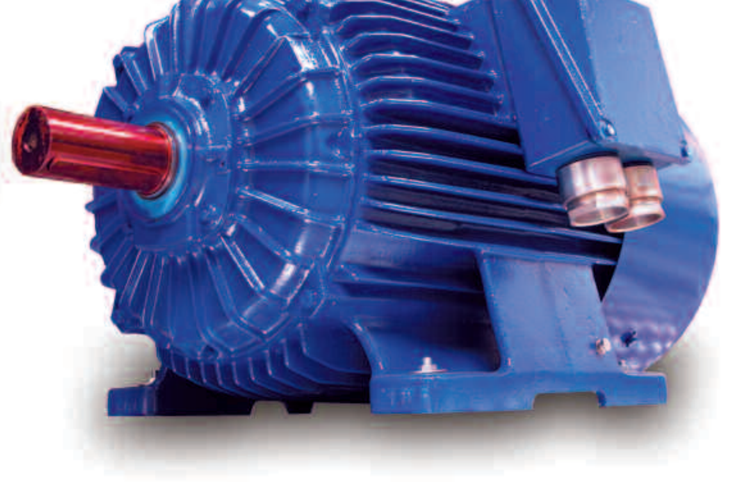
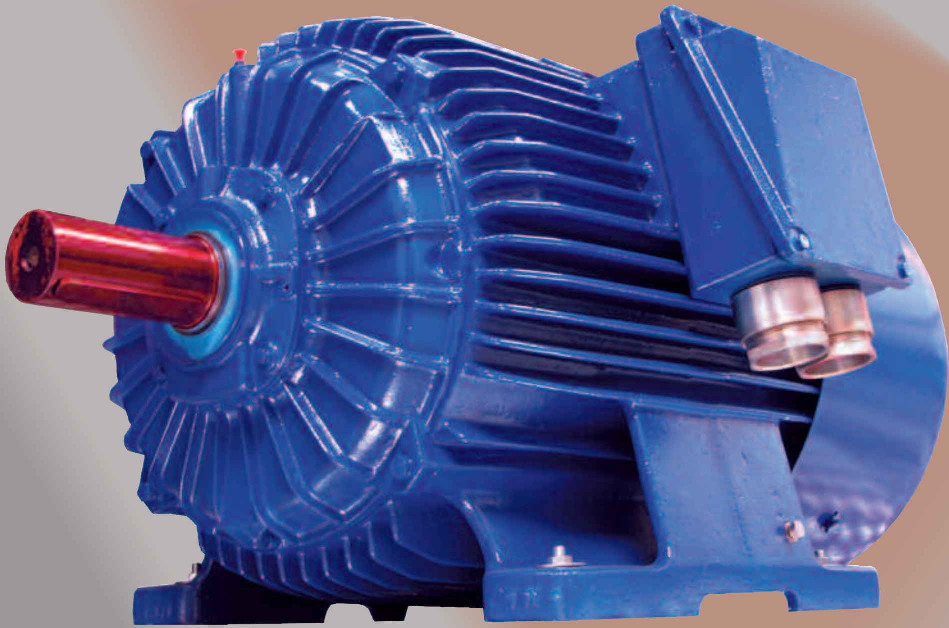
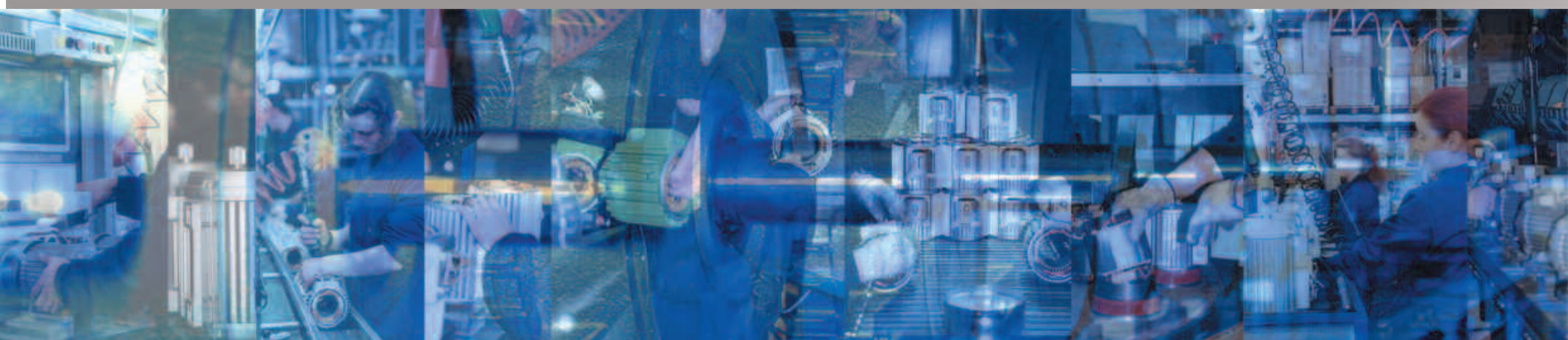
motori elettrici

SISTEMA DI GESTIONE PER LA QUALITÀ CERTIFICATO
UNI EN ISO 9001:2008
SINCERT DNV



Technical catalogue Fr. 355 - 400 - 450





www.vemat.eu

DESCRIPTION OF THE CATALOGUE VERSION

Duty:	S1
Rated voltage:	380V, 400V
Frequency:	50 Hz
Ambient Temperature:	from -15° C to +40° C
Mounting height:	up to 1000 m above sea level
Number of free shaft ends:	1
Insulation class:	F
Bearings:	according to page_

Other specifications dependent on the frame size:

FRAME SIZE	DEGREE OF PROTECTION	POSITION OF THE TERMINAL BOX	NUMBER OF TERMINALS	NUMBER OF CABLE OUTLETS	OPTIONAL ROTATION OF THE TERMINAL BOX	GLANDS	TEMPERATURE SENSORS IN WINDING	FRAME SIZE	FRAME SIZE
VTBSg 355	IP 55	right	6	2	4 x 90°	M 76	PTC Mark A	yes	on request
VTBSEE 355	IP 55	top	6	2	4 x 90°	M 76	PTC Mark A	yes	on request
VTBSh 355	IP 55	top	6	2	4 x 90°	M 76	Pt 100	yes	on request
VTBSh 400	IP 55	top	3 bars	3	180°	M 3 x 55	Pt 100	yes	on request
VTBSh 450	IP 55	top	3 bars	3	180°	M 3 x 55	Pt 100	yes	on request

We are able to supply almost any motor made according to customer's specifications

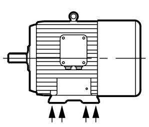
DESCRIPTION OF THE CUSTOMIZED VERSION

Different supply voltage:	
Frequency:	60 Hz
Degree of protection:	IP 56
Insulation class:	H
Number of free shaft ends:	2
Tropicalization:	
Different bearings:	
Different duty type:	
Adaotation for supply from a frequency inverter:	
Different versions per customer's specification:	

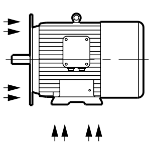
MOUNTING ARRANGEMENTS

Constructive shapes and mounting arrangements.
(IEC 34-7)

Horizontal shaft

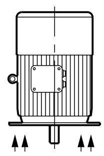


IM 1001
B3 (as per DIN 42950)



IM 2001
B3/B5 (as per DIN 42950)

Vertical shaft



IM 3011
V1 (as per DIN 42950)

COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001/2000=

VEMAT electric motors

RATING - TOLERANCES

Permissible deviations of real values from catalogue values according to IEC 60034-1:

Power factor cos φ	$\Delta\cos\varphi = -1/6\ (1-\cos\varphi_N)$
Efficiency η	$\Delta\eta = -15\%(100-\eta_N)$
Speed n	$\Delta n = \pm20\%(n_s-n_N)$ for $P_N > 1kW$ $\Delta n = \pm30\%(n_s-n_N)$ for $P_N \leq 1kW$
Locked rotor current I_L/I_N	$\Delta(I_L/I_N) = +20\%\ (I_L/I_N)$
Locked rotor torque T_L/T_N	min $(T_L/T_N) = -15\%\ (T_L/T_N)$ max $(T_L/T_N) = +25\%\ (T_L/T_N)$
Breakdown torque T_b/T_N	$\Delta(T_b/T_N) = -10\%\ (T_b/T_N)$
Moment of inertia J [kgm²]	$\Delta J = \pm10\%$ J
Sound pressure level L_{pA} [dB]	$\Delta L_{pA} = \pm3$ dB /A/

The rated current of a motor is the value consumed by a given motor at the rated load, rated supply voltage, rated efficiency and power factor.

Real current consumed by the motor at the rated supply voltage and rated load results from the real efficiency and real power factor (permissible deviations).

No-load current in small motors and low speeds, e.g. frame size 90, 2p=6 or 2p=8, may be approximately slightly lower or equal to the rated current. In case of supply voltage higher than the rated one it may even exceed the rated current.

STANDARDS AND EQUIVALENTS

The electric motors are manufactured according to international standards:

Rating and performance	**IEC 60034-1**
Methods for determining losses and efficiency	**IEC 60034-2**
Classification of degrees of protection	**IEC 60034-5**
Methods of cooling	**IEC 60034-6**
Symbols of construction and mounting arrangements	**IEC 60034-7**
Terminal markings and direction of rotation	**IEC 60034-8**
Noise limits	**IEC 60034-9**
Dimensions and output for electric machines	**IEC 60072-1**
Vibration limits	**IEC 60034-14**

The products comply with the specifications regarding the electromagnetic compatibility specified in:
EN 50081-1, EN 50081-2, EN 50082-1, EN 50082-2.

Country	Standard	
Germany	**DIN VDE 0530;** **DIN EN 60034/VDE;** **DIN IEC 34;** **DIN 42673;**	**DIN 42677**
Great Britain	**BS 5000;**	**BS 4999**
France	**NFC 51 111 51 120;** **NFC 51 200;** **NFC 51 117;**	 **NFC 51 115** **NFC 51 119**
Italy	**CEI 2-3 1988;** **CEI 2-6;** **CEI 2-8;** **CEI/UNEL 13113-71;** **CEI/UNEL 13117-71;** **CEI/UNEL 13118-71;**	 **CEI 2-7** **CEI 2-15**

All the motors are manufactured in Quality Assurance System consistent with ISO 9001. ISO 9001

The motors covered by the present catalogue comply with the regulations and standards effective in other countries, consistent with IEC standards. IEC

All the motors described in the present catalogue are provided with CE mark. It means that our products are consistent with the European Union directives regarding the safety measures. CE

Degree of protection (IP).

The selection of the appropriate degree of protection is a necessary requisite for the optimum operation and working life of the motor and depends on the motor's surrounding conditions.

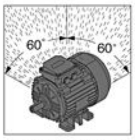
The types of protection as per IEC 34-5 are specified by the characteristic symbol "IP" (international protection) and a combination of 3 digits:

The first digit indicates protection against accidental contact and infiltration by foreign objects; the second digit specifies the protection against liquid; the third digit defines the mechanical protection.

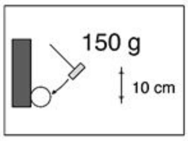
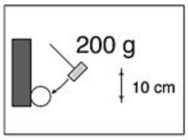
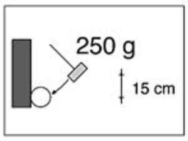
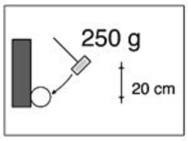
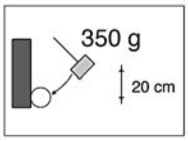
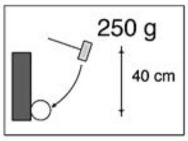
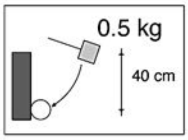
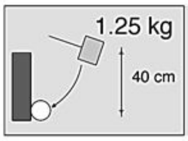
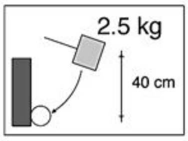
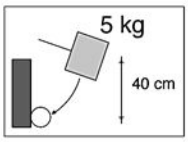
PROTECTION AGAINST CONTACT WITH FOREIGN SOLID OBJECTS

1ª characteristic digit		DESCRIPTION
0		Unprotected
1		Protected against solid bodies of greater than 50 mm size
2		Protected against solid bodies of greater than 12 mm size
3		Protected against solid bodies of greater than 2,5 mm size
4		Protected against solid bodies of greater than 1 mm size
5		Protected against Dust deposit
6		Totally protected against dust deposit

PROTECTION AGAINST INFILTRATION BY LIQUIDS

2ª characteristic digit		DESCRIPTION
0		Unprotected
1 of		Protected against vertically falling drops of water
2		Protected against vertically falling drops of water up to 15°
3		Protected against the rain up to 60°
4		Protected against the rain from every direction
5		Protected against sprays from every direction
6		Protected against temporary flooding
7		Protected against submersion between 0.15 and 1 meter
8		Protected against submersion at established pressure and time

MECHANICAL PROTECTION

3ª characteristic digit		DESCRIPTION
0		No protection
1		Striking energy: 0,15 J
2		Striking energy: 0,20 J
3		Striking energy: 0,37 J
4		Striking energy: 0,50 J
5		Striking energy: 0,70 J
6		Striking energy: 1 J
7		Striking energy: 2 J
8		Striking energy: 5 J
9		Striking energy: 10 J
10		Striking energy: 20 J

All standard-built **Vemat** motors are provided with IP 55 protection in compliance with the standards in force (IEC 34-5) and the features indicated in the table below.

