Volt electric motors

TECHNICAL CATALOGUE

Volt Motors is a subsidiary of the Saya Group, a privately held Turkish conglomerate with interests in real estate development, tooling and molding, pharmaceuticals, mining and low-voltage industrial motor manufacturing.

We manufacture the highest quality electric motors, designed and produced in a modern facility utilizing highly trained personnel and the latest manufacturing equipment. We not only operate cost efficiently but also in an environmentally responsible manner.

Our recent expansion into international markets has led to a new management philosophy based on international standards in administration and customer support. Our new International Development Strategy fosters an environment of not only quality and service, but also the international perspective and the professionalism necessary to support our partners worldwide. This approach has led to successful partnerships with several large OEMs and distributors in the Middle East and Europe and was the strategy behind the establishment of Volt Electric Motors B.V. in The Netherlands with warehouse, sales and the technical support capacity required in the European market.

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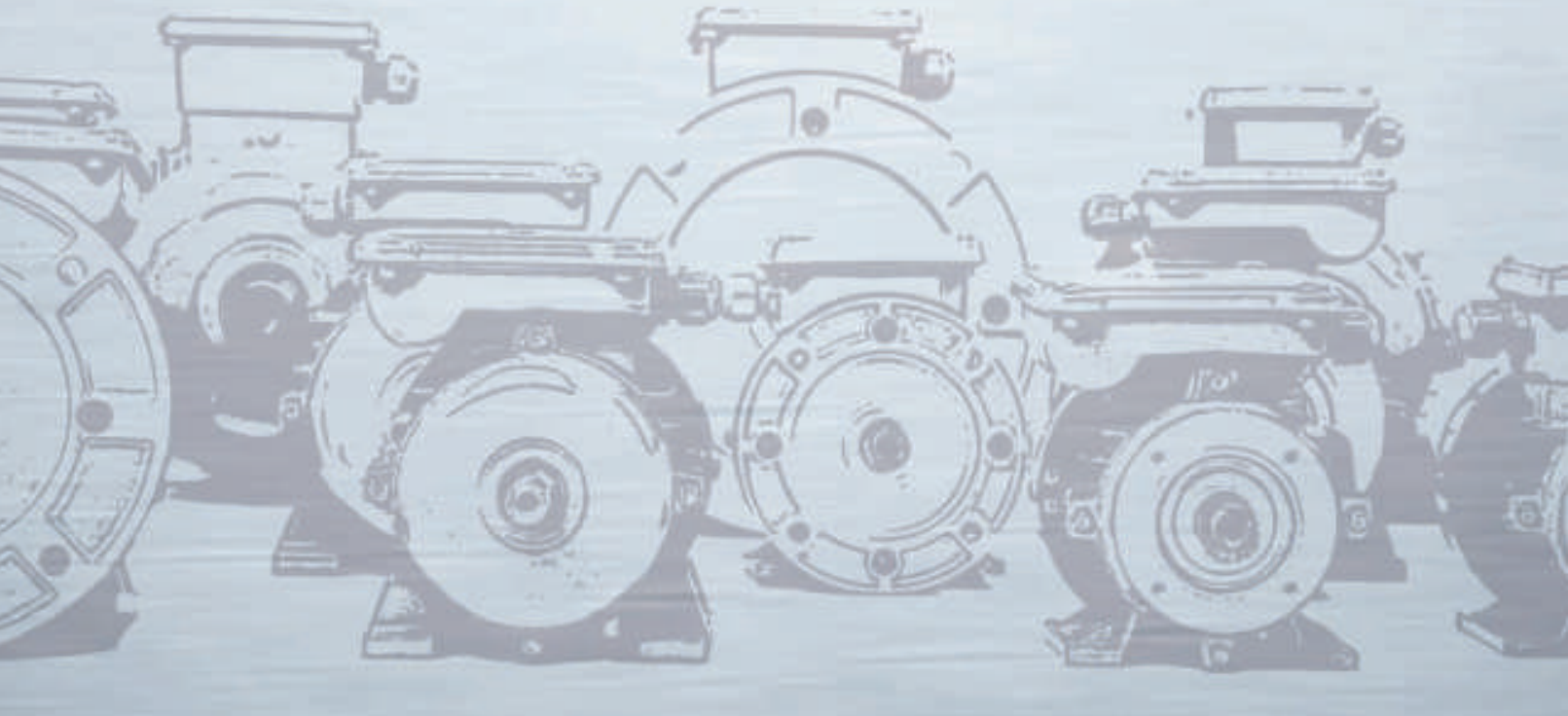

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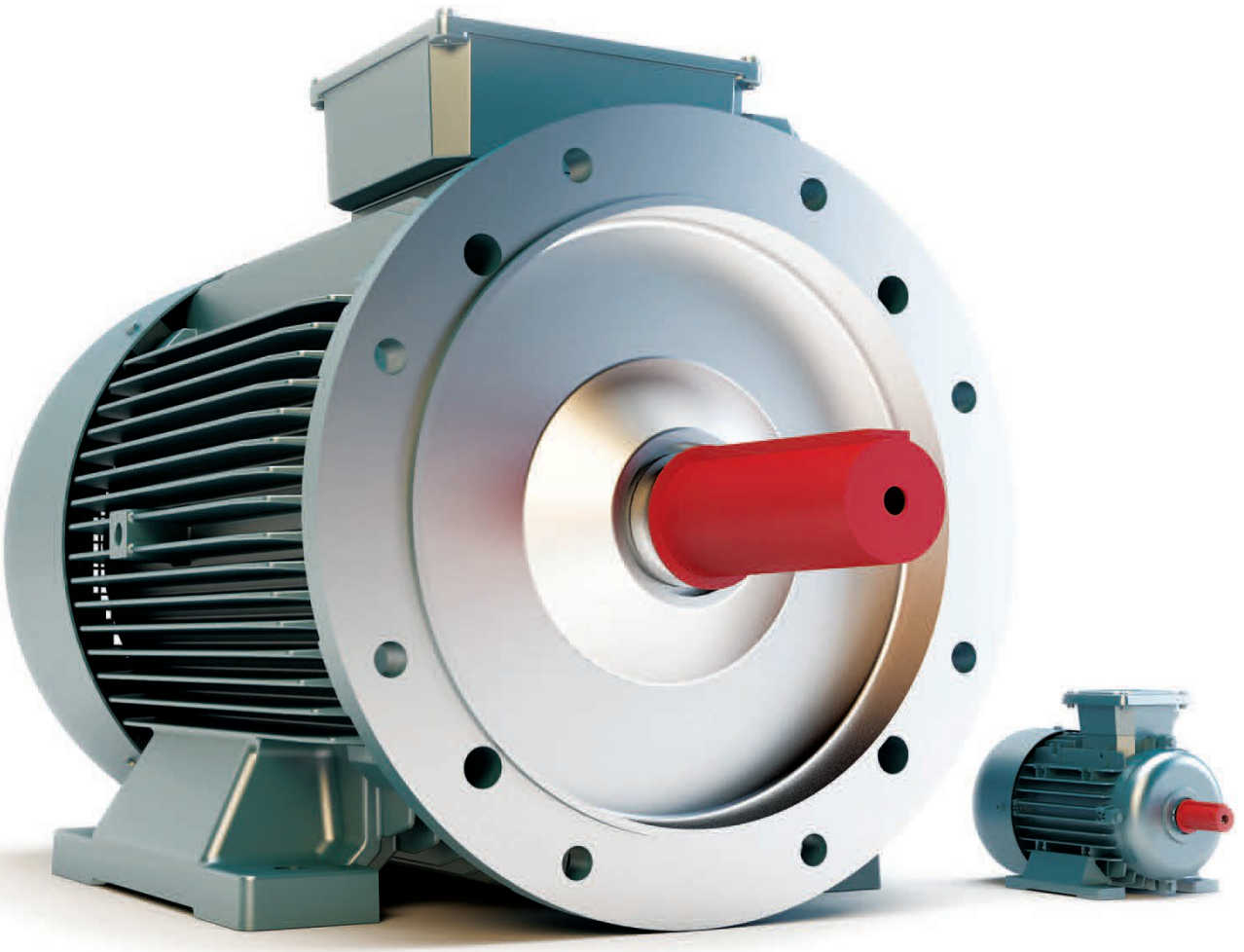
frame sizes

from 63

to 315



IE1 IE2 IE3 IE4

General purpose motors can be produced as 2-4-6 poles, 380 and 400V/50Hz for three-phase and 220V/50Hz and 230V/50Hz for single-phase. Special motors with special shafts, multi-speeds, various voltages and frequencies can be produced according to customer's requests.

Aluminum and cast iron frames are between 63-315, 0,12 kW - 200 kW. (Aluminum frame: 63 – 180. Cast iron frame: 160-315).

Their manufacturing and installation systems are IM B3, IM B5, IM B14 and B3/B5 (B35) and B3/B14 (B34) combined system format according to IEC 60034-7. Motors can also operate in vertical and appropriate installation positions.

Efficiency Class	: IE4, IE3, IE2, IE1
Cooling system	: IC411
Operation Type	: S1
Protection Class	: IP55
Working Height	: Maximum 1000 meters
Isolation class	: F
Temperature increase class	: B
Maximum ambient temperature for working	: 40°C

PTC thermistors in the windings are embedded in frame sizes 180 and bigger. PTC thermistors can be used in smaller sizes according to customer's request.

The voltages and frequencies for 2 and 4-pole, three-phase motors up to 3 kW and 6-pole, three-phase motors up to 2,2 kW are 230 230VD/400VY 50 Hz. The voltages and frequencies for 2 and 4-pole, three-phase motors over 3 kW and 6-pole, three-phase motors over 2,2 kW are 400 VD/690VY 50 Hz.

Terminal boxes are made from aluminum alloy for three-phase motors and thermoplastic materials with capacitor slots for single-phase motors.

The standard position of the terminal box is on the upper part of the motors. Terminal boxes include six terminals for motor power supply. Grounding connection takes place in the terminal box. Additionally, there is a grounding connection in the motor frame.

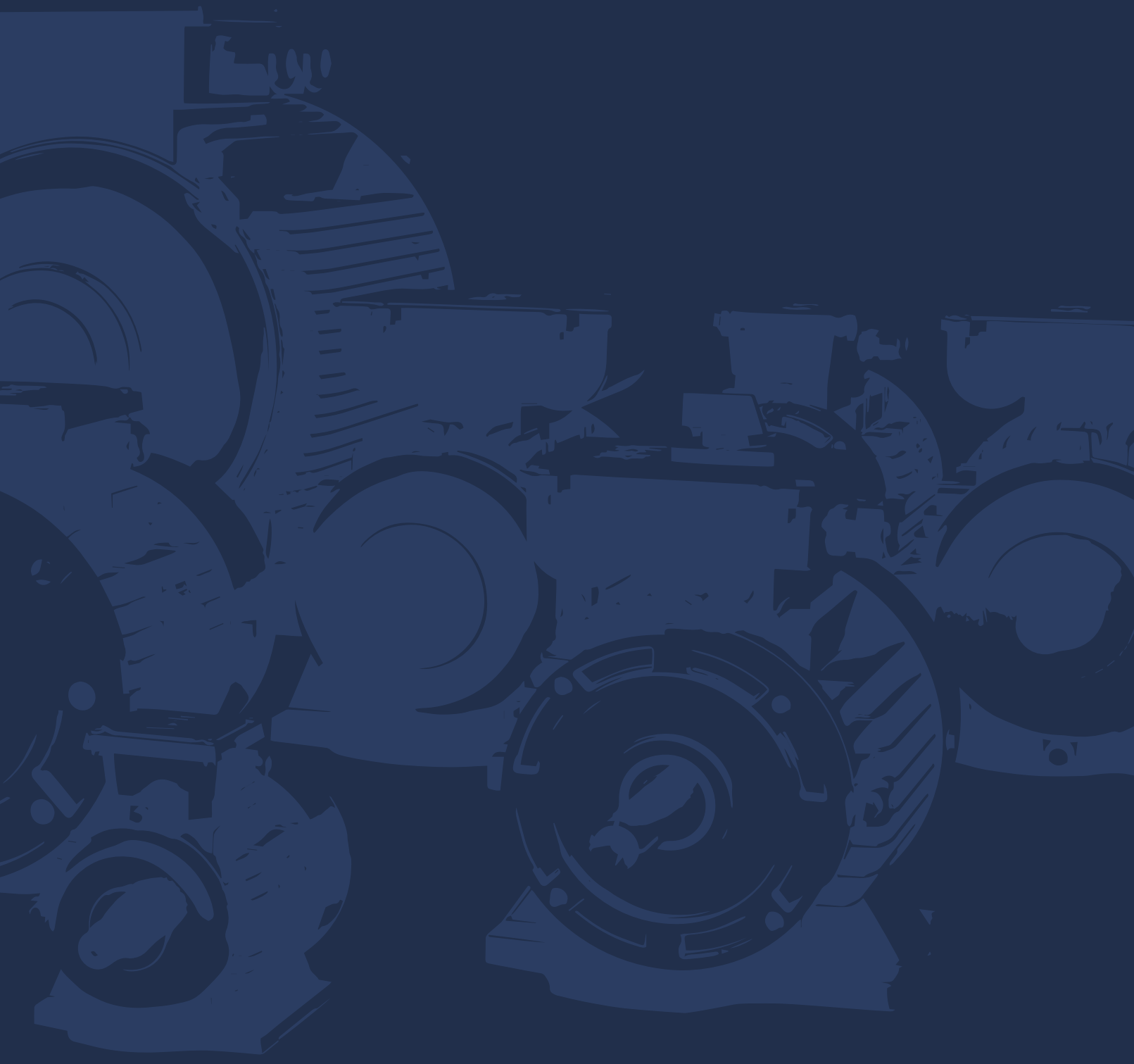
Noise level is within IEC 60034-9 Standard.

Vibration intensity level is 'Normal' class according to 60034-14.

RAL 7031, gray colored, with single-component synthetic painting is standard and suitable for industrial environments. Upon customer's request different applications are possible.

VSD compatible motors can be produced upon customer's request.

Volt electric motors

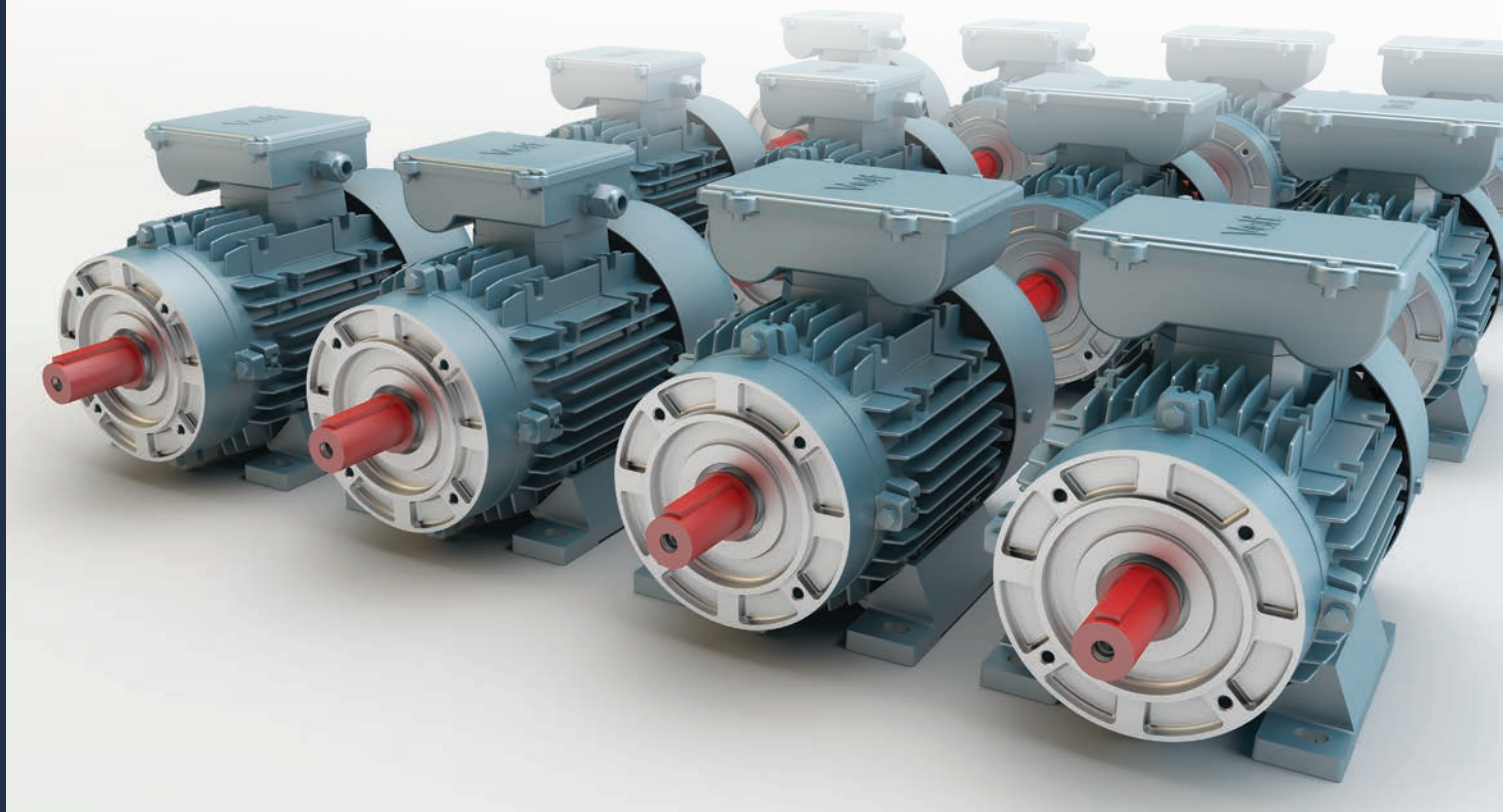


Volt electric motors

STANDARDS and RECOMMENDATIONS

Standard No.	Description
IEC 60034-1	Rating and Performance
IEC 60034-2-1	Standard Methods for Determining Losses and Efficiency from Tests
IEC 60034-2-2	Specific Methods for Determining Separate Losses of Large Machines from Tests - Supplement to IEC 60034-2-1
IEC 60034-5	Protection Level (IP Code)
IEC 60034-6	Cooling Method (IC Code)
IEC 60034-7	Construction Type and Installation System (IM Code)
IEC 60034-8	Marking of Connection Terminals and Rotation Direction
IEC 60034-9	Noise Limits
IEC 60034-11	Thermal Protection Classes
IEC 60034-12	Starting Performance
IEC 60034-14	Mechanical Vibration Measurement and Limitations
IEC 60034-30	Three-phase Caged Induction Motors Efficiency Classes
IEC 60072-1	Three-phase Induction Motors Construction Sizes
IEC 60027-4	Letter Symbols
IEC 60252-2	Start Capacitors
IEC 60252-1	Capacitor Performance Experiments and Declaration Values
EN ISO 1680	Test Code for the Measurement of Airborne Noise Emitted by Rotating Electrical Machines
IEC 60085	Electrical Insulation - Thermal Classification
IEC 60072-1	Cylindrical Shaft Ends

TABLE 1: Standards and Recommendations.



EFFICIENCY CLASSIFICATION in LOW-VOLTAGE MOTORS ACCORDING TO IEC 60034-30

IEC/EN 60034-34 has been published by IEC in October of 2008. Its purpose is to eliminate the numerous different energy standards used for cage-induction motors and to create a single description for low-voltage motors efficiencies to be used globally.

These efficiency classes are:
- Premium efficiency IE3
- High efficiency IE2
- Standard efficiency IE1

IE4 class was defined in IEC 60034-30:2008 for asynchronous and synchronous motors. 15% more efficiency was aimed with respect to IE3 motors. Innovations in cage rotor designs and material technology were requested for providing IE4 efficiency. During a review of standards, this application could be added to the system at a later time.

It has a wider coverage compared to the previous standard. The standard covers most kinds of motors (i.e. general purpose standard motors, motors designed for explosive areas, marine motors and motors with reducers and brakes).

Properties of IE2 motors covered by this standard are:
- Three-phase, single-speed asynchronous motors; 50 Hz and 60 Hz
- Motors with power between 0.75kW and 375kW
- 2, 4 and 6-pole motors
- Motors with rated voltage up to 1000V
- Operation type S1 and operation period 80% and over S3
- Motors operating directly with delta connection

Following motors are excluded from standard are:
- Motors used with speed control devices
- Motors that cannot be tested without the appliances they are used for (i.e. pumps, fans and compressors)

Efficiency Classes:
Efficiency classes defined in IEC 60034-30 standard have entered into force in 2008 by IEC. Comparable efficiency levels are displayed in Figure 1.

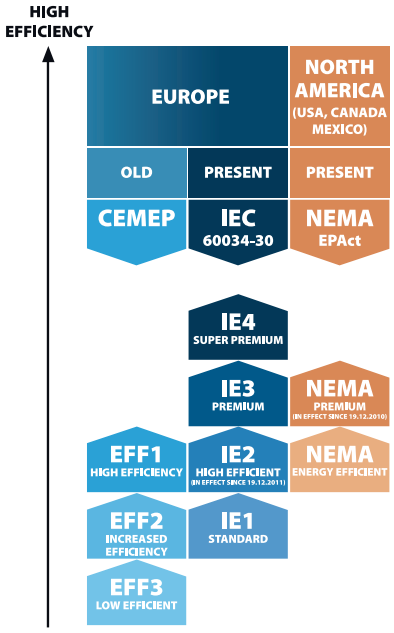


FIGURE 1: Efficiency classes defined in IEC 60034-30 standard and their comparable efficiency levels

APPLICATION CALENDAR

Efficiency application calendar shall be applied as in Figure .

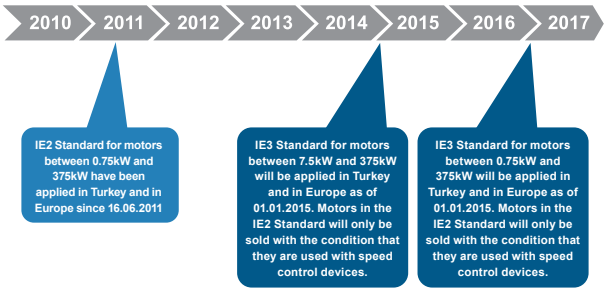


FIGURE 2: Efficiency Application Calendar

According to this calendar:
- Motors between 0.75kW and 375kW that are in the IE1 (EFF2 and EFF3) efficiency class and do not correspond with the IEC 60034-30 cannot be sold in Europe and Turkey as of 2010.
- Provided that motors between 7.5kW and 375kW are not launched with VDF (Variable Frequency Drives), they should have IE3 energy efficiency. IE2 energy efficiency motors between 7.5kW and 375kW cannot be sold if they were launched with VFD.
- As of 2017, the same provision will be expanded and applied for the motors between 0.75kW and 375kW.

Efficiency standards prepared by IEC:
The standards formed by IEC to test energy efficiencies and performances are as following:

- Development studies formed by IEC to standardize the special test methods for AC motor efficiencies and losses, supplied by Variable Frequency Drives, still continue.

- Motors produced according to the IEC 60034-30 efficiency standard should be tested again according to the IEC 60031-2-1 test standards published by IEC in September, 2007.

EFFICIENCY CLASS TABLES ACCORDING TO IEC 60034-30 (50 Hz)

MOTOR POWER kW	IE1 - STANDARD EFFICIENCY			IE2 - HIGH EFFICIENCY			IE3 - PREMIUM EFFICIENCY		
	2 Poles	4 Poles	6 Poles	2 Poles	4 Poles	6 Poles	2 Poles	4 Poles	6 Poles
0,75	72,1	72,1	70,0	77,4	79,6	75,9	80,7	82,5	78,9
1,1	75,0	75,0	72,9	79,6	81,4	78,1	82,7	84,1	81,0
1,5	77,2	77,2	75,2	81,3	82,8	79,8	84,2	85,3	82,5
2,2	79,7	79,7	77,7	83,2	84,3	81,8	85,9	86,7	84,3
3	81,5	81,5	79,7	84,6	85,5	83,3	87,1	87,7	85,6
4	83,1	83,1	81,4	85,8	86,6	84,6	88,1	88,6	86,8
5,5	84,7	84,7	83,1	87,0	87,7	86,0	89,2	89,6	88,0
7,5	86,0	86,0	84,7	88,1	88,7	87,2	90,1	90,4	89,1
11	87,6	87,6	86,4	89,4	89,8	88,7	91,2	91,4	90,3
15	88,7	88,7	87,7	90,3	90,6	89,7	91,9	92,1	91,2
18,5	89,3	89,3	88,6	90,9	91,2	90,4	92,4	92,6	91,7
22	89,9	89,9	89,2	91,3	91,6	90,9	92,7	93,0	92,2
30	90,7	90,7	90,2	92,0	92,3	91,7	93,3	93,6	92,9
37	91,2	91,2	90,8	92,5	92,7	92,2	93,7	93,9	93,3
45	91,7	91,7	91,4	92,9	93,1	92,7	94,0	94,2	93,7
55	92,1	92,1	91,9	93,2	93,5	93,1	94,3	94,6	94,1
75	92,7	92,7	92,6	93,8	94,0	93,7	94,7	95,0	94,6
90	93,0	93,0	92,9	94,1	94,2	94,0	95,0	95,2	94,9
110	93,3	93,3	93,3	94,3	94,5	94,3	85,2	95,4	95,1
132	93,5	93,5	93,5	94,6	94,7	94,6	95,4	95,6	95,4
160	93,8	93,8	93,8	94,8	94,9	94,8	95,6	95,8	95,6
200	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
220	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
250	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
300	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
330	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8
375	94,0	94,0	94,0	95,0	95,1	95,0	95,8	96,0	95,8

TABLE 2: Efficiency class and values according to IEC 60034-30 (50Hz)

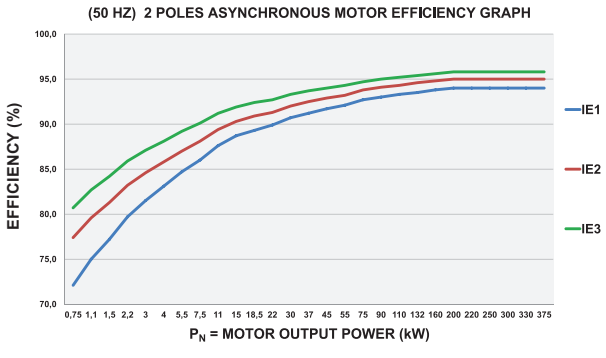


FIGURE 3: 2 poles Asynchronous motor efficiency power chart (50 Hz)

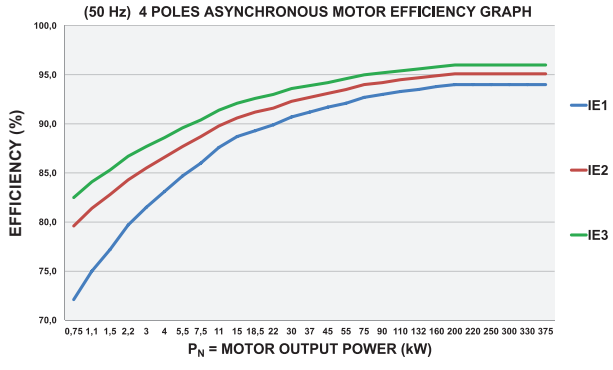


FIGURE 4: 4 poles Asynchronous motor efficiency power chart (50 Hz)

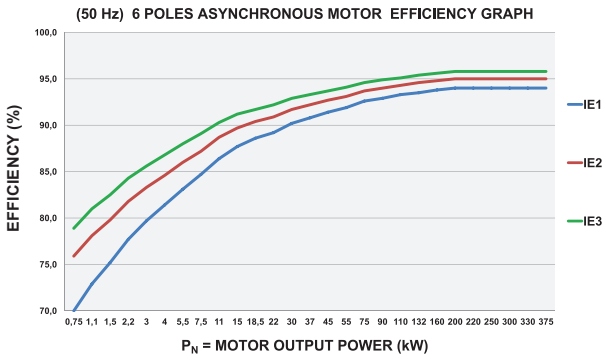


FIGURE 5: 6 poles Asynchronous motor efficiency power chart (50 Hz)

EFFICIENCY CLASS TABLES ACCORDING TO IEC 60034-30 (60 Hz)

MOTOR POWER kW	IE1 - STANDARD EFFICIENCY			IE2 - HIGH EFFICIENCY			IE3 - PREMIUM EFFICIENCY		
	2 Poles	4 Poles	6 Poles	2 Poles	4 Poles	6 Poles	2 Poles	4 Poles	6 Poles
0,75	77,0	78,0	73,0	75,5	82,5	80,0	77,0	85,5	82,5
1,1	78,5	79,0	75,0	82,5	84,0	85,5	84,0	86,5	87,5
1,5	81,0	81,5	77,0	84,0	84,0	86,5	85,5	86,5	88,5
2,2	81,5	83,0	78,5	85,5	87,5	87,5	86,5	89,5	89,5
3,7	84,5	85,0	83,5	87,5	87,5	87,5	88,5	89,5	89,5
5,5	86,0	87,0	85,0	88,5	89,5	89,5	89,5	91,7	91,0
7,5	87,5	87,5	86,0	89,5	89,5	89,5	90,2	91,7	91,0
11	87,5	88,5	89,0	90,2	91,0	90,2	91,0	92,4	91,7
15	88,5	89,5	89,5	90,2	91,0	90,2	91,0	93,0	91,7
18,5	89,5	90,5	90,2	91,0	92,4	91,7	91,7	93,6	93,0
22	89,5	91,0	91,0	91,0	92,4	91,7	91,7	93,6	93,0
30	90,2	91,7	91,7	91,7	93,0	93,0	92,4	94,1	94,1
37	91,5	92,4	91,7	92,4	93,0	93,0	93,0	94,5	94,1
45	91,7	93,0	91,7	93,0	93,6	93,6	93,6	95,0	94,5
55	92,4	93,0	92,1	93,0	94,1	93,6	93,6	95,4	94,5
75	93,0	93,2	93,0	93,6	94,5	94,1	94,1	95,4	95,0
90	93,0	93,2	93,0	94,5	94,5	94,1	95,0	95,4	95,0
110	93,0	93,5	94,1	94,5	95,0	95,0	95,0	95,8	95,8
150	94,1	94,5	94,1	95,0	95,0	95,0	95,4	96,2	95,8
185	94,1	94,5	94,1	95,4	95,4	95,0	95,8	96,2	95,8
220	94,1	94,5	94,1	95,4	95,4	95,0	95,8	96,2	95,8
250	94,1	94,5	94,1	95,4	95,4	95,0	95,8	96,2	95,8
300	94,1	94,5	94,1	95,4	95,4	95,0	95,8	96,2	95,8
330	94,1	94,5	94,1	95,4	95,4	95,0	95,8	96,2	95,8
375	94,1	94,5	94,1	95,4	95,4	95,0	95,8	96,2	95,8

TABLE 3: Efficiency class tables according to IEC 60034-30 (60Hz)

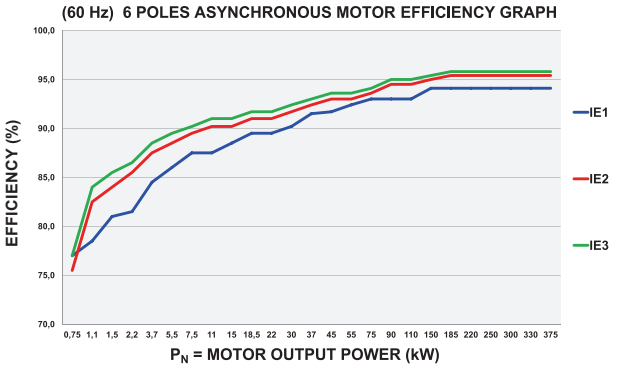


FIGURE 6: 6 poles Asynchronous motor efficiency power chart (60Hz)

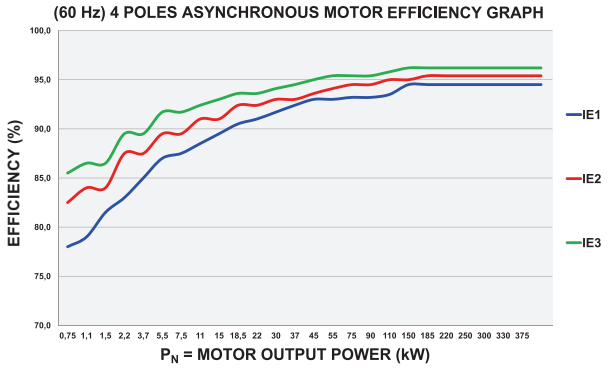


FIGURE 7: 4 poles Asynchronous motor efficiency power chart (60Hz)

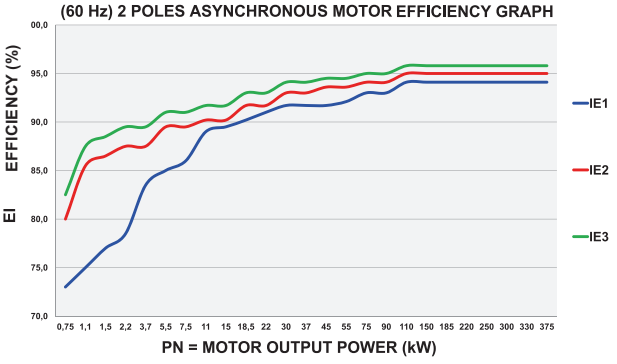


FIGURE 8: 2 poles Asynchronous motor efficiency power chart (60Hz)

ASYNCHRONOUS MOTOR LOSSES

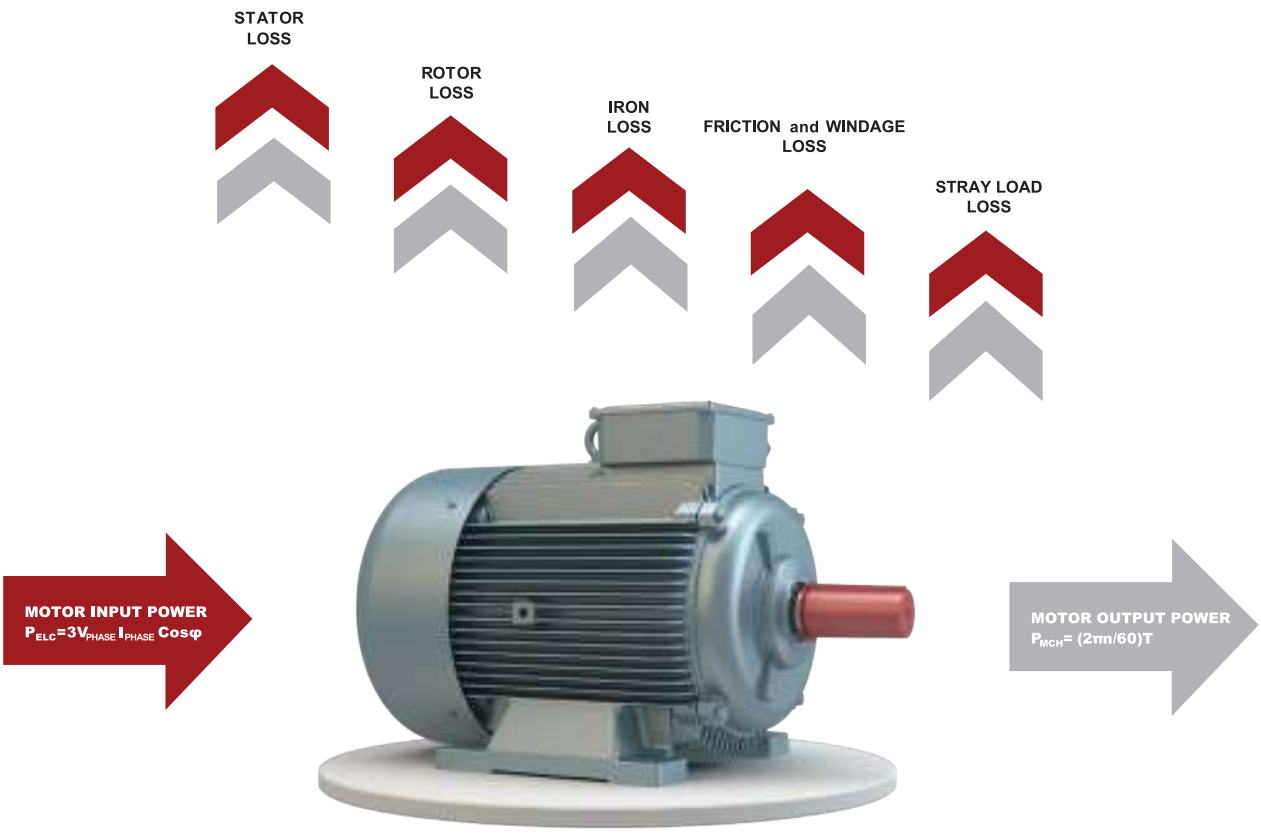


FIGURE 9: Asynchronous Motor Losses

Motor efficiency was calculated based on the previous EN/IEC 60034-2-1996 standard using the following methods:

- Direct method
- Indirect method
- PLL (additional losses) is considered as 0,5% of motor input power

Resistance losses in stator and rotor winding and wound rotor motors are defined according to 95°C temperature.

Motor efficiency calculation according to the new IEC/ EN 60034-2-1-2007 standard is calculated as follows:

- Direct method
- Indirect method
- PLL (additional losses) is calculated with three separate methods that can be selected by producer's preference
- Calculated based on load tests performed in different voltages and loads
- Considered as 2,5%-1,0% of motor input power at rated power for the motors between 0,1-1000kW
- Alternatively it can be determined with an indirect calculation method. Once values at ambient temperature 25°C (or real ambient temperature value) or the values obtained after winding temperature has been reached, the thermal stability in motor thermal tests can be used for stator and rotor wound motors resistance calculation.

Since additional losses are more sensitively measured with special methods and calculation, it is considered that additional losses are more than 0,5% of input power. Calculated efficiency with respect to the new standard can be lower than efficiency, which is calculated according the previous standard.

Efficiency values in IEC 60034-2-1:2007 standard are recalculated and are declared in IEC 60034-30 standard in IE1, IE2 and IE3 efficiency classes. These declaration values are given in tables (Table 2 and Table 3) and in graphics (Figure: 3-8).

DUTY TYPES

S1

Continuous running duty

Motor operates under fixed load until reaching heat balance. Without indications of the type of rated motor, S1 continuous running duty should be assumed. This is used in pump, fan, ventilation, and compressor applications.

