
RAEL
MOTORI
Ex
ELETTRICI
APTITUDE FOR FLAMEPROOF MOTORS

RAEL , founded in Genoa in 1969 as an electric motor repair an rewinding company, has grown to become an established name in projection and manufacture of electric motors for potentially explosive atmospheres.
Since 1986 the company has grown considerably and moved to Predosa (AL) where both production and offices are actually located.
Through constant research of products which can offer a high quality standard and market competitiveness we are geared up with automated production systems like CNC turning and latest generation machining centers , industrial robots , CNC grindig machine, inspection room with CMM machines computer controlled system for inline electrical test and Dynamometric breaking test bench, automated assembly lines.

The total area occupied by the company is about 20000 m² of which 11300 m² are buildings and divided as follows:
- Production and warehouse 10500 m²
- Offices 800 m²

- In-house:
  - more than 20 CNC machines
  - automatic winding lines , last one built in 2023
  - cable preparation & cover assembly
  - 12 assembly lines – possibilities to work shifts / hire seasonal workers if necessary
  - 7 automatic warehouses
  - since 2023 foundry in house with the latest machines on the market .
- High degree of automation
- Proprietary design and certificates
- Alluminum motors from 56 to 160 size
- 100% quality and performance test on the final products
- In-house testing laboratory

We offer a great flexibility in fulfilling special customer requirements.
All of the above helped to place Rael among the leading producers of explosion proof motors.

RL Ex db/ Ex db eb
TUBE MOTORS
SINGLE PHASE / THREE PHASE

MIA SERIES
INCREASE SAFETY MOTORS
MIA1 SERIES
NON - SPARKING MOTORS

RAEL

MOTORI ELETTRICI

APTITUDE FOR FLAMEPROOF MOTORS

BRAKEX
MOTORS WITH INTEGRATED BRAKE

ADPE
DISPENSER MOTORS

CONTENTS

1. INTRODUCTION

1.0 SI Units

Base units

Base quantity	Base quantity symbol	SI Name	SI Symbol
length	*l*	meter	m
mass	*m*	kilogram	kg
time	*t*	second	s
electric current	*I, i*	ampere	A
thermodynamic temperature	*T*	Kelvin	K
amount of substance	*n*	mole	mol
luminous intensity	I_V	candela	cd

Derived units

Derived quantity	Derived quantity symbol	SI Name	SI symbol	Expression in terms of other SI units	Expression in terms of SI base units
frequency	hertz	Hz	-	-	s^{-1}
force	F	Newton	N	-	$kg \cdot m \cdot s^{-2}$
pressure, stress	p	Pascal	Pa	$N \cdot m^{-2}$	$kg \cdot m^{-1} \cdot s^{-2}$
energy, work, quantity of heat	E	joule	J	$N \cdot m$	$kg \cdot m^{2} \cdot s^{-2}$
power	P, W	watt	W	$J \cdot s^{-1}$	$kg \cdot m^{2} \cdot s^{-3}$
electric charge	q	coulomb	C		$A \cdot s$
electric potential difference, electromotive force	v	volt	V	$J \cdot C^{-1}$	$m^{2} \cdot kg \cdot s^{-3} \cdot A^{-1}$
electric resistance	R	ohm	Ω	$V \cdot A^{-1}$	$m^{2} \cdot kg \cdot s^{-3} \cdot A^{-2}$
electric conductance	G	siemens	S	$A \cdot V^{-1}$	$s^{3} \cdot A^{2} \cdot m^{-2} \cdot kg^{-1}$
capacitance	C	farad	F	$C \cdot V^{-1}$	$s^{4} \cdot A^{2} \cdot m^{-2} \cdot kg^{-1}$
magnetic flux density	B	tesla	T	$V \cdot s \cdot m^{-2}$	$kg \cdot s^{-2} \cdot A^{-1}$
magnetic flux	Φ(B)	Weber	Wb	$V \cdot s$	$m^{2} \cdot kg \cdot s^{-2} \cdot A^{-1}$
inductance	L	Henry	H	$V \cdot s \cdot A^{-1}$	$m^{2} \cdot kg \cdot s^{-2} \cdot A^{-2}$
Celsius temperature	T	degree Celsius	°C	K	
plane angle	φ,θ	radiant	rad	1	$m \cdot m^{-1}$
luminance		lux	lx	$cd \cdot sr \cdot m^{-2}$	

Other derived quantities

area	A				m^{2}
volume	V				m^{3}
speed, velocity	v				$m \cdot s^{-1}$
angular velocity	ω				s^{-1}
					$rad \cdot s^{-1}$
acceleration	a				$m \cdot s^{-2}$
Torque, moment of force	M			$N \cdot m$	$m^{2} \cdot kg \cdot s^{-2}$
moment of inertia	J				$Kg\ m^{2}$
mass density	ρ				$kg \cdot m^{-3}$
specific volume					$m^{3} \cdot kg^{-1}$
dynamic viscosity	ρ			$N \cdot s \cdot m^{-2}$	$m^{-1} \cdot kg \cdot s^{-1}$
				$Pa \cdot s$	

1.1 Standards of reference

RAEL motors are constructed in compliance with the following standards:

Title	EU CENELEC	International IEC
Rotating electrical machines Part 1: Rating and performance	EN 60034-1	IEC 60034-1
Rotating electrical machines Part 2-1:Standard methods for determining losses and efficiency from tests (excluding machines for traction vehicles)	EN 60034-2	IEC 60034-2
Rotating electrical machines. Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code). Classification	EN 60034-5	IEC 60034-5
Rotating electrical machines Part 6: Methods of cooling (IC Code)	EN 60034 -6	IEC 60034 -6
Rotating electrical machines Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM Code)	EN 60034-7	IEC 60034-7
Rotating electrical machines Part 9: Noise limits	EN 60034-9	IEC 60034-9
Rotating electrical machines Part 12: Starting performance of single-speed three-phase cage induction motors	EN 60034-12	IEC 60034-12
Rotating electrical machines Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity	EN 60034-14	IEC 60034-14
General purpose three-phase induction motors having standard dimensions and outputs. Frame numbers 56 to 315 and flange numbers 65 to 740	ENIEC60072-1	IEC 60072-1
Degrees of protection provided by enclosures (IP Code)	EN 60529	IEC 60529
Electrical apparatus for explosive gas atmospheres Part 0: General requirements	EN 60079-0	IEC 60079-0
Electrical apparatus for explosive gas atmospheres Part 1: Flameproof enclosures 'd'	EN 60079-1	IEC 60079-1
Electrical apparatus for explosive gas atmospheres Part 7: Increased safety "e"	EN 60079-7	IEC 60079-7
Electrical apparatus for use in the presence of combustible dust Part 1: Protection by enclosures "t"	EN 60079-31	IEC 60079-31

1.2 Tolerances

Mechanical tolerances according to EN 50347 and IEC 60072-1:

Symbol	Description	Tolerance
A	Distance between centre-lines of fixing holes (end view)	± 1 mm
AB	Overall dimensions across the feet (end view)	+ 2 %
AC	Diameter of the motor (without terminal box)	+ 2 %
B	Distance between centre-lines of fixing holes (side view)	± 1 mm
C - CA	Distance from the shaft end shoulder to the centre-line of nearest mounting holes in the feet	± 3 mm
D - DA	Diameter of the shaft extension.	Ø 11 – 28 j6 Ø 32 – 48 k6 Ø ≥ 55 m6
E - EA	Length of the shaft extension from the shoulder	Ø < 55 mm - 0,3 mm Ø > 60 mm + 0,5 mm
F - FA	Width of the keyway of the shaft extension	H9
GA - GC	Distance from the top of the key to the opposite surface of the shaft extension	+ 0,2 mm
H	Distance between the centre-line of the shaft to the bottom of the feet	H ≤ 250 - 0,5 mm H ≥ 280 - 1 mm
HD	Distance from the top of the terminal box and to the bottom of the feet	+ 2 %
K	Diameter of the holes or width of the slots in the feet of the motor	+ 3 %
L	Overall length of the motor with a single shaft extension	+ 1 %
M	Pitch circle diameter of the fixing holes	± 0,8 mm
N	Diameter of the spigot	Ø < 230 j6 Ø ≥ 250 h6
P	Outside diameter of the flange	± 1 mm
R	Distance from the shaft shoulder to the mounting surface of the flange	± 3 mm
S	Diameter of the fixing holes in the mounting flange or nominal diameter of thread	+ 3 %
	Distance from the shaft shoulder to the mounting surface of the flange with locked bearing	± 0,5 mm
	Mass of the motor	– 5 a + 10 %

Electrical tolerances according to EN 60034-1 and IEC 60034-1:

Quantity	Tolerance
Efficiency **(η)**	- 0,15 (1-η) for $P_N \leq 50$ kW
Total losses	+10%
Power factor **(Cos φ)**	$\frac{1-\cos\varphi}{6}$ minimum absolute value 0,02 maximum absolute value 0,07
Slip **(rpm)** (at full load and working temperature)	± 30% per $P_N < 1$ kW ± 20% per $P_N \geq 1$ kW
Locked rotor current **(I_A)**	+ 20%
Locked rotor torque **(T_A)**	-15% a +25%
Breakdown torque **(T_{max})**	-10% (for this tolerance the value T_{max} / T_n should be at least 1,6)
Moment of Inertia **(J)**	±10%
Sound intensity level **(sound pressure)**	+3 dB (A)

1.3 Hazardous places

1.3.1 General information

DIRECTIVE 1999/92/EC on minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres**.**

'Explosive atmosphere' means a mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture.

The directive gives information regarding '**Classification of places where explosive atmosphere may occur'.**

The classification of hazardous places in zones competes to the customer whose working centres and activities contain or give place to such dangers.

The safety against explosion can be only reached with the contribution, and the mutual informative exchange, both the manufacturer and the final users.

INDICATIONS REGARDING THE CLASSIFICATION OF PLACES WHERE EXPLOSIVE ATMOSPHERES MAY OCCUR

For the classification of the areas reference to the relative harmonized technical norms regarding the specific fields:

- EN 60079-10 (IEC 60079-10) Electrical apparatus for explosive gas atmospheres.
  Part 10: Classification of hazardous areas.
- EN ISO/IEC 80079-20-2 Electrical apparatus for use in the presence of combustible dust
  Part 10: Classification of areas where combustible dusts are or may be present.

Zone 0
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.
Note: In general, said conditions, when they present, they interest the inside of tanks, tubes and containers, etc.

Zone 1
A place in which an explosive atmosphere consisting of a mixture with air or flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.
Note: such zone can also comprise:
- places in the immediate vicinities of zone 0;
- places in the immediate vicinities of the feeding openings;
- places in the immediate vicinities of the filling openings and emptying;
- places in the immediate vicinities of apparatuses, systems of protection and fragile components of glass, ceramics and analogous materials;
- places in the immediate vicinities of glands not sufficiently sealing, as an example on pumps and valves with glands.

Zone 2
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Note: such zone can also comprise, surrounding places zones 0 or 1.

Zone 20
A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is present continuously, or for long periods or frequently.
Note: In general, said conditions, when they present, they interest the inside of tanks, tubes and containers, etc.

Zone 21
A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is likely to occur in normal operation occasionally.
Note: such zone can also comprise, for example, places in the immediate vicinities of loading points and powder emptying and places in which powder layers are formed or that, during the normal operation, could produce one explosive combustible powder concentration in mixture with the air.

Zone 22
A place in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only.
Note: such zone can also comprise, places in proximity of apparatuses, systems of protection and components containing powders, from which the powders can leak out because of losses and to form layers of powders (for example salt from milling, in which the powder leak from the mills and it is deposited).

Notes:
1. Layers, deposits and heaps of combustible dust must be considered as any other source which can form an explosive atmosphere.
2. 'Normal operation' means the situation when installations are used within their design parameters.

1.3.2 Classification of the equipment for areas where explosive atmosphere may occur

GROUPS AND CATEGORIES OF APPARATUSES

Within the directive 2014/34/EU, the apparatuses, comprised if necessary the devices and the components are divided in two groups.

Group I comprises equipment intended for use in the underground parts of mines, and to those parts of surface installations of such mines, likely to become endangered by firedamp and/or combustible dust.
It is sub-divided into 2 Categories, as shown below:

Category M1: very high level of protection
Category M2: high level of protection

Group II comprises equipment intended for use in other places likely to become endangered by explosive atmospheres.
It is sub-divided into 3 Categories, as shown below

Category 1: very high level of protection
Category 2: high level of protection
Category 3: normal level of protection

For the type of protection "d", "i", "nC" and "nL", the electrical apparatus of Group II are subdivided in IIA, IIB and IIC, like prescribed in the relative specific European Norms regarding these types of protection.

How much higher is the possibility that an explosive atmosphere can take place, much higher must be the level of the adopted safety measures.

CRITERIA FOR THE CHOICE OF THE APPARATUSES AND THE SYSTEMS OF PROTECTION

In case the document on the protection against explosion based on the risk assessment does not preview otherwise, in all the areas in which explosive atmospheres can be formed are used apparatuses and systems of protection correspondents to the categories as per directive 2014/34/EU.
In particular, in such areas the following categories of apparatuses are used, provided that adapted, to second of the cases, to gas, vapours or fogs and/or powders:

- in zone 0 or zone 20, apparatuses of category 1;
- in zone 1 or zone 21, apparatuses of category 2;
- in zone 2 or zone 22, apparatuses of category 3;

Below you can find an outline for the choice of means of protection in function of the use zone.

GRUOP	CATEGORY	Means of protection			Explosive atmosphere presence	Zone
		Level	Characteristic of protection (All. I)	Characteristic of protection (All. II)		
II	1	Very high	In case of breakdown of means of protection, the level of safety is guaranteed from at least a second independent mean of protection. Moreover, the level of safety is guaranteed even if two independent anomalies are manifested	They must be planned and manufactured so that the sources of ignition are not activated, not even in case of exceptional anomalies of the apparatus	continuously or for long periods	0 1 2 20 21 22
	2	High	The level of safety is guaranteed also in presence of recurrent anomalies or defects of operation of the apparatuses of which it is habitually necessary to hold account.	They must be planned and manufactured so as to avoid sources of ignition, also in case of recurrent anomalies or defects of operation of the apparatuses of which it is habitually necessary to hold account.	Intermediate situation between previous and the successive one	1 2 21 22
	3	Normal	The level of safety is guaranteed in the normal operation.	They must be planned and manufactured so as to avoid sources of ignition expectable during the normal operation.	Scarce probability and if it take place is of short duration	2 22

1.4 Temperature Classes

1.4.1 Explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist (GAS)

Ignition temperature of an explosive gas atmosphere

Lowest temperature of a heated surface which, under specified conditions according to IEC 60079-20, will ignite a flammable substance in the form of a gas or vapour mixture with air.

Maximum surface temperature

Highest temperature which is attained in service under the most adverse conditions (but within the specified tolerances) by any part or surface of an electrical apparatus, which would be able to produce an ignition of the surrounding explosive atmosphere.

Group II electrical apparatus, in function of their maximum surface temperature shall be marked either classified in a temperature class given in Table below:

Classification of maximum surface temperatures for Group II electrical apparatus

Temperature class	Maximum surface temperature (°C)
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

The maximum surface temperature shall not exceed the lowest ignition temperature of the explosive atmospheres concerned.

As far as the electric motors the maximum surface temperature will be referred to the temperature of:

the **external surface** of the enclosure as far as the *Flameproof enclosures 'd'* (EN 60079-1, IEC 60079-1) and *Equipment protection by pressurized enclosures 'p'* (EN 60079-2, IEC 60079-2)

all the surfaces both external and internal as far as the *Increased safety "e"* (EN 60079-7, IEC60079-7) and the *Construction, test and marking of type of protection 'n' electrical apparatus* (EN 60079-15, IEC 60079-15).

Below there is a representing table of the main inflammable gas substances divided by group of gas with relative temperatures of ignition and classes of temperature.

Main inflammable substances subdivided for group of gas (IIA, IIB, IIC) and temperature of ignition.

Inflammable substance	Group of GAS	temperature of ignition	Class of Temperature (°C)	Inflammable substance	Group of GAS	temperature of ignition	Class of Temperature (°C)
2-Methylpentane	IIA	300	T2	Ethyl formate	IIA	440	T2
Amyl acetate	IIA	360	T2	Methyl formate	IIA	450	T1
Butyl-n acetate	IIA	425	T2	Natural gas	IIA	482	T1
Ethyl acetate	IIA	426	T2	Isobutane	IIA	460	T1
Isobutil acetate	IIA	420	T2	Isoheptane	IIA	220	T3
Methyl acetate	IIA	502	T1	Isohexane	IIA	264	T3
Propil acetate	IIA	430	T2	Isooctane	IIA	410	T2
Vinyl acetate	IIA	425	T2	Isoprene	IIA	220	T3
Acetone	IIA	465	T1	Methane	IIA	537	T1
Methanol	IIA	464	T1	Methylcyclopentane	IIA	258	T3
Bromethane	IIA	511	T1	Methylamine	IIA	430	T2
Butane	IIA	287	T3	Methylmetacrylate	IIA	430	T2
Butene - 1	IIA	384	T2	Paraldehyde	IIA	239	T3
Butene - 2	IIA	325	T2	Pentane	IIA	258	T3
Cycloexano	IIA	259	T3	Pyridine	IIA	483	T1
Cycloexanol	IIA	300	T2	Propane	IIA	470	T1
Cyclohexanone	IIA	419	T2	Propylamine	IIA	318	T2
Cyclohexene	IIA	244	T3	Propylbenzene	IIA	450	T1
Cyclopropane	IIA	498	T1	Propylene	IIA	455	T1
Cymene (p)	IIA	436	T2	Styrene	IIA	490	T1
Chloro-benzene	IIA	637	T1	Toluene	IIA	480	T1
Acetyl chloride	IIA	390	T2	m-Xylene	IIA	522	T1
Allyl chloride	IIA	390	T2	o-Xylene	IIA	464	T1
Chlorbutane	IIA	240	T3	p-Xilene	IIA	528	T1
Chloroethane	IIA	495	T1	1,2 Butadiene	IIB	430	T2
Vinyl chloride	IIA	472	T1	1,3 Butadiene	IIB	430	T2
Dichlorobenzene	IIA	648	T1	Dioxane	IIB	245	T3
Dichloroethylene 1,1	IIA	570	T1	Diethyl ether	IIB	160	T4
Dichloroethylene 1,2	IIA	441	T2	Ethyl vinyl ether	IIB	200	T3
Diethylamine	IIA	312	T2	Methyl vinyl ether	IIB	350	T2
Dimethylamine	IIA	400	T2	Acrylate ethyl	IIB	350	T2
Dimethylaniline	IIA	371	T2	Ethylene	IIB	425	T2
Dimethylbutane 2,3	IIA	405	T2	LPG	IIB	365	T2
Dimethylpentane 2,3	IIA	330	T2	Sulphurated Hydrogen	IIB	260	T3
Heptane	IIA	215	T3	Methylacrylate	IIB	415	T2
Hexane	IIA	233	T3	Carbon monoxide	IIB	605	T1
Heptane	IIA	515	T1	Ethylene oxide	IIB	435	T2
Ethylacetoacetate	IIA	350	T2	Propylene oxide	IIB	430	T2
Ethylamine	IIA	385	T2	Acetylene	IIC	305	T2
Ethylmercaptane	IIA	295	T3	Hydrogen	IIC	500	T1
Butyl formate	IIA	320	T2	Carbon disulfide	IIC	95	T6

1.4.2 Explosive atmosphere in the form of a cloud of combustible dust (DUST)

We take in consideration protection by enclosures "t" (*Ex t)*. The ignition protection is based on the limitation of the maximum surface temperature of the enclosure and on other surfaces which could be in contact with dust and on the restriction of dust ingress into the enclosure by the use of "dust-tight" or "dust-protected" enclosures.

The choice of these constructions so to avoid primes due to excessive surface temperatures must be carried out in function of the limits of temperature of ignition for the presence of flammable dust both in form of clouds and layers.

In case of presence of flammable dust cloud, the maximum surface temperature will be

$T_{max(1)} = 2/3 \cdot T_{cl}$ with T_{cl} ignition temperature in °C of the dust cloud.

While in case of presence of a flammable dust layer:

$T_{max(2)} = T_l - 75\ °C$ with T_l ignition temperature in °C of a layer of dust 5 mm thick.

The surface temperature must be smaller or equal to the minimum value between $T_{max(1)}$ e $T_{max(2)}$.

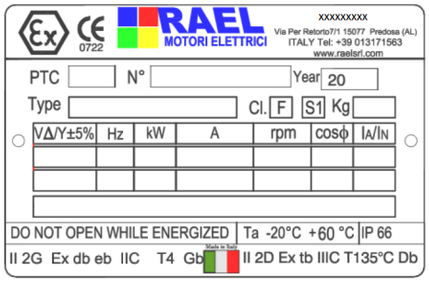
Main inflammable substances (DUST) and their own maximum surface temperature

Substance	Medium largeness particles (µm)	LEL (g/m3)	Cloud ignition temperature T_{cl} (°C)	Layer 5mm thick ignition temperature T_l (°C)
Metals, alloys				
Aluminium	10	60	560	430
Bronze	18	750	390	260
Iron	12	500	580	>450
Graphite	7	30	600	680
Lamp-black (carbon black)	13	15	620	435
Sulphur	20	30	280	260
Wood, products of wood, fibres				
Paper		100	620	370
Cellulose (93% sweet wood, 6% hard wood)	14	15	420	335
wood flour	60		470	305
Wood (50% pear tree and 50% kernel)	35	100	500	340
Wood (beech)	61		490	310
Wood (pear tree)	27	100	500	320
Sawdust of wood	65		470	290
Cork	42	30	470	300
Agricultural products				
Cacao	3	125	460-540	245
Coffee	10	25	360	450
Cereals (mixed powders)	37	125	510	300
Wheat flour	56-125	60	480	>450
Soy flour	20	200	620	280
Gelatine	65	60	560	>450
Wheat		100	470	220
Dry milk	165	60	460	330
Milk sugar	22	60-125	450	>450
Rye			415-470	325
Buttermilk	400		450	420
Tobacco		60	485	290
Black tea	76	125	510	300
Sugar	32	30	360	>450
Powdered sugar	17	60	350	>450

1.5 Electric motor choice

After speaking about classification of areas with explosion atmosphere, motor groups , categories and temperature classes , we can switch to the choice of the type of protection of the motor and the reading of the motor marking.

Explosive atmosphere type				Motor Marking					
	Area Classification	Presence of explosive atmosphere	Protection	Group	Category	Type of Protection	Gas Group	Temperature Class	IP degree
GAS	Zone 1	Probable	High	II	2G	Ex d (Ex de *on request*)	IIC IIB (d)	T4 (T5 e T6 *on request*)	-
GAS	Zone 2	Improbable	Normal	II	2G	Ex d (Ex de *on request*)	IIC IIB(d)	T4 (T5 e T6 *on request*)	-
POLVERI	Zone 21	Probable	High	II	2D	Ex t	-	T135°C (T100°C e T85°C *on request*)	IP6x
POLVERI	Zone 22	Improbable	Normal	II	2D	Ex t	-	T135°C (T100°C e T85°C *on request*)	IP6x



CE Xxxx	Marking of conformity in compliance with European Directives. Number of Notified body that issued the Product Quality Assurance Notification
Ex	Marking of conformity to the Directive 2014//34/EU and the relevant technical rules
II	Explosion Group (surface plants different from mines)
2	Category
G	Type of explosive atmosphere: Gas, Vapour or Mist
D	Type of explosive atmosphere: Dust
Ex	Symbol for security appliances that meets a certain protection mode
db o eb	Explosion proof terminal box / Increased safety terminal box
tb	Motors with dust protection zone 21 (and zone 22)
IIC	Gas group (II C Hydrogen and Acetylene)
IIIC	Dust group
T6 …T4	Motor temperature class suitable for flammable substance temperature class in case of protection G (Gas)
T85°C ….T135°C	Motor temperature class suitable for flammable substance temperature class in case of protection D (Dust)
AB xx ATEX yyy	AB : Name of the body that released CE type certificate xx : year of production yyy : certificate number
IPXX	Protection degree to be marked on the nameplate for D version
°C amb	Temperature rage
Gb	Gas protection degree
Db	Dust protection degree

a) Motors for zones 21 and 22 have protection type Ex t (DUST) matched with protection type Ex d (or Ex de) (GAS).

b) On request it is possible to have motors Ex de with motor ‘d’ and increased safety terminal box ‘e’.

c) Motors marked with gas group IIC are suitable to be used where gas groups IIB or IIA are requested.

d) Single-phase motors with internal capacitors can be marked IIC and IIB and are suitable also for IIA (see page 34) .

e) Motors with temperature class T4 (gas) are suitable to be used where temperature classes T3, T2, T1 are requested. (On request it is possible to have temperature classes T5 e T6).

f) IP degree protection is IP55 for GAS and IP66 for DUST.

g) Ambient temperature range is as follows:
-20° +60°C for temperature class T4 and surface temperature T135°C (possible to have -40° +60°C IIB version)
-20° +50°C for temperature class T5 and surface temperature T100°C (possible to have -40° +60°C IIB version)
-20° +40°C for temperature class T6 and surface temperature T85°C (possible to have -40° +60°C IIB version)

2. GENERAL INFORMATION

2.1 Range of Motors

Motors RL series are manufactured in compliance with all the European standards concerning equipment and protective systems for potentially explosive atmosphere in compliance with the European Directive ATEX 2014/34/EU (better known as ATEX).
As we just told in part 2.0 to be in compliance with ATEX Directive are necessary:

- EC type Certificate
- Product Quality assurance Notification

Such certificates are issued by notified bodies qualified to release them.

Motors RL series group II category 2G (GAS) with IP%% protection are suitable for zone 1 and zone 2, while the motors group II category 2D (DUST) with protection IP66 are suitable also for zone 21 and zone 22.

Version	Frame size (mm)	Power (kW)	Poles	GAS Group	Temperature Class 2G motors	Surface temperature 2D motors	Ambient Temperature
Three phase - 1 speed 2 - 4 - 6 - 8 poles	56 – 160	0,06 – 18,5	2	IIC IIB	T4 [a] T4/T5/T6/T6	T 135 °C [a] T135-T100-T85°C	-20°C a +60°C (c) -40°C a +60°C
		0,06 – 15	4				
		0,035 – 11	6				
		0,06 - 7,5	8				
Three phase – 2 speeds (Constant Torque), 2/4 - 4/8 – 4/6 – 6/8 poles	63 – 160	0,25/0,18 - 15/12	2/4	IIC IIB	T4 (b) T4/T5	T 135 °C (b) T135-T100	-20°C a +60°C -40°C a +60°C
		0,18/0,09 – 10/6,6	4/8				
		0,2/0,1 – 8,8/5,9	4/6				
		0,08/0,12 – 5,5/4	6/8				
Three phase – 2 speeds (Quadratic Torque), 2/4 - 4/8 – 4/6 – 6/8 poles	63 – 160	0,25/0,06 – 16/4,4	2/4	IIC IIB	T4 (b) T4/T5	T 135 °C (b) T135-T100	-20°C a +60°C -40°C a +60°C
		0,25/0,05 – 12/3,2	4/8				
		0,3/0,1 – 11/3,3	4/6				
		0,33/0,09 – 7,5/4	6/8				
		0,06 – 15	4				
		0,035 – 11	6				
		0,06 – 7,5	8				
Single-phase 2 - 4 – 6 poles	56 - 100	0,06 - 3	2	IIB[d] IIB[e]	T4 T4	T 135 °C T 135 °C	-20°C a +40°C -40°C a +60°C
		0,06 – 1,6	4				
		0,06 – 1,1	6				

[a] Available also in version T5 (T100°C) and T6 (T85°C) on request
[b] Available also in version T5 (T100°C) on request
[c] Available in version T6 (T85°C) the ambient temperature range is -20°C +40°C
[d] Available also IIC (frame 56-63-71-80-90-100)
[e] Available also IIB with increased safety "e" terminal box (frame 56-63-71)

2.2 EQUIPMENT PROTECTION LEVEL (EPL)

IEC 60079 standards now include provision for equipment on the basis of risk.
If the consequences of an explosion are deemed particularly severe, then to decrease the risk, the category/zone relationship can be changed to give a lower possibility of ignition.

So category 2 apparatus could be selected for use in a zone 2 for instance:

GROUP	EPL	INTENDED FOR EQUIPMENT GROUP	GIVING PROTECTION
Group I	Ma	Equipment for mining	High level of protection against becoming an ignition source
	Mb		Level of protection which can be electrically isolated if hazardous atmosphere is known to exist
Group II	Ga	Equipment for explosive gas atmospheres	Very High level of protection against becoming an ignition source
	Gb		High level of protection against becoming an ignition source
	Gc		Assured level of protection against becoming an ignition source in normal operation
Group III	Da	Equipment for explosive dust atmospheres	Very High level of protection against becoming an ignition source
	Db		High level of protection against becoming an ignition source
	Dc		Assured level of protection against becoming an ignition source in normal operation

2.3 Main features

Motors RL comply with the Essential Health and Safety Requirements for potentially explosive atmospheres provided by European Standards: EN 60079-0, EN 60079-1, EN 60079-7, EN 60079-31, EN 60529.

- Three-phase and single-phase squirrel cage asynchronous induction motors.
- Aluminium modular motors, flanges and feet can be assembled and disassembled.
- Type of protection Ex d, Ex de, Ex t.
- Overall dimensions comply with IEC 60072.
- Ventilations **IC 411** (Self ventilated).
- Voltage 230/400 V ± 5% Δ/Y (56 - 112), 400/690 V ± 5% Δ/Y (132 - 160), frequency 50 Hz ± 2%.
- Insulation Class F.

- Protection degree IP55 for zone 1 and zone 2, IP66 for zone 21 and zone 22.
- Maximum noise level 80 dB (A).
- Terminal box (see 3.1):
    - Version Ex d IIC
    - Version Ex e IIC
    - Version without terminal box, motor comprehensive of cable
    - Version Ex d IIB terminal box **A**

      (for single-phase - 1 capacitor)
    - Version Ex d IIB terminal box **B**

      (for high torque single-phase - 2 capacitors, starting system, soft-starter, poles commutation system)
    - Version Ex d IIB terminal box **C**

      (Motor provided with contactor system for starting, soft-starter, contactor system for pole commutation)
- Fan cover in sheet steel.
- Low friction dust seals.

2.3 Main Options

Motors Versions

- Motors 2D protection degree IP66 suitable for zone 21 and zone 22.
- Special Powers on frames 132 and 160
- Motors without ventilation (**IC 410**).
- Motors with forced ventilation (**IC 416**).
- Single phase version Ex d IIB with high starting torque (1 run capacitor – 1 start capacitor).
- Motors with starting system inside the terminal board.

Electrical and mechanical variants

- Special voltage and frequency.
- Thermal protectors (probe PTC or PTO).
- Anti-condensation heaters.
- Insulation class H.
- Motors tropicalized.
- Motors suitable for frequency inverter drive.
- Double shaft motors.
- Special shaft for ENCODER.
- Special shafts.
- Special flanges.
- Motor without terminal box with cable (length on request).
- Terminal box on the side (right or left).
- Terminal box with special cable glands.
- Increased safety ‘e’ terminal box.
- Terminal box type A, B, C for special purpose (it is possible to have single-phase motors with frame 112 and box C, please see next page).
- Protection IP66.
- Temperature class T5 e T6.
- Fan cover + rain cover.
- Special bearings.
- Locked front bearing.
- **Tube version specially designed for ATEX axial fan (see 3.2)**

Tests

All RAEL motors are 100% tested, both at the beginning (winding test) and at the end of production (motor electric test).

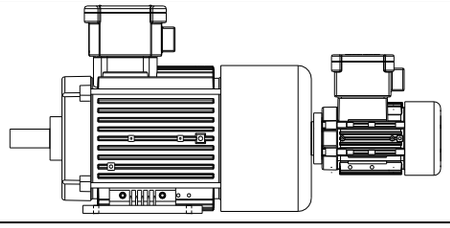
On request additional tests on the motors can be performed:

- Standard test “Routine Test”.
- Heating test.

Forced Ventilation (IC416)

Cooling is provided by an auxiliary Ex motor, fitted in the back of the main motor. In RL series it is a 56 frame single or three phase motor.

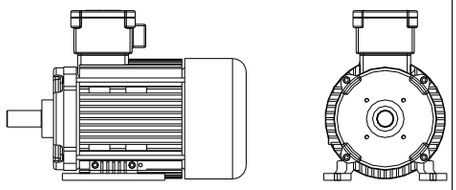
The user shall use an electric device that enables the main motor to run only when the auxiliary motor is already running.