The seal of the terminal box is ensured by the appropriate liner.

Motors with higher degree of protection can be provided on request.

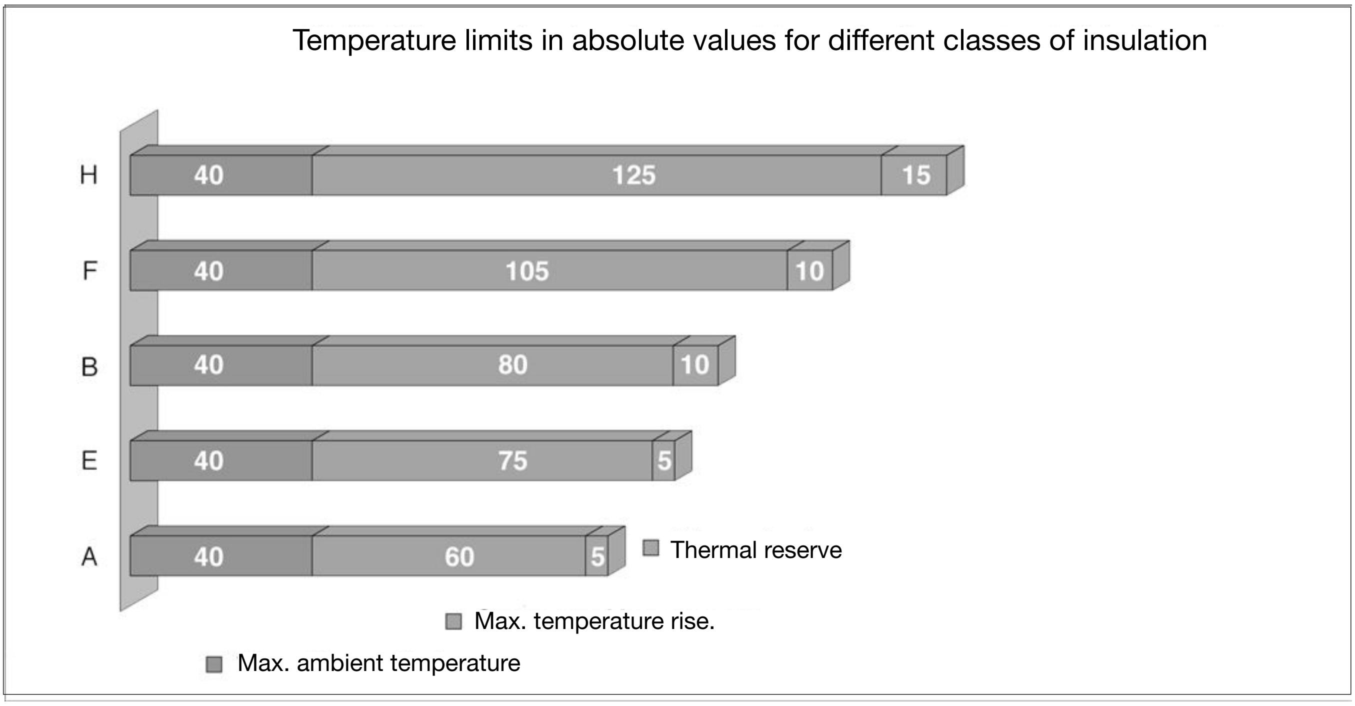
INSULATION

Insulation class

The chemical and physical characteristics of the insulation material are fundamental to the optimum operation and duration of any electric motor, and for this reason a temperature limit corresponding to the insulation material used must be determined; for this reason, each insulation material used must ensure the reliable operation of the motor within its own absolute temperature limits.
Insulation material quality is defined by IEC 34-1 Standards in distinct insulation classes for each of which an absolute temperature limit has been established..

Class A 105° **Class F 155°** **Class B 130°**
Class E 120° **Class H 180°**

As specified by international standard, temperature is measured in °C, (degrees Celsius) while the difference in temperature is measured in K (1°C = 1K). For Class F, for example, the temperature increase cannot exceed 105K provided that the room temperature does not exceed +40°C. This value is valid when applied to the resistance measurement method. This means that the resistance of the winding at room temperature is measured first and then a thermal test is performed on the motor at rated power, after which the resistance of the winding is measured again. The temperature increase is calculated with the following formula:
$\Delta T=[(R2-R1)/R1]\ (235+T1) + (T1-T2)$
where:
R^1: low temperature resistance measured at room temperature T';
R^2: high temperature resistance measured at room temperature T'';
235: constant for copper windings.
This method requires the determination of the average temperature increase.
For this purpose 10K, for example, provides an additional thermal margin between the winding's average temperature and the temperature at its hottest point.
All **Vemat** motors are produced using copper wire for the winding in class H and Class F insulation material.
Each winding is provided with a careful hot polymerising resin treatment that grants remarkable resistance against both humidity and sudden changes in room temperature, while the paint treatment employs special protective paint (tropical insulation) that gives the motor elevated protection against the most extreme weather conditions.

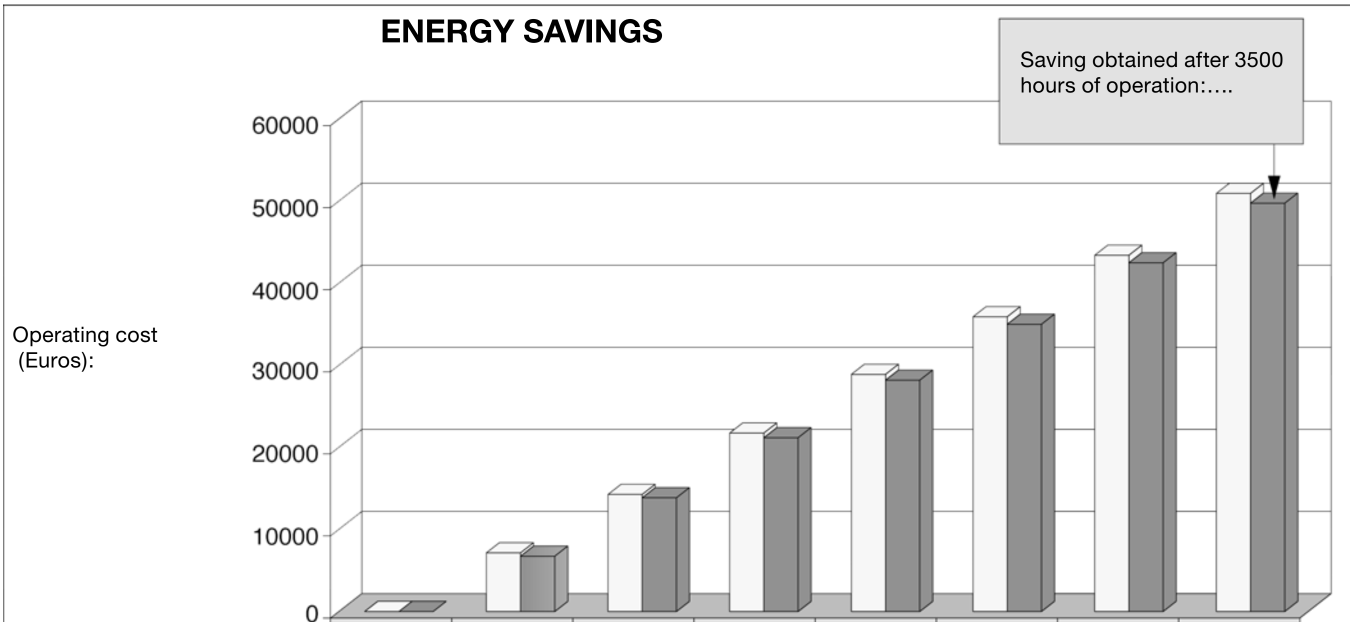


All **Vemat** motors come standard-equipped with Class F insulation and Class B operating over-temperature, and therefore the temperature of the stator windings is considerably reduced and the motor's average working life is extended as a result.

All motors come standard-equipped with Class F insulation; Class H available on request.

High-efficiency is a standard feature in all **Vemat** motors.

Reduced power consumption at the levels of both single users and industry is closely linked to careful selection of the electric motors and the use of new technologies in their construction. This is why we search constantly for new solutions that provide even better results. The chart below illustrates the significant savings obtained by using a high-efficiency **Vemat** motor compared to the average value provided using other motors.



Hours of operation	0	500	1000	1500	2000	2500	3000	3500
Motor average	0	7247	14494	21741	28988	36235	43482	50729
Vemat	0	7080	14161	21241	28321	35402	42482	49563

Values expressed in €

Note: calculations made using a hypothetical electrical energy cost of 0.0847 Euro "approx. 164 £"/kWh.

CALCULATION PARAMETERS	Vemat Motor	Motor average
Motor power delivered	160 KW	160 KW
Efficiency	95,70%	93,50%

As may be seen, the longer the operating time, the greater the savings in power, to the degree that savings equal to the cost of a new motor can be accumulated in the period of just a few years.

As illustrated in Fig. 1 below, the remarkable constancy of motor efficiency from 60% to 100% of the load permits significant energy savings to be achieved in nearly every application. Taking a 55 kW, 4-pole VTB 250M4 motor used at 60% of the rated load, for example, the Figure shows that the efficiency is 3.5% higher than the value supplied by a standard motor.
Hypothesising 4000 hours of operation/ year, the following is obtained:
kW 55x60% x 0.035 x 4000 hours/year = 4620 kWh saved annually.
This performance is all the more remarkable when considering that the "low load" operating time is the longest and therefore most significant in terms of power consumption.

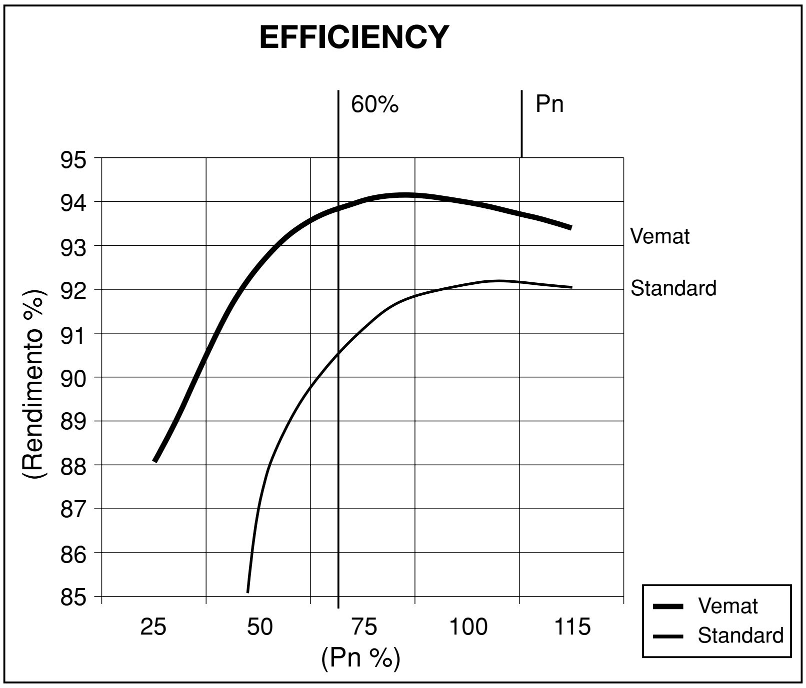


Fig. 1 Characteristic efficiency curve for the power delivered by a 55 kW 4 pole motor.