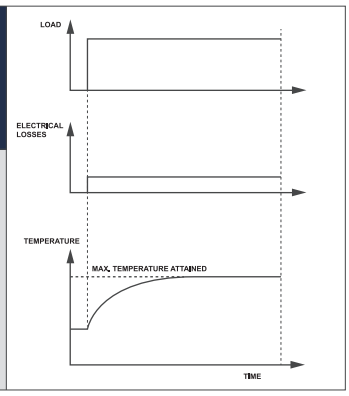


FIGURE 10: S-1 DUTY TYPE - Continuous running duty

S2

Short time duty

Motor operates under fixed load without reaching the heat balance. Motor cools down to ambient temperature in stop times. Operation time is recommended as 10, 30, 60 and 90 minutes. Dam covers, sirens and some cranes can be seen as examples of application.

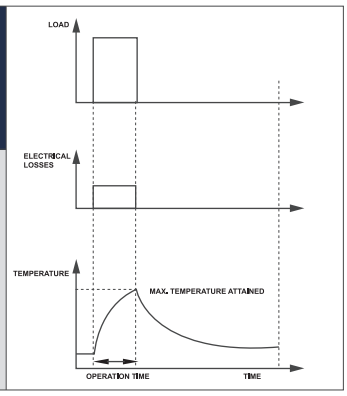


FIGURE 11: S-2 DUTY TYPE - Short-time duty

S3

Intermittent periodic duty not affected by the starting process

Operation periods are composed of a fixed load operation with a proceeding stop. Starting current does not cause temperature increase. Unless otherwise specified operation period is 10 minutes. Relative operation period can be 15%, 25%, 40% and 60% of the period. Motor valve systems and wire pulling machines are classified in S3 operation type.

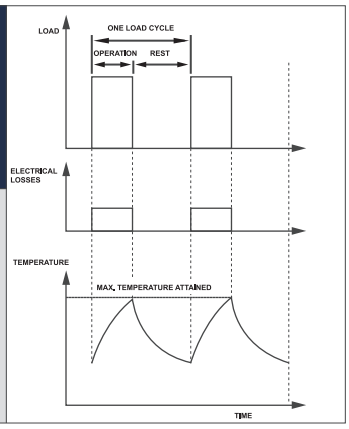


FIGURE 12: S-3 DUTY TYPE - Intermittent periodic duty

S4

Intermittent periodic duty affected by the starting process

This system is composed of identical operation period series. Each period has long starts, operating under a fixed load with stop periods that are not negligible. Due to very short operation periods, thermal balance cannot be reached. Overhead cranes, typical cranes, and elevators are examples of these types of applications.

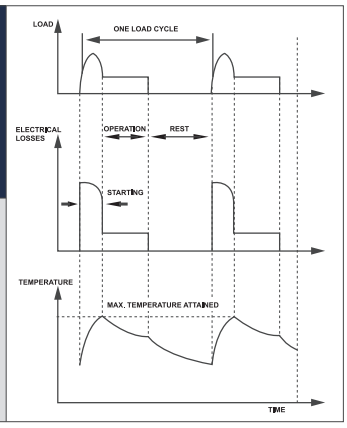


FIGURE 13: S-4 DUTY TYPE – Intermittent periodic duty with starting process

S5

Intermittent periodic duty affected by the starting process and by electric braking

This system is composed of an identical operation period series. Each period is composed of long starts, operating under a fixed load with instantaneous electrical braking and stop periods that are not negligible.

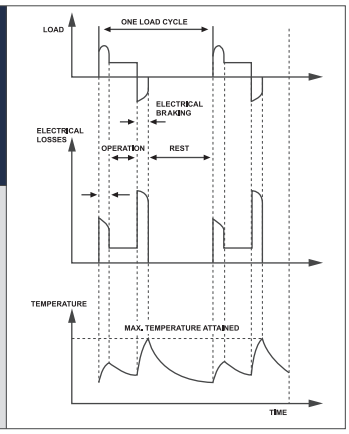


FIGURE 14: S-5 DUTY TYPE - Intermittent periodic duty with electric braking

S6

Continuous operation, periodic duty with intermittent load

This system is composed of an identical operation period series. Each period consists of two parts: one is operation under fixed load and the other is unloaded operation. Due to very short operation periods, thermal balance cannot be reached. Unless otherwise determined operation period is 10 minutes. Relative operation periods can be 15%, 25%, 40% and 60% of the period. Conveyors, machine tools and hand tools are covered in S6 operation type.

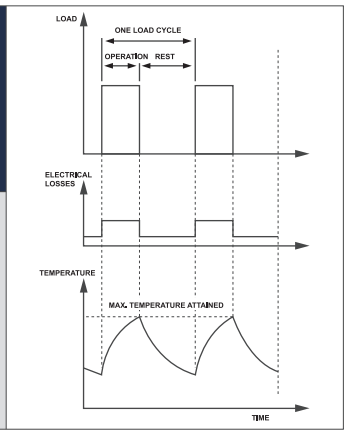


FIGURE 15: S-6 DUTY TYPE – Continuous operation duty with intermittent load

S7

Uninterrupted periodic duty, affected by the starting process and electric braking

This system comprises of a sequence of identical duty cycles. Each cycle has a period of starting current, a period of operation at constant load, and a period of electrical braking. The braking method is too short for thermal equilibrium to be obtained.

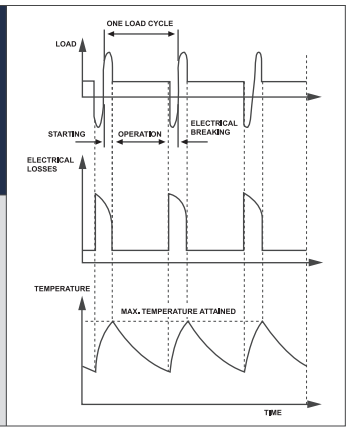


FIGURE 16: S-7 DUTY TYPE -
Continuous operation periodic duty with electric braking

S8

Uninterrupted periodic duty with recurring speed and load changes

This system is a sequence of identical duty cycles, each period comprises of a period of operation at constant load (corresponding to a predetermined speed of rotation), and one or more periods of operation at other loads (corresponding to different speeds of rotation). The period of the duty cycle is too short for thermal equilibrium to be obtained. This type of duty cycle is used for pole changing motors. Applications which require different loads and different speeds are covered in S8 type operation

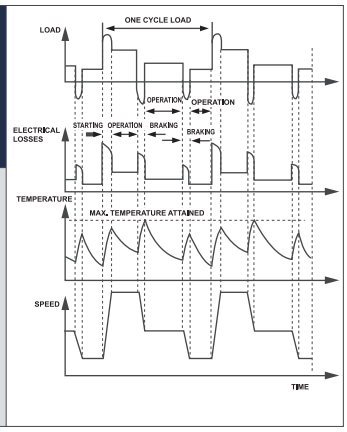


FIGURE 17: S-8 DUTY TYPE
Continuous operation periodic duty with related load/speed changes

PROTECTION CLASSES

Our motors are manufactured according to the IEC 60034-5 standard, protecting them against dust and squirting liquids. Our standard motors are manufactured in IP 55 protection class. IP56, IP65 and IP66 are available upon request.

As shown in Table 4, the first digit in the IP (Ingress Progress) diagram describes the protection against solid materials. The second digit shows the protection against liquid materials.

IP	5	5	
Protection Against Solid Materials	**First Number**	**Second Number**	**Protection Against Liquid Materials**
Unprotected	0	0	Unprotected
Protection against objects greater than 50 mm	1	1	Protection against water coming vertically
Protection against objects greater than 12 mm	2	2	Protection against water coming vertically up to 15 ° angle
Protection against objects greater than 2.5 mm	3	3	Protection against water coming vertically up to 60 ° angle
Protection against objects greater than 1 mm	4	4	Protection against water splashing from all directions
Protection against dust	5	5	Protection against water squirting from all directions
Complete protection against dust	6	6	Protection against powerful water squirting from all directions
	0	7	Protection against temporary water submersion between 0.15m and 1m
	0	8	Protection against permanent water submersion

TABLE 4: Protection Classes

MAIN COOLING TYPES ACCORDING TO IEC 60034-6

COOLING TYPE

The aim of cooling is to transfer the heat from the motor to ambient. The objective is to keep the temperature of isolation materials under the limit values.

The cooling type in Electrical Machines are determined with numbers between "1-9" that come after 'IC' (International Cooling), code letters according to the IEC 60034-6 standard.

Cooling air is supplied by a plastic fan which is connected to the motor shaft and operates inside a holed steel sheet protection cover; cooling is performed outside of the completely closed surface of the motor. Since Volt Electric motors are cooled with a fan from a completely closed outside surface, their cooling type is IC 411. IC 418 cooling type can also be manufactured upon special requests. Commonly used cooling examples for IEC 60034-6 standard are given in following Figure 18.

IC411

Cooling air is supplied by a plastic fan which is connected to the motor shaft and operates inside a holed steel sheet protection cover; cooling is performed outside of the completely closed surface of the motor.

FIGURE 18: Main Cooling Types According to IEC 60034-6

CONSTRUCTION FORMATS and INSTALLATION SYSTEMS

Asynchronous motors have standardized feet height (H) dimensions from base to shaft. This dimension defines the construction size of the motor. Dimension B measures the length (S, M, L) of the frame size.

S - Short size frame length
M - Medium size frame length
L - Large size frame length

Standardized construction sizes and standardized frame sizes are shown according to IEC 60072-1 and EN 50347 standards. Construction sizes and corresponding (H) axis heights are given in following table.

IEC Construction Sizes H (mm)						
56	63	71	80	90	100	112
132	160	180	200	225	250	280
315	355	400	450	500	560	630
710	800	900	1000	1120	1250	1400

Three-phase Volt Electric Motors are produced in: 63 – 71 – 80 – 90S – 90L – 100 – 112 – 132S – 132M – 160M – 160L – 180M – 180L –200L – 225S – 225M - 250M - 280S - 280M - 315S - 315M - 315L construction sizes.

TABLE 5: IEC Construction Sizes

Powers and axial heights (frame sizes) and some external dimensions are standardized in asynchronous motors. Changeability and new project studies have become easier by means of this standardization. Specifying motor operational voltage, power, revolution speed, frame size, protection type and construction type is necessary for new motor orders.

Six basic standardized dimensions of asynchronous motors based on IEC 60072-1 are as follows:

1. H (frame size or construction size)
2. Longitudinal and latitudinal distances of fixing holes A, B
3. Distance between shaft rabbet and nearest foot's fixing hole C
4. Shaft end diameter, D
5. Length of shaft extension beginning from shaft rabbet, E
6. Fixing hole diameter, K

F: Key slot width
GD: Key thickness GD
GE: Key slot depth
GA: The distance between top of wedge and shaft's other surface in the axis is GA.

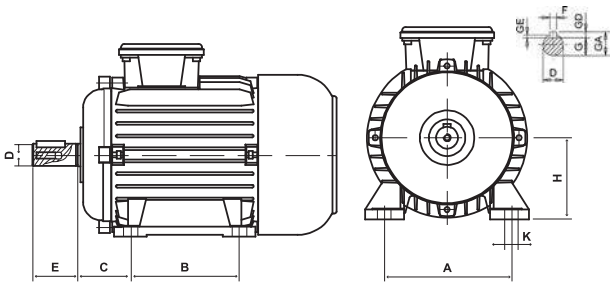


FIGURE 68: Asynchronous motor frame sizes

EN 50347 provides standardized dimensions, key and key slot dimensions, power values and standard flange dimensions for flanged motors.

Construction Types (IM):
Construction types and installation systems are standardized according to IEC 60034-7.

There are main five construction types:
1. Foot type
2. Foot and flanged type (B35 and B34)
3. Without foot flanged type (B5 and B14)
4. Foot and without front cover type (B15)
5. Without foot and without front cover type (B9)

Mainly used types are: foot type, foot and flanged type and without foot flanged type. Symbolization of this part is formed by two separate coding.

Classifications of motor construction types and installation systems have been done in IEC 60034-7 and abbreviated as IM (International Mounting).

Code I: This part solely covers motors which are embedded from side covers only and single shaft prominent motors. The letter B corresponds to horizontal shaft motors and V letter corresponds to vertically-installed motors. These types of motors (embedded from side covers and single shaft prominent) are shown with numbers following the letter B or V.

Code II: This part covers all electrical motors designed for general and special purposes. They are classified with four numbers following the letters IM. Numbers are defined as following:

1 = Class of construction type class
2 and 3 = Installation systems
4 = Shaft extension

STANDARD ROTATION DIRECTION

When you look at the motor shaft (the front side, drive-D) the clockwise rotation is the standard motor rotation direction. The rotation direction can be changed by changing two phases.

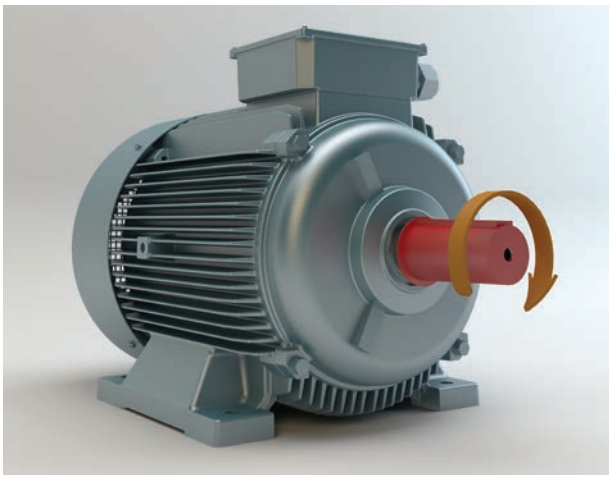


FIGURE 19: Motor rotation direction

CONNECTIONS and TERMINAL MARKINGS OF ASYNCHRONOUS MOTORS

Item No	Description	Symbols According to IEC 60034-8
1	Three-phase network	L1 - L2 - L3
2	Three-phase and single-phase network neutral line	N
3	Single Phase network	L - N
4	Single-phase, single-speed Stator winding (6 connection terminal)	Input **U1 - U2 V1 - V2 W1 - W2** Output
5	Three-phase, single-speed stator winding (3 connection terminal)	U - V - W
6	Single-phase motor winding • Main winding • Auxiliary winding	U1 - U2 Z1 - Z2
7	Three-phase, two-speed Dahlender winding Low Speed High Speed	1U - 1V - 1W Low 2U - 2V - 2W High
8	Three-phase, two-speed PAM winding Or two separate windings (e.g. for 8/6 poles) Low speed High speed	For 6/8 poles ; 8U - 8V - 8W 6U - 6V - 6W
9	Three-phase motor winding (3 connection terminals)	K - L - M

TABLE 6: Marking of connection terminals for Asynchronous motors

Connection Terminal Marking:
Terminals are marked with standard symbols to make connections in electrical machines easier and more accurate. Volt Electric Motors uses markings according to IEC 60034-8, as shown in Table 6.

SURFACE SOUND PRESSURE LEVEL LpA dB(A)

FRAME SIZE	6 POLES		4 POLES		2 POLES	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
63	42	45	45	48	51	56
71	44	47	46	49	52	56
80	45	48	47	51	55	58
90	46	49	48	52	56	60
100	49	53	50	54	59	64
112	54	59	56	59	63	67
132	57	61	60	64	66	69
160	63	66	64	68	70	74
180	63	66	64	68	71	75
200	64	67	64	68	73	76
225	64	67	65	69	74	78
250	66	69	68	71	76	80
280	67	71	68	71	77	80
315	73	77	74	78	79	82

TABLE 7: Sound pressure levels per frame size

NOISE LIMITS ACCORDING TO IEC 60034-9

Noise level limits for general purpose electrical machines are determined in IEC 60034-9. Permitted unloaded operation sound level and A-sound power level L WA limit values in operation at rated power are given in Table and Table . The relationship between LWA and surface sound pressure level L_{PA} is $L_{PA} = L_{WA} - 10\log\left(\frac{S}{S_o}\right)$

Here;

L_{PA} = Sound pressure level in free area over reflection plane whose distance is 1 m with motor surface

L_{WA} = Determined sound power level that is determined according to this standard

S_0 = 1 m^2 (Reference area)

S = Area of measurement surface

As seen in Table 7, 8 and Table 9 noise levels of Volt Electric motors are very low with respect to the standard limit values. The average sound pressure measurements, made in different locations with 1m distance to the LpA motor surface in terms of dB (A) unit, are given in Table 7-9.

SOUND POWER LEVEL L_{WA} (dB) AT UNLOADED OPERATION ACCORDING TO IEC 60034-9

MOTOR OUTPUT POWER P_N kW	8 poles		6 poles		4 poles		2 poles	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
$1,0<P_N \leq 2,2$	70	71	70	71	70	71	78	85
$2,2<P_N \leq 5,5$	73	76	73	76	73	76	83	88
$5,5<P_N \leq 11$	77	80	77	80	78	81	88	91
$11< P_N \leq 22$	81	84	81	84	85	88	91	94
$22<P_N \leq 37$	84	87	84	87	88	91	93	100
$37<P_N \leq 55$	86	90	87	91	91	95	95	101
$55<P_N \leq 110$	89	93	91	95	95	98	97	104
$110<P_N \leq 220$	94	97	96	99	99	102	100	107
$220<P_N \leq 400$	96	98	98	101	102	105	103	109
$440<P_N \leq 1000$	97	99	99	102	105	108	105	110

TABLE 8: Sound power level at unloaded operation

SOUND POWER LEVEL L_{WA} (dB) AT RATED POWER OPERATION ACCORDING TO IEC 60034-9

MOTOR OUTPUT POWER P_N kW	8 poles		6 poles		4 poles		2 poles	
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
$1,0<P_N \leq 2,2$	78	79	77	78	75	76	80	87
$2,2<P_N \leq 5,5$	81	84	80	83	78	81	85	90
$5,5<P_N \leq 11$	85	88	84	87	83	86	90	93
$11< P_N \leq 22$	88	91	87	90	89	92	93	96
$22<P_N \leq 37$	91	94	90	93	92	95	95	102
$37<P_N \leq 55$	92	96	92	96	94	98	97	103
$55<P_N \leq 110$	95	99	100	104	101	104	101	108
$110<P_N \leq 220$	99	102	100	104	102	105	102	109
$220<P_N \leq 440$	101	103	98	101	102	105	103	109
$440<P_N \leq 1000$	101	103	102	105	107	110	107	112

TABLE 9: Sound power level at rated power operation

ISOLATION CLASSES

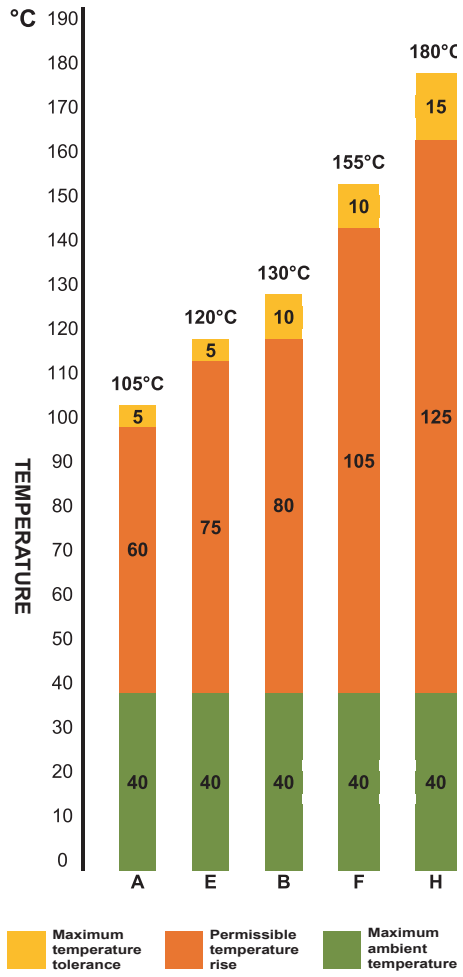


FIGURE 20: Isolation classes chart

Maximum Values that are permitted		Unit	Isolation Class				
			A	E	B	F	H
Total winding temperature	($t_{ambient}$+ Δt + $t_{tolerance}$)	°C	105	120	130	155	180
Winding temperature increase	(Δt)	K	60	75	80	105	125
Ambient Temperature	($t_{ambient}$)	°C	40	40	40	40	40
Tolerance	($t_{tolerance}$)	K	5	5	10	10	15

TABLE 10: Isolation classes

The temperature rise limit of Volt Electric motors is in class B. Stator windings are composed of copper conductors which are plated by double-layered enamel in class H. In phase windings (in each channel and in each winding start) and winding heads, complete isolation is provided by Lacquer absorption method which is high qualified and in class H (total 180 °C). Other isolation materials are also in class H. This enables a winding construction to stand up to 155 °C.

The classification of isolation materials based on their standing temperature are shown in Table 10.

There are also Y, 200, 220, 250 isolation classes according to IEC 60085. Y class defines 90 °C temperature limit, 200 class defines 200 °C limit, 220 class defines 220 °C limit and 250 class defines 250 °C temperature limit.

A graphical representation of above mentioned are shown in Figure 20.

VIBRATION LIMITS ACCORDING TO IEC 60034-14

Vibration Grade	Shaft Height (mm)	56 ≤ H ≤ 132			132 < H ≤ 280			H > 280		
	Mounting	Displac. µm	Vel. mm/s	Acc. m/s²	Displac. µm	Vel. mm/s	Acc. m/s²	Displac. µm	Vel. mm/s	Acc. m/s²
A	Free Suspension	25	1,6	2,5	35	2,2	3,5	45	2,8	4,4
	Rigid Mounting	21	1,3	2,0	29	1,8	2,8	37	2,3	3,6
B	Free Suspension	11	0,7	1,1	18	1,1	1,7	29	1,8	2,8
	Rigid Mounting		-		14	0,9	1,4	24	1,5	2,4

TABLE 11: Vibration Limits according to IEC 60034-14

Grade "A" applies to machines with no special vibration requirements.
Grade "B" applies to machines with special vibration requirements. Rigid mounting is not considered acceptable for machines with shaft heights less than 132 mm.
The interface frequencies for displacement/velocity and velocity/acceleration are 10 Hz and 250 Hz respectively.

VIBRATION LIMITS ACCORDING TO IEC 60034-14

Permitted vibration densities are determined in IEC 60034-14 standards and these values which are given in Table 11 are recommended as upper limit values for motor producers. Three separate vibration density levels are determined according to this standard. Vibration levels of Volt Electric motors are within normal limits and meet the standard provisions. All our rotors are dynamically balanced by half key.

Duty types:

Duty type is an operational program that covers unloaded operation and stop period; and the load applying order and periods.

Operation regime type is the operation system that does not change one or more loads for a definite time period. Electrical motors are manufactured according to operational conditions. Standard operational duty types are classified according to IEC 60034-1.

WORKING CONDITIONS

Volt Electric Motors are manufactured to operate continuously at rated power in S1 duty type at 40°C ambient temperature and at an altitude up to 1000 m. Since motor performance will decrease at values which exceed these temperature and altitude values, the motor rated power should be decreased.

Temperature Controlled Protection Equipments:

Motor protection is achieved with fuses thermal relays, thermal magnetic circuit breakers and thermistors. Fuses protect motor, cable, relays circuit breakers and soft starters and speed controlling devices as well as; against short circuits however they cannot protect motors against overloading and over warming. Thermal relays and thermal magnetic circuit breakers are adjusted according to the rated current of motor they protect the motor by cutting the circuit against overloading and over current. However, other factors out of overloading and over current can cause damages to motor. Operation at two phase; decreasing or stop at cooling air; exceeding ambient temperature and unstable ambient conditions (e.g. environment where thermal relay exist can be cool and environment where motor exists can be hot) to operation at high altitudes; over start/stop; longer starting; and braking and similar situations; can cause winding temperature to increase up to permitted temperatures and thermal relays may not provide protection. In explained and similar situations increase in temperature more than set forth values should not be permitted. The most reliable protection for these cases is temperature-controlled protection.

Generally two types of protection equipment are used in temperature-controlled protection:

- Bi-metal circuit breakers (Micro thermostats)
- Semi-conductor temperature sensors (PTC Thermistors)

Micro Thermostats:

They are serial-connected b-imetal circuit breakers that include two or three elements. They open the circuit during over limit temperatures and are closed during under limit temperatures. They have NC (Normally Closed) and NO (Normally Opened) types. Micro thermostats are selected according to motor insulation class and maximum temperature limits which are permitted for windings, and are placed inside stator phase windings. Thermostat terminals are brought into motor terminal table and one type of thermostat is used for motors for all power classes.

Micro thermostat protection thermals are serially connected to contactor coil circuit, which controls motor energy contactor. If the temperature in the motor windings exceeds limit value the bi-metal circuit breaker is opened. Since the thermostat circuit is serially connected to motor energy, the contactor coil circuit energy contactor opens and the motor will stop.

Volt Electric installs micro thermostat equipment into motor windings upon the request of customers. These types of motors are ready for temperature controlled protection.

PTC (PositiveTemperatureCoefficient) Thermistor and Relay:

PTC thermistors are sets with serially-connected, three components and a relay. They are semi-conductor temperature-sensitive equipment. Their electrical resistances increase according to certain temperature values. Temperature value where their resistance suddenly increases is called Nominal Response Temperature (NAT). Nominal Response Temperature should be selected according to motor's insulation class and permitted temperature value of the motor being protected. There is one type of thermistor and relay for all kinds of motors at all power, which is efficient for motors with greaser power. PTC thermistor elements as sets are installed into motor's stator windings. PTC relay is installed in the motor control cabinet. Relay connections can be different according to producers. Relay controls motor energy contactor. Thermistor elements provides an alarm signal for the relay when temperature is close to limit temperature as well as trip signal at the permitted limit temperature. The relay operates when it recieves a trip signal and opens the energy contactor. Therefore they protect windings from blowing out during situations such as sudden over current increasesand sudden over voltage changes.

Volt Electric uses total of 3 PTC thermistors in each of the three-phase stator windings, one-by-one , in motor frame sizes 180 and up. PTC thermistors and bi-metal thermostats can be used in smaller size frames according to customer's requests.

MOTORS with VSD USAGE

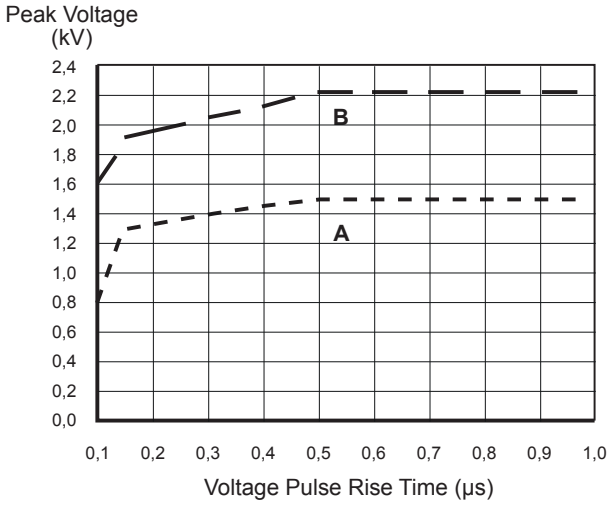
- High Frequency Switching (PWM frequency): PWM is aimed to have a sinusoidal wave at motor terminals by firing rapid voltage pulses.
- Short Rise Time: Related to the PWM frequency, voltage at motor terminals changes in very short time between high and low values (high $\Delta U/\Delta t$ rate).
- Transient Voltage Spikes: Many transient spikes occur at the voltage wave because of switching.
- Reflected Wave Voltage: Voltage applied to motor is reflected due to impedance difference of cable between motor and driver. The reflected voltage increases voltage

at motor terminals. Reflected wave voltage is especially important when cable between driver and electronic is too long.

- Additional Heating: Cooling performance of motor decreases as the speed of motor decreases. If the motor is loaded with same torque value, heating will be higher in the case of lower speed than higher speed.
- Bearing Current: An excessive voltage inducted on rotor due to high switching frequency and transient voltage spikes. This inducted voltage causes current flow on motor housing, end shields, bearing and shaft. Arcing cause by this current causes corrosion and damage on bearings.

Motors should be used under below condition to prevent above mentioned problems:

- Maximum length of the cable between driver and motor should be 5m.
- Motor housing must be grounded properly.
- $\Delta U/\Delta t$ filter should be used in required applications.
- Voltage drop between motor and inverter should not exceed 2%.
- Motor and driver specifications should match.
- Motor parameters should be defined to the drive correctly.
- Only one motor must be supplied with one driver.
- Peak value of voltage at motor terminals for given time should not exceed curve A for motors with rated voltage up to 500V and curve B for motors with rated voltage between 500V and 690V. Curve A and curve B are according to IEC 60034-25 and are given below.



Our standard motors are suitable for inverter applications for above conditions. Please contact with us for any variations.

VOLTAGE and FREQUENCY

ELECTRICAL PERFORMANCE VALUES	VOLTAGE (V)		FREQUENCY (Hz)	
	110%	90%	105%	95%
Starting and Rated Torque	1,21	0,81	0,95	1,11
Synchronous Speed	1	1	1,05	0,95
Rated Speed	1,01	0,98	1,05	0,95
% Slip	0,83	1,23	Slight change	Slight change
Slip at Full Load	1,01	0,985	1,05	0,95
Unloaded Operation Current	1,10 - 1,16	0,90 - 0,88	0,95 - 0,94	1,05 - 1,06
Starting Current	1,10 - 1,12	0,90 - 0,88	0,95 - 0,94	1,05 - 1,06
Rated Current	0, 93	1,11	Slightly decrease	Slightly increase
Temperature Increase	0,97 - 0,96	1,06 - 1,07	Slightly decrease	Slightly increase
Overload Operation capacity	1,21	0,81	Slightly decrease	Slightly increase
Magnetic Noise	Slightly increase	Slightly decrease	Slightly decrease	Slightly increase
Rated Efficiency	1,05 - 1,1	0,985	Slightly increase	Slightly decrease
Power Factor (Cosϕ)	0,97	1,01	Slightly increase	Slightly decrease

TABLE 12: Effects of Voltage and Frequency Changes over Motor Performance

Our single-phase motors are manufactured in 230 Volt rated voltage and 50 Hz frequency. Our three-phase motors are manufactured in 400 Volt rated voltage and 50 Hz frequency. Manufacturing can be done based on 480V-660 V and 50-60Hz frequency upon special request. ±5% changes in rated voltage and ±2% changes in rated frequency do not cause significant changes in motor power.

The temperature value of the motors continuously operating in lower and upper limit values of permissible voltage values can exceed maximum temperature increase value by 10 K.

We can see the effects of ±10% change in rated voltage and ±5% change in rated frequency over motor's electrical frequency in Table 12.

Magnetic flux density decreases when the frequency increases without a change in the voltage. The magnetic flux density increases when the frequency increases. The motor reaches saturation when the magnetic flux increases. The motor's rotational torque is proportional with the square of motor magnetic flux density. Motor power is the multiplication of rotation speed and torque. Thus, motor power changes with speed and torque value.

Motors are manufactured appropriate to their rated voltage and rated frequency. Volt Electric manufactures motors with different voltage and frequency values by special order.

Motors manufactured according to 50 Hz rated frequency can practically be used at 60 Hz Frequency. However, increase in frequency causes change in speed and torque. When the motor voltage changes with frequency, then the motor power changes as well.

Motors manufactured to operate at rated frequency of 50Hz can be used in 60Hz. The working conditions are shown in Table 13.

50 Hz	60 Hz				
Rated Voltage V	Network Voltage V	rpm	Rated Power V	Rated Torque Nm	Rated Current A
220	220	1,20	1,00	0,83	1,00
	240	1,20	1,10	0,91	1,00
380	380	1,20	1,00	0,83	1,00
	400	1,20	1,05	0,87	1,00
	415	1,20	1,09	0,91	1,00
	440	1,20	1,15	0,96	1,00
	460	1,20	1,20	1,00	1,00
	480	1,20	1,33	1,10	1,00
400	400	1,20	1,00	0,83	1,00
	415	1,20	1,03	0,86	1,00
	440	1,20	1,10	0,91	1,00
	460	1,20	1,15	0,96	1,00
	480	1,20	1,20	1,00	1,00
415	415	1,20	1,00	0,83	1,00
	440	1,20	1,05	0,87	1,00
	460	1,20	1,10	0,91	1,00
	480	1,20	1,15	0,96	1,00
440	440	1,20	1,00	0,83	1,00
	460	1,20	1,05	0,87	1,00
	480	1,20	1,09	0,91	1,00
500	500	1,20	1,00	0,83	1,00
	550	1,20	1,10	0,91	1,00
660	660	1,20	1,00	0,83	1,00

TABLE 13: Performance values of motor which is produced for 50 Hz at 60 Hz operation

Motors are manufactured according to their rated voltage and rated frequency. Volt Electric phase motors are manufactured according to 380V and 400V 50 Hz, which is the network voltage in Turkey. However, standard voltage and frequency values change according to countries.

Volt Electric manufactures motors with different voltage and frequency values according to special orders.

Motors which are manufactured according to 50 Hz rated frequency can practically be used at 60 Hz frequency. However, increases in frequency causes change in speed and torque. If motor voltage changes with frequency, motor power also changes.

Factors for finding estimated operational changes, which can be seen in motor operational characteristics for the motors that are manufactured to operate at 50 Hz at network, and which will be used in 60 Hz and different network voltages, are given in Table 13.

BEARINGS

Classification of Bearings:
Bearings are separated into two groups according to their rolling elements: ball bearings and roller bearings. Bearings are also separated as axial bearings and radial bearings based on the carried load.

Ball bearings are generally used in small types of electrical motors and these bearings carry load in a radial direction.

Bearing Space:
When one of the internal or external rings of a bearing is fixed, the other ring moves in a radial or axial direction. Bearing spaces are considered in radial and axial direction. Bearings should be embedded to their houses as carefully as possible. Radial space in used bearings is permitted in certain limits. Several criteria are considered for obtaining these working conditions. Different thermal expansions in bearing rings and connected parts cause crick-in bearing. A close fit decreases bearing space. Generally, the working space is smaller than the bearing space. Space of uninstalled bearing should be selected according to different working conditions and application tolerances. Therefore, there are smaller and greater spaced bearings in addition to normal spaced bearings.

In electrical motor production, manufacturers can limit bearing radial spaces according to shaft dimensional tolerances. The aim is to increase longevity and maximize efficiency.

Bearing Fitting and House Sensitivity:
When bearing housing and shaft are designed, it should be provided that bearing should fit on shaft and house with enough closeness. Generally, bearing's internal and external rings do not rotate at the same time. Principally, the ring which rotates should fit closely to house and the ring, which does not rotate should there be space. For an electrical motor, rotor shaft should fit closely with bearing ring. Ratio of this closeness is limited with bearing space. This aspect should be considered in bearing changes if an extra operation is performed in shaft.

Bearing Lubrication:
Lubrication should be used to prevent direct contact between balls and rolling paths and to prevent abrasion in surfaces for reliable operation of bearings. Greases, liquid or solid lubricants can be used for bearing lubrication. Lubrication reduces friction, therefore preventing abrasion and corrosion. Lubricants can also help with cooling and impermeability. Generally lubricants in electrical motors are greases.

Bearing Mounting/Dismounting and Maintenance:
Parts should be measured before mounting of bearing begins. The main principal in measurement is that part and measurement device should be the same temperature. Micrometer is used for measurement of shaft's internal and external radius and hole micrometer should be used for measurement of hole diameters. A diameter should be normally measured at least in two sections and more than one plane.

Mounting environment should be very clean and smooth. After acquiring necessary measurement devices, tools are brought to mounting area; mounting order is determined and then bearing is taken from its package. If possible the bearings are held with gloves instead of bare hands--corrosion, which may be caused by sweat, can be prevented.

Bearing Mounting:
Major aspects to be considered in bearing mounting:
- Never hit bearing with a hammer. Use press and mounting apparatus if possible.
- Ring which will fit with close fit is mounted first. Mounting force is always applied through mounted ring. Thus, if internal ring is mounted over shaft, force is applied from the side of internal ring.
- Necessary radial and axial space should be controlled after mounting is completed.

If the mounting is performed according to instructions, bearing should run silently and normally. For example, irregular, scrabble-like sounds and vibrations mean that there is dirt in the bearing. More tough and boom-like sound is evidence that there is deficiency in rolling paths and bearing elements. Regular metallic and shrill sounds mean that there is not enough grease or lubricants in rolling paths. Operating bearings without lubricant can cause breakdowns in a short time. If bearing's temperature rises in a very short time period, this will mean there is a fault in the mounting and lubrication system. Therefore, it should immediately be dismounted and controlled.

Mounting methods are divided into mechanical, hydraulic, and thermal according to how much force is needed to be applied.

Mechanical mounting is generally applied in bearings having a hole diameter less than 100 mm. If mechanical force is applied by hammer, bearing should be hit with bushing (which is prepared by soft alloy or a support). Bushing or support should contact with rings only and with the cage or bearing elements. Hole and external diameter of bushing should be processed such that it is slightly smaller than wall thickness of bearing ring where mounting force is transmitted. Ring flank face should be pushed up so it stands to shaft rabbet or an intermediate part while bearing is mounted. Ring which is made with closed fit should be fixed against axial standing.

Bearing Dismounting:

You should work carefully and with appropriate tools while dismounting the bearing. The bearing should not be hit with a hammer when it is mounted. Generally, the dismounting process requires more force than the mounting process. Yet, force should not be applied through the cage or bearing components in the process of dismounting.

Bearing Cleaning:

Polluted bearings or bearings that are dismounted after usage for maintenance should be cleaned carefully by gas oil and brush and should be washed and cleaned in at least two separate baths: one for washing and one for cleaning. For controlling the result of this cleaning process, the bearing has to be oiled with thin oil and rotated by hand. There should not be any irregular noise or roughness. Cleaned bearing should be lubricated with suitable grease or oil. Bearings should be packaged to prevent dust and dirt.

Closed bearings are checked and if they are not suitable for usage they have to be disposed. Suitable ones are cleaned and packaged.

