7 | 6,2 | 3,2 | 9,0 | 4,1 | 0,0039 | 73 |
| 8 | (E)cSTe112M2-IE3 | 4 | 5,5 | 2925 | 13,1 | 88,1 | 0,89 | 7,4 | 5,9 | 2,3 | 8,4 | 3,2 | 0,0075 | 95 |
| 9 | (E)cSTe112M2A-IE3 | 5,5 | 7,5 | 2925 | 17,9 | 89,2 | 0,87 | 10,2 | 8,2 | 2,0 | 7,4 | 3,2 | 0,0075 | 98 |
| 10 | (E)cSTe132S2A-IE3 | 5,5 | 7,5 | 2940 | 17,9 | 89,2 | 0,89 | 10,0 | 8,0 | 2,6 | 8,2 | 3,4 | 0,014 | 140 |
| 11 | (E)cSTe132S2B-IE3 | 7,5 | 10 | 2940 | 24,4 | 90,1 | 0,90 | 13,3 | 10,7 | 2,8 | 8,5 | 3,8 | 0,017 | 148 |
| 12 | (E)cSTe132M2-IE3 | 9,2 | 12,3 | 2935 | 30 | 90,7 | 0,88 | 16,6 | 13,3 | 3,2 | 9,7 | 3,8 | 0,02 | 155 |
| 13 | (E)cSTe132M2A-IE3 | 11 | 15 | 2925 | 36 | 91,2 | 0,89 | 19,6 | 15,6 | 2,6 | 8,1 | 3,8 | 0,021 | 160 |
| 14 | (E)cSTe160M2A-IE3 | 11 | 15 | 2945 | 36 | 91,2 | 0,90 | 19,3 | 15,5 | 2,1 | 7,9 | 3,0 | 0,048 | 244 |
| 15 | (E)cSTe160M2B-IE3 | 15 | 20 | 2945 | 49 | 91,9 | 0,90 | 26,2 | 20,9 | 2,4 | 8,0 | 3,3 | 0,059 | 251 |
| 16 | (E)cSTe160L2-IE3 | 18,5 | 25 | 2940 | 60 | 92,4 | 0,90 | 32 | 25,7 | 2,3 | 7,7 | 3,0 | 0,072 | 258 |
| 17 | (E)cSTe180M2-IE3 | 22 | 30 | 2955 | 71 | 92,7 | 0,90 | 38 | 30,5 | 3,2 | 9,2 | 3,7 | 0,095 | 304 |
| 18 | (E)cSTe200L2A-IE3 | 30 | 40 | 2965 | 97 | 93,5 | 0,90 | 51 | 41 | 2,4 | 7,0 | 2,8 | 0,19 | 438 |
| 19 | (E)cSTe200L2B-IE3 | 37 | 50 | 2955 | 120 | 93,7 | 0,90 | 63 | 51 | 2,2 | 6,3 | 2,6 | 0,2 | 470 |
| 20 | (E)cSTe200L2C-IE3 | 45 | 60 | 2962 | 145 | 94,0 | 0,90 | 77 | 61 | 2,6 | 7,3 | 2,5 | 0,21 | 475 |
| 21 | (E)cSTe225M2-IE3 | 45 | 60 | 2972 | 145 | 94,2 | 0,88 | 78 | 63 | 2,3 | 7,8 | 3,5 | 0,26 | 480 |
| 22 | (E)cSTe225M2C-IE3 | 55 | 75 | 2970 | 177 | 94,5 | 0,89 | 94 | 76 | 2,1 | 7,1 | 3,1 | 0,33 | 530 |
| 23 | (E)cSTe250M2-IE3 | 55 | 75 | 2969 | 177 | 94,5 | 0,91 | 92 | 74 | 2,2 | 6,9 | 2,9 | 0,42 | 630 |
| 24 | (E)cSTe250M2C-IE3 | 75 | 100 | 2969 | 241 | 94,7 | 0,88 | 130 | 104 | 2,3 | 7,2 | 3,2 | 0,42 | 630 |
| 25 | (E)cSTe280S2-IE3 | 75 | 100 | 2978 | 241 | 94,7 | 0,91 | 126 | 100 | 1,8 | 6,7 | 2,9 | 0,76 | 800 |
| 26 | (E)cSTe280M2-IE3 | 90 | 125 | 2979 | 289 | 95,0 | 0,91 | 150 | 120 | 1,8 | 7,3 | 3,1 | 0,95 | 830 |
| 27 | (E)cSTe280M2C-IE3 | 110 | 150 | 2978 | 353 | 95,2 | 0,92 | 181 | 145 | 1,9 | 6,9 | 2,9 | 0,98 | 905 |
| 28 | (E)cSTe315S2-IE3 | 110 | 150 | 2978 | 353 | 95,2 | 0,92 | 181 | 145 | 1,9 | 6,9 | 2,9 | 0,98 | 1000 |
| 29 | (E)cSTe315M2A-IE3 | 132 | 175 | 2977 | 423 | 95,6 | 0,92 | 217 | 173 | 2,0 | 7,3 | 2,7 | 1,28 | 1100 |
| 30 | (E)cSTe315M2B-IE3 | 160 | 220 | 2978 | 513 | 95,8 | 0,92 | 262 | 210 | 2,2 | 8,2 | 3,1 | 1,57 | 1250 |
| 31 | (E)cSTe315M2C-IE3 | 200 | 270 | 2980 | 641 | 95,8 | 0,93 | 324 | 260 | 2,3 | 8,1 | 3,1 | 1,74 | 1360 |



As part of our development program, we reserve the right to alter or amend any of the specifications without giving prior notice.

# Totally Enclosed Motors IP 55 f=50Hz RPM=1500 min$^{-1}$

| Item | Type | Rated output | | Rated speed | Rated torque | Efficiency | Power factor | Full load current | | Locked rotor torque ratio | Locked rotor current ratio | Breakdown torque ratio | Moment of inertia | Weight (IMB3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $P_N$ | | $n_N$ | $T_N$ | $\eta_N$ | cos φ | $I_N$ at rated voltage [A] | | $T_L/T_N$ | $I_L/I_N$ | $T_B/T_N$ | J | |
| | | [kW] | [HP] | [min$^{-1}$] | [Nm] | [%] | [-] | 400V | 500V | [-] | [-] | [-] | [kgm$^2$] | [kg] |
| | | | | | **2p=4** | | **$n_s$=1500 rpm** | | | | | | | |
| 32 | (E)cSTe80-4A-IE3 | 0,55 | 0,75 | 1420 | 3,7 | 81,5 | 0,64 | 1,6 | 1,3 | 3,0 | 5,1 | 3,1 | 0,00208 | 29 |
| 33 | (E)cSTe80-4B-IE3 | 0,75 | 1 | 1430 | 5,0 | 82,5 | 0,64 | 2,1 | 1,6 | 4,1 | 6,3 | 3,9 | 0,00265 | 33 |
| 34 | (E)cSTe90S4-IE3 | 1,1 | 1,5 | 1450 | 7,2 | 84,1 | 0,77 | 2,5 | 2,0 | 2,3 | 7,2 | 3,5 | 0,0036 | 53 |
| 35 | (E)cSTe90L4-IE3 | 1,5 | 2 | 1450 | 9,9 | 85,3 | 0,78 | 3,3 | 2,6 | 2,5 | 7,4 | 3,4 | 0,004 | 56 |
| 36 | (E)cSTe90L4A-IE3 | 2,2 | 3 | 1455 | 14,4 | 86,7 | 0,77 | 4,8 | 3,8 | 2,9 | 8,1 | 3,9 | 0,004 | 59 |
| 37 | (E)cSTe100L4A-IE3 | 2,2 | 3 | 1465 | 14,3 | 86,7 | 0,80 | 4,6 | 3,7 | 2,5 | 7,1 | 3,3 | 0,0076 | 70 |
| 38 | (E)cSTe100L4B-IE3 | 3 | 4 | 1465 | 19,6 | 87,7 | 0,79 | 6,3 | 5,0 | 2,5 | 7,4 | 3,5 | 0,0086 | 73 |
| 39 | (E)cSTe100L4C-IE3 | 4 | 5,5 | 1465 | 26,1 | 88,6 | 0,79 | 8,2 | 6,6 | 3,0 | 8,3 | 4,1 | 0,0086 | 79 |
| 40 | (E)cSTe112M4-IE3 | 4 | 5,5 | 1460 | 26,3 | 88,6 | 0,80 | 8,1 | 6,5 | 2,1 | 7,0 | 3,0 | 0,0115 | 98 |
| 41 | (E)cSTe112M4A-IE3 | 5,5 | 7,5 | 1460 | 36 | 89,6 | 0,80 | 11,1 | 8,9 | 2,5 | 7,2 | 3,3 | 0,0115 | 107 |
| 42 | (E)cSTe132S4-IE3 | 5,5 | 7,5 | 1465 | 36 | 89,6 | 0,85 | 10,4 | 8,3 | 2,5 | 8,5 | 3,4 | 0,036 | 145 |
| 43 | (E)cSTe132M4-IE3 | 7,5 | 10 | 1465 | 49 | 90,4 | 0,83 | 14,4 | 11,5 | 2,9 | 8,8 | 3,5 | 0,042 | 150 |
| 44 | (E)cSTe132M4A-IE3 | 9,2 | 12,3 | 1460 | 60 | 91,0 | 0,83 | 17,6 | 14,1 | 3,1 | 9,0 | 4,1 | 0,05 | 155 |
| 45 | (E)cSTe132M4B-IE3 | 11 | 15 | 1460 | 72 | 91,4 | 0,83 | 20,9 | 16,7 | 3,2 | 9,5 | 4,4 | 0,057 | 158 |
| 46 | (E)cSTe160M4-IE3 | 11 | 15 | 1470 | 72 | 91,4 | 0,83 | 20,9 | 16,7 | 2,6 | 7,3 | 3,0 | 0,088 | 258 |
| 47 | (E)cSTe160L4-IE3 | 15 | 20 | 1470 | 97 | 92,1 | 0,83 | 28,3 | 22,7 | 2,7 | 7,9 | 3,2 | 0,104 | 290 |
| 48 | (E)cSTe180M4-IE3 | 18,5 | 25 | 1475 | 120 | 92,6 | 0,85 | 34 | 27,1 | 2,9 | 8,3 | 3,5 | 0,162 | 312 |
| 49 | (E)cSTe180L4-IE3 | 22 | 30 | 1475 | 142 | 93,0 | 0,83 | 41 | 33 | 3,2 | 8,5 | 3,6 | 0,185 | 320 |
| 50 | (E)cSTe200L4-IE3 | 30 | 40 | 1477 | 194 | 93,8 | 0,89 | 52 | 42 | 2,1 | 6,4 | 2,6 | 0,38 | 460 |
| 51 | (E)cSTe200L4C-IE3 | 37 | 50 | 1475 | 240 | 93,9 | 0,86 | 66 | 53 | 2,3 | 6,7 | 2,7 | 0,38 | 465 |
| 52 | (E)cSTe225S4-IE3 | 37 | 50 | 1485 | 238 | 94,0 | 0,87 | 65 | 52 | 2,0 | 6,9 | 2,8 | 0,51 | 470 |
| 53 | (E)cSTe225M4-IE3 | 45 | 60 | 1483 | 290 | 94,3 | 0,88 | 78 | 63 | 2,1 | 7,1 | 2,7 | 0,59 | 520 |
| 54 | (E)cSTe225M4C-IE3 | 55 | 75 | 1484 | 354 | 94,6 | 0,86 | 98 | 78 | 2,1 | 7,1 | 2,9 | 0,66 | 545 |
| 55 | (E)cSTe250M4-IE3 | 55 | 75 | 1487 | 353 | 94,7 | 0,90 | 93 | 75 | 2,5 | 7,6 | 2,9 | 1,0 | 670 |
| 56 | (E)cSTe250M4C-IE3 | 75 | 100 | 1483 | 483 | 95,0 | 0,90 | 127 | 101 | 2,3 | 6,8 | 3,0 | 1,15 | 710 |
| 57 | (E)cSTe280S4-IE3 | 75 | 100 | 1488 | 481 | 95,0 | 0,89 | 128 | 102 | 2,0 | 6,8 | 2,5 | 1,37 | 865 |
| 58 | (E)cSTe280M4-IE3 | 90 | 125 | 1491 | 576 | 95,4 | 0,89 | 153 | 122 | 2,6 | 8,4 | 3,0 | 1,8 | 970 |
| 59 | (E)cSTe315S4-IE3 | 110 | 150 | 1488 | 706 | 95,4 | 0,90 | 185 | 148 | 2,0 | 6,6 | 2,4 | 2,25 | 1100 |
| 60 | (E)cSTe315M4A-IE3 | 132 | 175 | 1489 | 847 | 95,6 | 0,91 | 219 | 175 | 2,3 | 7,9 | 2,8 | 2,59 | 1160 |
| 61 | (E)cSTe315M4B-IE3 | 160 | 220 | 1490 | 1026 | 95,8 | 0,90 | 268 | 214 | 2,4 | 8,5 | 3,1 | 2,8 | 1245 |
| 62 | (E)cSTe315M4C-IE3 | 200 | 270 | 1488 | 1284 | 96,2 | 0,90 | 333 | 267 | 2,4 | 8,1 | 2,9 | 3,46 | 1385 |