Efficiency value % in regard to load				
1/4 Pn	**1/2 Pn**	**3/4 Pn**	**Pn(*)**	**5/4 Pn**
30-32	41	50	**55**	56
31-33	46	55	**57**	57
31-34	49	59	**60**	61
32-35	51	58	**62**	61
35-42	60	65	**65**	64
46-50	63	68	**68**	67
48-58	65	70	**70**	70
54-59	67	73	**73**	72
54-65	70	75	**75**	75
58-65	73	77	**78**	76
61-65	75	79	**80**	78
67-69	78	84	**85**	83
78-80	79	87	**87**	85
80-81	88	90	**90**	88
83-86	90	92	**92**	91
88-89	92	93	**93**	92
89-90	93	94	**94**	93
89-92	94	95	**95**	94
90-92	94	96	**96**	96

The power factor

Power factor values in regard to load				
1/4 Pn	**1/2 Pn**	**3/4 Pn**	**Pn (*)**	**5/4 Pn**
0,27-0,33	0,41-0,45	0,53-0,56	**0,65**	0,71
0,30-0,34	0,43-0,45	0,52-0,58	**0,67**	0,72
0,28-0,33	0,45-0,49	0,57-0,58	**0,70**	0,74
0,28-0,34	0,46-0,52	0,60-0,65	**0,72**	0,76
0,32-0,35	0,48-0,54	0,62-0,65	**0,75**	0,77
0,32-0,45	0,48-0,62	0,62-0,74	**0,78**	0,8
0,39-0,47	0,57-0,65	0,72-0,76	**0,80**	0,83
0,39-0,46	0,58-0,67	0,74-0,76	**0,82**	0,84
0,47-0,49	0,68-0,79	0,76-0,79	**0,85**	0,85
0,52-0,63	0,73-0,80	0,83-0,85	**0,87**	0,89
0,59-0,70	0,79-0,94	0,87-0,88	**0,90**	0,91
0,66-0,71	0,84-0,85	0,89	**0,91**	0,91
0,68-0,71	0,86-0,89	0,89-0,90	**0,92**	0,92

(*) See the value corresponding to the rated power for the motor selected in "Electrical Characteristics" and transfer this value to the "Pn" column. Then read the values for the other load conditions in the corresponding line.

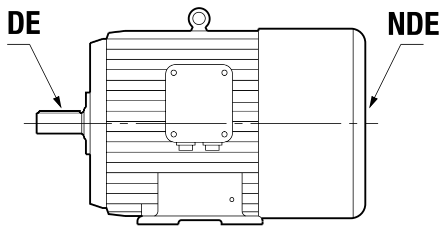
Electromechanical feature tolerance values

As per IEC 34-1, the following tolerance values are acceptable for rated motor parameters:

Efficiency [n]	Power factor	Slip	Starting current	Starting torque	Pull-in torque	Moment of inertia
Measurement with the	-1/6 (1 – cos φ)	Referred to the Pn and	+20%	-15%	-10%	± 10%
separate loss method	(min 0.02)	the working temperature	(Compared to	+25%		
Pn < 50KW 15% (1-η)	(max 0.07)	Pn < 1KW ± 30%	rated values)	(Compared to	(Compared to	(Compared to
Pn > 50KW 10% (1-η)		Pn > 1KW ± 20%		rated values)	rated values)	rated values)
Direct method						
measurement: 15% (1-η)						
Approx. Value at 0.1%						

Rotation direction

As per IEC 34-7 publications, the sides of a motor are defined as follows:
DE SIDE: is the side where the motor coupling is usually made.
NDE SIDE: is the side usually opposite the motor coupling side.
All motors can be run in both rotation directions indifferently. Hypothesising the connection of an L1-L2-L3 right-hand power supply triad in this order to the U1-V1-W1 terminals of an electric motor, clockwise rotation direction will be obtained when looking at the motor from the control side.
In order to invert rotation direction, the connection to two of the motor's terminals must be inverted.



Unit of measure and simple formulae

Absorbed power [KW]	Powered delivered [KW]	Absorbed current [A]	Power factor [cos fi]	Efficiency [n]
$Pa = \frac{V \times I \times 1.73 \times \cos\varphi}{1000}$	$Pr = \frac{V \times I \times 1.73 \times \cos\varphi \times \eta}{1000}$	$In = \frac{Pr \times 1000}{V \times 1.73 \times \cos\varphi \times \eta}$	$\cos\varphi = \frac{Pa \times 1000}{V \times I \times 1.73}$	$n\,\% = \frac{100\ Pr}{Pa}$

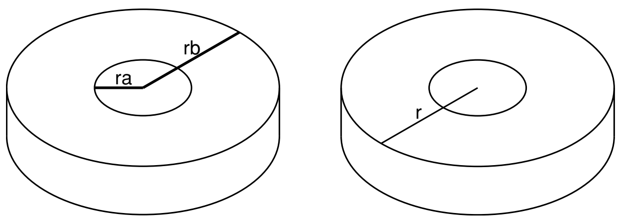
Rated torque [Kgm]	Synchronous speed [ns]	Slip [s]	Moment of inertia [Kgm²]	Dynamic moment [Kgm]
$Mn = \frac{Pr \times 1000}{1.027 \times rpm}$	$ns = \frac{f \times 120}{no.\ of\ poles}$	$s\% = \frac{100\ ns - n}{ns}$ 4	$J = \frac{PD^2}{n^2}$	$PD^2 = 364 \times \underline{P \times V^2}$

Key:
Pa = absorbed power in (kW); Pr = power delivered in (kW); V = input voltage (V); In = rated absorbed current (A); n = rpm with normal working load .
For the starting and braking phases, in addition to the drive torque curve, the moment of inertia of the rotating machine in regard to the motor's speed must also be known.

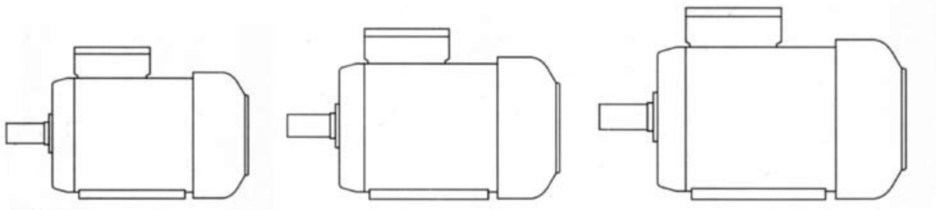
Notes for the calculation of the moment of inertia J

Calculation of [J] with solid cylinder: $J = m \times \frac{r^2}{2}$

Calculation of [J] with hollow cylinder: $J = m \times \frac{ra^2 - rb^2}{2}$



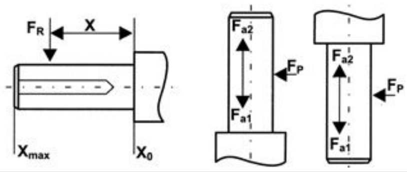
HOUSING, END SHIELDS, FEET



355 400 450

FRAME SIZE (MM)	MOTOR HOUSING	END SHIELDS	FEET
355	Cast iron	Cast iron	Cast iron - integrated
400	Cast iron	Cast iron	Cast iron - integrated
450	Cast iron	Cast iron	Cast iron - integrated

FRAME SIZE	NUMBER OF POLE	HORIZONTAL OPERATION	VERTICAL OPERATION



VTBSg 355 S:	adaption to belt drive on customer's request
VTBSg 355 M:	adaption to belt drive on customer's request
VTBSEE 355:	adaption to belt drive on customer's request
VTBSh 355:	adaption to belt drive on customer's request
VTBSh 400:	adaption to belt drive on customer's request
VTBSh 450:	adaption to belt drive on customer's request

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

$$F_R = \frac{19600 \times P \times k}{D_K \times n} \ [N]$$

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

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

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

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

Painting.

Vemat motors are provided with standard RAL 5010 paint treatment. On request, this paint treatment can also be extended to smaller sizes and provided with different colours.

Operating conditions associated with the environment

The tables below illustrate normal characteristics during continuous operation with power supply at the rated voltage and frequency of 50 Hz; max. 40° room temperature and altitude of up to 1000 metres above sea level. Powers vary under other conditions and are obtained by applying the correction factors indicated in the table.

Room temp.- (°C)	**40**	**45**	**50**	**55**	**60**	**70**
Acceptable Pmax - (%Pn)	**100**	**96,5**	**93**	**90**	**86,5**	**79**

Altitude - (mt)	**1000**	**1500**	**2000**	**2500**	**3000**	**3500**	**4000**
Acceptable Pmax - (%Pn)	**100**	**97**	**94,5**	**92**	**89**	**86,5**	**83,5**

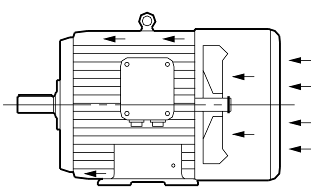
Cooling circuit characteristic digits (IEC 34.6)

1st characteristic digit	CIRCUIT LAYOUT Description	2a characteristic digit	CIRCULATION Description
0	The coolant enters and exits the machine freely (Free circulation)	0	The circulation of the coolant occurs through temperature difference. (Free convection)
1	The coolant is tapped from an area outside the machine and conveyed towards the machine through a special suction duct and then freely eliminated in the machine area	1	The circulation of the coolant is made by the action of the rotor and a device fastened to the rotor itself (Self-circulation)
2	The coolant is tapped form around the machine and then conveyed in a special elimination duct to an area outside the machine.	2	-----------------
3	The coolant is conveyed through a suction duct to the machine and is then eliminated through another duct following its injection and elimination into an area outside the machine.	3	-----------------
4	The primary coolant circulates in a closed circuit and yields its heat to the secondary fluid that surrounds the machine through its casing.	4	-----------------
5	The primary coolant circulates in a closed circuit and yields its heat to the secondary fluid that surrounds the machine by passing through a heat exchanger that is a part of the machine.	5	The circulation of the coolant occurs through an integrated device independent from the machine .(Example: electric fan fed by a separate power supply).
6	The primary coolant circulates in a closed circuit and yields its heat to the secondary fluid that surrounds the machine by passing through a heat exchanger external to the machine	6	The circulation of the coolant occurs through a device assembled on the machine, but fed by a separate power supply.
7	The primary coolant circulates in a closed circuit and yields its heat to the secondary fluid outside the machine that passes into a heat exchanger that is part of the machine	7	The circulation of the coolant occurs either through a device not installed and independent of the machine or by the pressure of the coolant fluid distribution circuit.
8	The primary coolant circulates in a closed circuit and yields its heat to the secondary fluid outside the machine that passes into a heat exchanger that is also outside the machine.	8	The circulation of the coolant occurs thanks to the movement that the machine makes in regard to the fluid (Example: an electric fan that is cooled by the current of air produced).
9	The primary coolant circulates in a closed circuit and yields its heat to the secondary fluid that passes into a heat exchanger to compose an independent unit separate from the machine.	9	Circulation through devices other than those described above.

Vemat motors are cooled by external surface ventilation. This ventilation is performed by a fan keyed onto the rotor shaft and protected by a cap that permits the flow of air along the finned frame of the motor "IC 411".

Cooling can be performed equally in either motor rotation direction because the fans are of radial two-directional type. On request, motors can also be supplied with "IC 410" free convection cooling systems or in other words without axial ventilation.

IC 411
(Standard motor)



SERVO-VENTILATION

Motors for variable speed operation.

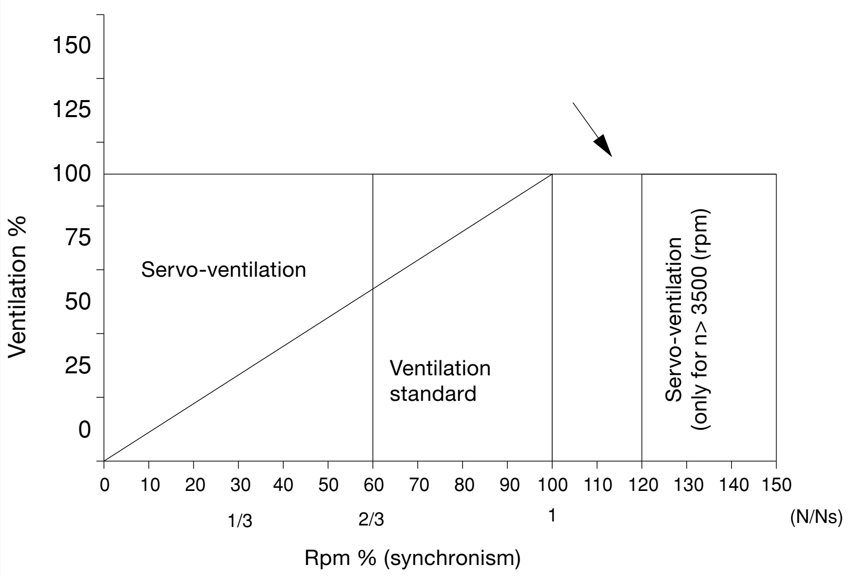
The use of three-phase asynchronous motors in standard configuration coupled to speed variation devices requires the following special measures:

- During the continuous running of the motor at low speed, ventilation is not sufficiently effective;
- Whenever the machine is used at particularly high speed, the noise generated by ventilation can negatively affect the motor's operating silence to make it no longer in compliance with IEC 34-9.

In both cases, we recommend using forced ventilation or "servo-ventilation" with constant flow and independent of motor speed. This type of forced ventilation consists in a fan mounted coaxially to the rotor shaft provided with a power supply independent from the main motor power supply.

