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EMTAŞ

ELSAN ELEKTRİK SAN. ve TİC. A.Ş.

INTERNALLY FAN COOLED - IP23 -WP1
TOTALLY ENCLOSED FAN COOLED - IP55-TEFC
THREE PHASE - ASYNCHRONOUS
SQUIRREL CAGE
3 kW - 370 kW

VERTICAL HOLLOW SHAFT MOTORS

EMPOWERED TO EMPOWER

The factory, one of the first electric motor manufacturers in Turkey which was founded in 1964, and was able to manufacture norm electric motors up to 18,5 kW at the beginning, mostly with imported parts and in the form of assembly, has grown and developed continuously, today has come to the point of designing and manufacturing IEC norm motors up to 400 kWs, also of designing and building special purpose motors upon customers' specifications.

The company, which has the widest product range in the field of electric motors in our country, responds to almost all kinds of electric motor request with the products it puts on the market under the EMTAŞ brand.

Our factory of 17.000 m2 outdoor and 8.500 m2 indoor space located in Etimesgut-Ankara, meticulously selected raw materials such as magnetic steel sheet, coil wire, cast iron, aluminium are transformed into high quality products using modern technology by experienced technical personnel.

EMTAŞ which is always in production effort with the most appropriate technology, takes pride of making an important contribution to Turkey's becoming an exporting country from its position as an electric motor importing country.

GENERAL INFORMATION

STANDARDS

Motors in this catalogue are manufactured in compliance with the below standarts and suggestions:

TS EN 60034-1	Rating and performance
TS EN 60034-2-1	Standard methods for determining losses and efficiency from tests
TS EN IEC 60034-5	Degrees of protection provided by the integral design of rotating electrical machines (IP code) classification
TS 3210 EN 60034-6	Methods of cooling (IC codes)
TS EN 60034-8	Terminal markings and direction of rotation
TS EN 60034-9	Noise limits
TS EN 60034-12	Starting performance of single-speed three-phase cage induction motors
TS EN IEC 60034-14	Measurement, evaluation and limits of vibration severity
TS EN 60034-15	Impulse voltage withstand levels of form-wound stator coils for rotating a.c. machines
TS EN 60034-18-1	Functional evaluation of insulation systems - General guidelines
NEMA MG 1	Dimensions - AC motors of small and medium sizes

GENERAL INFORMATION

APPLICATION

The electric motors in this document are vertical hollow shaft (VHS) deep well pump motors designed for deep well pumps, which are the most effective and most widely used pump type in agricultural irrigation, drinking and utility water supply.

Their designs have been realized as a result of sensitive studies on the needs of the pump industry. In difficult working conditions, they can work for a long time without any problems with minimum maintenance.

Compared to solid shaft electric motors, VHS motors provide complete savings from additional costs associated with axial load bearing, braking device, male-female coupling set, clearance adjustment nut, intermediate cage etc. and their additional labor.

These motors are mounted directly on the top head of the pump. Assembly/disassembly and clearance adjustment is done much easier and in a short time compared to the solid shaft electric motor.

Shaft of the vertical pump goes through the hollow shaft of the motor, enabling the motor to carry the axial load of the pump and can be mounted easily to the coupling on the upper side of the motor.

The coupling construction is suitable for vertical movement of the pump shaft for the position adjustment of the fan and bowls in the pump.

VHS motors have single or double mounting system of 72-73 series angular contact ball bearings or single mounting system of 29 series spherical roller thrust bearings to meet heavy axial load.

ENCLOSURE - PROTECTION CLASS

VHS motors are manufactured as IP23 protection class - WP1 as standard.

It is possible to produce IP55 protection class - TEFC for 37 kW and higher powers.

It is recommended to apply tropical varnish and install a heater on engines that will operate in humid environments.

MECHANICAL CONSTRUCTION

The frames of VHS motors in IP55 - TEFC protection class and VHS motors in IP23 - WP1 protection class with 7.5 kW and less power are of cast iron construction. Other motors are manufactured with steel bodies.

The flanges that connect the VHS motor to the pump chassis and the couplings that connect the pump shaft to the motor are cast iron, ductile cast iron is possible upon request.

VHS motors are flanged as NEMA standard "P" type and are suitable for vertical mounting only.

GENERAL INFORMATION

COOLING

Cooling in VHS motors with IP23 - WP1 protection class is provided by the principle of heat dissipation with the air drawn from the motor by the fan on the shaft.

IP55 - TEFC protection class deep well pump motors are cooled by the air blown by the fan on the shaft over the body ribs.