Cylindrical Roller Bearings Construction:

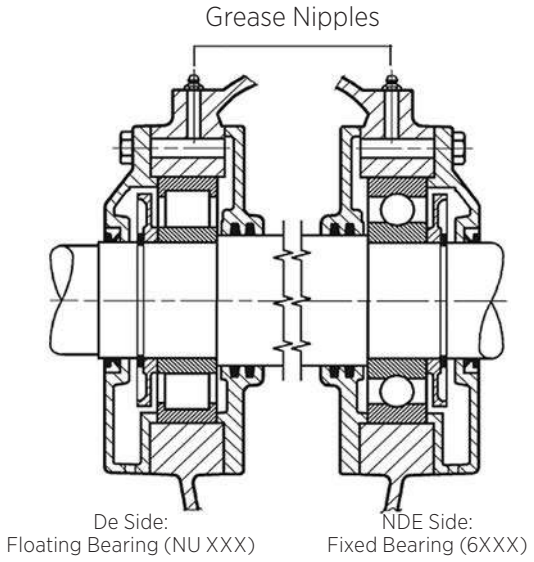


FIGURE 21: Construction of bearings.

For the application with high radial load and there is rapid changes in speed and high speeds, cylindirical roller bearings are used. These kind of bearings have more load carry capacity than ball bearings.

For special applications on 200 Frame and upper-size motors, please contact us.

FRAME SIZE	POLE	DE BEARING	NDE BEARING
200	2-4-6	NU 312	6312 C3
225	2-4-6	NU 313	6313 C3
250	2-4-6	NU 315	6315 C3
280	2	NU 315	6315 C3
	4-6	NU 316	6316 C3
315	2	NU 316	6316 C3
	4-6	NU 318	6318 C3

TABLE 14: Type of bearings.

COMPONENTS

Volt electric motors

MATERIALS INCORPORATED PER FRAME SIZE for VOLT MOTORS

FRAME SIZE	HOUSING				FAN	FAN COVER	B3 COVERS		FLANGE COVERS				TERMINAL CONNECTION BOX	
	FIXED FOOT MOUNTED		REMOVABLE FOOT MOUNTED	WITHOUT FOOT MOUNTED					B5		B14			
	ALUMINUM	CAST IRON	ALUMINUM	CAST IRON	PLASTIC	STEEL SHEET	ALUMINUM	CAST IRON	ALUMINUM	CAST IRON	ALUMINUM	CAST IRON	PLASTIC	ALUMINUM
63	√				√	√	√		√		√		√	√
71	√		√		√	√	√		√		√		√	√
80	√		√		√	√	√		√		√		√	√
90	√		√		√	√	√		√		√		√	√
100	√		√		√	√	√		√		√		√	√
112	√		√		√	√	√		√		√		√	√
132			√		√	√	√		√		√			√
160			√	√	√	√	√	√	√	√		√		√
180		√	√		√	√	√	√		√				√
200		√			√	√	√	√		√				√
225		√			√	√	√	√		√				√
250		√			√	√	√	√		√				√
280		√			√	√	√	√		√				√
315		√			√	√	√	√		√				√

TABLE 15: Material incorporated per frame size for Volt Electric Motors

CABLE GLAND and TERMINAL BOLT DIMENSIONS

CABLE GLANDS	
FRAME SIZE	CABLE GLAND
63	M20+M16
71	M20+M16
80	M25+M16
90	M25+M16
100	M25+M16
112	2xM32+M16
132	2xM32+M16
160	2xM40+M16
180	2xM40+M16
200	2xM50+M20
225	2xM50+M20
250	2xM63+2xM20
280	2xM63+2xM20
315	2xM63+2xM20

THREAD TYPE	CLAMPING RANGE	
	Ø min-max mm	
M16X1,5	4,0	8,0
M20X1,5	6,0	12,0
M25X1,5	11,0	17,0
M32X1,5	15,0	21,0
M40X1,5	19,0	28,0
M50X1,5	30,0	38,0
M63X1,5	34,0	44,0

TABLE 16: Cable gland and bolt dimensions that are used in Volt Electric Motors

BEARINGS THAT ARE USED in SINGLE-PHASE MOTORS

Fixed-ball bearing, whose both sides are closed (ZZ), are used in motors with frame sizes 63-132 (Figure 22) as well as frame sizes 160-225 (Figure 22).

In some cases construction can be made (as seen in Figure 23) for preventing axial movement of shaft with respect to some applications in frame sizes 63-132.

Rubber dust gaskets (V-ring) are placed in front and rear covers. Oil seal can be placed upon on request.

FRAME SIZE	POLE NUMBER	DE BEARING	NDE BEARING
63	2-4-6	6201 ZZ	6201 ZZ
71	2-4-6	6202 ZZ	6202 ZZ
80	2-4-6	6204 ZZ	6202 ZZ
90S	2-4-6	6204 ZZ	6203 ZZ
90Sa	2-4-6	6205 ZZ	6203 ZZ
90L	2-4-6	6205 ZZ	6203 ZZ
100	2-4-6	6206 ZZ C3	6204 ZZ C3

TABLE 17: Bearings that are used in Volt Electric Motors according to Frame size (Single-phase motors)

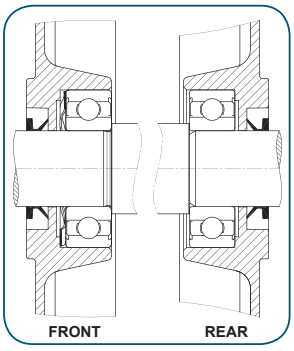


FIGURE: 22

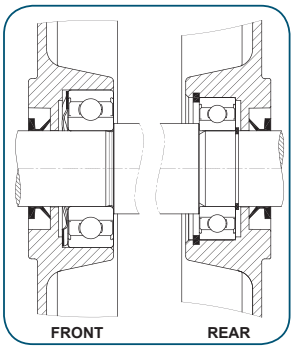


FIGURE: 23

BEARINGS THAT ARE USED in THREE-PHASE MOTORS

Bearing, Seal And Wedge Information Which Are Used In Volt Electric Motors:

Volt Electric Motors utilizes bearings that are produced with special radial space and grease, providing minimum friction loss, and serial and perfect operation during movement. Bearings that are used in Volt Electric Motors are given in following Table 18.

FRAME SIZE	POLE	HOUSING MATERIAL	DRIVE END (DE) Bearing ZZ/C3	NONE DRIVE END (NDE) Bearing ZZ/C3
63	all	Aluminum	6201 - 2Z	6201 - 2Z
71	all	Aluminum	6202 - 2Z	6202 - 2Z
80	all	Aluminum	6204 - 2Z	6204 - 2Z
90	all	Aluminum	6205 - 2Z	6205 - 2Z
100	all	Aluminum	6206 - 2Z	6206 - 2Z
112	all	Aluminum	6206 - 2Z	6206 - 2Z
132	all	Aluminum	6208 - 2Z	6208 - 2Z
160	all	Aluminum	6309 - 2Z	6309 - 2Z
160	all	Cast Iron	6309 - 2Z	6209 - 2Z
180	all	Aluminum	6310 - 2Z	6210 - 2Z
180	all	Cast Iron	6310 - 2Z	6210 - 2Z
200	all	Cast Iron	6312 - 2Z	6212 - 2Z
225	all	Cast Iron	6313 - 2Z	6213 - 2Z
250	2	Cast Iron	6215 - 2Z	6215 - 2Z
250	4,6	Cast Iron	6315 - 2Z	6215 - 2Z
280	2	Cast Iron	6315 - 2Z	6315 - 2Z
280	4,6	Cast Iron	6316 - 2Z	6316 - 2Z
315	2	Cast Iron	6316 - 2Z	6316 - 2Z
315	4,6	Cast Iron	6318 - 2Z	6318 - 2Z

TABLE 18: Bearings that are used in Volt Electric Motors according to Frame size (three-phase motors)

SEAL DIMENSIONS PER FRAME SIZE

FRAME SIZE	POLE	"DRIVE END Seal KK (Rubber Coated)"	"NONE DRIVE END Seal KK (Rubber Coated)"
63	all	12*22*7	12*22*7
71	all	15*26*7	15*26*7
80	all	20*35*7	20*35*7
90	all	25*40*7	25*40*7
100	all	30*47*7	30*47*7
112	all	30*47*7	30*47*7
132	all	40*55*7	40*55*7
160	all	45*60*8	45*60*8
160	all	45*60*8	45*60*8
180	all	50*65*8	50*65*8
180	all	50*65*8	50*65*8
200	all	60*80*8	60*80*8
225	all	65*85*10	65*85*10
250	2	75*100*10	75*100*10
250	4,6	75*100*10	75*100*10
280	2	75*100*10	75*100*10
280	4,6	80*100*10	80*100*10
315	2	80*100*10	80*100*10
315	4,6	90*110*10	90*110*10

TABLE 19: Seal dimensions that are used in Volt Electric Motors

KEY DIMENSIONS PER FRAME SIZE

FRAME SIZE	POLE NUMBER	MOUNTING SIDE (DE) (WIDTH) X (HEIGHT) X (LENGTH) (mm)
63	2-4	4X4X16
71	2-4-6	5X5X18
80	2-4-6	6X6X28
90 S - L	2-4-6	8X7X36
100 - 112	2-4-6	8X7X50
132 S - M	2-4-6	10X8X70
160 M - L	2-4-6	12X8X90
180 M - L	2-4-6	14X9X100
200 L	2-4-6	16X10X100
225 S - M	2	16X10X100
	4-6	18X11X125
250 M	2-4-6	18X11X125
280 S - M	2	18X11X125
	4-6	20X12X125
315 S - M - L	2	18X11X125
	4-6	22X14X140

TABLE 20: Key dimensions that are used in Volt Electric Motors

CONSTRUCTION and MOUNTING CONFIGURATIONS

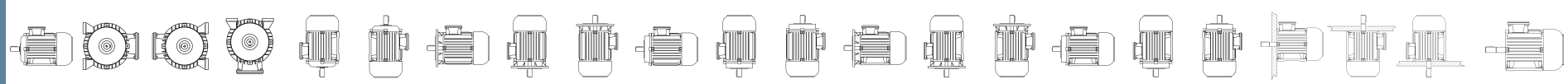
	FOOT MOUNTED						WITHOUT FOOT, FLANGE MOUNTED						FOOT AND FLANGE MOUNTED						WITHOUT FOOT, WITHOUT ENDSHIELD AT DRIVE END			FOOT MOUNTED, WITHOUT ENDSHIELD AT DRIVE END
	B3						B5			B14			B35			B34			B9			B15
FRAME SIZE	IM B3 IM 1001	IM B6 IM1051	IM B7 IM 1061	IM B8 IM 1071	IM V5 IM 1011	IM V6 IM1031	IM B5 IM 3001	IM V1 IM 3011	IM V3 IM 3031	IM B14 IM 3601	IM V18 IM 3611	IM V19 IM 3631	IM B35 IM 2001	IM V15 IM 2011	IM V36 IM 2031	IM B34 IM 2101	IM V17 IM 2131	IM V37 IM 2131	IM B9 IM 9101	IM V8 IM 9111	IM V9 IM 9131	IM B5 IM 1201
																						
VM63	√	√	√	√	√	√							√	√	√	√	√	√				√
VM71	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM80	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM90	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM100	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM112	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM132	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM160	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
VM180	√	√	√	√	√	√	√	√	√				√	√	√				√	√	√	√
VM200	√	√	√	√	√	√	√	√	√				√	√	√							√
VM225	√	√	√	√	√	√	√	√	√				√	√	√							√
VM250	√	√	√	√	√	√	√	√	√				√	√	√							√
VM280	√	√	√	√	√	√	√	√	√				√	√	√							√
VM315	√	√	√	√	√	√							√	√	√							√

TABLE 21: Construction and mounting configurations

THREE-PHASE MOTOR NAMEPLATE

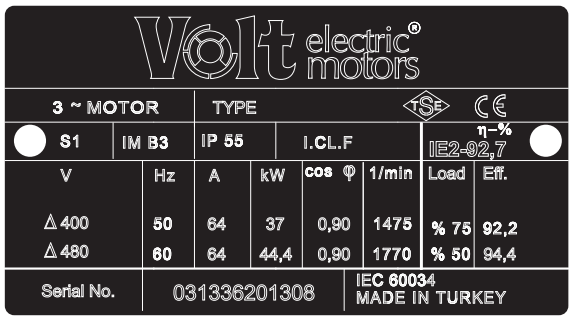


FIGURE 24: Three-phase motor nameplate

3~motor	Three-phase motor
TİP V2EG225S4AB3	Volt Motor, frame size 225 M, 4 poles, cast iron housing
TSE	Turkish Standards appropriateness marking
CE	Appropriateness marking with European Union
S1	Duty type: Continuous working
IMB3	Construction Type, Foot-type motors
IP55	Mechanical protection type: protected against dust and squirting water
I.CL.F	Winding insulation type: F
IE2 - 92,7	Efficiency class IE2, efficiency at 100%, load is 92,7%, at 75% load is 92,2%, at 50% load is 94,4%
Δ 400 / 50 Hz	Motor is connected as Δ at 400 V 50 Hz.
Δ 460 / 60 Hz	Motor is connected as Δ at 460 V 60 Hz.
64 A	Rated current
37 kW - 44,4 kW	Rated powers
Cosφ = 0,90	Rated power factors
1475 - 1770 1/min	Rated speeds
IEC60034	Asynchronous motor standard
Production Serial Number	There are 12 digit numbers in Volt Electric Motor "Serial No parts". First 6 digits are the serial number of motor, following 4 digits are production year and remaining two digits are the week of production.

TABLE 22: Identification of three-phase motor nameplate

SINGLE-PHASE MOTOR NAMEPLATE

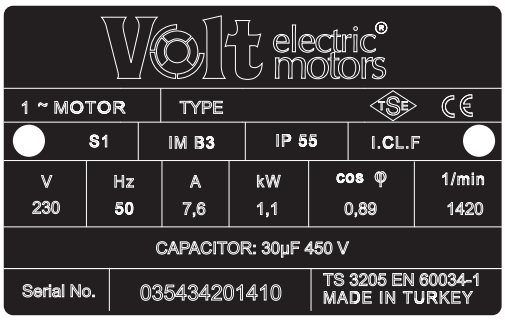


FIGURE 25: Single-phase motor nameplate

1~motor	Single-phase motor
TİP VSPA90S4BB3	Volt Motor, frame size 90 S, 4 poles
TSE	Turkish Standards appropriateness marking
CE	Appropriateness marking with European Union
S1	Duty type: Continuous working
IMB3	Construction Type, Foot-type motors
IP55	Mechanical protection type: protected against dust and squirting water
I.CL.F	Winding insulation type: F
230 V	230 V
50 Hz	Rated frequency: 50 Hz
7,6 A	Rated line current: 7,6 A
1,1 kW	Rated power: 1,1 kW
1,1 kW	Rated powers
Cosφ = 0,89	Rated power factor: 0,85
1/min 1420	Rated revolution speed: 1420 rpm
Cap. 30µF, 450V	Permanent circuit capacitor: 30µF,450 V.
TS EN 60034-1	Asynchronous motor standard
Production Serial Number	There are 12 digit numbers in Volt Electric Motor "Serial No parts". First 6 digits are the serial number of motor, following 4 digits are production year and remaining two digits are the week of production.

TABLE 23: Identification of single-phase motor nameplate

PART NUMBER LEGEND

V1E	GA	80	M	2	A	B3	*
↓ Phase & Efficiency	↓ Shields and housing material	↓ Frame Size	↓ Length of housing	↓ Poles	↓ Stator length (Power)	↓ Mounting type	↓ Adaptations for customer requests
I	II	III	IV	V	VI	VII	VIII
3 digit	1 or 2 digit	2 or 3 digit	1 digit	1 digit	1 digit	2 or 4 digit	1 digit

MOTOR PHASE and EFFICIENCY (I)	
V1E	Volt Motor 3 Phase IE1
V2E	Volt Motor 3 Phase IE2
V3E	Volt Motor 3 Phase IE3
V4E	Volt Motor 3 Phase IE4
VSS	Single Phase,Start and Run capacitor
VSP	Single Phase Run capacitor
V1X	II 2G Eexde IIC T4 Gb zone 1 "d"
V1T	Two Speed Motors
VPM	Milking Machine Motors
VPC	Centrifugal Pump Motors

MOTOR BODY MATERIALS (II)	
A	Al housing
G	Cast Iron housing
GA	Cast Iron shields and Aluminum Housing

FRAME SIZE (III)	
56-355	Center of the shaft and ground height (mm)

LENGTH of HOUSING (IV)	
S	Short
M	Medium
L	Long

STATOR LENGTH (Power) (VI)	
A	Small
B	Medium
C	Large
D	Progressive
E	Progressive

MOUNTING TYPE(VII)	
B3	Feet B3, B6, B7, B8, V5, V6 / V19
B5	Flange w/out feet B5, V1, V3
B14	Flange w/out feet B14, V18, V19
B35	Flange with feet B35, V15, V36
B34	Flange with feet B34, V17, V37
B9	No feet no flange B9, V8, V9

OPTIONS (VIII)	
*	Adaptations for customer request

POLES (V)	
2	2 poles, 3000 rpm
4	4 poles, 1500 rpm
6	6 poles, 1000 rpm
8	8 poles, 750 rpm
1	4/2 poles,1500/3000 rpm Dahlander
3	8/4 poles,750/1500 rpm Dahlander

TABLE 24: Part number legend

FRAME SIZE	POWER							
	2 POLES		4 POLES		6 POLES		8 POLES	
	kW	Stator Length (Power)	kW	Stator Length (Power)	kW	Stator Length (Power)	kW	Stator Length (Power)
56M	0,09 0,12	A B	0,06 0,09	A B				
63M	0,18 0,25	A B	0,12 0,18	A B				
71M	0,37 0,55	A B	0,25 0,37	A B				
80M	0,75 1,1	A B	0,55 0,75	A B	0,37 0,55	A B		
90S	1,5	A	1,1	A	0,75	A	0,37	A
90L	2,2	B	1,5	B	1,1	B	0,55	B
100L	3	A	2,2 3	A B	1,5	A	0,75 1,1	A B
112M	4	A	4	A	2,2	A	1,5	A
132S	5,5 7,5	A B	5,5	A	3	A	2,2	A
132M	-	C	7,5	B	4 5,5	B C	3	B
160M	11 15	A B	11	A	7,5	A	4 5,5	A B
160L	18,5	C	15	B	11	B	7,5	C
180M	22	A	18,5	A	-		-	
180L	-		22	B	15	A	11	A
200L	30 37	A B	30	A	18,5 22	A B	15	A
225S	-		37	A	30	A	18,5	A
225M	45	A	45	B			22	B
250M	55	A	55	A	37	A	30	A
280S	75	A	75	A	45	A	37	A
280M	90	B	90	B	55	B	45	B
315S	110	A	110	A	75	A	55	A
315M	132	B	132	B	90 110	B C	75	B
315L	160 200	C D	160 200	C D	132 160	D E		

TERMINAL CONNECTIONS

STATOR WINDING	STANDARD TERMINAL MARKING	TERMINAL CABLE COLORS
Main Winding	U1- U2	Black-Blue
Auxillary Winding	Z1-Z2	White-Red

TABLE 25: Terminal connection for standard single-phase asynchronous motor.

Terminal Connection Standard Single-Phase Asynchronous Motor

The coding that Volt Electric Motors applies for the main windings and auxiliary windings that form the stator windings are shown in Table 25.

Main winding's (Black-Blue) endings are connected to U1 and U2 terminals in terminal table and auxiliary windings (White-Red) endings are connected to Z1 and Z2 terminals.

TERMINAL CONNECTION for CAPACITOR RUN SINGLE-PHASE MOTOR

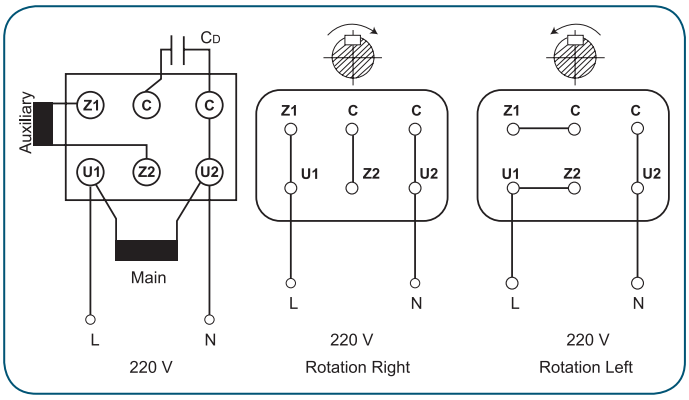


FIGURE 26.

Changing the rotation direction in capacitor run single-phase asynchronous motors with run capacitor:

To change the direction of rotation in one-phase asynchronous motors, it is necessary to change the direction of current in main windings or auxiliary windings. If the direction of current in auxiliary winding or main winding is changed, the direction of magnetic field also changes.

Motor terminal table connection and motor rotation direction of permanent capacitor asynchronous motor is given in Figure... Meaning of rotation right and rotation left is as follows:

Rotation Right: When you look at motor drive's shaft end the direction of rotation is clockwise.
Rotation Left: When you look at motor drive's shaft end the direction of rotation is counter clockwise.

TERMINAL CONNECTION for CAPACITOR START and CAPACITOR RUN SINGLE-PHASE MOTOR

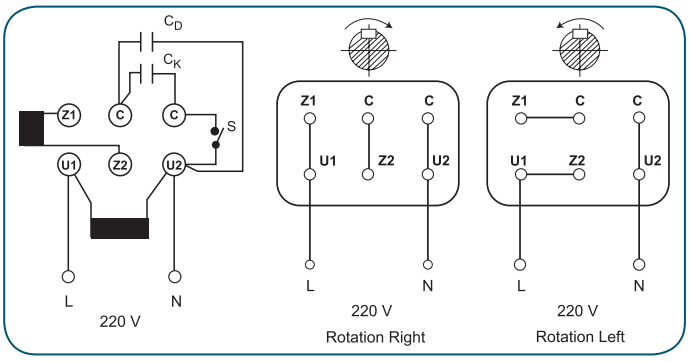


FIGURE 27.

Volt Electric Motor's single one-phase asynchronous motor terminal table connections rotate left (jumps are in horizontal position). If the motor rotates in reverse direction, the jump between U1-Z2 will be taken between U1-Z1 and the jump between Z1-C shall be taken to C-Z2 (jumps at vertical position). Line connections (L-N) will always be connected at motor's U1-U2 terminals.

TERMINAL CONNECTION for THREE-PHASE ASYNCHRONOUS MOTORS

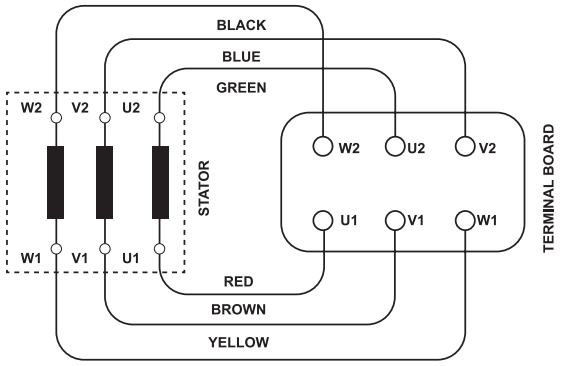


FIGURE 28: Connection of stator winding ends to the terminal table

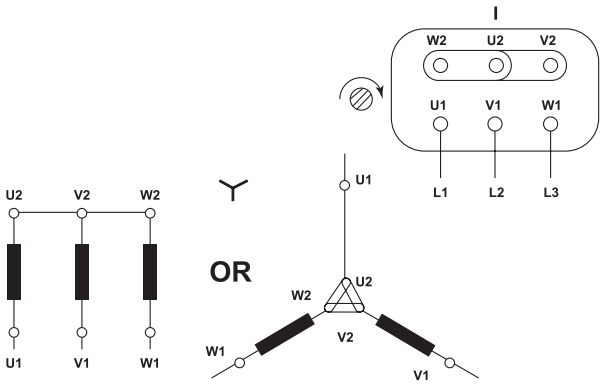


FIGURE 29: Star(Y) connection of stator winding ends

Connection of Stator Winding Ends to the Terminal Table:

Connection of stator's three-phase windings to the motor's terminal table is shown in Figure 28. In this connection, input terminals are connected to terminal table (U1, V1, W1) with same order and output endings are cross connected to other terminals U2, V2, W2. Volt Electric Motors codes its stator phase windings input and output terminals with colored cables. Also, terminal connection screws in terminals are marked with standard letters. This coding makes terminal connection and determination of winding endings easier. Cables' color codes are shown in Figure 28.

Star (Y) Connection Between Phases of Stator:

Motor stator windings are connected as star or delta in three-phase asynchronous motors. Volt Electric Motors up to 3 kw motors (included) in 2 and 4 poles and up to 2.2 kW (Included) for 6 poles are connected as a star in 400 V network. As shown above, star connection is obtained by combining the stator winding output endings. U2, V2, W2 terminals are joined for star connection. Three-phase network (L1, L2, L3) are connected to U1, V1, W1 terminals.

STATOR WINDING DELTA (Δ) CONNECTION BETWEEN PHASES

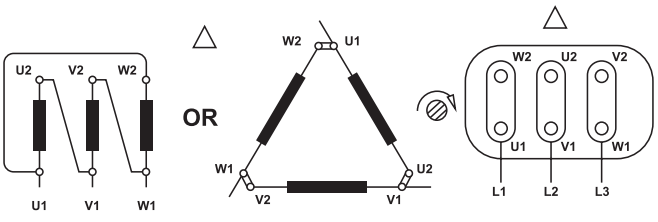


FIGURE 30: Delta connection (Δ) of Stator winding ends

Delta connection is obtained by joining phase winding's output endings with other phase winding's input endings. As it can be seen in Figure 30, corresponding endings in motor terminals are combined with jumps, therefore delta connection is obtained.

If a motor, which should be operated with (Y) 400 V in three-phase network, is mistakenly connected with (Δ) and operated, then √3 fold of voltage is applied to phase windings. Although motor phase windings voltage is 230V, 380 V is applied. If phase current, which passes through motor windings, increase √3 fold (similar to voltage), then motor is in breakdown risk.

If a motor which should be operated (Δ) 380 V at three-phase network is operated (Y) connected in same network; voltage, which is applied to windings, reduces to 1/√3 = 0,58 value (220V). Motor works under low voltage. Since power and torque will reduce, motor cannot be loaded with nameplate power.

STAR (Y) AND DELTA (Δ) CONNECTION METHODS OF VOLT ELECTRIC MOTORS

POLE NUMBER (2P)	STAR (Y) CONNECTION 380V(Y) - 400V(Y) (50Hz)	DELTA (Δ) CONNECTION 380V (Δ) - 400V (Δ) (50Hz)
2 AND 4	$P_{MOTOR} \leq 3$ kW	$P_{MOTOR} > 3$ kW
6	$P_{MOTOR} \leq 2,2$ kW	$P_{MOTOR} > 2,2$ kW

TABLE 26: (Y) and (Δ) connection methods

TERMINAL CONNECTION for TWO-SPEED ASYNCHRONOUS MOTORS

Revolution number of asynchronous motors depends on pole number of stator windings and frequency of applied voltage. If frequency is fixed; different revolution is obtained by different windings having different number of poles or connection which is made by different number of poles in same winding. Accordingly, we can think of two-speed motors being in two groups:

- Two separate two-speed motors
- One winding two-speed motor

If two separate independent windings having different number of poles are wound into same stator slots, two winding, two-speed motor is obtained. In this type of motor, speed according to pole number of the winding is obtained depending on which winding is applied with three-phase voltage. Windings star (Y) or delta (Δ) connection is made inside the stator in this kind of winding. Three ending for each winding is brought to the terminal table. For example, 6-pole winding endings for 6/4 pole, two winding two-speed motor is 6U-6V-6W and 4U-4V-4W for 4-pole winding endings, respectively.

Two winding two-speed motors are not economical. Because two separate windings are placed into slots which are considered for one winding. Therefore less power is obtained with respect to one winding two-speed motors. In other words you can obtain more power with one winding two-speed motors with respect to two separate winding two-speed motor.

Production of two winding two-speed motors is limited since they are not economical. They are applied for pole numbers which are not folds of each other since their connection and design are easier.

One winding two-speed motors are considered in two groups.
2.1 Dahlander winding motors
2.2 PAM winding motors

2.1 Dahlander Winding Motors:
Their design and connection is easy. But pole number ratio in this connection type is 2/1, thus 4/2 or 8/4 poles. If a connection which provides different pole numbers which are fold of each other in a winding; this connection is called “Dahlander Connection” and these kinds of motors are called “Dahlander winding motors”. Winding in Dahlander connection is designed according to lower revolution number, thus bigger pole number. Medium endings of each phase windings are found. Phase winding input endings are marked as 1U-1V-1W and medium endings are marked as 2U-2V-2W Six ending are brought into terminal table.

Dahlander Motor Terminal Connection:
Dahlander motor connected winding endings are connected in terminal table as follows:

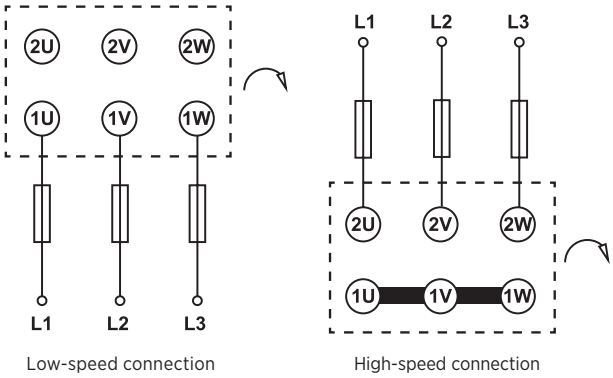


FIGURE 31: Terminal table and two different speed connection in Dahlander winding

In Dahlander connection rotation of both speeds of motor should be same direction as it can be seen in Figure . For providing same rotation direction and to connect 2U-2V-2W terminals in terminal table with same order, there should be change in two phases in medium endings of phase groups. For example, 2W should be connected instead of 2U which is the medium ending of first phase ending 1U and connection 2U instead of 2W which is the medium ending of third phase 1W. If this change is made, motor which is shown in Figure 31 will rotate in same direction for both speeds.

Dahlander winding motors are complete mold winding systems. Half-mold winding applications cause powerful harmonics in bigger pole number (low speed) operation and these harmonics may have bad effects related to motor starting. Therefore, half-mold Dahlander windings are not used.

Volt Electric Dahlander winding motors are full-mold winding. Motors have 4/2 or 8/4 poles. Phase windings are (Δ) connected inside stator. When three-phase voltage is applied to phase winding input endings (1U-1V-1W), windings are serially delta connected and low speed is provided by bigger pole number. 1U-1V-1W endings are jumped medium endings of phase windings (2U-2V-2W) they are parallel star connected and motor rotates with lower pole number and higher speed.

TERMINAL CONNECTION for TWO-SPEED ASYNCHRONOUS MOTORS

Serial Delta- Parallel Star Connection (Δ-YY) Connection and Winding Schema:

This is the most applied connection in Dahlander winding motors. Motor power and current changes in both speed. Power is greater in high speed. It is used in pumps with piston, compressors, band conveyors and in many similar places. Volt Electric Dahlander winding Δ motors are Δ / YY connected.

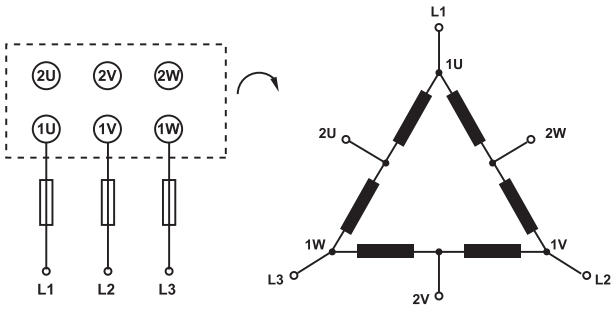


FIGURE 32: 2P=4 Poles, delta wiring in series for low speed

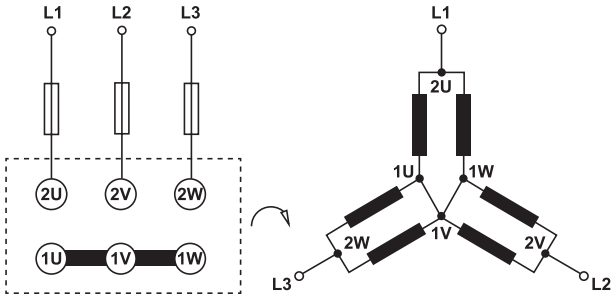


FIGURE 33: 2P=2 poles, star wiring in parallel for high speed

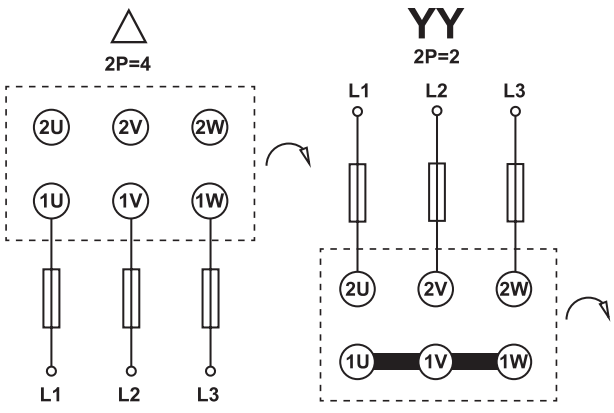


FIGURE 34: 4/2 poles, Δ / YY Dahlander winding connection

Serial Star – Parallel Star (Y-YY) Connection and Winding Schema:

This is another connection which is applied in Dahlander winding motors. Each phase group connection's output endings are combined in stator and star (Y) connection is obtained. Motor power and torque proportionally changes with revolution in this connection. Motors having serial star parallel star (Y/YY) connection motors are called different torque Dahlander winding motors. This connection is preferred in ventilators, blowers, centrifugal pumps, and similar place drives.