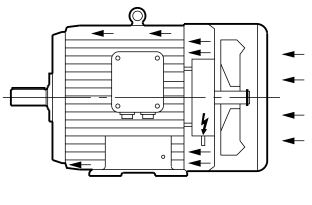
When using servo-ventilation, we also recommend the use of heat protectors in order to prevent damage caused by the overheating of the stator winding if the servo-ventilation system malfunctions.

When servo-ventilation is required
(for constant torque applications)

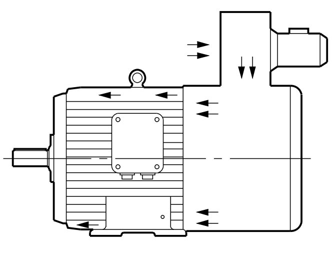


These motors can be applied for:

- Controls speed adjustment through power supply with inverter.
- High-temperature areas where more efficient ventilation is required to keep the motor within the acceptable temperature range.
- Intermittent duty with quiescence (S4) and cycles with a high number of hourly startings for which self-ventilated motors are inappropriate.
- Closed-loop applications with speed/ position feedback on inverter.



IC 416 A
(Servo-ventilation)



IC 416 R
(Servo-ventilation)

Thanks to both their electromechanical structure and thermal reserve, our motors can also be used at operating speeds that differ significantly from rated speeds. This is why all **Vemat** motors are particularly suited for use with inverters.

BEARINGS

FRAME	NUMBER OF POLES	BEARINGS
VTBSg 355	2	6317 C3
VTBSg 355 DE NDE	4 ÷12	NU 322 C3 6322 C3
VTBSEE 355	2	6217 C3
VTBSEE 355	4 ÷ 8	6222 C3
VTBSh 355	2	6217 C3
VTBSh 355	4 ÷ 8	6322M C3
VTBSh 400	2	6218 C3
VTBSh 400 DE NDE	4 ÷ 8	6324 C3 6322 C3
VTBSh 450 DE NDE	4 ÷ 8	6324M C3 NU222 EM1

Cooling System.

Motors of frame size 355÷450 are being cooled down by means of a fan installed on the shaft from the non drive end, covered with steel cover, cooling system IC 411 according to the IEC 60034-6 standard.

The design of fans and fan cover as well as materials used ensure optimum utilization of their aerodynamic and aerocoustic properties

ORDERING INFORMATION

Orders for motors should specify:

- motor type designation,
- rated output,
- rated speed,
- operating duty,
- supply voltage and connection,
- frequency,
- mounting arrangements,
- degree of protection,
- machine to be driven,
- other details of out-of-catalogue or special version,

and information concerning additional accessories e.g.

- thermal protection,
- anticondensation heaters,
- vibration sensors,
- etc.

When ordering high-power or special purpose motors one should also indicate:

- required direction of rotation,
- required degree of interior protection,
- method of start-up,
- method of coupling with the driven unit (gears, dimensions of belt pulleys, etc.),
- type of driven machine (nature of load), including the moment of inertia J or flywheel effect GD^2 brought to the motor shaft,
- other customer's specifications.

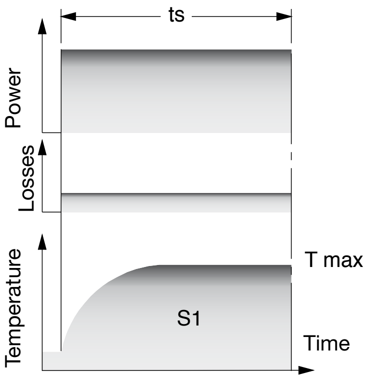
When ordering spare parts one should specify:

- full designation of the motor type including its serial number (provided on the nameplate) or catalogue number,
- degree of protection,
- mounting form,
- name of part,
- number of pieces.

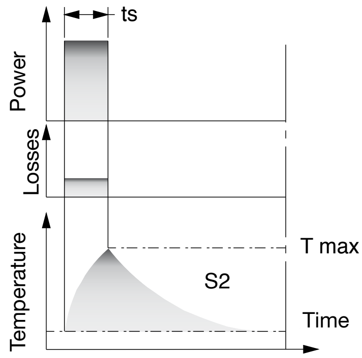
Power and duty
The term rated power is used to indicate the mechanical power delivered to the motor axis expressed in kW. The electrical features page features two power values: one expressed in kW, the other rounded off and expressed in HP. We list the types of duty most commonly utilised below.

Duty.
With the exception of Continuous duty S1, it is difficult to provide exact definitions for other conditions of duty, but given the importance of the topic, we provide an excerpt from IEC 34-1 Standards below. The indication of the duty required must be specified by the purchaser with the greatest precision possible. In some cases, when the load is constant or whenever it varies predictably, the duty can be indicated numerically or by means of a chart that represents the variations over time. Whenever the sequence of values over time is indeterminate, a fictional sequence that is at least as severe as the real sequence must be indicated, together with the choice of preference between the types of duty listed below.

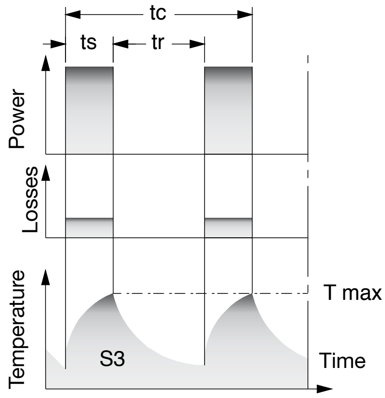
Continuous duty S1.
Operation at constant load and duration required to reach thermal equilibrium.



Limited duty S2.
Constant-load operation for a determined time lower than the achievement of thermal equilibrium followed by a pause that permits the re-establishment of the temperature of the room or coolant with approx. 2°C tolerance.

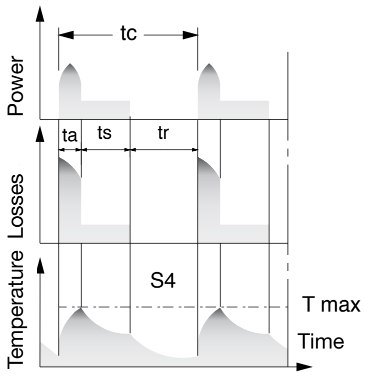


Periodic intermittent duty S3.
Operation through a series of cycles, each of which composed of a constant load part and a quiescent part. The duty period is short and does not permit the achievement of thermal equilibrium.



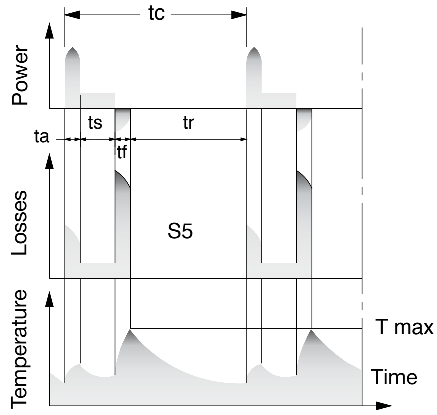
S3 : [ts / (ts + tr) x 100%]

Continuous duty with starting S4.
Operation through a series of identical cycles composed of a starting phase sufficient to affect the temperature, a constant load phase, and a quiescent phase. The duty period is short and does not permit the achievement of thermal equilibrium.



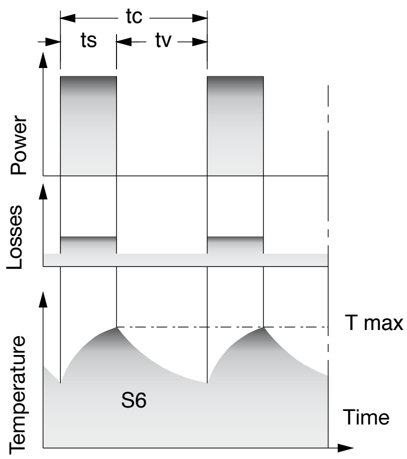
S4 : [(ta+ts) / (ta+ts+tr) x 100%]

Intermittent duty with starting and braking S5.
Operation as S4 above with braking performed electrically (e.g. counter-current). S5 duty is composed of a series of equal periods, each one of which represents a starting phase, a constant load phase followed by electric braking, and a quiescent phase. The duty period is short and does not permit the achievement of thermal equilibrium.



S5 : [t(ta+ts+tf) / tc x 100%]

Continuous duty with intermittent load S6.
Operation through a series of identical cycles, each of which composed of a constant load work period and a loadless operation phase. There are no quiescent phases. The work period is not sufficient to permit the achievement of thermal equilibrium.



S6 : [ts / tc x 100%]

ts : constant load operation
tc : cycle duration
tr : quiescence
ta : starting
tf : electric braking
tv : idling

Speed.

The speed of an AC three-phase asynchronous motor is in direct correlation to the mains frequency and the number of poles:

ns = (2 x f x 60) / p

where “ns” = synchronous speed

f = mains frequency

p = number of poles

The rated speed values indicated in the electrical features table apply to full load power and steady speed operation

Slip.

A three-phase electric asynchronous motor does not in any way reach synchronism speed, even if a considerably similar values can be reached during loadless operation, especially in motors with higher power.

The slip is determined by the following formula:

S = [(ns –n) / ns x 100%]

where: “s” = slip

ns= synchronous speed

n = asynchronous speed

according to the standards in force, slip values are valid to a tolerance of ±20%.

Although most applications require motors with a single fixed speed; special needs often require 2 or 3 speed operation. This can be achieved using motors with multiple polarity.

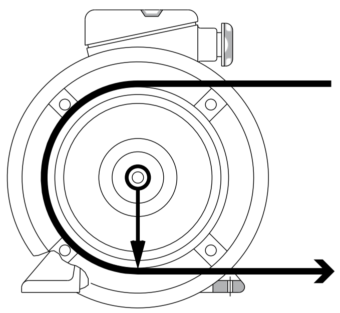
There are essentially 2 methods of construction for the above.

1. Motors with single windings(“Dahlander”) with 1 to 2 speed ratios. The most commonly-used are 2 – 4 pole (3000/1500 rpm) and 4 – 8 pole (1500/750 rpm).
2. Motors with numerous windings with speed ratios other than 1 to 2. The most commonly-used are 4 – 6 pole (1500/1000 rpm) and 6 – 8 pole (1000/750 rpm).

Torque

An electric motor’s torque value expresses the rotor’s torsion force and depends on the power delivered to the axis and the rpm.

Hypothesising use with a belt drive, for example, a certain force F will be determined near the pulley. The torque corresponds to the product of such force multiplied by the pulley’s radius..



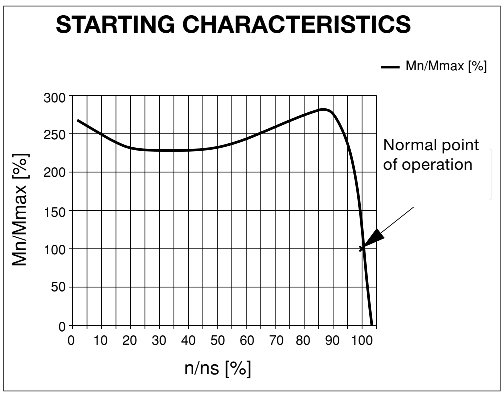
A motor’s rated torque is usually calculated as follows:

$$Mn = \frac{Pn \times 1000}{1{,}027 \times n} \quad [Kgm]$$

where: Pn = rated power expressed in kW.

n = rpm

We provide the characteristic starting torque curve as a function of the speed of a Sg 180 L4 type motor as an example below.



MOTOR ELECTRIC FEATURES	
Type: **SG 180 L4**	
Voltage frequency (V/Hz):	380t50
Power delivered (KW):	22
Poles/rpm:	4/1470
Efficiency (%):	91,4
Rated current (A):	40,6
Rated torque (Kgm):	14,61
Moment of inertia (Kgm²):	0,155

Voltage and frequency.

As per CEI 8-6 Standard dated March, 1990, "the rated voltages for he 1st category of AC power mains are 230/400 V".
For a maximum period of 10 years, the voltage values at the distribution points must be maintained at the following maximum values:

- **Three-phase current: from 358 to 423 V**

The IEC 38 publication indicates that European reference voltage will be 230/400V with three-phase current and 230V in single-phase current with a tolerance value of from +6% to -10% until the year 2003 and from ± 10% subsequently.
In standard motors with 60 Hz input, the rotation speeds indicated in the technical data tables increase by 20%, power by 15%, while the starting torque, starting current and pull-in torque values remain more or less unchanged but on the basis of the increases in power.
Important! All motors can be run indifferently at both 50 and 60 Hz but with their respective operating voltages. If this does not occur, the rated data will vary as shown in Table 3 below; for example, when the mains voltage at 60 Hz is equal to the motor's rated voltage (for example, mains voltage of 220V – 60 Hz, voltage of the motor 220V – 50 Hz), the motor's rated power and current values remain practically the same, while the starting torque and current values decrease by around 17% compared to the values of motor at 50 Hz.