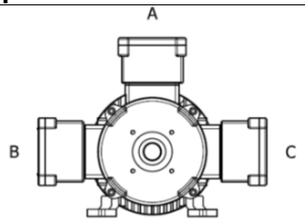
3. TERMINAL BOX

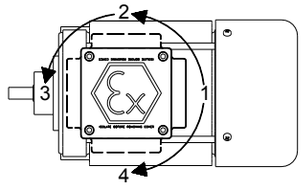
3.1 Versions

a. Three phase version Ex d IIC and three phase version Ex e IIC increased safety “e”



Wiew from the shaft

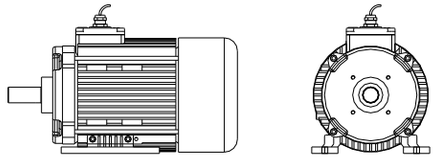




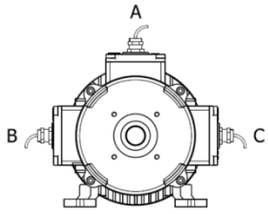
The standard position of terminal box is **A – 1** with box on the top and cable outlet in the back

It is possible to have the box on the sides (position **B** or **C**) and the cable outlet in the positions **2**, **3** e **4**

b. Motor without terminal box comprehensive of cable. Three phase version Ex d IIC



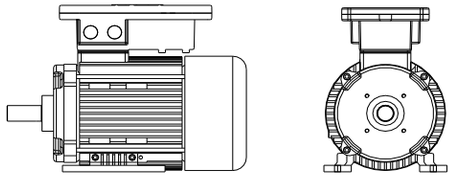
Wiew from the shaft



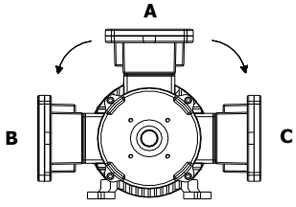
The standard position is **A** but It is possible to have the cable outlet on the side (**B** o **C**)

c. Motor with terminal box A Version Ex d IIB

Application: single phase motor with internal run capacitor



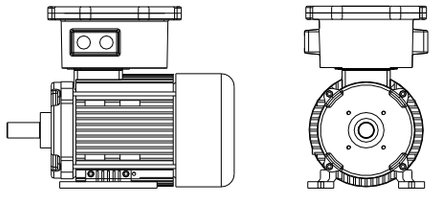
Wiew from the shaft



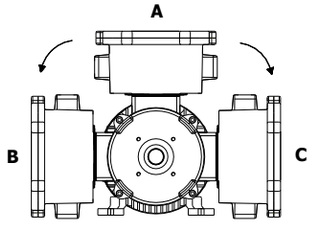
The standard position is **A** but It is possible to have the cable outlet on the side (**B** o **C**)

d. Motor with terminal box B Version Ex d IIB

Application: - single phase motor with high starting torque with internal run and start capacitor
- motor provided with contactor system for starting, soft-starter, pole commutation system



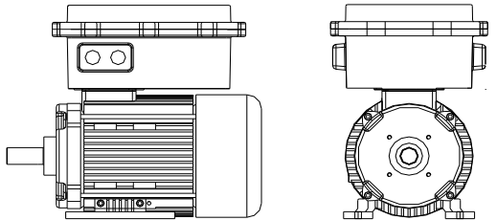
Wiew from the shaft



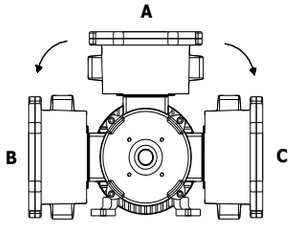
The standard position is **A** but It is possible to have the cable outlet on the side (**B** o **C**)

e. Motor with terminal box C Version Ex d IIB

Application: motor provided with contactor system for starting, soft-starter, contactor system for pole commutation



Wiew from the shaft



The standard position is **A** but It is possible to have the cable outlet on the side (**B** o **C**)

3.3 Cable entries and terminals

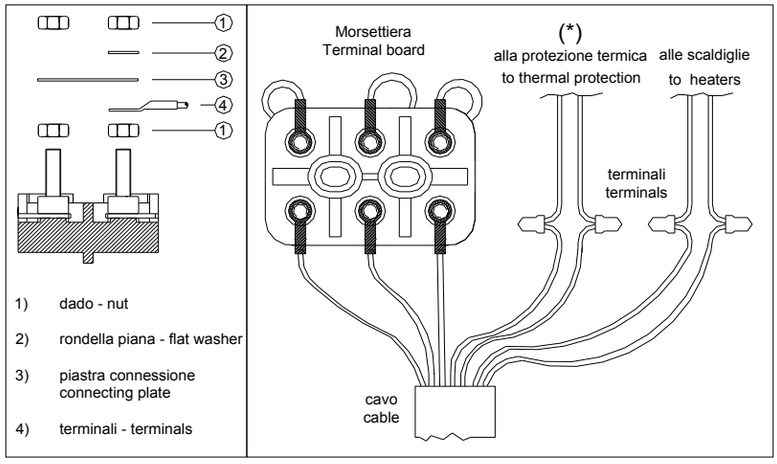
Motor version Ex ‘d’ must be provided with cable entries that comply with EN 60079-1.
Motor version Ex ‘de’ must be provided with cable entries that comply with EN 60079-7.
Motor version Ex t must be provided with cable entries that comply with EN 61241-1.

		Cable entries			Terminals
		Frame	Standard	On request	
Three phase version	Mains	56 - 90	1 x M20	1 x NPT ½”	M4
		100 - 112	1 x M25	1 x NPT ¾”	M5
		132-160	2 x M32	2 x NPT 1”	M6
	Auxiliaries	56-160	1 x M20	1 x NPT ½”	See (1) and (2)
Version with increased terminal box A, B, C	-	56 – 112	Up to n.4 cable entries M20 o M25	Up to n.4 cable entries NPT ¾” o NPT 1”	

When the motor is provided with a thermal protection and/or heaters these must have a separate cable entry and the connection shall be done as shown below (depending on the type of terminal box):

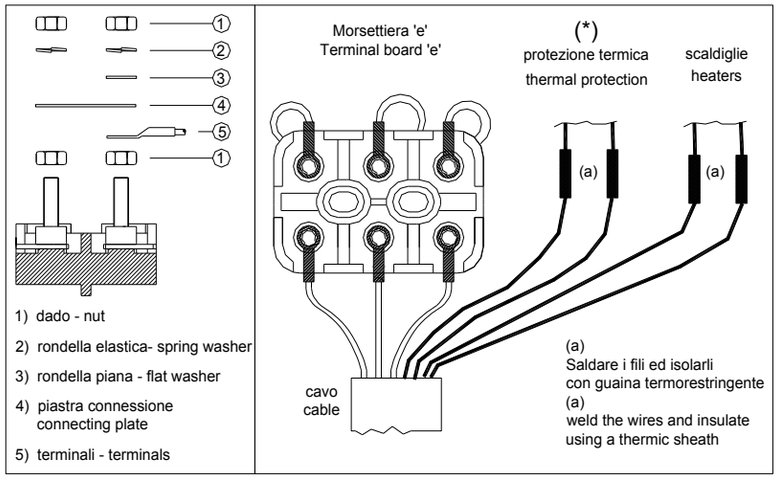
(1) Terminal box version Ex ‘d’

(Terminal board 6 pins)



(2) Terminal box version Ex ‘e’

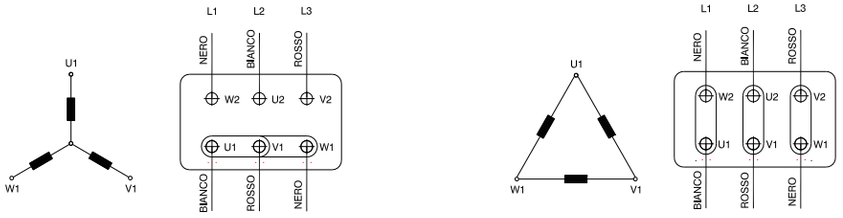
(Terminal board 6 pins increased safety ‘e’)



3.4 Connecting diagrams

Three phase 1 speed – Star and delta connection

Standard



Star Delta

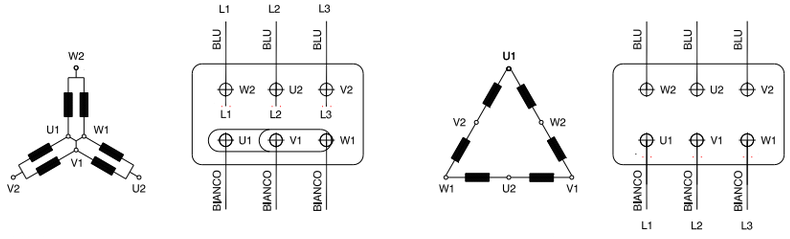
Standard with thermal protection

Star connection, with thermal protection (T.P.)
(Always use the U1-V1-W1 pins)

Delta connection, with thermal protection (T.P.)
(Always use the U1-V1-W1 pins)

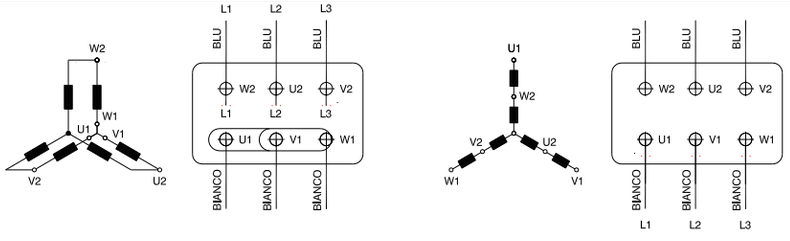
Three phase 2 speeds – Dahlander Connection - 2/4 - 4/8 poles

Constant Torque



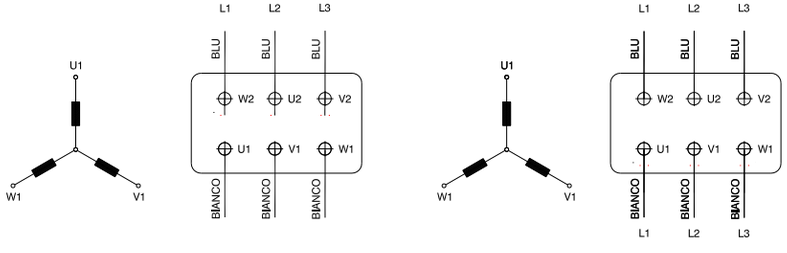
High speed Low speed

Quadratic Torque



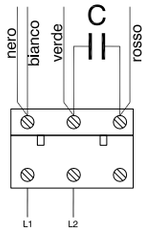
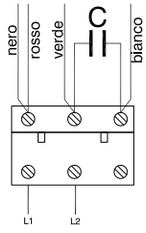
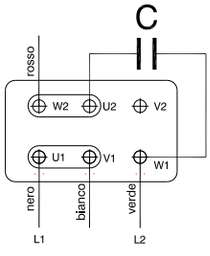
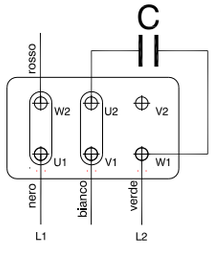
High speed Low speed

Three phase 2 speeds – 2 separate windings - 4/6 - 6/8 poles



High speed Low speed

Single phase

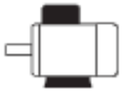
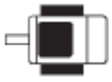
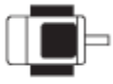
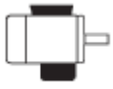
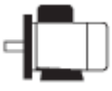
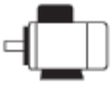
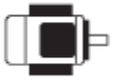
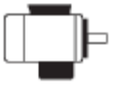
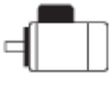
IIC Version (page 34)		IIB Version (page 34)	
			
Clockwise rotation	Conuterclockwise rotation	Clockwise rotation	Counterclockwise rotation

4. MECHANICAL CHARACTERISTIC

4.1 Mounting arrangements

RL motors can be made in the mounting arrangements as shown in the table.
Such motors are designed and manufactured with modular feet and flanges, so to ease the change of mounting arrangement and to optimize the warehouse management.
The basic mounting arrangements are shown in the standard EN 60034-7. Motors with mounting arrangements IM B3, IM B5, IM B14 can also be used in different mounting positions.

IM B3 IM B6, IM B7, IM B8, IM V5 o IM V6.
IM B35 IM V15 o IM V36, IM 2051, IM 2061, IM 2071.
IM B34 IM 2111 O IM 2131, IM 2151, IM 2161, IM 2171.
IM B5 IM V1 o IM V3. (flange with passing holes).
IM B14 IM V18 o IM V19. (flange with threaded holes).

Basic mountings			Other mountings		
IM B3 **IM 1001**	**IM V5** **IM 1011**	**IM V6** **IM 1031**	**IM B6** **IM 1051**	**IM B7** **IM 1061**	**IM B8** **IM 1071**
					
IM B35 **IM 2001**	**IM V15** **IM 2011**	**IM V36** **IM 2031**	**-** **IM 2051**	**-** **IM 2061**	**-** **IM 2071**
					
IM B34 **IM 2101**	**-** **IM 2111**	**-** **IM 2131**	**-** **IM 2151**	**-** **IM 2161**	**-** **IM 2171**
					
IM B5 **IM 3001**	**IM V1** **IM 3011**	**IM V3** **IM 3031**			
					
IM B14 **IM 3601**	**IM V18** **IM 3611**	**IM V19** **IM 3631**			
					

4.2 Materials

Materials of the main components.

Type of material

Shield fames flanges terminal box	Shaft	Rotor	Fan	Fan cover	Tie rods	Screw	Cable glands	Motor Plate
Aluminium	Steel 35S20	Die-cast Aluminium (squirrel cage)	Thermoplastic material or Aluminium	Zinc-plated steel	Steel 4.8	Steel 8.8	nickel-plated brass	Anodized aluminium or *on request* stainless steel

Bearings

The 2Z series bearings are lubricated for life and required not further lubrication. Nevertheless, we recommend in case of continuous running, long time stop, low temperature, radial and/or axial load, frequency inverter used, to control some time to time the ball bearings (40 000 hours for 4,6,8 pole motors and 20 000 hours for the 2 pole motors).

Motor		Bearing		Lubrication
Frame	Poles	Drive-end shield	Rear shield	
56	2 - 4 - 6 - 8	6201 2Z	6201 2Z	It doesn't need lubrication
63	2 - 4 - 6 - 8	6202 2Z	6202 2Z	It doesn't need lubrication
71	2 - 4 - 6 - 8	6202 2Z	6202 2Z	It doesn't need lubrication
80	2 - 4 - 6 - 8	6204 2Z	6204 2Z	It doesn't need lubrication
90	2 - 4 - 6 - 8	6205 2Z	6205 2Z	It doesn't need lubrication
100	2 - 4 - 6 - 8	6206 2Z	6206 2Z	It doesn't need lubrication
112	2 - 4 - 6 - 8	6306 2Z	6306 2Z	It doesn't need lubrication
132	2 - 4 - 6 - 8	6308 2Z	6308 2Z	It doesn't need lubrication
160	2 - 4 - 6 - 8	6309 2Z	6309 2Z	It doesn't need lubrication

Rotary shaft seals

Motors RL series can be equipped with seals so to guarantee an IP66 degree protection. In such a way the motor is protected from the income of dust and polluting agents.
IP65 or IP66 protection degree is furthermore necessary to warranty the protection type Ex t.

Motor		Rotary shaft seal (DIN 3760)	
Frame	Poles	Front	Rear
56	2 - 4 - 6 - 8	12x22x7A	12x22x7A
63	2 - 4 - 6 - 8	15x24x5A	15x24x5A
71	2 - 4 - 6 - 8	15x24x5A	15x24x5A
80	2 - 4 - 6 - 8	20x30x5A	20x30x5A
90	2 - 4 - 6 - 8	25x37x5A	25x37x5A
100	2 - 4 - 6 - 8	30x50x7A	30x50x7A
112	2 - 4 - 6 - 8	30x50x7A	30x50x7A
132	2 - 4 - 6 - 8	40x72x7A	40x72x7A
160	2 - 4 - 6 - 8	45x72x8A	45x72x8A

5. ELECTRICAL DATA

5.1 Three phase motors - 1 speed

The features of three phase motors for general purpose are as follows:

- Three phase asynchronous motor, squirrel cage rotor, self ventilated (IC411).
- Duty S1, Insulation class "F", IP55, 400V - 50 Hz.
- Connections

Type	Δ	Y
56 – 112	230 V	400V
132 – 160	400 V	690 V
56-160 for INVERTER	230 V	400 V

- For temperature class T5 and T6 and ambient temperature see par 2.1

5.1. Motors for INVERTER duty

In case the motors are driven by **INVERTER** we have to point out some things:

- Motor must be equipped with PTC thermistor.
- Motor driven by inverter means not to have a perfect voltage and current sine wave with increase of losses and heating of the motor.
- Speed variation affects also the ventilation (in case of IC411).
- The stress on the bearings increases and they shall be checked more frequently; for this reason the operating period with a speed above 3600 rpm shall never exceed 10% of the complete working cycle.
- The **best connection** for motors driven by inverter is the **star connection .**
- In case of **constant torque application and with frequency values above 60Hz** it is necessary to use a **delta connection**.

For all these reasons RAEL manufactures special motors for inverter duty so to minimize all the inconveniences described above.

These motors are electrically oversized so to minimize the electrical losses and also reduce the heating and are provided with thermistor PTC120°C for temperature class T4; for this reason the winding of the motor is made on an oversized stator and is fitted with phase-insulators (on request it is possible to have the version T5 with PTC90°C and T6 with PTC70°C).

In case of overheating it is possible to use the forced ventilation option (see page 15).

All the bearings mounted on RAEL motors have the best quality for motors.

In this paragraph we will show the rating of the 1 speed 3-phase motors and the rating of the motors for inverter duty.

The data tables of the motors for inverter duty give an idea of power and current values and are reliable only in the case that the inverter used to drive the motor is an high quality and an high performance one.

1 Speed 3000 Rated data at 400V/50Hz – direct on line start																
Code	Type				P kW	hp	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos φ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3}	Nominal Value of Efficiency
RL0042	RL	56	A	2	**0,06**	0,08	2730	0,5	4	0,4	0,2	3,5	3,5	T4/T5/T6	0,09	43%
RL0043	RL	56	A	2	**0,09**	0,12	2730	0,53	4	0,5	0,3	4,0	4	T4/T5/T6	0,09	51,5%
2RL0044	RL	56	B	2	**0,12**	0,16	2848	0,56	3.5	0,54	0,4	4	4,5	T4/T5/T6	0,1	IE2=53.6%
2RL0001	RL	63	A	2	**0,12**	0,16	2730	0,4	3.1	0,8	0,4	3,3	7	T4/T5/T6	0,13	IE2=53,6%
2RL0002	RL	63	A	2	**0,18**	0,25	2850	0,5	3.6	0,74	0,6	3,8	7	T4/T5/T6	0,13	IE2=60,4%
2RL0003	RL	63	B	2	**0,25**	0,34	2840	0,62	4.3	0,8	0,9	3,5	7,5	T4/T5/T6	0,19	IE2=64,8%
2RL0004	RL	71	A	2	**0,37**	0,50	2850	0,9	4.8	0,8	1,3	3	7,5	T4/T5/T6	0,36	IE2=69,5%
2RL0005	RL	71	B	2	**0,55**	0,75	2810	1,5	3.8	0,8	2,1	3	8,5	T4/T5/T6	0,46	IE2=74,1%
3RL0006	RL	80	A	2	**0,75**	1,00	2820	1,8	5	0,85	2,6	2,4	11	T4/T5/T6	0,76	IE3=80,7%
3RL0007	RL	80	B	2	**1,10**	1,50	2850	2,4	5.8	0,88	3,8	3	12	T4/T5/T6	0,89	IE3=82,7%
3RL0008	RL	90	S	2	**1,50**	2,00	2800	3,4	5	0,86	5,2	2,9	19	T4/T5/T6	1,37	IE3=84,2%
3RL0009	RL	90	L	2	**2,20**	3,00	2860	4,4	5.4	0,84	7,5	3	20,5	T4/T5/T6	1,8	IE3=85,9%
3RL0032	RL	100	LA	2	**3,00**	4,00	2880	5,5	6	0,84	10,2	2,6	28,5	T4/T5/T6	2,8	IE3=87,1%
3RL0033	RL	112	M	2	**4,00**	5,50	2880	7,4	5,8	0,89	13,2	2,6	36,8	T4/T5/T6	5,2	IE3=88,1%
3RL0049	RL	132	SA	2	**5,50**	7,50	2938	10,21	6,7	0,9	18,3	2,6	61	T4/T5/T6	10,63	IE3=89,2%
3RL0050	RL	132	SB	2	**7,50**	10,00	2920	13,3	6,9	0,91	24,7	2,9	67,2	T4/T5/T6	13,83	IE3=90,1%
3RL0051	RL	132	MB	2	**9,00**	12,00	2930	16	6,9	0,89	30,5	2,9	73,3	T4/T5/T6	17,31	IE3=90,8%
3RL0053	RL	160	MA	2	**11,00**	15,00	2930	19,03	7,9	0,9	36	2,8	108	T4/T5/T6	40	IE3=91,2%
3RL0054	RL	160	MB	2	**15,00**	20,00	2950	26,3	8	0,9	49	3,1	115	T4/T5/T6	51,75	IE3=91,9%
3RL0055	RL	160	L*	2	**18,50**	25,00	2940	33,04	8,0	0,88	60	3,1	130	T4/T5/T6	64	IE3=92,4%

1 Speed 1500 Rated data at 400V/50Hz – direct on line start																
Code	Type				P kW	hp	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos φ	M_n Nm	M_a/M_n	m Kg	T Class	Moment of inertia J 10^{-3} $Kg.m^2$	Nominal Value of Efficiency
RL0045	RL	56	A	4	**0,06**	0,08	1360	0,4	3,5	0,68	0,4	4	4	T4/T5/T6	0,14	64%
RL0046	RL	56	B	4	**0,09**	0,12	1360	0,45	3	0,665	0,6	3,5	4,5	T4/T5/T6	0,14	66,5%
2RL0010	RL	63	A	4	**0,12**	0,16	1430	0,51	3,3	0.6	0,9	3	6,5	T4/T5/T6	0,25	IE2=59,1%
2RL0011	RL	63	B	4	**0,18**	0,25	1410	0,5	3,5	0.66	1,3	2.2	7	T4/T5/T6	0,27	IE2=64,7%
2RL0012	RL	71	A	4	**0,25**	0,34	1415	0,8	3	0,63	1,8	2,2	7	T4/T5/T6	0,63	IE2=68,5%
2RL0013	RL	71	B	4	**0,37**	0,50	1400	1,1	3,4	0,65	2,6	2,4	8	T4/T5/T6	0,76	IE2=72,7%
2RL0014	RL	80	A	4	**0,55**	0,75	1410	1,5	4,4	0,7	3,8	2,2	11	T4/T5/T6	1,6	IE2=77,1%
3RL0015	RL	80	B	4	**0,75**	1,00	1440	2	4,9	0,7	5,2	1,9	13,5	T4/T5/T6	2,1	IE3=82,5%
3RL0016	RL	90	S	4	**1,10**	1,50	1449	2,7	4,2	0.7	7,7	2,3	19,8	T4/T5/T6	2,5	IE3=84,1%
3RL0017	RL	90	L	4	**1,50**	2,00	1420	3,3	5	0.8	10,4	3	19,8	T4/T5/T6	3,13	IE3=85,3%
3RL0034	RL	100	LA	4	**2,20**	3,00	1440	5,5	5	0,8	15,1	2,3	27	T4/T5/T6	4,5	IE3=86,7%
3RL0035	RL	100	LB	4	**3,00**	4,00	1435	6,55	6	0.8	20,1	2,6	29	T4/T5/T6	5,58	IE3=87,7%
3RL0036	RL	112	M	4	**4,00**	5,50	1440	8,8	6	0.8	26,8	2,7	39,5	T4/T5/T6	12,2	IE3=88,6%
3RL0056	RL	132	SB	4	**5,50**	7,50	1450	11,94	6,1	0,8	36	2,4	68	T4/T5/T6	22,4	IE3=89,6%
3RL0057	RL	132	MB	4	**7,50**	10,00	1450	14,4	6,6	0,84	49,5	2,4	71	T4/T5/T6	32,5	IE3=90,4%
3RL0058	RL	132	ML	4	**9,00**	12,00	1450	17,5	6,7	0,84	58	2,5	83	T4/T5/T6	37,25	IE3=91%
3RL0059	RL	160	MB	4	**11,00**	15,00	1460	21,97	5,5	0,85	72	2,6	125	T4/T5/T6	85	IE3=91,4%
3RL0060	RL	160	L*	4	**15,00**	20,00	1470	29,5	5,8	0,83	97,1	2,6	120	T4/T5/T6	105,75	IE3=92,1%

1 Speed 1000 Rated data at 400V/50Hz – direct on line start																
Code	Type				P kW	Hp	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos j	M_n Nm	M_a/M_n	m Kg	Classe T Class	Moment of inertia J 10^{-3} $Kg.m^2$	Nominal Value of Efficiency
2RL0018	RL	63	B	6	**0,12**	0,16	930	0,55	2.6	0,5	1,3	2,6	7,5	T4/T5/T6	0,3	IE2=50,6%
2RL0019	RL	71	A	6	**0,18**	0,25	925	0,76	2.8	0,6	2,0	2,4	7,5	T4/T5/T6	0,6	IE2=56,6%
2RL0020	RL	71	B	6	**0,25**	0,34	920	1,1	2.9	0,6	2,7	3,1	8,5	T4/T5/T6	0,9	IE2=61,6%
2RL0021	RL	80	A	6	**0,37**	0,50	935	1,25	3,9	0,61	3,8	2,6	11	T4/T5/T6	1,97	IE2=67,6%
2RL0022	RL	80	B	6	**0,55**	0,75	930	1,7	3,5	0,7	5,8	2,8	13	T4/T5/T6	2,47	IE2=73,1%
3RL0023	RL	90	S	6	**0,75**	1,00	940	2,7	3,5	0,7	7,9	2,3	17,5	T4/T5/T6	3,18	IE3=78,9%
3RL0024	RL	90	L	6	**1,10**	1,50	930	3,1	3,7	0,7	11,6	2,3	21	T4/T5/T6	4,78	IE3=81%
3RL0037	RL	100	LB	6	**1,50**	2,00	940	3,8	3,8	0,75	15,2	1,7	31	T4/T5/T6	6,73	IE3=82,5%
3RL0038	RL	112	M	6	**2,20**	3,00	950	5,4	4,7	0,75	22,4	1,8	38	T4/T5/T6	14,18	IE3=84,3%
3RL0061	RL	132	SB	6	**3,00**	4,00	960	6,75	4,5	0,8	30,3	1,7	64	T4/T5/T6	23,53	IE3=85,6%
3RL0062	RL	132	MB	6	**4,00**	5,50	950	8,64	4,5	0,78	39,0	1,8	67	T4/T5/T6	29,5	IE3=86,8%
3RL0063	RL	132	ML	6	**5,50**	7,50	950	11,5	4,6	0,8	55,0	1,8	73	T4/T5/T6	37,75	IE3=88%
3RL0064	RL	160	MB	6	**7,50**	10,00	965	15,9	4,5	0,8	75,6	1,8	121	T4/T5/T6	81,25	IE3=89,1%
3RL0065	RL	160	L	6	**11,00**	15,00	955	23,5	4,6	0,75	110	1,8	130	T4/T5/T6	105,75	IE3=90,3%

1 speed 750 rpm Rated data at 400V /50Hz -direct on line start																
Code	Type				P kW	CV	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos j	M_n Nm	M_a/M_n	m Kg	Classe T Class	Moment of inertia J10^{-3} $Kg.m^2$	Nominal Value of Efficiency
RL0025	RL	63	B	8	**0,06**	0,08	660	0,6	2.3	0.63	0,9	2.8	7	T4/T5/T6	0,8	34%
RL0026	RL	71	A	8	**0,09**	0,12	660	0,75	2.2	0.63	1,3	2.7	7	T4/T5/T6	0,9	38%
2RL0027	RL	71	B	8	**0,12**	0,16	640	0,9	2	0,55	1,8	2,3	8,5	T4/T5/T6	0,9	IE2=39,8%
2RL0028	RL	80	A	8	**0,18**	0,25	690	0,95	2,8	0,7	2,5	2,7	11	T4/T5/T6	1,2	IE2=45,9%
2RL0029	RL	80	B	8	**0,25**	0,34	700	1,2	2,9	0,55	3,6	2,8	13	T4/T5/T6	1,97	IE2=50,6%
2RL0030	RL	90	S	8	**0,37**	0,50	680	1,3	3	0,69	5,2	1,6	17,5	T4/T5/T6	3,18	IE2=56,1%
2RL0031	RL	90	L	8	**0,55**	0,75	670	1,85	3	0,63	7,7	2,4	19	T4/T5/T6	4,78	IE2=61,7%
3RL0039	RL	100	LA	8	**0,75**	1,00	700	2,6	3,4	0,65	10	2,3	25	T4/T5/T6	6,72	IE3=75%
3RL0040	RL	100	LB	8	**1,10**	1,50	690	3	3,7	0,73	15,6	1,8	27	T4/T5/T6	15,93	IE3=77,7%
3RL0041	RL	112	M	8	**1,50**	2,00	705	4,3	4,1	0,65	20,2	1,9	38	T4/T5/T6	16,7	IE3=79,8%
3RL0066	RL	132	SB	8	**2,20**	3,00	705	5,2	3,8	0,75	30,2	1,8	58	T4/T5/T6	29,5	IE3=81,9%
3RL0067	RL	132	MB	8	**3,00**	4,00	710	7	4	0,74	40,0	1,9	63	T4/T5/T6	37,75	IE3=83,5%
3RL0068	RL	160	MA	8	**4,00**	5,50	710	9	4,1	0,78	52,0	1,9	97	T4/T5/T6	89,5	IE3=84,8%
3RL0069	RL	160	MB	8	**5,50**	7,50	715	12,3	4	0,76	72,5	2,1	109	T4/T5/T6	119,5	IE3=86,2%
3RL0070	RL	160	L	8	**7,50**	10,00	720	15,9	4,2	0,79	99,8	2,3	121	T4/T5/T6	150,25	IE3=87,3%

5.2 Three-phase Motors 2 speed – Constant Torque (for general purpose)

- Three phase asynchronous motor, squirrel cage rotor, self ventilated (IC411).
- Duty S1, Insulation class "F", IP55, 400V- 50 Hz.
- Connections

Poles	Connections	High Speed	Low Speed
2/4 – 4/8	(Dahlander)	**YY** 400 V	Δ 400V
4/6 – 6/8	(2 Separate windings)	**Y** 400 V	**Y** 400V

- For ambient temperature see par 2.1

Code		Type			Poles	2 speed 3000/1500 P kW	rpm min^{-1}	COSTANT TORQUE - Rated data at 400V 50Hz In 400 V Amp.	I_a/I_n	η%	Cosφ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} Kg.m^2
RL4001	RL	2CT	63	B	2/4	**0,25**	2800	1	3,5	52	0,7	0,9	1,7	6.5	T4	0,2
						0,18	1380	88	3	58	0,66	1,3	1,7			
RL4002	RL	2CT	71	A	2/4	**0,30**	2800	1,35	3,2	53	0,71	1,1	1,7	6.5	T4	0,6
						0,20	1400	1,05	3	57	0,66	1,4	1,5			
RL4003	RL	2CT	71	B	2/4	**0,45**	2805	1,72	3,8	60	0,7	1,6	1,8	7.5	T4	0,9
						0,30	1400	1,2	3,6	68	0,62	2,1	1,8			
RL4004	RL	2CT	80	A	2/4	**0,55**	2700	1,5	4,1	67	0,85	1,9	1,7	10	T4	0,9
						0,37	1390	1	3,9	68	0,8	2,6	1,7			
RL4005	RL	2CT	80	B	2/4	**0,75**	2830	2,3	4,4	72	0,81	2,6	1,8	12	T4	1,3
						0,55	1400	2,1	4,1	67	0,71	3,9	1,8			
RL4006	RL	2CT	90	S	2/4	**1,25**	2830	3,2	5,4	73	0,82	4,4	2,1	16	T4	2
						0,90	1405	2,8	4,6	69	0,72	6,4	1,9			
RL4007	RL	2CT	90	L	2/4	**1,60**	2820	4,05	4,2	70	0,81	5,6	2,1	17.5	T4	2,6
						1,20	1405	3,3	3,5	69	0,76	8,5	2			
RL4008	RL	2CT	100	LA	2/4	**2,35**	2820	5,4	6,4	77	0,85	8,3	2,4	23	T4	4,3
						1,85	1420	4,6	5,5	75	0,79	13	2,1			
RL4009	RL	2CT	100	LB	2/4	**3,00**	2840	6,43	7	77,5	0,84	10,5	2,2	25	T4	5,3
						2,40	1425	4,85	6,1	77	0,85	16,8	2			
RL4010	RL	2CT	112	M	2/4	**4,00**	2890	9	7,1	77	0,88	13,8	2,2	35	T4	10,3
						3,30	1430	7,5	6,2	78	0,87	23	2,2			
RL4036	RL	2CT	132	S	2/4	**5,90**	2850	13	7,1	84	0,85	19,5	2,2	60	T4	15
						4,80	1440	10,4	6,3	85	0,87	32,0	2,1			
RL4037	RL	2CT	132	MB	2/4	**7,50**	2880	13,8	7,3	87	0,91	25,0	2,1	66	T4	17,8
						5,50	1450	11	6,5	87	0,84	44,0	2,1			
RL4038	RL	2CT	132	L	2/4	**8,00**	2930	15,9	7,4	87	0,89	30,5	2,2	70,5	T4	21,6
						6,00	1460	13	6,2	85	0,86	50,0	2,1			
RL4039	RL	2CT	160	M	2/4	**11,00**	2915	23	7,2	82	0,89	36,0	2,2	105	T4	62,7
						8,80	1460	18	6,4	88	0,85	58,5	2,2			
RL4040	RL	2CT	160	L	2/4	**15,00**	2910	29,3	7,4	84	0,91	49,0	2,5	115	T4	80,1
						12,00	1450	24,7	6,5	87	0,84	79,0	2,4			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