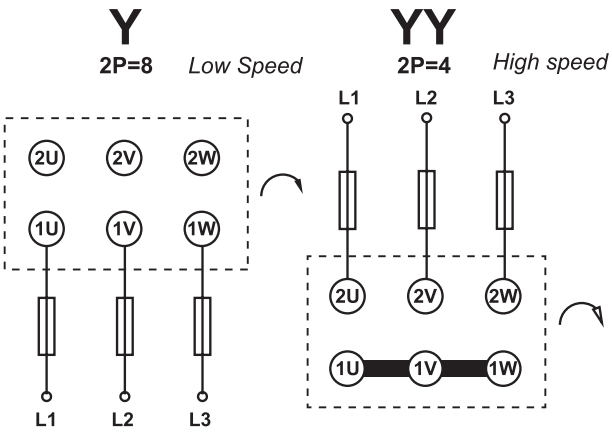
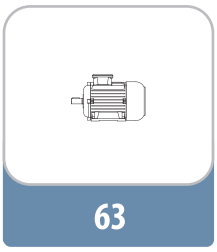


FIGURE 35: Y / YY Dahlander winding connection

VOLT ELECTRIC MOTORS FRAME SIZES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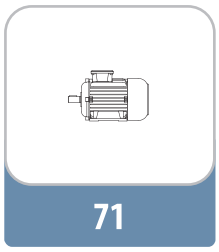
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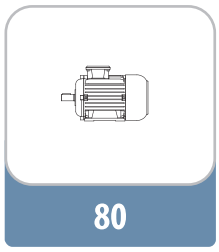
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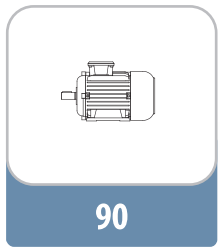
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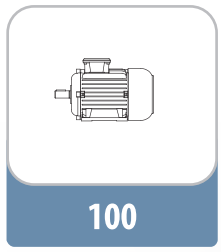
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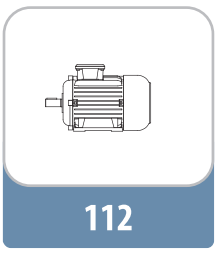
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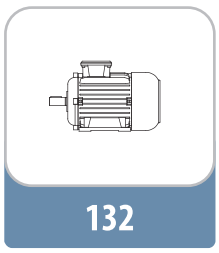
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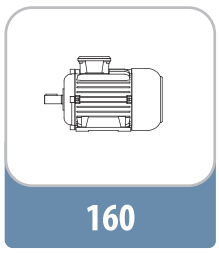
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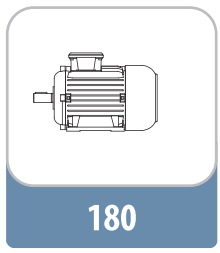
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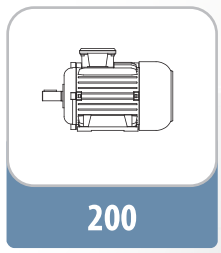
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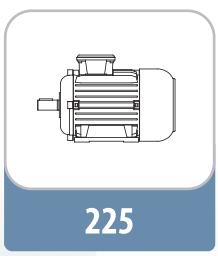
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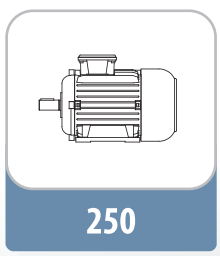
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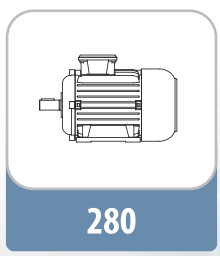
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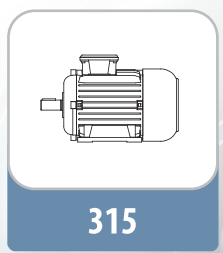
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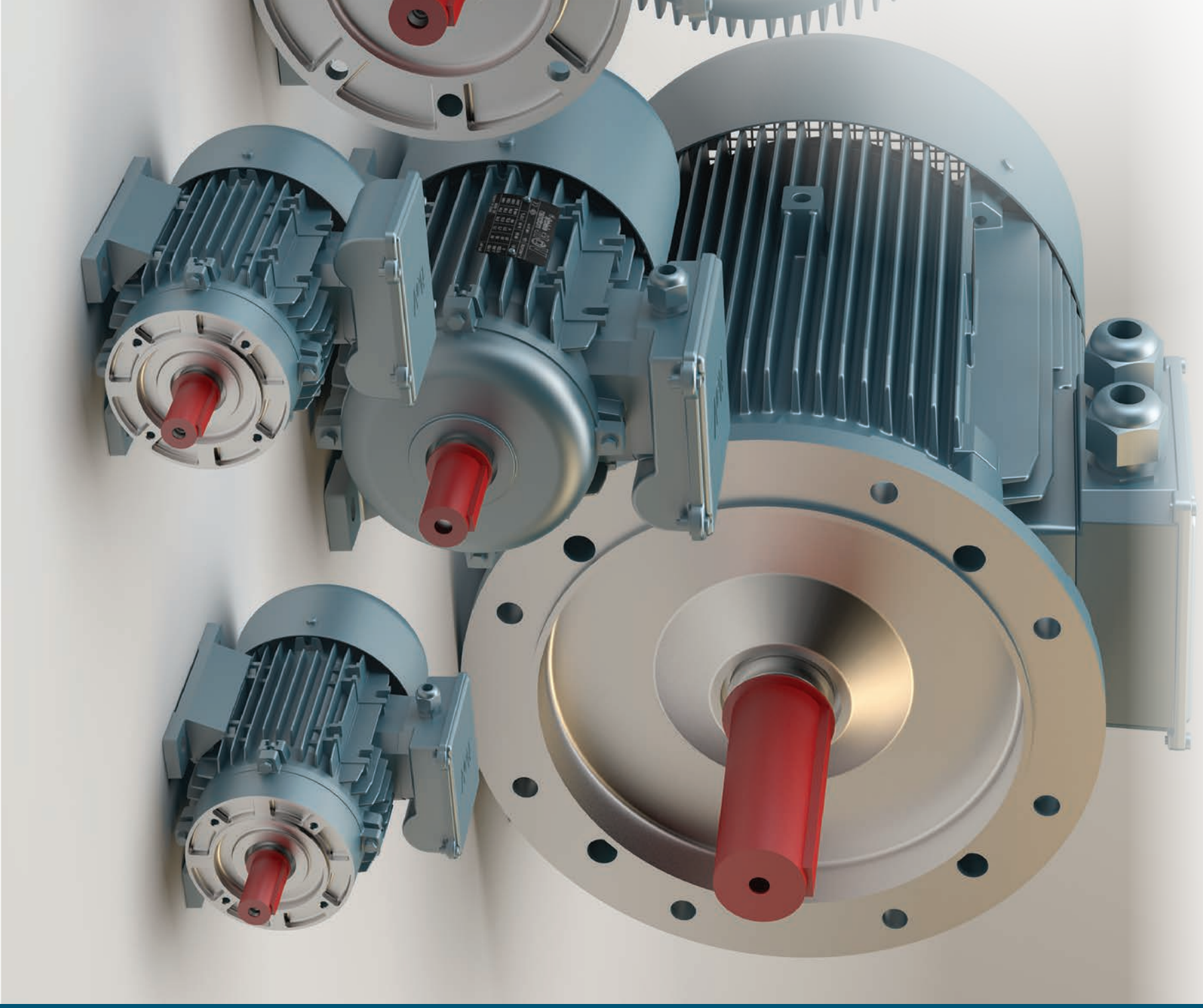
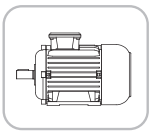


ELECTRICAL PERFORMANCE VALUES: IE3

Volt electric motors

THREE-PHASE ASYNCHRONOUS MOTORS-IE3

Aluminum housing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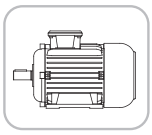
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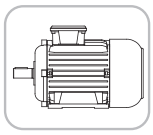
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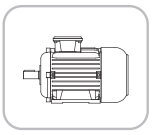
Cast iron housing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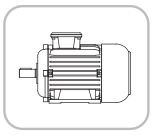
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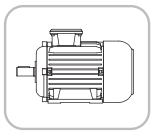
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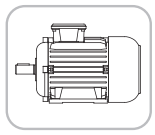
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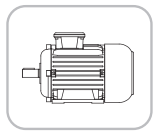
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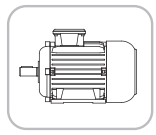
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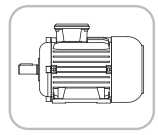

315

THREE-PHASE ASYNCHRONOUS MOTORS (IE3)	
Motor output power	7,5 - 200 kW
Frame sizes and materials	132 - 315
	132 - 180 aluminum housing
	160 - 315 cast iron housing
Rated voltage	For 2 and 4 poles; 230/400 V, 50 Hz (Pn ≤ 3 kW) 400/690 V 50 Hz (Pn > 3 kW)
	For 6 poles; 230/400 V 50 Hz (Pn ≤ 2,2 kW) 400/690 V 50 Hz (Pn > 2,2 kW)
IP	55 and upon request 56, 65, 66
Insulation Class	F class
Temperature Class	B Class
Duty Type	S1
Ambient Temperature	40°C
Altidude of installation	1000 meters
Rotor Material	Aluminum die cast
Cooling	IC 411
Bearings	Table: 18
Terminal box location	Top of the motor at DE
Terminal box material	Table: 15
Thermal protection (PTC Thermistor)	Standard for 180-315 frame sizes
Paint	Standard Gray RAL 7031
Foot Type	Table: 21

TABLE 26: Three-phase asynchronous motors IE3

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	η	Eta	%	Efficiency
n_N	n_{Rated}	(rpm)	Rated speed	Cosφ			Power factor

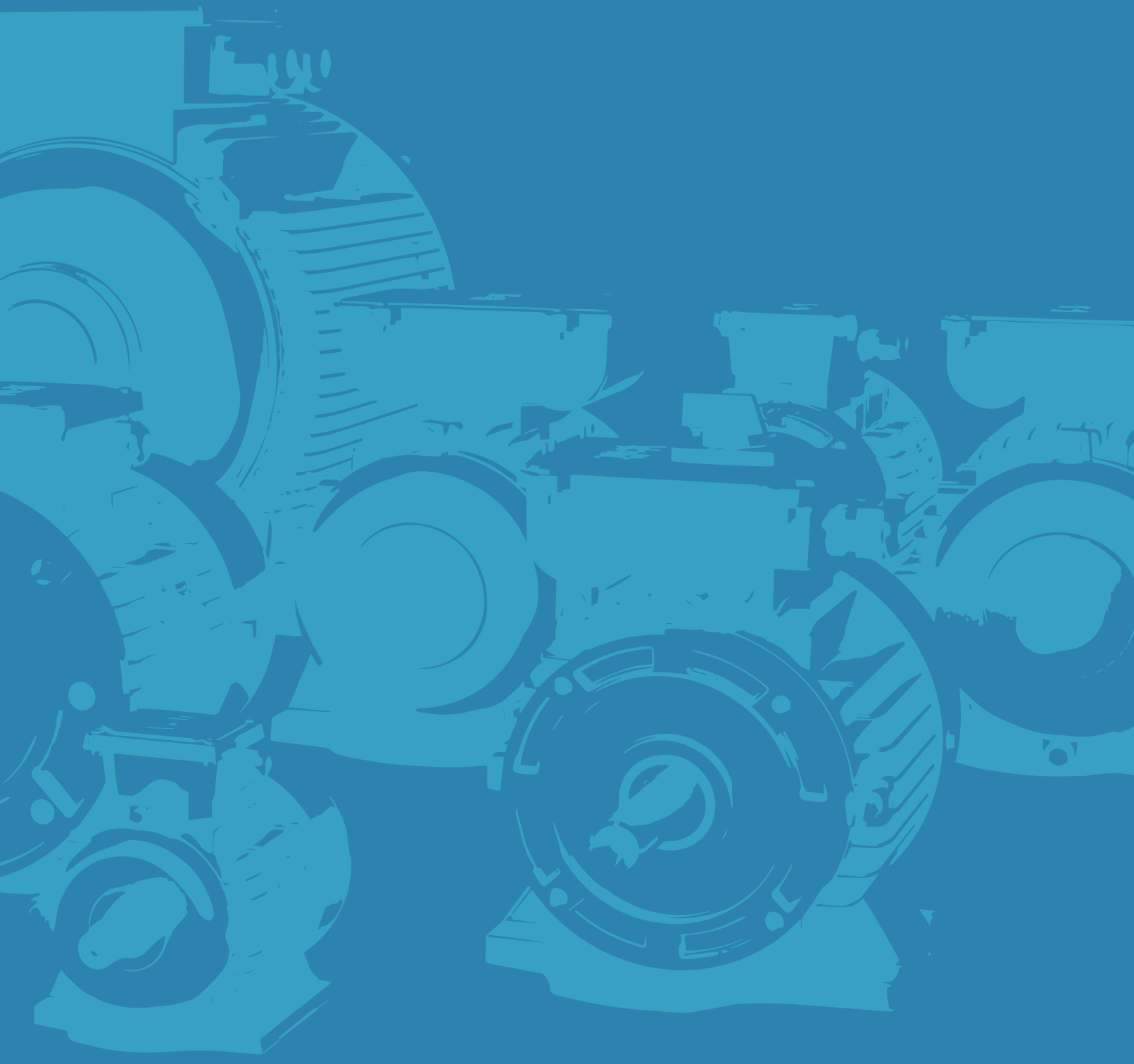
TABLE 27: Symbols in electrical performance tables

IE3 PREMIUM EFFICIENCY ASYNCHRONOUS THREE-PHASE MOTORS - 400 V 50Hz

	VOLT MOTOR CODE	Type	Rated Values						Starting Data				Breakdown Torque	Efficiency			J	APPROX. Weight B3 Kg
			Power		Speed	Current	Torque	Power Factor	Locked Rotor Current		Locked Rotor Torque			P_N % 100	P_N % 75	P_N % 50		
			kW	HP	rpm	I_N A	T_N Nm	Cosφ	I_{LR}/I_N Y	I_{LR}/I_N Δ	T_{LR}/T_N Y	T_{LR}/T_N Δ	T_B/T_N	η%			kgm²	
		2 Poles																
400/690V	**V3E-A-132-S-2-B**	VM 132S	7,5	10	2950	13,2	24,29	0,91	2,59	8	1,1	3,4	3,6	90,1	89,30	86,77	0,017	54
	V3E-A-160-M-2-A	VM 160M	11	15	2955	19,5	35,50	0,89	2,62	8,1	1,1	3,2	3,6	91,4	90,70	88,50	0,039	82
	V3E-A-160-M-2-B	VM 160M	15	20	2955	26,4	48,77	0,89	2,75	8,5	1,1	3,2	3,5	92,1	91,41	89,40	0,050	96
	V3E-A-160-L-2-C	VM 160L	18,5	25	2960	32	59,69	0,90	2,43	7,5	1,0	3,1	3,5	92,6	91,90	90,13	0,057	119
	V3E-A-180-M-2-A	VM 180M	22	30	2960	37,6	70,98	0,91	2,49	7,7	0,8	2,5	2,8	92,8	92,13	90,30	0,080	184
	V3E-G-200-L-2-A	VM 200L	30	40	2970	51,3	96,46	0,90	2,59	8	0,9	2,8	3	93,7	93,10	91,40	0,129	252
	V3E-G-200-L-2-B	VM 200L	37	50	2970	63,2	118,97	0,90	2,88	8,9	0,9	2,8	3	93,8	93,20	91,70	0,153	281
	V3E-G-225-M-2-A	VM 225M	45	60	2975	76,5	144,45	0,90	2,56	7,9	1,0	2,9	3,2	94,3	93,76	92,27	0,236	370
	V3E-G-250-M-2-A	VM 250M	55	75	2960	93,4	177,45	0,90	2,59	8	1	3	3,2	94,4	93,86	92,70	0,332	477
	V3E-G-280-S-2-A	VM 280S	75	90	2970	128,4	241,16	0,89	2,91	9	1	3	3,3	94,7	94,30	93,40	0,770	580
	V3E-G-280-M-2-B	VM 280M	90	120	2970	152,9	289,39	0,89	3,24	10	1	3	3,3	95,4	95,00	94,10	0,940	610
	V3E-G-315-S-2-A	VM 315S	110	150	2975	184,7	353,11	0,90	3,56	11	1	3	3,5	95,5	95,20	94,40	1,400	735
	V3E-G-315-M-2-B	VM 315M	132	175	2980	218	422,8	0,91	2,50	7,2	1	2,8	3,1	95,6	95,40	95,00	1,600	870
	V3E-G-315-M-2-C	VM 315L	160	210	2981	260	512	0,91	2,80	7,8	1	2,8	3,2	95,6	95,35	95,00	1,850	950
	V3E-G-315-L-2-D	VM 315L	200	270	2981	328	639,5	0,90	2,7	7,5	1	2,5	3,1	95,7	95,5	95,1	2,250	1100
		4 Poles																
400/690	**V3E-A-132-M-4-B**	VM 132M	7,5	10	1460	14,9	35,99	0,80	1,94	6	1,0	2,9	3,1	90,7	89,70	87,70	0,046	61
	V3E-A-160-M-4-A	VM 160M	11	15	1470	21,1	71,46	0,82	2,52	7,8	0,9	2,8	3	91,7	90,78	88,95	0,083	94
	V3E-A-160-L-4-B	VM 160L	15	20	1470	28,3	97,46	0,83	2,56	7,9	0,9	2,6	3	92,1	91,18	89,60	0,099	128
	V3E-A-180-M-4-A	VM 180M	18,5	25	1475	34,2	119,78	0,84	2,49	7,7	0,8	2,3	2,6	92,9	91,97	90,60	0,130	196
	V3E-A-180-L-4-B	VM 180L	22	30	1475	41	142,40	0,83	2,69	8,3	0,8	2,3	2,6	93,3	92,37	91,20	0,172	207
	V3E-G-200-L-4-A	VM 200L	30	40	1478	54,3	193,84	0,85	2,72	8,4	0,9	2,6	2,8	93,8	93,14	91,90	0,259	254
	V3E-G-225-S-4-A	VM 225S	37	50	1478	66,8	239,07	0,85	2,52	7,8	0,9	2,8	3	94,1	93,44	92,40	0,290	370
	V3E-G-225-M-4-B	VM 225M	45	60	1480	80,1	290,37	0,86	2,59	8	0,9	2,8	3	94,3	93,92	92,90	0,473	376
	V3E-G-250-M-4-A	VM 250M	55	75	1480	96,3	354,90	0,87	2,59	8	0,9	2,8	3	94,7	94,32	93,50	0,705	471
	V3E-G-280-S-4-A	VM 280S	75	90	1480	133,6	483,95	0,85	2,59	8	1,0	3	3,2	95,3	95,11	94,50	0,810	585
	V3E-G-280-M-4-B	VM 280M	90	120	1480	160,3	580,74	0,85	2,59	8	1,0	3,1	3,3	95,4	95,21	94,60	0,989	620
	V3E-G-315-S-4-A	VM 315S	110	150	1485	191,2	707,41	0,87	2,59	8	1,1	3,3	3,5	95,5	95,31	94,90	1,521	750
	V3E-G-315-M-4-B	VM 315M	132	175	1487	225	845,00	0,88	2,50	7,5	1,0	3,2	3,4	95,6	95,40	95,10	1,725	895
	V3E-G-315-M-4-C	VM 315L	160	210	1490	267	1024,00	0,88	2,50	7,5	1,0	3,2	3,4	95,8	95,50	95,10	2,000	975
	V2E-G-315-L-4-D	VM 315L	200	270	1490	335	1283	0,88	2,5	7,5	1	3,2	3,5	96,1	95,7	95,2	2,750	1130

TABLE 28: IE3 premium efficiency asynchronous three-phase motors - 400V 50Hz

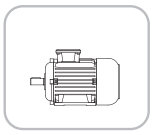
ELECTRICAL PERFORMANCE VALUES: IE2



Volt electric motors

THREE-PHASE ASYNCHRONOUS MOTORS-IE2

Aluminum housing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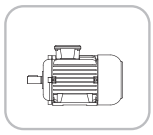
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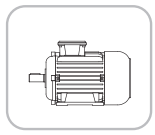
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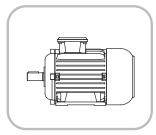
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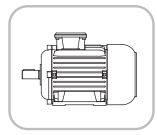
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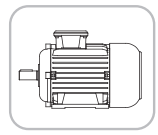
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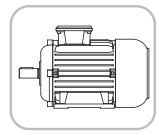
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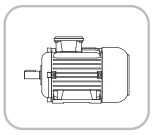
Cast iron housing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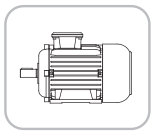
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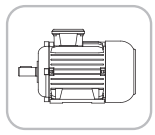
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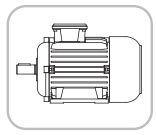
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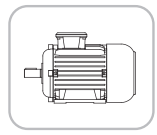
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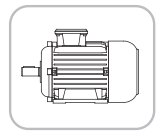
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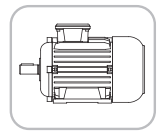

315

THREE-PHASE ASYNCHRONOUS MOTORS (IE2)	
Motor output power	0,75 - 200 kW
Frame size and case materials	80 - 315
	80 - 180 aluminum housing
	160 - 315 cast iron housing
Rated voltage	For 2 and 4 poles ; 230/400 V, 50 Hz (Pn ≤ 3 kW) 400/690 V 50 Hz (Pn > 3 kW)
	For 6 poles; 230/400 V 50 Hz (Pn ≤ 2,2 kW) 400/690 V 50 Hz (Pn > 2,2 kW)
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 18
Terminal box location	On top of the motor at D-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor)	Standard for frame sizes 180 - 315
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 29: Three-phase asynchronous motors IE2

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	η	Eta	%	Efficiency
n_N	n_{Rated}	(rpm)	Rated speed	Cosφ			Power factor

TABLE 30: Symbols in electrical performance tables

IE2 HIGH EFFICIENCY ASYNCHRONOUS THREE-PHASE MOTORS – 400 V / 50 Hz, 2 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency			Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor				Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N					I_{LR} / I_N		T_{LR} / T_N				
		kW	HP	rpm	A	Nm	Cos φ	P_N % 100	P_N % 75	P_N % 50	Y	Δ	Y	Δ	T_B / T_N	Aluminum	Cast Iron
	2 Poles							η %								Synchronous Speed 3000 rpm	
V2E-A-80-M-2-A	VM 80	0,75	1	2850	1,7	2,6	0,85	77,4	76,7	71,1	5,8	_	2,7	_	3,0	9,0	
V2E-A-80-M-2-B	VM 80	1,1	1,5	2860	2,6	3,7	0,8	79,6	76,6	72,6	6,1	_	3,0	_	3,7	10,5	
V2E-A-90-S-2-A	VM 90 S	1,5	2	2890	3,4	5	0,79	81,3	79,1	75	7,6	_	3,2	_	4,0	14,0	
V2E-A-90-L-2-B	VM 90 L	2,2	3	2875	4,5	7,3	0,84	83,2	80,6	78,3	7,7	_	3,7	_	4,0	16,0	
V2E-A-100-M-2-A	VM 100	3	4	2885	6	10	0,85	84,6	83,4	83	7,3	_	3,1	_	3,7	21,2	
V2E-A-112-M-2-A	VM 112	4	5,5	2895	7,1	13,2	0,91	86,6	86,7	84,9	2,4	7,3	1,2	3,6	3,0	22,7	
V2E-A-132-S-2-A	VM132 S	5,5	7,5	2955	10,9	17,8	0,85	87	84,6	80,6	3,3	9,8	1,3	3,9	4,7	39,5	
V2E-A-132-S-2-B	VM 132 S	7,5	10	2940	13,8	24,4	0,9	88,1	86,5	84	2,8	8,5	1,1	3,3	3,6	44	
V2E-A(G)-160-M-2-A	VM 160 M	11	15	2955	20	35,5	0,88	89,4	87,6	85	2,7	8,3	1,1	3,3	3,6	73,3	
V2E-A(G)-160-M-2-B	VM 160 M	15	20	2950	26,9	48,7	0,89	90,3	88,3	86	2,7	8,1	1,2	3,6	3,5	81,0	110
V2E-A(G)-160-L-2-C	VM 160 L	18,5	25	2930	33,2	60,4	0,89	90,9	89,2	87,6	2,5	7,4	1,0	3,1	3,5	92,0	135
V2E-A(G)-180-M-2-A	VM 180 M	22	30	2950	38	71,4	0,93	91,3	89,3	84,8	2,3	7,0	1,0	3,0	2,8	117,0	172
V2E-G-200-L-2-A	VM 200 L	30	40	2970	52	96,5	0,91	92	87,2	85,4	2,7	8,1	0,8	2,3	2,5		210
V2E-G-200-L-2-B	VM 200 L	37	50	2970	64,6	119	0,93	92,5	90	89,5	2,5	7,6	0,9	2,7	3,0		241
V2E-G-225-M-2-A	VM 225 M	45	60	2975	77	145	0,91	92,9	91	90	2,3	7,0	0,8	2,5	2,6		345
V2E-G-250-M-2-A	VM 250 M	55	75	2980	91	176	0,92	93,2	93,7	92,2	2,8	8,7	0,9	2,9	3,0		433
V2E-G-280-S-2-A	VM 280 S	75	100	2980	127	240	0,91	93,9	94,1	92,5	2,6	8,5	0,9	2,9	3,2		510
V2E-G-280-M-2-B	VM 280 M	90	125	2980	151	288	0,91	94,2	94,2	92,7	2,7	8,0	0,9	2,7	3,0		585
V2E-G-315-S-2-A	VM 315 S	110	150	2982	186	352	0,86	94,3	94	93	2,6	7,8	0,8	2,0	3,0		675
V2E-G-315-M-2-B	VM 315 M	132	175	2982	219	423	0,89	94,6	94,4	94	2,6	7,5	0,8	2,3	3,0		742
V2E-G-315-M-2-C	VM 315 M	160	220	2980	264	513	0,89	94,8	94,6	94,1	2,6	7,6	0,8	2,4	3,0		810
V2E-G-315-L-2-D	VM 315 L	185	250	2980	305	592	0,9	95	94,8	94,4	2,6	7,7	0,8	2,5	3,0		910
V2E-G-315-L-2-E	VM 315 L	200	270	2980	330	640	0,9	95	94,8	94,4	2,6	8,0	0,8	2,7	3,0		911
*Progressive Motors																	
V2E-A-100-M-2-B	VM 100 M	4	5,5	2890	7,8	13,2	0,86	85,8	85,4	84,4	-	4,5	-	3,5	2,7	23	
V2E-A-112-M-2-B	VM 112 M	5,5	7,5	2920	10	18	0,91	87	86,2	84,2	-	3,3	-	3,6	3,0	24	
V2E-A-132-M-2-C	VM132 M	11	15	2950	19,7	35,7	0,9	89,4	88,5	86,6	-	1,7	-	4,0	3,7	46	
V2E-A(G)-160-L-2-D	VM 160L	22	30	2960	39,2	71,2	0,89	91,3	89,9	87,5	-	9,2	-	3,8	4,1	95	138

TABLE 31: IE2 high efficiency asynchronous three-phase motors - 400 V / 50 Hz, 2 poles

Volt Electric Has Right To Change All The Data Without Prior Notice,

Voltage	: 400V
Frequency	: 50 Hz
I, Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

IE2 HIGH EFFICIENCY ASYNCHRONOUS THREE-PHASE MOTORS – 400 V / 50 Hz, 4 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency			Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor				Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N		P_N % 100	P_N % 75	P_N % 50	I_{LR} / I_N		/ T_N T_{LR}				
		kW	HP	rpm	A	Nm	Cos φ	η %			Y	Δ	Y	Δ	T_B / T_N	Aluminum	Cast Iron
	4 Poles															Synchronous Speed 1500 rpm	
V2E-A-80-M-4-A	VM 80	0,75	1	1415	2,0	5,1	0,7	79,6	78,9	72,1	5,5	_	3,5	_	3,3	10	
V2E-A-90-S-4-A	VM 90 S	1,1	1,5	1420	2,6	7,5	0,77	81,4	79,8	77,2	6,1	_	3,2	_	3,3	13,8	
V2E-A-90-L-4-B	VM 90 L	1,5	2	1430	3,7	10	0,73	82,8	79,8	75,8	5,6	_	3,4	_	3,3	17,3	
V2E-A-100-M-4-A	VM 100	2,2	3	1430	4,7	14,7	0,79	84,3	82,6	80,5	5,7	_	3,2	_	2,9	21	
V2E-A-100-M-4-B	VM 100	3	4	1440	6,5	19,8	0,77	85,5	85	83,6	6	_	3,3	_	3,3	28	
V2E-A-112-M-4-A	VM 112	4	5,5	1440	8,1	26,6	0,82	86,6	85,6	84,7	1,9	5,9	0,9	2,6	2,9	36,2	
V2E-A-132-S-4-A	VM 132 S	5,5	7,5	1455	10,9	36,3	0,8	87,7	87,5	87	2,2	6,6	1	3	3,4	45	
V2E-A-132-M-4-B	VM 132 M	7,5	10	1450	15,1	49,4	0,81	88,7	87,5	86,5	2	6,2	1	2,9	3,1	56,5	
V2E-A(G)-160-M-4-A	VM 160 M	11	15	1465	21,1	71,6	0,83	89,8	89,8	89,4	2,2	6,6	0,9	2,8	3	100	131
V2E-A(G)-160-L-4-B	VM 160 L	15	20	1460	28,7	98	0,83	90,6	90,5	90,5	2	6,1	0,8	2,6	3	110	140
V2E-A(G)-180-M-4-A	VM 180 M	18,5	25	1470	34,5	120,7	0,83	91,2	90,5	89,8	2	6,1	0,8	2,3	2,6	174	174
V2E-A(G)-180-L-4-B	VM 180 L	22	30	1470	41,7	144	0,84	91,6	91,5	90	1,8	5,4	0,7	2,1	2,3	185	185
V2E-G-200-L-4-A	VM 200 L	30	40	1465	54,5	195,4	0,87	92,3	89,6	86,4	1,9	5,9	0,9	2,6	2,8		225
V2E-G-225-S-4-A	VM 225 S	37	50	1475	66,8	240	0,86	92,7	92	91,5	2,5	7,6	1	3	3		315
V2E-G-225-M-4-B	VM 225 M	45	60	1475	81,0	292	0,87	93,1	92,5	92	2	6,1	0,9	2,9	3		362
V2E-G-250-M-4-A	VM 250 M	55	75	1480	96,5	355	0,88	93,5	93,8	93,2	2,5	7,6	1	3,1	2,9		420
V2E-G-280-S-4-A	VM 280 S	75	100	1485	133,0	482	0,87	94	94,1	93,4	2,5	7,9	0,8	2,6	2,8		550
V2E-G-280-M-4-B	VM 280 M	90	125	1485	158,0	579	0,87	94,3	94,5	93,8	2,4	7,4	0,9	2,9	3		615
V2E-G-315-S-4-A	VM 315 S	110	150	1489	187,0	705	0,88	94,5	94,3	93,4	2,3	7,2	0,7	2	2,6		784
V2E-G-315-M-4-B	VM 315 M	132	175	1489	224,0	846	0,89	94,7	94,5	93,5	2,3	7,2	0,7	2,5	2,6		860
V2E-G-315-L-4-C	VM 315 L	160	220	1489	269,0	1026	0,89	94,9	94,6	93,7	2,3	7,3	0,7	2,6	2,6		880
V2E-G-315-L-4-D	VM 315 L	185	250	1489	310,0	1185	0,89	95,1	94,8	94,1	2,3	7,4	0,7	2,8	2,6		960
V2E-G-315-L-4-E	VM 315 L	200	270	1489	334,0	1282	0,89	95,1	94,8	94,1	2,3	7,5	0,7	2,9	2,6		1015
*Progressive Motors																	
V2E-A-112-M-4-B	VM 112 M	5,5	7,5	1445	11,3	36,7	0,8	87,7	86,4	85,2	-	6,11	-	2,6	3,00	37	
V2E-A-132-M-4-C	VM 132 M	11	15	1455	22,0	72	0,81	89,8	88,0	86,7	-	7,14	-	7,0	3,44	58	
V2E-A(G)-160-L-4-C	VM 160 L	18,5	25	1465	35,3	121	0,84	91,2	90,1	89,4	-	6,52	-	2,7	2,93	112	142
V2E-G-200-L-4-B	VM 200 L	37	50	1478	69,0	239	0,85	92,7	89,9	88,9	-	7,10	-	2,3	3,10		227

TABLE 32: IE2 high efficiency asynchronous three-phase motors - 400 V / 50 Hz, 4 poles

Volt Electric Has Right To Change All The Data Without Prior Notice,

Voltage	: 400V
Frequency	: 50 Hz
I, Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

IE2 HIGH EFFICIENCY ASYNCHRONOUS THREE-PHASE MOTORS – 400 V / 50 Hz, 6 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency			Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor				Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N					I_{LR} / I_N		$_N T_{LR} / T$				
		kW	HP	rpm	A	Nm	Cos φ	P_N % 100	P_N % 75	P_N % 50	Y	Δ	Y	Δ	T_B / T_N	Aluminum	Cast Iron
	6 Poles							η %								Synchronous Speed 1000 rpm	
V2E-A-90-S-6-A	VM 90S	0,75	1	930	2,1	7,7	0,7	75,9	72,9	70,1	3,8	_	2,1	_	2,3	13	
V2E-A-90-L-6-B	VM 90L	1,1	1,5	920	2,8	11,5	0,74	78,1	75,3	73,2	3,9	_	2	_	2	15	
V2E-A-100-M-6-A	VM 100	1,5	2	960	3,6	15	0,75	79,8	77,5	74	5,5	_	2,3	_	2,9	23	
V2E-A-112-M-6-A	VM 112	2,2	3	965	5,7	22	0,69	81,8	79,5	75,7	5,3	_	2,7	_	2,8	30	
V2E-A-132-S-6-A	VM 132 S	3	4	975	7,7	29,8	0,67	83,3	81,4	76,9	2,2	6,7	0,9	2,7	4	45	
V2E-A-132-M-6-B	VM 132 M	4	5,5	965	9	40	0,75	85,2	85,1	83,2	2,1	6,4	0,8	2,3	3,3	50	
V2E-A-132-M-6-C	VM 132 M	5,5	7,5	965	11,7	54,4	0,79	86	85,5	83,8	2,1	6,2	0,7	1,9	3,1	55	
V2E-A(G)-160-M-6-A	VM 160 M	7,5	10	975	15,2	73,4	0,81	88,1	88,1	87,3	2,2	6,7	0,8	2,4	3,2	90	123
V2E-A(G)-160-L-6-B	VM 160 L	11	15	965	22	109,7	0,82	88,7	88	87,5	2	6,1	0,8	2,3	2,8	112	143
V2E-A(G)-180-L-6-A	VM 180 L	15	20	975	29,8	147,3	0,8	89,7	89,8	89,7	1,9	5,6	0,7	2	2,6	165	190
V2E-G-200-L-6-A	VM 200 L	18,5	25	980	35,6	185	0,82	90,4	89,2	88	1,7	5,1	0,6	1,7	2,3		225
V2E-G-200-L-6-B	VM 200 L	22	30	980	42,7	215	0,82	90,9	89,3	88,8	1,7	5,1	0,6	1,7	2,3		243
V2E-G-225-M-6-A	VM 225 M	30	40	980	57,8	280	0,82	91,7	91	89,5	2	6,1	0,7	2	2,4		330
V2E-G-250-M-6-A	VM 250 M	37	50	985	69	359	0,84	92,2	92,2	90,1	2,3	7	1	3	2,6		380
V2E-G-280-S-6-A	VM 280 S	45	60	990	92	434	0,76	92,7	92,7	90,9	2,3	7	1,1	3,3	2,6		500
V2E-G-280-M-6-B	VM 280 M	55	75	990	107	531	0,8	93,1	93,1	91,5	2,3	7	1,1	3,3	2,6		553
V2E-G-315-S-6-A	VM 315 S	75	100	990	140	723	0,82	93,7	93,7	92,4	2,3	7	0,8	2,5	3		727
V2E-G-315-M-6-B	VM 315 M	90	125	990	166	868	0,83	94	94	92,6	2,3	7	0,8	2,5	3		805
V2E-G-315-M-6-C	VM 315 M	110	150	990	198	1061	0,85	94,3	94,3	92,7	2,3	7	0,8	2,5	3		860
V2E-G-315-L-6-D	VM 315 L	132	175	990	235	1273	0,86	94,6	94,6	93	2,3	7	0,8	2,5	3		1020
V2E-G-315-L-6-E	VM 315 L	160	220	990	290	1543	0,84	94,8	94,8	94,6	2,3	7	0,8	2,5	3		1120

TABLE 33: IE2 high efficiency asynchronous three-phase motors - 400 V / 50 Hz, 6 poles

Volt Electric Has Right To Change All The Data Without Prior Notice,

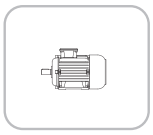
Voltage	: 400V
Frequency	: 50 Hz
I, Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

ELECTRICAL PERFORMANCE VALUES: IE1

Volt electric motors

THREE-PHASE ASYNCHRONOUS MOTORS-IE1

Aluminum housing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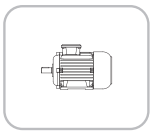
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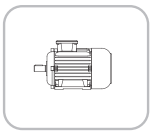
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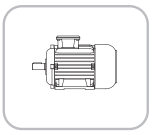
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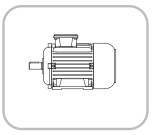
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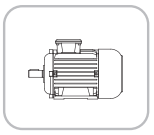
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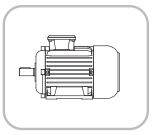
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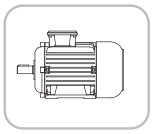
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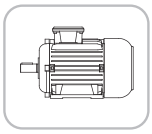
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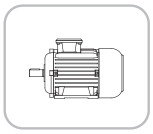
Cast iron housing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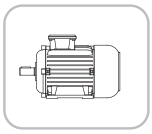
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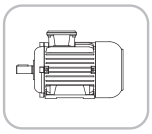
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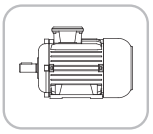
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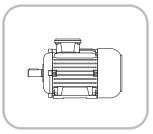
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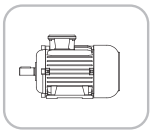
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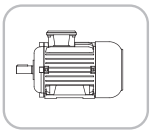

315

THREE-PHASE ASYNCHRONOUS MOTORS (IE1)	
Motor output power	0,12 - 200 kW
Frame size and case materials	63 - 315
	63 - 180 Aluminum housing
	160 - 315 Cast iron housing
Rated voltage	For 2 and 4 poles; 220/380 V and 230/400 V, 50 Hz (Pn ≤ 3 kW) 380/660 V and 400/690 V 50 Hz (Pn > 3 kW) For 6 poles; 220/380 V and 230/400 V 50 Hz (Pn ≤ 2,2 kW) 380/660 V and 400/690 V 50 Hz (Pn > 2,2 kW)
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 18
Terminal box location	On top of the motor at D-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor)	Standart for frame sizes 180, 315
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 34: Three-phase asynchronous motors IE1

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	η	Eta	%	Efficiency
n_N	n_{Rated}	(rpm)	Rated speed	Cosφ			Power factor

TABLE 35: Symbols in electrical performance tables

EFF2 (IE1) STANDARD ASYNCHRONOUS THREE-PHASE MOTORS – 380 V / 50 Hz, 2 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data				Breakdown Torque		APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor		Locked Rotor Current		Locked Rotor Torque					
					I_N	T_N			I_{LR}/I_N		T_{LR}/T_N					
		kW	HP	rpm	A	Nm	Cosφ	η %	Y	Δ	Y	Δ	T_B/T_N		Aluminum	Cast Iron
	2 Poles														Synchronous Speed 3000 rpm	
V1E-A-63-M-2-A	VM 63	0,18	1/4	2820	0,6	0,6	0,8	65	4,2	__	2,9	__	2,9		3,6	
V1E-A-63-M-2-B	VM 63	0,25	1/3	2800	0,7	0,85	0,79	68	5,1	__	3,2	__	2,4		4,1	
V1E-A-71-M-2-A	VM 71	0,37	1/2	2800	1,1	1,3	0,8	67	3,7	__	2,3	__	2,3		5	
V1E-A-71-M-2-B	VM 71	0,55	3/4	2780	1,3	1,9	0,91	73	4,6	__	3,1	__	3,2		5,9	
V1E-A-80-M-2-A	VM 80	0,75	1	2820	1,9	2,6	0,83	72,1	4,4	__	2,1	__	3,2		7,8	
V1E-A-80-M-2-B	VM 80	1,1	1,5	2800	2,5	3,8	0,85	75	4,5	__	2,3	__	2,2		8,8	
V1E-A-90-S-2-A	VM 90S	1,5	2	2800	3,4	5,1	0,83	79	5,6	__	2,3	__	2,5		11,8	
V1E-A-90-L-2-B	VM 90L	2,2	3	2840	5	7,6	0,85	81	6,2	__	2,8	__	2,8		14	
V1E-A-100-M-2-A	VM 100	3	4	2850	6,7	10	0,86	83	6,6	__	2,4	__	3		17	
V1E-A-112-M-2-A	VM 112	4	5,5	2850	8,6	13,4	0,88	85	1,9	5,7	1	2,9	2,9		23	
V1E-A-132-S-2-A	VM 132 S	5,5	7,5	2870	11,4	18,4	0,9	84,7	1,8	5,5	1	2,9	2,9		35	
V1E-A-132-S-2-B	VM 132 S	7,5	10	2885	15,4	24,8	0,9	87	1,9	5,8	0,9	2,6	2,8		41	
V1E-A(G)-160-M-2-A	VM 160 M	11	15	2930	22,3	35,9	0,84	88	2,4	7,2	1	2,9	2,9		70	88
V1E-A(G)-160-M-2-B	VM 160 M	15	20	2930	28,6	48,8	0,89	89	2,5	7,6	0,9	2,8	2,8		81	98
V1E-A(G)-160-L-2-C	VM 160 L	18,5	25	2920	35,1	60,4	0,88	90	2,5	7,6	0,9	2,8	3,1		92	116
V1E-A(G)-180-M-2-A	VM 180 M	22	30	2930	40,5	72	0,92	89,9	2,2	6,7	0,6	1,8	2,7		117	159
V1E-G-200-L-2-A	VM 200 L	30	40	2910	57,8	98,5	0,9	90,7	2	5,9	0,7	2,1	2,4			215
V1E-G-200-L-2-B	VM 200 L	37	50	2925	71	121,6	0,88	91,2	2,5	7,6	0,9	2,7	2,8			225
V1E-G-225-M-2-A	VM 225M	45	60	2975	82,5	145,7	0,91	91,7	2,4	7,1	0,6	1,9	2,5			275
V1E-G-250-M-2-A	VM 250 M	55	75	2970	95	176	0,92	92,1	2,5	7,7	0,8	2,6	2,9			300
V1E-G-280-S-2-A	VM 280 S	75	100	2975	128	240	0,91	92,7	2,3	7	0,7	2,3	2,6			485
V1E-G-280-M-2-B	VM 280 M	90	125	2970	152	288	0,91	93,1	2,3	7	0,8	2,6	2,6			520
V1E-G-315-S-2-A	VM 315 S	110	150	2980	186	353	0,91	93,3	2,4	7,4	0,8	2,4	3,1			675
V1E-G-315-M-2-B	VM 315 M	132	175	2980	223	423	0,9	93,7	2,4	7,4	0,8	2,5	3,1			740
V1E-G-315-M-2-C	VM 315 M	160	220	2980	266	513	0,92	93,8	2,4	7,4	0,8	2,4	2,7			810
V1E-G-315-L-2-D	VM 315 L	185	250	2978	304	593	0,93	94	2,4	7,5	0,8	2,5	3,1			910
V1E-G-315-L-2-E	VM 315 L	200	270	2977	328	640	0,92	94,2	2,3	7	0,7	2,2	2,9			920
* Progressive Motors																
V1E-A-100-M-2-B	VM C100	4	5,5	2870	8,2	13,3	0,9	85	2,2	6,6	1	2,9	3		21	
V1E-A-112-M-2-B	VM C112	5,5	7,5	2870	11	18,8	0,9	86	2,2	6,6	1	3	3,1		27	
V1E-A-132-M-2-C	VM C132 M	11	15	2915	22	36	0,93	89	2,5	7,4	1,1	3,2	3,3		56,3	