Table for variation of 50 Hz motor characteristics when supplied with 60 Hz frequency

Motor wound for 50 Hz and voltage values	Voltage at 60 Hz	Catalogue characteristic variation coefficient						
		Power	Speed	Rated current	Rated torque	Starting torque	Starting current	Pull-in torque
230 V	220 V	1	1,2	1	0,83	0,83	0,83	0,83
400 V	380 V	1	1,2	1	0,83	0,83	0,83	0,83
400 V	440 V	1,15	1,2	1	0,96	0,96	0,96	0,96
500 V	500 V	1	1,2	1	0,83	0,83	0,83	0,83
500 V	550 V	1,1	1,2	1	0,91	0,91	0,91	0,91
500 V	600 V	1,2	1,2	1	1	1	1	1

Tab.3

EUROVOLTAGE

Eurovoltage.
All **Vemat** motors have been designed for use in European 400/690 V ± 10% - 50 Hz power mains.
Motor characteristics undergo evident variations whenever the voltage varies in the range of ± 10% (See Tab. 4).

Table for variation of motor characteristics in regard to variations in voltage

Torque curve	0,81	0,90	1	1,10	1,21
Slip	1,23	1,11	1	0,91	0,83
Rated current	1,10	1,05	1	0,98	0,98
Rated efficiency	0,97	0,98	1	1,00	0,98
Rated Cos φ	1,03	1,02	1	0,97	0,94
Starting current	0,90	0,95	1	1,05	1,10
Rated heating	1,18	1,05*	1	1*	1,10
P (Watt) loadless (idle)	0,85	0,92	1	1,12	1,25
Q (Var) loadless (idle)	0,81	0,9	1	1,1	1,21

Tab.4

DETERMINATION OF STARTING TIME

The knowledge of a three-phase electric asynchronous motor's starting time assumes fundamental importance; in fact, the current absorbed by the motor during this phase is very high and if it persists for too long triggers the deterioration of the insulation, thereby significantly reducing the motor's average working life. In order to determine the starting time, the following must be known:

MN = motor torque [Nm]
ML = torque of the load applied [Nm]
JM = motor moment of inertia [Kgm2]
JL = moment of inertia of the load [Kgm2]
ω = motor angular velocity
and the following equation must be applied:

$$M_N - M_L = (J_M+J_L)\,(d\omega/dt)$$

Experience and testing have enabled us to conduct everything to a simplified formula that adopts constants that let us calculate the times desired with sufficient precision:

$$tavv = (J_M+J_L)\,K/Macc$$

where:
tavv = starting time [sec]
Macc = acceleration torque [Nm] (*)
Mmax = Pull-in torque
K = constant

(*) Machine (fans)
Machine (piston pumps)
Machine (elevators, etc.) = 0.45 (ML + Mmax)
Machine (flywheels) = 0.45 (ML + Mmax)

Cnostant K	No. of poles 2	4	6	8
50 Hz	350	160	105	80
60Hz	420	190	125	95

If a speed ratio exists between the motor and the load, both the latter's torque and moment of inertia must be recalculated on the basis of the new speed.

CONNECTION

Direct starting

The simplest way to start a three-phase motor is performed by connecting the winding terminals directly to the power supply line. This system is widely used for low-power motors, while higher power motors require the checking of the characteristics of the system, which must withstand the motor's starting current (which is from 4 to 8 times greater than the rated value) without problem. If the motor's starting current is higher than the value permitted by the mains, Y/ Δ starting can be used.

Y - Δ starting.

This system is widely used for medium and large size motors. Y/Δ starting means that a 380 Δ wound motor is started with a star connected winding. Using this system, the starting current and the starting torque are reduced by around 30%. The disadvantage in this system is the interruption of power supply during the passage from star to delta that can result in current peaks of extremely short duration but with elevated magnetic value. This phenomenon is considerably increased whenever a load with elevated resisting torque is applied during starting.

Connection diagrams

Single-pole three-phase asynchronous motors are usually supplied with 6 terminals to permit connection by star or delta. Whenever the order specifies the rotation direction (see from the shaft side), the winding phase terminals are mounted in such way that with the application of a voltage triad in L1-L2-L3 order, the motor will turn clockwise. With L2-L1-L3 connection, the opposite (counter-clockwise) direction is obtained.

MOTOR PROTECTION

The protection of a three-phase asynchronous motor against malfunction requires the installation of adequate protection devices upstream in the line capable of detecting the fault responsible and then disconnecting the power supply to the machine in the moment that such fault persists for the length of time considered dangerous for the motor itself or its power supply line.

Protections can be divided as follows:

1. protection against overcurrent
2. protection against over-temperature
3. protection against short-circuit
4. protection against earth faults.

1. Protection against overcurrent is usually provided by thermal cutouts with operation based on the principle of the thermal dilation of a bimetallic strip sensitive to the overheating produced by an excess absorption of current. (Fig. 1)

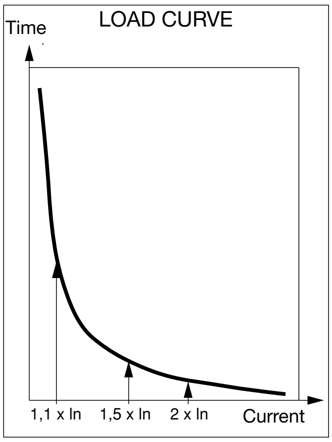


Fig.1

Special attention must be paid to the type of thermal cutout, which must be selected also on the basis of the type of motor starting. Startings that do not last longer than 10 seconds are defined by the standards as normal, and in such cases thermal cutouts with 10 or 10A triggering rating can be used. (IEC 947-4).

Particularly demanding startings usually require the use of bimetallic strip thermal cutouts with saturated iron TA in class 20 o 30; unlike normal thermal cutouts that can be used with frequencies of up to 500 Hz without problem, these however cannot be used with frequencies other than 50 or 60 Hz, and in order to solve this problem thermal relays can be used. However for startings that take longer than 30 seconds, the relays above cannot be used and must be by-passed during this transitory period.

2. Protection against over-temperature is provided by temperature probes, which are used to particular advantage in the protection of motors with extremely high keying frequency because thermal cutouts are not suited for use with keying frequencies of more than 15 starting cycles/hour. The thermistor used most widely is the binary-type positive coefficient PTC, in which when the critical temperature is reached the resistance increases abruptly to trigger the immediate triggering of the devices to which the PTC is connected (Fig. 2).

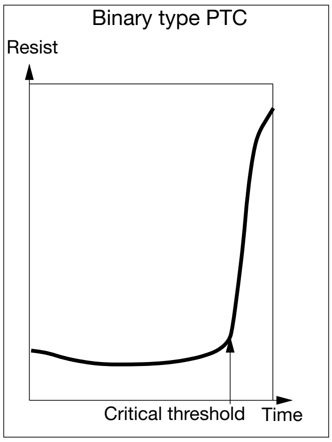


Fig.2

Positive coefficient analogue PTC and negative coefficient NTC are also used; the latter are usually adopted whenever two thresholds are required: one for signalling and one for intervention (Fig. 3). These types of devices are also used for the protection of motors with servo-assisted ventilation because thermal cutouts are incapable of detecting the stator temperature increase caused by a ventilation malfunction.

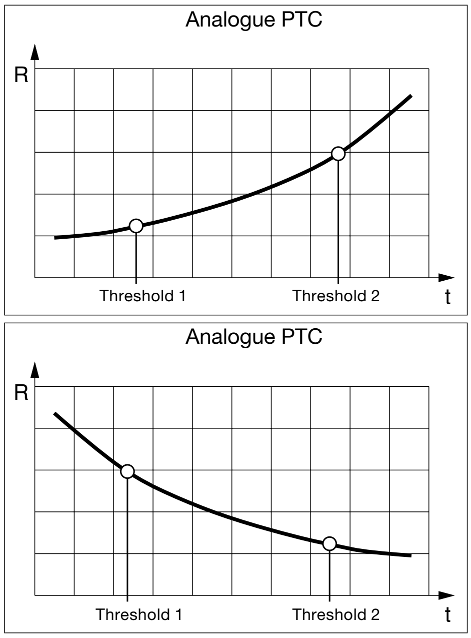


Fig.3

3. Protection against short-circuit requires the use of fuses or automatic circuit-breakers . Fuses offer the advantage of offering remarkable circuit-breaking power at low cost, while their constructive principle guarantees triggering times that decrease considerably with the increase of the short-circuit current in order to permit the constancy of the specific energy curve (I2 t). Automatic circuit-breakers offer the possibility of greater precision in adjustment compared to fuses. There are also electromagnetic thermal cutouts that can protect the motor against both overloads and short-circuits; in any case however, the magnetic protection must assume values of at least 12 - 15 greater than the "In" in order to prevent triggering during starting.

4. Protection against earth faults is usually obtained by using differential relays that are sensitive to the leakage of current towards earth caused by either malfunction or an interruption in insulation in the machine; in medium and large size motors (from 30 kW 2 pole on upwards) with direct starting, such differential protection must be bypassed in order to avoid unnecessary triggering due to the imbalance between the three phases that occurs during starting. There are also special differential relays for the protection of motors.