VOLTAGE AND FREQUENCY

VHS motors are manufactured according to 380 V - 50 Hz as standard. It is possible to manufacture motors up to 1100 V voltage. Upon request, motors that can operate at different voltages and frequencies can also be manufactured.

The fact that the mains voltage is ±5% from 380 V and the mains frequency is ±2% from 50 Hz does not affect the operation of the motor.

If a motor designed for 380 V - 50 Hz is used at different and voltage frequencies, there will be the following changes in power and speed:

Voltage [V]	380		440		460	
Frequency [Hz]	Power	Speed	Power	Speed	Power	Speed
50	1,00	1,00	1,00	1,00	1,00	1,00
60	1,00	1,20	1,15	1,20	1,20	1,20

POWER

Power values specified in the catalog refer to the mechanical power obtained from the motor shaft at the rated voltage and frequency, at a maximum ambient temperature of 40°C and at a maximum altitude of 1000 m above sea level, in the operating regime specified on the motor plate.

If the ambient temperature or altitude is different from the above values, the derating factors shown in the tables below should be applied.

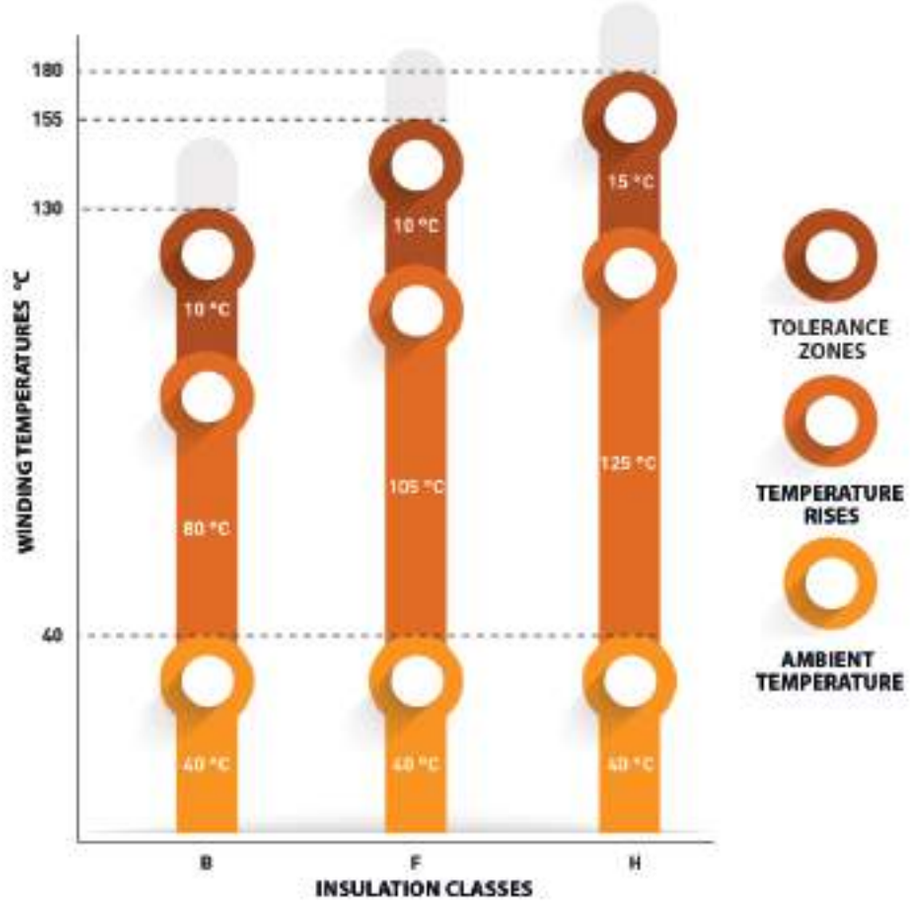
Ambient Temperature [°C]	30	35	40	45	50	55	60
Derating Factor k_1	1,07	1,04	1,00	0,95	0,91	0,86	0,80

Altitude [m]	1000	2000	3000	4000	5000
Derating Factor k_2	1,00	0,94	0,87	0,80	0,77

EXAMPLE
Rated Power : 110 kW
Ambient Temperature : 45 °C
Altitude : 2000 m

The actual output of the motor with a rated power of 110 kW under the above operating conditions is calculated as follows:
$P = k_1 \times k_2 \times P_n = 0,95 \times 0,94 \times 110 = 98,2$ kW

INSULATION CLASS



VHS motors with 90 kW and less power are manufactured in "F" insulation class, motors with larger power are manufactured in "H" insulation class.