As part of our development program, we reserve the right to alter or amend any of the specifications without giving prior notice.

# Totally Enclosed Motors IP 55 f=50Hz RPM=1000 min$^{-1}$

| Item | Type | Rated output | | Rated speed | Rated torque | Efficiency | Power factor | Full load current | | Locked rotor torque ratio | Locked rotor current ratio | Breakdown torque ratio | Moment of Inertia | Weight (IMB3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $P_N$ | | $n_N$ | $T_N$ | $\eta_N$ | cos φ | $I_N$ at rated voltage [A] | | $T_L/T_N$ | $I_L/I_N$ | $T_B/T_N$ | J | |
| | | [kW] | [HP] | [min$^{-1}$] | [Nm] | [%] | [-] | 400V | 500V | [-] | [-] | [-] | [kgm$^2$] | [kg] |
| | | | | | **2p=6** | | **$n_s$=1000 rpm** | | | | | | | |
| 63 | (E)cSTe90S6-IE3 | 0,75 | 1 | 940 | 7,6 | 78,9 | 0,70 | 2,0 | 1,6 | 1,7 | 4,3 | 2,4 | 0,0032 | 49 |
| 64 | (E)cSTe90L6-IE3 | 1,1 | 1,5 | 940 | 11,1 | 81,0 | 0,70 | 2,8 | 2,2 | 2,1 | 4,5 | 2,6 | 0,009 | 52 |
| 65 | (E)cSTe90L6A-IE3 | 1,5 | 2 | 940 | 15,2 | 82,5 | 0,70 | 3,7 | 3,0 | 2,5 | 4,7 | 3,0 | 0,009 | 57 |
| 66 | (E)cSTe100L6-IE3 | 1,5 | 2 | 960 | 14,9 | 82,5 | 0,74 | 3,5 | 2,8 | 2,6 | 6,2 | 3,3 | 0,01 | 67 |
| 67 | (E)cSTe100L6A-IE3 | 2,2 | 3 | 960 | 21,9 | 84,3 | 0,73 | 5,2 | 4,1 | 2,9 | 6,5 | 3,6 | 0,01 | 70 |
| 68 | (E)cSTe112M6-IE3 | 2,2 | 3 | 965 | 21,8 | 84,3 | 0,76 | 5,0 | 4,0 | 2,1 | 5,9 | 2,6 | 0,0177 | 95 |
| 69 | (E)cSTe112M6A-IE3 | 3 | 4 | 960 | 29,7 | 85,6 | 0,75 | 6,7 | 5,4 | 1,5 | 5,5 | 2,3 | 0,0177 | 98 |
| 70 | (E)cSTe132S6-IE3 | 3 | 4 | 965 | 29,7 | 85,6 | 0,81 | 6,2 | 4,9 | 2,2 | 6,6 | 2,9 | 0,044 | 119 |
| 71 | (E)cSTe132M6A-IE3 | 4 | 5,5 | 965 | 39,8 | 88,0 | 0,81 | 8,1 | 6,5 | 2,3 | 6,6 | 3,0 | 0,0579 | 126 |
| 72 | (E)cSTe132M6B-IE3 | 5,5 | 7,5 | 965 | 54,7 | 88,0 | 0,81 | 11,1 | 8,9 | 2,2 | 7,0 | 3,1 | 0,0637 | 131 |
| 73 | (E)cSTe132M6C-IE3 | 7,5 | 10 | 965 | 74,2 | 89,1 | 0,76 | 16,0 | 12,8 | 3,1 | 7,7 | 3,8 | 0,0637 | 134 |
| 74 | (E)cSTe160M6-IE3 | 7,5 | 10 | 970 | 74 | 89,5 | 0,82 | 14,8 | 11,8 | 2,3 | 6,6 | 2,8 | 0,102 | 254 |
| 75 | (E)cSTe160L6-IE3 | 11 | 15 | 970 | 108 | 90,3 | 0,82 | 21,4 | 17,2 | 2,2 | 7,0 | 3,0 | 0,123 | 270 |
| 76 | (E)cSTe180L6-IE3 | 15 | 20 | 975 | 147 | 91,2 | 0,81 | 29,3 | 23,5 | 3,3 | 7,3 | 2,8 | 0,276 | 310 |
| 77 | (E)cSTe200L6A-IE3 | 18,5 | 25 | 988 | 179 | 91,7 | 0,81 | 36 | 29 | 2,0 | 5,8 | 2,4 | 0,50 | 450 |
| 78 | (E)cSTe200L6B-IE3 | 22 | 30 | 987 | 213 | 92,2 | 0,82 | 42 | 33,5 | 2,0 | 5,7 | 2,1 | 0,64 | 470 |
| 79 | (E)cSTe225M6-IE3 | 30 | 40 | 989 | 290 | 92,9 | 0,83 | 56 | 45 | 1,9 | 6,4 | 2,3 | 0,89 | 490 |
| 80 | (E)cSTe225M6C-IE3 | 37 | 50 | 991 | 357 | 93,9 | 0,77 | 74 | 59 | 2,4 | 8,6 | 2,6 | 1,09 | 530 |
| 81 | (E)cSTe250M6-IE3 | 37 | 50 | 991 | 357 | 93,3 | 0,82 | 70 | 56 | 2,0 | 6,7 | 2,6 | 1,23 | 550 |
| 82 | (E)cSTe250M6C-IE3 | 45 | 60 | 992 | 433 | 93,7 | 0,82 | 85 | 68 | 2,0 | 6,9 | 2,6 | 1,55 | 600 |
| 83 | (E)cSTe280S6-IE3 | 45 | 60 | 993 | 433 | 93,7 | 0,81 | 86 | 69 | 2,3 | 7,3 | 2,6 | 1,7 | 770 |
| 84 | (E)cSTe280M6-IE3 | 55 | 75 | 992 | 529 | 94,1 | 0,82 | 103 | 82 | 2,3 | 6,8 | 2,6 | 1,9 | 840 |
| 85 | (E)cSTe280M6C-IE3 | 75 | 100 | 992 | 722 | 94,7 | 0,82 | 139 | 112 | 2,4 | 7,1 | 2,6 | 2,4 | 950 |
| 86 | (E)cSTe315S6-IE3 | 75 | 100 | 992 | 722 | 94,7 | 0,82 | 139 | 112 | 2,4 | 7,1 | 2,6 | 2,4 | 1035 |
| 87 | (E)cSTe315M6A-IE3 | 90 | 125 | 993 | 866 | 95,1 | 0,82 | 167 | 133 | 2,6 | 7,6 | 2,7 | 2,93 | 1100 |
| 88 | (E)cSTe315M6B-IE3 | 110 | 150 | 992 | 1059 | 95,2 | 0,82 | 203 | 163 | 2,8 | 7,5 | 2,8 | 3,46 | 1270 |
| 89 | (E)cSTe315M6C-IE3 | 132 | 175 | 992 | 1271 | 95,4 | 0,83 | 241 | 193 | 2,5 | 7,0 | 2,5 | 4,21 | 1400 |
| 90 | (E)cSTe315M6D-IE3 | 160 | 220 | 992 | 1540 | 95,6 | 0,78 | 310 | 248 | 3,3 | 8,0 | 2,7 | 4,36 | 1420 |

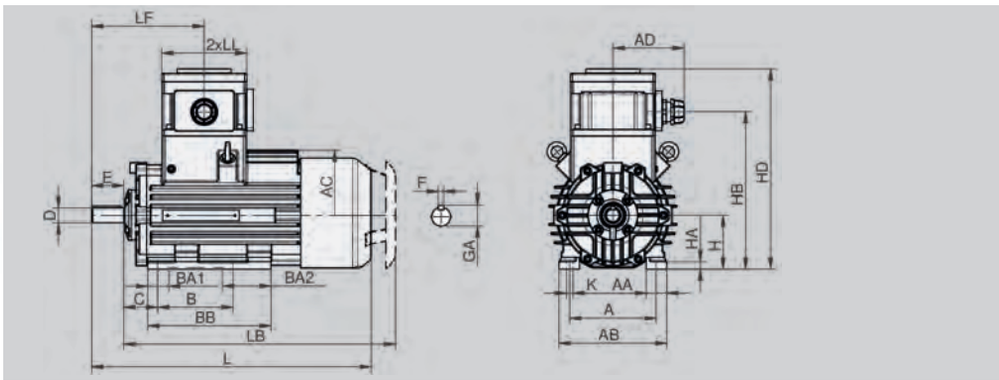


As part of our development program, we reserve the right to alter or amend any of the specifications without giving prior notice.