2 speed 1500/750 COSTANT TORQUE - Rated data at 400V 50Hz																
Code		Type		Poles	P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η%	Cosφ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} $Kg.m^2$
RL4011	RL	2CT 71	A	4/8	**0,18**	1380	0,82	3,5	68	0,62	1,3	2,2	6,5	T4	0,07
					0,09	660	0,65	2,2	40	0,72	1,4	2,7			
RL4012	RL	2CT 71	B	4/8	**0,25**	1380	0,88	3	70	0,75	1,5	2,2	8	T4	1
					0,12	660	0,78	2	42	0,71	1,5	2,3			
RL4013	RL	2CT 80	A	4/8	**0,37**	1400	1	3,4	71	0,75	2,2	2,4	10	T4	2,2
					0,18	670	0,77	2,8	50	0,67	2,3	2,7			
RL4014	RL	2CT 80	B	4/8	**0,55**	1400	1,63	4,4	75	0,74	3,1	2,2	12	T4	2,7
					0,25	670	2,17	2,9	54	0,69	2,9	2,8			
RL4015	RL	2CT 90	S	4/8	**0,75**	1405	2,05	4,9	71	0,77	4,5	1,9	16	T4	3,4
					0,37	675	1,43	3	62	0,7	4,4	1,6			
RL4016	RL	2CT 90	L	4/8	**1,00**	1405	2,7	4,2	77	0,75	6,9	2,3	18	T4	4,9
					0,55	675	1,9	3	67	0,7	6,8	2,4			
RL4017	RL	2CT 100	LA	4/8	**1,30**	1420	3,7	4,5	79	0,77	9,1	3	23	T4	8,8
					0,70	700	2,6	4,9	70	0,68	8,9	1,9			
RL4018	RL	2CT 100	LB	4/8	**1,80**	1430	4,5	5	80	0,81	11,5	2,5	25	T4	8,8
					0,90	690	3,1	3,7	72	0,74	12	1,8			
RL4019	RL	2CT 112	M	4/8	**2,50**	1450	5,5	5,5	81	0,85	17,2	2,1	35	T4	17,2
					1,25	705	4,2	4,1	78	0,65	16,9	1,9			
RL4041	RL	2CT 132	S	4/8	**3,30**	1445	7,8	4,9	83	0,85	22,0	1,6	56	T4	32,3
					1,85	705	5,4	4,1	82	0,75	25,0	1,6			
RL4042	RL	2CT 132	MB	4/8	**4,80**	1430	10	5,2	85	0,82	32,0	1,7	61	T4	50,6
					2,40	710	5,5	4,3	82	0,76	33,0	1,7			
RL4043	RL	2CT 132	L	4/8	**5,50**	1440	11,4	5,5	85	0,82	36,0	1,8	71	T4	50,6
					3,00	715	7	4,5	84	0,74	39,7	1,8			
RL4044	RL	2CT 160	M	4/8	**7,50**	1450	17,1	5,7	87	0,84	49	1,9	106	T4	91,9
					4,80	715	10,7	4,7	86	0,76	63	1,8			
RL4045	RL	2CT 160	L	4/8	**10,00**	1450	21,7	6,8	83	0,84	66,0	1,9	118	T4	121,8
					6,60	720	13,8	5,6	86	0,87	88	1,9			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

Code			Type		Poles	P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η%	Cosφ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} Kg.m^2
						2 speed 1500/1000		COSTANT TORQUE - Rated data at 400V 50Hz								
RL4020	RL	2CT	71	B	4/6	**0,20**	1400	0,75	3,3	70	0,75	1,3	1,4	8	T4	1
						0,10	900	0,58	2,4	53	0,71	1,1	1,4			
RL4021	RL	2CT	80	A	4/6	**0,40**	1400	1,3	3,4	71	0,75	2,9	1,4	10	T4	2,7
						0,20	905	0,85	2,5	62	0,72	2,1	1,5			
RL4022	RL	2CT	80	B	4/6	**0,50**	1405	1,58	3,6	71	0,74	3,4	1,5	12	T4	2,7
						0,30	910	2,1	3,1	66	0,73	3,0	1,5			
RL4023	RL	2CT	90	S	4/6	**0,65**	1405	1,85	5,8	76	0,75	4,5	1,6	16	T4	3,4
						0,45	910	1,46	4,3	70	0,73	4,6	1,5			
RL4024	RL	2CT	90	L	4/6	**0,95**	1410	2,56	5,5	77	0,76	6,3	1,5	18	T4	4,9
						0,60	910	1,86	3,6	70	0,74	6,4	1,6			
RL4025	RL	2CT	100	LA	4/6	1,40	1415	3,6	5,7	78	0,73	9,4	1,8	23	T4	8,8
						0,90	930	3	4,1	70	0,7	9,3	1,7			
RL4026	RL	2CT	100	LB	4/6	**1,85**	1415	4,6	5,8	80	0,81	12,4	1,6	25	T4	8,8
						1,10	910	3,4	3,9	74	0,74	12,1	1,6			
RL4027	RL	2CT	112	M	4/6	**2,4**	1420	5,45	6,1	82	0,85	16,2	1,8	35	T4	17,2
						1,6	940	4,16	4,3	81	0,77	16,5	1,7			
RL4046	RL	2CT	132	S	4/6	**3,00**	1440	7,0	5,9	82	0,87	20,0	1,9	55	T4	32,3
						2,00	945	5,5	3,9	81	0,80	20,2	1,6			
RL4047	RL	2CT	132	MA	4/6	**4,00**	1450	9,4	6,1	84	0,82	26,3	2,0	60	T4	39,5
						2,60	940	6,8	4,5	84	0,77	25,9	1,8			
RL4048	RL	2CT	132	MB	4/6	**4,40**	1445	10,0	6,3	83	0,89	29,0	1,9	66	T4	50,6
						3,00	965	7,6	4,4	80	0,80	30,3	1,7			
RL4049	RL	2CT	132	L	4/6	**5,15**	1450	11,7	6,8	85	0,82	33,5	1,9	71	T4	50,6
						3,30	945	8,3	4,7	86	0,76	33,0	1,7			
RL4050	RL	2CT	160	M	4/6	**6,60**	1460	14,4	6,8	86	0,83	43,0	1,9	106	T4	91,9
						4,40	950	10,9	4,4	82	0,79	43,9	1,8			
RL4051	RL	2CT	160	L	4/6	**8,80**	1460	22,2	6,8	83	0,84	57,7	1,9	118	T4	121,8
						5,90	950	33,6	4,9	81	0,8	58	1,8			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

Code			Type		Poles	P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η%	Cosφ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} Kg.m^2
						2 speed 1000/750		COSTANT TORQUE - Rated data at 400V 50Hz								
RL4028	RL	2CT	71	B	6/8	**0,12**	900	0,73	2,4	50	0,71	1,3	1,4	8	T4	1
						0,08	690	0,64	2,2	49	0,61	1,1	1.3			
RL4029	RL	2CT	80	A	6/8	**0,15**	935	0,88	2,6	50	0,71	1,5	1,5	10	T4	2,7
						0,13	690	0,83	2,1	52	0,6	1,9	1,5			
RL4030	RL	2CT	80	B	6/8	**0,25**	930	1,2	3,2	52	0,72	2,7	1,5	12	T4	2,7
						0,15	685	1,02	2,2	49	0,6	2,2	1,4			
RL4031	RL	2CT	90	S	6/8	**0,35**	910	1,55	3,8	55	0,74	3,6	1,4	16	T4	3,4
						0,25	650	1,2	3,1	60	0,6	3,8	2,5			
RL4032	RL	2CT	90	L	6/8	**0,60**	935	2,2	3,8	60	0,76	6,1	1,5	18	T4	4,9
						0,30	685	1,55	3,4	61	0,6	4,3	1,6			
RL4033	RL	2CT	100	LA	6/8	**0,80**	920	2,85	4	65	0,77	8,2	1,5	23	T4	8,8
						0,55	700	2,4	3,6	68	0,63	7,4	1,6			
RL4034	RL	2CT	100	LB	6/8	**1,00**	930	3,4	4,1	67	0,75	10,5	1,6	25	T4	8,8
						0,65	700	2,7	3,7	68	0,66	8,8	1,6			
RL4035	RL	2CT	112	M	6/8	**1,50**	960	4,7	4	75	0,72	15,0	1.7	35	T4	17,2
						1,00	710	3,8	3,9	65	0,7	13,4	1.6			
RL4052	RL	2CT	132	S	6/8	**1,85**	960	6,2	4,1	74	0,71	18,4	1,6	60	T4	32,3
						1,30	720	5,1	4,0	68	0,65	17,5	1,8			
RL4053	RL	2CT	132	MB	6/8	**2,55**	965	7,9	4,2	74	0,73	25,1	1,8	66	T4	39,5
						1,85	720	6,9	4,1	69	0,67	24,6	1,8			
RL4054	RL	2CT	132	L	6/8	**3,00**	980	8,3	4,2	80	0,75	29,5	1,8	71	T4	50,6
						2,00	735	6,9	4,1	74	0,65	26,3	1,9			
RL4055	RL	2CT	160	M	6/8	**4,00**	980	10,4	4,3	82	0,75	39,3	1,9	106	T4	91,9
						2,80	725	8,5	4,2	78	0,70	37,2	1,9			
RL4056	RL	2CT	160	L	6/8	**5,50**	985	13,9	4,3	84	0,74	53,5	1,9	118	T4	121,18
						4,00	730	10,9	4,2	78	0,75	53	1,9			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

5.3 Three phase motors 2 speed Quadratic Torque (For centrifugal machines)

- Three phase asynchronous motor, squirrel cage rotor, self ventilated (IC411).
- Duty S1, Insulation class "F", IP55, 400V- 50 Hz.
- Connections

Poles	Connections	High Speed	Low Speed
2/4 – 4/8	(Dahlander)	**YY** 400 V	**Y** 400V
4/6 – 6/8	(2 Separate windings)	**Y** 400 V	**Y** 400V

- For ambient temperature see par 2.1

2 speed 3000/1500 QUADRATIC TORQUE - Rated data at 400V 50Hz																
Code		Type		Poles		P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η %	Cos φ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} $Kg.m^2$
RL6001	RL	2QT	63	B	2/4	**0,25**	2780	1,1	3,3	52	0,7	0,9	2	7	T4	0,1
						0,06	1410	0,4	2,5	58	0,68	0,4	1,7			
RL6002	RL	2QT	71	A	2/4	**0,37**	2790	1,3	3,5	59	0,8	1,3	1,8	7	T4	0,4
						0,09	1410	0,7	2,8	33	0,7	0,6	1,8			
RL6003	RL	2QT	71	B	2/4	**0,50**	2800	2,1	3,6	60	0,7	1,7	1,8	8	T4	0,4
						0,14	1410	0,65	2,9	65	0,7	1	1,9			
RL6004	RL	2QT	80	A	2/4	**0,75**	2800	2,46	4	63	0,76	2,6	1,8	11	T4	0,6
						0,18	1415	0,7	3,5	66	0,79	1,2	2,2			
RL6005	RL	2QT	80	B	2/4	**1,10**	2810	3,0	4,1	66	0,81	3,7	1,8	13	T4	0,8
						0,25	1415	0,64	3,7	70	0,81	1,7	2,2			
RL6006	RL	2QT	90	S	2/4	**1,50**	2780	4	4,5	66	0,82	5,1	2	17,5	T4	1,2
						0,37	1420	1,7	3,9	64	0,81	2,5	2,2			
RL6007	RL	2QT	90	L	2/4	**2,20**	2860	5,0	4,4	70	0,89	7,5	1,9	19	T4	1,5
						0,55	1400	1,3	4,4	67	0,5	3,7	2,1			
RL6008	RL	2QT	100	LA	2/4	**2,60**	2820	5,3	5,6	77	0,9	8,8	2,1	25	T4	2,9
						0,62	1420	1,42	5,3	73	0,8	4,2	2			
RL6009	RL	2QT	100	LB	2/4	**3,30**	2800	7,14	5,6	78	0,92	11,3	2,1	27	T4	2,9
						0,75	1415	2,1	5	73	0,9	5,1	2			
RL6010	RL	2QT	112	M	2/4	**4,40**	2890	9,5	5,4	80	0,8	14,6	2	35	T4	7,4
						1,10	1440	2,4	5	80	0,8	7,4	1,9			
RL6035	RL	2QT	132	S	2/4	**6,50**	2920	12,85	6,1	84	0,87	21,4	2,2	60	T4	15
						2,00	1415	5,4	5,9	81	0,85	13,1	2,1			
RL6036	RL	2QT	132	M	2/4	**8,50**	2910	16,9	6,7	92	0,83	28,1	2,3	66	T4	17,8
						2,50	1450	5,9	6,4	90	0,80	16,4	2,3			
RL6037	RL	2QT	132	M	2/4	**9,20**	2900	18,4	6,8	89	0,85	30,5	2,4	71	T4	21,6
						2,80	1450	6,6	6,5	86	0,83	18,5	2,3			
RL6038	RL	2QT	160	M	2/4	**12,00**	2940	26,9	6,1	87	0,9	39,0	3,5	105	T4	36
						3,00	1450	8,9	4,3	69	0,9	19	2,2			
RL6039	RL	2QT	160	M	2/4	**16,00**	2930	29,4	7,3	86	0,94	52,0	2,1	115	T4	53,4
						4,40	1460	11,40	6,9	79	0,8	28,5	2			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

Code			Type		Poles	P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η%	Cos φ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} $Kg.m^2$
						2 speed 1500/750	QUADRATIC TORQUE - Rated data at 400V 50Hz									
RL6011	RL	2QT	71	A	4/8	**0,25**	1400	0,89	3	70	0,75	1,7	2,2	6.5	T4	0,9
						0,05	700	0,56	2,3	28	0,68	0,7	2,8			
RL6012	RL	2QT	71	B	4/8	**0,37**	1380	1,3	2,5	59	0,8	2,6	1,2	7.5	T4	0,9
						0,07	680	0,65	1,4	33	0,7	1,1	1,2			
RL6013	RL	2QT	80	A	4/8	**0,55**	1405	1,63	4,4	75	0,74	3,7	2,2	10	T4	1,3
						0,10	700	0,78	2	38	0,66	1,4	2,3			
RL6014	RL	2QT	80	B	4/8	**0,75**	1410	2,1	4,1	70	0,76	5,1	1,7	12	T4	1,3
						0,15	690	0,9	2,4	48	0,66	2,1	1,5			
RL6015	RL	2QT	90	S	4/8	**0,90**	1415	2,75	4	77	0,75	6,1	2,3	16	T4	2
						0,25	710	0,96	2,9	54	0,7	3,4	2,8			
RL6016	RL	2QT	90	L	4/8	**1,20**	1420	3,4	4,2	80	0,79	8,1	2,3	17.5	T4	2,6
						0,30	710	1,1	1,3	57	0,7	4	3			
RL6017	RL	2QT	100	LA	4/8	**1,90**	1420	4,5	5	78	0,8	13,1	3	23	T4	5,3
						0,45	670	1,5	3	65	0,68	6,1	2			
RL6018	RL	2QT	100	LB	4/8	**2,20**	1440	4,86	6	84	0,85	14,6	2,5	25	T4	5,3
						0,55	720	1,68	3	67,5	0,7	7,3	2,4			
RL6019	RL	2QT	112	M	4/8	**3,00**	1450	6,9	6	80	0,8	19,8	2,6	35	T4	10,3
						0,75	710	2,4	3	74	0,61	9,9	2,4			
RL6040	RL	2QT	132	S	4/8	**4,40**	1450	9,2	5,8	85	0.82	29.0	2,2	60	T4	25
						1,10	710	3,1	3,5	72	0,73	15,00	1,9			
RL6041	RL	2QT	132	S	4/8	**5,90**	1445	11,9	6,2	87	0,84	39,0	2,1	66	T4	32,4
						1,50	705	4,33	3,9	79	0,64	20,0	1,8			
RL6042	RL	2QT	132	M	4/8	**7,50**	1450	15,9	6,7	87	0,84	50.0	2,1	71	T4	40,5
						1,85	705	5,9	4,3	80	0,70	25.0	1,9			
RL6043	RL	2QT	160	M	4/8	**8,80**	1450	17,5	6,8	87	0,84	57,3	2,2	116	T4	62,7
						2,50	700	7,0	3,9	78	0,7	33,8	2,9			
RL6044	RL	2QT	160	M	4/8	**12,00**	1460	23,9	6,8	88	0,85	78.6	2,2	118	T4	80,1
						3,20	700	9	4,0	83,5	0,7	42.2	2,1			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

Code			Type		Poles	P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η%	Cos φ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3} $Kg.m^2$
						2 speed 1500/1000	QUADRATIC TORQUE - Rated data at 400V 50Hz									
RL6020	RL	2QT	71	B	4/6	**0,30**	1400	0,95	2,6	71	0,75	2,1	2,0	7.5	T4	0,9
						0,10	900	0,50	1,4	63	0,72	1,4	1,8			
RL6021	RL	2QT	80	A	4/6	**0,44**	1405	1,2	3,2	59	0,8	3,0	1,5	10	T4	1,3
						0,13	900	0,5	1,7	33	0,7	1,4	1,1			
RL6022	RL	2QT	80	B	4/6	**0,59**	1405	1,6	3,5	76	0,8	3,9	1,7	12	T4	1,3
						0,18	905	0,65	2,3	72	0,75	1,9	1,2			
RL6023	RL	2QT	90	S	4/6	**0,90**	1400	2,25	4,1	77	0,8	6,1	2,1	16	T4	2
						0,30	900	0,95	3,1	68	0,7	3,1	1,6			
RL6024	RL	2QT	90	L	4/6	**1,15**	1400	3	4	71	0,8	7,5	1,8	19,5	T4	2,6
						0,40	900	1,4	3,2	60	0,8	4,2	1,3			
RL6025	RL	2QT	100	LA	4/6	**1,80**	1400	4,4	5,1	75	0,83	12,1	2,1	23	T4	5,3
						0,60	920	1,9	3,9	78	0,78	6,1	1,8			
RL6026	RL	2QT	100	LB	4/6	**2,20**	1440	4,9	3,8	82	0,87	15,2	1,7	25	T4	5,3
						0,70	940	2,1	3,0	80	0,75	7,5	1,5			
RL6027	RL	2QT	112	M	4/6	**3,00**	1450	6,3	5,5	84	0,82	19,8	2,0	35	T4	10,3
						0,90	940	2	4,0	81	0,79	9,1	1,9			
RL6045	RL	2QT	132	S	4/6	**4,00**	1450	8,4	6,3	84	0,82	26,0	2,1	55	T4	25
						1,20	945	2,9	4,9	80	0,75	11,8	1,7			
RL6046	RL	2QT	132	S	4/6	**4,80**	1445	10	6,6	84	0,82	31,2	1,9	60	T4	32,4
						1,40	940	3,36	5,2	80	0,75	14,0	1,9			
RL6047	RL	2QT	132	S	4/6	**5,50**	1455	12	5,4	83	0,8	36,0	2,1	70	T4	32,4
						1,70	950	4,7	4,8	77	0,7	17,0	1,9			
RL6048	RL	2QT	132	M	4/6	**6,60**	1460	16,30	6,7	89	0,72	43,2	1,9	71	T4	40,5
						2,00	950	8,90	5,2	78	0,55	20,1	1,9			
RL6049	RL	2QT	160	M	4/6	**7,50**	1460	15	7,2	87,5	0,84	49,0	2,2	106	T4	62,7
						2,50	960	5,9	5,9	84	0,7	24,2	2,3			
RL6050	RL	2QT	160	L*	4/6	**11,00**	1450	23	6,9	88	0,8	72,0	2,2	120	T4	80,1
						3,30	960	9	6,1	85	0,7	32,0	2,3			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

Code	Type	Poles	P kW	rpm min^{-1}	In 400 V Amp.	I_a/I_n	η%	Cosφ	M_n Nm	M_a/M_n	m Kg	T Class	Moment of inertia J 10^{-3} $Kg.m^2$
			2 speed 1500/750	QUADRATIC TORQUE -Rated data at 400V 50Hz									
RL6028	RL 2QT 80	A 6/8	**0,33**	920	1,52	3,1	55	0,70	3,4	1,8	10	T4	2,7
			0,09	680	0,60	1,9	57	0,62	1,3	1,4			
RL6029	RL 2QT 80	B 6/8	**0,40**	935	1,68	2,9	58	0,70	4,0	1,8	12	T4	2,7
			0,12	685	0,70	2,1	55	0,63	1,7	1,4			
RL6030	RL 2QT 90	S 6/8	**0,48**	925	1,98	3,1	61	0,65	4,8	1,9	16	T4	3,4
			0,19	690	1,05	2,1	55	0,62	2,7	1,5			
RL6031	RL 2QT 90	L 6/8	**0,66**	900	3,00	3,2	60	0,80	7,1	2,0	17.5	T4	4,9
			0,25	700	1,40	2,3	52	0,62	3,5	1,7			
RL6032	RL 2QT 100	LA 6/8	**0,90**	960	3,35	4,1	67	0,68	8,9	1,9	23	T4	8,8
			0,37	720	2,25	3,5	50	0,65	4,8	1,8			
RL6033	RL 2QT 100	LB 6/8	**1,10**	940	2,7	4	80	0,75	11,2	1,6	25	T4	8,8
			0,45	710	1,2	3,5	72	0,73	6	1,4			
RL6034	RL 2QT 112	M 6/8	**1,50**	970	4,40	4,4	75	0,74	15,1	2,1	35	T4	17,2
			0,75	720	3,20	3,5	61	0,68	10,1	1,7			
RL6051	RL 2QT 132	S 6/8	**2,20**	960	6,60	4,4	75	0,75	22,2	2,2	60	T4	32,3
			0,90	720	4,20	3,7	62	0,66	11,9	1,8			
RL6052	RL 2QT 132	MA 6/8	**3,00**	970	7,90	4,8	77	0,82	29,7	2,1	66	T4	39,5
			1,20	730	5,80	3,8	61	0,63	15,6	1,8			
RL6053	RL 2QT 132	MB 6/8	**3,70**	970	9,80	5,1	80	0,77	36,5	2,1	71	T4	50,6
			1,50	720	5,90	3,8	65	0,70	20,1	2,1			
RL6054	RL 2QT 160	M 6/8	**5,50**	980	13,30	5,5	88	0,75	53,5	2,2	106	T4	91,9
			2,50	730	7,70	4,2	84	0,65	32,5	2,3			
RL6055	RL 2QT 160	L 6/8	**7,50**	970	15,30	5,7	84	0,85	73,5	2,1	118	T4	12,18
			4,00	720	10,10	3,9	81	0,80	53,2	2,1			

All motors are certified as follows: :
TUV IT 13 ATEX 038X version IIB (T.amb. -40;+60 °C for T4 and T5)
TUV IT 13 ATEX 039X version IIC (T.amb. -20;+60 °C for T4 and -20,+50 for T5)

5.4 Single-phase motors

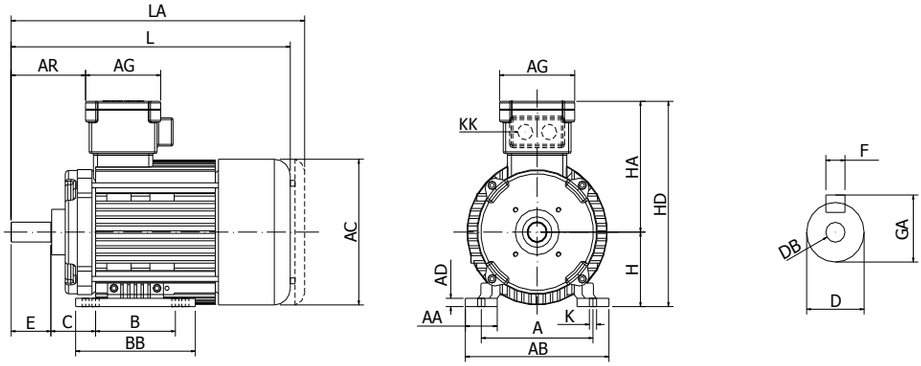
- Single-phase asynchronous motor, squirrel cage rotor, self- ventilated (IC411).
- Duty S1, Insulation class "F", IP55, 230V - 50 Hz.
- The motors considered in the rating table are single-phase motors with 1 capacitor. In case of single-phase motors with high starting torque it is possible to have a start capacitor complete with electronic switch (on request mechanical).

Rated data at 230V/50Hz																			
Code	Type			Poles	P Kw	P Hp	rpm min1	In Amp	Ia/In	η%	cos ϕ	Mn Nm	Ma/Mn	Cap. μF	m Kg	Classe T	Certificate	
RL8001*	RL	56	A	2	0,06	0,08	2710	0,8	2,8	42	0,88	0,15	0,6	5	4	T4	1or2or4	3
RL8002*	RL	56	B	2	0,09	0,12	2709	0,93	3	43	0,9	0,2	0,6	3	4,5	T4	1or2or4	3
2RL8003*	RL	63	A	2	0,12	0,16	2770	1,43	3,2	IE2=53,6	0,9	0,3	0,7	6,3	6,5	T4	1or2or4	3
2RL8004*	RL	63	B	2	0,18	0,25	2710	2	3,7	IE2=60,4	0,8	0,6	0,7	6,3	7	T4	1or2or4	3
2RL8005*	RL	71	A	2	0,25	0,34	2785	2,2	3,6	IE2=64,8	0,83	0,65	0,7	8	7	T4	1or2or4	3
2RL8006*	RL	71	B	2	0,37	0,50	2840	2,5	5	IE2=69,5	0,9	1,3	0,7	12,5	8	T4	1or2or4	3
2RL8007	RL	80	A	2	0,55	0,75	2840	3,4	4	IE2=74,1	0,9	1,8	0,7	16	10,5	T4	4	3
2RL8008	RL	80	B	2	0,75	1,00	2800	4,7	4	IE2=77,4	0,9	2,5	0,6	20	11,5	T4	4	3
2RL8009	RL	90	S	2	1,1	1,50	2830	6,8	4	IE2=79,6	0,9	3,7	0,6	25	16,5	T4	4	3
2RL8010	RL	90	L	2	1,5	2,00	2830	8,9	4,8	IE2=81,3	0,9	5,0	0,7	30	18	T4	4	3
2RL8011	RL	100	LA	2	2,2	3,00	2820	12,9	4,8	IE2=83,2	0,9	7,2	0,6	50	25	T4	4	3
2RL8012	RL	100	LB	2	3	4,00	2800	18,00	4	IE2=84,6	0,9	10,2	0,4	75	27	T4	4	3
RL8013*	RL	56	B	4	0,06	0,08	1285	0,88	2,7	49	0,9	0,4	0,6	3,75	4,5	T4	1or2	3
RL8014*	RL	63	A	4	0,09	0,12	1390	0,9	3,1	45	0,85	0,6	0,8	3,75	6	T4	1or2	3
2RL8015*	RL	63	B	4	0,12	0,16	1385	1,3	2,5	IE2=59,1	0,86	2,5	0,7	6,3	6,5	T4	1or2	3
2RL8016*	RL	71	A	4	0,18	0,25	1390	1.75	4	IE2=64,7	0,75	1,2	0,7	8	7,5	T4	1or2	3
2RL8017*	RL	71	B	4	0,25	0,34	1440	1,95	4	IE2=68,5	0,8	1,6	0,7	8	7.5	T4	1or2	3
2RL8018	RL	80	A	4	0,37	0,50	1410	3	4	IE2=72,7	0,85	2,4	0,7	16	10,5	T4	4	3
2RL8019	RL	80	B	4	0,55	0,75	1420	4.5	5	IE2=77,1	0,8	3,7	0,6	16	11,5	T4	4	3
2RL8020	RL	90	S	4	0,75	1,00	1400	4,6	4	IE2=79,6	0,9	5	0,8	18	16,5	T4	4	3
2RL8021	RL	90	L	4	1,1	1,50	1400	6,9	4	IE2=81,4	0,9	7,5	0,8	25	18	T4	4	3
2RL8022	RL	100	LA	4	1,3	1,75	1385	8,80	3,2	IE2=81,7	0,96	9,0	0,55	32	25	T4	4	3
2RL8023	RL	100	LB	4	1,6	2,20	1420	11	5,5	IE2=82,9	0,9	11,1	0,55	50	27	T4	4	3
RL8024*	RL	63	A	6	0,06	0,08	890	0,80	2,4	43	0,85	0,6	0,5	6,3	6	T4	1or2	3
RL8025*	RL	63	B	6	0,09	0,12	902	1.52	2,3	48	0,82	0,8	0,5	8	6,5	T4	1or2	3
2RL8026*	RL	71	A	6	0,12	0,16	930	1,3	2,4	IE2=50,6	0,9	1,2	1	6,3	6,5	T4	1or2	3
2RL8027*	RL	71	B	6	0,18	0,25	900	1,9	2	IE2=56,6	0,9	2	0,7	8	7,5	T4	1or2	3
2RL8028	RL	80	A	6	0,25	0,34	920	3,00	2,8	IE2=61,6	0,92	2,2	0,6	16	10	T4	4	3
2RL8029	RL	80	B	6	0,37	0,50	940	3,2	3	IE2=67,6	0,9	3,7	0,6	13,75	12	T4	4	3
2RL8030	RL	90	S	6	0,55	0,75	930	4	3	IE2=73,1	0,95	5,6	0,7	18	16	T4	4	3
2RL8031	RL	90	L	6	0,75	1,00	900	5,90	3,1	IE2=75,9	0,90	8,1	0,7	30	17,5	T4	4	3
2RL8032	RL	100	LA	6	1,10	1,50	920	8,76	3,1	IE2=78,1	0,90	11,5	0,7	45	23	T4	4	3

1--> II 2 G Ex db IIC or II 2 D Ex tb IIIC terminal box for 3 phase motor (version a) TUV IT 13 ATEX 039X (T. amb. -20;+60°C)
2--> II 2 G Ex db IIB or II 2 D Ex tb IIIC terminal box for 3 phase motor (version a) TUV IT 13 ATEX 038X (T.amb. -40 ;+60°C)
3--> II 2 G Ex db IIB or II 2 D Ex tb IIIC terminal box for 1 phase motor (type c-d-e) TUV IT 14 ATEX 029X (T. amb. -20 ;+60°C)
4--> II 2 G Ex db IIC or II 2 D Ex tb IIIC terminal box for 1 phase motor (type c) TUV IT 13 ATEX 039X (T. amb. -20 ;+60°C)
* Available for version TUBE MOTORS TUV IT 12 ATEX 070X version IIC (T.amb. -40;+60 °C for T4 -T5-T6)

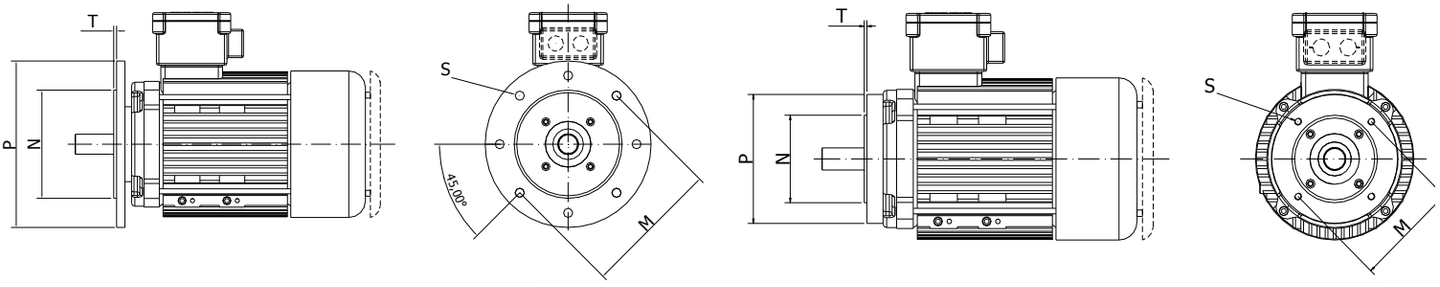
6. OVERALL DIMENSIONS

6.1 Three-phase motors



Mounting B3																			Shaft			
Type	**A**	**AA**	**AB**	**AC**	**AD**	**AG**	**AR**	**B**	**BB**	**C**	**K**	**KK**	**H**	**HA**	**HD**	**L**	**LA**	**D**	**DB**	**E**	**F**	**GA**
56	90	24	108	110	9	94,2	46,9	71	84	36	6,2	M20x1,5	56	125	181	211,5	223	9j6	M3	20	3	10,2
63	100	25	125	131	6	94,2	63,4	80	108	40	7,0	M20x1,5	63	142	205	270,8	283	11j6	M4	23	4	12,5
71	112	30	142	138	8	94,2	64,4	90	120	45	7,0	M20x1,5	71	142	213	271,8	284	14j6	M5	30	5	16
80	125	30	155	156	8	4,2	80,4	100	125	50	9,0	M20x1,5	80	151	231	299	314	19j6	M6	40	6	21,5
90S	140	40	180	176	10	94,2	93,4	100	150	56	9,0	M20x1,5	90	158	248	350	368	24j6	M8	50	8	27
90L	140	40	180	176	10	94,2	93,4	125	150	56	9,0	M20x1,5	90	158	248	350	368	24j6	M8	50	8	27
100	160	40	200	197	12	123,5	107	140	180	63	12,0	M25x1,5	100	188	288	404	416	28j6	M10	60	8	31
112	190	40	230	218	12	123,5	112,3	140	180	70	12,0	M25x1,5	112	198	310	418	442	28j6	M10	60	8	31
132S	216	63	248	257	16	168	177	140	175	89	12	M32X1,5	132	247	379	553	566	38k6	M12	80	10	41
132M	216	63	248	257	16	168	177	178	213	89	12	M32X1,5	132	247	379	553	566	38k6	M12	80	10	41
160M	254	70	310	310	20	168	215	210	255	108	14	M32X1,5	160	285	445	670	688	42k6	M16	110	12	45
160L	254	70	310	310	20	168	215	254	300	108	14	M32X1,5	160	285	445	670	688	42k6	M16	110	12	45