On request, different insulation and heat rise class motors can also be manufactured.

EFFICIENCY AND POWER FACTOR

In the Operational Values tables, the efficiency and power factor values at the rated point (at 100% load) and at 125%, 75% and 50% load points are provided.

GENERAL INFORMATION

SERVICE FACTOR

Service factor (SF) is a measure of the overload capacity of a motor at which it can operate without damage. The service factor for standard electric motors is 1.0.

Some applications may require the motor to exceed its rated power. In such cases, additional load can be applied to the motor with the service factor indicated on the motor nameplate.

BEARINGS

In VHS motors, 72-73 series angular contact ball or 29 series spherical roller axial bearings with high axial load capability are used at the top (thrust bearings), and 62-63 series deep groove ball bearings, which can carry radial and axial loads, are used at the bottom (guide bearings).

In the axial load calculations, the bearing life is accepted as a minimum of 10.000 hours. The average bearing life is 5 times the minimum bearing life, is 5 years. Reduced axial load increases bearing life.

Axial load carrying capacity and bearing numbers of deep well pump motors are given in the table on the page titled "Mechanical Dimensions".

If higher axial load capacities are required, angular contact ball bearings can be used in tandem arrangement. In this case, the axial load capacity increases by approximately 60%.

For such needs, please contact our company.

EFFECT OF AXIAL LOAD ON EFFICIENCY

The efficiency values given in the operating values tables are the values measured when there is no axial load on the deep well pump motors. The axial load on the shaft of the motor after it is mounted on the pump causes a loss of efficiency in the motor.

This loss is approximately 0,033 kW per 100 rpm speed and 1000 kgf axial load and this loss must be taken into account by the pump manufacturer when calculating the overall moto-pump efficiency.

EXAMPLE

Rated Power	: 30 kW
Rated Speed	: 2930 rpm
Axial Load	: 1500 kgf
Efficiency	: %87,0

Input power: 30 / 0,87 = 34,48 kW
Axial load loss: 0,033 x 29,3 x 1,5 = 1,45 kW
Actual efficiency of the motor under axial load: 30 / (34,48 + 1,45) = 0,834 → %83,4

NON-REVERSE RATCHET

There is a locking device/non-reverse ratched in the upper bearing area to prevent the VHS motor from turning backwards (reverse direction).

In case of sudden stops of the motor, if the water column in the pump starts to fall and the pump shaft reverses its normal rotation direction, the pump shaft may be released from the coupling and fall into the well. The locking device prevents the motor from starting in such a case or if the motor is accidentally turned in the opposite direction.

VHS motors are manufactured to rotate counterclockwise as standard.

On demand, it is possible manufacture motors with clockwise rotation.

TERMINAL BOX

The terminal box is affixed to the body with the cable outlets facing downwards.

If the cable outlet direction of IP23 - WP1 protection class motors are required to be different from the downward direction, it must be specified in the order.

The terminal box of IP55 protection class motors is designed to be rotated 90°.

PAINT

VHS motors are painted in RAL2011 (orange) color as standard. They can be painted with different colors or paints suitable for working conditions upon request.

STARTING

Three methods are generally used to start electric motors:
- Direct on line (with full voltage) starting
- Starting with star/delta or soft starter (reduced voltage)
- Starting with frequency converter (VFD)

DIRECT ON LINE (DOL) STARTING

If the mains and other elements are available, our motors can be started directly. In this starting method; starting torques and correspondingly starting currents are high.

STAR/DELTA STARTING

Due to the negative effects that high current may cause, star/delta starting motors of 4 kW and larger are more appropriate and generally preferred.

In star/delta starting, the starting torque and current decrease to approximately 1/3 of their value compared to direct starting.

SOFT STARTERS

All our VHS / deep well pump motors are compatible with soft-starters.