# Totally Enclosed Motors IP 55 f=50Hz RPM=750 min$^{-1}$

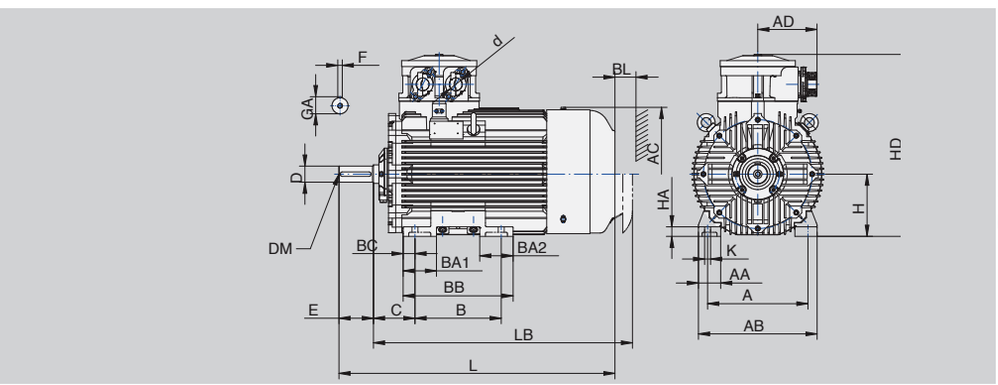
| Item | Type | Rated output | | Rated speed | Rated torque | Efficiency | Power factor | Full load current | | Locked rotor torque ratio | Locked rotor current ratio | Breakdown torque ratio | Moment of Inertia | Weight (IMB3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $P_N$ | | $n_N$ | $T_N$ | $\eta_N$ | cos φ | $I_N$ at rated voltage [A] | | $T_L/T_N$ | $I_L/I_N$ | $T_B/T_N$ | J | |
| | | [kW] | [HP] | [min$^{-1}$] | [Nm] | [%] | [-] | 400V | 500V | [-] | [-] | [-] | [kgm$^2$] | [kg] |
| | | | | | **2p=8** | | **$n_s$=750 rpm** | | | | | | | |
| 91 | (E)cSTe90S8-IE3 | 0,37 | 0,5 | 709 | 5,0 | 69,3 | 0,57 | 1,4 | 1,1 | 1,4 | 3,6 | 2,2 | 0,0026 | 49 |
| 92 | (E)cSTe90L8-IE3 | 0,55 | 0,75 | 700 | 7,5 | 73,0 | 0,64 | 1,7 | 1,4 | 1,4 | 3,6 | 2,2 | 0,0035 | 52 |
| 93 | (E)cSTe100L8A-IE3 | 0,75 | 1 | 720 | 10,0 | 75,0 | 0,63 | 2,3 | 1,8 | 1,4 | 4,0 | 2,4 | 0,0076 | 69 |
| 94 | (E)cSTe100L8B-IE3 | 1,1 | 1,5 | 710 | 14,8 | 77,7 | 0,64 | 3,2 | 2,6 | 1,4 | 3,7 | 2,0 | 0,0122 | 75 |
| 95 | (E)cSTe112M8-IE3 | 1,5 | 2 | 700 | 20,5 | 79,7 | 0,70 | 3,9 | 3,1 | 1,7 | 4,6 | 2,7 | 0,0168 | 95 |
| 96 | (E)cSTe132S8-IE3 | 2,2 | 3 | 714 | 29,4 | 81,9 | 0,71 | 5,5 | 4,3 | 2,2 | 5,5 | 2,9 | 0,0361 | 130 |
| 97 | (E)cSTe132M8-IE3 | 3 | 4 | 710 | 40,4 | 83,5 | 0,75 | 6,9 | 5,5 | 2,3 | 5,7 | 2,9 | 0,0489 | 138 |
| 98 | (E)cSTe160M8A-IE3 | 4 | 5,5 | 710 | 54 | 84,8 | 0,74 | 9,2 | 7,4 | 1,7 | 4,9 | 2,4 | 0,057 | 220 |
| 99 | (E)cSTe160M8B-IE3 | 5,5 | 7,5 | 710 | 74 | 86,2 | 0,73 | 12,6 | 10,1 | 1,8 | 5,0 | 2,6 | 0,078 | 230 |
| 100 | (E)cSTe160L8-IE3 | 7,5 | 10 | 710 | 101 | 87,3 | 0,77 | 16,1 | 12,9 | 2,0 | 5,4 | 2,6 | 0,102 | 240 |
| 101 | (E)cSTe180L8-IE3 | 11 | 15 | 730 | 144 | 88,6 | 0,76 | 24,6 | 18,9 | 2,0 | 6,0 | 2,3 | 0,219 | 280 |
| 102 | (E)cSTe200L8-IE3 | 15 | 20 | 736 | 195 | 89,6 | 0,78 | 31 | 25 | 2,0 | 6,4 | 2,9 | 0,45 | 320 |
| 103 | (E)cSTe225S8-IE3 | 18,5 | 25 | 737 | 240 | 90,1 | 0,77 | 38,5 | 31 | 2,4 | 6,0 | 2,3 | 0,58 | 390 |
| 104 | (E)cSTe225M8-IE3 | 22 | 30 | 737 | 285 | 90,6 | 0,80 | 44 | 35 | 2,1 | 5,8 | 2,4 | 0,68 | 430 |
| 105 | (E)cSTe250M8-IE3 | 30 | 40 | 739 | 388 | 91,3 | 0,80 | 59 | 47 | 2,8 | 6,6 | 2,5 | 1,27 | 580 |
| 106 | (E)cSTe280S8-IE3 | 37 | 50 | 738 | 479 | 92,8 | 0,83 | 69 | 55 | 2,0 | 5,3 | 1,8 | 1,47 | 720 |
| 107 | (E)cSTe280M8-IE3 | 45 | 60 | 738 | 582 | 92,2 | 0,82 | 86 | 69 | 2,3 | 6,0 | 2,1 | 1,8 | 770 |
| 108 | (E)cSTe315S8-IE3 | 55 | 75 | 740 | 710 | 92,5 | 0,80 | 107 | 86 | 1,9 | 6,3 | 2,6 | 2,16 | 1110 |
| 109 | (E)cSTe315M8A-IE3 | 75 | 100 | 739 | 969 | 93,1 | 0,80 | 145 | 116 | 2,1 | 6,6 | 2,8 | 2,29 | 1160 |
| 110 | (E)cSTe315M8B-IE3 | 90 | 125 | 739 | 1163 | 93,4 | 0,80 | 174 | 139 | 2,2 | 7,1 | 3,1 | 2,86 | 1280 |
| 111 | (E)cSTe315M8C-IE3 | 110 | 150 | 740 | 1420 | 93,7 | 0,78 | 217 | 174 | 2,4 | 7,3 | 2,8 | 4,1 | 1410 |
| 112 | (E)cSTe315M8D-IE3 | 132 | 175 | 739 | 1706 | 94,0 | 0,79 | 257 | 205 | 2,2 | 7,2 | 3,0 | 4,36 | 1430 |

# Dimensions of Foot Mounted Motors – IM B3



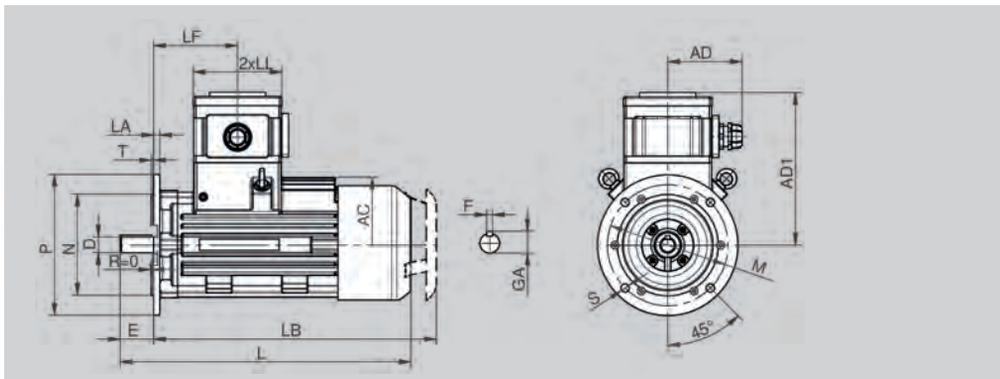

| Size | A | B | C | $D_{j6}$ | E | $F_{h9}$ | GA | $H_{-0,5}$ | HA | K | AA | AB | AC | AD | BA1 | BA2 | BB | HB | HD | L | LB | LF | LL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 80-2A, 4A | 125 | 100 | 50 | 19 | 40 | 6 | 21,5 | 80 | 12 | 10 | 40 | 165 | 190 | 145 | 38 | 38 | 130 | 217 | 275 | 315 | 300 | 138 | 66 |
| 80-2B, 4B | 125 | 100 | 50 | 19 | 40 | 6 | 21,5 | 80 | 12 | 10 | 33 | 165 | 190 | 145 | 38 | 38 | 130 | 217 | 275 | 355 | 340 | 138 | 66 |
| 90S | 140 | 100 | 56 | 24 | 50 | 8 | 27 | 90 | 12 | 10 | 35 | 180 | 220 | 135 | – | – | 201 | 265 | 346 | 475 | 450 | 183 | 91 |
| 90L | 140 | 125 | 56 | 24 | 50 | 8 | 27 | 90 | 12 | 10 | 35 | 180 | 220 | 135 | – | – | 201 | 265 | 346 | 475 | 450 | 183 | 91 |
| 100 | 160 | 140 | 63 | 28 | 60 | 8 | 31 | 100 | 14 | 9 | 38 | 200 | 240 | 150 | – | – | 230 | 292 | 375 | 525 | 510 | 209 | 80 |
| 112 | 190 | 140 | 70 | 28 | 60 | 8 | 31 | 112 | 14 | 12 | 54 | 230 | 260 | 150 | – | – | 230 | 330 | 415 | 535 | 515 | 213 | 96 |
| 132S | 216 | 140 | 89 | 38k6 | 80 | 10 | 41 | 132 | 16 | 12 | 60 | 272 | 290 | 150 | – | – | 280 | 377 | 460 | 620 | 595 | 238 | 96 |
| 132M | 216 | 178 | 89 | 38k6 | 80 | 10 | 41 | 132 | 16 | 12 | 60 | 272 | 290 | 150 | – | – | 280 | 377 | 460 | 620 | 595 | 238 | 96 |