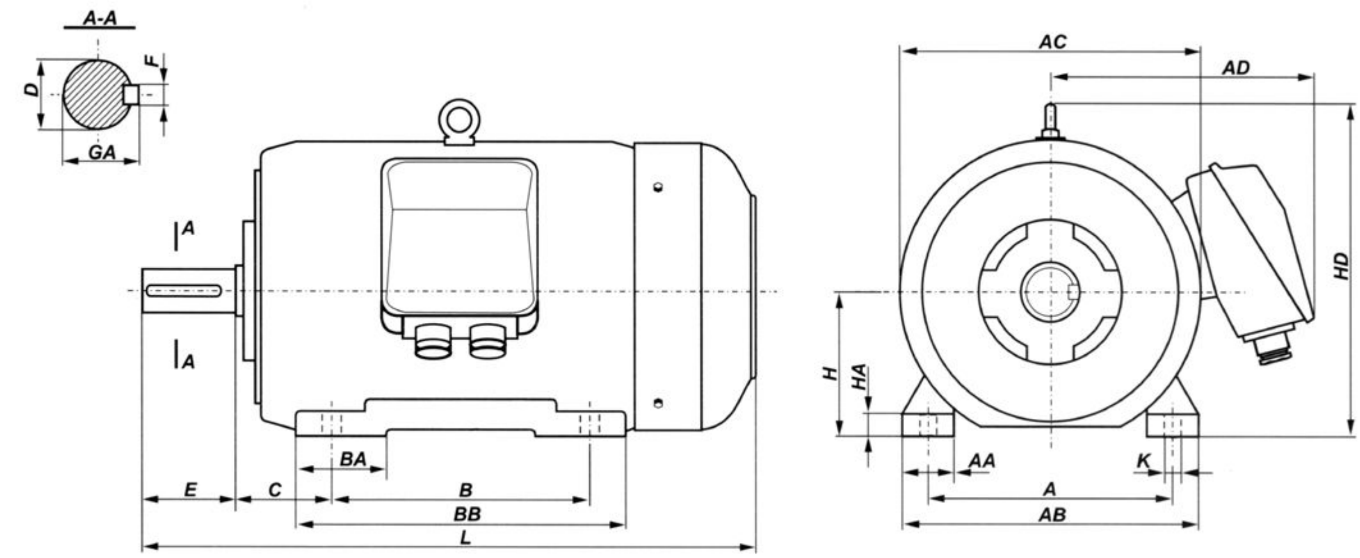
TOTALLY ENCLOSED MOTORS IP 55

Type	Rated output		Rated speed	Rated torque	Efficiency			Power factor	Full load current			Locked rotor torque	Locked rotor current	Breakdown torque	Moment of inertia	Sound power level	Sound pressure level	Weight (IMB3)
	P_N		n_N	T_N	η_N (%) at % of full load			COS φ_N	I_N at rated voltage			T_L/T_N	I_L/I_N	T_B/T_N	J	L_{WA}	L_{PA}	m
	kW	HP	rpm	Nm	50%	75%	100%	(-)	$(A)_{230V}$	$(A)_{380V}$	$(A)_{400V}$	(-)	(-)	(-)	(kgm^2)	(dB)	(dB)	(kg)
2 poles n=3000 rpm																		
VTBSg 355S2	200	270	2975	642	93,2	94,5	94,0	0,89	-	-	342	1,6	6,6	2,8	2,60	93	84	1350
VTBSEE 355ML2A	250	340	2982	801	95,5	96,3	96,4	0,91	-	-	415	1,8	7,0	2,8	2,70	93	84	1530
VTBSEE 355ML2B	315	430	2982	1009	95,9	96,6	96,6	0,91	-	-	517	1,9	7,3	3,0	3,30	93	84	1680
VTBSh 355H2Ds	355	480	2982	1137	95,6	96,3	96,4	0,91	-	-	585	1,3	6,1	2,5	5,10	93	84	2060
VTBSh 355H2Es	400	540	2982	1281	95,9	96,5	96,6	0,91	-	-	657	1,4	6,4	2,4	5,70	93	84	2185
VTBSh 400H2Cs	450	610	2984	1440	95,7	96,4	96,6	0,91	-	-	740	1,0	6,5	2,6	7,20	93	84	2650
VTBSh 400H2Ds	500	680	2985	1599	95,8	96,6	96,7	0,91	-	-	821	1,1	7,0	2,8	7,90	93	84	2720
VTBSh 400H2Es	560	760	2985	1792	95,7	96,5	96,6	0,91	-	-	921	1,0	6,9	2,6	8,50	94	84	2850
4 poles n=1500 rpm																		
VTBSg 355S4	200	270	1489	1283	93,2	94,7	95,0	0,89	-	-	343	2,0	6,5	2,8	5,30	93	84	1440
VTBSEE 355ML4A	250	340	1489	1603	95,8	96,4	96,3	0,89	-	-	424	2,0	7,3	2,4	4,90	88	78	1610
VTBSEE 355ML4B	315	430	1489	2020	96,4	96,7	96,3	0,90	-	-	523	2,2	7,6	2,5	6,20	88	78	1810
VTBSh 355H4Ds	355	480	1488	2277	96,3	96,7	96,5	0,88	-	-	604	1,5	6,5	2,2	8,20	94	84	2190
VTBSh 355H4Es	400	540	1489	2565	96,4	96,8	96,7	0,88	-	-	678	1,8	7,0	2,3	9,10	94	84	2320
VTBSh 400H4Cs	450	610	1491	2882	96,3	96,9	96,9	0,86	-	-	780	1,4	7,0	2,5	9,90	95	84	2920
VTBSh 400H4Ds	500	680	1491	3200	96,5	97,0	97,0	0,86	-	-	865	1,6	7,5	2,5	11,0	95	84	3050
VTBSh 400H4Es	560	760	1490	3588	96,6	96,9	96,9	0,87	-	-	960	1,5	6,9	2,4	12,2	95	84	3180
VTBSh 400H4Fs	630	850	1490	4038	96,6	96,9	96,9	0,87	-	-	1080	1,4	6,9	2,3	13,4	95	84	3320
VTBSh 450H4Bs	710	960	1492	4543	96,8	97,1	97,1	0,89	-	-	688	1,0	6,7	2,3	27,5	96	84	3980
VTBSh 450H4Cs	800	1080	1492	5118	96,8	97,1	97,1	0,89	-	-	776	1,0	6,8	2,3	30,7	96	84	4200
VTBSh 450H4Ds	900	1220	1494	6754	96,8	97,2	97,2	0,89	-	-	872	1,1	7,5	2,5	35,7	96	84	4550
VTBSh 450H4Es	1000	1360	1494	6393	96,9	97,3	97,3	0,89	-	-	967	1,1	7,5	2,5	39,8	96	84	4800
6 poles n=1000 rpm																		
VTBSg 355S6	160	220	989	1544	94,0	94,6	94,5	0,86	-	-	284	1,6	5,5	2,2	7,50	87	78	1330
VTBSEE 355ML6A	200	270	990	1928	95,5	96,0	95,8	0,86	-	-	351	2,2	7,1	2,3	6,20	84	75	1650
VTBSEE 355ML6B	250	340	990	2412	95,7	96,1	95,9	0,86	-	-	437	2,2	7,1	2,4	7,70	87	75	1790
VTBSh 355H6Cs	315	430	991	3034	96,0	96,2	96,1	0,86	-	-	550	1,9	7,0	2,2	11,0	90	78	2370
VTBSh 355H6Ds	355	480	991	3421	96,0	96,1	96,1	0,86	-	-	621	2,0	7,3	2,0	12,0	90	78	2450
VTBSh 400H6Bs	400	540	993	3845	95,5	96,1	96,1	0,82	-	-	734	1,3	6,4	2,1	20,5	92	80	3075
VTBSh 400H6Cs	450	610	993	4328	95,7	96,2	96,1	0,83	-	-	815	1,3	6,3	2,0	22,1	93	80	3240
VTBSh 450H6As	500	680	994	4803	96,6	96,9	96,8	0,88	-	-	491	1,2	6,7	2,6	36,5	95	82	3800
VTBSh 450H6Bs	560	760	994	5379	96,7	97,0	96,9	0,88	-	-	549	1,2	6,8	2,6	40,6	95	82	4010
VTBSh 450H6Cs	630	850	994	6050	96,7	97,1	97,0	0,89	-	-	611	1,3	7,0	2,6	45,0	95	82	4300
VTBSh 450H6Ds	710	960	994	6821	96,7	97,0	97,0	0,89	-	-	689	1,3	7,2	2,5	49,0	95	82	4550
8 poles n=750 rpm																		
VTBSEE 355ML8A	160	220	739	2067	95,1	95,5	95,0	0,80	-	-	305	1,6	5,8	2,0	6,10	85	74	1600
VTBSEE 355ML8B	200	270	740	2582	95,1	95,6	95,2	0,79	-	-	384	1,8	6,2	2,1	7,50	85	74	1750
VTBSh 355H8Ds	250	340	742	3218	95,5	96,0	95,8	0,78	-	-	483	1,3	6,0	2,0	11,8	88	77	2440
VTBSh 355H8Es	315	430	743	4049	95,6	96,0	95,8	0,78	-	-	609	1,3	6,0	2,0	13,8	88	77	2590
VTBSh 400H8Ds	355	480	742	4569	95,3	95,9	95,9	0,77	-	-	695[2]	1,2	5,8	2,0	18,8	89	78	3200
VTBSh 400H8Es	400	540	742	5148	95,4	96,0	96,0	0,77	-	-	782[2]	1,2	5,9	2,0	21,0	89	78	3350
VTBSh 450H8Bs	450	610	746	5761	95,5	96,3	96,4	0,78	-	-	501[2]	1,0	5,8	2,1	41,6	89	78	4400
VTBSh 450H8Cs	500	680	746	6401	95,5	96,3	96,4	0,78	-	-	557[2]	1,0	5,8	2,1	46,0	89	78	4600
VTBSh 450H8Ds	560	760	746	7169	95,6	96,4	96,5	0,78	-	-	623[2]	1,0	5,7	2,1	49,0	89	78	4770
VTBSh 450H8Es	630	850	746	8065	95,8	96,4	96,5	0,79	-	-	692[2]	1,0	5,6	2,0	53,8	89	78	4980

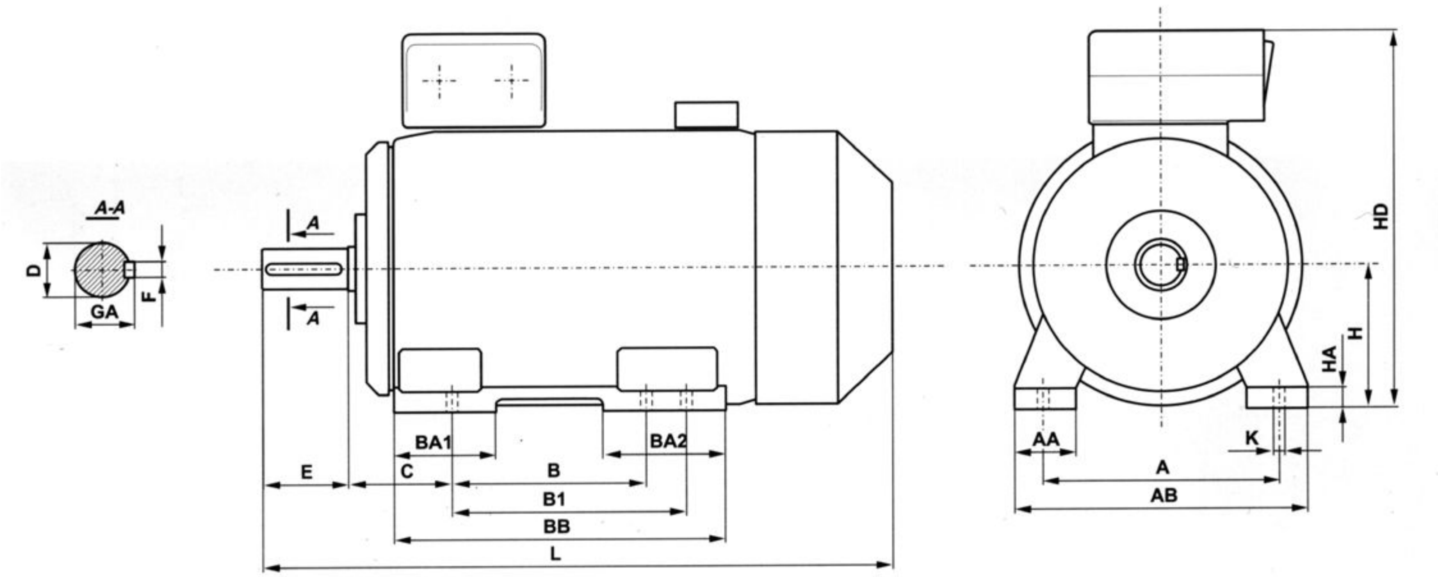
COMPANY
WITH QUALITY SYSTEM
CERTIFIED BY DNV
=ISO 9001/2000=

VEMAT electric motors

FOOT MOUNTED MOTORS - IM B3

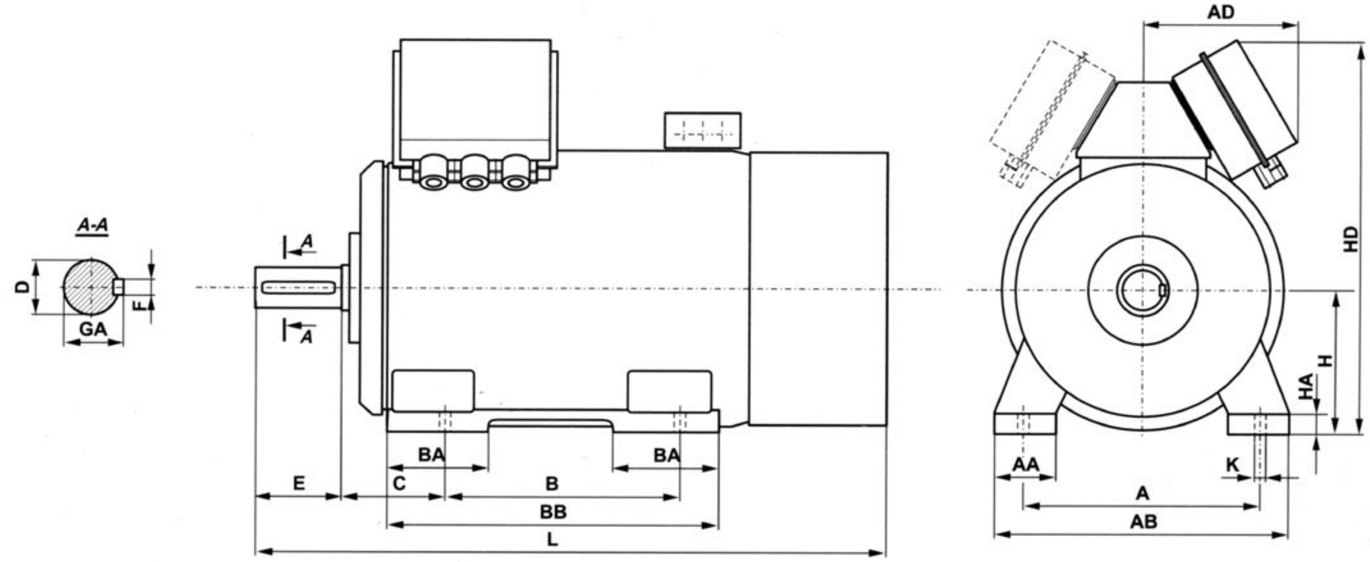


MOTOR TYPE	A	B	C	D	E	F	GA	H	HA	K	AA	AB	AC	AD	BA	BB	HD	L
VTBSg 355 S2	610	500	254	80m6	170	22h9	85	355	50	28	158	720	764	620	170	600	848	1354
VTBSg 355 S..	610	500	254	100m6	210	28h9	106	355	50	28	158	720	764	620	170	600	848	1394
VTBSg 355 M..	610	500	254	100m6	210	28h9	106	355	50	28	158	720	764	620	205	730	848	1454