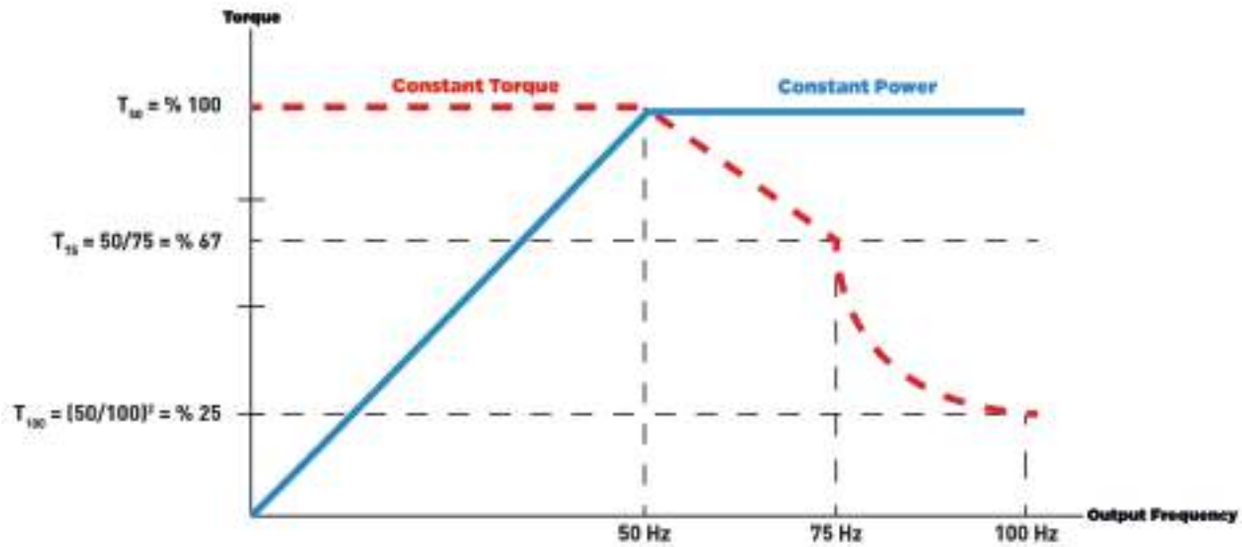
FREQUENCY CONVERTER (FREQUENCY INVERTER - VFD)

The speed of the AC asynchronous electric motor is directly proportional to the frequency of the mains energized to the motor.

Frequency converters are electronic devices that convert the input of fixed frequency AC power to variable frequency output and are used to change the speed of the motor by controlling the frequency of the electrical power supplied to the motor.

Above rated speed, the frequency converter and motor system operate in constant power mode. Torque decreases linearly at speeds up to 150% of the rated speed, and generally by the square of the V/Hz ratio at speeds above that.

At lower speeds than the rated speed, the frequency converter and motor system operate in constant torque mode.



STARTING

BENEFITS OF FREQUENCY CONVERTERS

Frequency converter;
- Saves energy by controlling the capacity need,
- Enables the lowest starting current compared to other starting methods,
- Eliminates the need for throttling mechanisms (control valve, outlet damper, etc.) that waste energy,
- It contributes to the improvement of the system power factor by providing high power factor.

Due to these advantages, frequency converters provide great energy savings, especially in pump and fan applications.

EFFECTS OF FREQUENCY CONVERTERS ON MOTORS

With the increase in the use of frequency converters, new problems in electric motors arise.

These problems are the peaks, harmonics and the stresses they create on the winding insulation, motor heating, shaft currents, etc. due to the frequency converter output form. In order to reduce these problems, the following changes are made in the motors to be used with the frequency converter:

- Winding with Corona Discharge resistant wire
- Reinforced insulation
- Single-cage rotor design (30 kW and higher power motors)
- Insulated NDE bearing (110 kW and higher power motors)

In addition to the above measures, it is recommended to use suitable filters at the frequency converter output.

COMPARISON OF STARTING METHODS

The comparison of the starting currents and starting torques of electric motors at full load according to the starting methods is given in the table below.

Starting Method	Starting Current I_K/I_N	Starting Torque M_K/M_N
Direct	4,0 - 8,0	1,5 - 3,0
Star/Delta	1,3 - 3,0	0,5 - 1,0
Soft Starter	2,0 - 6,0	0,1 - 1,5
Frequency Converter	1,0 - 1,5	1,5 - 2,0

THERMAL PROTECTION

Electric motors can be fitted with the below temperature measurement apparatus.

TERMISTOR

It is a temperature control apparatus that provides temperature-dependent protection in motor windings or bearings. Detailed information can be found in the "Protection with Thermistors" section of this document.

TEMPERATURE SENSOR

It is a temperature control apparatus that enables temperature monitoring in motor windings or bearings. According to the information to be obtained from this element, alarm and/or engine stopping systems can be arranged.

The most well-known temperature sensor is the PT100. The use of PT1000 type temperature sensors is also possible.

The recommended alarm and motor stopping temperatures according to the insulation class for the use of temperature sensors in the windings are given in the table below.

Status	Temperature [°C]	
	F Insulation	H Insulation
Warning Light	130	150
Warning Sound	140	160
Motor Halting	150	170

HEATER

It is the heating apparatus used to condense the moisture accumulated in the motor windings. It is recommended to be installed on engines used in high humidity areas.