# Dimensions of Foot Mounted Motors – IM B3



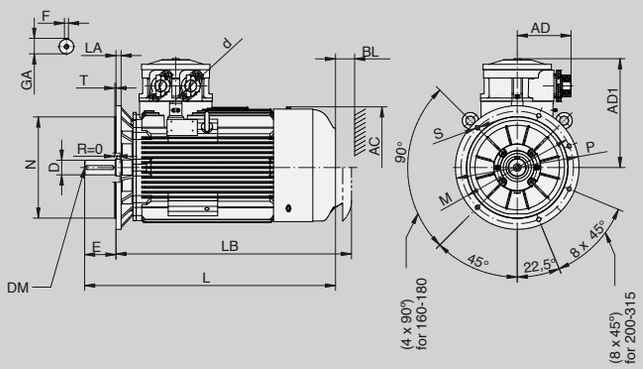

| Size | A | B | C | DM | Dk6 (160; 180) Dm6 | E | $F_{h9}$ | GA | $H_{-0,5}$ | HA | K | AA | AB | AC | AD | BA1 | BA2 | BB | $BC_{\pm 0,3}$ | HD | BL | L | LB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 160M | 254 | 210 | 108 | 16 | 42 | 110 | 12 | 45 | 160 | 24 | 15 | 63 | 320 | 350 | 225 | 75 | 115 | 310 | 23 | 575 | 60 | 825 | 780 |
| 160L | 254 | 254 | 108 | 16 | 42 | 110 | 12 | 45 | 160 | 24 | 15 | 63 | 320 | 350 | 225 | 75 | 115 | 310 | 23 | 575 | 60 | 825 | 780 |
| 180M | 297 | 241 | 121 | 16 | 48 | 110 | 14 | 51,5 | 180 | 28 | 15 | 68 | 345 | 370 | 225 | 110 | 110 | 340 | 28 | 600 | 65 | 860 | 810 |
| 180L | 297 | 279 | 121 | 16 | 48 | 110 | 14 | 51,5 | 180 | 28 | 15 | 68 | 345 | 370 | 225 | 110 | 110 | 340 | 28 | 600 | 65 | 860 | 810 |
| 200L | 318 | 305 | 133 | 20 | 55 | 110 | 16 | 59 | 200 | 32 | 19 | 80 | 402 | 450 | 245 | 115 | 115 | 380 | 30 | 670 | 75 | 960 | 930 |
| 225S4÷8 | 356 | 286 | 149 | 20 | 60 | 140 | 18 | 64 | 225 | 34 | 19 | 85 | 444 | 500 | 230 | 115 | 115 | 380 | 36 | 700 | 75 | 1015 | 950 |
| 225M2 | 356 | 311 | 149 | 20 | 55 | 110 | 16 | 59 | 225 | 34 | 19 | 85 | 444 | 500 | 230 | 115 | 115 | 380 | 36 | 700 | 75 | 1015 | 950 |
| 225M4÷8 | 356 | 311 | 149 | 20 | 60 | 140 | 18 | 64 | 225 | 34 | 19 | 85 | 444 | 500 | 230 | 115 | 115 | 380 | 36 | 700 | 75 | 1015 | 950 |
| 250M2 | 406 | 349 | 168 | 20 | 60 | 140 | 18 | 64 | 250 | 37 | 24 | 90 | 480 | 545 | 245 | 135 | 135 | 445 | 48 | 740 | 75 | 1120 | 1050 |
| 250M4÷8 | 406 | 349 | 168 | 20 | 65 | 140 | 18 | 69 | 250 | 37 | 24 | 90 | 480 | 545 | 245 | 135 | 135 | 445 | 48 | 740 | 75 | 1120 | 1050 |
| 280S2 | 457 | 368 | 190 | 20 | 65 | 140 | 18 | 69 | 280 | 40 | 24 | 94 | 560 | 625 | 265 | 117 | 170 | 550 | 42 | 860 | 80 | 1100 | 1040 |
| 280S4÷8 | 457 | 368 | 190 | 20 | 75 | 140 | 20 | 79,5 | 280 | 40 | 24 | 94 | 560 | 625 | 265 | 117 | 170 | 550 | 42 | 860 | 80 | 1100 | 1040 |
| 280M2 | 457 | 419 | 190 | 20 | 65 | 140 | 18 | 69 | 280 | 40 | 24 | 94 | 560 | 625 | 265 | 117 | 170 | 550 | 42 | 860 | 80 | 1100 | 1040 |
| 280M4÷8 | 457 | 419 | 190 | 20 | 75 | 140 | 20 | 79,59 | 280 | 40 | 24 | 94 | 560 | 625 | 265 | 117 | 170 | 550 | 42 | 860 | 80 | 1100 | 1040 |
| 315(S2, M2A) | 508 | 457 | 216 | M20 | 65 | 140 | 18 | 69 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1245 | 1225 |
| 315M2(B,C) | 508 | 457 | 216 | M20 | 65 | 140 | 18 | 69 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1345 | 1325 |
| 315S4 | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1275 | 1225 |
| 315M4(A,B) | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1375 | 1325 |
| 315M4C | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 135 | 265 | 685 | 55 | 895 | 130 | 1475 | 1425 |
| 315(S6, M6A) | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1275 | 1225 |
| 315M6B | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1375 | 1325 |
| 315M6C | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 135 | 265 | 685 | 55 | 895 | 130 | 1475 | 1425 |
| 315M6D | 508 | 457 | 216 | M24 | 90 | 170 | 25 | 95 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 135 | 265 | 685 | 55 | 895 | 130 | 1475 | 1425 |
| 315(S8, M8A) | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1275 | 1225 |
| 315M8B | 508 | 457 | 216 | M20 | 80 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 117 | 168 | 550 | 47 | 895 | 130 | 1375 | 1325 |
| 315M8(C,D) | 508 | 457 | 216 | M24 | 90 | 170 | 25 | 95 | 315 | 46 | 28 | 120 | 610 | 625 | 265 | 135 | 265 | 685 | 55 | 895 | 130 | 1475 | 1425 |

# Dimensions of Flange Mounted Motors – IM B5, IM B14, IM V1



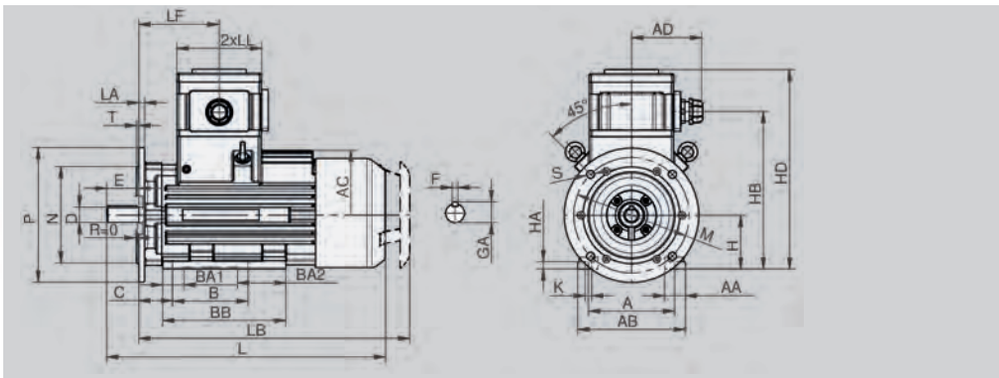

| Size | $D_{j6}$ | E | $F_{h9}$ | GA | AC | AD | AD1 | L | LB | LF | LL | LA | IMB5 | | | | | | IMB14 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | $M_{\pm 0,3}$ | $N_{j6}$ | P | S | | T | $M_{\pm 0,3}$ | $N_{j6}$ | P | S | | T |
| | | | | | | | | | | | | | | | | ø | Qty | | | | | – | Qty | |
| 80-2A, 4A | 19 | 40 | 6 | 21,5 | 190 | 145 | 195 | 315 | 300 | 138 | 66 | 15 | 165 | 130 | 200 | 12 | 4 | 3,5 | 100 | 80 | 120 | M6 | 4 | 3 |
| 80-2B, 4B | 19 | 40 | 6 | 21,5 | 190 | 145 | 195 | 355 | 340 | 138 | 66 | 15 | 165 | 130 | 200 | 12 | 4 | 3,5 | 100 | 80 | 120 | M6 | 4 | 3 |
| 90 | 24 | 50 | 8 | 27 | 220 | 135 | 256 | 475 | 450 | 183 | 91 | 11 | 165 | 130 | 200 | 12 | 4 | 3,5 | 115 | 95 | 140 | M8 | 4 | 3 |
| 100 | 28 | 60 | 8 | 31 | 240 | 150 | 275 | 525 | 510 | 209 | 80 | 11 | 215 | 180 | 250 | 15 | 4 | 4 | 130 | 110 | 160 | M8 | 4 | 3,5 |
| 112 | 28 | 60 | 8 | 31 | 260 | 150 | 303 | 535 | 515 | 213 | 96 | 12 | 215 | 180 | 250 | 15 | 4 | 5 | 130 | 110 | 160 | M8 | 4 | 3,5 |
| 132 | 38k6 | 80 | 10 | 41 | 290 | 150 | 328 | 620 | 595 | 238 | 96 | 16 | 265 | 230 | 300 | 15 | 4 | 4 | 165 | 130 | 200 | M10 | 4 | 3,5 |