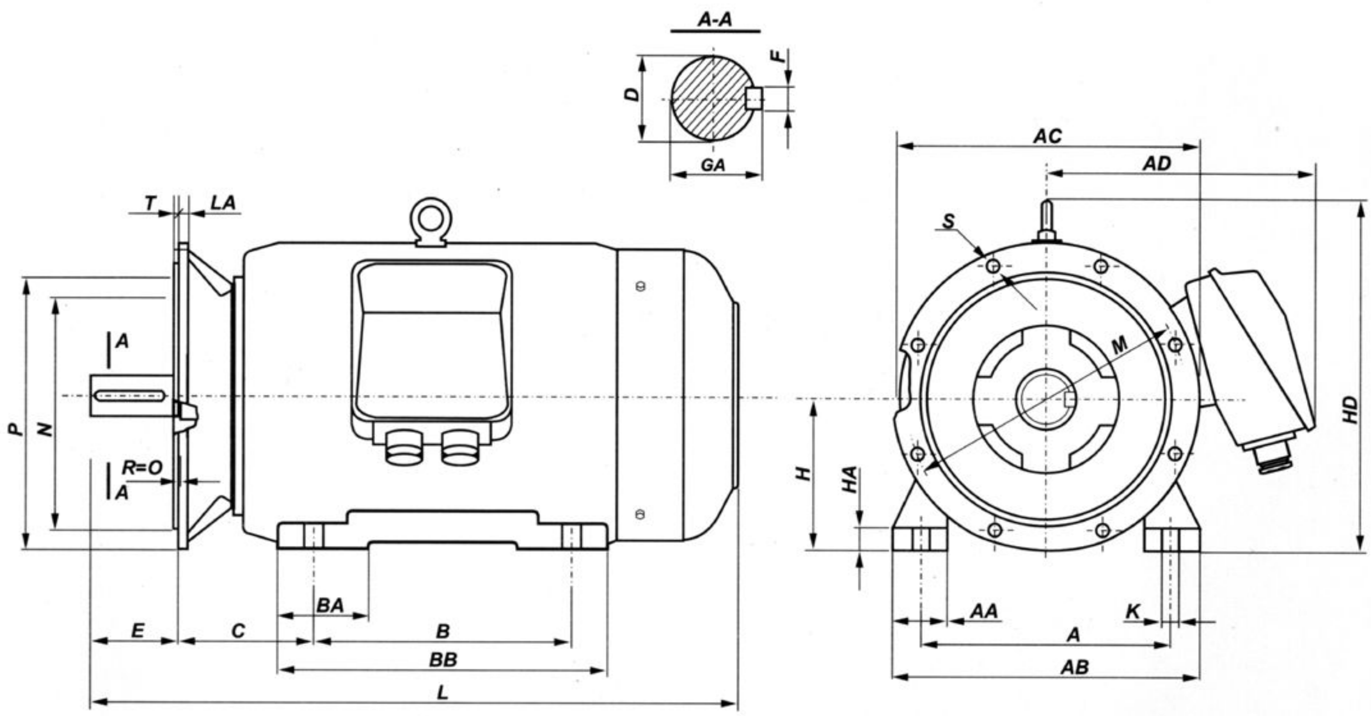
MOTOR TYPE	No. of poles	A	B	B1	C	D	E	F	GA	H	HA	K	AA	AB	BA1	BA2	BB	HD	L
VTBSE 355..	2	610	560	630	254	80	170	22	85	355	50	28	150	720	250	300	890	935	1580
VTBSEE 355..	4÷8	610	560	630	254	100	210	28	106	355	50	28	150	720	250	300	890	935	1620
VTBSh 355...s	2	610	900	-	200	70	140	20	75	355	45	28	160	730	265	265	1045	995	1800
VTBSh 355...s	4÷8	610	900	-	200	100	210	28	106	355	45	28	160	730	265	265	1045	995	1870

FOOT MOUNTED MOTORS - IM B3



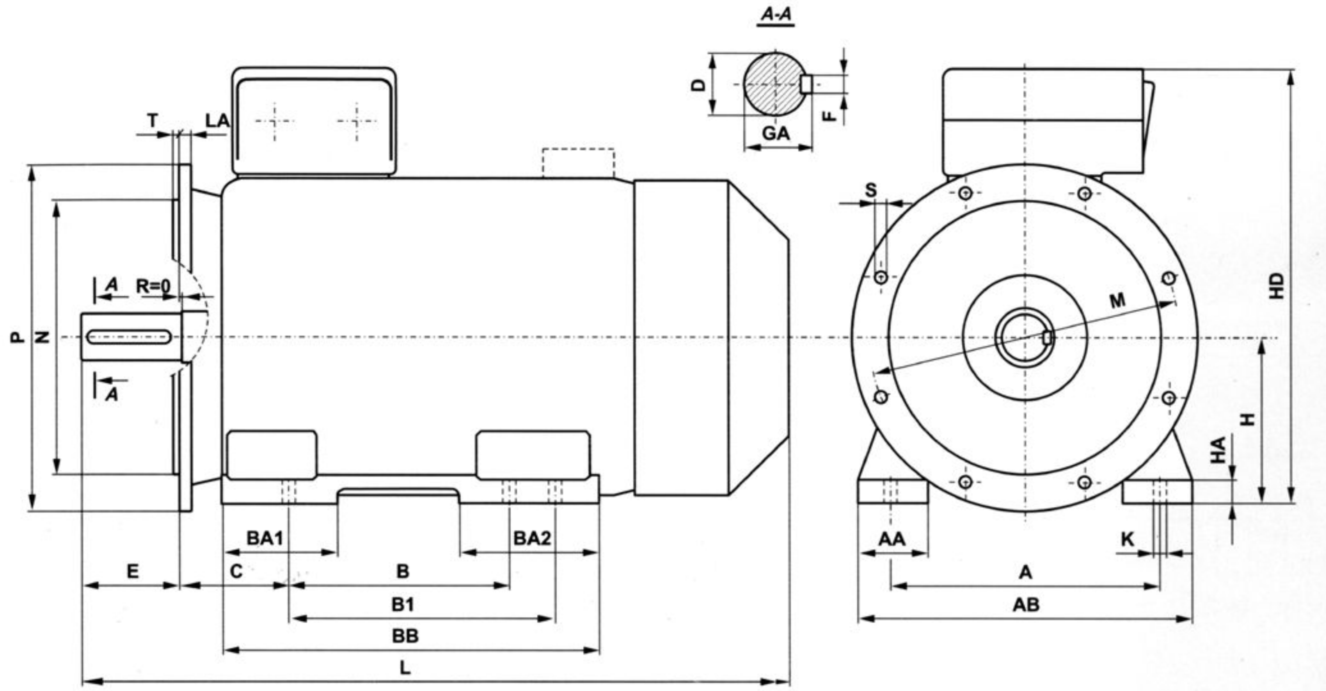
MOTOR TYPE	No. of poles	A	B	C	D	E	F	GA	H	HA	K	AA	AB	BA1	BA2	BB	HD	L
VTBSh 400...s	2	686	1000	224	80	170	22	85	400	50	35	175	840	520	265	1160	1255	1975
VTBSh 400...s	4÷8	686	1000	224	110	210	28	116	400	50	35	175	840	520	265	1160	1255	1960
VTBSh 450...s	4÷8	750	1120	254	110	210	28	116	450	60	35	205	940	560	340	1320	1356	2105

FOOT/FLANGE MOUNTED MOTORS - IM B35

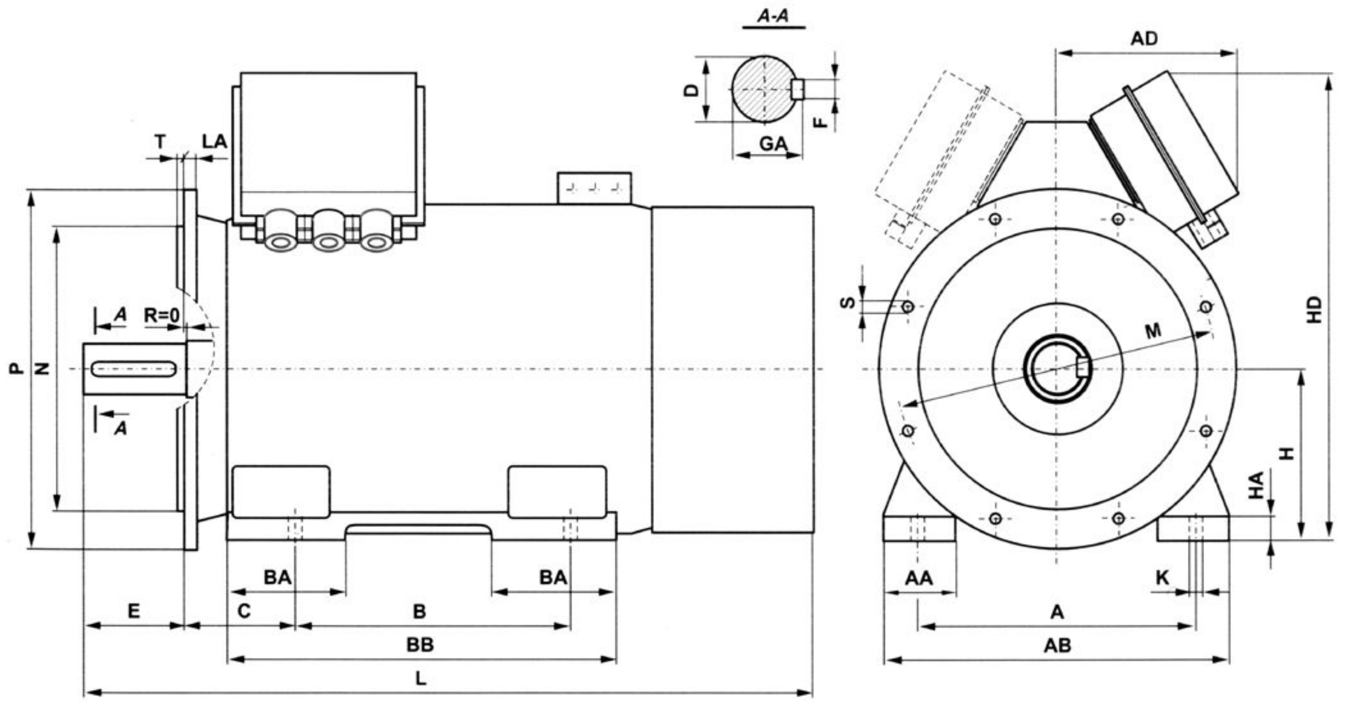


MOTOR TYPE	A	B	C	D	E	F	GA	H	HA	K	AA	AB	AC	AD	BA	BB	HD	L	LA	M	N	P	T	S	
																								ø	holes
VTBSg 35 S2	610	500	254	80m6	170	22h9	85	355	50	28	158	720	764	620	170	600	848	1354	24	740	680	800	6	24	8
VTBSLg 355 S..	610	500	254	100m6	210	28h9	106	355	50	28	158	720	764	620	170	600	848	1394	24	740	680	800	6	24	8
VTBSLg 355 M..	610	560	254	100m6	210	28h9	106	355	50	28	158	720	764	620	205	730	848	1454	24	740	680	800	6	24	8