The heater values that can be mounted on the windings are given in the table below.

Rated Power (kW)	Heater Power (W)	
3		26
4	7,5	40
11	18,5	42
22	45	50
55	150	75
160	370	100

ELECTRICAL PROTECTION

Electric-thermal protection of motors is done with fuses, thermal relays (or switches) and thermistors.

PROTECTION WITH FUSES

Fuses serve to protect the motor, cable, relays and switches against short circuits, but by themselves they cannot protect the motor against overloading and overheating.

PROTECTION WITH THERMAL RELAYS

Thermal relays are adjusted to the rated current of the motor, they protect the motor by breaking the circuit in case of overload and overcurrent.

PROTECTION WITH THERMISTORS

A number of factors other than overloading may also cause the engine to burn;
- Dropping to two phases,
- Decreased or faulty cooling,
- Extreme ambient temperature or altitude above sea level,
- Excessive starting/stopping.

In such cases, fuses and thermal relays cannot protect the motor. Therefore, the best way of thermal protection of the motor is thermistors placed between the windings and referenced directly from the winding temperature.

The advantage of thermistors is that they protect the windings from burning, as they are directly affected by the winding temperature, except for sudden overcurrent spikes and sudden overvoltage changes.

PTC thermistors are installed as standard in deep well pump motors with 45 kW and higher power. In other types, PTC thermistors can be installed on demand.

Thermistor information used according to the insulation class of the deep well pump motors is given in the table below:

Area of Use	Insulation Class	Thermistor Starting Temperature [°C]	Thermistor Color Codes
Windings	F	150	Black - Black
Windings	H	170	White - Green
Bearings	-	120	Gray - Gray