L* For part number 2RL0055/0060 L/LA= +80mm B=254/BB=300



Mounting B5 4 (8) holes - 45°					
Type	**P**	**N**	**M**	**S**	**T**
56	120	80j6	100	7	3
63	140	95j6	115	9	3
71	160	110j6	130	10	3,5
80	200	130j6	165	12	3,5
90S	200	130j6	165	12	3,5
90L	200	130j6	165	12	3,5
100	250	180j6	215	15	4
112	250	180j6	215	15	4
132S	300	230j6	265	15	4
132M	300	230j6	265	15	4
160M	350	250h6	300	18	5
160L	350	250h6	300	18	5

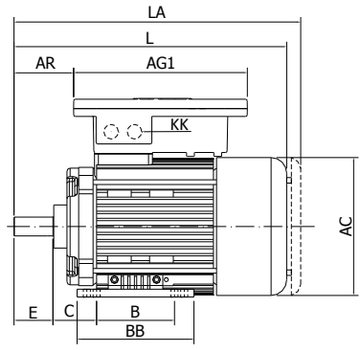
Mounting B14 4 holes - 45°					
Type	**P**	**N**	**M**	**S**	**T**
56	76	50j6	65	M5	2,5
63	90	60j6	75	M5	2,5
71	105	70j6	85	M6	2,5
80	120	80j6	100	M6	3
90S	140	95j6	115	M8	3
90L	140	95j6	115	M8	3
100	160	110j6	130	M8	3,5
112	160	110j6	130	M8	3,5
132S	200	130j6	165	M10	3,5
132M	200	130j6	165	M10	3,5
160M	250	180h6	215	M12	4
160L	250	180h6	215	M12	4

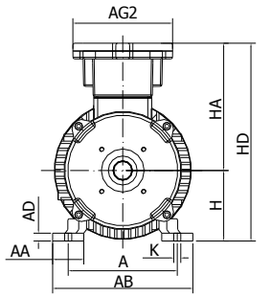
6.2 Forced Ventilation Motors

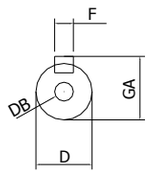
Length of motors complete with forced ventilation (auxiliary motor frame 56)

Frame	63	71	80	90S	90L	100	112	132S	132M	160M	160L
L	519,5	520,5	574	624	624	678	698	865	945	994	1074

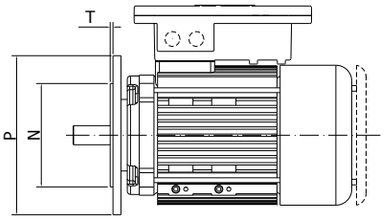
6.3 Single-phase motors

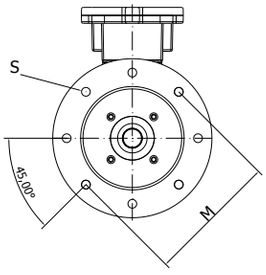


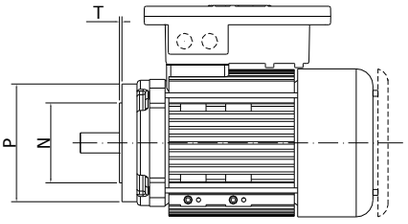


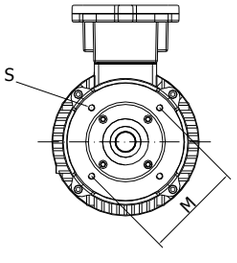


Mounting B3																		Shaft			
Type	**A**	**AA**	**AB**	**AC**	**AD**	**AG1 AG2**	**AR**	**B**	**BB**	**C**	**K**	**KK**	**H**	**HA**	**HD**	**L**	**LA**	**D**	**DB**	**E**	**F**	**GA**
56 (IIB)	90	24	108	110	9	223 128	46,9	71	84	36	6,2	M20x1,5	56	125	181	211,5	220	9j6	M3	20	3	10,2
56 (IIC)	90	24	108	110	9	94,2	46,9	71	84	36	6,2	M20x1,5	56	125	181	211,5	223	9j6	M3	20	3	10,2
63 (IIB)	100	25	125	131	6	223 128	46,5	80	108	40	7,0	M20x1,5	63	146,5	209,5	270,8	283	11j6	M4	23	4	12,5
63 (IIC)	100	25	125	131	6	94,2	63,4	80	108	40	7,0	M20x1,5	63	142	205	270,8	283	11j6	M4	23	4	12,5
71 (IIB)	112	30	142	138	8	223 128	47,5	90	120	45	7,0	M20x1,5	71	146,5	217,5	271,8	284	14j6	M5	30	5	16
71 (IIC)	112	30	142	138	8	94,2	64,4	90	120	45	7,0	M20x1,5	71	142	213	271,8	284	14j6	M5	30	5	16
80	125	30	155	156	8	223 128	63,5	100	125	50	9,0	M20x1,5	80	155,5	235,5	299	314	19j6	M6	40	6	21,5
90S	140	40	180	176	10	223 128	76,5	100	150	56	9,0	M20x1,5	90	162,5	252,5	350	368	24j6	M8	50	8	27
90L	140	40	180	176	10	223 128	76,5	125	150	56	9,0	M20x1,5	90	162,5	252,5	350	368	24j6	M8	50	8	27
100	160	40	200	197	12	206 190	96,0	140	180	63	12,0	M20x1,5	100	208	308	404	416	28j6	M10	60	8	31







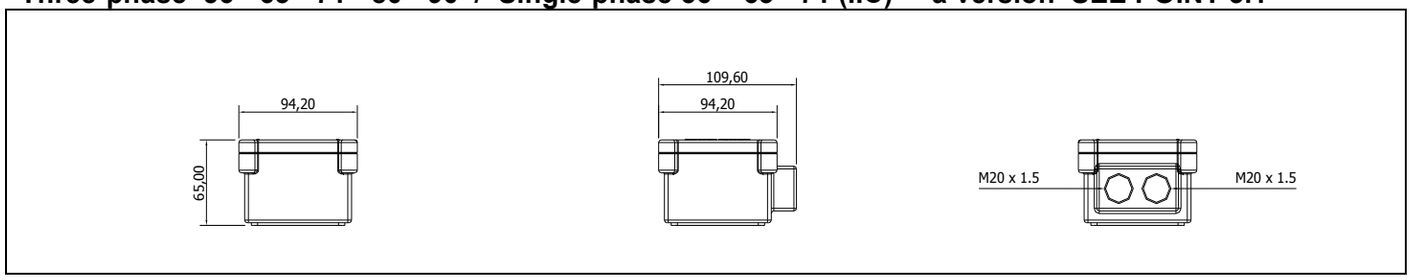


Mounting B5 4 (8) holes - 45°					
Type	**P**	**N**	**M**	**S**	**T**
56	120	80j6	100	7	3
63	140	95j6	115	9	3
71	160	110j6	130	10	3,5
80	200	130j6	165	12	3,5
90S	200	130j6	165	12	3,5
90L	200	130j6	165	12	3,5
100	250	180j6	215	15	4

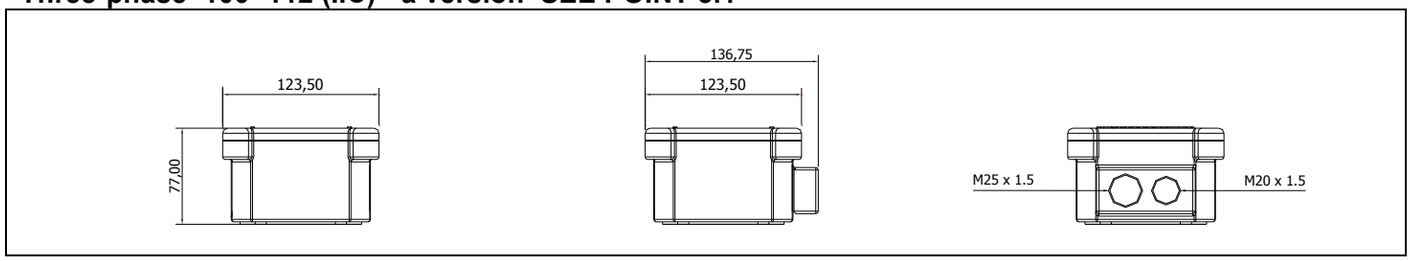
Mounting B14 4 holes - 45°					
Type	**P**	**N**	**M**	**S**	**T**
56	76	50j6	65	M5	2,5
63	90	60j6	75	M5	2,5
71	105	70j6	85	M6	2,5
80	120	80j6	100	M6	3
90S	140	95j6	115	M8	3
90L	140	95j6	115	M8	3
100	160	110j6	130	M8	3,5

6.3 Terminal box

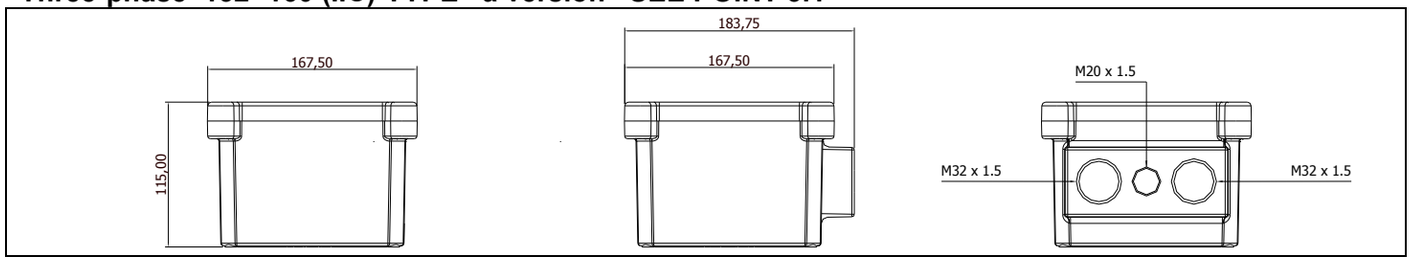
Three-phase 56 - 63 - 71 - 80 - 90 / Single-phase 56 – 63 - 71 (IIC) – ‘a version’ SEE POINT 3.1



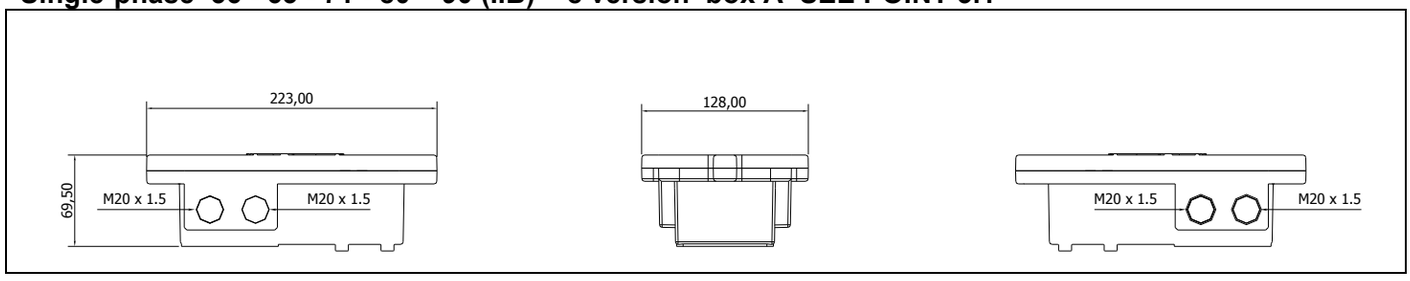
Three-phase 100 -112 (IIC)- ‘a version’ SEE POINT 3.1



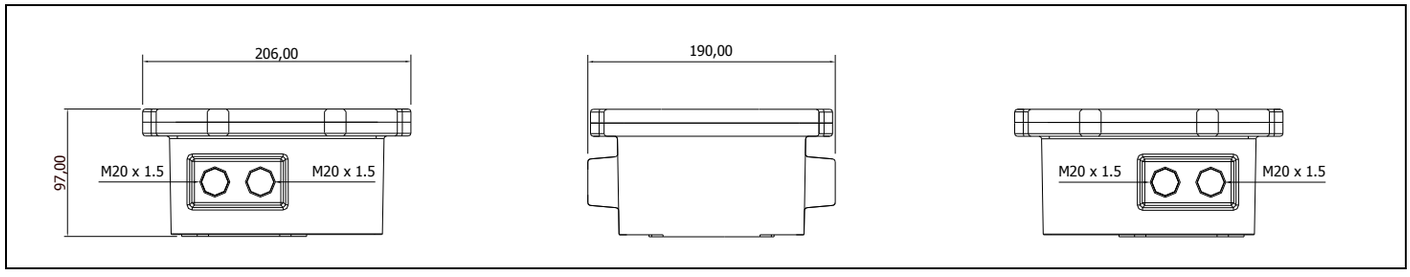
Three-phase 132 -160 (IIC)-TYPE ‘ a version ’ SEE POINT 3.1



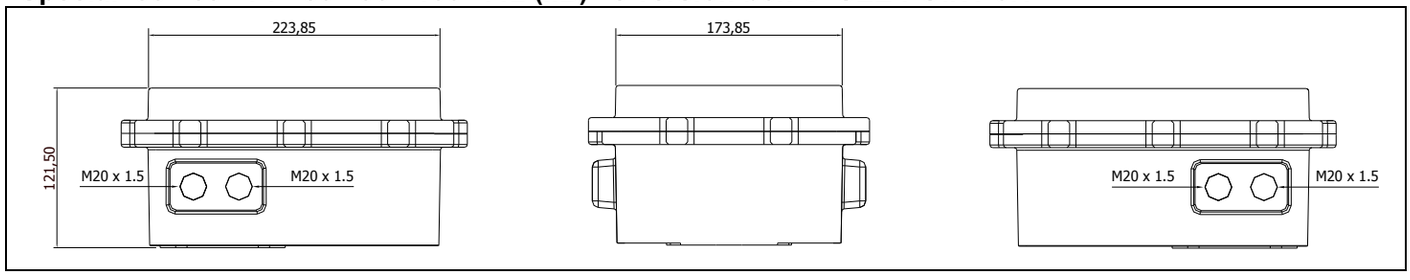
Single-phase 56 - 63 - 71 - 80 – 90 (IIB) –‘c version box A’ SEE POINT 3.1



Single-phase 2 Capacitors – High starting torque 63 - 71 - 80 - 90 – 100 (IIB) –‘d version box B’ SEE POINT 3.1



Special 56 - 63 - 71 - 80 - 90 - 100 -112 (IIB) ‘e version box C’ SEE POINT 3.1



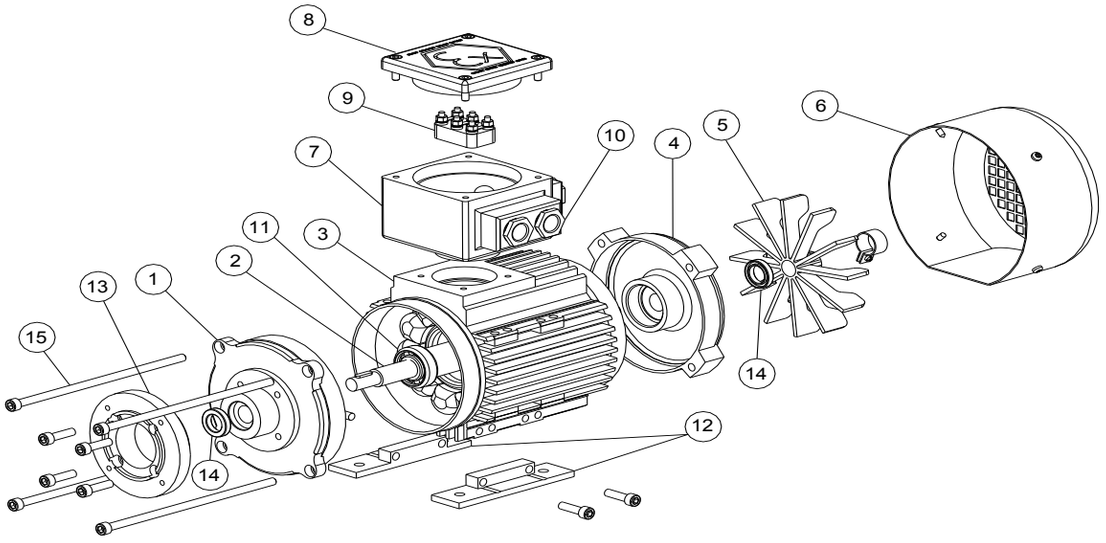
7. SPARE PARTS

7.1 Personnel qualification

Overhauls and repairs must be only realised by qualified people in accordance with the standards EN 60079-17 or national standards (last edition). Qualified people must have knowledge about explosion protection.
Repairs must be made regarding the rules as define in EN 60079-19 standards.
These repairs can only be done under the control or agreement with Motori Elettrici by a repair shop designed by RAEL or a recognized laboratory.
In case these rules are not respected, liability is released.

7.2 List of spare parts

All motors components must be replaced by original spare parts. In these cases please contact RAEL directly and give the serial number of the motor so to ask the authorization to repair the motor too.



1	DRIVE END SHIELD	6	FAN COVER	11	BALL BEARINGS
2	SHAFT WITH ROTOR	7	TERMINAL BOX	12	MOTOR FEET
3	FRAME	8	TERMINAL BOX COVER	13	FLANGE B14 (or B5)
4	NO-DRIVE END SHIELD	9	TERMINAL BLOCK	14	ABY ANGULAR BEARING
5	COOLING FAN	10	CABLE GLAND	15	TIE RODS (quality 4.8)

SCREWS
Screws quality 8.8

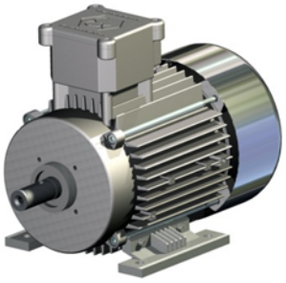
	56	**63**	**71**	**80**	**90**	**100**	**112**	**132**	**160**
FLANGE B14 (o B5)	M5x14	M6x20	M6x16	M6x16	M6x20	M6x20	M6x20	M8x25	M8x25
MOTOR FEET	M5x10	M6x12	M6x14	M6x16	M6x16	M8x20	M8x25	M8x20	M8x25
TERMINAL BOX COVER	M5x14	M5x14	M5x14	M5x14	M5x14	M5x20	M5x20	M8x20	M8x20

	M4	**M5**	**M6**	**M8**	**M10**
TIGHTENING TORQUE (Nm)	2	3.2	5	12	18

7.3 Warranty

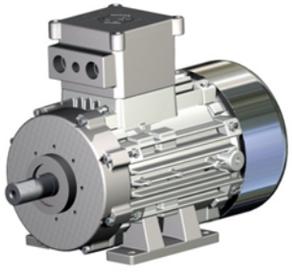
The warranty period expends to 12 months from the motor shipment date, unless different agreements are recorded in written .

RL series

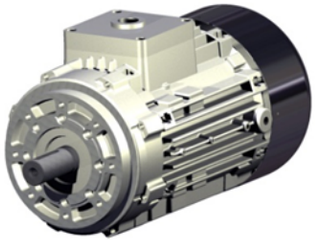


RL

RL

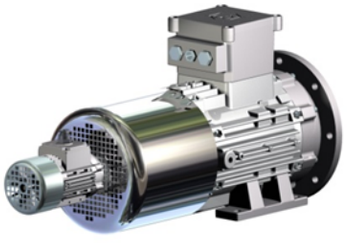


RL



RL No Tbox

RL



RL Forced ventilation + Encoder

RL Box A

RL Box B

RL with Encoder

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

Italia

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate number:

TÜV IT 14 ATEX 029 X Rev.2

[4] Equipment or Protective System: Electrical motor RLM Series

[5] Manufacturer: RAEL motori elettrici S.r.l.

[6] Address: Via per Retorto 7/1
I-15077 Predosa (AL) - ITALY

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] TUV Italia, notified body no. 0948 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. R 14 EX 025 Rev.2

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018; EN 60079-1:2014; EN 60079-31:2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

II 2G Ex db IIB T6...T4 Gb
II 2D Ex tb IIIC T85°C..T135°C Db

This certificate may only be reproduced in its entirety and without any change, schedule included.

Issue date: 02nd February 2024

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 081B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

TÜV Italia S.r.l.
Notified body N° 0948

Alberto Carelli
Industry Service - Real Estate & Infrastructure
Managing Director

TÜV Italia has been authorized by Italian government to operate as notified body for the certification of equipment or protective system intended for use in potentially explosive atmospheres. This document is not valid without official signature and logo. The internal reference code is 722295396-8.

PEX-01-MOD2_r07 del 29/03/2018

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

Italia

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate number:

TÜV IT 13 ATEX 038 X Rev.3

[4] Equipment or Protective System: **Electrical motor RL Series (IIB)**

[5] Manufacturer: **RAEL motori elettrici S.r.l.**

[6] Address: **Via per Retorto, 7/1**
I-15077 Predosa (AL)

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] TÜV Italia, notified body no. 0948 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. R 13 EX 021 Rev.3

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018; EN 60079-1:2014; EN 60079-7:2015+ A1/2018; EN 60079-31:2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

II 2G Ex db IIB T6...T4 Gb
II 2G Ex db eb IIB T6...T4 Gb
II 2D Ex tb IIIC T85°C..T135°C Db

This certificate may only be reproduced in its entirety and without any change, schedule included.

Issue date: 11th November 2023

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 081B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

TÜV Italia S.r.l.
Notified body N° 0948

Alberto Carelli
Industry Service - Real Estate & Infrastructure
Managing Director

TÜV Italia has been authorized by Italian government to operate as notified body for the certification of equipment or protective system intended for use in potentially explosive atmospheres. This document is not valid without official signature and logo. The internal reference code is 722295396-4.

PEX-01-MOD2_r07 del 29/03/2018

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ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

Italia

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate number:

TÜV IT 13 ATEX 039 X Rev.3

[4] Equipment or Protective System: Electrical motor RL Series (IIC)

[5] Manufacturer: RAEL motori elettrici S.r.l.

[6] Address: Via per Retorto 7/1
I-15077 Predosa (AL) - ITALY

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] TUV Italia, notified body no. 0948 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. R 13 EX 022

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018; EN 60079-1:2014; EN IEC 60079-7:2015/A1:2018; EN 60079-31:2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

II 2G Ex db IIC T6...T4 Gb
II 2G Ex db eb IIC T6...T4 Gb
II 2D Ex tb IIIC T85°C..T135°C Db

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Issue date: 07th March 2023

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 081B
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Signatory of EA, IAF and ILAC Mutual Recognition Agreements

TÜV Italia S.r.l.
Notified body N° 0948

Alberto Carelli
Industry Service - Real Estate & Infrastructure
Managing Director

TÜV Italia has been authorized by Italian government to operate as notified body for the certification of equipment or protective system intended for use in potentially explosive atmospheres. This document is not valid without official signature and logo. The internal reference code is 722178354-5.

PEX-01-MOD2_r07 del 29/03/2018

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ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

№ ЕАЭС RU C-IT.AA87.B.00823/21

Серия RU № 0344060

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»). Адрес места нахождения юридического лица: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», литера В, Объект 6, этаж 3, офис 26. Адрес места осуществления деятельности в области аккредитации: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», Литера В, Объект 6, этаж 3, офисы 26/3, 26/4, 26/5, 27/6, 30/1, 32. Аттестат № RA.RU.11AA87 от 20.07.2015 г. Телефон: +7 (495) 558-83-53, +7 (495) 558-82-44. Адрес электронной почты: ccve@ccve.ru

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Вулкан Пумпен Рус»

Адрес места нахождения юридического лица и адрес места осуществления деятельности: Россия, 196650, Санкт-Петербург, город Колпино, улица Финляндская, дом 31, пом. 48. ОГРН: 1107847122239. Телефон: +7 (812) 951 58-06. Адрес электронной почты: sale@vpumpen.ru

ИЗГОТОВИТЕЛЬ RAEL Motori Elettrici S.r.l.

Адрес места нахождения юридического лица и адрес места осуществления деятельности по изготовлению продукции: Via Per Retorto 7/1, 15077 Predosa (AL), Италия.

ПРОДУКЦИЯ Взрывозащищенные электродвигатели серий AD-PE, RL, RLM, MIA и MIA1, TUBE с Ex-маркировкой согласно приложению (см. бланки №№ 0855097, 0855098). Документы, в соответствии с которыми изготовлены изделия - см. приложение, бланк № 0855096. Серийный выпуск

КОД ТН ВЭД ЕАЭС 8501 51000, 8501 52 200, 8501 40 200, 8501 40 800

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ

ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах»

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ

Протоколов испытаний № 350.2021-Т от 25.10.2021, № 350/1.2021-Т от 25.10.2021 Испытательной лаборатории технических устройств Автономной некоммерческой организации «Национальный испытательный и научно-исследовательский институт оборудования для взрывоопасных сред» ИЛ Ex ТУ (аттестат № РОСС RU.0001.21МШ19 выдан 16.10.2015); Акта анализа состояния производства № 43-ДА/21 от 27.05.2021 Органа по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»); Документов, представленных заявителем в качестве доказательства соответствия продукции требованиям ТР ТС 012/2011 (см. приложение, бланк № 0855096). Схема сертификации – 1с.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Перечень стандартов, применяемых на добровольной основе для соблюдения требований ТР ТС 012/2011 (см. приложение, бланк № 0855096). Условия и срок хранения указаны в эксплуатационной документации. Назначенный срок службы – 12 лет. Анализ состояния производства проведен посредством дистанционной оценки.

СРОК ДЕЙСТВИЯ С 08.11.2021 **ПО** 07.11.2026 **ВКЛЮЧИТЕЛЬНО**

Руководитель (уполномоченное лицо) органа по сертификации (подпись) Залогин Александр Сергеевич (Ф.И.О.)

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) Протовский Николай Николаевич

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	IECEx CCVE 15.0003X	Issue No: 0	Certificate history: Issue No. 0 (2015-12-11)
Status:	Current	Page 1 of 5	
Date of Issue:	2015-12-11		
Applicant:	RAEL MOTORI ELETTRICI S.r.l VIA PER RETORTO 7/1, PREDOSA (AL), ITALY Italy		
Electrical Apparatus:	EXPLOSION PROOF MOTORS RL SERIES. THREEPHASE AND SINGLEPHASE, FRAMESIZES 56-160		
Optional accessory:			
Type of Protection:	flameproof enclosure d, increased safety e, protection by enclosure t		
Marking:	Ex d IIB T4/T5/T6 Gb or Ex de IIB T4/T5/T6 Gb Ex tb IIIC T135/T100/T85°C Db IP55/IP66 Ta -40/+60 °C Ex d IIC T4/T5/T6 Gb or Ex de IIC T4/T5/T6 Gb Ex tb IIIC T135/T100/T85°C Db IP55/IP66 Ta -20/+60 °C		

Approved for issue on behalf of the IECEx Certification Body: Alexander Zalogin

Position: Head of NANIO "CCVE"

Signature: (for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

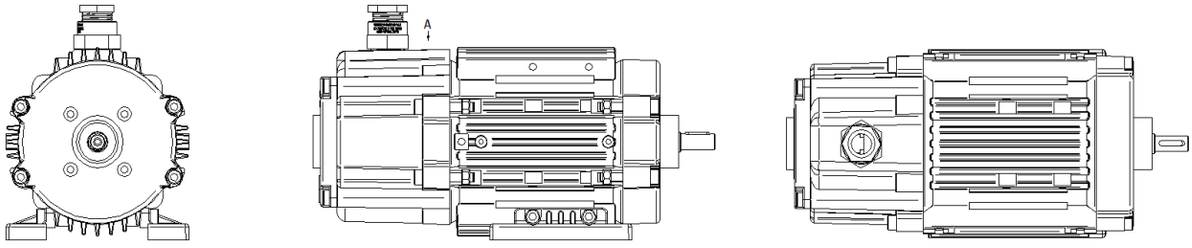
8.1 Tube motors

Tube motors have been specifically designed with axial fan manufacturers in mind.
Being a direct evolution of the RL series , they maintain the same features of the main RL series:
-interchangeable and removable mounting arrangements: B3, B5, B14,B30, B34, B35
-Same protection degrees : Ex d, Ex de, Ex t.
Tube motors differ from standard RL series motors due to their lower profile, allowing ideal airflow in a duct fan configuration.
Terminal box has been repositioned in the back side of the motor providing multiple choice in terms of cable output position, both in-axe and perpendicular.
Tube series motors are available in 56,63 and 71 frames with B3,B5, B14 and B34,B35, B30 mounting arrangements.
Tube series can be personalized on customer's request.
For electrical data please consult three and single phases RL motors data up to frame size 71.

Cable Output Positions

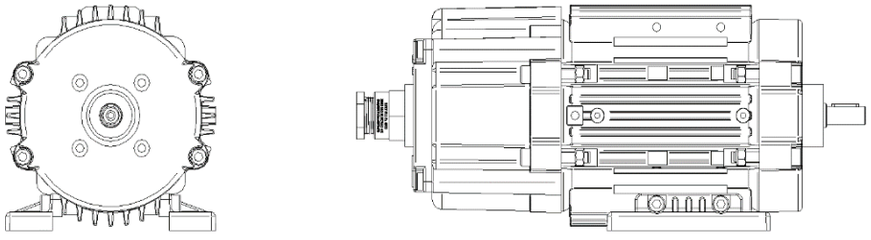
a. Top

With or without cable gland/ cable.

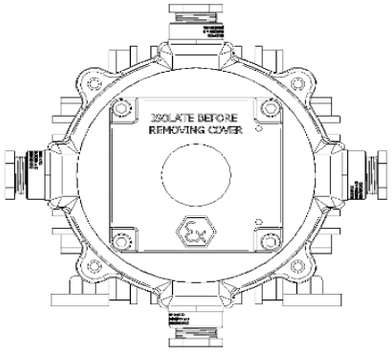


b. **Back**

With or without cable gland/ cable.