FOOT/FLANGE MOUNTED MOTORS - IM B35

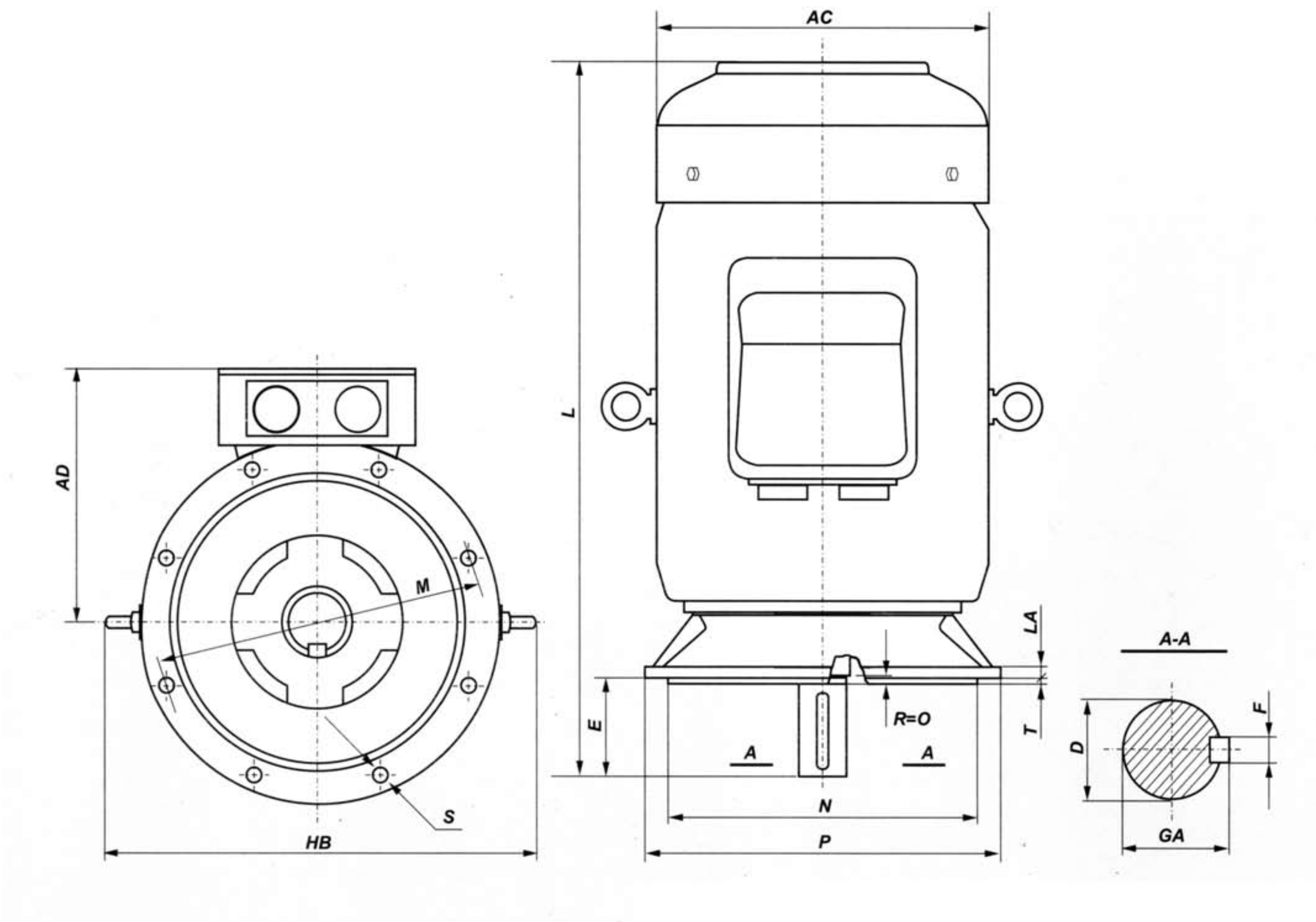


MOTOR TYPE	No. of poles	A	B	B1	C	D	E	F	GA	H	HA	K	AA	AB	BA1	BA2	BB	HD	L	LA	M	N	P	S	T
VTBSLEE 355...	2	610	560	630	254	80	170	22	85	355	50	28	150	720	250	300	890	935	1580	24	740	680	800	22	6
VTBSLEE 355...	4÷8	610	560	630	254	100	210	28	106	355	50	28	150	720	250	300	890	935	1620	24	740	680	800	22	6
VTBSLh 355...s	2	610	900	-	254	70	140	20	74,5	355	45	28	160	730	265	265	1045	995	1854	24	740	680	800	22	6
VTBSLh 355...s	4÷8	610	900	-	254	100	210	28	106	355	45	28	160	730	265	265	1045	995	1924	24	740	680	800	22	6



MOTOR TYPE	No. of poles	A	B	C	D	E	F	GA	H	HA	K	AA	AB	AD	BA	BB	HD	L	LA	M	N	P	S	T
VTBSLh 400...s	2	686	1000	280	80	170	22	85	400	50	35	175	840	520	265	1160	1255	2031	30	940	880	1000	25	6
VTBSLh 400...s	4÷8	686	1000	280	110	210	28	116	400	50	35	175	840	520	265	1160	1255	2016	30	940	880	1000	25	6
VTBSLh 450...s	4÷10	750	1120	315	110	210	28	116	450	60	35	205	940	560	340	1320	1356	2175	30	1080	1000	1150	28	6

FLANGE MOUNTED MOTORS - IM B5, IM V1, IM V3

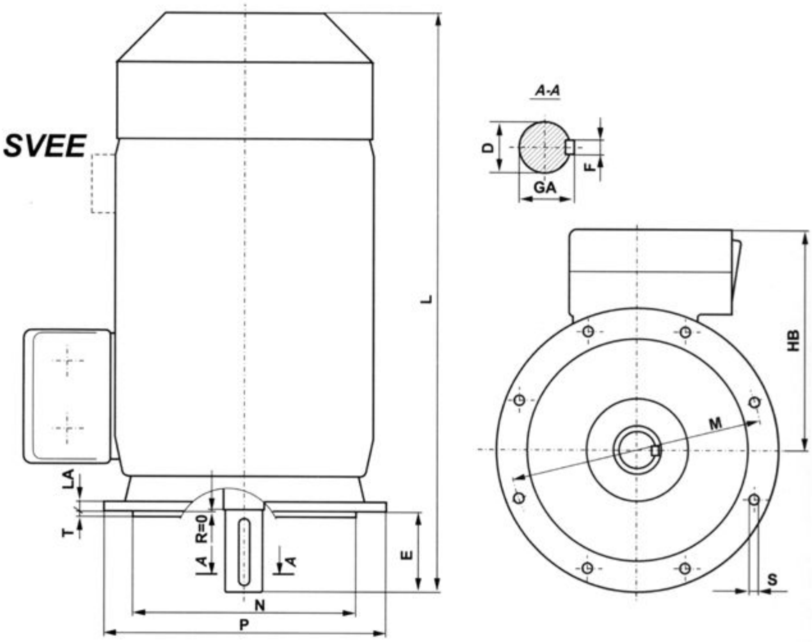


MOTOR TYPE	D	E	F	GA	AC	AD	HB	L	LA	M	N	P	T	S	
														ø	holes
VTBSVg 355 S..*	100m6	210	28h9	106	767	588	970	1580	24	740	680js6	800	6	24	8
VTBSVg 355 M..*	100m6	210	28h9	106	767	588	970	1580	24	740	680js6	800	6	24	8

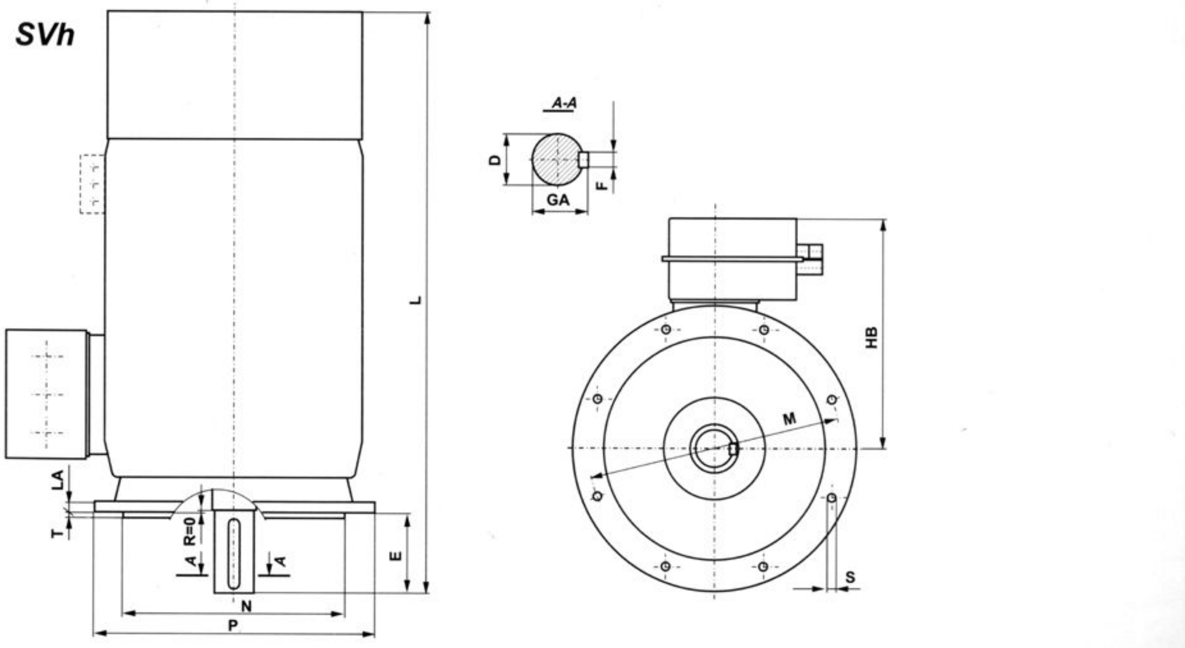
** The VTBSVg motors may operate only in vertical position IM V1*

FLANGE MOUNTED MOTORS - IM V1

SVEE



SVh



MOTOR TYPE	No. of poles	D	E	F	GA	HB	L	LA	M	N	P	S	T
VTBSVEE 355...*	4÷8	100	210	28	106	580	1620	24	740	680	800	22	6
VTBSVh 355...s*	4÷8	100	210	28	106	640	1955	24	740	680	800	22	6
VTBSVh 400...s*	4÷8	110	210	28	116	725	2016	37	940	880	1000	23	6
VTBSVh 450...s*	4÷8	110	210	28	116	835	2152	30	1080	1000	1150	28	6

** The VTBSVh and VTBSVEE motors may operate only in vertical position IM V1*

SAFETY

GENERAL RULES AND PRESCRIPTIONS

Although the three-phase asynchronous motors illustrated in this catalogue comply perfectly with all the safety standards and regulations in force. However certain danger areas inevitably remain due to the presence of voltage and moving parts.
As per internationally-approved IEC 364 Standards, installation and maintenance operations must be performed exclusively by qualified personnel. Failure to respect the above can raise the risk of damage and injury. We recommend observing all the local standards and regulations in force and scrupulously respecting the instructions for motor operation provided.

ELECTRICAL CONNECTION

Before performing any operations on the motor, make sure that no voltage is present and that the motor cannot be accidentally switched on. This precaution also applies to any accessories installed for the motor such as anti-condensate devices, servo-assisted ventilation, etc...
Before connecting power supply to the motor, make sure that the mains voltage and frequency match the data listed on the motor's rating plate, paying particular attention to the accepted ranges of tolerance, while bearing in mind that the power line must be sized to the power of the user (CEI 64-8 Standards).
Always make the ground connection!

MOTOR INSTALLATION SITE

Vemat motors are designed for use in industrial surroundings as per harmonised EN 60034 Standards. Other installations (e.g. places where children are present), may require the installation of additional protections directly at the site of motor operation. Special attention must be paid to the surrounding conditions at the motor installation site, such as the degree of insulation necessary against penetration by water. **Vemat** motors come with IP55 Protection rating; for areas where greater protection is required, consult this catalogue's Accessories section or contact our Technical Office directly.

GUARANTEE
The guarantee provided by VEMAT SPA expires after one year from invoice date of our products. It only covers the replacement or repair free of charge of defective units or parts provided that VEMAT admit that said faults or defects are to be ascribed to manufacturing processes. The customer does not have to feel entitled to cancel or reduce the outstanding orders because of defective materials previously supplied. VEMAT will not be responsible for the payment of any charges related to goods to be replaced or repaired under guarantee. Returns of materials will only be accepted if both back and forth transport charges will be covered by the customer. Our guarantee becomes completely null and void if units result altered or repaired. Our guarantee does not cover defects or faults which could be attributed to external factors, insufficient maintenance, overload, unproper selection, mounting errors or shipping damages.

COMPLAINTS
Complaints for defective material must be effected in writing and within the legal terms or they will be considered null. In case of complaints the buyer is not anyhow entitled to stop or delay payments.

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

DET NORSKE VERITAS

QUALITY MANAGEMENT SYSTEM CERTIFICATE

Certificato No. / Certificate No. ***CERT-11553-2003-AQ-VEN-SINCERT***

Si attesta che / This certifies that

Il sistema di gestione per la qualità di / the quality management system of

VEMAT MOTORI S.r.l.

Via Gualda, 10 - 36075 Montecchio Maggiore (VI) - Italy

È conforme ai requisiti della norma per i sistemi di gestione per la qualità
Conforms to the quality management systems standard

UNI EN ISO 9001:2008 (ISO 9001:2008)

Questa certificazione è valida per il seguente campo applicativo:
This certificate is valid for the following products or services:

Progettazione, sviluppo, produzione e vendita di motori elettrici asincroni monofase e trifase

Design and manufacture of asynchronous three-phase and single-phase electric motors

Data Prima Emissione / First Issue Date: 2003-01-07

Data di scadenza / Expiry Date: 2014-12-06

Luogo e data / Place and date: Agrate Brianza, (MB) 2011-11-08

ACCREDIA

per l'Organismo di Certificazione / for the Accredited Unit: DET NORSKE VERITAS ITALIA S.R.L.

Settore EA : 19

Francesco Paolo Nasuti
Lead Auditor

Zeno Beltrami
Management Representative

VEMAT motori elettrici

VEMAT MOTORI S.r.l. - Sede legale: Via Pantano, 2 - 20122 Milano - Italy
Stabilimento e sede amministrativa: Via Gualda, 10 Z.I. - 36075 Montecchio Maggiore (VI) - Italy
Tel. +39 0444 491973 r.a. - Fax +39 0444 491978 - e-mail: vemat@vemat.it - www.vemat.it