# Dimensions of Flange Mounted Motors – IM B5, IM V1



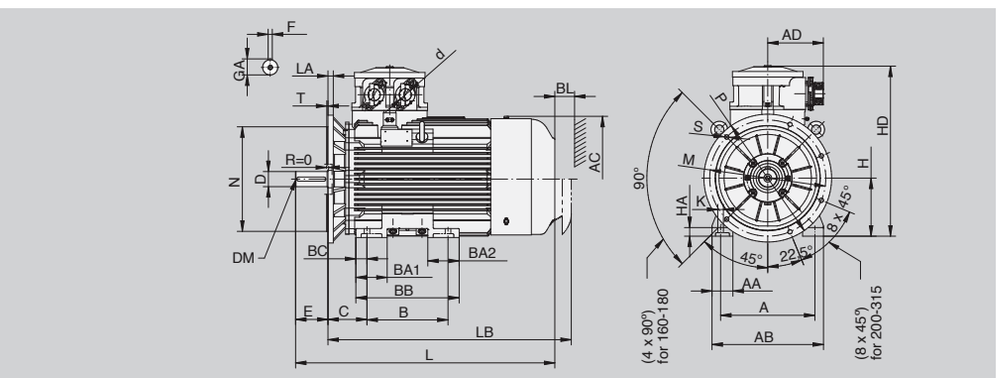

| Size | Dk6 (160; 180) Dm6 | DM | E | $F_{h9}$ | GA | AC | AD | AD1 | LA | $M_{\pm 0,4}$ | N j6 | P | S ø | S Qty | T | BL | L | LB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 160M | 42 | 16 | 110 | 12 | 45 | 350 | 225 | 415 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 60 | 825 | 780 |
| 160L | 42 | 16 | 110 | 12 | 45 | 350 | 225 | 415 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 60 | 825 | 780 |
| 180M | 48 | 16 | 110 | 14 | 51,5 | 370 | 225 | 420 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 65 | 860 | 810 |
| 180L | 48 | 16 | 110 | 14 | 51,5 | 370 | 225 | 420 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 65 | 860 | 810 |
| 200L | 55 | 20 | 110 | 16 | 59 | 450 | 245 | 470 | 19 | 350 | 300 | 400 | 19 | 4 | 5 | 75 | 960 | 930 |
| 225S4÷8 | 60 | 20 | 140 | 18 | 64 | 500 | 230 | 475 | 21 | 400 | 350 | 450 | 19 | 8 | 5 | 75 | 1015 | 950 |
| 225M2 | 55 | 20 | 110 | 16 | 59 | 500 | 230 | 475 | 21 | 400 | 350 | 450 | 19 | 8 | 5 | 75 | 1015 | 950 |
| 225M4÷8 | 60 | 20 | 140 | 18 | 64 | 500 | 230 | 475 | 21 | 400 | 350 | 450 | 19 | 8 | 5 | 75 | 1015 | 950 |
| 250M2 | 60 | 20 | 140 | 18 | 64 | 545 | 245 | 490 | 23 | 500 | 450 | 550 | 19 | 8 | 5 | 75 | 1120 | 1050 |
| 250M4÷8 | 65 | 20 | 140 | 18 | 69 | 545 | 245 | 490 | 23 | 500 | 450 | 550 | 19 | 8 | 5 | 75 | 1120 | 1050 |
| 280S2 | 65 | 20 | 140 | 18 | 69 | 625 | 265 | 580 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 280S4÷8 | 75 | 20 | 140 | 20 | 79,5 | 625 | 265 | 580 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 280M2 | 65 | 20 | 140 | 18 | 69 | 625 | 265 | 580 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 280M4÷8 | 75 | 20 | 140 | 20 | 79,59 | 625 | 265 | 580 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 315(S2, M2A) | 65 | M20 | 140 | 18 | 69 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1245 | 1225 |
| 315M2(B,C) | 65 | M20 | 140 | 18 | 69 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1345 | 1325 |
| 315S4 | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1275 | 1225 |
| 315M4(A,B) | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1375 | 1325 |
| 315M4C | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |
| 315(S6, M6A) | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1275 | 1225 |
| 315M6B | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1375 | 1325 |
| 315M6C | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |
| 315M6D | 90 | M24 | 170 | 25 | 95 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |
| 315(S8, M8A) | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1275 | 1225 |
| 315M8B | 80 | M20 | 170 | 22 | 85 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1375 | 1325 |
| 315M8(C,D) | 90 | M24 | 170 | 25 | 95 | 625 | 265 | 580 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |

# Dimensions of Foot / Flange Mounted Motors – IM B35, IM B34




| Size | A | B | C | $D_{j6}$ | E | $F_{h9}$ | GA | $H_{-0,5}$ | HA | K | AA | AB | AC | AD | BA1 | BA2 | BB | HB | HD | L | LB | LF | LL | LA | IM B35 | | | | | | IM B34 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | | | | | | | | $M_{\pm 0,3}$ | $N_{j6}$ | P | S | | T | $M_{\pm 0,3}$ | $N_{j86}$ | P | S | | T |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | ø | Qty | | | | | - | Qty | |
| 80-2A, 4A | 125 | 100 | 50 | 19 | 40 | 6 | 21,5 | 80 | 12 | 10 | 40 | 165 | 190 | 145 | 38 | 38 | 130 | 217 | 275 | 315 | 300 | 138 | 66 | 15 | 165 | 130 | 200 | 12 | 4 | 3,5 | 100 | 80 | 120 | M6 | 4 | 3 |
| 80-2B, 4B | 125 | 100 | 50 | 19 | 40 | 6 | 21,5 | 80 | 12 | 10 | 33 | 165 | 190 | 145 | - | - | 183 | 217 | 275 | 355 | 340 | 138 | 66 | 15 | 165 | 130 | 200 | 12 | 4 | 3,5 | 100 | 80 | 120 | M6 | 4 | 3 |
| 90S | 140 | 100 | 56 | 24 | 50 | 8 | 27 | 90 | 12 | 10 | 35 | 180 | 220 | 135 | - | - | 201 | 265 | 346 | 475 | 450 | 183 | 91 | 11 | 165 | 130 | 200 | 12 | 4 | 3,5 | 115 | 95 | 140 | M8 | 4 | 3 |
| 90L | 140 | 125 | 56 | 24 | 50 | 8 | 27 | 90 | 12 | 10 | 35 | 180 | 220 | 135 | - | - | 201 | 265 | 346 | 475 | 450 | 183 | 91 | 11 | 215 | 180 | 250 | 15 | 4 | 4 | 130 | 110 | 160 | M8 | 4 | 3,5 |
| 100 | 160 | 140 | 63 | 28 | 60 | 8 | 31 | 100 | 14 | 9 | 38 | 200 | 240 | 150 | - | - | 230 | 292 | 375 | 525 | 510 | 209 | 80 | 12 | 215 | 180 | 250 | 15 | 4 | 5 | 130 | 110 | 160 | M8 | 4 | 3,5 |
| 112 | 190 | 140 | 70 | 28 | 60 | 8 | 31 | 112 | 14 | 12 | 54 | 230 | 260 | 150 | - | - | 230 | 330 | 415 | 535 | 515 | 213 | 96 | 16 | 265 | 230 | 300 | 15 | 4 | 4 | 165 | 130 | 200 | M10 | 4 | 3,5 |
| 132S | 216 | 140 | 89 | 38k6 | 80 | 10 | 41 | 132 | 16 | 12 | 60 | 272 | 290 | 150 | - | - | 280 | 377 | 460 | 620 | 595 | 238 | 96 | 15 | 165 | 130 | 200 | 12 | 4 | 3,5 | 100 | 80 | 120 | M6 | 4 | 3 |
| 132M | 216 | 178 | 89 | 38k6 | 80 | 10 | 41 | 132 | 16 | 12 | 60 | 272 | 290 | 150 | - | - | 280 | 377 | 460 | 620 | 595 | 238 | 96 | 15 | 165 | 130 | 200 | 12 | 4 | 3,5 | 100 | 80 | 120 | M6 | 4 | 3 |

# Dimensions of Foot / Flange Mounted Motors – IM B35




| Size | A | B | C | Dk6 (160; 180) Dm6 | DM | E | $F_{h9}$ | GA | $H_{-0,5}$ | HA | K | AA | AB | BB | B ±3 | BA1 | BA2 | AC | AD | HD | LA | M ±0,4 | N j6 | P | S ø | S Qty | T | BL | L | LB |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 160M2÷8 | 254 | 210 | 108 | 42 | 16 | 110 | 12 | 45 | 160 | 24 | 15 | 63 | 320 | 310 | 23 | 75 | 115 | 350 | 225 | 575 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 60 | 825 | 780 |
| 160L2÷8 | 254 | 254 | 108 | 42 | 16 | 110 | 12 | 45 | 160 | 24 | 15 | 63 | 320 | 310 | 23 | 75 | 115 | 350 | 225 | 575 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 60 | 825 | 780 |
| 180M2÷8 | 297 | 241 | 121 | 48 | 16 | 110 | 14 | 51,5 | 180 | 28 | 15 | 68 | 345 | 340 | 28 | 110 | 110 | 370 | 225 | 600 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 65 | 860 | 810 |
| 180L4÷8 | 297 | 279 | 121 | 48 | 16 | 110 | 14 | 51,5 | 180 | 28 | 15 | 68 | 345 | 340 | 28 | 110 | 110 | 370 | 225 | 600 | 18 | 300 | 250 | 350 | 19 | 4 | 5 | 65 | 860 | 810 |
| 200L2÷8 | 318 | 305 | 133 | 55 | 20 | 110 | 16 | 59 | 200 | 32 | 19 | 80 | 402 | 380 | 30 | 115 | 115 | 450 | 245 | 670 | 19 | 350 | 300 | 400 | 19 | 4 | 5 | 75 | 960 | 930 |
| 225S4÷8 | 356 | 286 | 149 | 60 | 20 | 140 | 18 | 64 | 225 | 34 | 19 | 85 | 444 | 380 | 36 | 115 | 115 | 500 | 230 | 700 | 21 | 400 | 350 | 450 | 19 | 8 | 5 | 75 | 1015 | 950 |
| 225M2 | 356 | 311 | 149 | 55 | 20 | 110 | 16 | 59 | 225 | 34 | 19 | 85 | 444 | 380 | 36 | 115 | 115 | 500 | 230 | 700 | 21 | 400 | 350 | 450 | 19 | 8 | 5 | 75 | 1015 | 950 |
| 225M4÷8 | 356 | 311 | 149 | 60 | 20 | 140 | 18 | 64 | 225 | 34 | 19 | 85 | 444 | 380 | 36 | 115 | 115 | 500 | 230 | 700 | 21 | 400 | 350 | 450 | 19 | 8 | 5 | 75 | 1015 | 950 |
| 250M2 | 406 | 349 | 168 | 60 | 20 | 140 | 18 | 64 | 250 | 37 | 24 | 90 | 480 | 445 | 48 | 135 | 135 | 545 | 245 | 740 | 23 | 500 | 450 | 550 | 19 | 8 | 5 | 75 | 1120 | 1050 |
| 250M4÷8 | 406 | 349 | 168 | 65 | 20 | 140 | 18 | 69 | 250 | 37 | 24 | 90 | 480 | 445 | 48 | 135 | 135 | 545 | 245 | 740 | 23 | 500 | 450 | 550 | 19 | 8 | 5 | 75 | 1120 | 1050 |
| 280S2 | 457 | 368 | 190 | 65 | 20 | 140 | 18 | 69 | 280 | 40 | 24 | 94 | 560 | 550 | 42 | 117 | 170 | 625 | 265 | 860 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 280S4÷8 | 457 | 368 | 190 | 75 | 20 | 140 | 20 | 79,5 | 280 | 40 | 24 | 94 | 560 | 550 | 42 | 117 | 170 | 625 | 265 | 860 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 280M2 | 457 | 419 | 190 | 65 | 20 | 140 | 18 | 69 | 280 | 40 | 24 | 94 | 560 | 550 | 42 | 117 | 170 | 625 | 265 | 860 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 280M4÷6 | 457 | 419 | 190 | 75 | 20 | 140 | 20 | 79,5 | 280 | 40 | 24 | 94 | 560 | 550 | 42 | 117 | 170 | 625 | 265 | 860 | 20 | 500 | 450 | 550 | 19 | 8 | 5 | 80 | 1100 | 1040 |
| 315(S2, M2A) | 508 | 457 | 216 | 65 | M20 | 140 | 18 | 69 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1245 | 1225 |
| 315M2(B,C) | 508 | 457 | 216 | 65 | M20 | 140 | 18 | 69 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1345 | 1325 |
| 315S4 | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1275 | 1225 |
| 315M4(A,B) | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1375 | 1325 |
| 315M4C | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 685 | 457 | 135 | 265 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |
| 315(S6, M6A) | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1275 | 1225 |
| 315M6B | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1375 | 1325 |
| 315M6C | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 685 | 457 | 135 | 265 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |
| 315M6D | 508 | 457 | 216 | 90 | M24 | 170 | 25 | 95 | 315 | 46 | 28 | 120 | 610 | 685 | 457 | 135 | 265 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |
| 315(S8, M8A) | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1275 | 1225 |
| 315M8B | 508 | 457 | 216 | 80 | M20 | 170 | 22 | 85 | 315 | 46 | 28 | 120 | 610 | 550 | 457 | 117 | 168 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1375 | 1325 |
| 315M8(C,D) | 508 | 457 | 216 | 90 | M24 | 170 | 25 | 95 | 315 | 46 | 28 | 120 | 610 | 685 | 457 | 135 | 265 | 625 | 265 | 895 | 23 | 600 | 550 | 660 | 24 | 8 | 6 | 130 | 1475 | 1425 |

# Flameproof motors with electromagnetic brake

Cantoni Group has a vast experience in the production of explosion proof motors. In 1950s, it was one of Cantoni Group's manufacturing companies which produced the first explosion proof and flameproof motors in Poland. Such long experience resulted in Cantoni's outstanding knowledge in this field.