TABLE 36: EFF2 (IE1) standard asynchronous three-phase motors - 380 V / 50 Hz, 2 poles

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 380V
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

EFF2 (IE1) HIGH EFFICIENCY ASYNCHRONOUS THREE PHASE MOTORS – 400 V / 50 Hz, 2 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor		Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N			I_{LR}/I_N		T_{LR}/T_N				
		kW	HP	rpm	A	Nm	Cos φ	η %	Y	Δ	Y	Δ	T_B/T_N	Aluminum	Cast Iron
	2 Poles													Synchronous Speed 3000 rpm	
V1E-A-63-M-2-A	VM 63	0,18	1/4	2820	0,6	0,6	0,8	65	2,5	__	1,72	__	1,72	3,6	
V1E-A-63-M-2-B	VM 63	0,25	1/3	2800	0,7	0,85	0,79	68	3,6	__	2,7	__	2	4,1	
V1E-A-71-M-2-A	VM 71	0,37	1/2	2800	1,1	1,3	0,8	67	4,1	__	2,98	__	3	5	
V1E-A-71-M-2-B	VM 71	0,55	3/4	2780	1,3	1,9	0,91	73	6	__	5,96	__	6	5,9	
V1E-A-80-M-2-A	VM 80	0,75	1	2820	1,9	2,6	0,83	72,1	8,4	__	5,52	__	8,32	7,8	
V1E-A-80-M-2-B	VM 80	1,1	1,5	2800	2,5	3,8	0,85	75	11,3	__	8,7	__	8,2	8,8	
V1E-A-90-S-2-A	VM 90S	1,5	2	2800	3,4	5,1	0,83	79	19	__	11,7	__	13	11,8	
V1E-A-90-L-2-B	VM 90L	2,2	3	2840	5	7,6	0,85	81	31	__	21,3	__	21	14	
V1E-A-100-M-2-A	VM 100	3	4	2850	6,7	10	0,86	83	44	__	24	__	30	17	
V1E-A-112-M-2-A	VM 112	4	5,5	2850	8,6	13,4	0,88	85	49	148	38,9	117,7	39	23	
V1E-A-132-S-2-A	VM 132 S	5,5	7,5	2870	11,4	18,4	0,9	84,7	63	190	53	160	54	35	
V1E-A-132-S-2-B	VM 132 S	7,5	10	2885	15,4	24,8	0,9	87	90	271	64,4	194,2	69	41	
V1E-A(G)-160-M-2-A	VM 160 M	11	15	2930	22,3	35,9	0,84	88	160	481	104	313	104	70	88
V1E-A(G)-160-M-2-B	VM 160 M	15	20	2930	28,6	48,8	0,89	89	216	649	136	409	136	81	98
V1E-A(G)-160-L-2-C	VM 160 L	18,5	25	2920	35,1	60,4	0,88	90	266	799	169	508	187	92	116
V1E-A(G)-180-M-2-A	VM 180 M	22	30	2930	40,5	72	0,92	89,9	273	820	133	400	133	117	159
V1E-G-200-L-2-A	VM 200 L	30	40	2910	57,8	98,5	0,9	90,7	343	1030	208	625	234		215
V1E-G-200-L-2-B	VM 200 L	37	50	2925	71	121,6	0,88	91,2	540	1621	335	1006	343		225
V1E-G-225-M-2-A	VM 225M	45	60	2975	82,5	145,7	0,91	91,7	583	1750	269	808	364		275
V1E-G-250-M-2-A	VM 250 M	55	75	2970	95	176	0,92	92,1	2,5	8,5	0,8	3,4	2,9		300
V1E-G-280-S-2-A	VM 280 S	75	100	2975	128	240	0,91	92,7	2,3	7,9	0,7	3,1	2,6		485
V1E-G-280-M-2-B	VM 280 M	90	125	2970	152	288	0,91	93,1	2,3	7,9	0,8	3,4	2,6		520
V1E-G-315-S-2-A	VM 315 S	110	150	2980	186	353	0,91	93,3	2,4	8,2	0,8	3,4	3,1		675
V1E-G-315-M-2-B	VM 315 M	132	175	2980	223	423	0,9	93,7	2,4	8,2	0,8	3,4	3,1		740
V1E-G-315-M-2-C	VM 315 M	160	220	2980	266	513	0,92	93,8	2,4	8,2	0,8	3,4	2,7		810
V1E-G-315-L-2-D	VM 315 L	185	250	2978	304	593	0,93	94	2,4	8,2	0,8	3,4	3,1		910
V1E-G-315-L-2-E	VM 315 L	200	270	2977	328	640	0,92	94,2	2,3	7,9	0,7	3,1	2,9		920
* Progressive Motors															
V1E-A-100-M-2-B	VM C100	4	5,5	2870	8,2	13,3	0,9	85	54	163	38,6	116,8	40	21	
V1E-A-112-M-2-B	VM C112	5,5	7,5	2870	11	18,8	0,9	86	73	220	56,1	169,3	58	27	
V1E-A-132-M-2-C	VM C132 M	11	15	2915	22	36	0,93	89	163	490	115,2	346,6	119	56,3	

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 400V
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

TABLE 37: EFF2 (IE1) high efficiency asynchronous three phase motors – 400 V / 50 Hz, 2 poles

EFF2 (IE1) STANDARD ASYNCHRONOUS THREE-PHASE MOTORS – 380 V / 50 Hz, 4 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor		Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N			I_{LR}/I_N		T_{LR}/T_N				
		kW	HP	rpm	A	Nm	Cosφ	η %	Y	Δ	Y	Δ	T_B/T_N	Aluminum	Cast Iron
	4 Poles													Synchronous Speed 1500 rpm	
V1E-A-63-M-4-A	VM 63	0,12	1/6	1390	0,42	0,8	0,68	65	3	—	1,9	—	2,1	3,5	
V1E-A-63-M-4-B	VM 63	0,18	1/4	1370	0,6	1,24	0,7	65	3,3	—	1,9	—	1,9	4,2	
V1E-A-71-M-4-A	VM 71	0,25	1/3	1380	0,9	1,17	0,7	60	3,2	—	2,9	—	3,1	5	
V1E-A-71-M-4-B	VM 71	0,37	1/2	1390	1,2	2,5	0,66	69	3,9	—	2,4	—	2,4	6	
V1E-A-80-M-4-A	VM 80	0,55	3/4	1365	1,6	3,9	0,75	70	3,8	—	1,8	—	2	7,5	
V1E-A-80-M-4-B	VM 80	0,75	1	1370	2,1	5,2	0,72	73	4,7	—	1,9	—	2	8,6	
V1E-A-80-S-4-A	VM 90S	1,1	1,5	1390	2,8	7,8	0,8	75,7	4,5	—	2,3	—	2,4	11,3	
V1E-A-80-L-4-B	VM 90L	1,5	2	1390	3,7	10,3	0,8	77,2	4,9	—	2,5	—	2,7	13,3	
V1E-A-100-M-4-A	VM 100	2,2	3	1400	5,3	15,6	0,8	81	5,3	—	2,4	—	2,7	17,5	
V1E-A-100-M-4-B	VM 100	3	4	1405	6,4	20,4	0,84	85	5	—	2,3	—	2,5	21	
V1E-A-112-M-4-A	VM 112	4	5,5	1425	8,6	28	0,81	86,6	1,8	5,5	0,8	2,3	2,6	28	
V1E-A-132-S-4-A	VM 132 S	5,5	7,5	1430	11,8	36,7	0,85	86	1,8	5,5	0,8	2,4	2,5	40,1	
V1E-A-132-M-4-B	VM 132 M	7,5	10	1425	15,4	50,4	0,85	86,8	2	6	0,8	2,5	2,5	48,5	
V1E-A(G)-160-M-4-A	VM 160 M	11	15	1450	22,4	72	0,83	88	2,2	6,5	0,9	2,6	2,7	82	100
V1E-A(G)-160-L-4-A	VM 160 L	15	20	1435	30,4	88,7	0,85	89	2,2	6,7	1	2,9	3	110	114
V1E-A(G)-180-M-4-A	VM 180 M	18,5	25	1455	38,4	121	0,82	89,3	1,8	5,5	0,8	2,3	2,4	115	157
V1E-A(G)-180-L-4-A	VM 180 L	22	30	1450	44,4	145	0,83	89,9	1,7	5,1	0,7	2	2,3	125	160
V1E-A(G)-200-L-4-A	VM 200 L	30	40	1470	57,3	194,7	0,87	90,7	2	6,1	0,7	2	2,5		215
V1E-A(G)-225-S-4-A	VM 225 S	37	50	1475	73	240	0,84	91,2	2	5,9	0,7	2,2	2,4		250
V1E-A(G)-225-M-4-B	VM 225 M	45	60	1475	86,8	292	0,87	91,7	2	5,9	0,7	2,1	2,3		274
V1E-A(G)-250-M-4-A	VM 250 M	55	75	1470	97	357	0,89	93	2,2	6,8	0,9	2,8	2,4		375
V1E-A(G)-280-S-4-A	VM 280 S	75	100	1475	133	486	0,88	93,6	2,1	6,4	0,7	2,2	2,4		500
V1E-A(G)-280-M-4-B	VM 280 M	90	125	1480	158	581	0,88	93,9	2,3	7,2	0,8	2,4	2,6		550
V1E-A(G)-315-S-4-A	VM 315 S	110	150	1480	195	710	0,87	94	2,3	7,2	0,7	2,3	2,7		705
V1E-A(G)-315-M-4-B	VM 315 M	132	175	1485	235	849	0,87	94,6	2,2	6,8	0,7	2,3	2,7		785
V1E-A(G)-315-M-4-C	VM 315 M	160	220	1485	280	1029	0,88	95	2,3	7,1	0,8	2,4	2,8		860
V1E-A(G)-315-L-4-D	VM 315 L	185	250	1485	323	1190	0,88	95	2,3	7	0,7	2,3	2,7		875
V1E-A(G)-315-L-4-E	VM 315 L	200	270	1483	350	1288	0,88	95,2	2,2	6,9	0,7	2,1	2,7		900
* Progressive Motors															
V1E-A-71-M-4-C	VM C71	0,55	3/4	1360	1,8	3,85	0,68	67,6	3,8	—	2,8	—	2,4	7	
V1E-A-80-M-4-C	VM C80	1,1	1,5	1325	3,2	8,2	0,8	67,2	3,3	—	2	—	1,8	9,5	
V1E-A-112-M-4-B	VM C112	5,5	7,5	1415	11,9	38	0,85	86	1,7	5,2	0,8	2,5	2,6	32,2	
V1E-A-132-M-4-C	VM C132 M	9	12	1445	19	59,7	0,85	88	1,8	5,4	0,8	2,3	2,5	57	
V1E-G-200-L-4-B	VM C200 L	37	50	1440	71	246	0,89	91,2	1,7	5,2	0,6	1,9	2,3		235

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 380V
Frequency	: 50 Hz
I.Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

TABLE 37: EFF2 (IE1) standard asynchronous three-phase motors - 380 V / 50 Hz, 4 poles

EFF2 (IE1) HIGH EFFICIENCY ASYNCHRONOUS THREE PHASE MOTORS – 400 V / 50 Hz, 4 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor		Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N			I_{LR}/I_N		T_{LR}/T_N				
		kW	HP	rpm	A	Nm	Cos φ	η %	Y	Δ	Y	Δ	T_B/T_N	Aluminum	Cast Iron
	4 Poles													Synchronous Speed 1500 rpm	
V1E-A-63-M-4-A	VM 63	0,12	1/6	1390	0,42	0,8	0,68	65	1,25	—	1,5	—	1,7	3,5	
V1E-A-63-M-4-B	VM 63	0,18	1/4	1370	0,6	1,24	0,7	65	1,95	—	2,4	—	2,3	4,2	
V1E-A-71-M-4-A	VM 71	0,25	1/3	1380	0,9	1,17	0,7	60	2,9	—	3,4	—	3,6	5	
V1E-A-71-M-4-B	VM 71	0,37	1/2	1390	1,2	2,5	0,66	69	4,7	—	6	—	6,1	6	
V1E-A-80-M-4-A	VM 80	0,55	3/4	1365	1,6	3,9	0,75	70	6	—	7	—	7,8	7,5	
V1E-A-80-M-4-B	VM 80	0,75	1	1370	2,1	5,2	0,72	73	9,8	—	9,9	—	10,4	8,6	
V1E-A-90-S-4-A	VM 90S	1,1	1,5	1390	2,8	7,8	0,8	75,7	12	—	18	—	19	11,3	
V1E-A-90-L-4-B	VM 90L	1,5	2	1390	3,7	10,3	0,8	77,2	18	—	25,7	—	27,8	13,3	
V1E-A-100-M-4-A	VM 100	2,2	3	1400	5,3	15,6	0,8	81	28	—	37,2	—	42	17,5	
V1E-A-100-M-4-B	VM 100	3	4	1405	6,4	20,4	0,84	85	32	—	46	—	52	21	
V1E-A-112-M-4-A	VM 112	4	5,5	1425	8,6	28	0,81	86,6	47	141	65,5	196,5	72	28	
V1E-A-132-S-4-A	VM 132 S	5,5	7,5	1430	11,8	36,7	0,85	86	65	195	88	264	91	40,1	
V1E-A-132-M-4-B	VM 132 M	7,5	10	1425	15,4	50,4	0,85	86,8	93	279	125	375	125	48,5	
V1E-A(G)-160-M-4-A	VM 160 M	11	15	1450	22,4	72	0,83	88	146	438	187	561	194	82	100
V1E-A(G)-160-L-4-B	VM 160 L	15	20	1435	30,4	88,7	0,85	89	204	612	254	762	264	110	114
V1E-A(G)-180-M-4-A	VM 180 M	18,5	25	1455	38,4	121	0,82	89,3	211	633	281	843	296	115	157
V1E-A(G)-180-L-4-B	VM 180 L	22	30	1450	44,4	145	0,83	89,9	227	681	294	882	329	125	160
V1E-A(G)-200-L-4-A	VM 200 L	30	40	1470	57,3	194,7	0,87	90,7	350	1050	392	1176	496		215
V1E-A(G)-225-S-4-A	VM 225 S	37	50	1475	73	240	0,84	91,2	434	1302	520	1560	580		250
V1E-A(G)-225-M-4-B	VM 225 M	45	60	1475	86,8	292	0,87	91,7	513	1539	605	1815	659		274
V1E-A(G)-250-M-4-A	VM 250 M	55	75	1470	97	357	0,89	93	2,2	6,6	0,9	2,7	2,4		375
V1E-A(G)-280-S-4-A	VM 280 S	75	100	1475	133	486	0,88	93,6	2,1	6,3	0,7	2,1	2,4		500
V1E-A(G)-280-M-4-B	VM 280 M	90	125	1480	158	581	0,88	93,9	2,3	6,9	0,8	2,4	2,6		550
V1E-A(G)-315-S-4-A	VM 315 S	110	150	1480	195	710	0,87	94	2,3	6,9	0,7	2,1	2,7		705
V1E-A(G)-315-M-4-B	VM 315 M	132	175	1485	235	849	0,87	94,6	2,2	6,6	0,7	2,1	2,7		785
V1E-A(G)-315-M-4-C	VM 315 M	160	220	1485	280	1029	0,88	95	2,3	6,9	0,8	2,4	2,8		860
V1E-A(G)-315-L-4-D	VM 315 L	185	250	1485	323	1190	0,88	95	2,3	6,9	0,7	2,1	2,7		875
V1E-A(G)-315-L-4-E	VM 315 L	200	270	1483	350	1288	0,88	95,2	2,2	6,6	0,7	2,1	2,7		900
* Progressive Motors															
V1E-A-71-M-4-C	VM C71	0,55	3/4	1360	1,8	3,85	0,68	67,6	6,2	—	10,8	—	9,5	7	
V1E-A-80-M-4-C	VM C80	1,1	1,5	1325	3,2	8,2	0,8	67,2	10,5	—	16,5	—	15	9,5	
V1E-A-112-M-4-B	VM C112	5,5	7,5	1415	11,9	38	0,85	86	62	186	95	285	98	32,2	
V1E-A-132-M-4-C	VM C132 M	9	12	1445	19	59,7	0,85	88	102	306	136	408	150	57	
V1E-G-200-L-4-B	VM C200 L	37	50	1440	71	246	0,89	91,2	372	1116	477	1431	556		235

TABLE 37: EFF2 (IE1) high efficiency asynchronous three phase motors – 400 V / 50 Hz, 4 poles

Volt Electric Has Right To Change All The Data Without Prior Notice,

Voltage	: 400V
Frequency	: 50 Hz
I,Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

EFF2 (IE1) HIGH EFFICIENCY ASYNCHRONOUS THREE-PHASE MOTORS – 380 V / 50 Hz, 6 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current I_N	Torque T_N	Power Factor		Locked Rotor Current I_{LR}/I_N		Locked Rotor Torque T_{LR}/T_N				
		kW	HP	rpm	A	Nm	Cos φ	η %	Y	Δ	Y	Δ	T_B/T_N	Aluminum	Cast Iron
	6 Poles													Synchronous Speed 1000 rpm	
V1E-A-71-M-6-A	VM 71	0,18	1/4	910	0,8	1,9	0,72	53	2,1	__	1,4	__	1,7	4,8	
V1E-A-71-M-6-B	VM 71	0,25	1/3	910	1	2,7	0,62	63	3,2	__	2,3	__	2,4	5,7	
V1E-A-80-M-6-A	VM 80	0,37	1/2	920	1,2	3,9	0,7	76	3,4	__	2	__	2,2	8,2	
V1E-A-80-M-6-B	VM 80	0,55	3/4	900	1,6	5,9	0,71	73	3,6	__	1,9	__	1,9	9,8	
V1E-A-90-S-6-A	VM 90S	0,75	1	910	2,2	7,9	0,7	76	3,8	__	1,7	__	1,9	11	
V1E-A-90-L-6-B	VM 90L	1,1	1,5	915	3,2	11,5	0,75	71,4	3,5	__	1,4	__	1,8	14,2	
V1E-A-100-M-6-A	VM 100	1,5	2	925	3,7	15,8	0,81	77	4,9	__	1,9	__	2,5	19,7	
V1E-A-112-M-6-A	VM 112	2,2	3	940	5,4	22,4	0,76	80	4,6	__	2,1	__	2,3	27,4	
V1E-A-132-S-6-A	VM 132 S	3	4	945	7,2	30,3	0,78	80,4	1,6	4,9	0,6	1,9	2,4	34,5	
V1E-A-132-M-6-B	VM 132 M	4	5,5	940	9,4	40,6	0,9	82	1,5	4,5	0,7	2,2	2,4	42	
V1E-A-132-M-6-C	VM 132 M	5,5	7,5	945	12,7	56	0,8	83,1	1,9	5,6	0,8	2,5	2,6	50,5	
V1E-A(G)-160-M-6-A	VM 160 M	7,5	10	950	15,5	76	0,86	86,3	1,7	5,2	0,6	1,9	2,4	88,5	102,5
V1E-A(G)-160-L-6-B	VM 160 L	11	15	950	22,5	112	0,86	86,7	1,8	5,3	0,6	1,9	2,3	102,5	125
V1E-A(G)-180-L-6-A	VM 180 L	15	20	965	32,4	149	0,8	88,7	1,8	5,5	0,6	1,7	2,5	138	172
V1E-A(G)-200-L-6-A	VM 200 L	18,5	25	960	38	184,7	0,83	88,6	1,5	4,5	0,5	1,4	2		205
V1E-A(G)-200-L-6-B	VM 200 L	22	30	965	46	217,5	0,84	89,2	1,6	4,9	0,5	1,4	2,3		222
V1E-A(G)-225-L-6-A	VM 225 M	30	40	970	60	294	0,83	90,3	1,9	5,9	1	3,1	2,3		290
V1E-A(G)-250-L-6-A	VM 250 M	37	50	970	71	364	0,83	90,8	2,1	6,5	0,8	2,6	2,2		376
V1E-A(G)-280-S-6-A	VM 280 S	45	60	980	90	439	0,8	91,4	1,8	5,6	0,9	2,7	2		500
V1E-A(G)-280-M-6-B	VM 280 M	55	75	985	107	533	0,81	92,1	2,1	6,5	1	3	2,2		550
V1E-A(G)-315-S-6-A	VM 315 S	75	100	988	139	725	0,84	92,7	2	6,2	0,7	2,1	2,5		655
V1E-A(G)-315-M-6-B	VM 315 M	90	125	988	166	870	0,84	93	2,2	6,7	0,7	2,3	2,8		727
V1E-A(G)-315-M-6-C	VM 315 M	110	150	988	198	1063	0,86	93,4	2,3	7	0,8	2,4	3		805
V1E-A(G)-315-L-6-D	VM 315 L	132	175	988	235	1276	0,87	93,5	2,1	6,4	0,6	2	2,5		860
V1E-A(G)-315-L-6-E	VM 315 L	160	220	988	290	1547	0,85	93,9	2,3	7	0,7	2,2	2,8		1020

TABLE 38: EFF2 (IE1) standard asynchronous three-phase motors - 380 V / 50 Hz, 6 poles

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 380V
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

EFF2 (IE1) HIGH EFFICIENCY ASYNCHRONOUS THREE PHASE MOTORS – 400 V / 50 Hz, 6 POLES

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data				Breakdown Torque	APPROX. Weight B3 Kg	
		Power		Speed	Current	Torque	Power Factor		Locked Rotor Current		Locked Rotor Torque				
					I_N	T_N			I_{LR}/I_N		T_{LR}/T_N				
		kW	HP	rpm	A	Nm	Cos φ	η %	Y	Δ	Y	Δ	T_B/T_N	Aluminum	Cast Iron
	6 Poles													Synchronous Speed 1000 rpm	
1E-A-71-M-6-A	VM 71	0,18	1/4	910	0,8	1,9	0,72	53	1,7	—	2,6	—	3,2	4,8	
1E-A-71-M-6-B	VM 71	0,25	1/3	910	1	2,7	0,62	63	3,2	—	6,1	—	6,4	5,7	
1E-A-80-M-6-A	VM 80	0,37	1/2	920	1,2	3,9	0,7	76	4,1	—	7,7	—	8,5	8,2	
1E-A-80-M-6-B	VM 80	0,55	3/4	900	1,6	5,9	0,71	73	5,7	—	11	—	11,5	9,8	
1E-A-90-S-6-A	VM 90S	0,75	1	910	2,2	7,9	0,7	76	8,3	—	13,3	—	15	11	
1E-A-90-L-6-B	VM 90L	1,1	1,5	915	3,2	11,5	0,75	71,4	11,2	—	15,9	—	20,3	14,2	
1E-A-100-M-6-A	VM 100	1,5	2	925	3,7	15,8	0,81	77	18	—	30	—	40	19,7	
1E-A-112-M-6-A	VM 112	2,2	3	940	5,4	22,4	0,76	80	25	—	47	—	51	27,4	
1E-A-132-S-6-A	VM 132 S	3	4	945	7,2	30,3	0,78	80,4	35	105,5	59	177	73	34,5	
1E-A-132-M-6-B	VM 132 M	4	5,5	940	9,4	40,6	0,9	82	42	126,5	89	267	97	42	
1E-A-132-M-6-C	VM 132 M	5,5	7,5	945	12,7	56	0,8	83,1	71	213,5	138	414	145	50,5	
1E-A(G)-160-M-6-A	VM 160 M	7,5	10	950	15,5	76	0,86	86,3	81	243,5	142	426	185	88,5	102,5
1E-A(G)-160-L-6-B	VM 160 L	11	15	950	22,5	112	0,86	86,7	119	357,5	212	636	260	102,5	125
1E-A(G)-180-L-6-A	VM 180 L	15	20	965	32,4	149	0,8	88,7	178	534,5	252	756	367	138	172
1E-A(G)-200-L-6-A	VM 200 L	18,5	25	960	38	184,7	0,83	88,6	173	519,5	262	786	381		205
1E-A(G)-200-L-6-B	VM 200 L	22	30	965	46	217,5	0,84	89,2	229	687,5	300	900	465		222
1E-A(G)-225-L-6-A	VM 225 M	30	40	970	60	294	0,83	90,3	263	789,5	375	1125	502		290
1E-A(G)-250-L-6-A	VM 250 M	37	50	970	71	364	0,83	90,8	2,1	6,5	0,8	2,6	2,2		376
1E-A(G)-280-S-6-A	VM 280 S	45	60	980	90	439	0,8	91,4	1,8	5,6	0,9	2,7	2		500
1E-A(G)-280-M-6-B	VM 280 M	55	75	985	107	533	0,81	92,1	2,1	6,5	1	3	2,2		550
1E-A(G)-315-S-6-A	VM 315 S	75	100	988	139	725	0,84	92,7	2	6,2	0,7	2,1	2,5		655
1E-A(G)-315-M-6-B	VM 315 M	90	125	988	166	870	0,84	93	2,2	6,7	0,7	2,3	2,8		727
1E-A(G)-315-M-6-C	VM 315 M	110	150	988	198	1063	0,86	93,4	2,3	7	0,8	2,4	3		805
1E-A(G)-315-L-6-D	VM 315 L	132	175	988	235	1276	0,87	93,5	2,1	6,4	0,6	2	2,5		860
1E-A(G)-315-L-6-E	VM 315 L	160	220	988	290	1547	0,85	93,9	2,3	7	0,7	2,2	2,8		1020

TABLE 37: EFF2 (IE1) high efficiency asynchronous three phase motors – 400 V / 50 Hz, 6 poles

Volt Electric Has Right To Change All The Data Without Prior Notice,

Voltage	: 400V
Frequency	: 50 Hz
I,Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

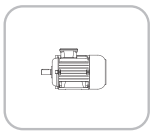
ELECTRICAL PERFORMANCE VALUES: TWO-SPEED

Volt electric motors

GENERAL PURPOSE MOTORS

THREE-PHASE TWO-SPEED ASYNCHRONOUS MOTORS (DAHLENDER WINDING)

Aluminum housing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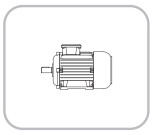
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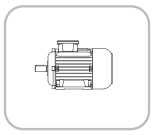
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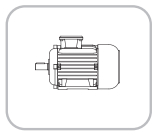
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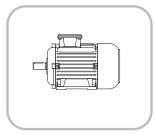
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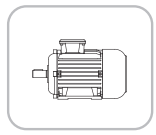
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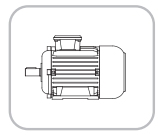
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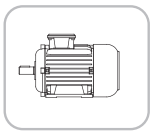
Cast iron housing


160

THREE-PHASE TWO-SPEED ASYNCHRONOUS MOTORS (DAHLANDER)	
Motor output power	0,22/0,30 - 12,5/15 kW 4/2 poles
	0,25/0,37 - 7,5/11 kW 8/4 poles
	0,75/1,1 - 1,1/1,6 kW 8/6 poles
Frame size and case materials	71 - 160, Aluminium housing, 4/2 poles
	80 - 160, Aluminium housing, 8/4 poles
	160, Cast iron housing
Rated voltage	380/380 V 50 Hz Δ/YY
	380/380 V 50 Hz Y/Y
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 18
Terminal box location	On top of the motor at D-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor, Micro thermostat)	Optional
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 39: Three-phase two-speed asynchronous motors (Dahlander)

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	η	Eta	%	Efficiency
n_N	n_{Rated}	(rpm)	Rated speed	Cosφ			Power factor

TABLE 40: Symbols in electrical performance tables

ASYNCHRONOUS THREE-PHASE TWO-SPEED (Dahlander CIRCUIT) MOTORS, 4/2 POLES

VOLT MOTOR CODE	Type	Rated Values					Efficiency	Starting Data		Breakdown Torque	Weight B3
		Power	Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		
				I_N	T_N						
		kW	rpm	A	Nm	Cos φ	η %	I_{LR} / I_N	T_{LR} / T_N	T_B / T_N	kg
4 / 2 Poles										Synchronous Speed 1500/3000 rpm	
V1T-A-71-M-1-A	VM 71	0,22	1340	0,8	1,5	0,73	58	2,9	1,7	2	5
		0,3	2780	0,9	1,0	0,78	66	3,6	2	1,8	
V1T-A-71-M-1-B	VM 71	0,3	1370	1,0	2,2	0,66	66	3,4	2	2,1	6
		0,44	2800	1,2	1,5	0,78	71	4,2	2,1	2	
V1T-A-80-M-1-A	VM 80	0,5	1370	1,5	3,5	0,8	65	3,5	1,3	1,7	7,5
		0,6	2780	1,7	2,1	0,87	67	3,9	1,9	2	
V1T-A-80-M-1-B	VM 80	0,7	1370	2,1	4,9	0,76	67	3,1	1,5	1,7	8,6
		0,85	2800	2,4	2,9	0,79	72	3,8	2,3	2	
V1T-A-90-S-1-A	VM 90S	1	1360	2,9	7,2	0,75	71	3,4	2	1,9	11,3
		1,3	2770	3,5	4,6	0,78	71	3,8	2,1	2	
V1T-A-90-L-1-B	VM 90L	1,3	1390	3,4	8,9	0,79	74	4,5	2,2	2,5	13,3
		1,8	2780	4,5	6,1	0,84	73	4,8	2	2,1	
V1T-A-100-M-1-A	VM 100	1,8	1420	4	12,1	0,85	77	5,8	2,4	2,6	17,5
		2,2	2850	5,8	7,4	0,8	71	5,5	2,5	2,8	
V1T-A-100-M-1-B	VM 100	2,4	1400	5,5	16,5	0,82	79	5,8	2,4	2,4	21,1
		3	2850	7,2	10,2	0,84	74	6	2,5	2,9	
V1T-A-112-M-1-A	VM 112	3,7	1417	8	25	0,83	80,5	4,8	1,8	2,2	28
		4,5	2872	10	15	0,86	78	5,4	2	2,4	
V1T-A-132-S-1-A	VM 132S	4,7	1430	10	31	0,86	84,7	5,4	2	2,2	40
		6	2850	14	20	0,85	79,9	5,1	1,9	2,2	
V1T-A-132-M-1-B	VM 132M	6,3	1440	13,2	42	0,88	87	5,6	2,3	2,4	48
		7,8	2880	17,5	26	0,85	83,5	6	2,4	2,7	
V1T-A-160-M-1-A	VM 160M	9	1450	19,5	59	0,79	88,5	6,1	2,4	2,6	81,3
		11	2910	24	36	0,82	84	5,4	2,7	3,2	
V1T-A-160-M-1-B	VM 160L	12,5	1465	24,8	82	0,86	87	5,6	2,2	2,2	111,5
		15	2930	29,7	49	0,89	84	6,9	2,4	2,5	

TABLE 41: Asynchronous three-phase two-speed (Dahlander circuit) motors, 4/2 poles

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 380V
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

ASYNCHRONOUS THREE-PHASE TWO-SPEED (Dahlander CIRCUIT) MOTORS, 8/4 POLES

VOLT MOTOR CODE	Type	Rated Values					Efficiency	Starting Data		Breakdown Torque	Weight B3
		Power	Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		
				I_N	T_N						
		kW	rpm	A	Nm	Cos φ	η %	I_{LR} / I_N	TLR / TN	TB / TN	kg
8 / 4 Poles										Synchronous Speed 750/1500 rpm	
V1T-A-80-M-3-A	VM 80	0,25	675	1,2	3,6	0,64	51	2,4	1,5	1,9	8,2
		0,37	1385	1	2,5	0,81	66	4	1,7	2,5	
V1T-A-80-M-3-B	VM 80	0,35	680	1,4	5	0,62	54	2,6	1,5	1,8	9,8
		0,55	1380	1,7	3,8	0,87	71	3,4	1,6	1,9	
V1T-A-90-S-3-A	VM 90S	0,4	690	1,8	5,5	0,59	56	2,4	1,5	2,1	11
		0,7	1340	1,8	4,8	0,83	68	3,2	1,5	2	
V1T-A-90-L-3-B	VM 90L	0,6	660	2,3	8,4	0,57	61	2,5	1,3	1,8	14,2
		0,9	1385	2,5	6,3	0,81	73	3,4	1,7	2	
V1T-A-100-M-3-A	VM 100	0,75	690	2,5	10,4	0,7	63	3,6	1,5	1,9	17
		1,1	1400	2,7	7,5	0,86	75	4,6	1,8	2,2	
V1T-A-100-M-3-B	VM 100	1	690	3,5	14	0,62	68	3,4	1,8	2,2	19,7
		1,7	1400	3,7	11	0,9	78	4,9	1,7	2,2	
V1T-A-112-M-3-A	VM 112	1,5	705	4,7	20,3	0,7	73	3,8	1,9	2,4	27
		2,5	1400	5,7	17	0,84	80	4,2	1,7	2,2	
V1T-A-132-S-3-A	VM 132S	2,2	710	7,2	30	0,65	73	3,6	1,6	2,1	42
		3,4	1410	7,7	23	0,83	78	4,8	1,7	1,9	
V1T-A-132-M-3-B	VM 132M	3,5	700	10,5	46	0,69	74	3,8	1,6	2	51
		5,5	1420	11,7	37	0,9	79	5,3	1,7	2	
V1T-A-160-M-3-A	VM 160M	4,5	715	11	60	0,8	80	4,3	1,7	2	70,5
		6	1425	13,1	40	0,79	78	5,1	1,7	2,2	
V1T-A-160-M-3-B	VM 160M	5,5	715	13,1	73,5	0,75	81	5,2	2,2	2,4	80,8
		7,5	1435	15,5	50	0,86	80	6,1	2,2	2,4	
V1T-A-160-L-3-C	VM 160L	7,5	720	17,8	99,5	0,76	83	5	2,1	2,4	108,9
		11	1440	22,5	73	0,88	82	5,8	2,4	2,4	

TABLE 42: Asynchronous three-phase two-speed (Dahlander circuit) motors, 8/4 poles

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 380V
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

ASYNCHRONOUS THREE-PHASE TWO WINDINGS TWO-SPEED MOTORS, 8/6 POLES

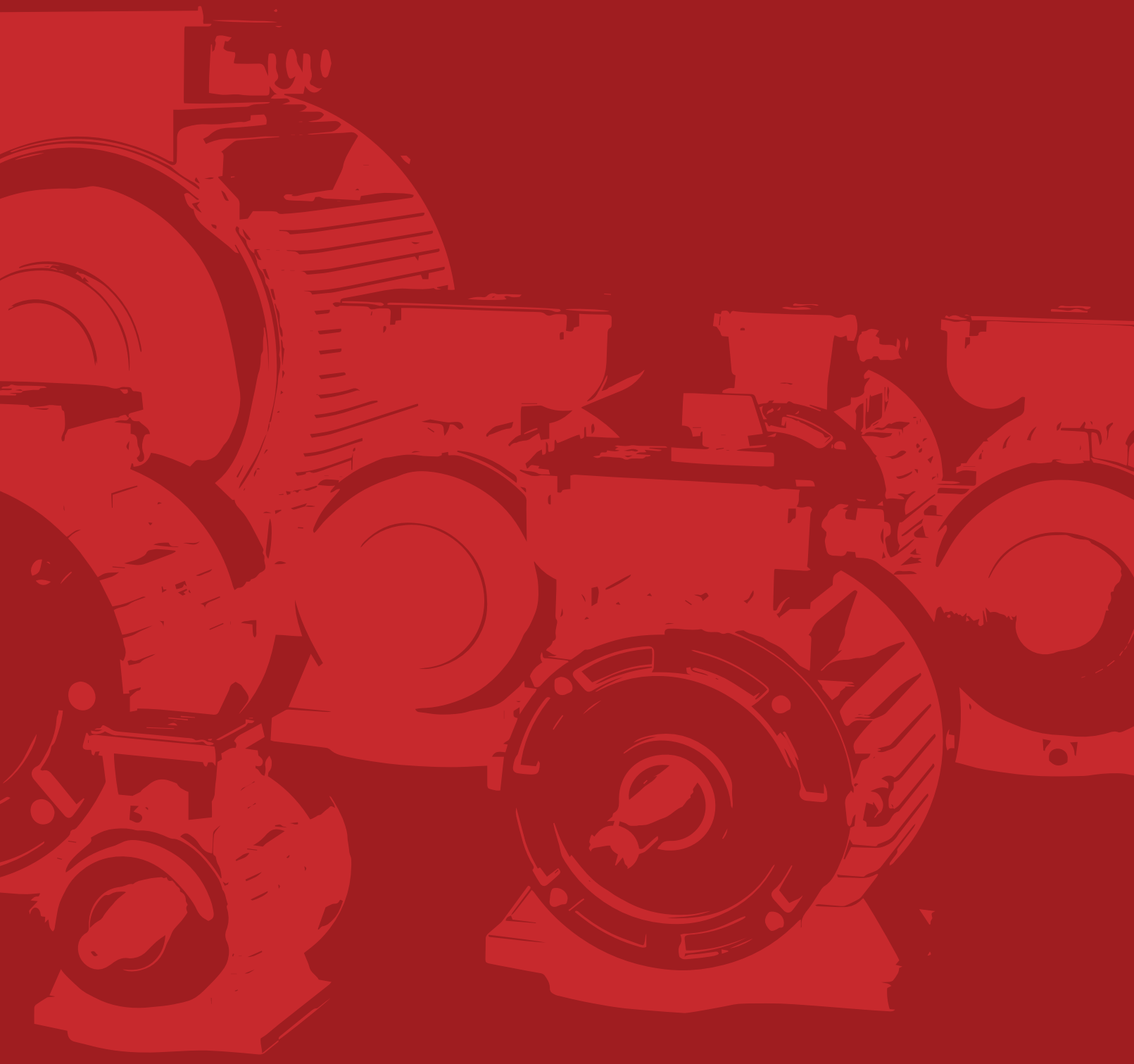
VOLT MOTOR CODE	Type	Rated Values					Efficiency	Starting Data		Breakdown Torque	Weight B3
		Power	Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		
				I_N	T_N						
		kW	rpm	A	Nm	Cos φ	η %	I_{LR} / I_N	T_{LR} / T_N	T_B / T_N	kg
8 / 6 Poles				Synchronous Speed 750/1000 rpm							
V1T-A-100-M-5-A	VM 100	0,75	705	2,6	10,2	0,7	63	3,5	1,6	2	19,5
		1,1	955	3,2	11	0,73	72	4,1	2	2,2	
V1T-A-112-M-5-A	VM 112	1,1	705	3,6	15	0,72	65	3,3	1,4	2	27,2
		1,6	955	4,2	16	0,83	70	4,8	1,8	2,4	