PERFORMANCE DATA

Motor Type	Rated Power				Axial Load / Thrust		Rated Current [A]			Rated Speed [rpm]		Power Factor (Cos φ)			Efficiency [%]			Rated Torque [Nm]		Starting Current	Starting Torque	Breakdown Torque	Weight
	[kW]	[hp]	[kW]	[hp]	[kN]	[lbs]	380 V - 50 Hz	460 V - 50 Hz	460 V - 60 Hz	50 Hz	60 Hz	%100	%75	%50	%100	%75	%50	50 Hz	60 Hz	I_K/I_N	M_K/M_N	M_D/M_N	[kg]
	380 V - 50 Hz		460 V - 60 Hz																				
2 POLES																				**IP23 PROTECTION CLASS - WP1**			
VH23 3/2	3	4	3,6	4,8	10,21	2.295	6,8 Δ	5,6 Δ	6,7 Δ	2830	3396	0,85	0,83	0,75	79,0	78,0	75,0	10,1	8,4	6,1	1,7	2,7	50
VH23 4/2	4	5,5	4,8	6,6	10,21	2.295	8,4 Δ	7,0 Δ	8,3 Δ	2870	3444	0,88	0,85	0,78	82,0	84,0	81,0	13,3	11,1	6,9	2,2	2,3	60
VH23 5,5/2	5,5	7,5	6,6	9	10,21	2.295	11,4 Δ	9,4 Δ	11,3 Δ	2880	3456	0,87	0,84	0,77	84,0	85,0	82,0	18,2	15,2	5,6	2,5	2,6	69
VH23 7,5/2	7,5	10	9	12	10,21	2.295	16,2 Δ	13,3 Δ	16,0 Δ	2870	3444	0,86	0,83	0,75	82,0	84,0	81,0	25,0	20,8	6,3	2,3	2,7	86
VH23 11/2	11	15	13	18	12,99	2.920	23,4 Δ	19,3 Δ	23,2 Δ	2915	3498	0,85	0,84	0,77	84,0	84,0	81,0	36,0	30,0	6,5	2,4	2,5	160
VH23 15/2	15	20	18	24	12,99	2.920	30,8 Δ	25,5 Δ	30,6 Δ	2915	3498	0,88	0,85	0,78	84,0	86,0	83,0	49,1	41,0	6,5	2,8	3,0	166
VH23 18,5/2	18,5	25	22	30	12,99	2.920	38,0 Δ	31,4 Δ	37,7 Δ	2915	3498	0,88	0,83	0,75	84,0	86,0	83,0	60,6	50,5	6,4	3,0	2,9	178
VH23 22/2	22	30	26	36	12,99	2.920	43,7 Δ	36,1 Δ	43,3 Δ	2920	3504	0,90	0,87	0,80	85,0	87,0	84,0	72,0	60,0	7,1	2,2	3,0	196
VH23 30/2	30	40	36	48	17,91	4.026	57,6 Δ	47,5 Δ	57,1 Δ	2925	3510	0,90	0,85	0,78	88,0	90,0	87,0	97,9	81,6	6,6	2,3	2,6	290
VH23 37/2	37	50	44	60	17,91	4.026	72,6 Δ	60,0 Δ	72,0 Δ	2925	3510	0,88	0,85	0,78	88,0	89,0	86,0	120,8	100,7	7,6	2,7	2,9	300
VH23 45/2	45	60	54	72	17,91	4.026	88,3 Δ	72,9 Δ	87,5 Δ	2940	3528	0,88	0,86	0,79	88,0	88,0	85,0	146,2	121,8	7,4	2,3	2,8	314
VH23 55/2	55	75	66	90	17,91	4.026	104,7 Δ	86,5 Δ	103,8 Δ	2940	3528	0,90	0,88	0,81	88,7	90,7	87,7	178,7	148,9	7,3	2,1	3,0	334
VH23 75/2	75	100	90	120	20,60	4.631	141,8 Δ	117,2 Δ	140,6 Δ	2960	3552	0,88	0,88	0,81	91,3	93,3	90,3	242,0	201,6	6,5	2,2	3,2	441
VH23 90/2	90	125	108	150	20,60	4.631	164,8 Δ	136,1 Δ	163,4 Δ	2955	3546	0,90	0,83	0,76	92,2	91,2	88,2	290,9	242,4	7,2	2,3	3,1	490