**Cantoni motors are recognized globally as safe, reliable and durable, operating in the harshest conditions.**

Premium efficiency IE3 flameproof motor (Ex db eb) with built in electromagnetic brake HEX160 (1600Nm) type EcSTe315M4B-IE3-H

Apart from the wide range of standard flameproof motors, our offer includes also many different special executions of motors.

One of them are motors equipped with **flameproof electromagnetic (DC)** brakes which are installed on the ND side of motor. This compact execution enables to reduce complexity of the drive system.

The whole variety of electromagnetic brakes (including flameproof brakes) is produced within Cantoni Group, therefore, we can guarantee the highest quality of the whole set.

**HEX DC electromagnetic brakes** are switchable spring loaded and electromagnetically released brakes which can be used also separately (as stand alone components) in different drive systems to brake the rotating parts of machines (safety) and their exact positioning.

They feature high repeatability, also at high operating rates and can be powered from alternating current sources through a built-in rectifier. Brakes are optionally equipped with manual release levers to allow their emergency releasing.

An additional feature is their stable operation, which is particularly important if a machine is powered by several drives, working at high on-off rates. Brake design guarantees simple and trouble-free installation.

Various versions are available with different equipment, brake power supply types, allowing users to select the right option for their needs.

**HEX brakes** provide protection:

- against methane and coal dust explosion for the I group of devices, category M2 (I M2 Ex db [ia] I Mb)
- against explosion of gases for the II group of devices, category 2G (I 2G Ex db [ia] IIB T4 Gb)
- against dust explosion for the II group of devices, category 2D (II 2D Ex tb [ia] IIIC T125°C Db)



CERTYFIKAT BADANIA TYPU UE

KDB 17ATEX0067X wydanie 0

Elektromagnetyczne hamulce tarczowe typu HEX05, HEX10, HEX15, HEX35, HEX50, HEX100, HEX160, HEX160J

Fabryka Aparatury Elektrycznej „EMA-ELFA" Sp. z o.o.

63-500 Ostrzeszów, ul. Pocztowa 7

KDBEx.eu

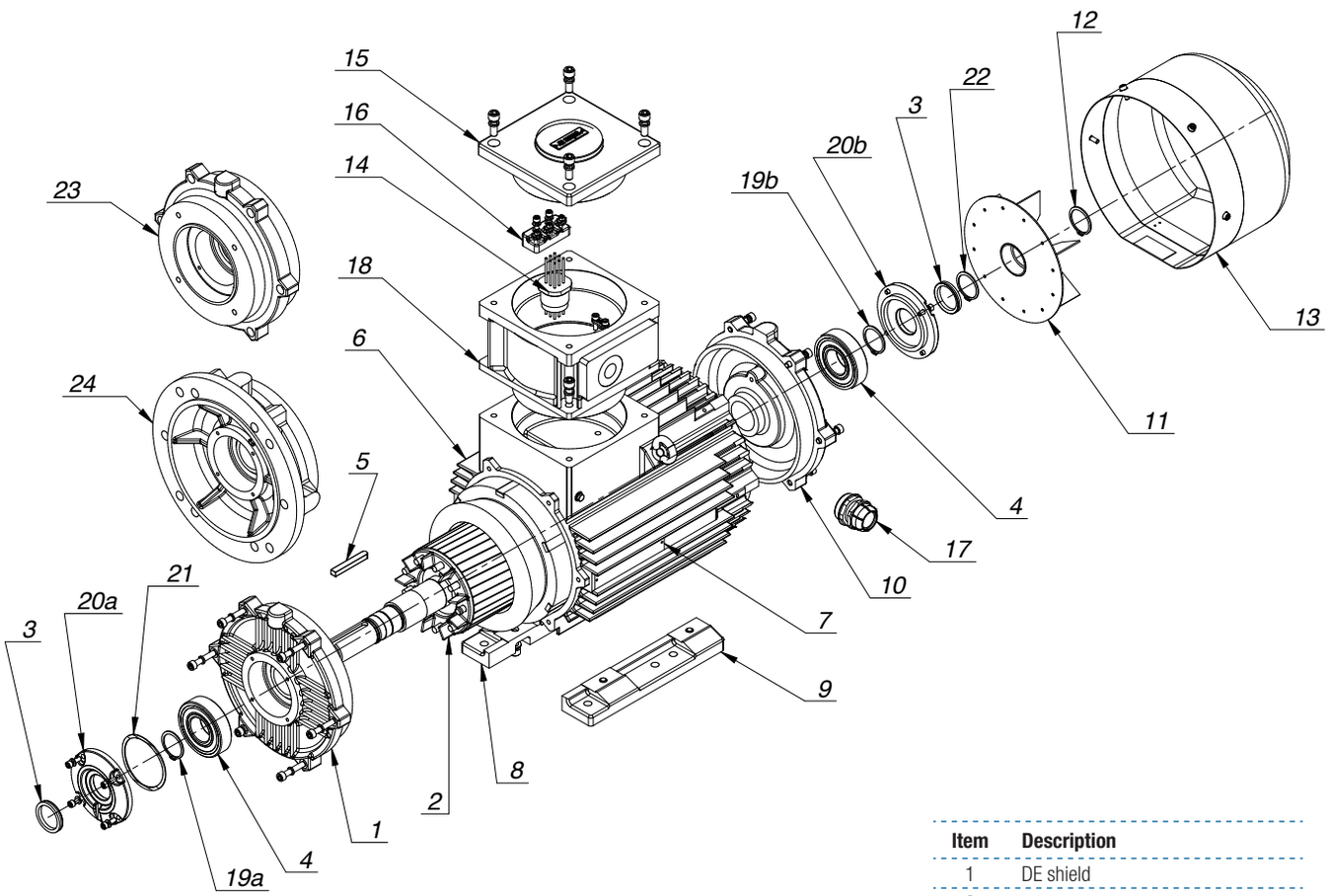
Application areas:

- Underground mining and open-cast mining
- Chemical industry
- Petrochemical and refinery industry
- Motor with brake – explosion proof self-braking motor
- Brake reducer - explosion proof kit
- Lifts, cranes and winches working in explosive areas…

For other types of brakes or for more information on brake motors please contact us directly or visit www.cantonigroup.com.

# List of Motor parts

## Frame Size: 80÷132

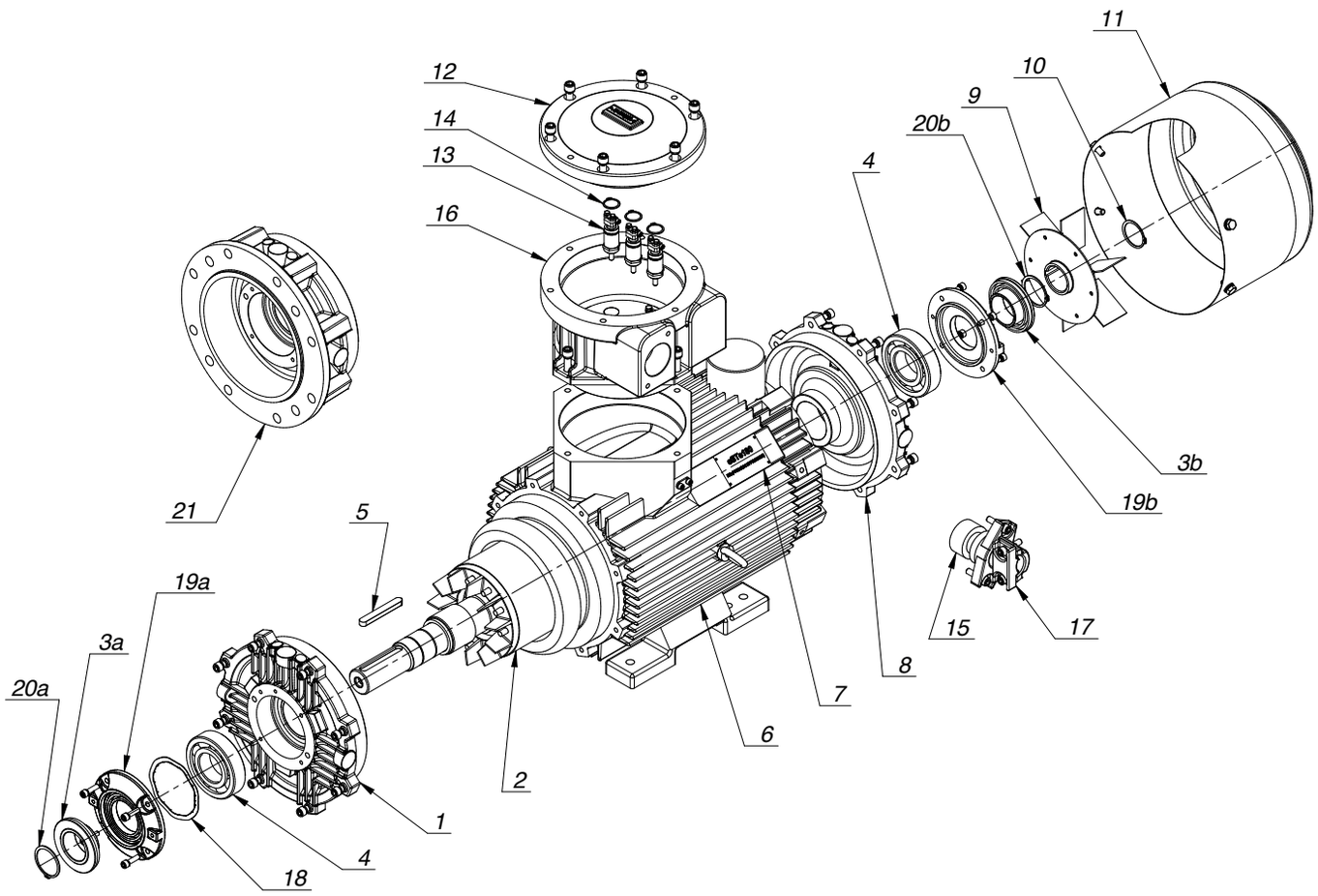



| Item | Description |
|---|---|
| 1 | DE shield |
| 2 | rotor |
| 3 | shaft seal |
| 4 | bearing |
| 5 | key |
| 6 | stator without feet |
| 7 | nameplate |
| 8 | left feet |
| 9 | right feet |
| 10 | NDE shield |
| 11 | fan |
| 12 | seeger ring |
| 13 | fan cover |
| 14 | cable bushing |
| 15 | terminal box cover |
| 16 | terminal board |
| 17 | cable gland |
| 18 | terminal box housing |
| 19ab | seeger ring – except (E)cST(K,L,1)80 |
| 20ab | external bearing cover – except (E)cST(K,L,1)80 |
| 21 | spring washer |
| 22 | seeger ring – except (E)cST(K,L,1)80 |
| 23 | B14 shield |
| 24 | B5 shield |