TABLE 43: Asynchronous three-phase two-speed (Dahlander circuit) motors, 8/6 poles

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 380V
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

ELECTRICAL PERFORMANCE VALUES: SINGLE-PHASE

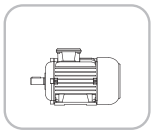


Volt electric motors

GENERAL PURPOSE MOTORS

SINGLE-PHASE ASYNCHRONOUS MOTORS with START and RUN CAPACITORS

Aluminum housing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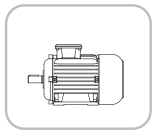
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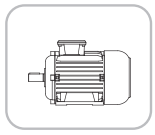
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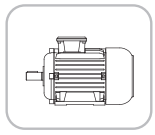
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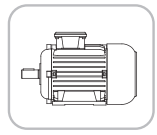
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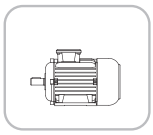
SINGLE-PHASE ASYNCHRONOUS MOTORS with RUN CAPACITOR

Aluminum housing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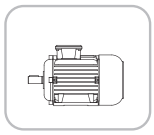
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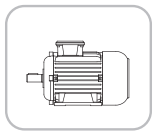
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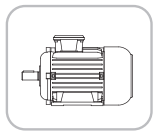
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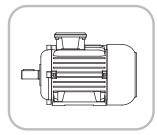
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SINGLE-PHASE ASYNCHRONOUS MOTORS	
Motor output power	0,18 - 1,5 kW, 2, 4 and 6 poles
Frame size and case materials	63 - 100 Aluminum housing with start and run capacitors
	63 - 90 Aluminum housing with run capacitor
Rated voltage	230 V, 50 Hz
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 17
Terminal box location	On top of the motor at ND-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor,Micro thermostat)	Optional
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 44: Single-phase asynchronous motors

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	Cosφ			Power factor
n_N	n_{Rated}	(rpm)	Rated speed	$C_{Kalkış}$		μF	Starting capacitor
η	Eta	%	Efficiency	$C_{Sürekli}$		$\mu F/V$	Run capacitor

TABLE 45: Symbols in electrical performance tables

ASYNCHRONOUS SINGLE-PHASE MOTORS with START and RUN CAPACITORS

VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data		Breakdown Torque	Capacitors		APPROX. Weight B3
		Power		Speed	Current I_N	Torque T_N	Power Factor		Locked Rotor Current	Locked Rotor Torque		Start	Run	
		kW	HP	rpm	A	Nm	Cos φ	η %	I_{LR} / I_N	T_{LR} /T_N	T_B / T_N	µF	µF/V	kg
2 Poles													Synchronous Speed 3000 rpm	
VSS-A-63-M-2-A	VM 63	0.18	1/4	2820	1.5	0.62	0.91	62	4.8	2.8	2.3	43-53	8/450	4
VSS-A-63-M-2-B	VM 63	0.25	1/3	2840	1.7	0.82	0.94	70	5	2.4	2.1	43-53	10/450	4.4
VSS-A-71-M-2-A	VM 71	0.37	1/2	2860	2.5	1.25	0.98	69	5	1.6	2	64-77	15/450	6.3
VSS-A-80-M-2-A	VM 80	0.37	1/2	2830	3.3	1.25	0.85	62	4.2	2.6	2.4	64-77	15/450	7.1
VSS-A-80-M-2-B	VM 80	0.55	3/4	2840	4	1.86	0.88	70	5.3	3.2	2.5	124-149	20/450	8
VSS-A-80-M-2-C	VM 80	0.75	1	2870	5.2	2.55	0.92	72	5.2	2.7	2.3	124-149	25/450	9
VSS-A-80-M-2-D	VM 80	1.1	1.5	2800	7.7	3.75	0.93	72	4.4	2.4	2	124-149	25/450	10
VSS-A-90-S-2-A	VM 90S	0.75	1	2870	5.7	2.55	0.88	67	5.3	2.5	2.2	124-149	25/450	9.5
VSS-A-90-S-2-B	VM 90S	1.1	1.5	2900	7.8	3.75	0.92	71	6	3.3	3.1	145-175	30/450	11.5
VSS-A-90-S-2-C	VM 90Sa	1.5	2	2880	10	5.02	0.9	76	6	3.6	2.7	280-333	40/450	13.3
VSS-A-90-L-2-D	VM 90L	2.2	3	2870	13.7	7.5	0.94	79	4.7	2.9	2.1	280-333	50/450	16.2
VSS-A-100-M-2-A	VM 100	3	4	2870	18	9.8	0.96	80	5.6	2.3	2.1	280-333	50/450	20
4 Poles													Synchronous Speed 1500 rpm	
VSS-A-63-M-4-A	VM 63	0.12	1/6	1420	0.9	0.8	0.92	65	5.8	2.4	1.9	43-53	8/450	4.4
VSS-A-63-M-4-B	VM 63	0.18	1/4	1420	1.6	1.24	0.96	57	4.7	2.7	2	43-53	15/450	5.3
VSS-A-71-M-4-A	VM 71	0.18	1/4	1380	1.6	1.24	0.88	58	4.7	2.6	1.7	43-53	10/450	5.3
VSS-A-71-M-4-B	VM 71	0.25	1/3	1390	2.1	1.7	0.84	61	4.3	2.4	2.1	43-53	10/450	6.1
VSS-A-80-M-4-A	VM 80	0.37	1/2	1420	3.2	2.52	0.82	65	4.2	2.3	1.9	64-77	15/450	7.7
VSS-A-80-M-4-B	VM 80	0.55	3/4	1410	4.5	3.75	0.88	67	4.9	2.4	1.8	124-149	20/450	9.2
VSS-A-80-M-4-C	VM 80	0.75	1	1420	5.7	5	0.88	67	4.4	1.8	1.9	124-149	25/450	10.5
VSS-A-90-S-4-A	VM 90S	0.55	3/4	1420	4.5	3.75	0.85	69	4.9	2.9	2.5	124-149	20/450	9.8
VSS-A-90-S-4-B	VM 90S	0.75	1	1420	5.5	5.1	0.85	74	5.3	2.8	2.1	145-175	25/450	11
VSS-A-90-S-4-C	VM 90Sa	1.1	1.5	1400	7.3	7.5	0.93	75	5.5	2.6	1.9	189-227	30/450	13.2
VSS-A-90-L-4-D	VM 90L	1.5	2	1400	10	10.2	0.93	77	5.1	2.5	1.9	189-227	40/450	14.5
VSS-A-100-M-4-A	VM 100	2.2	3	1430	14.2	15.2	0.93	78	5.2	2.6	1.9	280-333	50/450	20.9
VSS-A-100-M-4-B	VM 100	3	4	1420	18.5	20.1	0.92	80	4.6	2.1	1.8	280-333	50/450	23
6 Poles													Synchronous Speed 1000 rpm	
VSS-A-71-M-6-A	VM 71	0.18	1/4	940	1.7	1.9	0.92	52	5.5	3	1.6	64-77	15/450	6
VSS-A-80-M-6-A	VM 80	0.25	1/3	950	2.1	2.55	0.91	60	5.2	2.9	2.2	64-77	20/450	8.3
VSS-A-80-M-6-B	VM 80	0.37	1/2	950	3	3.75	0.89	63	4	2	1.9	64-77	25/450	9.7
VSS-A-90-S-6-A	VM 90Sa	0.55	3/4	930	4.2	5.7	0.87	67	5	2.7	1.9	124-149	30/450	11.1
VSS-A-90-S-6-B	VM 90L	0.75	1	940	5.8	7.7	0.85	70	5.5	3	1.7	145-175	30/450	13.7
VSS-A-100-S-6-A	VM 100	1.1	1.5	945	7.2	11.2	0.98	72	4.9	1.7	1.5	189-227	40/450	18.5
VSS-A-100-S-6-B	VM 100	1.5	2	945	10	15	0.98	72	4.5	1.6	1.4	280-333	50/450	22.5

TABLE 46: Asynchronous single-phase motors with start and run capacitors

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 220V
Frequency	: 50 Hz
I. Protection	: IP 55
İnsulation Class	: F
Duty Type	: S1
IEC 60034	

ASYNCHRONOUS SINGLE-PHASE MOTORS with RUN CAPACITOR

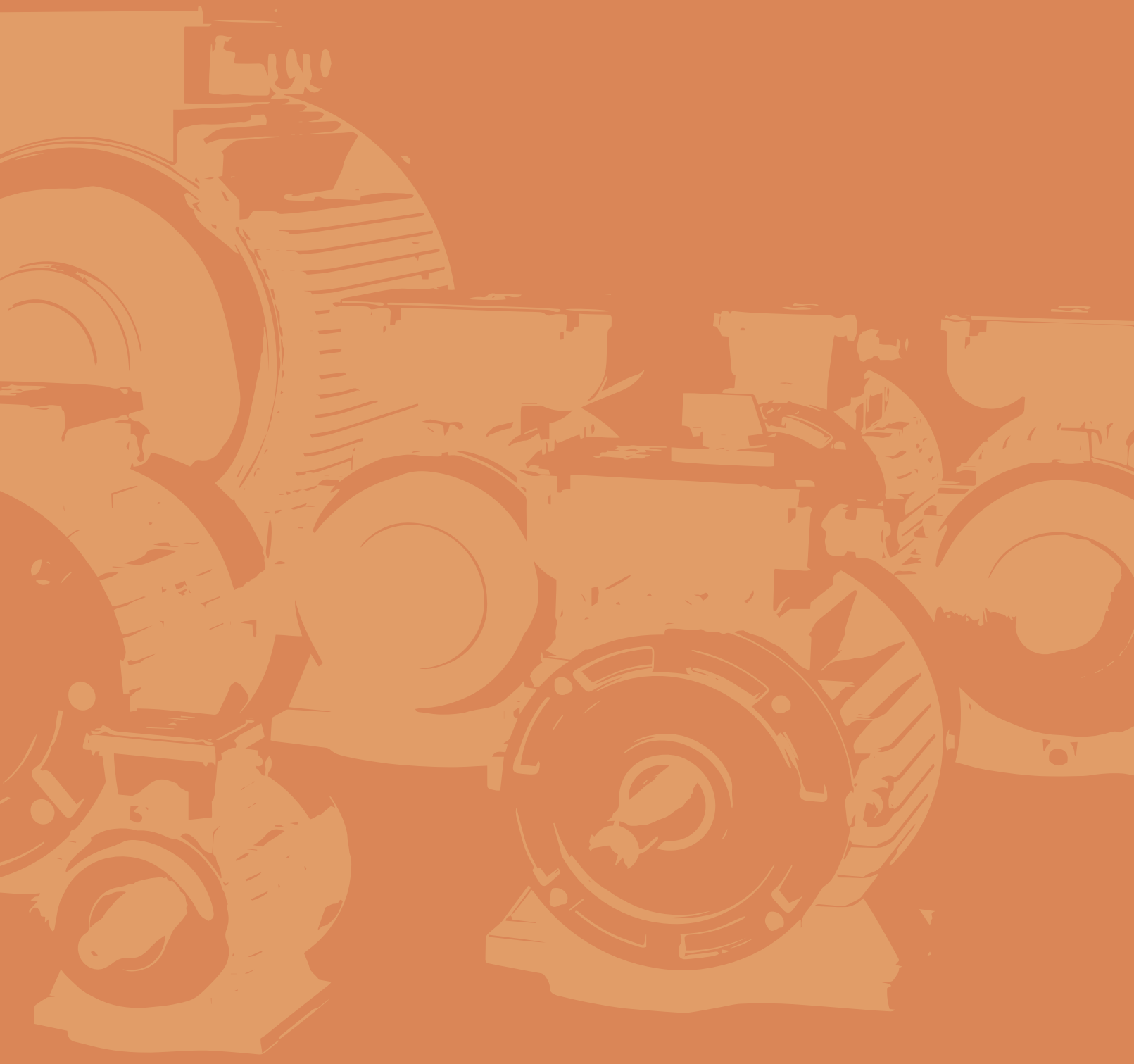
VOLT MOTOR CODE	Type	Rated Values						Efficiency	Starting Data		Breakdown Torque	Capacitors	APPROX. Weight B3
		Power		Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		Run	
					I_N	T_N							
		kW	HP	rpm	A	Nm	Cos φ	η %	I_{LR} / I_N	T_{LR} /T_N	T_B / T_N	µF/V	kg
2 Poles													Synchronous Speed 3000 rpm
VSP-A-63-M-2-A	VM 63	0.18	1/4	2820	1.5	0.62	0.91	62	3	0.5	2.3	8/450	4
VSP-A-63-M-2-B	VM 63	0.25	1/3	2840	1.7	0.82	0.94	70	3.5	0.6	2.1	10/450	4.4
VSP-A-71-M-2-A	VM 71	0.37	1/2	2850	2.5	1.25	0.98	69	3.3	0.4	2	15/450	5.5
VSP-A-71-M-2-B	VM 71	0.55	3/4	2830	4	1.86	0.91	68	3.8	0.4	2.1	20/450	7.3
VSP-A-80-M-2-A	VM 80	0.37	1/2	2830	3.3	1.25	0.85	62	3.2	0.5	2.4	15/450	7
VSP-A-80-M-2-B	VM 80	0.55	3/4	2840	4	1.86	0.88	70	3.8	0.6	2.5	20/450	7.9
VSP-A-80-M-2-C	VM 80	0.75	1.0	2860	5.2	2.55	0.92	72	4.1	0.5	2.4	25/450	8.9
VSP-A-80-M-2-D	VM 80	1.1	1.5	2800	7.7	3.75	0.93	72	3.4	0.4	2	25/450	9.7
VSP-A-90-S-2-A	VM 90S	0.75	1.0	2870	5.7	2.55	0.88	68	3.5	0.4	2.2	25/450	9.4
VSP-A-90-S-2-B	VM 90S	1.1	1.5	2900	7.8	3.75	0.92	71	4.9	0.7	3.1	30/450	11.3
VSP-A-90-S-2-C	VM 90Sa	1.5	2.0	2880	10	5.02	0.94	76	4.7	0.7	2.7	50/450	13.1
VSP-A-90-L-2-D	VM 90L	2.2	3.0	2870	13.7	7.5	0.94	79	4.2	0.7	2.1	60/450	16
4 Poles													Synchronous Speed 1500 rpm
VSP-A-63-M-4-A	VM 63	0.12	1/6	1420	0.9	0.8	0.92	65	2.6	0.6	1.9	8/450	4.4
VSP-A-63-M-4-B	VM 63	0.18	1/4	1420	1.6	1.24	0.96	57	2.3	1.1	2	15/450	5.3
VSP-A-71-M-4-A	VM 71	0.18	1/4	1380	1.6	1.24	0.88	58	2.6	0.5	1.7	10/450	5.1
VSP-A-71-M-4-B	VM 71	0.25	1/3	1360	2.1	1.7	0.74	61	3.8	0.5	2.1	10/450	7
VSP-A-71-M-4-C	VM 71	0.37	1/2	1400	3.4	2.52	0.77	66	2.9	0.4	1.9	15/450	7.3
VSP-A-80-M-4-A	VM 80	0.37	1/2	1420	3.2	2.52	0.82	65	3.1	0.4	1.9	15/450	7.6
VSP-A-80-M-4-B	VM 80	0.55	3/4	1410	4.5	3.75	0.88	67	3	0.3	1.8	20/450	9.1
VSP-A-90-S-4-A	VM 90S	0.55	3/4	1420	4.5	3.75	0.85	69	3.2	0.5	2.5	20/450	9.7
VSP-A-90-S-4-B	VM 90S	0.75	1	1420	5.5	5.1	0.85	71	3.6	0.5	2.1	25/450	10.8
VSP-A-90-S-4-C	VM 90Sa	1.1	1 1/2	1400	7.3	7.5	0.93	71	3.6	0.4	1.9	30/450	13.8
VSP-A-90-L-4-D	VM 90L	1.5	2	1400	10	10.2	0.93	77	3.6	0.4	1.9	40/450	14.3
VSP-A-100-L-4-A	VM 100	2.2	3	1430	14.2	15.2	0.93	78	4.1	0.5	1.9	50/450	20.7
6 Poles													Synchronous Speed 1000 rpm
VSP-A-71-M-6-A	VM 71	0.18	1/4	930	1.75	1.86	0.92	52	2.8	0.22	1.7	15/450	6
VSP-A-80-M-6-A	VM 80	0.25	1/3	950	2.1	2.55	0.91	60	3.1	0.38	2.2	20/450	8.2
VSP-A-80-M-6-B	VM 80	0.37	1/2	950	3	3.75	0.89	63	3.5	0.39	1.9	25/450	9.6
VSP-A-90-S-6-A	VM 90Sa	0.55	3/4	930	4.2	5.7	0.87	67	2.9	0.28	1.9	30/450	11
VSP-A-90-L-6-B	VM 90L	0.75	1	940	5.8	7.7	0.85	70	3.2	0.23	1.7	30/450	13.6

TABLE 47: Asynchronous single-phase motors with run capacitor

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 220V
Frequency	: 50 Hz
I. Protection	: IP 55
İnsulation Class	: F
Duty Type	: S1
IEC 60034	

ELECTRICAL PERFORMANCE VALUES: SPECIAL PURPOSE

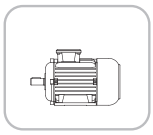


Volt electric motors

SPECIAL PURPOSE MOTORS

SINGLE-PHASE ASYNCHRONOUS PUMP MOTORS - THREE-PHASE ASYNCHRONOUS PUMP MOTORS

Aluminum housing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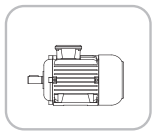
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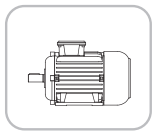
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SINGLE-PHASE ASYNCHRONOUS PUMP MOTORS	
Motor output power	0,37 - 1,5 kW, 2 Poles
Frame size and case materials	71 - 90 Aluminum housing with run capacitors
	80 - 90 Aluminum housing with start and run capacitor
Rated voltage	230 V, 50 Hz - 400 V, 50 Hz
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 17
Terminal box location	On top of the motor at ND-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor,Micro thermostat)	Optional
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 48: Single-phase asynchronous pump motors

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES			
P_N	P_{Rated}	(kW)	Motor output power
V_N	V_{Rated}	(V)	Rated voltage
I_N	I_{Rated}	(A)	Rated current
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current
n_N	n_{Rated}	(rpm)	Rated speed
η	Eta	%	Efficiency
T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
T_N	T_{Rated}	(Nm)	Rated torque
Cosφ			Power factor
$C_{Kalkış}$		μF	Starting capacitor
$C_{Sürekli}$		μF/V	Run capacitor

TABLE 49: Symbols in electrical performance tables

THREE-PHASE ASYNCHRONOUS PUMP MOTORS	
Motor output power	0,75 – 2,2 kW, 2 poles
Frame size and case materials	80 - 90 Aluminum housing
Rated voltage	230/400 V 50 Hz
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 17
Terminal box location	On top of the motor at D-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor, Micro thermostat)	Optional
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 50: Three-phase asynchronous pump motors

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES			
P_N	P_{Rated}	(kW)	Motor output power
V_N	V_{Rated}	(V)	Rated voltage
I_N	I_{Rated}	(A)	Rated current
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current
n_N	n_{Rated}	(rpm)	Rated speed
T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
T_N	T_{Rated}	(Nm)	Rated torque
η	Eta	%	Efficiency
Cosφ			Power factor

TABLE 49: Symbols in electrical performance tables

ASYNCHRONOUS SINGLE AND THREE-PHASE CENTRIFUGAL PUMP MOTORS

ASYNCHRONOUS SINGLE-PHASE CENTRIFUGAL PUMP MOTORS WITH STARTING AND RUN CAPACITORS													
Type	Rated Values						Efficiency	Starting Data		Breakdown Torque	Capacitors		Weight B3
	Power		Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		Start	Run	
				I_N	T_N								
	kW	HP	rpm	A	Nm	Cos φ	η %	I_{LR}/I_N	T_{LR}/T_N	T_B/T_N	µF	µF/V	kg
2 Poles												Synchronous Speed 3000 rpm	
VM 80	0,37	1/2	2830	3,3	1,25	0,85	62	4,2	2,6	2,4	64-77	15/450	7,1
VM 80	0,55	3/4	2840	4,0	1,86	0,88	70	5,3	3,2	2,5	124-149	20/450	8,0
VM 80	0,75	1	2860	5,2	2,55	0,92	72	5,2	2,7	2,3	124-149	25/450	9,0
VM 80	1,1	1,5	2800	7,7	3,75	0,93	72	4,4	2,4	2,0	124-149	25/450	10,0
VM 90S	0,75	1	2870	5,7	2,55	0,88	67	5,3	2,5	2,2	124-149	25/450	9,5
VM 90S	1,1	1,5	2900	7,8	3,75	0,92	71	6,0	3,3	3,1	145-175	30/450	11,5
VM 90S	1,5	2	2880	10,0	5,02	0,94	76	6,0	3,6	2,7	280-333	40/450	13,8

TABLE 51: Asynchronous single-phase centrifugal pump motors with starting and run capacitors

ASYNCHRONOUS SINGLE-PHASE CENTRIFUGAL PUMP MOTORS WITH RUN CAPACITOR												
Type	Rated Values						Efficiency	Starting Data		Breakdown Torque	Capacitors	WeightB3
	Power		Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		Run	
				I_N	T_N							
	kW	HP	rpm	A	Nm	Cos φ	η %	I_{LR}/I_N	T_{LR}/T_N	T_B/T_N	µF/V	kg
2 Poles											Synchronous Speed 3000 rpm	
	0,37	1/2	2850	2,5	1,25	0,98	69	3,3	0,6	2,3	15/450	5,8
	0,55	3/4	2830	4,0	1,86	0,91	68	3,8	0,4	2,1	20/450	7,3
	0,55	3/4	2840	4,0	1,86	0,88	70	4,1	0,6	2,4	20/450	8,1
	0,75	1	2860	5,2	2,55	0,92	72	3,5	0,5	2,4	25/450	8,9
	1,1	1,5	2850	7,7	3,75	0,93	72	3,6	0,5	2,2	40/450	11,0
	1,5	2	2800	9,3	5,02	0,95	75	4,8	0,5	1,9	40/450	11,9
	1,5	2	2880	10,0	5,02	0,94	76	4,7	0,7	2,7	50/450	13,1
	2,2	3	2840	13,7	7,5	0,94	79	4,3	0,4	2,2	70/450	16

TABLE 52: Asynchronous single-phase centrifugal pump motors with run capacitor

ASYNCHRONOUS THREE-PHASE CENTRIFUGAL PUMP MOTORS													
Type	Rated Values						Efficiency	Starting Data				Breakdown Torque	Weight B3
	Power		Speed	Current	Torque	Power Factor		Locked Rotor Current		Locked Rotor Torque			
				I_N	T_N			I_{LR}/I_N		T_{LR}/T_N			
	kW	HP	rpm	A	Nm	Cos φ	η %	Y	Δ	Y	Δ	T_B/T_N	kg
2 Poles												Synchronous Speed 3000 rpm	
VM 80	0,75	1	2820	1,9	2,6	0,83	72,1	4,4	—	2,1	—	3,2	7,8
VM 80	1,1	1,5	2800	2,5	3,8	0,85	75	4,5	—	2,3	—	2,2	8,8
VM 90S	1,5	2	2800	3,4	5,1	0,83	79	5,6	—	2,3	—	2,5	11,8
VM 90L	2,2	3	2840	5,0	7,6	0,85	81	6,2	—	2,8	—	2,8	14,0

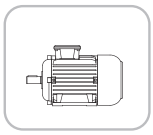
TABLE 53: Asynchronous three-phase centrifugal pump motors

Volt Electric Has Right To Change All The Data Without Prior Notice.

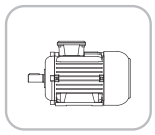
Voltage	: 230V (*380V)
Frequency	: 50 Hz
I. Protection	: IP 55
Insulation Class	: F
Duty Type	: S1
IEC 60034	

SINGLE-PHASE ASYNCHRONOUS MILK MACHINE MOTORS

Aluminum housing



90-S



90-L

SPECIAL PURPOSE SINGLE-PHASE ASYNCHRONOUS MOTOR FOR MILKING MACHINE	
Motor output power	0,55 - 1,5 kW, 4 poles
Frame size and case materials	90S and 90L aluminum housing with run capacitor
Rated voltage	220 V, 50 Hz
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 17
Terminal box location	On top of the motor at ND-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor,Micro thermostat)	Optional
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 54: Special purpose single-phase asynchronous motor for milking machine

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	Cosφ			Power factor
n_N	n_{Rated}	(rpm)	Rated speed	$C_{Kalkış}$		μF	Starting capacitor
η	Eta	%	Efficiency	$C_{Sürekli}$		μF/V	Run capacitor

TABLE 55: Symbols in electrical performance tables

SPECIAL PURPOSE MOTOR for MILKING MACHINES

Type	Rated Values						Efficiency	Starting Data		Breakdown Torque	Capacitors	WeightB3
	Power		Speed	Current	Torque	Power Factor		Locked Rotor Current	Locked Rotor Torque		Run	
				I_N	T_N						$\mu F / V$	
	kW	HP	rpm	A	Nm	Cos φ	η %	I_{LR}/I_N	T_{LR}/T_N	T_B/T_N		kg
4 Poles											Synchoronous Speed 1500 rpm	
VM 90S	0,55	3/4	1420	4,5	3,75	0,85	69	3,2	0,5	2,5	20/450	9,6
VM 90S	0,55	3/4	1420	4,5	3,75	0,90	69	3,2	0,6	2,2	25/450	9,8
VM 90S	0,75	1	1420	5,5	5,1	0,85	71	3,6	0,5	2,1	25/450	10,8
VM 90S	1,1	1,5	1400	7,3	7,5	0,93	71	3,6	0,4	1,9	30/450	13,8
VM 90L	1,5	2	1400	10,0	10,2	0,93	77	3,6	0,4	1,9	40/450	14,3

* The dimensions in parenthesis for only 90L type
* All dimensions in mm

Volt Electric Has Right To Change All The Data Without Prior Notice.

Voltage	: 220V
Frequency	: 50 Hz
I. Protection	: IP 55
I. Protection	: IP 56
Insulation Class	: F
Duty Type	: S1
IEC 60034	

TABLE 56: Special purpose motor for milking machines

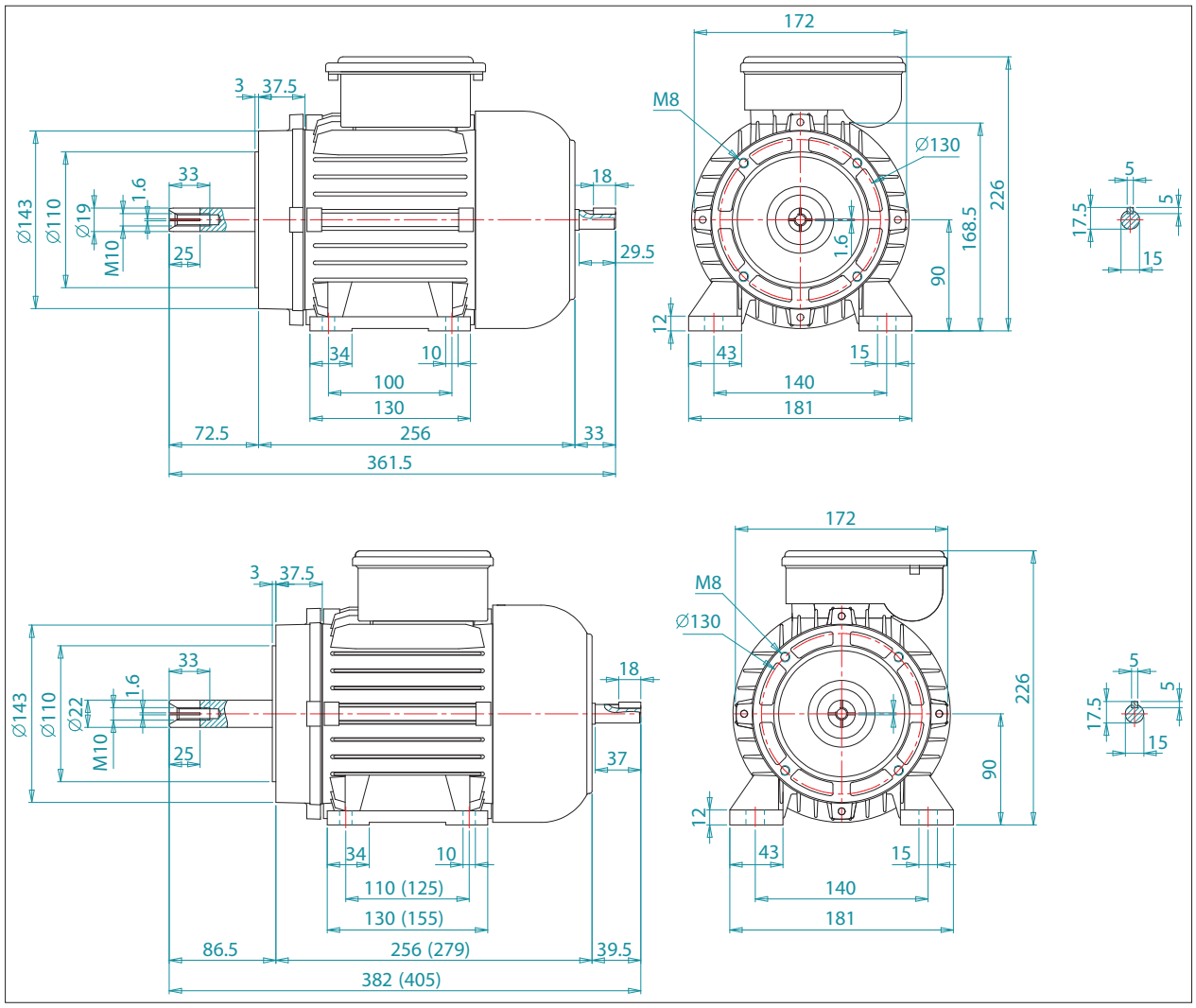
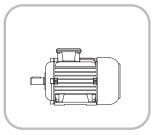


FIGURE 36: Milking machine dimensions.

THREE-PHASE ASYNCHRONOUS MOTORS with ELECTROMAGNETIC BRAKING

Aluminum housing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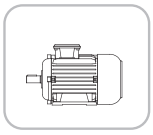
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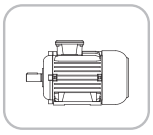
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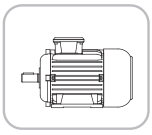
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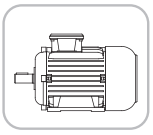
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THREE-PHASE ASYNCHRONOUS MOTORS WITH ELECTROMAGNETIC BRAKE	
Motor output power	0,25 - 4 kW, 4 poles
Frame size and case materials	Aluminum housing: 71 - 112
Rated voltage	380/660 V and 400/690 V 50 Hz
Brake voltage	24 VDC or 98 VDC on request
Construction and Mounting	Table: 21
Degree of protection of motor enclosures (IP)	IP 55 is standard, IP 56, IP 65 and IP 66 are optional
Isolation Class	F Class
Temperature rise	B Class
Duty type	S1
Maximum ambient temperature	40°C
Altitude of installation	Up to 1000 meters
Rotor material	Aluminum die cast
Cooling methods	IC 411
Bearings	Table: 18
Terminal box location	On top of the motor at D-End
Terminal box material	Table: 15
Mounting of fan cover	With bolt
Fan cover material	Stainless metal sheet, Table:
Thermal protection (PTC Thermistor,Micro thermostat)	Optional
Paint	Gray RAL 7031
Foot type (fixed foot, removable foot, without foot)	Table: 21

TABLE 57: Three-phase asynchronous motors with electromagnetic brake

SYMBOLS IN ELECTRICAL PERFORMANCE TABLES							
P_N	P_{Rated}	(kW)	Motor output power	T_{LR}	$T_{Locked\ Rotor}$	(Nm)	Locked rotor torque
V_N	V_{Rated}	(V)	Rated voltage	T_B	$T_{Breakdown}$	(Nm)	Breakdown torque
I_N	I_{Rated}	(A)	Rated current	T_N	T_{Rated}	(Nm)	Rated torque
I_{LR}	$I_{Locked\ Rotor}$	(A)	Locked rotor current	η	Eta	%	Efficiency
n_N	n_{Rated}	(rpm)	Rated speed	Cosφ			Power factor

TABLE 58: Symbols in electrical performance tables

ELECTRICAL PERFORMANCE DATA VMF SERIES BRAKE MOUNTING DIMENSION													
Type	Torque (Nm)	D1	D2	D3	D4	D5	D6	L1	L2	L3	LM	M	Air Gap
VMF 71	8	108	100	36	14	80	90	-	40.8	25	295	M4	0.3
VMF 80	12	119	110	24	19	86	96.5	51.9	45.9	25	344	M5	0.4
VMF 90S	16	145	136	34	24	107	121	53.9	47.9	25	381	M6	0.4
VMF 90L											404		
VMF 100	35	160	151	35	28	119	136	63.9	55.9	25	451	M8	0.4
VMF 112	60	180	173	50	28	136	152.5	76.4	68.4	40	475	M10	0.4

TABLE 59: Electrical performance data VMF series brake mounting dimension

All dimensions in mm

ELECTROMAGNETIC BRAKE DC & AC SWITCHING TIME				
Type	Torque (Nm)	SWITCHING TIME		
		t1 (ms)	t2 (ms)	t'2 (ms)
VMF 71	8	50-60	20	100
VMF 80	12	60-70	40	200
VMF 90	16	80-90	60	300
VMF 100	35	100-120	100	500
VMF 112	60	150-160	120	550

TABLE 60: Electromagnetic brake DC & AC switching time

t1 : Engage time
t2 : DC release time
t'2 : AC release time

Note: It can be produced according to specifications if the requested motor has special shaft dimensions, 60hz and different voltage

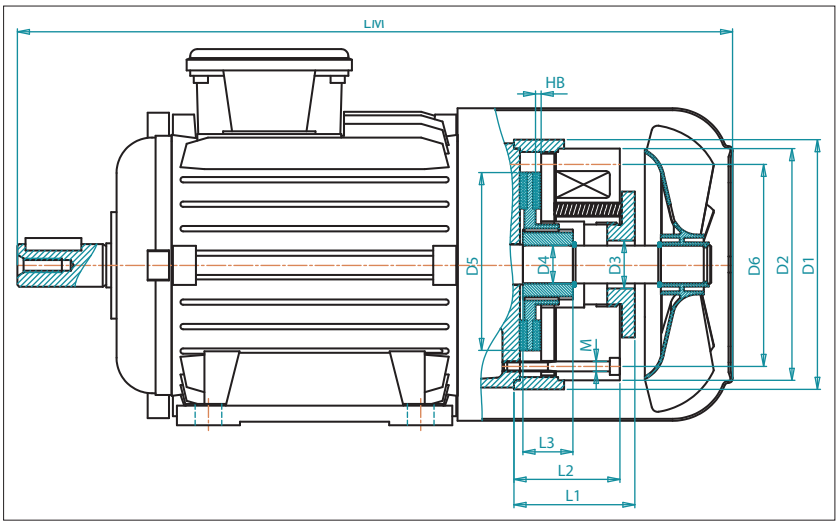


FIGURE 37: Electromagnetic brake motor dimensions.