VH23 110/2	110	150	132	180	28,54	6.416	201,4 Δ	166,4 Δ	199,7 Δ	2965	3558	0,90	0,88	0,87	92,2	88,2	91,2	354,3	295,3	7,0	2,1	2,9	760
VH23 132/2	132	180	158	216	28,54	6.416	240,6 Δ	198,8 Δ	238,6 Δ	2975	3570	0,90	0,92	0,90	92,6	88,1	91,1	423,7	353,1	6,9	2,1	2,9	820
VH23 150/2	150	200	180	240	CUSTOM DESIGNED ON REQUEST																		
VH23 160/2	160	220	192	264																			
VH23 185/2	185	250	222	300																			
VH23 200/2	200	270	240	324																			
VH23 220/2	220	300	264	360																			
VH23 250/2	250	340	300	408																			
2 POLES																				**IP55 PROTECTION CLASS - TEFC**			
VH55 37/2	37	50	44	60	CUSTOM DESIGNED ON REQUEST		68,1 Δ	56,3 Δ	67,5 Δ	2962	3554	0,90	0,89	0,84	91,7	90,6	90,5	119,3	99,4	7,0	2,5	2,8	-
VH55 45/2	45	60	54	72			82,8 Δ	68,4 Δ	82,1 Δ	2962	3554	0,90	0,89	0,84	91,7	90,6	90,5	145,1	120,9	7,0	2,5	2,8	-
VH55 55/2	55	75	66	90			99,3 Δ	82,0 Δ	98,4 Δ	2957	3548	0,91	0,90	0,86	92,5	90,9	90,7	177,6	148,0	6,7	2,5	2,6	334
VH55 75/2	75	100	90	120			139,7 Δ	115,4 Δ	138,5 Δ	2973	3568	0,88	0,87	0,82	92,7	92,2	92,7	240,9	200,8	6,5	2,0	2,7	441
VH55 90/2	90	125	108	150			165,2 Δ	136,5 Δ	163,8 Δ	2978	3574	0,89	0,88	0,85	93,0	93,5	92,5	288,6	240,5	7,5	2,1	2,9	490
VH55 110/2	110	150	132	180			205,9 Δ	170,1 Δ	204,1 Δ	2977	3572	0,87	0,86	0,81	93,3	93,0	91,0	352,9	294,1	7,5	2,3	2,7	760
VH55 132/2	132	180	158	216			235,7 Δ	194,7 Δ	233,7 Δ	2975	3570	0,91	0,92	0,90	93,5	92,8	91,3	423,7	353,1	6,8	1,8	2,8	820
VH55 150/2	150	200	180	240			267,9 Δ	221,3 Δ	265,5 Δ	2975	3570	0,91	0,92	0,89	93,5	93,5	91,0	481,5	401,3	6,9	1,8	2,6	-
VH55 160/2	160	220	192	264			285,1 Δ	235,5 Δ	282,6 Δ	2976	3571	0,91	0,90	0,88	93,7	94,4	92,2	513,4	427,9	7,0	1,8	2,6	820
VH55 185/2	185	250	222	300			325,0 Δ	268,5 Δ	322,2 Δ	2975	3570	0,92	0,92	0,89	94,0	93,4	92,1	593,9	494,9	7,0	1,9	2,5	-
VH55 200/2	200	270	240	324			346,5 Δ	286,2 Δ	343,5 Δ	2980	3576	0,93	0,92	0,89	94,3	93,7	91,7	640,9	534,1	7,5	2,1	2,4	-
VH55 220/2	220	300	264	360			384,5 Δ	317,6 Δ	381,1 Δ	2980	3576	0,92	0,91	0,88	94,5	94,5	91,5	705,0	587,5	7,5	2,0	2,3	-
VH55 250/2	250	340	300	408			436,9 Δ	360,9 Δ	433,1 Δ	2980	3576	0,92	0,90	0,86	94,5	94,6	91,9	801,2	667,6	7,5	2,0	2,2	-