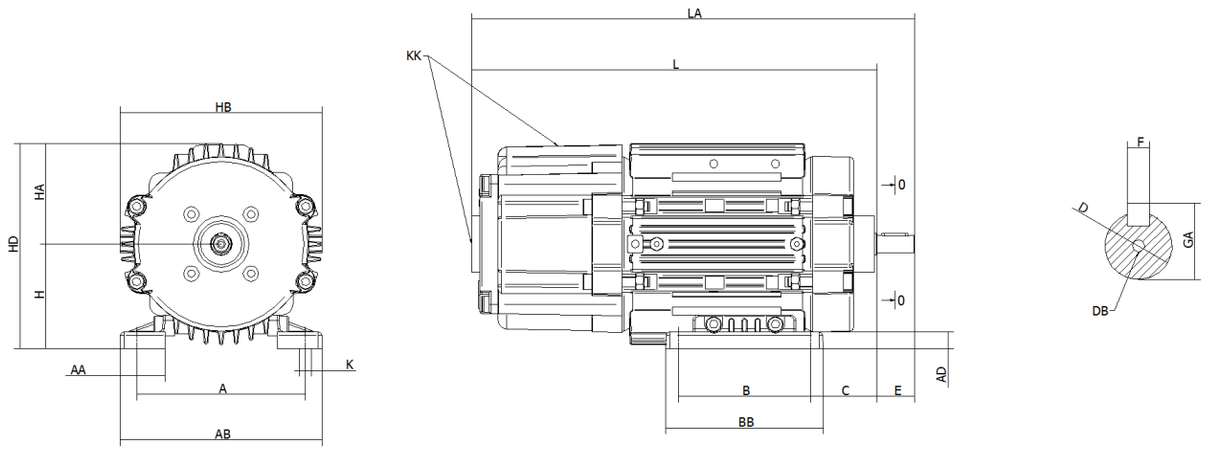


Possible cable output position for feet mounted version



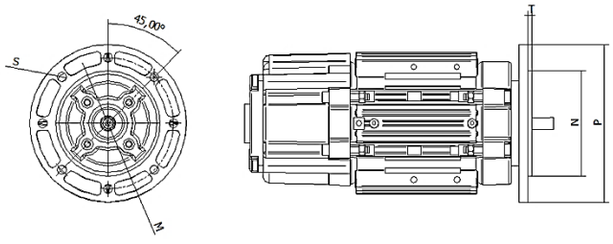
8.2 Tube Series

B3 Mounting



Mounting B3															Shaft				
Type	A	AA	AB	B	BB	AD	C	H	HA	HD	L	LA	HB	KK	K	D	DB	E	F	GA
56	90	24	108	71	84	9	36	56	56	112	217	237	108	M20x1.5	6.2	9 j6	M3	20	3	10.2
63	100	25	125	80	108	6	40	63	65	128	252	275	124	M20x1.5	7	11 j6	M4	23	4	12.5
71	112	30	142	90	120	8	45	71	65	136	245	275	124	M20x1.5	7	14 j6	M5	30	5	16

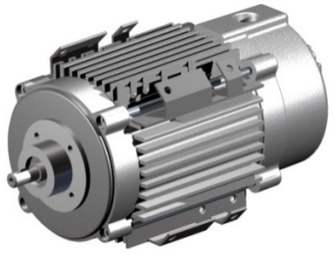
B5/B14 Mounting



Mounting B5 4 (8) holes - 45°					
Type	P	N	M	S	T
56	**120**	**80 j6**	**100**	**7**	**3**
63	**140**	**95 j6**	**115**	**9**	**3**
71	**160**	**110 j6**	**130**	**10**	**3.5**

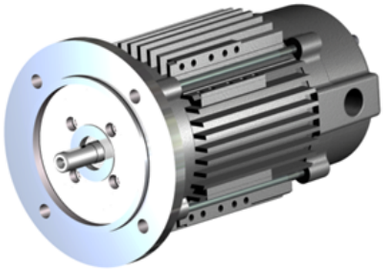
Mounting B14 4 holes - 45°					
Type	P	N	M	S	T
56	**76**	**50 j6**	**65**	**M5**	**2.5**
63	**90**	**60 j6**	**75**	**M5**	**2.5**
71	**105**	**70 j6**	**85**	**M6**	**2.5**

TUBE series



Tube Pad mounting

Tube



Tube

Tube Pad mounting (B30) with ventilator

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

№ ЕАЭС RU C-IT.АА87.В.00823/21

Серия RU № 0344060

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»). Адрес места нахождения юридического лица: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», литера В, Объект 6, этаж 3, офис 26. Адрес места осуществления деятельности в области аккредитации: Россия, 140004, Московская область., Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», Литера В, Объект 6, этаж 3, офисы 26/3, 26/4, 26/5, 27/6, 30/1, 32. Аттестат № RA.RU.11AA87 от 20.07.2015 г. Телефон: +7 (495) 558-83-53, +7 (495) 558-82-44. Адрес электронной почты: cсve@cсve.ru

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ИЗГОТОВИТЕЛЬ RAEL Motori Elettrici S.r.l.
Адрес места нахождения юридического лица и адрес места осуществления деятельности по изготовлению продукции: Via Per Retorto 7/1, 15077 Predosa (AL), Италия.

ПРОДУКЦИЯ Взрывозащищенные электродвигатели серий AD-PE, RL, RLM, MIA и MIA1, TUBE с Ex-маркировкой согласно приложению (см. бланки №№ 0855097, 0855098).
Документы, в соответствии с которыми изготовлены изделия - см. приложение, бланк № 0855096.
Серийный выпуск

КОД ТН ВЭД ЕАЭС 8501 51000, 8501 52 200, 8501 40 200, 8501 40 800

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ

ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах»

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ

Протоколов испытаний № 350.2021-Т от 25.10.2021, № 350/1.2021-Т от 25.10.2021 Испытательной лаборатории технических устройств Автономной некоммерческой организации «Национальный испытательный и научно-исследовательский институт оборудования для взрывоопасных сред» ИЛ Ex ТУ (аттестат № РОСС RU.0001.21МШ19 выдан 16.10.2015); Акта анализа состояния производства № 43-ДА/21 от 27.05.2021 Органа по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»); Документов, представленных заявителем в качестве доказательства соответствия продукции требованиям ТР ТС 012/2011 (см. приложение, бланк № 0855096).
Схема сертификации – 1с

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Перечень стандартов, применяемых на добровольной основе для соблюдения требований ТР ТС 012/2011 (см. приложение, бланк № 0855096). Условия и срок хранения указаны в эксплуатационной документации. Назначенный срок службы – 12 лет. Анализ состояния производства проведен посредством дистанционной оценки.

СРОК ДЕЙСТВИЯ С 08.11.2021 **ПО** 07.11.2026 **ВКЛЮЧИТЕЛЬНО**

Руководитель (уполномоченное лицо) органа по сертификации (подпись) Валюгин Александр Сергеевич (Ф.И.О.)

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) Преловский Николай Николаевич

STATEMENT ◆ ERKLÄRUNG ◆ DÉCLARATION ◆ DECLARACIÓN ◆ DICHIARAZIONE

TÜV SÜD Italia

CERTIFICATE

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate number:

TÜV IT 12 ATEX 070 X Rev.3

[4] Equipment or Protective System: Electrical motors TUBE Series

[5] Manufacturer: RAEL motori elettrici S.r.l.

[6] Address: Via per Retorto 7/1
I-15077 Predosa (AL) - ITALY

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] TÜV Italia, notified body no. 0948 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. R 12 EX 040 rev.3

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0: 2018; EN 60079-1: 2014; EN 60079-7: 2015+ A1/2018; EN 60079-31: 2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

II 2G Ex db IIC T6...T4 Gb
II 2G Ex db eb IIC T6...T4 Gb
II 2D Ex tb IIIC T85°C..T135°C Db

This certificate may only be reproduced in its entirety and without any change, schedule included.

Issue date: 20th May 2024

ACCREDIA L'ENTE ITALIANO DI ACCREDITAMENTO
PRD N° 081B
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

09 48

TÜV Italia S.r.l.
Notified body N° 0948

Alberto Carelli
Industry Service - Real Estate & Infrastructure
Managing Director

TÜV Italia has been authorized by Italian government to operate as notified body for the certification of equipment or protective system intended for use in potentially explosive atmospheres. This document is not valid without official signature and logo. The internal reference code is 7222965596-3

PEX-01-M002_r07 del 29/03/2018

CONTENTS MIA & MIA(1)

1 TOLERANCES AND STANDARDS

1.1 For mechanical and electrical tolerances please see RL point 1.2
1.2 For Mia Standards please see RL standards in point 1.1

1.3 EQUIPMENT PROTECTION LEVEL (EPL) for MIA please see RL point 2.2

RAEL motors series MIA and MIA1 have the following types of protection:

-Ex eb IIC Increased safety (GAS) or Ex tb IIIC enclosures (DUST) or both markings

-Ex ec IIC Non-sparking (GAS) or Ex tc IIIC enclosures (DUST) or both markings

MIA Series motor

The motor with increased safety prevents sparking, arcing and hot spots during the service (including start conditions at locked rotor), which could lead to ignition of a potential explosive atmosphere that surrounds both the internal and external parts of the engine.
This is ensured under certain constructional and dimensional information concerning:
-Minimum distances through air and between the surfaces
-Use of high resistance trace-proof insulating materials
-Elimination of sharp edges that may accumulate static electricity and verification of a correct coupling between electrical and mechanical parts.
-minimum distance between the fixed and rotating parts (eg. between iron rotor / stator)
-limits of temperature rise, considering the locked rotor situation and normal operation in the most unfavorable thermal condition (power supply voltage to the lower or upper tolerance limit).

Thermal protection

a) When the protection against over temperatures is realized via amperometric device, it will be listed on the plate the ratio between the currents I_A / I_N and the time t_E (t_E must not be less than 5 sec while I_A / I_N should not be than 10)

b) When the protection against over temperatures is achieved via thermal protectors, placed inside the windings and connected to a release device, will be reported in the plate only current ratio I_A / I_N. The time t_E should not be shown on the nameplate

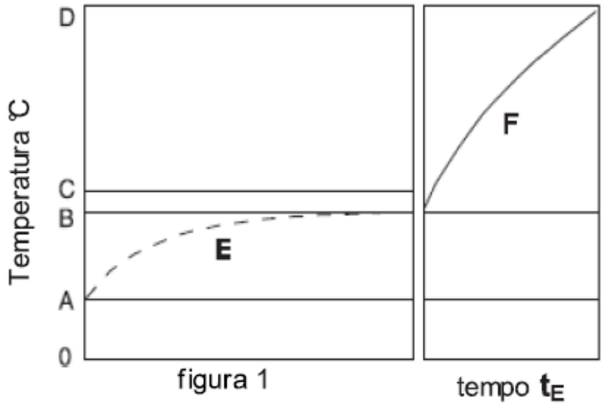


figura 1

O= temperature at 0°C
A= maximum ambient temperature
B= temperature at rated load and worst voltage conditions
C= max. temperature allowed by the insulation class
D= max limit of temperature(GAS temperature class)
E= Temperature rise curve at rated output and at worst voltage conditions
F= Temperature rise with locked rotor (t_E)

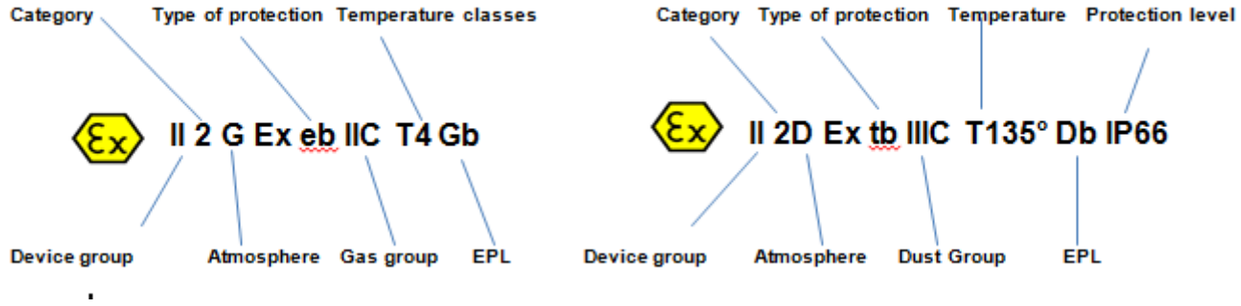
MIA1 Series motor

This type of protection is allowed in hazardous areas classified as Zone 2, which require a normal protection.
These constructions are known as non-sparking and the motor must be designed so that no spark is formed in the normal operating conditions. For the determination of the maximum allowable temperature are therefore excluding start-up situations with locked rotor

Protection through enclosures Ex tb (MIA) ed Ex tc (MIA1)

This type of protection prevents each transmission of explosive powders because the degree of IP protection prevents the dust from entering inside the motor, the maximum surface temperature of the motor does not exceed the temperature limit and no spark can escape from the housing of the motor.

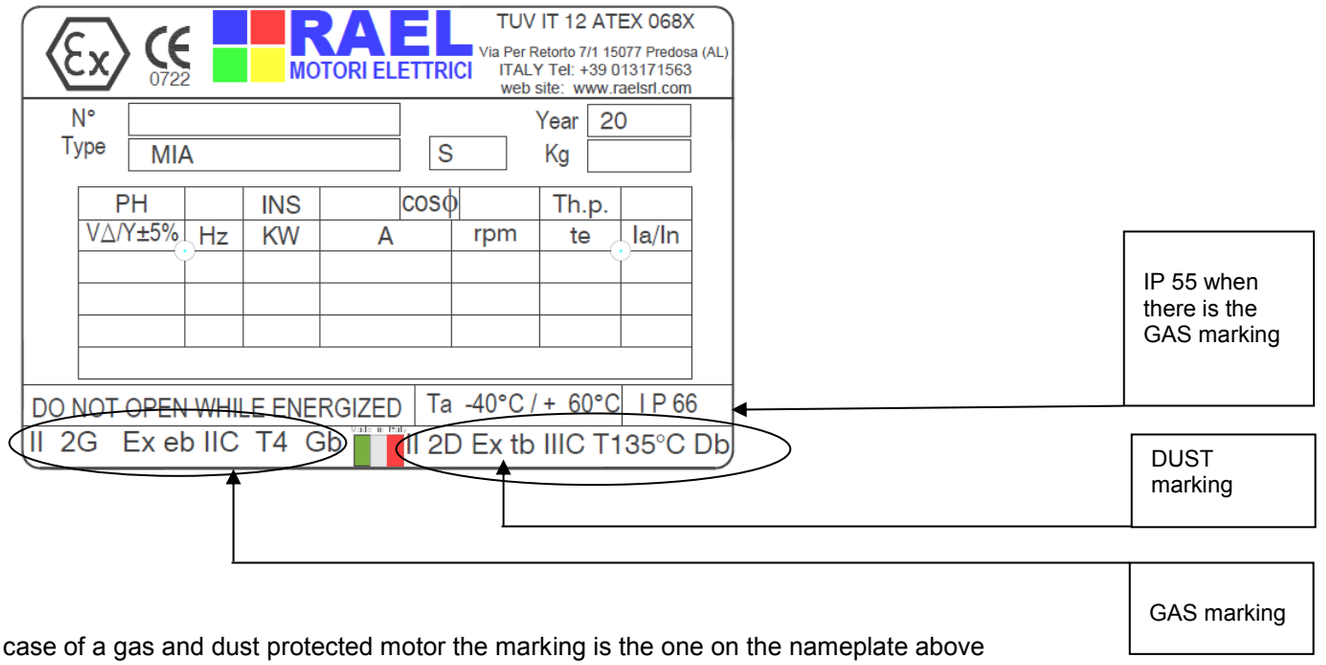
Marking example



2. EX markings or RAEL electric motors

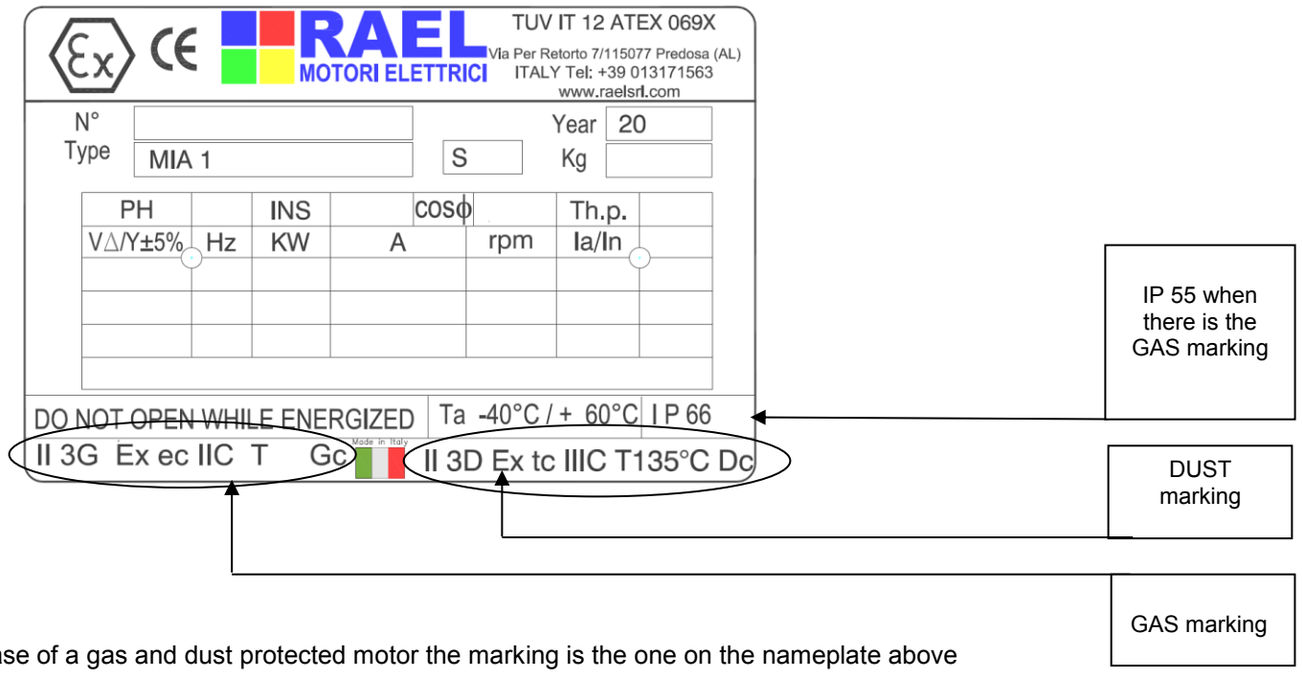
RAEL Ex motors have been designed to be used in applications with the presence of an explosive atmosphere due both to the presence of gases that the presence of combustible dust.

Motors for zone 1 and 21 (redundant for areas 2 e 22)



In case of a gas and dust protected motor the marking is the one on the nameplate above

Motors for zone 2 and 22



In case of a gas and dust protected motor the marking is the one on the nameplate above

3 GENERAL INFORMATION

3.1 Motors range

MIA and MIA1 series motors in this catalog are manufactured according to European standards of equipment and protective systems suitable for potentially explosive atmospheres in accordance with ATEX Directive 94/9/EC.
These motors according to ATEX directives are provided:
- Certificate of EC type
- Notification of Quality Assurance Product

These certificates are issued by notified bodies authorized to issue.

Series motors MIA (MIA 1) with IP55 protection are suitable for use in area 1 and area 2, while the IP66 are also suitable for use in zone 21 and zone 22.

Version	Frame size (mm)	Power (kW)	Poles	GAS group	Temperature class motors 2G	Surface temperature motors 2GD	Ambient temperature
Three phase 1 speed 2 - 4 - 6 - 8 Poli	56 – 160	0,06 – 18,5	2	IIC	T4	T 135° C	-40ºC a +60ºC
		0,06 – 15	4		T5	T 100° C	
		0,035 – 11	6				
		0,06 - 7,5	8		T6	T 85 ºC	
Three phase 2 speed Constant torque 2/4 - 4/8 – 4/6 – 6/8 poles	63 – 160	0,25/0,18 - 15/12	2/4	IIC	T4	T 135° C	-40ºC a +60ºC
		0,18/0,09 – 10/6,6	4/8		T5	T 100° C	
		0,2/0,1 – 8,8/5,9	4/6				
		0,08/0,12 – 5,5/4	6/8		T6	T 85 ºC	
Three phase 2 speeds Quadratic torque 2/4 - 4/8 – 4/6 – 6/8 poles	63 – 160	0,25/0,06 – 16/4,4	2/4	IIC	T4	T 135° C	-40ºC a +60ºC
		0,25/0,05 – 12/3,2	4/8		T5	T 100° C	
		0,3/0,1 – 11/3,3	4/6				
		0,33/0,09 – 7,5/4	6/8		T6	T 85 ºC	
Three phase for Inverter 2 - 4 - 6 - 8 Poli	56 – 160	0,06 – 18,5	2	IIC	T4	T 135° C	-40ºC a +60ºC
		0,06 – 15	4				
		0,035 – 11	6				
		0,06 – 7,5	8				
		0,06 – 1,6	4				
		0,06 – 1,1	6				

3.2 Main features

Motors MIA and MIA1 are in conformity with the Essential Health and Safety Requirements for potentially explosive atmospheres provided by European Standards: EN 60079-0, EN 60079-7, EN 60079-31.

- Three-phase and single-phase squirrel cage asynchronous induction motors.
- Aluminium modular motors, flanges and feet can be assembled and disassembled.
- Type of protection Ex e, (Ex tb) ,(Ex tc)
- Overall dimensions comply with IEC 60072 .
- Ventilations **IC 411** (Self ventilated).
- Voltage 230/400 V ± 5% Δ/Y (56 - 112), 400/690 V ± 5% Δ/Y (132 - 160), frequency 50 Hz ± 2%.
- Insulation Class F.
- Wiring produced using enameled copper wires with double insulating coat, and varnished with a third layer dried in oven.
- Protection degree IP55 for area 1 and area 2, IP66 for area 21 and area 22.
- Maximum noise level 80 dB (A).
- Fan cover in sheet metal
- Low friction dust seals.
- Motor carcass and flanges IEC 60072-1compliant, made using die cast aluminum with high mechanical strength
- Duty cycle S1
- Standard ambient temperature -40°C; +60°C

3.3 Main options

- Motors 2D protection degree IP66 suitable for zone 21 and zone 22(MIA) , and 3D for zone 22 (MIA1)
- Special Powers on frame 132 and 160
- Thermal protections (PTC or PTO probes).
- Heating resistors anti condensation
- Insulation class H.
- Tropicalized motors
- Motors suitable for inverters
- Special shafts
- Special flanges
- Terminal box in right and left position.
- Temperature class T5 and T6.
- Standard painting
- Special painting for marine environment

Tests

All motors RAEL are 100% tested, both at the beginning of production (test of winding) and at the end of production (electrical test).

On request we can conduct specific tests:

- Routine Test- a test to which each individual machine is subjected during or after manufacture to ascertain whether it complies with certain criteria
- Type test – a test of one or more machines made to a certain design to show that the design meets certain specifications
- Specific type test - a bench test performed on a machine with a specific serial number
- Heating test

4 CABLE ENTRY, TERMINAL BOX AND WIRING DIAGRAM

4.1 Cable entries and terminal box

Having the ability of mounting the feet in three different positions (size 63-71) is then possible to have the terminal box is at the top (A) on the right side (C) and on the left side (B) of the motor as shown in figure 1.
The terminal box can be mounted on the motor so as to have the output cables in the four positions shown in Figure 2.
Standard installation of the terminal box is in position A-4

Cable entries		
Frame	**T-BOX (standard)**	**CASING(optional)**
56 - 71	N.2 M x M16 STD	N.2 M16 + N.2 M20
80 - 112	N.1 x M20 + N.1 x M25 STD	2 x M20 + N.2 x M25
132-160	N. 2 x M32	N/A

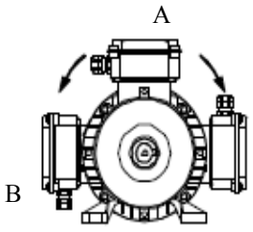


Figura 1

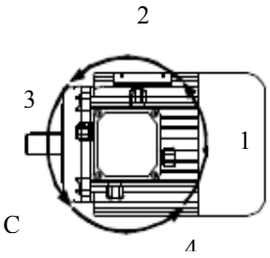
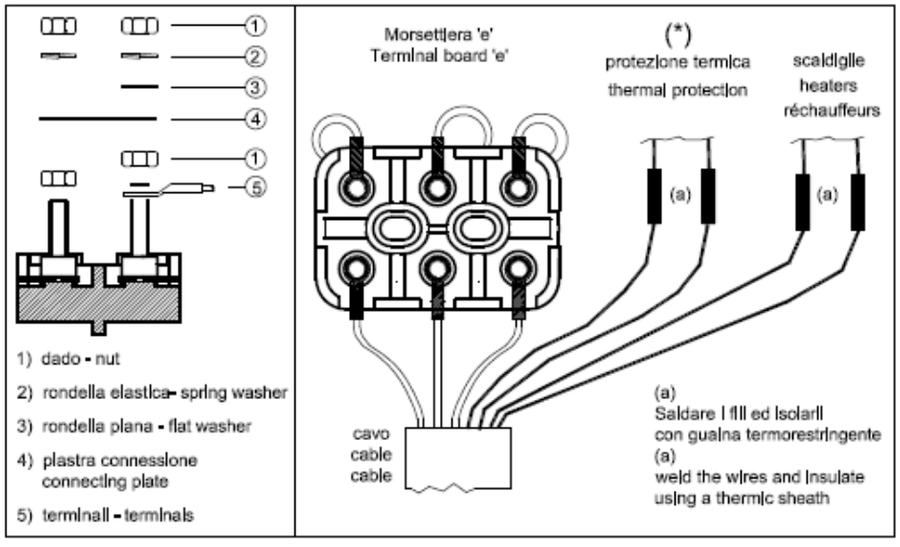


Figura 2

Motors with frame size from 56 to 90 use M4 terminals, motors with frame size 100 to 112use M5 terminal, motors with frame size 132 to 160 use M6 terminals.



4.2 WIRING DIAGRAMS- please see RL point 3.4 (single phase excluded)

5 MECHANICAL CHARACTERISTICS –please see RL point 4

5.1 MAIN COMPONENTS MATERIAL

Material								
Shield fames flanges terminal box	**Shaft**	**Rotor**	**Fan**	**Fan cover**	**Tie rods**	**Screw**	**Cable glands**	**Motor Plate**
Aluminium	Steel 35S20	Die-cast Aluminium (squirrel cage)	Thermoplastic material	Zinc-plated steel	Steel 4.8	Steel 8.8	plastic	Anodized aluminium

For Bearings please see MIA

Rings for shafts

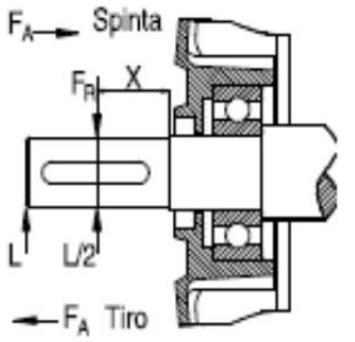
MIA and MIA1motors can be equipped with seals to ensure a degree of protection IP66. In this way the motor is protected from ingress of dust and contaminants.

Motor		Rings	
Frame size	**Poles**	**Front**	**Rear**
56	2 - 4 - 6 - 8	v-ring Ø12	v-ring Ø12
63	2 - 4 - 6 - 8	v-ring Ø14	v-ring Ø14
71	2 - 4 - 6 - 8	v-ring Ø14	v-ring Ø14
80	2 - 4 - 6 - 8	v-ring Ø20	v-ring Ø20
90	2 - 4 - 6 - 8	v-ring Ø25	v-ring Ø25
100	2 - 4 - 6 - 8	v-ring Ø30	v-ring Ø30
112	2 - 4 - 6 - 8	v-ring Ø30	v-ring Ø30
132	2 - 4 - 6 - 8	v-ring Ø40	v-ring Ø40
160	2 - 4 - 6 - 8	v-ring Ø45	v-ring Ø45

5.2 RADIAL FORCE PERMISSIBLE AT THE SHAFT END

The table below shows the permissible radial load (F_R) position in the L / 2, assuming the engine operating at 50 Hz and a working life of the bearings of at least 20,000 hours for 2-pole motors and engines 40,000 hours for 4 - 6-8 poles.
For operation 60Hz these values should be reduced by 10%. For double speed motors take as a reference the highest speed

Considering the load FR applied in the X position equal to L / 2 we have the load limit values shown in the table:



Motor	Bearing type		C Dynamic load (N)	FR in X=L/2 (N)			
	Front	Rear		2 poles	4 poles	6 poles	8 poles
56	6201-ZZ	6201-ZZ	6950	317	317	-	-
63	6202-ZZ	6202-ZZ	7800	356	356	408	449
71	6202-ZZ	6202-ZZ	7800	356	356	408	449
80	6204-ZZ	6204-ZZ	12700	580	580	664	731
90	6205-ZZ	6205-ZZ	14000	639	639	732	806
100	6206-ZZ	6206-ZZ	19300	881	881	1009	1111
112	6306-ZZ	6306-ZZ	29000	1325	1325	1516	1669
132	6308-ZZ	6308-ZZ	42500	1941	1941	2222	2446
160	6309-ZZ	6309-ZZ	53000	2421	2421	2771	3050

Axial forces permissible on the shaft

The table below shows the maximum axial loads (F_A) Permitted on the motor bearings, these values are provided from the bearing manufacturers and learned through experience. The value is about 2% of the dynamic load of the bearing indicated in the above table.

Motor	F_A (N)
56	139
63	156
71	156
80	254
90	280
100	386
112	580
132	850
160	1000

For applications with pulley and belt the maximum radial load Fr is given by

P = weight of the pulley [N]
F = tension of the belt [N] = (2. K. M) / D where
K = factor for belt tension belt (K = 3 for flat belt without belt tensioner, K = 2.2 ver V-belt, flat belt for K = 2
D = diameter of pulley [m]
M = torque [Nm] = 9550 P / n where
P = shaft power [kW]
n = rotational speed [rpm]

6 ELECTRICAL DATA

Code	Type				P kW	P hp	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos φ	M_n Nm	M_a/M_n	m Kg	Class T	Moment of inertia J 10^{-3}	Nominal Value of Efficiency
1 Speed 3000 Rated data at 400V/50Hz – direct on line start																
MIA0042	MIA	56	A	2	**0,06**	0,08	2730	0,5	4	0,4	0,2	3,5		T4/T5/T6	0,09	43%
MIA0043	MIA	56	A	2	**0,09**	0,12	2730	0,53	4	0,5	0,3	4,0		T4/T5/T6	0,09	51,5%
2MIA0044	MIA	56	B	2	**0,12**	0,16	2848	0,56	3.5	0,54	0,4	4	3,2	T4/T5/T6	0,1	IE2=53.6%
2MIA0001	MIA	63	A	2	**0,12**	0,16	2730	0,4	3.1	0,8	0,4	3,3	3,9	T4/T5/T6	0,13	IE2=53,6%
2MIA0002	MIA	63	A	2	**0,18**	0,25	2870	0,6	3.6	0,7	0,6	3,8	3,9	T4/T5/T6	0,13	IE2=60,4%
2MIA0003	MIA	63	B	2	**0,25**	0,34	2840	0,74	4.3	0,7	0,9	3,5	4,9	T4/T5/T6	0,19	IE2=64,8%
2MIA0004	MIA	71	A	2	**0,37**	0,50	2850	0,9	4.8	0,8	1,3	3	5,6	T4/T5/T6	0,36	IE2=69,5%
2MIA0005	MIA	71	B	2	**0,55**	0,75	2810	1,5	3.8	0,8	2,1	3	6,6	T4/T5/T6	0,46	IE2=74,1%
3MIA0006	MIA	80	A	2	**0,75**	1,00	2820	1,8	5	0,85	2,6	2,4	9,6	T4/T5/T6	0,76	IE3=80,7%
3MIA0007	MIA	80	B	2	**1,10**	1,50	2850	2,4	5.8	0,88	3,8	3	10,8	T4/T5/T6	0,89	IE3=82,7%
3MIA0008	MIA	90	L	2	**1,50**	2,00	2800	3,4	5	0,86	5,2	2,9	12,4	T4/T5/T6	1,37	IE3=84,2%
3MIA0009	MIA	90	L	2	**2,20**	3,00	2860	4,4	5.4	0,84	7,5	3	16,5	T4/T5/T6	1,8	IE3=85,9%
3MIA0032	MIA	100	LA	2	**3,00**	4,00	2880	5,5	6	0,84	10,2	2,6	25,8	T4/T5/T6	2,8	IE3=87,1%
3MIA0033	MIA	112	M	2	**4,00**	5,50	2880	7,4	5,8	0,89	13,2	2,6	30,5	T4/T5/T6	5,2	IE3=88,1%
3MIA0049	MIA	132	SA	2	**5,50**	7,50	2938	10,21	6,7	0,9	18,3	2,6	43,5	T4/T5/T6	10,63	IE3=89,2%
3MIA0050	MIA	132	MB	2	**7,50**	10,00	2920	13,3	6,9	0,91	24,7	2,9	48,4	T4/T5/T6	13,83	IE3=90,1%
3MIA0051	MIA	132	ML	2	**9,00**	12,00	2930	16	6,9	0,89	30,5	2,9	57,7	T4/T5/T6	17,31	IE3=90,8%
3MIA0053	MIA	160	MA	2	**11,00**	15,00	2930	19,03	7,9	0,9	36	2,8	65,8	T4/T5/T6	40	IE3=91,2%
3MIA0054	MIA	160	MB	2	**15,00**	20,00	2950	26,3	8	0,9	49	3,1	112	T4/T5/T6	51,75	IE3=91,9%
3MIA0055	MIA	160	L*	2	**18,50**	25,00	2940	33,04	8,0	0,88	60	3,1	128	T4/T5/T6	64	IE3=92,4%