VOLT MOTOR
MECHANICAL DIMENSIONS:
THREE-PHASE

Volt electric motors

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, ALUMINUM HOUSING, FOOT MOUNTED, B3

EN 50347

Type	A	AA	AB	AC	B	BB	BA	C	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L
132S	216	58,5	260	255	140	180	37	89	38	M12	80	70	10	8	41	132	17,5	263	317	28	12	482
132M	216	58,5	260	255	178	218	37	89	38	M12	80	70	10	8	41	132	17,5	263	316	28	12	520
160M	254	72	316	305	210	264	52	108	42	M16	110	90	12	8	45	160	23	319,5	400	29,5	15	621
160L	254	72	316	305	254	308	52	108	42	M16	110	90	12	8	45	160	23	319,5	400	29,5	15	664
180M	279	73,5	344	341	241	291	42	121	48	M16	110	100	14	9	51,5	180	25	356	436	41	14,5	708
180L	279	73,5	344	341	279	329	42	121	48	M16	110	100	14	9	51,5	180	25	356	436	41	14,5	708

All dimensions in mm

TABLE 59: Asynchronous IE3 three-phase motors, aluminum housing, foot mounted, B3

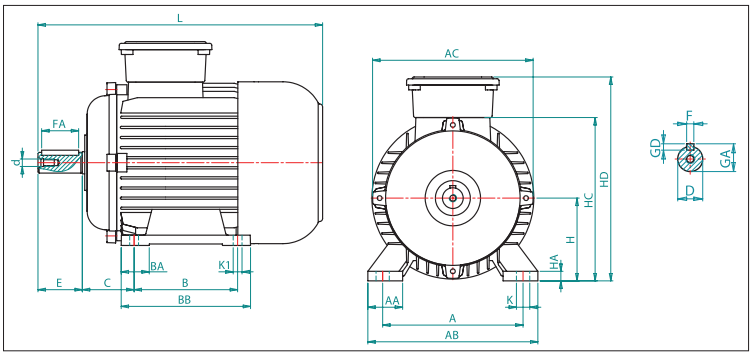


FIGURE 38: Asynchronous IE3 three-phase motors, aluminum housing, foot mounted, B3

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, CAST IRON HOUSING, FOOT MOUNTED, B3

EN 50347

Type		A	AA	AB	AC	B	B'	BB	BA	C	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K1	L
160M		254	72	316	310	210	-	264	52	108	42	M16	110	90	12	8	45	160	23	320	396.9	15	639
160L		254	72	316	310	254	-	308	52	108	42	M16	110	90	12	8	45	160	23	320	396.9	15	683
180	M	279	68	354	348	241	279	319	57	121	48	M16	110	100	14	9	51.5	180	25	360.5	444	15	684
	L																						
200L		318	81	401	391	305	_	357	72	133	55	M20	110	100	16	10	59	200	27	405	492	18.5	782
225 S/M	2 pole	356	83	441	435	286	-	365	76	149	55	M20	110	100	16	10	59	225	35	439	526	18.5	833
	4/6 pole	356	83	441	435	-	311	365	76	149	60	M20	140	125	18	11	64	225	35	439	526	18.5	863
250M	2 pole	406	80	484	480	349	_	410	75	168	60	M20	140	125	18	11	64	250	35	472	580	24	926
	4/6 pole	406	80	484	480	349	_	410	75	168	65	M20	140	125	18	11	69	250	35	472	580	24	926
280 S/M	2 pole	457	120	550	544	368	_	474	85	190	65	M20	140	125	18	11	69	280	40	530	630	24	970
	4/6 pole	457	120	550	544	_	419	474	85	190	75	M20	140	125	20	12	79.5	280	40	530	630	24	970
315 S/M	2 pole	508	125	620	616	406	_	550	115	216	65	M20	140	125	18	11	69	315	50	613	825	28	1120
	4/6 pole	508	125	620	616	_	457	550	115	216	80	M20	170	140	22	14	85	315	50	613	825	28	1150
315 L	2 pole	508	125	620	616	508	-	600	125	216	65	M20	140	125	18	11	69	315	50	613	825	28	1190
	4/6 pole	508	125	620	616	508	-	600	125	216	80	M20	170	140	22	14	85	315	50	613	825	28	1220

All dimensions in mm

TABLE 60: Asynchronous IE3 Three-Phase Motors, Cast Iron Housing, Foot Mounted, B3

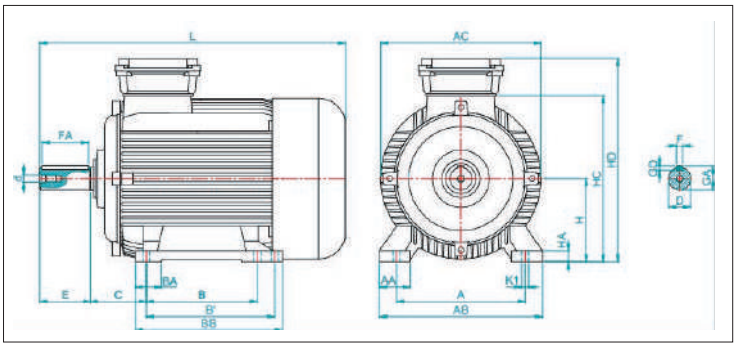


FIGURE 39: Asynchronous IE3 Three-Phase Motors, Cast Iron Housing, Foot Mounted, B3

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, ALUMINUM HOUSING, FOOT MOUNTED, B35

EN 50347

Type	A	AA	AB	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HD	K	K1	L	LA	LB	M	N	P	S	T
132S	216	58,5	260	140	180	37	38	M12	80	70	10	8	41	132	17,5	317	28	12	482	18	402	265	230	300	15	4
132M	216	58,5	260	178	218	37	38	M12	80	70	10	8	41	132	17,5	316	28	12	520	18	440	265	230	300	15	4
160M	254	72	316	210	264	52	42	M16	110	90	12	8	45	160	23	400	29,5	15	621	18	511	300	250	350	19	5
160L	254	72	316	254	308	52	42	M16	110	90	12	8	45	160	23	400	29,5	15	664	18	554	300	250	350	19	5
180M	279	73,5	344	241	291	42	48	M16	110	100	14	9	51,5	180	25	436	41	14,5	708	18,5	595	300	250	350	18,5	5
180L	279	73,5	344	279	329	42	48	M16	110	100	14	9	51,5	180	25	436	41	14,5	708	18,5	595	300	250	350	18,5	5

All dimensions in mm

TABLE 61: Asynchronous IE3 three-phase motors, aluminum housing, foot mounted, B35

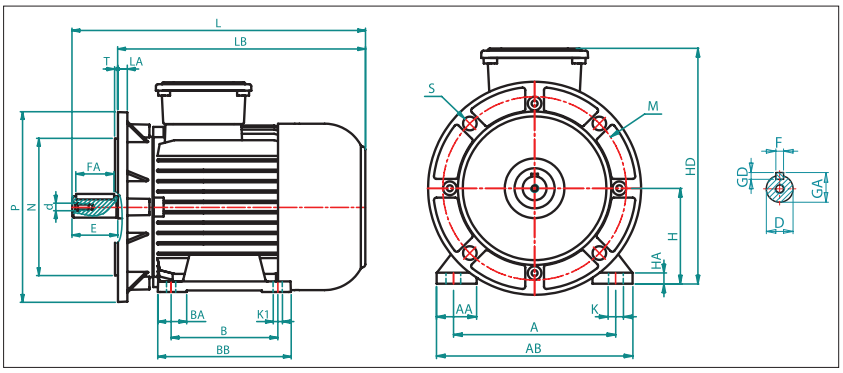


FIGURE 40: Asynchronous IE3 three-phase motors, aluminum housing, foot mounted, B35

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, ALUMINUM HOUSING, FLANGE MOUNTED, B5

EN 50347

Type	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S	T
132S	38	M12	80	70	10	8	41	482	18	402	265	230	300	15	4
132M	38	M12	80	70	10	8	41	520	18	440	265	230	300	15	4
160M	42	M16	110	90	12	8	45	621	18	511	300	250	350	19	5
160L	42	M16	110	90	12	8	45	664	18	554	300	250	350	19	5
180M	48	M16	110	100	14	9	51,5	708	18,5	595	300	250	350	18,5	5
180L	48	M16	110	100	14	9	51,5	708	18,5	595	300	250	350	18,5	5

All dimensions in mm

TABLE 62: Asynchronous IE3 three-phase motors, aluminum housing, flange mounted, B5

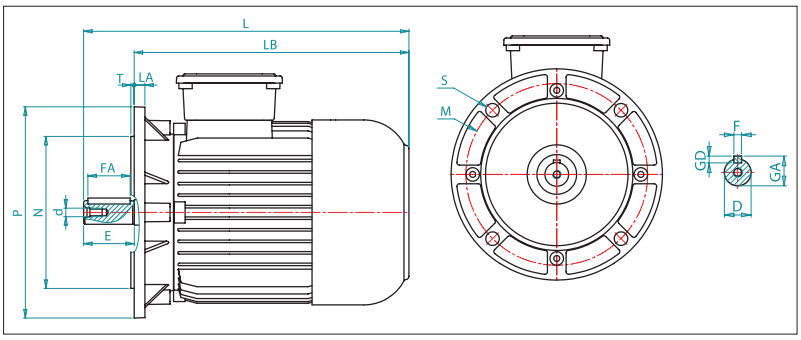


FIGURE 41: Asynchronous IE3 three-phase motors, aluminum housing, flange mounted, B5

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, CAST IRON HOUSING, FOOT MOUNTED, B35

EN 50347

Type		A	AA	AB	B	B'	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K1	L	LA	LB	M	N	P	S	T
160	M	254	72	316	210	-	264	52	42	M16	110	90	12	8	45	160	23	320	396.9	15	639	18	529	300	250	350	18-May	5
160	L	254	72	316	254	-	308	52	42	M16	110	90	12	8	45	160	23	320	396.9	15	683	18	573	300	250	350	18-May	5
180	M	279	68	354	241	279	319	57	48	M16	110	100	14	9	51.5	180	25	360.5	444	15	684	18.5	573	300	250	350	18.5	5
	L																											
200L		318	81	401	305	_	357	72	55	M20	110	100	16	10	59	200	27	405	492	18.5	782	22.5	674	350	300	400	18.5	5
225 S/M	2 pole	356	83	441	286	-	365	76	55	M20	110	100	16	10	59	225	35	439	526	18.5	833	24	723	400	350	450	18.5	5
	4/6 pole	356	83	441	-	311	365	76	60	M20	140	125	18	11	64	225	35	439	526	18.5	863	24	723	400	350	450	18.5	5
250M	2 pole	406	80	484	349	-	410	75	60	M20	140	125	18	11	64	250	35	472	580	24	926	24	776	500	450	550	18.5	5
	4/6 pole	406	80	484	349	-	410	75	65	M20	140	125	18	11	69	250	35	472	580	24	926	24	776	500	450	550	18.5	5
280 S/M	2 pole	457	120	550	368	-	474	85	65	M20	140	125	18	11	69	280	40	530	630	24	970	24	830	500	450	550	18.5	5
	4/6 pole	457	120	550	-	419	474	85	75	M20	140	125	20	12	79.5	280	40	530	630	24	970	24	830	500	450	550	18.5	5
315 S/M	2 pole	508	125	620	406	-	550	115	65	M20	140	125	18	11	69	315	50	613	825	28	1120	24	980	600	550	660	24	6
	4/6 pole	508	125	620	-	457	550	115	80	M20	170	140	22	14	85	315	50	613	825	28	1150	24	980	600	550	660	24	6
315L	2 pole	508	125	620	508	-	600	125	65	M20	140	125	18	11	69	315	50	613	825	28	1190	24	1050	600	550	660	24	6
	4/6 pole	508	125	620	508	-	600	125	80	M20	170	140	22	14	85	315	50	613	825	28	1220	24	1050	600	550	660	24	6

All dimensions in mm

TABLE 63: Asynchronous IE3 three-phase motors, cast iron housing, foot mounted, B35

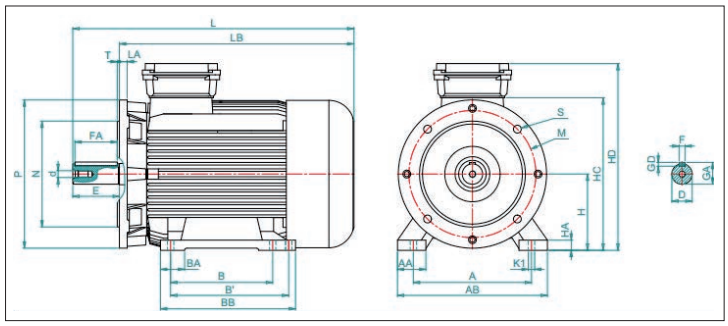


FIGURE 42: Asynchronous IE3 three-phase motors, cast iron housing, foot mounted, B35

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, CAST IRON HOUSING, FLANGE MOUNTED, B5

EN 50347

Type	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S	T
160M	42	M16	110	90	12	8	45	639	18	529	300	250	350	19	5
160L	42	M16	110	90	12	8	45	683	18	573	300	250	350	19	5

All dimensions in mm

TABLE 64: Asynchronous IE3 three-phase motors, cast iron housing, flange mounted, B5

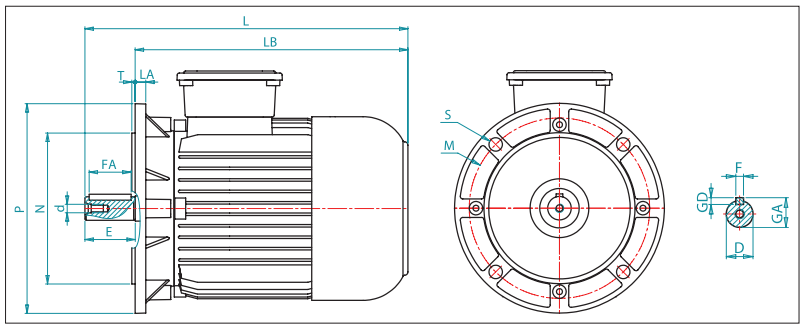


FIGURE 43: Asynchronous IE3 three-phase motors, cast iron housing, flange mounted, B5

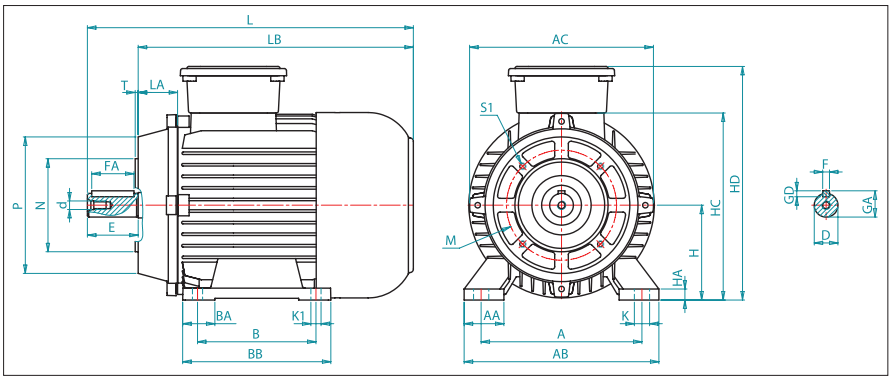
ASYNCHRONOUS IE3 THREE-PHASE MOTORS, ALUMINUM HOUSING, FOOT MOUNTED, B34

EN 50347

Type	A	AA	AB	AC	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L	LA	LB	M	N	P	S1	T
132S	216	58,5	260	255	140	180	37	38	M12	80	70	10	8	41	132	17,5	263	317	28	12	482	53	402	165	130	200	M10	3,5
132M	216	58,5	260	255	178	218	37	38	M12	80	70	10	8	41	132	17,5	263	316	28	12	520	53	440	165	130	200	M10	3,5

All dimensions in mm

TABLE 65: Asynchronous IE3 three-phase motors, aluminum housing, foot mounted, B34



FIGUREE44: Asynchronous IE3 three-phase motors, aluminum housing, foot mounted, B34

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, ALUMINUM HOUSING, FLANGE MOUNTED, B14

EN 50347

Type	AC	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S1	T
132S	215	38	M12	80	70	10	8	41	482	53	402	165	130	200	M10	3,5
132M	255	38	M12	80	70	10	8	41	520	53	440	165	130	200	M10	3,5

All dimensions in mm

TABLE 66: Asynchronous IE3 three-phase motors, aluminum housing, flange mounted, B14

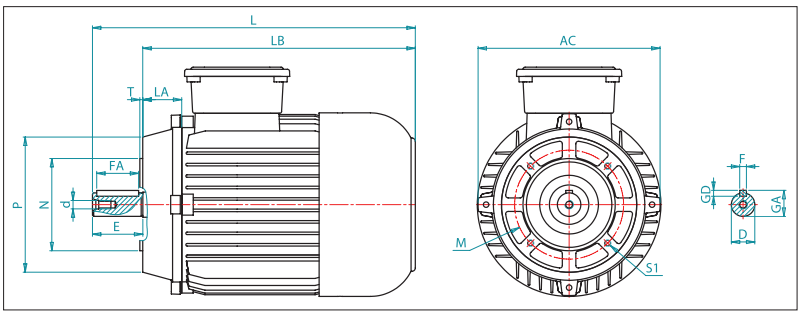


FIGURE 45: Asynchronous IE3 three-phase motors, aluminum housing, flange mounted, B14

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, CAST IRON HOUSING, FLANGE MOUNTED, B14

EN 50347

Type	AC	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S1	T
160M	305	42	M16	110	90	12	8	45	639	64	529	215	180	250	M12	4
160L	305	42	M16	110	90	12	8	45	683	64	573	215	180	250	M12	4

All dimensions in mm

TABLE 67: Asynchronous IE3 three-phase motors, cast iron housing, flange mounted, B14

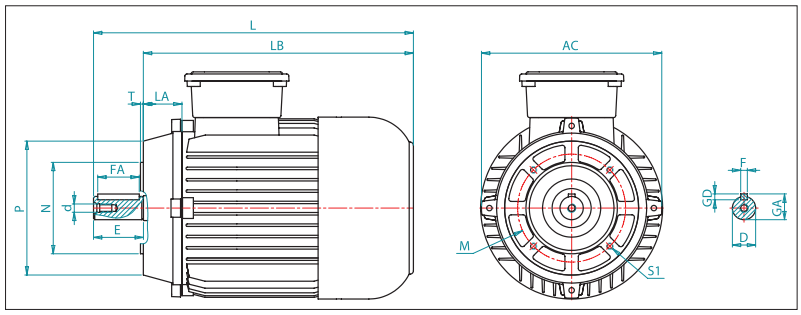


FIGURE 46: Asynchronous IE3 three-phase motors, cast iron housing, flange mounted, B14

ASYNCHRONOUS IE3 THREE-PHASE MOTORS, CAST IRON HOUSING, FOOT MOUNTED, B34

EN 50347

Type	A	AA	AB	AC	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L	LA	LB	M	N	P	S1	T
160M	254	72	316	310	210	264	52	42	M16	110	90	12	8	45	160	23	320	396.9	-	15	639	64	529	215	180	250	M12	4
160L	254	72	316	310	254	308	52	42	M16	110	90	12	8	45	160	23	320	396.9	-	15	683	64	573	215	180	250	M12	4

All dimensions in mm

TABLE 68: Asynchronous IE3 three-phase motors, cast iron housing, foot mounted, B34

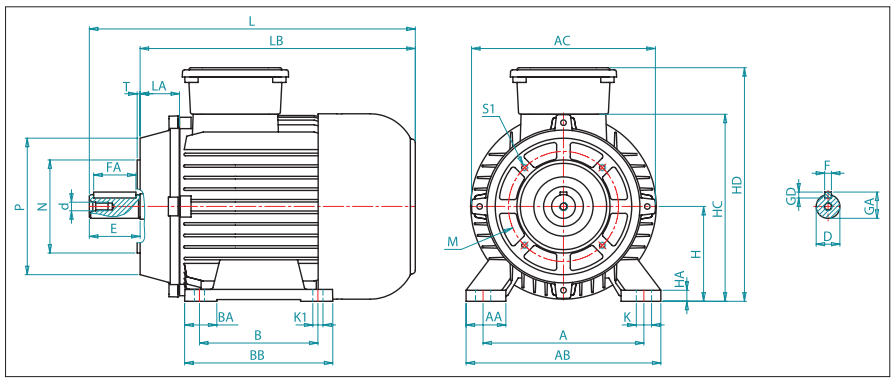


FIGURE 47: Asynchronous IE3 three-phase motors, cast iron housing, foot mounted, B34

ASYNCHRONOUS IE1 and IE2 THREE-PHASE MOTORS, ALUMINUM HOUSING, FOOT MOUNTED, B3

EN 50347

Type	A	AA	AB	AC	B	BB	BA	C	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L
63	100	22	119	125	80	100	23	40	11	M4	23	16	4	4	12,5	63	7	113,5	161	7	7	203
71	112	30	140	136	90	108	26	45	14	M5	30	18	5	5	16	71	10	129,5	180	11	7	242
80	125	35	159	154	100	125	32	50	19	M6	40	28	6	6	21,5	80	11	158	206	15	10	274
90S	140	40	181	172	100	130	34	56	24	M8	50	36	8	7	27	90	12	177	225	15	10	303
90L	140	40	179	172	125	155	35	56	24	M8	50	36	8	7	27	90	12	177	225	15	10	328
100	160	46	200	191	140	174	40	63	28	M10	60	50	8	7	31	100	13	197	245	18	12	371
112	190	51	228	215	140	175	38	70	28	M10	60	50	8	7	31	112	14	222	275,5	18	12	385
132S	216	58,5	260	255	140	180	37	89	38	M12	80	70	10	8	41	132	17,5	263	317	28	12	452
132M	216	58,5	260	255	178	218	37	89	38	M12	80	70	10	8	41	132	17,5	263	316	28	12	490
160M	254	72	316	305	210	264	52	108	42	M16	110	90	12	8	45	160	23	319,5	396,4	29,5	15	601
160L	254	72	316	305	254	308	52	108	42	M16	110	90	12	8	45	160	23	319,5	396,4	29,5	15	644
180M	279	73,5	344	341	241	291	42	121	48	M16	110	100	14	9	51,5	180	25	356	436	41	14,5	708
180L	279	73,5	344	341	279	329	42	121	48	M16	110	100	14	9	51,5	180	25	356	436	41	14,5	708
* Progressive Motors																						All dimensions in mm
100C	160	46	200	191	140	174	40	63	28	M10	60	50	8	7	31	100	13	197	245	18	12	389
112C	190	51	228	215	140	175	38	70	28	M10	60	50	8	7	31	112	14	222	276	18	12	390
132M-C	216	58,5	260	255	178	218	37	89	38	M12	80	70	10	8	41	132	17,5	263	316	28	12	537

TABLE 69: Asynchronous three-phase motors, aluminum housing, foot mounted, B3

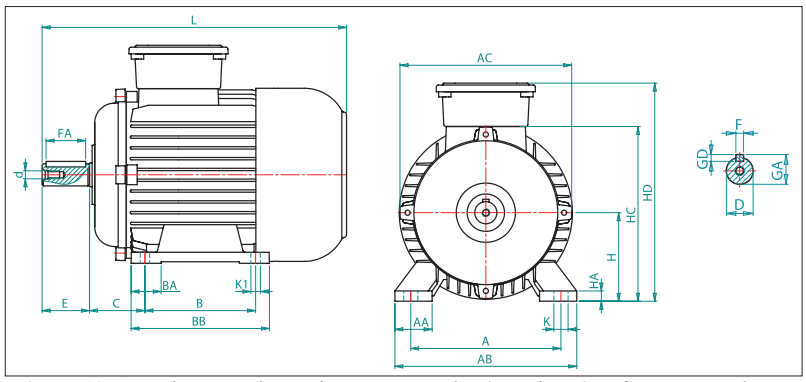


FIGURE 48: Asynchronous three-phase motors, aluminum housing, foot mounted, B3

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, CAST IRON HOUSING, FOOT MOUNTED, B3

EN 50347

Type		A	AA	AB	AC	B	B'	BB	BA	C	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K1	L
180	M	279	68	354	348	241	279	319	57	121	48	M16	110	100	14	9	51.5	180	25	360.5	437.4	15	659
	L																						
200L		318	81	401	391	305	_	357	72	133	55	M20	110	100	16	10	59	200	27	405	489	18.5	747
225 S/M	2 Pole	356	83	441	435	286	_	365	76	149	55	M20	110	100	16	10	59	225	35	439	526	18.5	763
	4/6 Pole	356	83	441	435	_	311	365	76	149	60	M20	140	125	18	11	64	225	35	439	526	18.5	793
250 M	2 Pole	406	80	484	480	349	_	410	75	168	60	M20	140	125	18	11	64	250	35	472	580	24	896
	4/6 Pole	406	80	484	480	349	_	410	75	168	65	M20	140	125	18	11	69	250	35	472	580	24	896
280 S/M	2 Pole	457	120	550	544	368	_	474	85	190	65	M20	140	125	18	11	69	280	40	530	630	24	970
	4/6 Pole	457	120	550	544	_	419	474	85	190	75	M20	140	125	20	12	79.5	280	40	530	630	24	970
315 S/M	2 Pole	508	125	620	616	406	_	550	115	216	65	M20	140	125	18	11	69	315	50	613	825	28	1120
	4/6 Pole	508	125	620	616	_	457	550	115	216	80	M20	170	140	22	14	85	315	50	613	825	28	1150
315 L	2 Pole	508	125	620	616	508	_	600	125	216	65	M20	140	125	18	11	69	315	50	613	825	28	1190
	4/6 Pole	508	125	620	616	508	_	600	125	216	80	M20	170	140	22	14	85	315	50	613	825	28	1220

All dimensions in mm

TABLE 70: Asynchronous three-phase motors, cast iron housing, foot mounted, B3

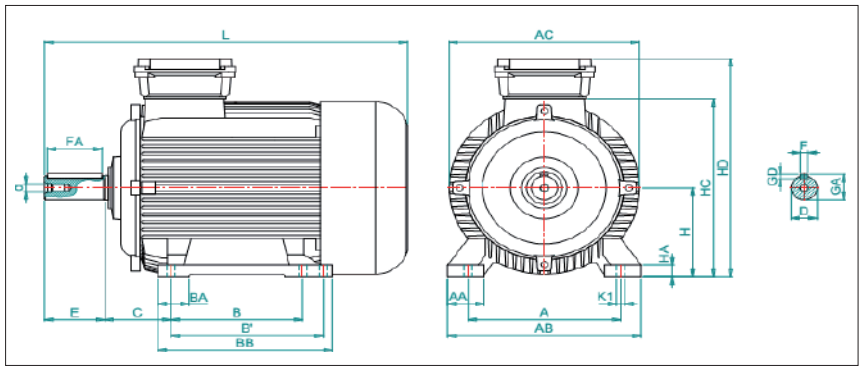


FIGURE 49: Asynchronous three-phase motors, cast iron housing, foot mounted, B3

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, ALUMINUM HOUSING, FOOT MOUNTED, B35

EN 50347

Type	A	AA	AB	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HD	K	K1	L	LA	LB	M	N	P	S	T
63	100	22	119	80	100	23	11	M4	23	16	4	4	12,5	63	7	161	7	7	203	8,5	180	115	95	140	10	3
71	112	30	140	90	108	26	14	M5	30	18	5	5	16	71	10	177	11	7	242	8	212	130	110	160	10	3,5
80	125	35	159	100	125	32	19	M6	40	28	6	6	21,5	80	11	206	15	10	274	10	234	165	130	200	12	3,5
90S	140	40	181	100	130	34	24	M8	50	36	8	7	27	90	12	225	15	10	303	10	253	165	130	200	12	3,5
90L	140	40	179	125	155	35	24	M8	50	36	8	7	27	90	12	225	15	10	328	10	278	165	130	200	12	3,5
100	160	46	200	140	174	40	28	M10	60	50	8	7	31	100	13	245	18	12	371	13	311	215	180	250	15	4
112	190	51	228	140	175	38	28	M10	60	50	8	7	31	112	14	276	18	12	385	13	323	215	180	250	15	4
132S	216	58,5	260	140	180	37	38	M12	80	70	10	8	41	132	17,5	317	28	12	452	18	372	265	230	300	15	4
132M	216	58,5	260	178	218	37	38	M12	80	70	10	8	41	132	17,5	316	28	12	490	18	410	265	230	300	15	4
160M	254	72	316	210	264	52	42	M16	110	90	12	8	45	160	23	396,4	29,5	15	601	18	396,4	300	250	350	19	5
160L	254	72	316	254	308	52	42	M16	110	90	12	8	45	160	23	396,4	29,5	15	644	18	534	300	250	350	19	5
180M	279	73,5	344	241	291	42	48	M16	110	100	14	9	51,5	180	25	436	41	14,5	708	18,5	595	300	250	350	18,5	5
180L	279	73,5	344	279	329	42	48	M16	110	100	14	9	51,5	180	25	436	41	14,5	708	18,5	595	300	250	350	18,5	5
*Progresive Motors																										
100C	160	46	200	140	174	40	28	M10	60	50	8	7	31	100	13	245	18	12	389	13	311	215	180	250	15	4
112C	190	51	228	140	175	38	28	M10	60	50	8	7	31	112	14	276	18	12	390	13	323	215	180	250	15	4
132M-C	216	58,5	260	178	218	37	38	M12	80	70	10	8	41	132	17,5	316	28	12	537	18	410	265	230	300	15	4

All dimensions in mm

TABLE 71: Asynchronous three-phase motors, aluminum housing, foot mounted, B35

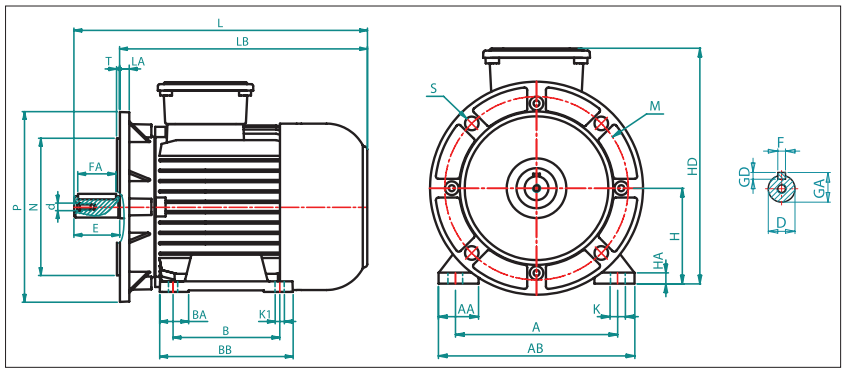


FIGURE 50: Asynchronous three-phase motors, aluminum housing, foot mounted, B35

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, CAST IRON HOUSING, FOOT MOUNTED, B35

EN 50347

Type		A	AA	AB	B	B'	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K1	L	LA	LB	M	N	P	S	T
180	M	279	68	354	241	279	319	57	48	M16	110	100	14	9	51.5	180	25	360.5	444	15	659	18.5	548	300	250	350	18.5	5
	L																											
200L		318	81	401	305	_	357	72	55	M20	110	100	16	10	59	200	27	405	492	18.5	747	22.5	639	350	300	400	18.5	5
225 S/M	2 Pole	356	83	441	286	-	365	76	55	M20	110	100	16	10	59	225	35	439	526	18.5	763	24	653	400	350	450	18.5	5
	4/6 Pole	356	83	441	-	311	365	76	60	M20	140	125	18	11	64	225	35	439	526	18.5	793	24	653	400	350	450	18.5	5
250M	2 Pole	406	80	484	349	-	410	75	60	M20	140	125	18	11	64	250	35	472	580	24	896	24	746	500	450	550	18.5	5
	4/6 Pole	406	80	484	349	-	410	75	65	M20	140	125	18	11	69	250	35	472	580	24	896	24	746	500	450	550	18.5	5
280 S/M	2 Pole	457	120	550	368	-	474	85	65	M20	140	125	18	11	69	280	40	530	630	24	970	24	830	500	450	550	18.5	5
	4/6 Pole	457	120	550	-	419	474	85	75	M20	140	125	20	12	79.5	280	40	530	630	24	970	24	830	500	450	550	18.5	5
315 S/M	2 Pole	508	125	620	406	-	550	115	65	M20	140	125	18	11	69	315	50	613	825	28	1120	24	980	600	550	660	24	6
	4/6 Pole	508	125	620	-	457	550	115	80	M20	170	140	22	14	85	315	50	613	825	28	1150	24	980	600	550	660	24	6
315 L	2 Pole	508	125	620	508	-	600	125	65	M20	140	125	18	11	69	315	50	613	825	28	1190	24	1050	600	550	660	24	6
	4/6 Pole	508	125	620	508	-	600	125	80	M20	170	140	22	14	85	315	50	613	825	28	1220	24	1050	600	550	660	24	6

All dimensions in mm

TABLE 72: Asynchronous three-phase motors, aluminum housing, foot mounted, B3

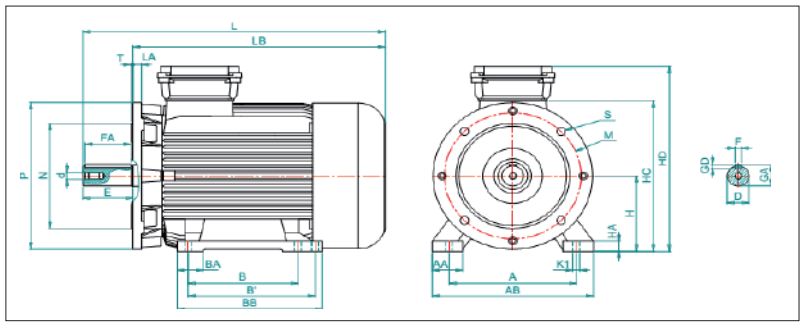


FIGURE 51: Asynchronous three-phase motors, aluminum housing, foot mounted, B3

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, ALUMINUM HOUSING, FLANGE MOUNTED, B5

EN 50347

Type	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S	T
71	14	M5	30	18	5	5	16	242	8	212	130	110	160	10	3,5
80	19	M6	40	28	6	6	21,5	274	10	234	165	130	200	12	3,5
90S	24	M8	50	36	8	7	27	303	10	253	165	130	200	12	3,5
90L	24	M8	50	36	8	7	27	328	10	278	165	130	200	12	3,5
100	28	M10	60	50	8	7	31	371	13	311	215	180	250	15	4
112	28	M10	60	50	8	7	31	385	13	323	215	180	250	15	4
132S	38	M12	80	70	10	8	41	452	18	372	265	230	300	15	4
132M	38	M12	80	70	10	8	41	490	18	410	265	230	300	15	4
160M	42	M16	110	90	12	8	45	601	18	491	300	250	350	19	5
160L	42	M16	110	90	12	8	45	644	18	534	300	250	350	19	5
180M	48	M16	110	100	14	9	51,5	708	18,5	595	300	250	350	18,5	5
180L	48	M16	110	100	14	9	51,5	708	18,5	595	300	250	350	18,5	5

All dimensions in mm

TABLE 73: Asynchronous three-phase motors, aluminum housing, flange mounted, B5

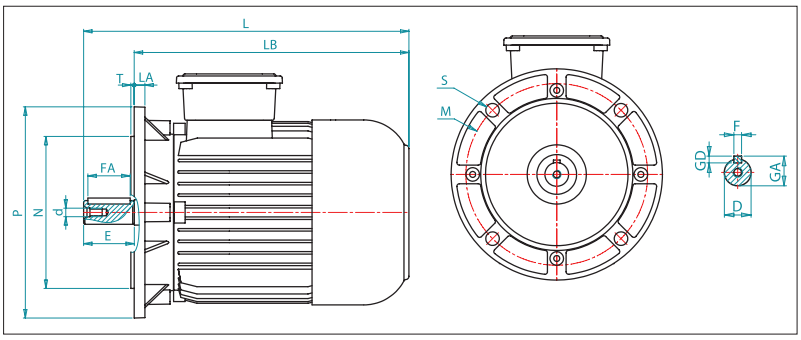


FIGURE 52: Asynchronous three-phase motors, aluminum housing, flange mounted, B5

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, CAST IRON HOUSING, FLANGE MOUNTED, B5

EN 50347

Type	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S	T
160M	42	M16	110	90	12	8	45	604	18	494	300	250	350	19	5
160L	42	M16	110	90	12	8	45	648	18	538	300	250	350	19	5

All dimensions in mm

TABLE 74: Asynchronous three-phase motors, cast iron housing, flange mounted, B5

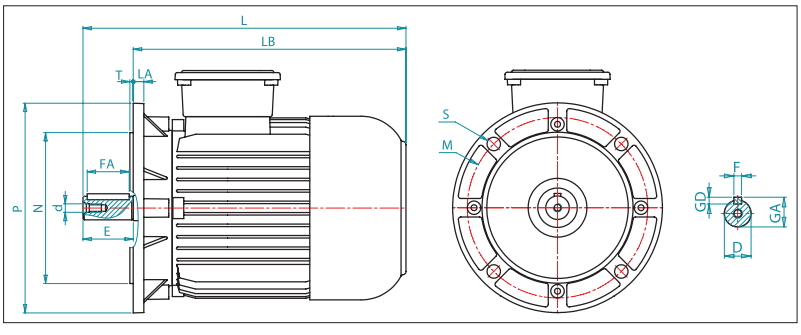


FIGURE 53: Asynchronous three-phase motors, cast iron housing, flange mounted, B5

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, ALUMINUM HOUSING, FOOT MOUNTED, B34

EN 50347

Type	A	AA	AB	AC	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L	LA	LB	M	N	P	S1	T
63	100	22	119	125	80	100	23	11	M4	23	16	4	4	12,5	63	7	113,5	161	7	7	203	26,5	180	75	60	90	M5	2,5
71	112	30	140	136	90	108	26	14	M5	30	18	5	5	16	71	10	129,5	177	11	7	242	34,5	212	85	70	105	M6	2,5
80	125	35	159	154	100	125	32	19	M6	40	28	6	6	21,5	80	11	158	206	15	10	274	34,5	234	100	80	120	M6	3
90S	140	40	181	172	100	130	34	24	M8	50	36	8	7	27	90	12	177	225	15	10	303	37,5	253	115	95	140	M8	3
90L	140	40	179	172	125	155	35	24	M8	50	36	8	7	27	90	12	177	225	15	10	328	37,5	278	115	95	140	M8	3
100	160	46	200	191	140	174	40	28	M10	60	50	8	7	31	100	13	197	245	18	12	371	43	311	130	110	157	M8	3,5
112	190	51	228	215	140	175	38	28	M10	60	50	8	7	31	112	14	222	276	18	12	385	47	323	130	110	160	M8	3,5
132S	216	58,5	260	255	140	180	37	38	M12	80	70	10	8	41	132	17,5	263	317	28	12	452	53	372	165	130	200	M10	3,5
132M	216	58,5	260	255	178	218	37	38	M12	80	70	10	8	41	132	17,5	263	316	28	12	490	53	410	165	130	200	M10	3,5

All dimensions in mm

TABLE 75: Asynchronous three-phase motors, aluminum housing, foot mounted, B34

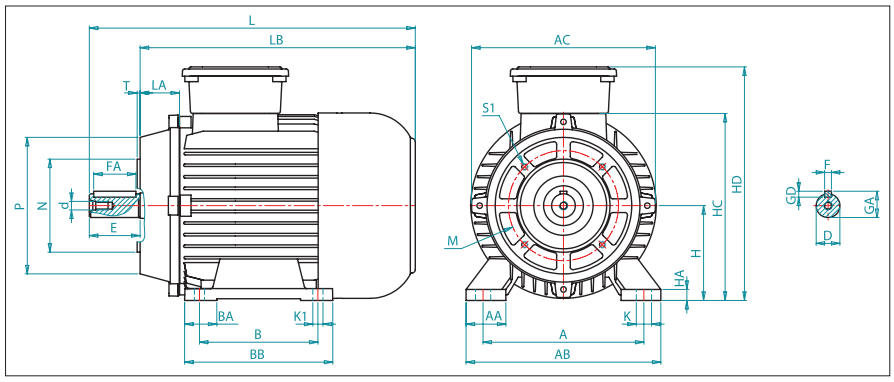


FIGURE 54: Asynchronous three-phase motors, aluminum housing, foot mounted, B34

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, ALUMINUM HOUSING, FLANGE MOUNTED, B14