DE – drive end
NDE – non drive end

# List of Motor parts

## Frame Size: 160÷180

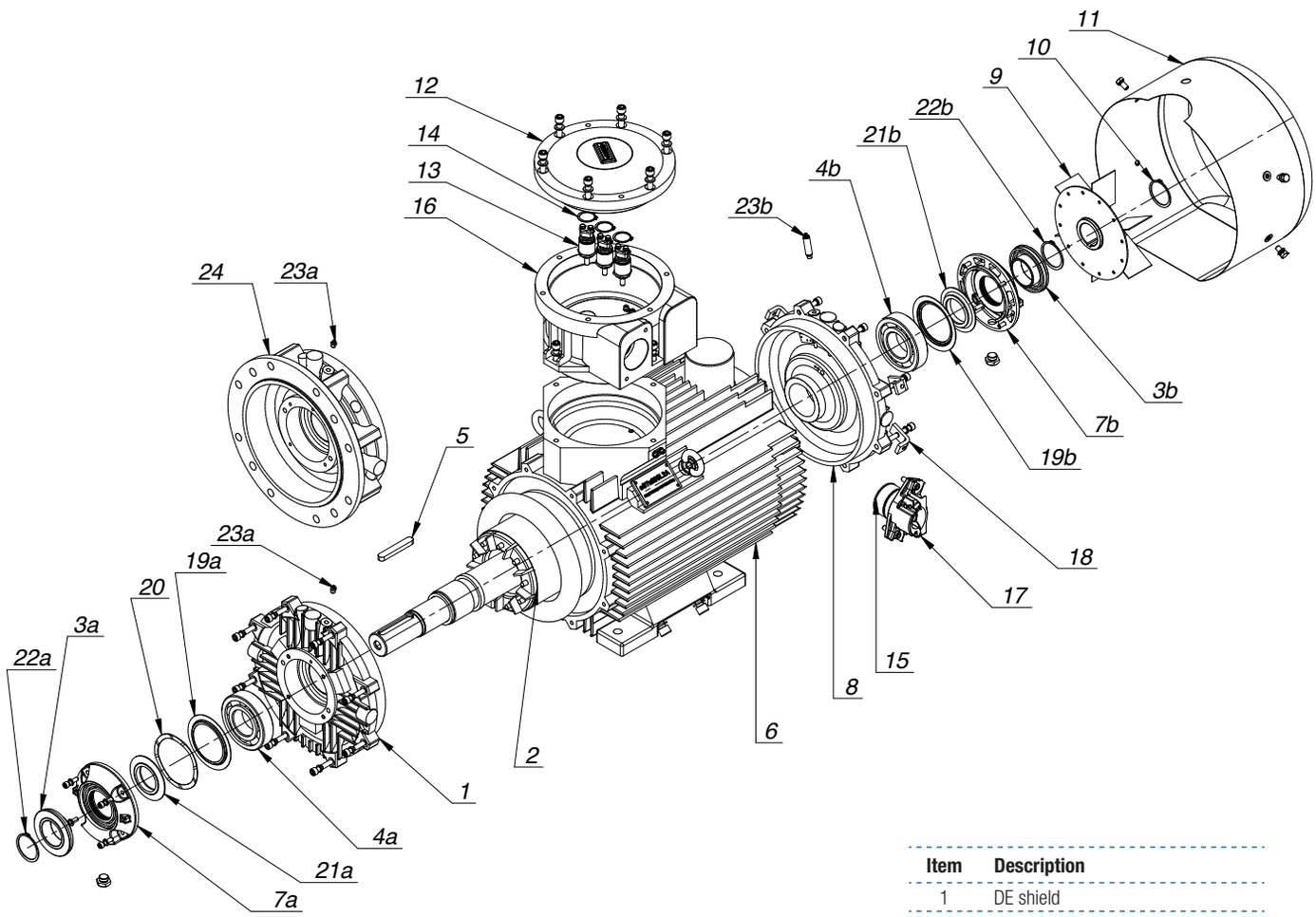



| Item | Description |
|---|---|
| 1 | DE shield |
| 2 | rotor |
| 3ab | shaft seal |
| 4 | bearing |
| 5 | key |
| 6 | stator |
| 7 | nameplate |
| 8 | NDE shield |
| 9 | fan |
| 10 | seeger ring |
| 11 | fan cover |
| 12 | terminal box cover |
| 13 | current insulators (terminals) |
| 14 | seeger rings |
| 15 | cable inlet seal |
| 16 | terminal box housing |
| 17 | cable inlet |
| 18 | spring washer |
| 19ab | external bearing cover |
| 20ab | seeger ring |
| 21 | B5 shield |

DE – drive end
NDE – non drive end

# List of Motor parts

## Frame Size: 200÷315




| Item | Description |
|---|---|
| 1 | DE shield |
| 2 | rotor |
| 3ab | shaft seal |
| 4ab | bearing |
| 5 | key |
| 6 | stator |
| 7ab | external bearing cover |
| 8 | NDE shield |
| 9 | fan |
| 10 | seeger ring |
| 11 | fan cover |
| 12 | terminal box cover |
| 13 | current insulators (terminals) |
| 14 | seeger rings |
| 15 | cable inlet seal |
| 16 | terminal box housing |
| 17 | cable inlet |
| 18 | fan cover support |
| 19ab | bearing internal ring |
| 20 | spring washer |
| 21ab | grease shield |
| 22ab | seeger ring |
| 23ab | grease nipple |
| 24 | B5 shield |

DE – drive end
NDE – non drive end

# Ordering information

**In order to select the proper motor and provide you the most accurate offer as the requirements of customer's applications are various, we ask you to specify below motor details:**

### Orders for motors should specify

» motor type designation, including terminal box design (Ex db or Ex eb)
» ambient temperature,
» rated output,
» rated speed,
» operating duty,
» supply voltage and connection,
» frequency,
» mounting arrangements,
» degree of protection,
» type of driven machine,
» number of cable glands,
» other details regarding special requests,

### and information concerning additional accessories e.g.

» auxiliary terminal box,
» thermal protection,
» anticondensation heaters,
» vibration sensors,
» method of start-up (DOL, Y/Δ, VSD, Soft-Start),
» method of coupling with the driven unit (gears, dimensions of belt pulleys, etc.).

### When ordering spare parts one should specify:

» full designation of the motor type including its serial number (provided on the nameplate),
» degree of protection,
» mounting arrangement,
» name of part,
» number of pieces.

**As part of our development program, we reserve the right to alter or amend any of the specifications without giving prior notice.**

# Order form

| | | | |
|---|---|---|---|
| Company name | | Contact person | |
| Country | | City | |
| Address | | | |
| Phone | | E-mail | |
| Subject | | | |
| Message | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Frame size | | Poles | | kW | | Voltage | | Hz | |
| Number of pieces | | | | | | | | | |
| Duty | | Mounting | | IP | | Insulation class | | | |
| Number of terminals | | | | | | | | | |
| Efficiency | | RAL | | Zone | | Ambient temperature | | | |
| PTC | | Yes | | No | Group | | Terminal box design (Ex db or Ex eb) | | |
| PT100 | | Yes | | No | Temperature class | | Starting and supply method (DOL, Y/Δ, VSD, Soft-Start) | | |
| Additional information | | | | | | | | | |

Dear Customer,
Please complete the above Order Form and send it to ffd@frank-dvorak.at. In case you need assistance, do not hesitate to contact us at phone number: 0043 263 180 05. It will be our pleasure to help you.

# Certifications

**Cantoni Group's factory, Celma Indukta was one of the first companies obtaining ISO 9001 certificate in Poland**

All Cantoni Group manufacturing plants comply with the most important standards.

**ISO 9001** is based on a number of quality management principles including a strong customer focus, the motivation and involvment of top management, the process approach and continuous improvement. Using ISO 9001 helps to ensure that customers get consistent, good quality products and services.

Our aim is to produce high quality products certified according to the most important standards. We always focus our work to provide a product that meets the customer requirements, define the approach to continuous improvement and monitor customer satisfaction. All employees in our Group are fully engaged and motivated to provide the top quality products. We achieve this thanks to skilled technicians, trained workers and customer oriented attitude.

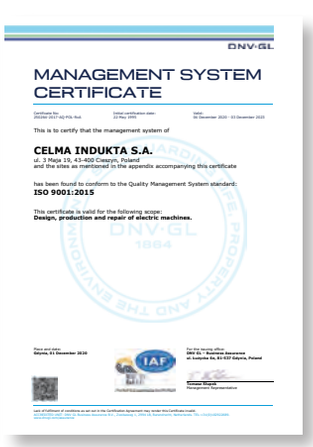
As a demonstration of our aim to meet all high level international standard requirements, we are also certified ISO 14001 and OHSAS 18001 to prove our internal processes and behaviour.

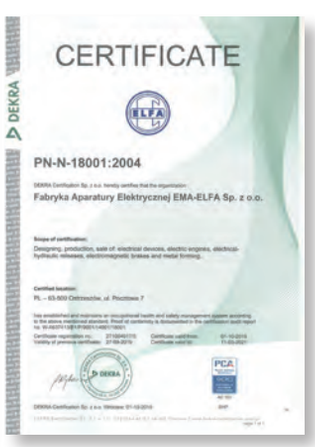
**ISO 14001** certification confirms that the organization manages their environmental responsibilities in an effective and internationally accepted way.