Code	Type				P kW	P hp	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos □	M_n Nm	M_a/M_n	m Kg	T Class	Moment of inertia J 10^{-3} Kg.m^2	Nominal Value of Efficiency
1 Speed 1500 Rated data at 400V/50Hz – direct on line start																
MIA0045	MIA	56	A	4	**0,06**	0,08	1360	0,4	3,5	0,68	0,4	4	3	T4/T5/T6	0,14	64%
MIA0046	MIA	56	B	4	**0,09**	0,12	1360	0,45	3	0,665	0,6	3,5	3,3	T4/T5/T6	0,14	66,5%
2MIA0010	MIA	63	A	4	**0,12**	0,16	1430	0,51	3,3	0.6	0,9	3	4	T4/T5/T6	0,25	IE2=59,1%
2MIA0011	MIA	63	B	4	**0,18**	0,25	1410	0,75	3,5	0.66	1,3	2.2	4,8	T4/T5/T6	0,27	IE2=64,7%
2MIA0012	MIA	71	A	4	**0,25**	0,34	1415	0,8	3	0,63	1,8	2,2	0,63	T4/T5/T6	0,63	IE2=68,5%
2MIA0013	MIA	71	B	4	**0,37**	0,50	1400	1,1	3,4	0,65	2,6	2,4	6,8	T4/T5/T6	0,76	IE2=72,7%
2MIA0014	MIA	80	A	4	**0,55**	0,75	1410	1,5	4,4	0,7	3,8	2,2	7,9	T4/T5/T6	1,6	IE2=77,1%
3MIA0015	MIA	80	B	4	**0,75**	1,00	1440	2	4,9	0,7	5,2	1,9	11	T4/T5/T6	2,1	IE3=82,5%
3MIA0016	MIA	90	L	4	**1,10**	1,50	1449	2,7	4,2	0.7	7,7	2,3	15,6	T4/T5/T6	2,5	IE3=84,1%
3MIA0017	MIA	90	L	4	**1,50**	2,00	1420	3,3	5	0.8	10,4	3	15,6	T4/T5/T6	3,13	IE3=85,3%
3MIA0034	MIA	100	LA	4	**2,20**	3,00	1440	5,5	5	0,8	15,1	2,3	25	T4/T5/T6	4,5	IE3=86,7%
3MIA0035	MIA	100	LB	4	**3,00**	4,00	1435	6,55	6	0.8	20,1	2,6	26,7	T4/T5/T6	5,58	IE3=87,7%
3MIA0036	MIA	112	M	4	**4,00**	5,50	1440	8,8	6	0.8	26,8	2,7	32	T4/T5/T6	12,2	IE3=88,6%
3MIA0056	MIA	132	MB	4	**5,50**	7,50	1450	11,94	6,1	0,8	36	2,4	46,9	T4/T5/T6	22,4	IE3=89,6%
3MIA0057	MIA	132	ML	4	**7,50**	10,00	1450	14,4	6,6	0,84	49,5	2,4	50	T4/T5/T6	32,5	IE3=90,4%
3MIA0059	MIA	160	MB	4	**11,00**	15,00	1460	21,97	5,5	0,85	72	2,6	118	T4/T5/T6	85	IE3=91,4%
3MIA0060	MIA	160	L*	4	**15,00**	20,00	1470	29,5	5,8	0,83	97,1	2,6	133	T4/T5/T6	105,75	IE3=92,1%

- **Certificate TUV IT12 ATEX 068X FOR MOTORS Ex eb**
- **Certificate TUV IT12 ATEX 069X FOR MOTORS Ex ec**

Code	Type			P	kW	Hp	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos φ	M_n Nm	M_a/M_n	m Kg	Classe T Class	Moment of inertia J 10^{-3} $Kg.m^2$	Nominal Value of Efficiency
					1 Speed 1000			Rated data at 400V/50Hz – direct on line start								
2MIA0018	MIA	63	B	6	**0,12**	0,16	930	0,55	2.6	0,5	1,3	2,6	6,3	T4/T5/T6	0,3	IE2=50,6%
2MIA0019	MIA	71	A	6	**0,18**	0,25	925	0,76	2.8	0,6	2,0	2,4	6,5	T4/T5/T6	0,6	IE2=56,6%
2MIA0020	MIA	71	B	6	**0,25**	0,34	920	1,0	2.9	0,6	2,7	3,1	7	T4/T5/T6	0,9	IE2=61,6%
2MIA0021	MIA	80	A	6	**0,37**	0,50	935	1,25	3,9	0,61	3,8	2,6	7,7	T4/T5/T6	1,97	IE2=67,6%
2MIA0022	MIA	80	B	6	**0,55**	0,75	930	1,7	3,5	0,7	5,8	2,8	10,4	T4/T5/T6	2,47	IE2=73,1%
3MIA0023	MIA	90	L	6	**0,75**	1,00	940	2,7	3,5	0,7	7,9	2,3	16	T4/T5/T6	3,18	IE3=78,9%
3MIA0024	MIA	90	L	6	**1,10**	1,50	930	3,1	3,7	0,7	11,6	2,3	17,1	T4/T5/T6	4,78	IE3=81%
3MIA0037	MIA	100	LB	6	**1,50**	2,00	940	3,8	3,8	0,75	15,2	1,7	23	T4/T5/T6	6,73	IE3=82,5%
3MIA0038	MIA	112	M	6	**2,20**	3,00	950	5,4	4,7	0,75	22,4	1,8	26	T4/T5/T6	14,18	IE3=84,3%
3MIA0061	MIA	132	SB	6	**3,00**	4,00	960	6,75	4,5	0,8	30,3	1,7	38	T4/T5/T6	23,53	IE3=85,6%
3MIA0062	MIA	132	MB	6	**4,00**	5,50	950	8,64	4,5	0,78	39,0	1,8	47	T4/T5/T6	29,5	IE3=86,8%
3MIA0063	MIA	132	ML	6	**5,50**	7,50	950	11,5	4,6	0,8	55,0	1,8	57	T4/T5/T6	37,75	IE3=88%
3MIA0064	MIA	160	L	6	**7,50**	10,00	965	15,9	4,5	0,8	75,6	1,8	65	T4/T5/T6	81,25	IE3=89,1%
3MIA0065	MIA	160	LL	6	**11,00**	15,00	955	23,5	4,6	0,75	110	1,8	125	T4/T5/T6	105,75	IE3=90,3%

Code	Type			P	kW	CV	rpm min^{-1}	In 400 V Amp.	I_a/I_n	Cos φ	M_n Nm	M_a/M_n	m Kg	Classe T Class	Moment of inertia J10^{-3} $Kg.m^2$	Nominal Value of Efficiency
					1 speed		750 rpm	Rated data at 400V /50Hz -direct on line start								
MIA0026	MIA	71	A	8	**0,09**	0,12	660	0,75	2.2	0.63	1,3	2.7	6	T4/T5/T6	0,9	38%
2MIA0027	MIA	71	B	8	**0,12**	0,16	640	0,7	2	0,7	1,8	2,3	7,8	T4/T5/T6	0,9	IE2=39,8%
2MIA0028	MIA	80	A	8	**0,18**	0,25	690	0,95	2,8	0,6	2,5	2,7	10,2	T4/T5/T6	1,2	IE2=45,9%
2MIA0029	MIA	80	B	8	**0,25**	0,34	700	1,2	2,9	0,55	3,6	2,8	11,4	T4/T5/T6	1,97	IE2=50,6%
2MIA0030	MIA	90	S	8	**0,37**	0,50	680	1,3	3	0,69	5,2	1,6	15,8	T4/T5/T6	3,18	IE2=56,1%
2MIA0031	MIA	90	L	8	**0,55**	0,75	670	1,85	3	0,63	7,7	2,4	18,5	T4/T5/T6	4,78	IE2=61,7%
3MIA0039	MIA	100	LA	8	**0,75**	1,00	700	2,6	3,4	0,65	10	2,3	20,8	T4/T5/T6	6,72	IE3=75%
3MIA0040	MIA	100	LB	8	**1,10**	1,50	690	3	3,7	0,73	15,6	1,8	22,5	T4/T5/T6	15,93	IE3=77,7%
3MIA0041	MIA	112	M	8	**1,50**	2,00	705	4,3	4,1	0,65	20,2	1,9	27,6	T4/T5/T6	16,7	IE3=79,8%
3MIA0066	MIA	132	SB	8	**2,20**	3,00	705	5,2	3,8	0,75	30,2	1,8	37,5	T4/T5/T6	29,5	IE3=81,9%
3MIA0067	MIA	132	MB	8	**3,00**	4,00	710	7	4	0,74	40,0	1,9	47	T4/T5/T6	37,75	IE3=83,5%
3MIA0068	MIA	160	MA	8	**4,00**	5,50	710	9	4,1	0,78	52,0	1,9	92,5	T4/T5/T6	89,5	IE3=84,8%
3MIA0069	MIA	160	MB	8	**5,50**	7,50	715	12,3	4	0,76	72,5	2,1	102	T4/T5/T6	119,5	IE3=86,2%
3MIA0070	MIA	160	L	8	**7,50**	10,00	720	15,9	4,2	0,79	99,8	2,3	118	T4/T5/T6	150,25	IE3=87,3%

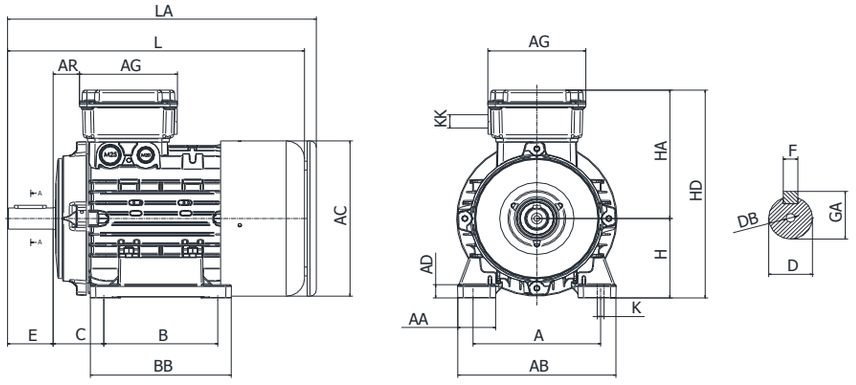
- **Certificate TUV IT12 ATEX 068X FOR MOTORS Ex eb**
- **Certificate TUV IT12 ATEX 069X FOR MOTORS Ex ec**

6.1 Three phase 2 speed motors Constant Torque - See RL point 5.2

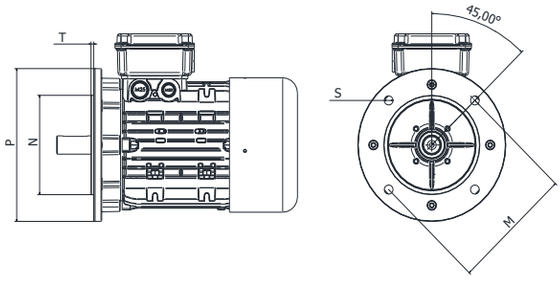
6.2 Three-phase Motors 2 –speed Quadratic torque see RL point 5.3

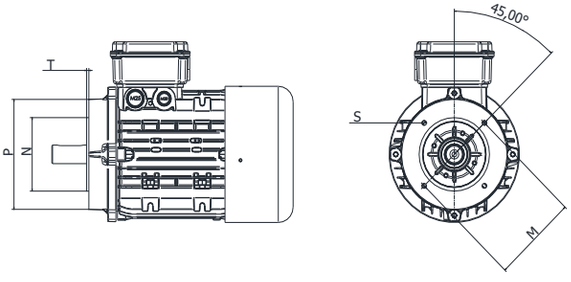
7. OVERALL DIMENSION

7.1 Three phase motors



Tipo	Mounting B3																Shaft				
	A	AA	AB	AC	AD	AG	AR	B	BB	C	K	KK	H	HA	HD	L	LA	D	DB	E	F	GA
56	90	21	108	110	10	100	12	71	90	36	6	2xM16	56	104	160	187	L+9	9j6	M3	20	3	10,2
63	100	28	120	124	10	100	12	80	105	40	7	2xM16	63	106	169	214	L+12	11j6	M4	23	4	12,5
71	112	30	137	138	12	100	18	90	110	45	7	2xM16	71	119	190	240	L+12	14j6	M5	30	5	16
80	125	32	154	156	13	108	26	100	125	50	9	M20-M25	80	142	222	275	L+11	19j6	M6	40	6	21,5
90S	140	42	178	176	15	108	29	100	130	56	9	M20-M25	90	146	236	304	L+15	24j6	M8	50	8	27
90L	140	42	178	176	15	108	29	125	155	56	9	M20-M25	90	146	236	325	L+15	24j6	M8	50	8	27
100	160	37	192	194	16	108	36	140	175	63	12	M20-M25	100	157	257	368	L+12	28j6	M10	60	8	31
112	190	40	224	218	16	108	38	140	176	70	12	M20-M25	112	167	279	385	L+11	28j6	M10	60	8	31
132S	216	58	258	258	18	121	46	140	180	89	12	2xM32	132	191	323	455	L+15	38k6	M12	80	10	41
132M	216	58	258	258	18	121	46	178	218	89	12	2xM32	132	191	323	495	L+15	38k6	M12	80	10	41
160M	254	72	318	310	22	186	50	210	264	108	14	2xM32	160	245	405	598	L+20	42k6	M16	110	12	45
160L	254	72	318	310	23	186	50	254	306	108	14	2xM32	160	245	405	641	L+20	42k6	M16	110	12	45





Mounting B5					
8 fori - 45°					
Tipo	**P**	**N**	**M**	**S**	**T**
56	120	80j6	100	7	3
63	140	95j6	115	9	3
71	160	110j6	130	10	3,5
80	200	130j6	165	12	3,5
90S	200	130j6	165	12	3,5
90L	200	130j6	165	12	3,5
100	250	180j6	215	15	4
112	250	180j6	215	15	4
132S	300	230j6	265	15	4
132M	300	230j6	265	15	4
160M	350	250h6	300	18	5
160L	350	250h6	300	18	5

Mounting B14					
8 fori - 45°					
Tipo	**P**	**N**	**M**	**S**	**T**
56	80	50j6	65	M4	2,5
63	90	60j6	75	M5	2,5
71	105	70j6	85	M6	2,5
80	120	80j6	100	M6	3
90S	140	95j6	115	M8	3
90L	140	95j6	115	M8	3
100	160	110j6	130	M8	3,5
112	160	110j6	130	M8	3,5
132S	200	130j6	165	M10	3,5
132M	200	130j6	165	M10	3,5
160M	250	180h6	215	M12	4
160L	250	180h6	215	M12	4

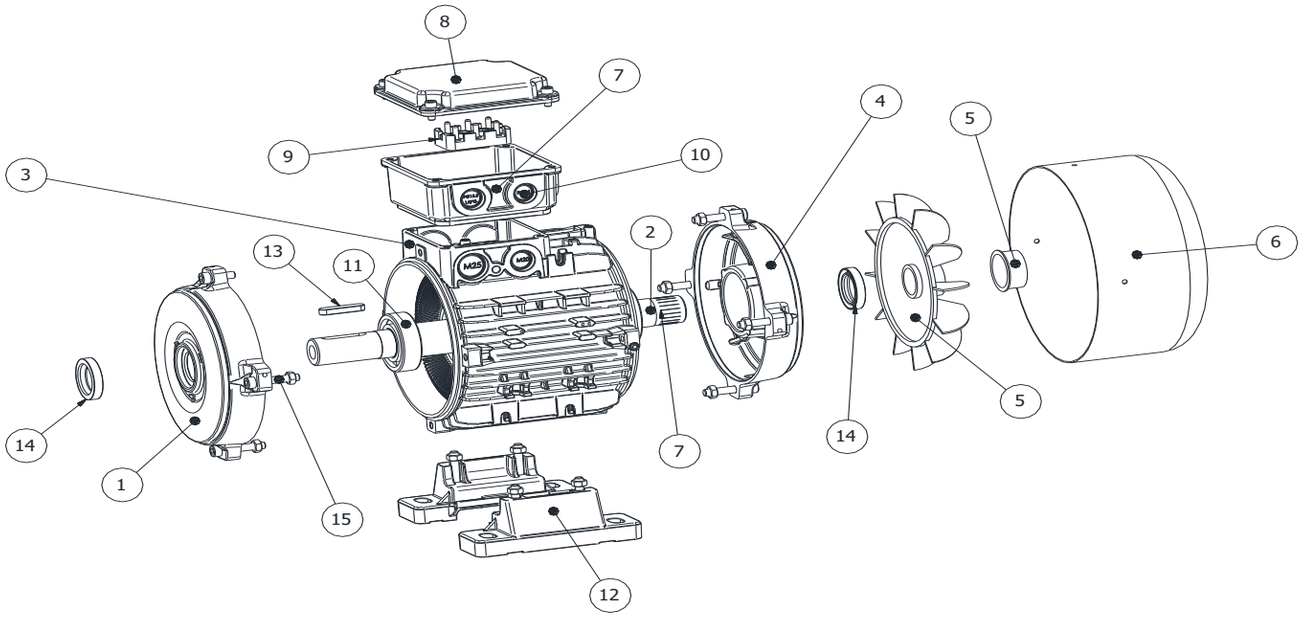
8 SPARE PARTS

8.1 Personnel qualification

Overhauls and repairs must be only realised by qualified people in accordance with the standards EN 60079-17 or national standards (last edition). Qualified people must have knowledge about explosion protection.
Repairs must be made regarding the rules as define in EN 60079-19 standards.
These repairs can only be done under the control or agreement with RAEL Motori Elettrici by a repair shop designed by RAEL or a recognized laboratory.
In case these rules are not respected, RAEL liability is released.

8.2 List of spare parts

All motors components must be replaced by original spare parts. In these cases please contact RAEL directly and give the serial number of the motor so to ask the authorization to repair the motor too.



1	DRIVE END SHIELD	6	FAN COVER	11	BALL BEARINGS
2	SHAFT WITH ROTOR	7	TERMINAL BOX	12	MOTOR FEET
3	FRAME	8	TERMINAL BOX COVER	13	FLANGE B14 (or B5)
4	NO-DRIVE END SHIELD	9	TERMINAL BLOCK	14	ABY ANGULAR BEARING
5	COOLING FAN	10	CABLE GLAND	15	TIE RODS (quality 4.8)

9.Warranty

The warranty period expends to 12 months from the motor shipment date, unless different agreements are recorded in written .

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

EAC

№ ЕАЭС RU C-IT.AA87.B.00823/21

Серия RU № 0344060

ОРГАН ПО СЕРТИФИКАЦИИ Орган по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»). Адрес места нахождения юридического лица: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», литера В, Объект 6, этаж 3, офис 26. Адрес места осуществления деятельности и области аккредитации: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», Литера В, Объект 6, этаж 3, офисы 26/3, 26/4, 26/5, 27/6, 30/1, 32. Аттестат № RA.RU.11AA87 от 20.07.2015 г. Телефон: +7 (495) 558-83-53, +7 (495) 558-82-44. Адрес электронной почты: ccve@ccve.ru

ЗАЯВИТЕЛЬ Общество с ограниченной ответственностью «Вулкан Пумпен Рус»
Адрес места нахождения юридического лица и адрес места осуществления деятельности: Россия, 196650, Санкт-Петербург, город Колпино, улица Финляндская, дом 31, пом. 48.
ОГРН: 1107847122239. Телефон: +7 (812) 951 58-06. Адрес электронной почты: sale@vpumpen.ru

ИЗГОТОВИТЕЛЬ RAEL Motori Elettrici S.r.l.
Адрес места нахождения юридического лица и адрес места осуществления деятельности по изготовлению продукции: Via Per Retorto 7/1, 15077 Predosa (AL), Италия.

ПРОДУКЦИЯ Взрывозащищенные электродвигатели серий AD-PE, RL, RLM, MIA и MIA1, TUBE с Ex-маркировкой согласно приложению (см. бланки №№ 0855097, 0855098). Документы, в соответствии с которыми изготовлены изделия - см. приложение, бланк № 0855096. Серийный выпуск

КОД ТН ВЭД ЕАЭС 8501 51000, 8501 52 200, 8501 40 200, 8501 40 800

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ
ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах»

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ
Протоколов испытаний № 350.2021-Т от 25.10.2021, № 350/1.2021-Т от 25.10.2021 Испытательной лаборатории технических устройств Автономной некоммерческой организации «Национальный испытательный и научно-исследовательский институт оборудования для взрывоопасных сред» ИЛ Ex ТУ (аттестат № РОСС RU.0001.21МШ19 выдан 16.10.2015); Акта анализа состояния производства № 43-ДА/21 от 27.05.2021 Органа по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»); Документов, представленных заявителем в качестве доказательства соответствия продукции требованиям ТР ТС 012/2011 (см. приложение, бланк № 0855096). Схема сертификации – 1с

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ
Перечень стандартов, применяемых на добровольной основе для соблюдения требований ТР ТС 012/2011 (см. приложение, бланк № 0855096). Условия и срок хранения указаны в эксплуатационной документации. Назначенный срок службы – 12 лет. Анализ состояния производства проведен посредством дистанционной оценки.

СРОК ДЕЙСТВИЯ С 08.11.2021 **ПО** 07.11.2026 **ВКЛЮЧИТЕЛЬНО**

Руководитель (уполномоченное лицо) органа по сертификации — (подпись) — Зеленин Александр Сергеевич (Ф.И.О.)

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) — (подпись) — Преловский Николай Николаевич

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

TÜV SÜD Italia

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate number:

TÜV IT 12 ATEX 068 X Rev.3

[4] Equipment or Protective System: Electrical motor Series MIA (CAT2)

[5] Manufacturer: RAEL motori elettrici S.r.l.

[6] Address: Via per Retorto 7/1
I-15077 Predosa (AL) - ITALY

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] TÜV Italia, notified body no. 0948 in accordance with Article 17 of Directive 2014/34/EU of the European Parliament and of the Council, dated 26 February 2014, certifies that this product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of products intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. R 12 EX 038

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018; EN IEC 60079-7:2015/A1:2018; EN 60079-31:2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EU - TYPE EXAMINATION CERTIFICATE relates only to the design and construction of the specified product. Further requirements of the Directive apply to the manufacturing process and supply of this product. These are not covered by this certificate.

[12] The marking of the product shall include the following:

Ex **II 2G Ex eb IIC T6...T4 Gb**
II 2D Ex tb IIIC T85°C..T135°C Db

This certificate may only be reproduced in its entirety and without any change, schedule included.

Issue date: 18th May 2023

ACCREDIA
PRD N° 081B
Member degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

09 48

TÜV Italia S.r.l.
Notified body N° 0948

Alberto Carelli
Industry Service - Real Estate & Infrastructure
Managing Director

TÜV Italia has been authorized by Italian government to operate as notified body for the certification of equipment or protective system intended for use in potentially explosive atmospheres. This document is not valid without official signature and logo. The internal reference code is 722296936-1.

PEX-01-M002_r07 del 29/03/2018

ZERTIFIKAT ◆ CERTIFICATE ◆ 認證證書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

CERTIFICATE

TÜV SÜD Italia

[1] **TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] Type Examination Certificate number:

TÜV IT 12 ATEX 069 X Rev.3

[4] Equipment or Protective System: Electrical motor Series MIA1 (CAT3)

[5] Manufacturer: RAEL motori elettrici S.r.l.

[6] Address: Via per Retorto 7/1
I-15077 Predosa (AL) - ITALY

[7] This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] TÜV Italia certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no. R 12 EX 039

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0:2018; EN IEC 60079-7:2015/A1:2018; EN 60079-31:2014

[10] If the sign "X" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.

[12] The marking of the product shall include the following:

Ex **II 3G Ex ec IIC T6...T4 Gc**
II 3D Ex tc IIIC T85°C..T135°C Dc

This certificate may only be reproduced in its entirety and without any change, schedule included.

Issue date: 19th May 2023

TÜV Italia S.r.l.
Notified body N° 0948

Alberto Carelli
Industry Service - Real Estate & Infrastructure
Managing Director

TÜV Italia has been authorized by Italian government to operate as notified body for the certification of equipment or protective system intended for use in potentially explosive atmospheres. This document is not valid without official signature and logo. The internal reference code is 722296936-2.

PEX-01-M002_r07 del 29/03/2018

BrakEx Series Electrical Motors

Contents

1.STANDARDS

NAME	EU-CENELEC	INTERN.-IEC
Rotating electrical machines Part 1: Rating and performance	EN 60034-1	IEC 60034-1
Rotating electrical machines Part 2-3: Specific test methods for determining losses and efficiency of converter-fed AC motors	EN 60034-2	IEC 60034-2
Rotating electrical machines Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) - Classification	EN 60034-5	IEC 60034-5
Rotating electrical machines Part 6: Methods of cooling (IC Code)	EN 60034-6	IEC 60034-6
Rotating electrical machines Part 7: Classification of types of construction, mounting arrangements, and terminal box position (IM Code)	EN 60034-7	IEC 60034-7
Rotating electrical machines Part 9: Noise limits	EN 60034-9	IEC 60034-9
Rotating electrical machines Part 12: Starting performance of single-speed three-phase cage induction motors	EN 60034-12	IEC 60034-12
Rotating electrical machines Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher - Measurement, evaluation and limits of vibration severity	EN 60034-14	IEC 60034-14
Dimensions and output series for rotating electrical machines Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080	EN 50347	IEC 60072-1
Degrees of protection provided by enclosures (IP Code)	EN 60259	IEC 529
Explosive atmospheres Part 0: Equipment - General requirements	EN IEC 60079-0	IEC 60079-0
Explosive atmospheres Part 1: Equipment protection by flameproof enclosures "d"	EN 60079-1	IEC 60079-1
Explosive atmospheres Part 7: Equipment protection by increased safety "e"	EN IEC 60079-7	IEC 60079-7
Explosive atmospheres Part 31: Equipment dust ignition protection by enclosure "t"	EN 60079-31	IEC 60079-31

2.TOLERANCE

3. ADITIONAL INFORMATION ON INVERTERS

Description	Tolerance
Distance between feet securing holes (front view)	±1 mm
Distance between feet (front view)	+2%
Motor diameter (without terminal box)	+2%
Distance between feet securing holes (side view)	±1 mm
Distance between the shaft shoulder and the first feet securing hole	±3 mm
Shaft diameter	Ø11-28 mm: j6 Ø32-48 mm: k6 Ø ≥55 mm: m6
Length of the shaft from the shaft shoulder	Ø < 55mm: -0,3 mm Ø > 60mm: +0,5 mm
Keyway width	h9
Distance between the key top and the bottom of the shaft	+0,2 mm
Distance between the shaft axis and the bottom of the motor feet	H≤250 mm: -0,5 mm H≥280 mm: -1 mm
Distance between the top of the terminal box and the bottom of the motor feet	+2%
Feet mounting holes diameter / width of the feet buttonholes	+3%
Motor length (with 1 driveshaft end)	+1%
Distance between the flange mounting holes centers	± 0,8 mm
Flange shoulder diameter	Ø < 230 mm: j6 Ø ≥ 250 mm: h6
Flange external diameter	± 1 mm
Distance between the shaft shoulder and the flange shoulder	± 3 mm
Flange mounting holes diameter or thread diameter	+3%
Distance between shaft shoulder and flange shoulder, with locked bearing	± 0,5 mm
Motor weight	-5% to +10%

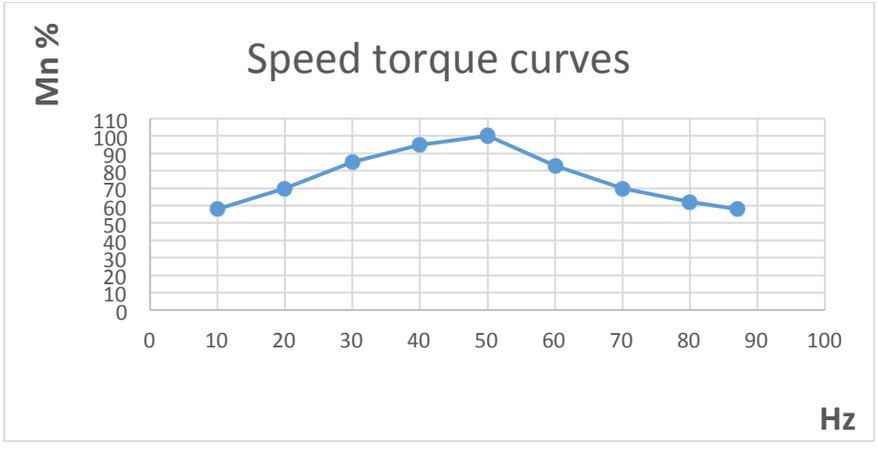
Lower Speed limit	-80% Rated speed	**Upper speed limit**	+74% Rated speed (Maximum 3600rpm)
Current	Rated current	**Rated current**	Rated current
Lower Voltage limit	-80% rated voltage	**Upper voltage limit**	+74% rated voltage
Pulse frequency	≥5 kHz		
If RAEL-Ex motors are used with converters, in addition to the general selection criteria limit values: • Rated voltage: ≤690V, • Peak voltage: ≤1kV • Voltage gradients: < 2,1 kV /1µs • "K=V/F" or "vector" driving algorithm			

Table 1: Speed/Current/Voltage limits and minimum inverter requirements for inverter-duty motors

• Motors powered by inverter have a voltage (or current) which is not purely sinusoidal. This leads to an increase in losses, vibration, noise, and a different temperature rise.
• Possibility of spikes is connected to the value of the converter power supply voltage and the length of the motor power cable. To limit the phenomenon, it's advisable to use specific filters connected between the converter and the motor (mandatory for motor power cables over 45 mt). All the motors are equipped as standard with a reinforcing insulating film between phases to protect against the voltage peaks.

• The correct grounding of the motor and the driven machine is very important to avoid voltage and stray currents in the bearings. To prevent the current circulation in the bearing if the motor it is not equipped with an insulated bearing, use a proper filter to reduce the high frequency harmonic voltage above 50kHz. It's mandatory connect thermal probes to the converter to safeguard the motor from the overheating which could be generate by a misuse. For inverter power supply the switching frequency must be higher than 5kHz (PWM type), output frequency range 10÷87Hz.

• If the motor is used at frequencies lower than 50Hz, please refer to the following graph for the maximum percentage of torque load admitted.



Mn= RATED TORQUE Hz= FREQUENCY

4.ELECTRICAL AND THERMAL PROTECTIONS

Protections must be chosen based on the specific running conditions, according to standards EN 60079-14:2014 and EN 61241-14:2011. For the motor line, the following thermal protection selection is mandatory to ensure a proper safety margin:

Temperature class	T5 (max. outer temp. 100°C)	T6 (max. outer temp. 85°C)
Thermal protector temp. threshold	90° C ±5° C	70° C ±5° C

The temperature threshold of the thermal protectors is chosen according to the specific thermal tests carried out. This will protect the motor against any over-temperature generated by low-quality inverters (poor waveform) / incorrect inverter choice (refer to table 1 for the minimum requirements).

EXTERNAL PROTECTIONS:

• Protection against overcurrent and short-circuits; this protection can be made with a magnetothermal circuit breaker or with fuses; these must be calibrated on the motor current.

• Protection against overload by thermal relay that controls a power line contactor upstream the motor.

• Depending to the application requirements, protection against excessive speed of the electric motor, for example if the mechanical load may drive the electric motor itself and thereby create a hazardous situation.

• If special conditions or synchronized operation with other machines or parts of machines require it, protection against power failures or dips by means of a minimum voltage relay that controls an automatic power breaking switch.

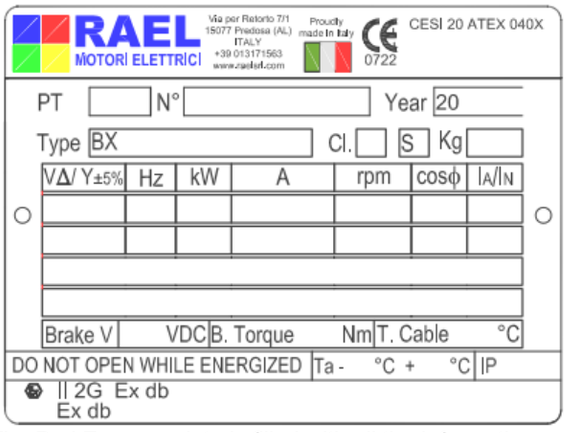
INTERNAL PROTECTIONS:

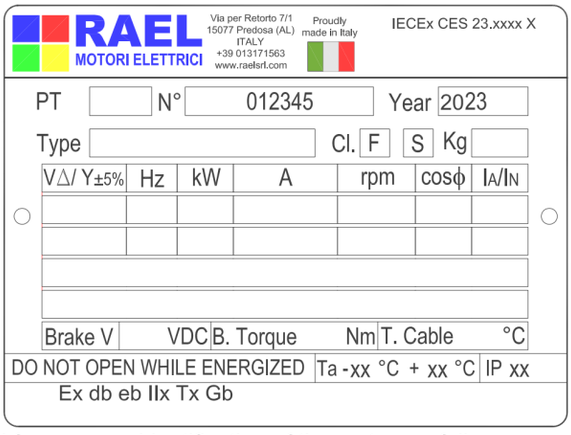
The electrical protections on the motor power supply may not be sufficient to protect against overloads. The inverter-duty motors have a built-in protection(s) on the windings, mandatory to be connected to a proper safety device. The following probes are used:

• PTO bimetallic probe (normally closed electromechanical device that becomes open when the threshold temperature is reached). The reset of this cut-out must be performed manually only, and not automatically. The user, in compliance with the norms, must use a tripping relay out in compliance with IEC 61508 standard (Fail Safe type).

• PTC thermistor (device that suddenly changes positively its resistance when the threshold temperature is reached).

5. MOTOR NAMEPLATE





The BrakEx nameplate is filled with all the information needed for a proper identification of the motor, as follows:

- PTC: breaking temperature of the thermal protector
- N°: serial number
- Year: manufacturing year
- Cl: winding insulation class
- S: service
- Kg: mass of the motor
- V: power supply voltage, delta/star
- Hz: power supply frequency
- kW: rated output power
- A: current absorption, at rated voltage and output power
- Rpm: motor speed at rated power
- Cosø:
- IA/IN:
- Brake V: brake power supply voltage
- Braking Torque: the torque [Nm] given by the brake
- Ta: environmental working temperature range [°C]
- IP: protection against fluids/dust penetration
- Screw quality of the tightening screws, always reported for “db” motors, eventually on additional / adhesive nameplate.