EN 50347

Type	AC	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S1	T
71	125	14	M5	30	18	5	5	16	242	34,5	212	85	70	105	M6	2,5
80	136	19	M6	40	28	6	6	21,5	274	34,5	234	100	80	120	M6	3
90S	154	24	M8	50	36	8	7	27	303	37,5	253	115	95	140	M8	3
90L	172	24	M8	50	36	8	7	27	328	37,5	278	115	95	140	M8	3
100	172	28	M10	60	50	8	7	31	371	43	311	130	110	157	M8	3,5
112	191	28	M10	60	50	8	7	31	385	47	323	130	110	160	M8	3,5
132S	215	38	M12	80	70	10	8	41	452	53	372	165	130	200	M10	3,5
132M	255	38	M12	80	70	10	8	41	490	53	410	165	130	200	M10	3,5

All dimensions in mm

TABLE 76: Asynchronous three-phase motors, aluminum housing, flange mounted, B14

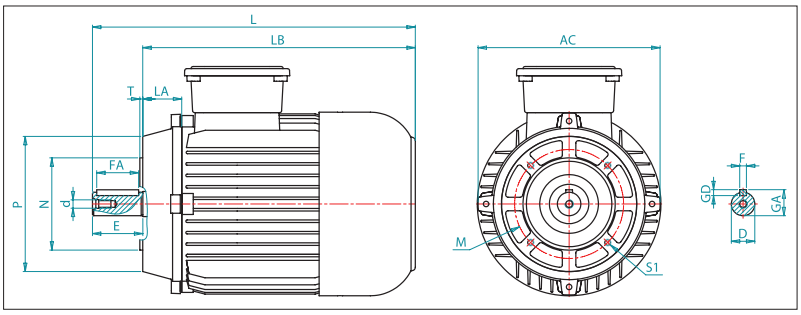


FIGURE 55: Asynchronous three-phase motors, aluminum housing, flange mounted, B14

ASYNCHRONOUS THREE-PHASE MOTORS IE1 and IE2, CAST IRON HOUSING, FLANGE MOUNTED, B14

EN 50347

Type	AC	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S1	T
160M	305	42	M16	110	90	12	8	45	604	64	494	215	180	250	M12	4
160L	305	42	M16	110	90	12	8	45	648	64	538	215	180	250	M12	4

All dimensions in mm

TABLE 77: Asynchronous three-phase motors, cast iron housing, flange mounted, B14

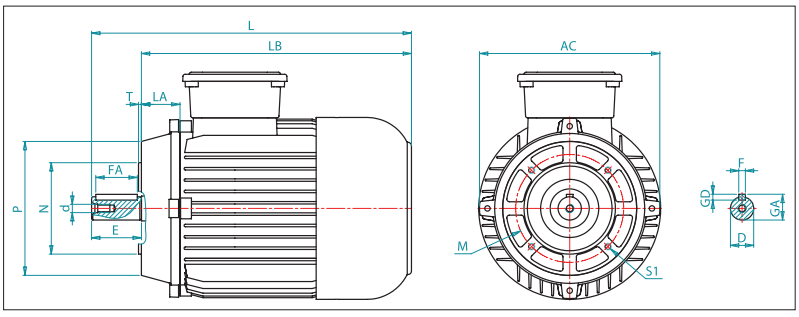


FIGURE 56: Asynchronous three-phase motors, cast iron housing, flange mounted, B14

ASYNCHRONOUS SINGLE AND THREE-PHASE CENTRIFUGAL PUMP MOTORS, ALUMINUM HOUSING, FOOT MOUNTED, B34

EN 50347

Type	A	AA	AB	AC	B	BB	BA	D	DA	DB	E	F	GF	GE	H	HA	HC	HD1	HD3	K	K1	L	LA	LB	LD	LE	LG	M	N	P	S1	T
80	125	38	159	154	100	125	32	19,7	16	M10	116	5	16,5	3	80	11	147	198	198	15	10	353	34,5	237	18	20	78	100	80	120	M8	3
80a											175											412				66	91				(M6)	
90S	140	43	181	172	100	130	34	19,7	16	M10	115	5	16,5	3	90	12	169	226	218	15	10	369	37,5	254	18	20	77	130	95	140	M8	3
90sa											174											428				66	90	-115				
90L	140	43	179	172	125	155	35	19,7	16	M10	115	5	16,5	3	90	12	169	226	218	15	10	392	37,5	277	18	20	77	130	95	140	M8	3
90La											174											451				66	90	-115				

TABLE 78: Asynchronous single and three-phase centrifugal pump motors, aluminum housing, foot mounted, B34

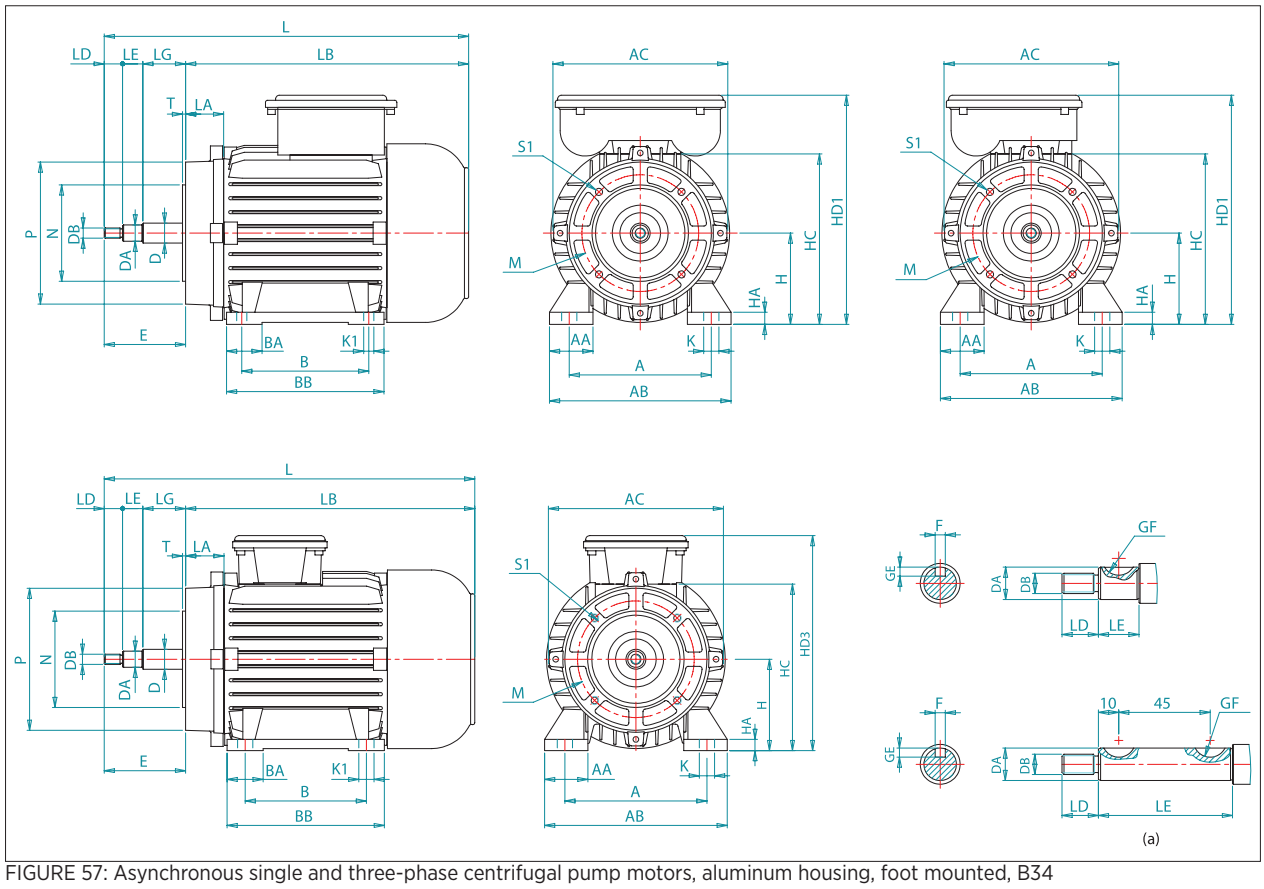


FIGURE 57: Asynchronous single and three-phase centrifugal pump motors, aluminum housing, foot mounted, B34

VOLT MOTOR MECHANICAL DIMENSIONS: SINGLE-PHASE

Volt electric motors

ASYNCHRONOUS SINGLE-PHASE MOTORS, FOOT MOUNTED, B3

EN 50347

Type	A	AA	AB	AC	AD	B	BB	BA	C	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L
63	100	22	119	125	172	80	100	23	40	11	M4	23	16	4	4	12,5	63	7	113,5	167	7	7	203
71	112	33	140	136	151	90	108	26	45	14	M5	30	18	5	5	16	71	10	129,5	179,5	11	7	242
80	125	38	159	154	151	100	125	32	50	19	M6	40	28	6	6	21,5	80	11	147	197	15	10	276
90S	140	43	181	172	168	100	130	34	56	19	M6	40	28	6	6	21,5	90	12	168,5	225	15	10	293
90Sa	140	43	181	172	168	100	130	34	56	24	M8	50	36	8	7	27	90	12	168,5	225	15	10	303
90L	140	43	179	172	168 178*	125	155	35	56	24	M8	50	36	8	7	27	90	12	168,5	232	15	10	328
100	160	47	200	191	178	140	174	40	63	28	M10	60	50	8	7	31	100	13	188	251,5	18	12	372

* Only in motor with 50 µf capacitor

TABLE 79: Asynchronous single-phase motors, foot mounted, B3

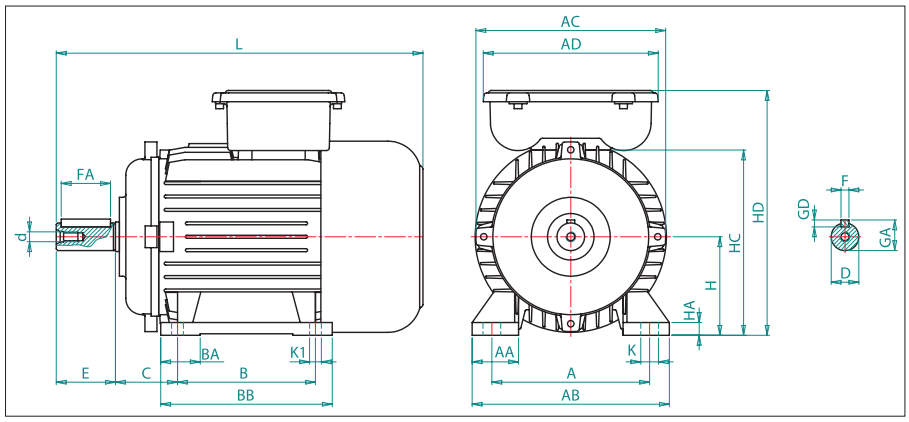


FIGURE 58: Asynchronous single-phase motors, foot mounted, B3

ASYNCHRONOUS SINGLE-PHASE MOTORS, FOOT MOUNTED, B35

EN 50347

Type	A	AA	AB	AD	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HD	K	K1	L	LA	LB	M	N	P	S	T
63	100	22	119	172	80	100	23	11	M4	23	16	4	4	12,5	63	7	167	7	7	203	8,5	180	115	95	140	10	3
71	112	33	140	151	90	108	26	14	M5	30	18	5	5	16	71	10	179,5	11	7	242	8	212	130	110	160	10	3,5
80	125	38	159	151	100	125	32	19	M6	40	28	6	6	21,5	80	11	197	15	10	276	10	236	165	130	200	12	3,5
90S	140	43	181	168	100	130	34	19	M6	40	28	6	6	21,5	90	12	225	15	10	293	10	253	165	130	200	12	3,5
90Sa	140	43	181	168	100	130	34	24	M8	50	36	8	7	27	90	12	225	15	10	303	10	253	165	130	200	12	3,5
90L	140	43	179	168 178*	125	155	35	24	M8	50	36	8	7	27	90	12	232	15	10	328	10	278	165	130	200	12	3,5
100	160	47	200	178	140	174	40	28	M10	60	50	8	7	31	100	13	252	18	12	372	13	312	215	180	250	15	4

* Only in motor with 50 µf capacitor

TABLE 80: Asynchronous single-phase motors, foot mounted, B35

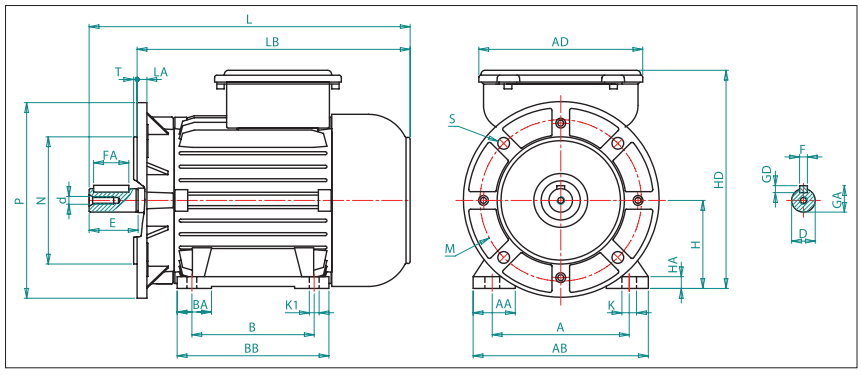


FIGURE 59: Asynchronous single-phase motors, foot mounted, B35

ASYNCHRONOUS SINGLE-PHASE MOTORS, FLANGE MOUNTED, B5

EN 50347

Type	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S	T
71	14	M5	30	18	5	5	16	242	8	212	130	110	160	10	3,5
80	19	M6	40	28	6	6	21,5	276	10	236	165	130	200	12	3,5
90S	19	M6	40	28	6	6	21,5	293	10	253	165	130	200	12	3,5
90Sa	24	M8	50	36	8	7	27	303	10	253	165	130	200	12	3,5
90L	24	M8	50	36	8	7	27	328	10	278	165	130	200	12	3,5
100	28	M10	60	50	8	7	31	372	13	312	215	180	250	15	4

All dimensions in mm.

TABLE 81: Asynchronous single-phase motors, flange mounted, B5

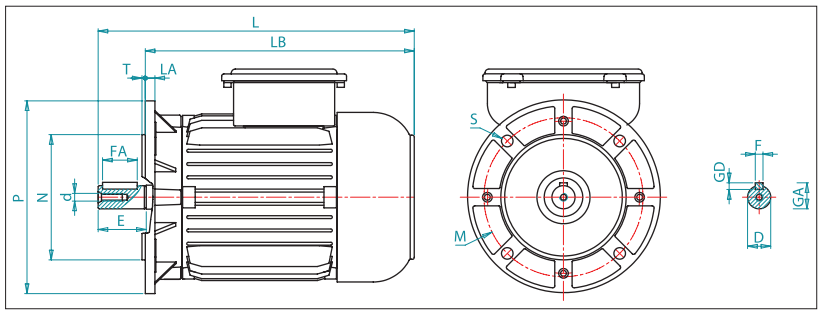


FIGURE 60: Asynchronous single-phase motors, flange mounted, B5

ASYNCHRONOUS SINGLE-PHASE MOTORS, FOOT MOUNTED, B34

EN 50347

Type	A	AA	AB	AC	AD	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L	LA	LB	M	N	P	S1	T
63	100	22	119	125	172	80	100	23	11	M4	23	16	4	4	12,5	63	7	113,5	167	7	7	203	26,5	180	75	60	90	M5	2,5
71	112	33	140	136	151	90	108	26	14	M5	30	18	5	5	16	71	10	129,5	179,5	11	7	242	34,5	212	85	70	105	M6	2,5
80	125	38	159	154	151	100	125	32	19	M6	40	28	6	6	21,5	80	11	147	198	15	10	276	34,5	236	100	80	120	M6	3
90S	140	43	181	172	168	100	130	34	19	M6	40	28	6	6	21,5	90	12	168,5	224,5	15	10	293	37,5	253	115	95	140	M8	3
90Sa	140	43	181	172	168	100	130	34	24	M8	50	36	8	7	27	90	12	168,5	224,5	15	10	303	37,5	253	115	95	140	M8	3
90L	140	43	179	172	168	125	155	35	24	M8	50	36	8	7	27	90	12	168,5	232	15	10	328	37,5	278	115	95	140	M8	3
100	160	47	200	191	178	140	174	40	28	M10	60	50	8	7	31	100	13	188	252	18	12	372	43	312	130	110	157	M8	3,5

* Only in motor with 50 µf capacitor

All dimensions in mm.

TABLE 82: Asynchronous single-phase motors, foot mounted, B34

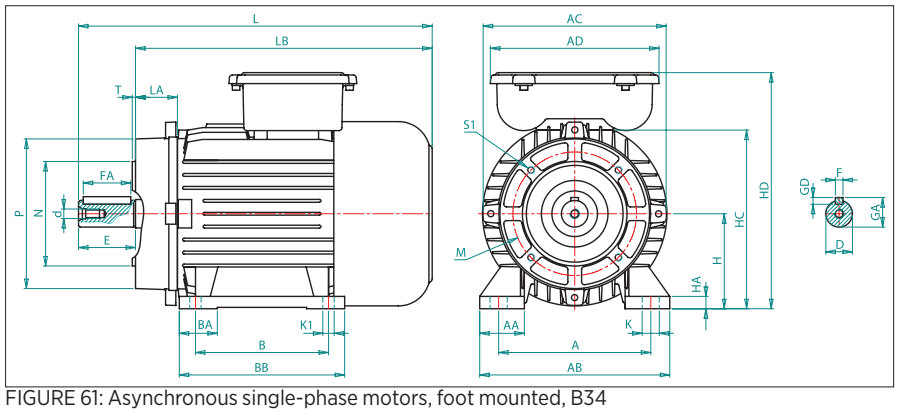


FIGURE 61: Asynchronous single-phase motors, foot mounted, B34

ASYNCHRONOUS SINGLE-PHASE MOTORS, FLANGE MOUNTED, B14

EN 50347

Type	AC	AD	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S1	T
71	136	151	14	M5	30	18	5	5	16	242	34,5	212	85	70	105	M6	2,5
80	154	151	19	M6	40	28	6	6	21,5	276	34,5	236	100	80	120	M6	3
90S	172	168	19	M6	40	28	6	6	21,5	293	37,5	253	115	95	140	M8	3
90Sa	172	168	24	M8	50	36	8	7	27	303	37,5	253	115	95	140	M8	3
90L	172	168 178*	24	M8	50	36	8	7	27	328	37,5	278	115	95	140	M8	3
100	191	178	28	M10	60	50	8	7	31	372	43	312	130	110	157	M8	3,5

* Only in motor with 50 μf capacitor

TABLE 83: Asynchronous single-phase motors, flange mounted, B14

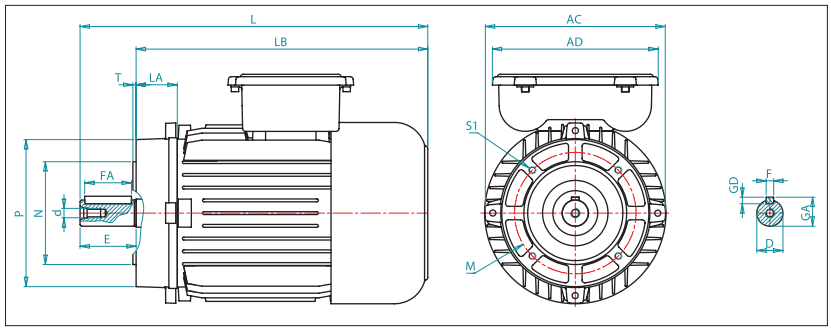


FIGURE 62: Asynchronous single-phase motors, flange mounted, B14

ASYNCHRONOUS SINGLE-PHASE MOTORS WITH RUN CAPACITOR, FOOT MOUNTED, B3

EN 50347

Type	A	AA	AB	AC	B	BB	BA	C	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L
63	100	22	119	125	80	100	23	40	11	M4	23	16	4	4	12,5	63	7	110,5	167	7	7	203
71	112	33	140	136	90	108	26	45	14	M5	30	18	5	5	16	71	10	129,5	176	11	7	242
80	125	38	159	154	100	125	32	50	19	M6	40	28	6	6	21,5	80	11	147	193,5	15	10	276
90S	140	43	181	172	100	130	34	56	19	M6	40	28	6	6	21,5	90	12	168,5	225	15	10	293
90Sa	140	43	181	172	100	130	34	56	24	M8	50	36	8	7	27	90	12	168,5	226	15	10	303
90L	140	43	179	172	125	155	35	56	24	M8	50	36	8	7	27	90	12	168,5	224,5	15	10	328
100	160	47	200	191	140	174	40	63	28	M10	60	50	8	7	31	100	13	188	244	18	12	372

TABLE 84: Asynchronous single-phase motors with run capacitor, foot mounted, B3

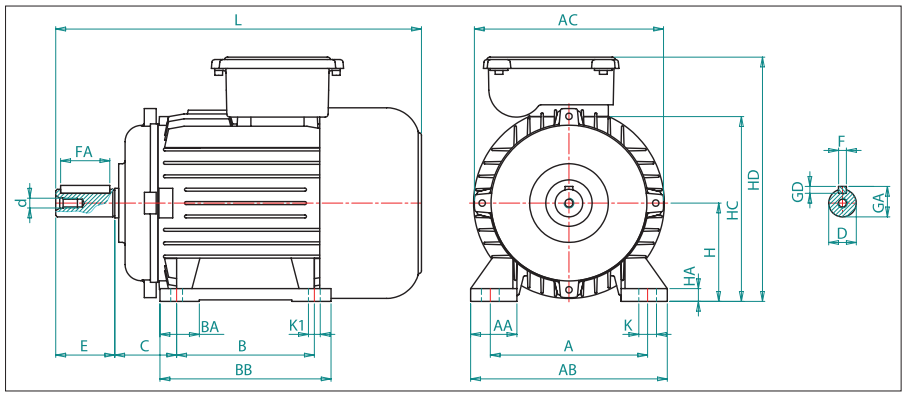


FIGURE 63: Asynchronous single-phase motors with run capacitor, foot mounted, B3

ASYNCHRONOUS SINGLE-PHASE MOTORS WITH RUN CAPACITOR, FOOT MOUNTED, B35

EN 50347

Type	A	AA	AB	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HD	K	K1	L	LA	LB	M	N	P	S	T
63	100	22	119	80	100	23	11	M4	23	16	4	4	12,5	63	7	167	7	7	203	8,5	180	115	95	140	10	3
71	112	33	140	90	108	26	14	M5	30	18	5	5	16	71	10	181	11	7	242	8	212	130	110	160	10	3,5
80	125	38	159	100	125	32	19	M6	40	28	6	6	21,5	80	11	198	15	10	276	10	236	165	130	200	12	3,5
90S	140	43	181	100	130	34	19	M6	40	28	6	6	21,5	90	12	226	15	10	293	10	253	165	130	200	12	3,5
90Sa	140	43	181	100	130	34	24	M8	50	36	8	7	27	90	12	226	15	10	303	10	253	165	130	200	12	3,5
90L	140	43	179	125	155	35	24	M8	50	36	8	7	27	90	12	226	15	10	328	10	279	165	130	200	12	3,5
100	160	47	200	140	174	40	28	M10	60	50	8	7	31	100	13	246	18	12	372	13	312	215	180	250	15	4

TABLE 85: Asynchronous single-phase motors with run capacitor, foot mounted, B35

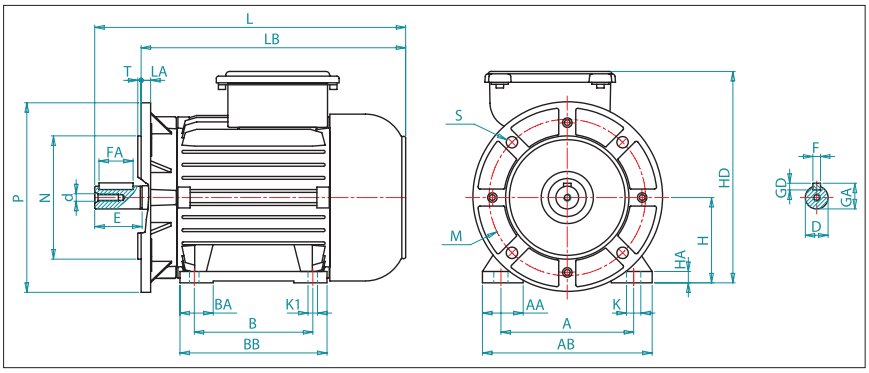


FIGURE 64: Asynchronous single-phase motors with run capacitor, foot mounted, B35

ASYNCHRONOUS SINGLE-PHASE MOTORS WITH RUN CAPACITOR, FLANGE MOUNTED, B5

EN 50347

Type	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S	T
71	14	M5	30	18	5	5	16	242	8	212	130	110	160	10	3,5
80	19	M6	40	28	6	6	21,5	276	10	236	165	130	200	12	3,5
90S	19	M6	40	28	6	6	21,5	293	10	253	165	130	200	12	3,5
90Sa	24	M8	50	36	8	7	27	303	10	253	165	130	200	12	3,5
90L	24	M8	50	36	8	7	27	328	10	278	165	130	200	12	3,5
100	28	M10	60	50	8	7	31	372	13	312	215	180	250	15	4

TABLE 86: Asynchronous single-phase motors with run capacitor, flange mounted, B5

All dimensions in mm

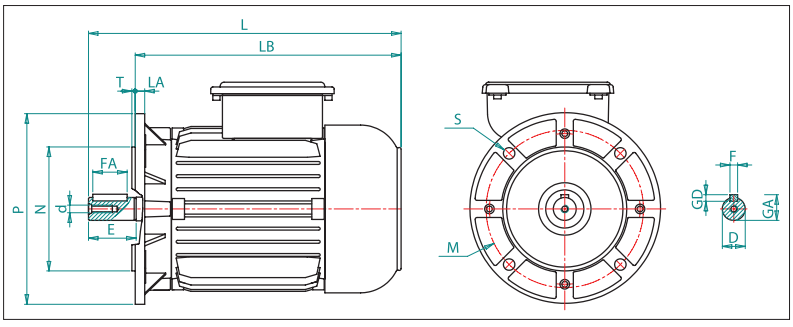


FIGURE 65: Asynchronous single-phase motors with run capacitor, flange mounted, B5

ASYNCHRONOUS SINGLE-PHASE MOTORS WITH RUN CAPACITOR, FOOT MOUNTED, B34

EN 50347

Type	A	AA	AB	AC	B	BB	BA	D	d	E	FA	F	GD	GA	H	HA	HC	HD	K	K1	L	LA	LB	M	N	P	S1	T
63	100	22	119	125	80	100	23	11	M4	23	16	4	4	12,5	63	7	113,5	167	7	7	203	26,5	180	75	60	90	M5	2,5
71	112	33	140	136	90	108	26	14	M5	30	18	5	5	16	71	10	129,5	176	11	7	242	34,5	212	85	70	105	M6	2,5
80	125	38	159	154	100	125	32	19	M6	40	28	6	6	21,5	80	11	147	193,5	15	10	276	34,5	236	100	80	120	M6	3
90S	140	43	181	172	100	130	34	19	M6	40	28	6	6	21,5	90	12	168,5	224,5	15	10	293	37,5	253	115	95	140	M8	3
90Sa	140	43	181	172	100	130	34	24	M8	50	36	8	7	27	90	12	168,5	224,5	15	10	303	37,5	253	115	95	140	M8	3
90L	140	43	179	172	125	155	35	24	M8	50	36	8	7	27	90	12	168,5	224,5	15	10	328	37,5	278	115	95	140	M8	3
100	160	47	200	191	140	174	40	28	M10	60	50	8	7	31	100	13	188	244	18	12	372	43	312	130	110	157	M8	3,5

TABLE 87: Asynchronous single-phase motors with run capacitor, foot mounted, B34

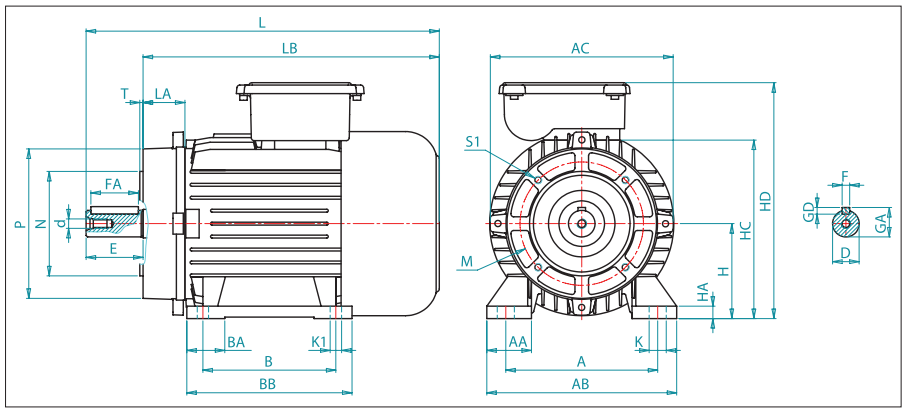


FIGURE 66: Asynchronous single-phase motors with run capacitor, foot mounted, B34

ASYNCHRONOUS SINGLE-PHASE MOTORS WITH RUN CAPACITOR, FLANGE MOUNTED, B14

EN 50347

Type	AC	D	d	E	FA	F	GD	GA	L	LA	LB	M	N	P	S1	T
71	136	14	M5	30	18	5	5	16	242	34,5	212	85	70	105	M6	2,5
80	154	19	M6	40	28	6	6	21,5	276	34,5	236	100	80	120	M6	3
90S	172	19	M6	40	28	6	6	21,5	293	37,5	253	115	95	140	M8	3
90Sa	172	24	M8	50	36	8	7	27	303	37,5	253	115	95	140	M8	3
90L	172	24	M8	50	36	8	7	27	328	37,5	278	115	95	140	M8	3
100	191	28	M10	60	50	8	7	31	372	43	312	130	110	157	M8	3,5

TABLE 88: Asynchronous single-phase motors with run capacitor, flange mounted, B14

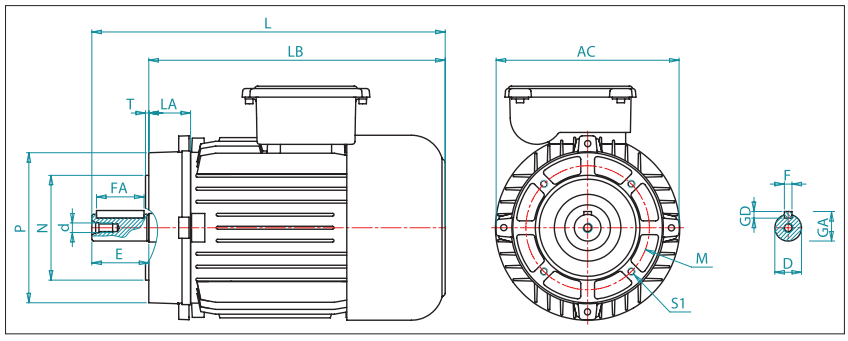
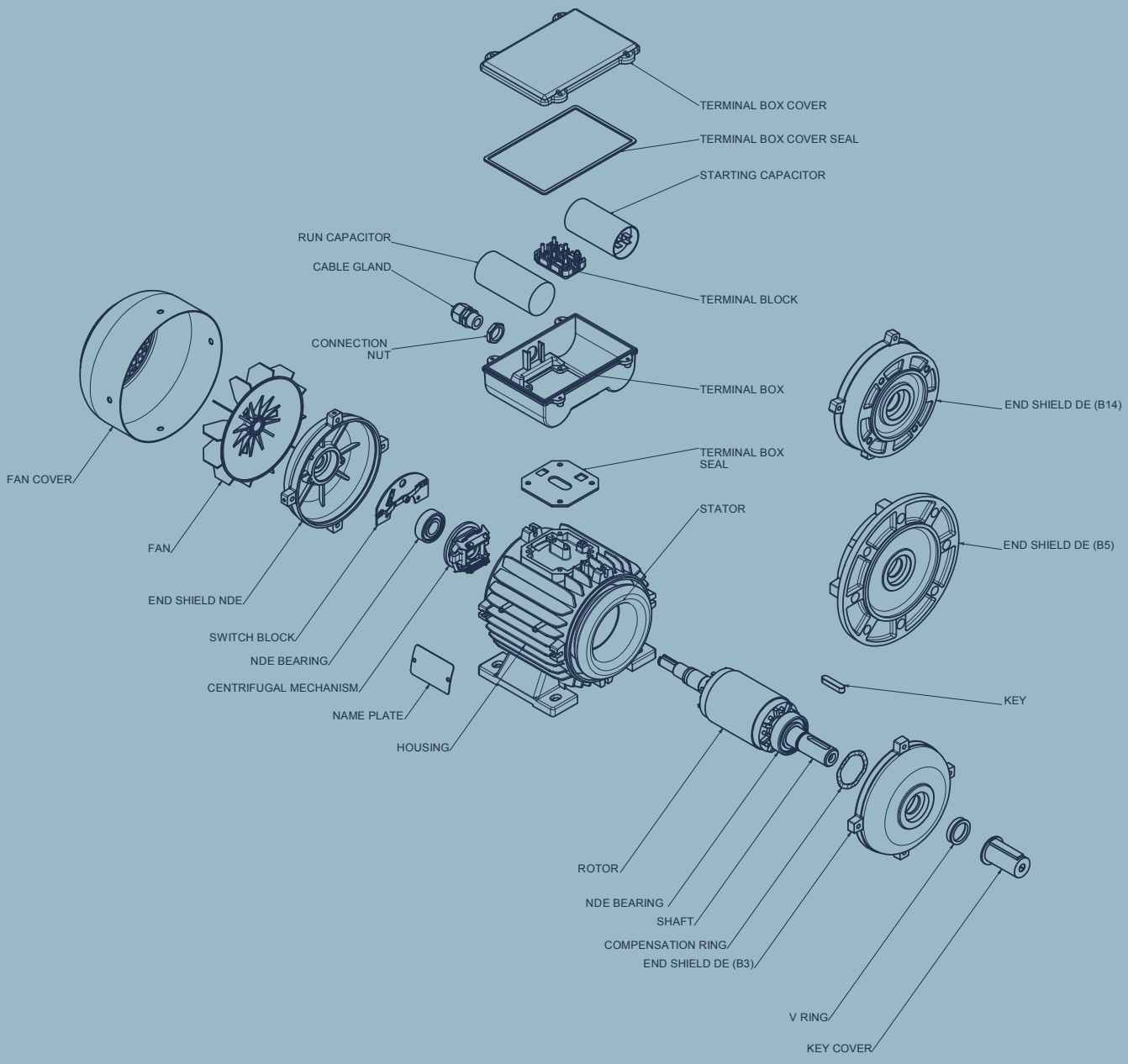
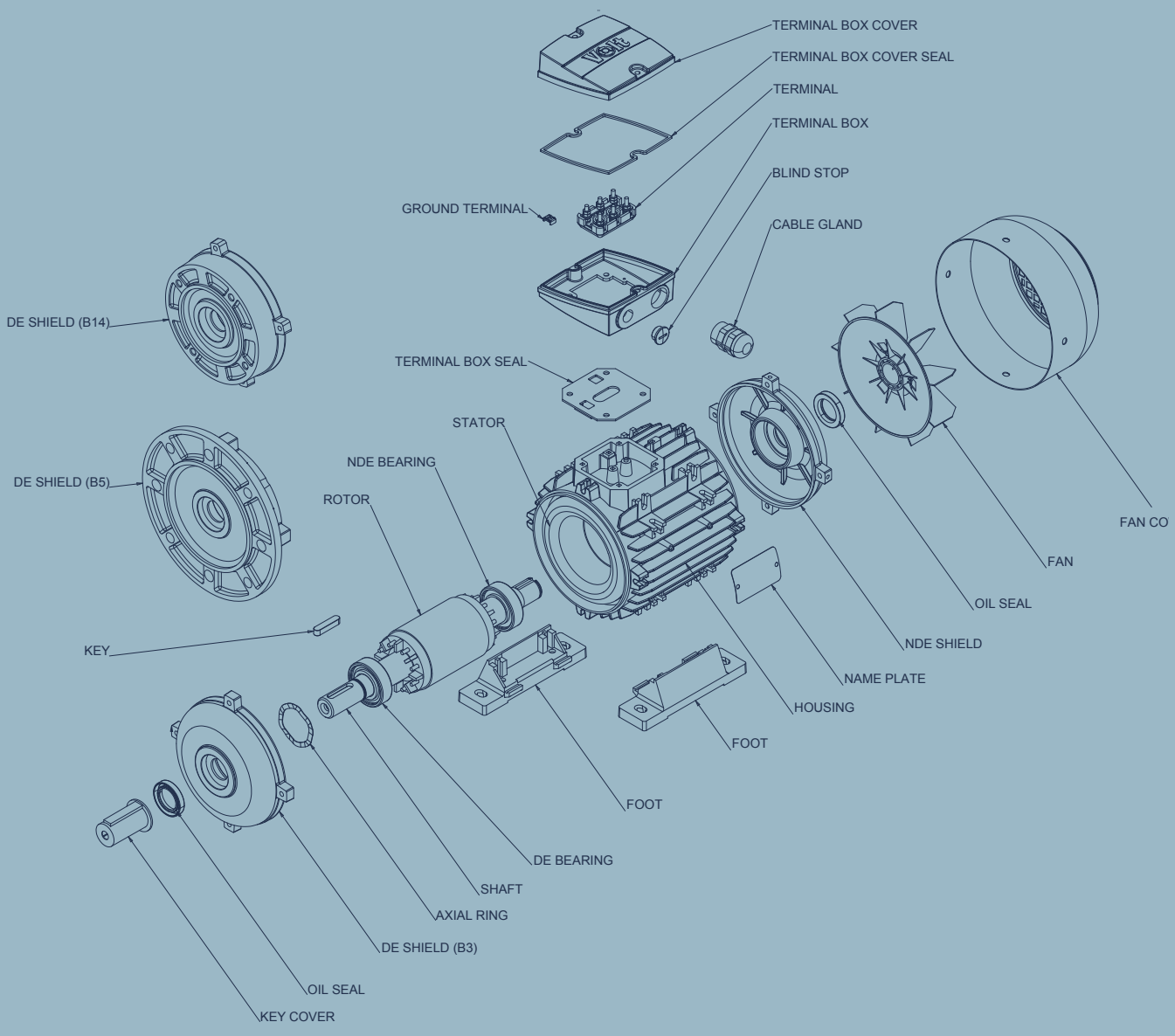


FIGURE 67: Asynchronous single-phase motors with run capacitor, flange mounted, B14

SINGLE-PHASE MOTOR PARTS



THREE-PHASE MOTOR PARTS



NOTES

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