**In Cantoni Group we know that taking care of the environment means taking care of our present and future.**






With **OHSAS 18001** certificate, Cantoni Group confirms the necessity of controlling and improving health and safety aspects within the organization.

**Employees are Cantoni Group's main asset, thus, their well-being and safety are our priority.**

Our laboratory Celma Indukta is also **ISO 17025** certified by Canadian Standard Association (CSA) for two aspects: safety and energy efficiency verification requirements as independent unit.

The safety part – Supervised Manufacturers Testing Certification (SMTC) confirms that our laboratory is allowed for supervised manufactured safety certification program.

The energy efficiency part confirms that energy verification program for motors operating as SMTC can be performed according to CSA 390 standard at our facilities.

All our prototype motors are tested and approved before series production and samples of our final products are tested periodically to check compliance with all parameters defined. Our production range has also different types of products certifications based on specific technical requirements, like UL-CSA, GOST, EAC, ATEX, IEC Ex, CCC, Bureau Veritas, DNV-GL, etc.

Our technicians are constantly updated, informed and trained about every new regulation in order to provide all possible solutions to meet final customer requirements and also study and engineer ad-hoc products with customers developers.


Certificate of Verification


Supplement No. 2 to Quality Assurance Notification

FTZÚ 04 ATEX Q 011


OBAC

Ośrodek Badań, Atestacji i Certyfikacji Sp. z o.o.

44-121 Gliwice, ul. Łabędzka 21

QUALITY ASSURANCE NOTIFICATION


CERTIFICATE OF COMPLIANCE


TYPE APPROVAL CERTIFICATE

FABRYKA SILNIKÓW ELEKTRYCZNYCH BESEL S.A.

ASYNCHRONOUS MACHINES (Power below 100kW)


PRODUCT CERTIFICATE

CHINA QUALITY CERTIFICATION CENTRE


ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ


Certificate of Compliance


Certificate of Qualification

This is to certify that

CELMA INDUKTA S.A.

Ul. 3 Maja 19, Cieszyn, 43-400

POLAND

has been qualified by CSA Group Testing & Certification Inc., as a Testing Facility for

CSA ENERGY EFFICIENCY VERIFICATION PROGRAM

Based on ISO/IEC 17025:2017 operating as a SMTC


Certificate of Qualification

This is to certify that

CELMA INDUKTA S.A.

Ul. 3 Maja 19, Cieszyn, 43-400

POLAND

has been qualified by CSA Group Testing & Certification Inc., as a Testing Facility for

SUPERVISED MANUFACTURER'S TESTING FOR CERTIFICATION PROGRAM

Based on ISO/IEC 17025:2017

# Top quality electric motors

Cantoni Group's electric motors are manufactured in such a way as to provide a durable product that our customers can rely on:

- motors manufactured using high quality raw materials and components
- long-life bearings
- robust and tough construction
- raw materials only from European qualified suppliers
- production process from the beginning to the end at our facilities
- proven electrical performance

# Our motors for many applications

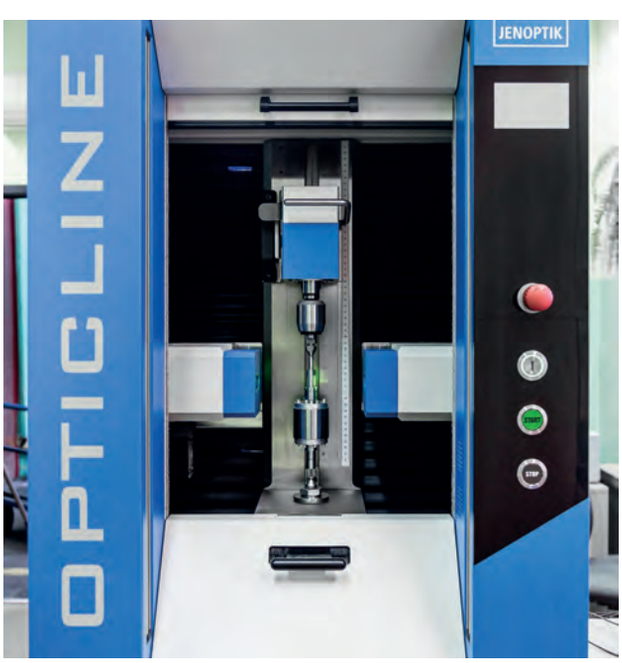
Our motors are produced with the aim to be flexible and adaptable to many different applications. The long tradition and experience of our technical departments, supported by a flexible and strong organization, can assure an engineering of the motor series that meet the most common requirements and the more and more specific requests from the manufacturers of cutting-edge machines.

Our long collaboration with some of the most important players in the global industrial market has built a strong and stable organization that is able to support the customer in the development of the best solutions for its applications.

# Cantoni Group continuous investments

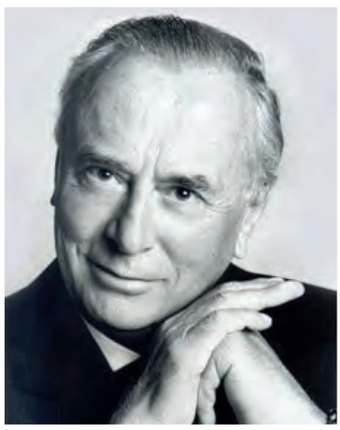
The strategy of Cantoni Group is to realize a strong and continuous plan of investments with the aim to constantly increase the range of products, quality level and high productivity. Cantoni Group international market leadership has been created thanks to such open and future oriented attitude. Investments into the new professional machinery, equipment and infrastructure increase the quality control, capacity and save the environment.

The use of world class CNC, automatic and semi-automatic machinery guarantees precision, repeatability and accuracy. Such considerable development plan of Cantoni Group enhances the already wide range of production, maximizes the quality of offered products and has led to a growing number of innovations (new series for specific applications, new design and solutions) and international approvals.




# Cantoni Group

**Giampiero Cantoni, Founder of Cantoni Group**



Since almost a century, the Cantoni Group has been known worldwide as a leader in manufacturing and supplying electric motors, components and tools.

Thanks to the entrepreneurial commitment and great talent, the founder of the Group, **Prof. Giampiero Cantoni**, created diversified Group Enterprise that has gained outstanding success on the Domestic and International markets, placing us among the most important European manufacturers.

# Company History – Frank & Dvorak (FFD)

For over 75 years, Frank & Dvorak (FFD) has stood for top quality and technical expertise in the manufacturing of electric motors. Since its founding, the company has established itself as a reliable partner for industrial companies and repair workshops.

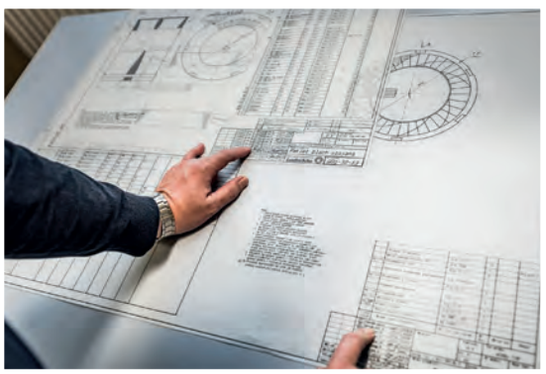
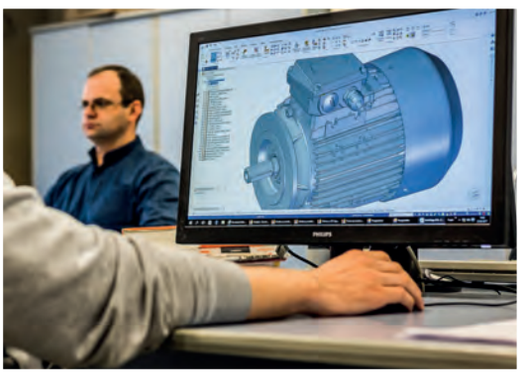
In 2000, FFD became part of the Cantoni Group, a globally leading manufacturer of electric motors. Through this integration, our customers benefit from an expanded product portfolio, state-of-the-art manufacturing technology, and a global service network.

Today, FFD offers a wide range of standard and customized motors for various industrial applications. With high stock availability, flexible production, and customer-specific solutions, we meet the highest standards of quality and performance.

As part of the Cantoni Group, we combine decades of experience with international strength, ensuring the highest precision, fast availability, and sustainable production in accordance with ISO 9001 and ISO 14001.

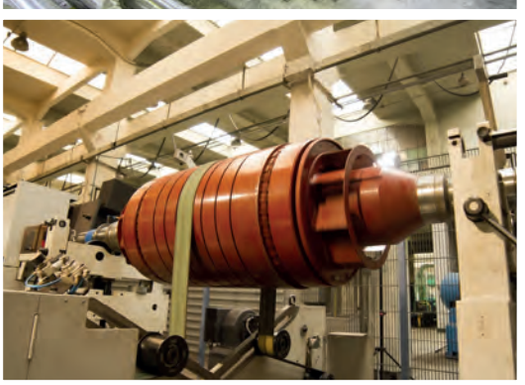
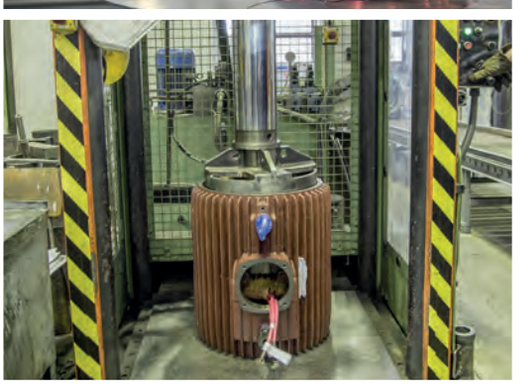
Frank & Dvorak – Your specialist for electric motors, powered by the global expertise of the Cantoni Group.

# From the project to the application








# THE WORLD OF ELECTRIC MOTORS







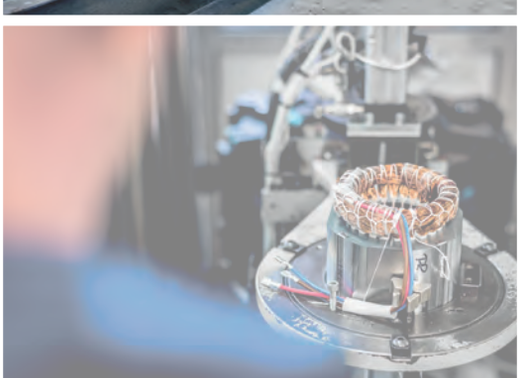






FRANK & DVORAK
ELEKTROMOTOREN

FFD


FRANK & DVORAK
ELEKTROMOTOREN

Cantoni GROUP

**FRANK & DVORAK**
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A-7033 Pöttsching, Industriestraße 1, +43 2631/8005, ffd@frank-dvorak.at
**www.frank-dvorak.at**