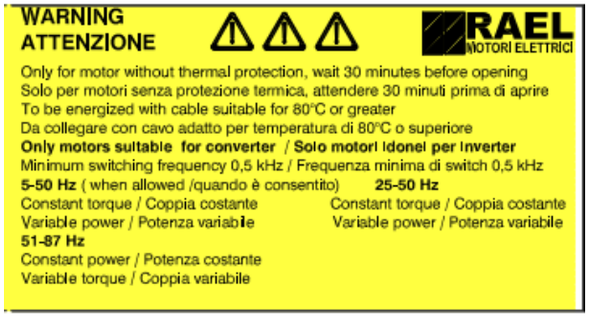
Moreover, the nameplate includes the CE marking, ATEX and IECEX certificate numbers, and manufacturer’s data.

6.NAMEPLATE DATA BELONGING TO SAFETY

CE 0722	European Standard conformity marking; Code number of the certification body that carried out the production system quality assessment *
Ex	Conformity to ATEX 2014/34/UE standard and associated technical notes *
II	Explosion Group (Mines excluded) *
2	Category *
G	Explosive atmosphere type: gases, vapours, fogs *
D	Explosive atmosphere type: dusts *
Ex	Marking for the safety devices that meet one protection mode
db	Explosion-proof housings
db o eb	Explosion-proof terminal box / Enhanced safety terminal box
tb	Zone 20 (and zone 21) dust-protection mode motor
IIB / IIB+H_2 / IIC	Gas group
IIIC	Combustible dusts group - Conductive dusts
T4 - T5 - T6	Motor temperature rating suitable for the corresponding temperature class of the flammable media (gas) for “G” execution
T85°C	Motor temperature rating suitable for the corresponding temperature class of the flammable media (dust) for “D” execution
AB xx ATEX yyy	AB: name of the laboratory that issued the type certificate; xx: certificate release year; yyy: number of the type certificate
IECEx AB zzz	AB: name of the laboratory that released the certificate according to the IECEX scheme zzz: number of the type certificate
IPXX	Protection grade, to be reported on the nameplate for “D” type motors
°C amb	Environmental temperature range

*: data belonging exclusively to the product marking according to ATEX 2014/34/UE

Additional label, made of self-adhesive plastic, applied to the external of the motor, typically on the fan cover. This label has some important warning information:



7.MOTOR TEMPERATURE CLASS FOR GAS AND DUST AND AMBIENT TEMPERATURES

Motor type	Maximum ambient temperature		
	+40°C	+50°C	+60°C
	Temperature Class (Gas) / Surface Temperature (Dust)		
BX 63 – 2 poli – Pmax. 0.25kW	T6 / T85°C	T6 / T85°C	T6 / T85°C
BX 71 – 2 poli – Pmax. 0.55kW			
BX 80 – 2 poli – Pmax. 1.10kW		T5 / N.A.	N.A.
BX 90 – 2 poli – Pmax. 2.20kW			
BX 100 – 2 poli – Pmax. 3.00kW			
BX 112 – 2 poli – Pmax. 4.00kW			
BX 63 – 4 e + poli – Pmax. 0.18kW	T5 / T85°C	N.A.	N.A.
BX 71 – 4 e + poli – Pmax. 0.37kW			
BX 80 – 4 e + poli – Pmax. 0.75kW			
BX 90 – 4 e + poli – Pmax. 1.50kW			
BX 100 – 4 e + poli – Pmax. 3.00kW			
BX 112 – 4 e + poli – Pmax. 4.00kW			

8. SPECIAL WORKING CONDITIONS

Due to protection “Ex db”, “Ex db eb” and “Ex tb”. Flameproof joints must be kept clean. If any screw, nut, or tie rod has to be replaced, please contact the producer to obtain proper specifications or spare parts.
Tightening torque:

Thread	M4	M5	M6	M8	M10
Torque [Nm]	2	3.2	5	12	18

Thermal protectors applied on the winding ends (3 maximum) and upon request on the brake body (1 maximum); Thermal protectors are optional, except for the following motors:

- Variable speed motors, powered by inverters.
- 3 phase motors, twin speed, constant torque / quadratic torque.
- Single phase motors.
- Motor without fan (IC 410) and with external cooling device (IC 416).

When a thermal protector is installed, it must be connected to a proper safety device in order to force the motor to turn off once the target critical temperature is reached; the safety device rearming shall not be automatic. The end user, according to the 2014/34/UE requirements, shall:

- Install a safety circuit breaker conformal to IEC 61508

Or

- Install a fail-safe circuit breaker capable to switch automatically to a “safe” position if the thermal limit is reached.

Temperature class	T5	T6
Thermal prot. Temp.	90°C±5°C	70°C±5°C

If the motor is not equipped with a thermal protector, the user shall install a thermal protection unit on the outside of the motor.
If the motor is fitted with cable, the end of the cable, not connected to the motor, must be connected in a safe area, or using an explosion proof connection box according to the protection mode required by the area.

- The end user must keep the motor clean from dust and particles to avoid deposits on the unit. The thickness has to be always lower than 5mm.

- If the motor is connected to other parts or devices that may produce sparks or surface heating, all the risks have to be addressed and considered according to 2014/34 EU.

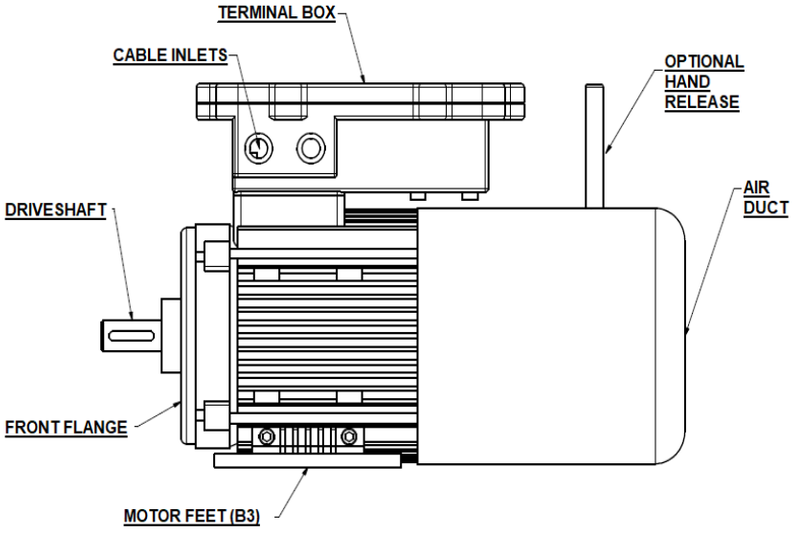
The end user has to follow the requirements of the equipment protection mode for the specific dangerous zone.

9. DESCRIPTION

BrakEx series electrical motors are self-braking motors. All the parts needed for the motor to work are already fitted on the motor (on request). Multiple control options are available, please contact the Producer for more info.
All the brakes are DC and it is possible to drive the brake independently by the motor and/or using a voltage rectifier that can be installed by RAEL. The motor is connected to the power supply with a 6 poles terminal block, or an 8 poles terminal block (where 2 are dedicated to the connection of the thermal protector). If the motor is not configured to drive the brake automatically, a separate terminal block for the voltage rectifier is provided. If a direct DC power supply to the brake is requested, a dedicated terminal block is installed, and a dummy unit is fitted into the terminal box. The dummy unit shall not be removed. Multiple mounting, voltage and thermal protector options are available.
The BrakEx motors do not need external cooling units on standard working conditions. The onboard fan is in charge of both brake and motor cooling, even if some heat is generating due to the friction. As an option, a forced ventilation device can be added, using a second motor that is driving the cooling fan.
The most common use of self-braking motors is parking brakes. If any kind of motor drag is expected or requested during the braking operation, please be sure that the torque applied to the motor is compatible with the braking torque.
An external hand-release device is available on request.
The available windings are single phase, 3 phases (Inverter Duty also) and dual-speed 3 phases.

10. MOTOR COMPONENTS

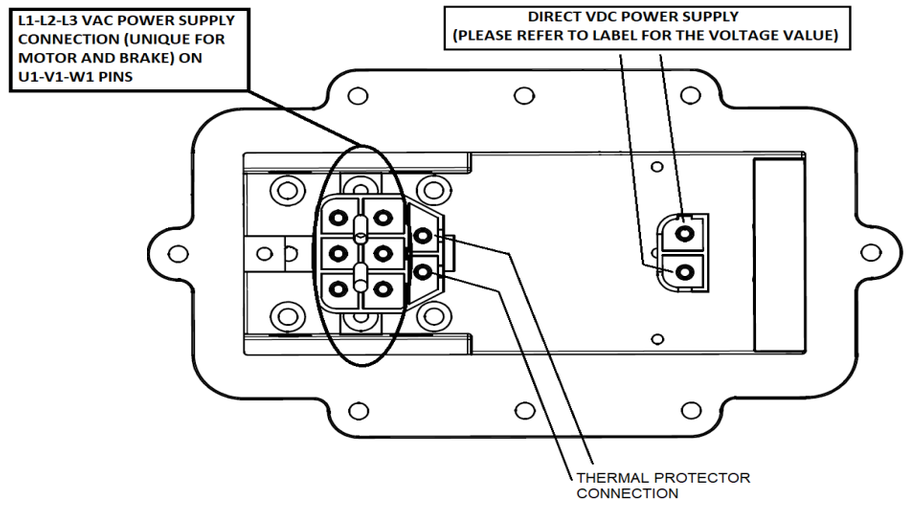
The motors are described as follows:



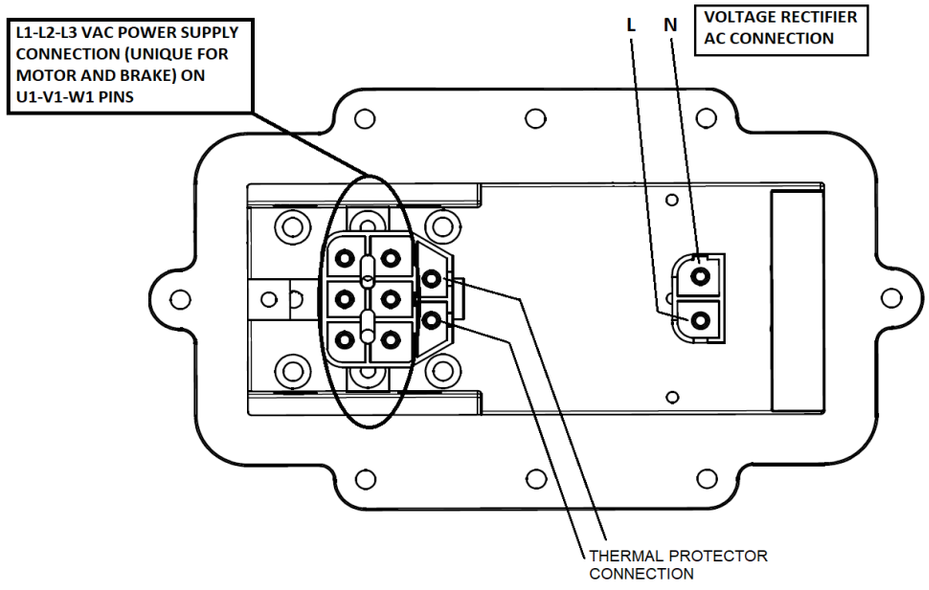
A set of gaskets and sealing devices are used to reach the IP66 protection. For vertical installation, it is available a fan cover with rain cover. The motors can be painted and equipped with stainless steel hardware for marine environments or extremely cold environments.

11. TERMINAL BOARD(S)

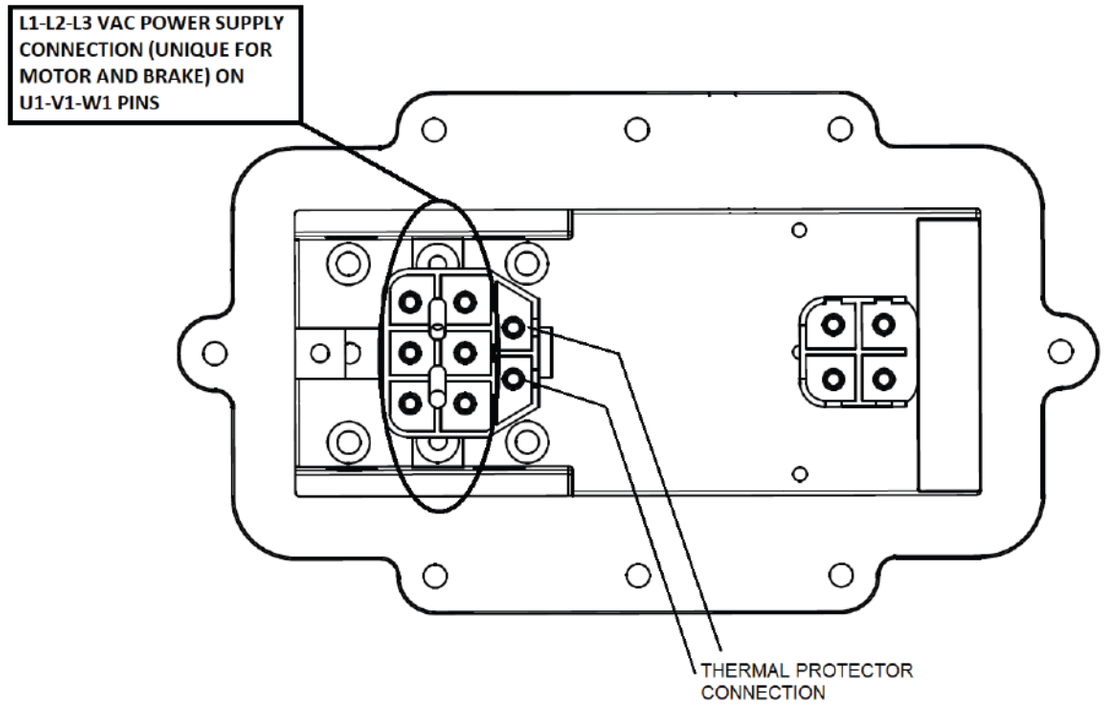
MOTORS WITHOUT VOLTAGE RECTIFIER (SEPARATE VDC POWER SUPPLY)



MOTORS WITH VOLTAGE RECTIFIER (SEPARATE VAC POWER SUPPLY FOR THE BRAKE)



MOTORS WITH VOLTAGE RECTIFIER CONFIGURED FOR AUTOMATIC BRAKE OPERATION



12. BRAKE SPECIFICATIONS

The brakes fitted into the BrakEx motor line are always DC power supplied. The standard voltage is 105VDC. If the motor is not equipped with a voltage rectifier, a plastic dummy is fitted into the terminal box.

Size	63	71	80	90	100	112	112HD
Torque [Nm]	10	10	15	20	40	40	75
Power consumption [W] @105VDC	31	31	30	41	55	55	77
Current consumption[A] @105V	0,3	0,3	0,29	0,39	0,5	0,5	0,73
Coil resistance [□] at 105VDC	348	348	362	268	211	211	143

Please note:

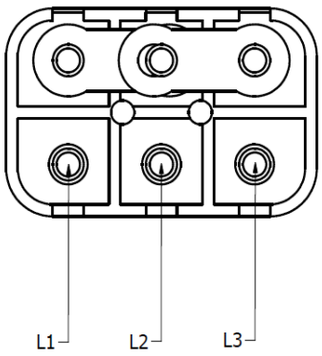
- All the data has to be intended± 10%.
- The torque can be adjusted from the factory. If a specific torque is required, contact the Producer
- If the brake was requested with a different voltage, the values have to be calculated for the specific value.

13. PUTTING INTO SERVICE

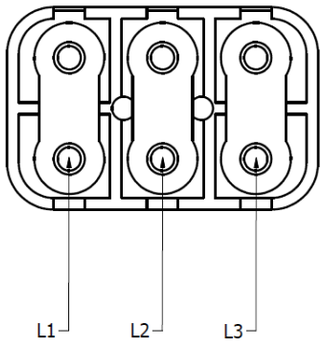
- STANDARD MOTORS: the connections must comply with the info provided in this manual. NEVER change the brake connections.
- INVERTER-DUTY MOTORS: Always refer to the information provided into this manual.
- **Motors equipped with heaters:** connect the free wires according to nameplate voltage specifications.

14. CONNECTING DIARGAMS

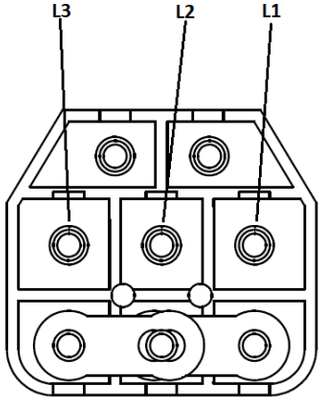
The connection has to be carried out by qualified Personnel. Check insulation first. Follow the pictures reported:



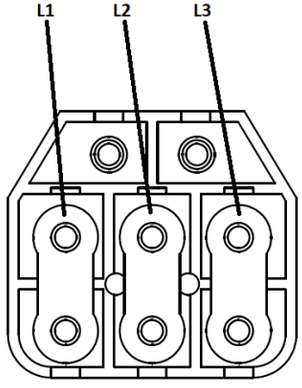
Star connection, without thermal prot.



Delta connection, without thermal prot.



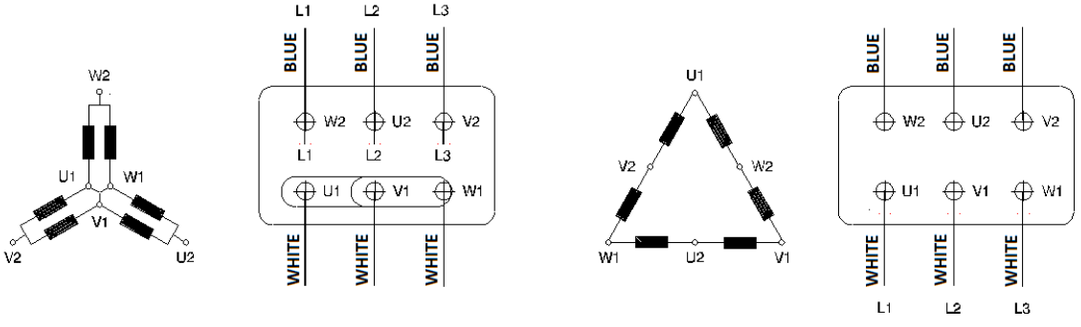
Star connection, with thermal prot.
(Always use the U1-V1-W1 pins)

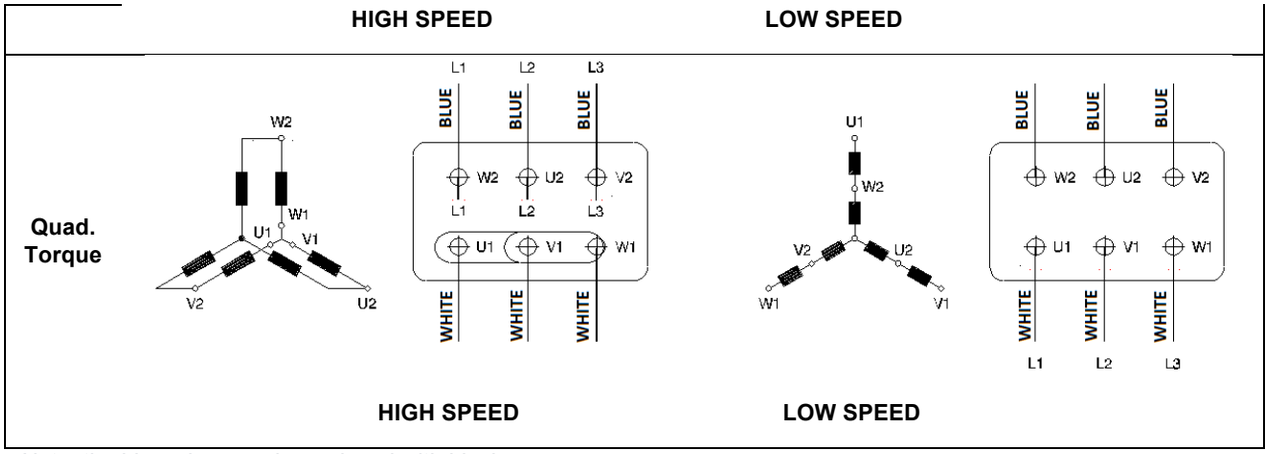


Delta connection, with thermal prot.
(Always use the U1-V1-W1 pins)

Three phase 2 speeds – Dahlander Connection - 2/4 - 4/8 poles

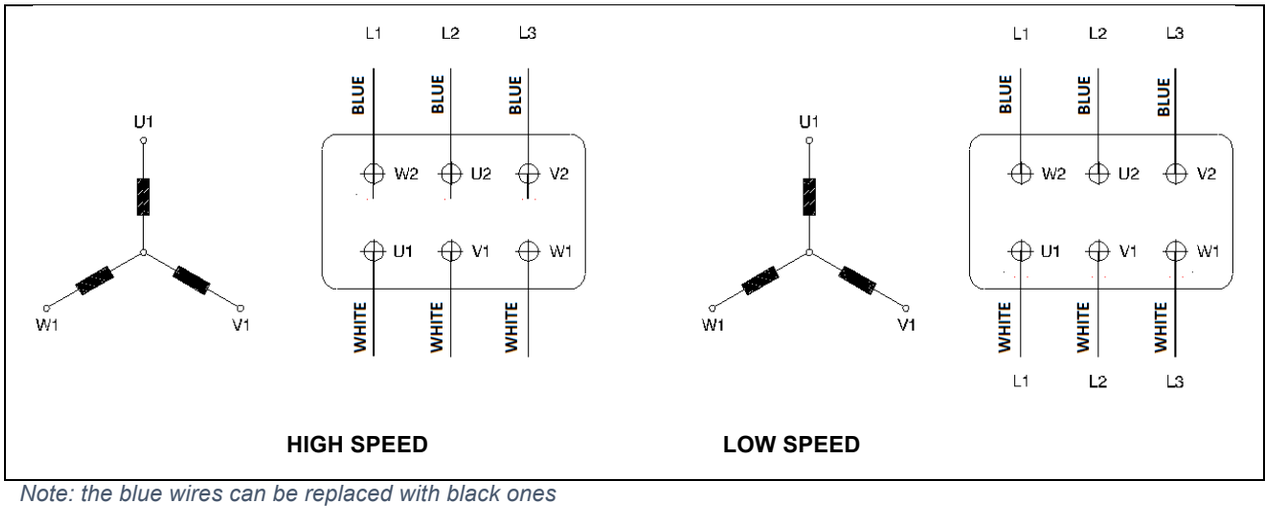
Const. Torque





Note: the blue wires can be replaced with black ones

Three phase 2 speeds – 2 separate windings - 4/6 - 6/8 poles



Note: the blue wires can be replaced with black ones

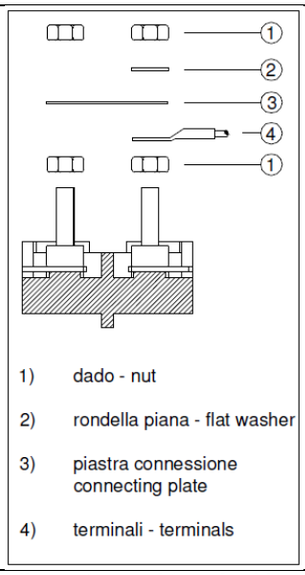
Ex db motors have to be fitted with cable inlet according EN IEC 60079-1 (IEC 60079-0). The available inlet threaded holes on the terminal box for the cable glands are 4 (maximum), M20x1,5 threaded (6H class, ISO 968-I/III). The standard motor version has 1 of 4 cable inlets opened. The cable inlets thread spec. is M20x1,5
Motors with thermal protector have 2 cable inlets opened.
Motors with thermal protector and dedicated line to power the brake, are available either with or without a 3rd cable inlet open.
If the cable is not certified with the motor, or if it is chosen by the customer, it must be minimum 3 meters long. This is not applied to “de” motors or to motors where a “sealed” certified cable gland is used.
To choose a cable gland, please note that:

- Ex db motors - cable glands according to EN IEC 60079-1 (IEC 60079-0)
- Ex db eb motors - cable glands according to EN IEC 60079-7 (IEC 60079-7)
- Ex tb motors - cable glands according to EN 60079-31 (IEC 60079-31)

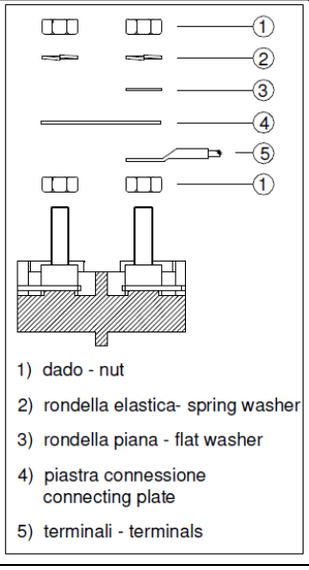
If a different thread for the cable gland is needed, it is allowed the use of adapters, only if conformal to EN IEC 60079-0 (IEC 60079-0), EN 60079-1 (IEC 60079-1), EN IEC 60079-7 (IEC 60079-7), or EN 60079-31 (IEC 60079-31), according to the protection grade listed before.
Any unused cable inlet hole must be sealed with a certified plug conformal to the protection grade of the motor.
Tightening torque for the terminal board nuts:

- M4: 2,0 Nm
- M5: 3,2 Nm

15.CONNECTION TYPES



“Ex db” - motor and terminal box “db”
The contact has to be effective and reliable. The connections must be safe, so that no parts at different electric potential can come into contact.



“Ex db eb” - “db” motors “eb” terminal box
Increased safety terminal board (“eb”) as stated into EN IEC 60079-7 (IEC 60079-7).

According to EN IEC 60079-7 (IEC 60079-7) standard, the electrical connections to external circuits must comply with all the indications regarding the terminal securing and the respect of the air gaps and distances between surfaces as reported into chapters 4.1, 4.2, 4.3, 4.4, 4.5.

16. GROUND CONNECTION

The BrakEx motors are equipped with ground connections both into the terminal box and on the motor body.

Ground connection cable	Connection wire
= S	$S < 25\ mm^2$
25	$25\ mm^2 \leq S \leq 50\ mm^2$
≥ 0,5·S	$S > 50 mm^2$

17. INVERTER DUTY MOTORS

All the inverter duty motors are equipped with a thermal protector device. Always connect the thermal protector to a proper power breaker device. The device must be a manual re-arming type.
Please note that the Inverter-duty motors are always designed with the brake powered independently from the motor, and from the inverter.
The frequency, speed, torque, and voltage limits information are attached to the specific order documentation.

18. COOLING SYSTEM

In the following, multiple cooling options are listed.

- SELF-COOLING MOTORS (IC 411)
- NOT-VENTILATED MOTORS (IC410)
- FORCED VENTILATION MOTORS (IC 416): An auxiliary motor is in charge of the forced ventilation, fitted to the fan cover of the main motor. The protection class of the auxiliary motor is equal or better than the class of the main motor. A control device inhibiting the main motor if the auxiliary is not running has to be fitted. In 21 and 22 areas, metallic / conductive plastic fan is used.
-

19. FLAMEPROOF JOINTS

The flameproof joints are maintenance-free.

Definition	Maximum air gap
Shaft flamepath	0,25mm
Control beams pathway (hand release)	0,10mm
Cylindrical joints	0,10mm / 0,15mm
Flat joints	gap <= 0,04mm

SAFETY NOTE: THE SERVICING / REPAIR OF EXPLOSION-PROOF ENCLOSURES MUST BE CARRIED OUT ONLY BY AUTHORIZED PERSONNEL, UNDERGOING A PRELIMINARY WRITTEN SPECIFIC AUTHORIZATION SUPPLIED BY RAEL. ANY UNAUTHORIZED ACTION WILL LEAD TO WARRANTY VOIDING AND RELEASE OF LIABILITY OF RAEL.

20. BALL BEARINGS

Bearings are self-lubricated for life. If a replacement is required (20000h for 2P, 40000h for 4-6-8P) contact the producer. The ball bearings are the same of the RL line, except for the BX80 size that is equipped with 1x6204-2Z and 1x6005-2Z.

21. SEALING DEVICES

The sealing devices are specifically designed for the BrakEx motors. The gaskets for shaft, motor frame and flanges are made of NBR70 rubber, C.O.T. -40°C to +100°C. The terminal box cover gasket is made of VMQ60, C.O.T. -60°C to +200°C.

22. MAIN COMPONENTS MATERIALS

Nameplate	Plated aluminium or stainless steel
Cable gland	Nickel plated brass or stainless steel
Screws	8.8 zinc plated steel (up to -20°C); A2 50 / A4 50 stainless steel from -20°C to -40°C)
Tie rods	4.8 (8.8 for 63 and 71 variants) zinc plated steel (up to -20°C); A2 50 / A4 50 stainless steel from -20°C to -40°C)
Fan cover	Zinc plated and/or painted steel
Fan	Thermoplastic polymer / aluminium
Rotor	Squirrel cage, aluminium die-cast
Shaft	C45 steel
Housing	46100 Aluminium alloy

23. MANTEINANCE

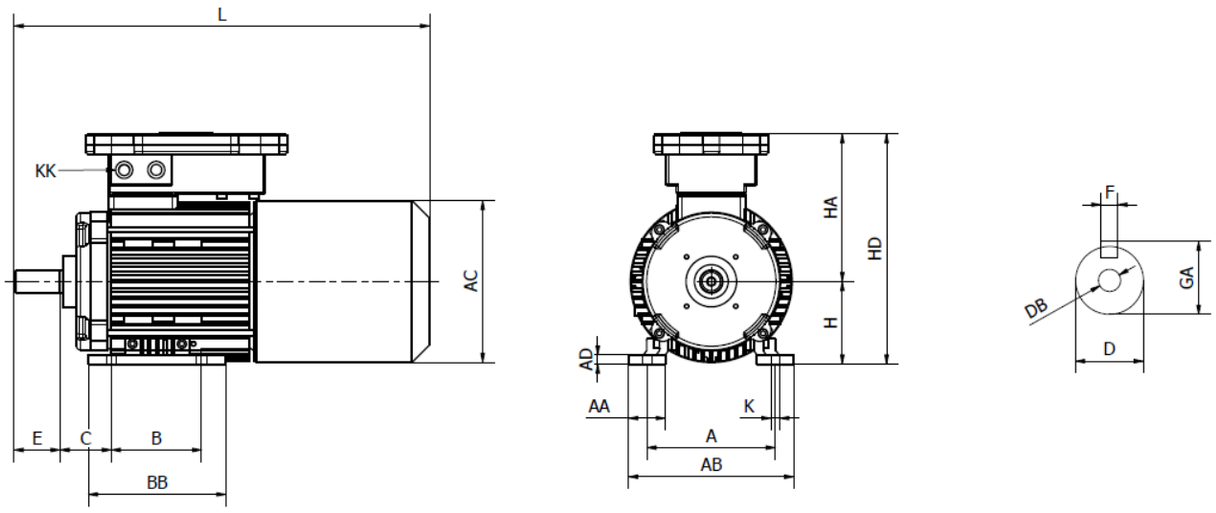
The BrakEx motors do not require any maintenance. The units must be kept clean and dry. If a sealing is missing or damaged, never turn on the motor. If the cooling fan is damaged, remove the motor from service and contact the Producer. The motor under normal working conditions can produce noise. It is normal, due to the brake disc that is free once the brake is on. If any liquid is seeping into the motor, remove it from the service and contact the producer. If the contamination is only on the external parts, dry the motor with a soft cloth. Never pour water or pressurized water on the motor for the cleaning.

24. MOTOR RECYCLING

Always remove the power before dismantling a motor.

- Winding: copper and iron
- Rotor: remove from the shaft and recycle separately
- Explosion proof housing: aluminium
- Terminal block, rectifier, wires and cable: electric/electronic devices
- Fan cover: iron
- Fan: plastic or metal
- Brake: electric/electronic device
- Braking hub: Iron
- Braking disc: composite
- Bearings: iron
- Sealing devices: rubber

25. OVERALL DIMENSIONS



Size	A	AA	AB	AC	AD	B	BB	C	K	KK	H	HA	HD	L	D	DB	E	F	GA
63	100	30	125	131	6	80	108	40	7	M20x1,5 (Up to 4)	63	149	212	357	11j6	M4	23	4	12,5
71	112	30	142	138	8	90	120	45	7	M20x1,5 (Up to 4)	71	149	220	365	14j6	M5	30	5	16,0
80	125	40	155	156	8	100	125	50	9	M20x1,5 (Up to 4)	80	157	237	395	19j6	M6	40	6	21,5
90S	140	40	180	176	10	100	150	56	9	M20x1,5 (Up to 4)	90	164	254	455	24j6	M8	50	8	27,0
90L	140	40	180	176	10	125	150	56	9	M20x1,5 (Up to 4)	90	164	254	455	24j6	M8	50	8	27,0
100	160	40	200	197	12	140	180	63	12	M20x1,5 (Up to 4)	100	185	285	535	28j6	M10	60	8	31,0
112	190	40	230	218	12	140	180	70	12	M20x1,5 (Up to 4)	112	193	305	565	28j6	M10	60	8	31,0

Please note that the dimension “L” is referred to standard BrakEx motors without hand release device, and with standard fan cover (the special rain covers will increase the overall length)

CESI

ISMES

IPH BERLIN

FGH

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Tel: +39 02 21251
Fax: +39 02 21255440
e-mail: info@cesi.it
www.cesi.it

Schema di certificazione CESI-ATEX

ACCREDIA
CERTIFICATO N. 0188
Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

ATEX 6900X/01 1-EN

CERTIFICATE

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment or Protective System intended for use in potentially explosive atmospheres Directive 2014/34/EU**

[3] EU-Type Examination Certificate number:

CESI 20 ATEX 040 X

[4] Product: **Three-phase and single-phase asynchronous motors with electrical brake series BrakEx, type BX 63 ÷ 112, supplied by mains**

[5] Manufacturer: **RAEL MOTORI ELETTRICI S.r.l.**

[6] Address: **Via per Retorto, 7/1, 15077 Predosa (AL) - Italy**

[7] This Product and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

[8] CESI, notified body n. 0722 in accordance with Article 17 of the Directive 2014/34/EU of the European Parliament and Council of 26 February 2014, certifies that this Product has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment or protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report n. EX-C2006435.

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN IEC 60079-0: 2018 **EN 60079-1:2014** **EN IEC 60079-7:2015/A1:2018**
EN 60079-31: 2014

except in respect of those requirements listed at item 18 of the Schedule.

[10] If the sign "X" is placed after the certificate number, it indicates that the Product is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EU-TYPE EXAMINATION CERTIFICATE relates only to the design, examination and tests of the specified Product in accordance to the Directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this Product. These are not covered by this certificate.

[12] The marking of the Product shall include the following:

II 2G Ex db IIB T6, T5 Gb, or **II 2G Ex db eb IIB T6, T5 Gb**, or

II 2G Ex db IIB+H_2 T6, T5 Gb, or **II 2G Ex db eb IIB+H_2 T6, T5 Gb**, or

II 2G Ex db IIC T6, T5 Gb, or **II 2G Ex db eb IIC T6, T5 Gb**, or

II 2D Ex tb IIIC T85°C Db

Date 02.02.2023 - Translation issued the 2nd of February 2023

Prepared	**Verified**	**Approved**
Vito Giampietro	Alessandro Fedato	Roberto Piccin

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx CES 24.0001X**	Page 1 of 3	Certificate history:
Status:	**Current**	Issue No: 0	
Date of Issue:	2024-01-18		
Applicant:	**RAEL Motori Elettrici S.r.l.** via per Retorto 7/1 I - 15077 Predosa (AL) **Italy**		
Equipment:	**Three-phase and single-phase asynchronous motors with electrical brake series BrakEx, supplied by mains or frequency converter, Sizes: BX 63, BX 71, BX 80, BX 90, BX 100, and BX 112**		
Optional accessory:			
Type of Protection:	**Flameproof enclosures 'd'; Increased safety 'e'; Dust ignition protection 't'**		
Marking:	**Ex db IIB T6, T5 Gb**, *or* **Ex db IIB+H_2 T6, T5 Gb**, *or* **Ex db IIC T6, T5 Gb.** *or* **Ex db eb IIB T6, T5 Gb**, *or* **Ex db eb IIB+H_2 T6, T5 Gb**, *or* **Ex db eb IIC T6, T5 Gb.** *or* **Ex tb IIIC T85°C Db**		

Approved for issue on behalf of the IECEx Certification Body: **Mirko BALAZ**

Position: **Deputy Head of IECEx CB**

Signature:
(for printed version)

Date:
(for printed version)

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting www.iecex.com or use of this QR Code.

Certificate issued by:

CESI
Centro Elettrotecnico Sperimentale Italiano S.p.A.
Via Rubattino 54
20134 Milano
Italy

CESI

ADPE motors

Explosion proof electric motor
For Fuel dispensing application

RAEL motori elettrici, since its inception in the late 60s, has assembled more than a million of explosion proof electric motors for fuel dispenser sold all over the world.

We like to think of it not as a goal but as of a further step in a process of growth, during which we kept investing in new manufacturing processes and in developing new products to meet the increasing demand and expectations while remaining competitive on the global market.

This journey so far has given us the opportunity to offer today's manufacturers of fuel dispensing equipment a top quality electric motor specifically designed for their application.

Our current range of atex-iecex certified ad-pe motors, totally modernized, comprise single and three phase AC motor, aluminium body, ssr, fully embedded capacitors and centrifugal switch, to name a few, and last but not least are proudly made in Italy.

Main characteristic

Explosion proof motors according to European standards en 60079-0 and en 60079-1

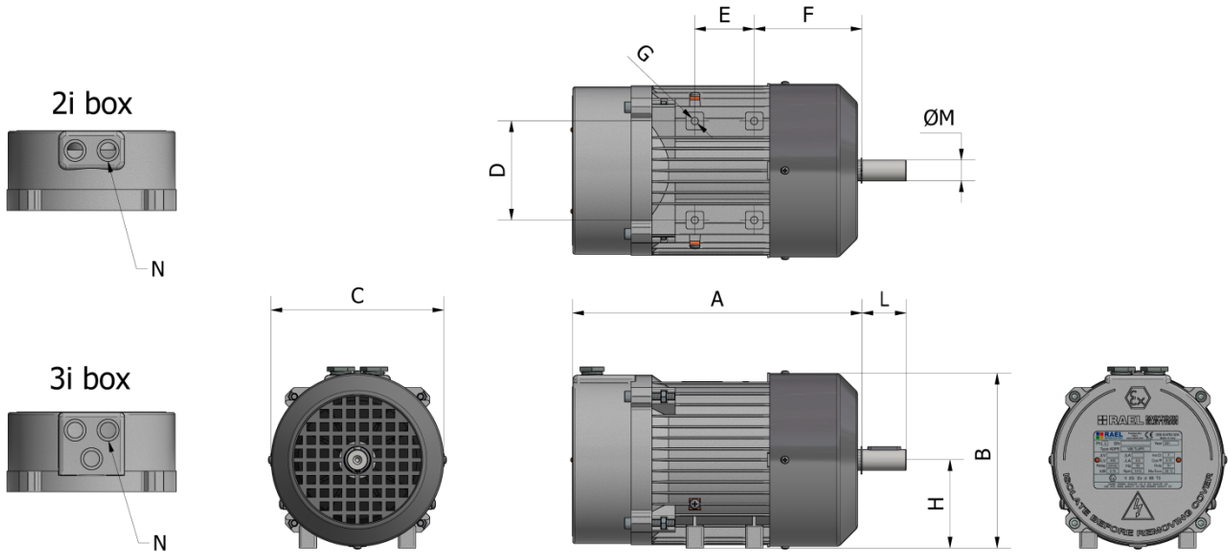
V80 – shaft Height 80mm:

- 3 phase asynchronous motor, squirrel cage
- IP55, s1 or s3 duty (non ventilated)
- SSR/power relay/contactor inside motor housing
- 2 or 3 cable entries
- Rc filters
- Thermal protection with automatic reset
- 2z or sealed 2rs self lubricated ball bearing

V90 – shaft height 90mm:

- Single phase or three phase asynchronous motor, squirrel cage
- IP55, s1 or s3 duty (non ventilated)
- SSR/power relay/contactor inside motor housing
- Start/run capacitor inside motor housing
- Centrifugal switch
- 2 or 3 cable entries
- Rc filters
- Thermal protection with automatic reset
- 2z or sealed 2rs self lubricated ball bearing
- Custom Non ventilated version suitable for vapour recovery pumps

V80 MOTOR – three phase



A	B	C	D	E	F	H	G	L	M	N
264	160	160	90	54	98	80	M8	30/40**	14/19**	M22

* All lengths +/- 1mm
** custom made also, max 19mm diameter

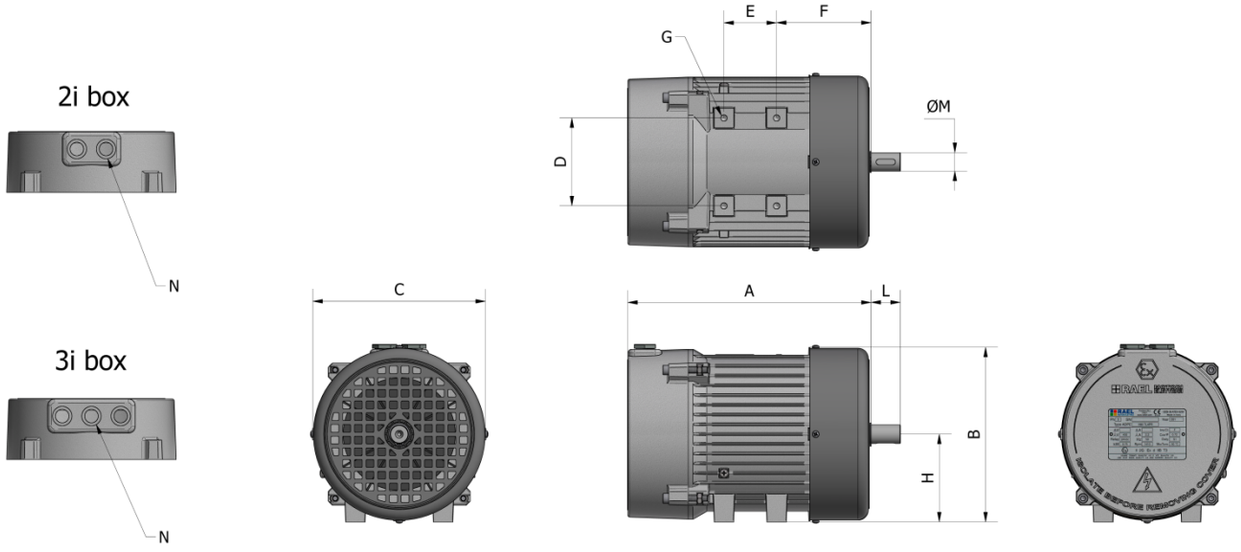
Three Phase AC Electrical Data

Type	Power kW	Power Hp	poles	V	Hz	A (400V)	A (230V)	RPM	Cosf	Duty
V80	1,00	1,36	2	230/400	50	2,6	4,5	2790	0.75	S1
V80	0,55	0,75	4	230/400	50	1,7	2,9	1420	0,75	S1
V80	0,65	0,88	4	230/400	50/60	1,95	3,4	1400	0,6	S1
V80	0,75	1,00	4	230/400	50/60	2,2	3,8	1410	0,72	S1
V80	1,00	1,36	4	230/400	50/60	3,3	5,8	1410	0,63	S1

Three phase AC without ventilation

Type	Power kW	Power Hp	poli poles	V	Hz	A (400V)	A (230V)	RPM	Cosf	Duty
V80	0,25	0,35	2	230/400	50	0,8	1,4	2800	0,7	S3
V80	0,37	0,50	2	230/400	50	0,9	1,6	1420	0,68	S3
V80	0,25	0,35	4	230/400	50	0,9	1,6	1410	0,7	S3
V80	0,37	0,50	4	230/400	50	1,0	1,8	1420	0,68	S3

V90 MOTOR - three phase



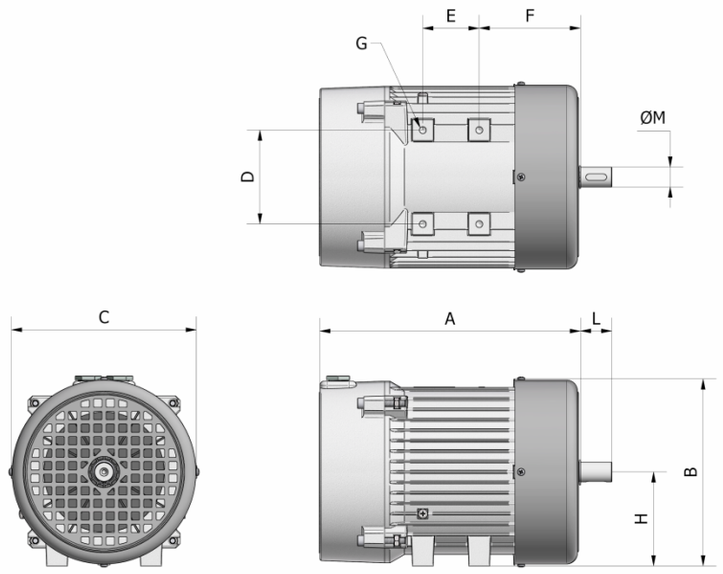
A	B	C	D	E	F	H	G	L	M	N
250	180	180	90	54	98	90	M8	30/40**	14/19**	M22

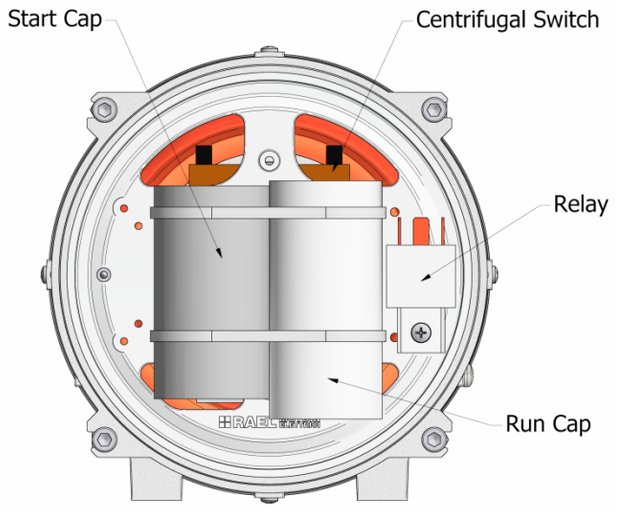
* All lengths +/- 1mm
** custom made also, max 19mm diameter

Three Phase AC Electrical Data

Type	Power		poles	V	Hz	A (400V)	A (230V)	RPM	Cosf	Duty
	kW	Hp								
V90	1,50	2,00	2	230/400	50/60	3,5	6,0	2810	0,8	S1
V90	2,20	3,00	2	230/400	50/60	5,2	8,9	2850	0,8	S1
V90	0,75	1,00	4	230/400	50/60	1.8	3,1	1420	0.8	S1
V90	1,10	1,50	4	230/400	50/60	2,9	5,0	1420	0,7	S1
V90	1,50	2,00	4	230/400	50/60	3,9	6,7	1390	0,8	S1
V90	0,55	0,75	6	230/400	50/60	1,8	3,1	920	0,7	S1
V90	0,75	1,00	6	230/400	50/60	2,1	3,6	900	0,7	S1
V90	1,00	1,36	6	230/400	50/60	2,8	4,8	930	0,78	S1

V90 motor - single phase





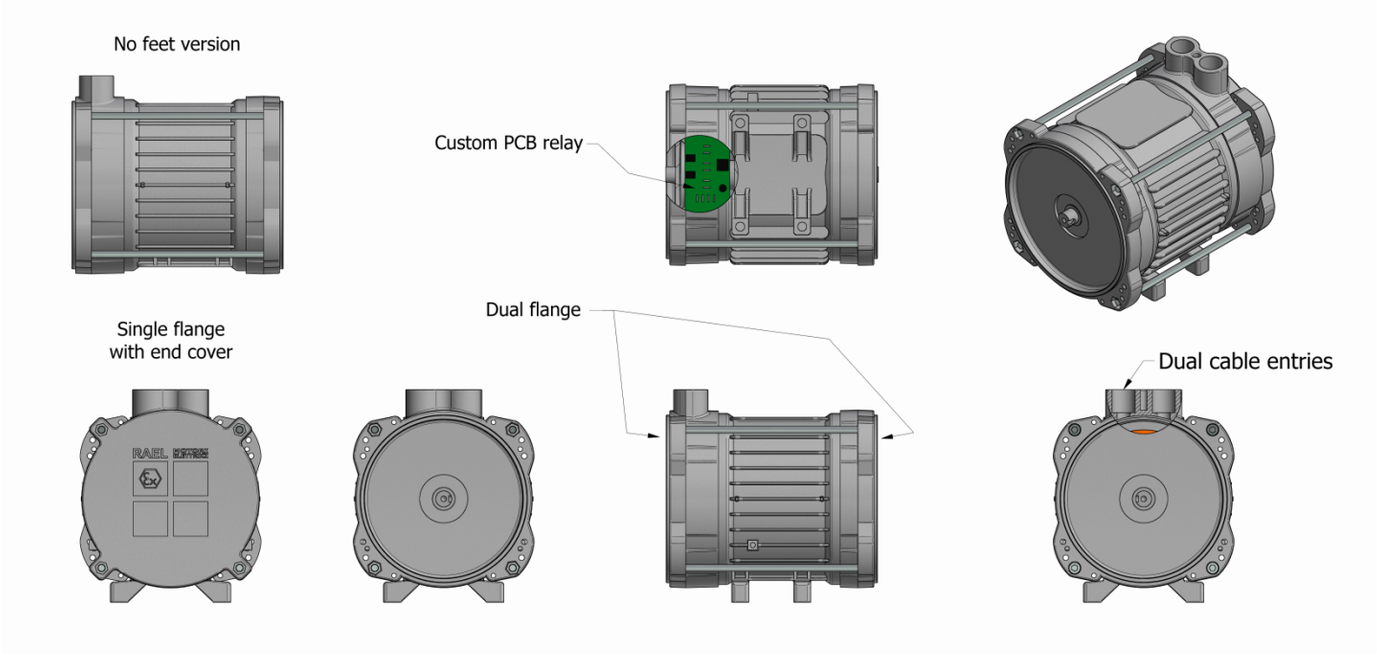
A	B	C	D	E	F	H	G	L	M	N
250	180	180	90	54	98	90	M8	30/40**	14/19**	M22

* All lengths +/- 1mm
** custom made also, max 19mm diameter

Single Phase AC Electrical Data

Type	Power kW	Power Hp	poles	V	Hz	A	Run Cap µf (450V)	Start Cap µF (250V)	RPM	Cosf	Duty
V90	1,00	1,36	2	230	50/60	6,0	25	200	2900	0,90	S1
V90	1,50	2,0	2	230	50/60	9,0	45	200	2860	0,90	S1
V90	0,55	0,75	4	230	50/60	3,8	20	100	1430	0,95	S1
V90	0,75	1,00	4	230	50/60	4,3	25	100	1410	0,90	S1
V90	1,00	1,36	4	230	50/60	5,7	30	100	1410	0,95	S1
V90	1,5	2,0	4	230	50/60	11,0	30	100	1430	0,90	S1
V90	0,75	1,00	6	230	50/60	6,2	25	60	920	0,90	S1

Custom vapour recovery Solutions or direct coupling



AD-PE motors are customizable, to face the most challenging installation process.

-Special Flange and shaft design based on customer requirement.

-Custom metal bracket in addition to the standard aluminium mounting post

-Custom designed pulley

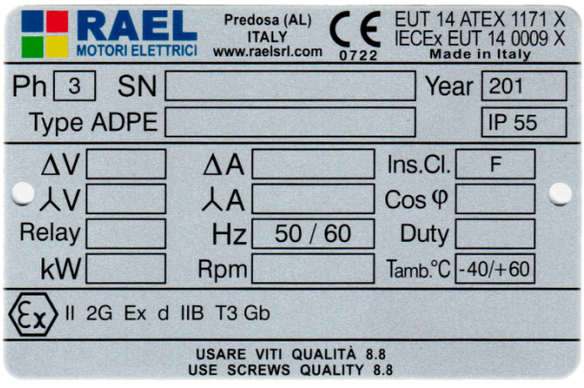
-For single phase motors, fully integrated start/run capacitors with electronic switch and relay (24vdc or 230vac)

gallery

Motor marking

Explosive atmosphere type				Motor Marking				
	Area Classification	Presence of explosive atmosphere	Protection	Category	Group	Type of Protection	Gas Group	Temperature Class
GAS	Zone 1	Probable	High	II	2G	Ex d	IIB	T3
	Zone 2	Improbable	Normal	II	2G	Ex d	IIB	T3

Motor nameplate



CE	Marking of conformity in compliance with the European Directives
0722	Number of Notified Body that gives the Product Quality Assurance Notification
Ex	Specific marking of explosion protection
II	Group (surface plants different from mines)
2	Category (high protection)
G	Explosive atmosphere for the presence of flammable gas, vapour or mist (GAS)
Ex d	Type of protection for explosive atmosphere for the presence of flammable gas
IIB	GAS Group
T3	Temperature class of the motor (GAS)
Gb	Equipment protection level
Tamb.	Max and Min Ambient Temperature
EPT 14 ATEX 1171	Type ATEX Certificate Number
IECEx EUT 14 0009X	Type IECEx Certificate Number

- Motors marked with gas group IIB are suitable also for gas group IIA.
- Motors with temperature class T3 (gas) are suitable for temperature classes T2, T1.
- Room temperature range: -40°C; +60°C

Markings example

- Motor for surface plant in explosive atmosphere (non mining)
- Zone 1
- explosive atmosphere consisting of a mixture with air of Diethyl ether (gas group IIB ignition temp. 160°C)
- Max ambient temperature 60°C

marking **II 2G Ex db IIB T3 Gb** is suitable for such application

Certificates

RAEL Motori Elettrici S.r.l. is certified ISO9001:2000 from February 2003 and as we manufacture motors complying with Directive 2014/34/EU we also have both the 'Product Quality Assurance Notification' and the CE certificates regarding the motors .

All motors are ATEX and IECEx certified

All motors are TR-CU(EAC) certified

All motors are UKCA certified

Motor Type	Type certificate number	Type of certificate
V 80 MOTOR	EPT 16 ATEX 2476 X	ATEX
	IECEx EUT 14 0009 X	IECEx
	RU C-IT.AA87.B.008231	TR-CU
V90 MOTOR	EPT 14 ATEX 1171 X	ATEX
	IECEx EUT 14 0009 X	IECEx
	RU C-IT.AA87.B.00823	TR-CU
	EPT 20 ATEX 3951 X	ATEX

eurofins | Product Testing

[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment intended for use in potentially explosive atmospheres**
Directive 2014/34/EU – Annex III

[3] Certificate Number: **EPT 14 ATEX 1171 X** **issue 2**

[4] Equipment: **Asynchronous electric motor**
Series: **AD-PE V90V2**

[5] Manufacturer: **RAEL MOTORI ELETTRICI S.R.L.**

[6] Address: Via per Retorto, 7/1- 15077 Predosa (AL) - Italy

[7] This equipment and its accepted variations are specified in the annex to this Certificate.

[8] Eurofins Product Testing Italy S.r.l., Notified Body n. 0477 in accordance with Article 21 of the Directive 2014/34/EU of the European Parliament and of the Council of 26th February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II of the Directive.
The examination and test results are recorded in the confidential Report N° EPT.21.REL.02/2013142.

[9] Compliance with the essential health and safety requirements is assured through the verification of them and by compliance with the harmonized standards:
IEC EN 60079-0:2018, EN 60079-1:2014, EN 60079-31:2014

[10] If the sign "X" is placed after the Certificate number, it indicates that the equipment is subject to the special conditions for safe use specified in the annex to this Certificate.

[11] This EU-TYPE EXAMINATION CERTIFICATE relates only to the design, the exam and the tests of the specified equipment.
Further requirements of the Directive 2014/34/EU apply to the manufacture and supply of this equipment.
These requirements are not object of this Certificate.

[12] The equipment shall include the sign Ex and at least one of the following strings:

II 2G Ex db IIB T4 Gb	**-40°C ≤ T_{amb} ≤ +60°C**
II 2D Ex tb IIIC T135°C Db	
II 2G Ex db IIB T3 Gb	
II 2D Ex tb IIIC T200°C Db	

Place and date of issue:
Torino, 2021-07-05

Dionisio Bucchieri
Directive Responsible

Paolo Trisoglio
Managing Director

Eurofins Product Testing Italy eurofins Notified Body N. 0477

ACCREDIA
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Signatory of EA, IAF and ILAC Mutual Recognition Agreements

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Notified Body N. 0477

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[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment intended for use in potentially explosive atmospheres**
Directive 2014/34/EU – Annex III

[3] Certificate Number: **EPT 20 ATEX 3951 X** **issue 0**

[4] Equipment: **Asynchronous electric motor**
Series: **AD 90 TS or AD 90 ML**

[5] Manufacturer: **RAEL MOTORI ELETTRICI S.R.L.**

[6] Address: Via per Retorto, 7/1- 15077 Predosa (AL) - Italy

[7] This equipment and its accepted variations are specified in the annex to this Certificate.

[8] Eurofins Product Testing Italy S.r.l., Notified Body n. 0477 in accordance with Article 21 of the Directive 2014/34/EU of the European Parliament and of the Council of 26th February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II of the Directive.
The examination and test results are recorded in the confidential Report N° EPT.20.REL.01/2013041.

[9] Compliance with the essential health and safety requirements is assured through the verification of them and by compliance with the harmonized standards:
EN 60079-0:2018, EN 60079-1:2014

[10] If the sign "X" is placed after the Certificate number, it indicates that the equipment is subject to the special conditions for safe use specified in the annex to this Certificate.

[11] This EU-TYPE EXAMINATION CERTIFICATE relates only to the design, the exam and the tests of the specified equipment.
Further requirements of the Directive 2014/34/EU apply to the manufacture and supply of this equipment.
These requirements are not object of this Certificate.

[12] The equipment shall include the sign Ex and the following string:

II 2G Ex db IIB T3 or T4 Gb	**-40°C ≤ T_{amb} ≤ +60°C**

CE

Place and date of issue:
Torino, 2020-09-25

Dionisio Bucchieri
Directive Responsible

Paolo Trisoglio
Managing Director

Eurofins Product Testing Italy eurofins Notified Body N. 0477

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This Certificate has 4 pages and it is not valid if not entirely. Conditions of validity are reported below.

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Notified Body N. 0477

ЕВРАЗИЙСКИЙ ЭКОНОМИЧЕСКИЙ СОЮЗ

СЕРТИФИКАТ СООТВЕТСТВИЯ

EAC

№ ЕАЭС **RU C-IT.AA87.B.00823/21**

Серия RU № 0344060

ОРГАН ПО СЕРТИФИКАЦИИ **Орган по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»). Адрес места нахождения юридического лица: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», литера В, Объект 6, этаж 3, офис 26. Адрес места осуществления деятельности в области аккредитации: Россия, 140004, Московская область, Люберецкий район, город Люберцы, поселок ВУГИ, АО «Завод «ЭКОМАШ», Литера В, Объект 6, этаж 3, офисы 26/3, 26/4, 26/5, 27/6, 30/1, 32. Аттестат № RA.RU.11AA87 от 20.07.2015 г. Телефон: +7 (495) 558-83-53, +7 (495) 558-82-44. Адрес электронной почты: ceve@ceve.ru**

ЗАЯВИТЕЛЬ **Общество с ограниченной ответственностью «Вулкан Пумпен Рус»**
Адрес места нахождения юридического лица и адрес места осуществления деятельности: Россия, 196650, Санкт-Петербург, город Колпино, улица Финляндская, дом 31, пом. 48.
ОГРН: 1107847122239. Телефон: +7 (812) 951 58-06. Адрес электронной почты: sale@vpumpen.ru

ИЗГОТОВИТЕЛЬ **RAEL Motori Elettrici S.r.l.**
Адрес места нахождения юридического лица и адрес места осуществления деятельности по изготовлению продукции: Via Per Retorto 7/1, 15077 Predosa (AL), Италия.

ПРОДУКЦИЯ **Взрывозащищенные электродвигатели серий AD-PE, RL, RLM, MIA и MIA1, TUBE с Ex-маркировкой согласно приложению (см. бланки №№ 0855097, 0855098). Документы, в соответствии с которыми изготовлены изделия - см. приложение, бланк № 0855096. Серийный выпуск**

КОД ТН ВЭД ЕАЭС **8501 51000, 8501 52 200, 8501 40 200, 8501 40 800**

СООТВЕТСТВУЕТ ТРЕБОВАНИЯМ

ТР ТС 012/2011 «О безопасности оборудования для работы во взрывоопасных средах»

СЕРТИФИКАТ СООТВЕТСТВИЯ ВЫДАН НА ОСНОВАНИИ

Протоколов испытаний № 350.2021-Т от 25.10.2021, № 350/1.2021-Т от 25.10.2021 Испытательной лаборатории технических устройств Автономной некоммерческой организации «Национальный испытательный и научно-исследовательский институт оборудования для взрывоопасных сред» ИЛ Ex ТУ (аттестат № РОСС RU.0001.21МШ19 выдан 16.10.2015); Акта анализа состояния производства № 43-ДА/21 от 27.05.2021 Органа по сертификации взрывозащищенного и рудничного оборудования (ОС ЦСВЭ) Общества с ограниченной ответственностью «Центр по сертификации взрывозащищенного и рудничного оборудования» (ООО «НАНИО ЦСВЭ»); Документов, представленных заявителем в качестве доказательства соответствия продукции требованиям ТР ТС 012/2011 (см. приложение, бланк № 0855096). Схема сертификации – 1с

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Перечень стандартов, применяемых на добровольной основе для соблюдения требований ТР ТС 012/2011 (см. приложение, бланк № 0855096). Условия и срок хранения указаны в эксплуатационной документации. Назначенный срок службы – 12 лет. Анализ состояния производства проведен посредством дистанционной оценки.

СРОК ДЕЙСТВИЯ С **08.11.2021** ПО **07.11.2026**
ВКЛЮЧИТЕЛЬНО

Руководитель (уполномоченное лицо) органа по сертификации (подпись) **Белогин Александр Сергеевич** (Ф.И.О.)

М.П.

Эксперт (эксперт-аудитор) (эксперты (эксперты-аудиторы)) (подпись) **Презовский Николай Николаевич**

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[1] **EU-TYPE EXAMINATION CERTIFICATE**

[2] **Equipment intended for use in potentially explosive atmospheres**
Directive 2014/34/EU – Annex III

[3] Certificate Number: **EPT 16 ATEX 2476 X** **issue 1**

[4] Equipment: **Asynchronous electric motor**
Series: **AD-PE V80V2A**

[5] Manufacturer: **RAEL MOTORI ELETTRICI S.R.L.**

[6] Address: Via per Retorto, 7/1- 15077 Predosa (AL) - Italy

[7] This equipment and its accepted variations are specified in the annex to this Certificate.

[8] Eurofins Product Testing Italy S.r.l., Notified Body n. 0477 in accordance with Article 21 of the Directive 2014/34/EU of the European Parliament and of the Council of 26th February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II of the Directive.
The examination and test results are recorded in the confidential Report N° EPT.21.REL.01/2013142.

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[10] If the sign "X" is placed after the Certificate number, it indicates that the equipment is subject to the special conditions for safe use specified in the annex to this Certificate.

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These requirements are not object of this Certificate.

[12] The equipment shall include the sign Ex and the following string:

II 2G Ex db IIB T3 Gb **-40°C ≤ T_{amb} ≤ +60°C**

Place and date of issue:
Torino, 2021-07-05

Eurofins Product Testing Italy
eurofins
Notified Body N. 0477

Dionisio Bucchieri
Directive Responsible

Paolo Trisoglio
Managing Director

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This Certificate has 5 pages and it is reproducible only in its entirety. Conditions of validity are reported below.

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Notified Body N. 0477

IECEx

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx EUT 14.0009X**	Page 1 of 4	Certificate history:
Status:	**Current**	Issue No: 2	Issue 1 (2016-06-29) Issue 0 (2014-12-09)
Date of Issue:	2021-07-05		
Applicant:	**RAEL MOTORI ELETTRICI S.r.l.** Via per Retorto, 7/1 15077 Predosa (AL) **Italy**		
Equipment:	**Three-phase and single-phase asynchronous motors; Series: AD-PE V90V2 and AD-PE V80V2A**		
Optional accessory:			
Type of Protection:	**Flameproof enclosures "d"; Equipment dust ignition protection by enclosure "t"**		
Marking:	Ex db IIB T3 Gb -40°C≤Ta≤+60°C Ex db IIB T3/T4 Gb -40°C≤Ta≤+60°C (only for AD-PE V90V2) Ex tb III C T200°C/T135°C Db -40°C≤Ta≤+60°C (only for AD-PE V90V2)		

Approved for issue on behalf of the IECEx Certification Body: **Dionisio Bucchieri**

Position: **Head of IECEx CB**

Signature: (for printed version)

Date: (for printed version)

1. This certificate and schedule may only be reproduced in full.
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Certificate issued by:

Eurofins Product Testing Italy S.r.l.
Via Cuorgnè
n.21 - 10156 Torino
Italy

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IEC IECEx

IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification System for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.:	**IECEx EUT 20.0021X**	Page 1 of 3	Certificate history:
Status:	**Current**	Issue No: 0	
Date of Issue:	2020-09-15		
Applicant:	**RAEL MOTORI ELETTRICI S.r.l.** Via per Retorto, 7/1 15077 Predosa (AL) **Italy**		
Equipment:	**Asyncronous electric motor AD 90 TS or AD 90 ML**		
Optional accessory:			
Type of Protection:	**Flameproof enclosure**		
Marking:	Ex db IIB T3 or T4 Gb		

Approved for issue on behalf of the IECEx Certification Body: **Bucchieri Dionisio**

Position: **Head of IECEx CB**

Signature: (for printed version)

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
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RAEL motori elettrici s.r.l.
Via per Retorto, 7/1, 15077 Predosa (AL)
www.raelsrl.com