- Dimensions are in mm's.
- Please visit our web site (www.emtas.com.tr) for the current dimensions and values.

Motor Type	Rated Power				Axial Load / Thrust		Rated Current [A]			Rated Speed [rpm]		Power Factor (Cos φ)			Efficiency [%]			Rated Torque [Nm]		Starting Current	Starting Torque	Breakdown Torque	Weight
	[kW]	[hp]	[kW]	[hp]																			
	380 V - 50 Hz		460 V - 60 Hz		[kN]	[lbs]	380 V - 50 Hz	460 V - 50 Hz	460 V - 60 Hz	50 Hz	60 Hz	%100	%75	%50	%100	%75	%50	50 Hz	60 Hz	I_K/I_N	M_K/M_N	M_D/M_N	[kg]
4 POLES															IP23 PROTECTION CLASS - WP1								
VH23 3/4	3	4	3,6	4,8	12,73	2.862	7,1 Δ	5,9 Δ	7,1 Δ	1425	1710	0,80	0,73	0,63	80,0	81,0	78,0	20,1	16,8	5,9	2,5	2,6	55
VH23 4/4	4	5,5	4,8	6,6	12,73	2.862	9,3 Δ	7,7 Δ	9,2 Δ	1425	1710	0,81	0,79	0,70	81,0	84,0	81,0	26,8	22,3	5,7	2,6	2,7	65
VH23 5,5/4	5,5	7,5	6,6	9	12,73	2.862	11,7 Δ	9,7 Δ	11,6 Δ	1430	1716	0,84	0,79	0,70	85,0	86,0	83,0	36,7	30,6	5,5	2,5	2,7	86
VH23 7,5/4	7,5	10	9	12	12,73	2.862	15,6 Δ	12,9 Δ	15,5 Δ	1430	1716	0,86	0,80	0,72	85,0	87,0	84,0	50,1	41,7	5,5	2,5	2,6	100
VH23 11/4	11	15	13	18	15,93	3.581	23,4 Δ	19,3 Δ	23,2 Δ	1445	1734	0,83	0,79	0,70	86,0	87,0	84,0	72,7	60,6	6,2	2,4	2,6	164
VH23 15/4	15	20	18	24	15,93	3.581	32,7 Δ	27,0 Δ	32,4 Δ	1445	1734	0,81	0,79	0,70	86,0	88,0	85,0	99,1	82,6	5,5	2,2	2,5	165
VH23 18,5/4	18,5	25	22	30	15,93	3.581	40,4 Δ	33,3 Δ	40,0 Δ	1445	1734	0,81	0,79	0,70	86,0	88,0	85,0	122,3	101,9	6,0	2,5	2,6	188
VH23 22/4	22	30	26	36	21,68	4.874	46,8 Δ	38,7 Δ	46,4 Δ	1445	1734	0,83	0,79	0,70	86,0	88,0	85,0	145,4	121,2	6,6	2,5	2,7	260
VH23 30/4	30	40	36	48	21,68	4.874	61,7 Δ	50,9 Δ	61,1 Δ	1445	1734	0,84	0,83	0,75	88,0	89,0	86,0	198,3	165,2	6,5	2,5	2,7	314
VH23 37/4	37	50	44	60	21,68	4.874	73,4 Δ	60,7 Δ	72,8 Δ	1460	1752	0,87	0,85	0,78	88,0	89,0	86,0	242,0	201,7	6,0	2,0	2,4	325
VH23 45/4	45	60	54	72	21,68	4.874	87,3 Δ	72,1 Δ	86,6 Δ	1460	1752	0,87	0,83	0,75	90,0	90,0	87,0	294,3	245,3	6,0	2,1	2,4	344
VH23 55/4	55	75	66	90	32,95	7.407	104,1 Δ	86,0 Δ	103,2 Δ	1465	1758	0,87	0,82	0,74	92,3	91,3	88,3	358,5	298,8	5,8	2,2	2,5	394
VH23 75/4	75	100	90	120	32,95	7.407	141,3 Δ	116,7 Δ	140,1 Δ	1470	1764	0,87	0,82	0,74	92,7	91,2	88,2	487,2	406,0	6,5	2,3	2,6	468
VH23 90/4	90	125	108	150	33,68	7.572	169,0 Δ	139,6 Δ	167,5 Δ	1470	1764	0,87	0,82	0,74	93,0	94,5	91,5	584,7	487,2	6,0	2,2	2,4	648
VH23 110/4	110	150	132	180	33,68	7.572	205,9 Δ	170,1 Δ	204,1 Δ	1470	1764	0,87	0,84	0,76	93,3	93,8	90,8	714,6	595,5	6,0	2,4	2,4	654
VH23 132/4	132	180	158	216	33,68	7.572	249,4 Δ	206,0 Δ	247,2 Δ	1480	1776	0,86	0,85	0,77	93,5	93,5	90,5	851,8	709,8	6,0	2,2	2,4	785
VH23 150/4	150	200	180	240	33,68	7.572	282,5 Δ	233,4 Δ	280,1 Δ	1480	1776	0,86	0,84	0,77	93,8	93,6	82,0	967,9	806,6	6,0	1,7	2,2	-
VH23 160/4	160	220	192	264	74,78	16.811	301,0 Δ	248,7 Δ	298,4 Δ	1480	1776	0,86	0,85	0,77	93,9	94,4	93,4	1.032,4	860,4	5,0	1,5	2,0	860
VH23 185/4	185	250	222	300	74,78	16.811	350,7 Δ	289,7 Δ	347,6 Δ	1480	1776	0,85	0,86	0,78	94,3	94,5	93,5	1.193,8	994,8	5,0	1,6	2,0	920
VH23 200/4	200	270	240	324	74,78	16.811	378,3 Δ	312,5 Δ	375,0 Δ	1480	1776	0,85	0,89	0,81	94,5	94,5	93,5	1.290,5	1.075,5	6,0	1,6	2,0	970
VH23 220/4	220	300	264	360	74,78	16.811	410,4 Δ	339,0 Δ	406,9 Δ	1480	1776	0,86	0,85	0,81	94,7	94,7	92,0	1.419,6	1.183,0	6,0	1,7	2,3	-
VH23 250/4	250	340	300	408	188,78	42.440	464,9 Δ	384,1 Δ	460,9 Δ	1480	1776	0,86	0,88	0,81	95,0	96,0	95,0	1.613,2	1.344,3	6,0	1,8	2,1	1110
VH23 260/4	260	350	312	420	188,78	42.440	483,5 Δ	399,4 Δ	479,3 Δ	1480	1776	0,86	0,86	0,84	95,0	95,5	94,5	1.677,7	1.398,1	6,0	1,8	2,4	-
VH23 280/4	280	380	336	456	188,78	42.440	514,7 Δ	425,2 Δ	510,2 Δ	1480	1776	0,87	0,87	0,80	95,0	96,0	95,0	1.806,8	1.505,6	6,0	1,7	2,1	1205
VH23 300/4	300	400	360	480	188,78	42.440	551,5 Δ	455,6 Δ	546,7 Δ	1480	1776	0,87	0,86	0,80	95,0	94,5	93,0	1.935,8	1.613,2	6,0	1,8	2,4	-
VH23 315/4	315	430	378	516	188,78	42.440	579,1 Δ	478,4 Δ	574,0 Δ	1480	1776	0,87	0,88	0,83	95,0	95,0	94,0	2.032,6	1.693,8	6,0	1,8	2,1	1595
VH23 330/4	330	450	396	540	188,78	42.440	606,6 Δ	501,1 Δ	601,4 Δ	1480	1776	0,87	0,88	0,84	95,0	95,0	94,0	2.129,4	1.774,5	6,0	1,9	2,5	-
VH23 355/4	355	485	426	582	188,78	42.440	652,6 Δ	539,1 Δ	646,9 Δ	1480	1776	0,87	0,90	0,86	95,0	95,5	94,5	2.290,7	1.908,9	6,0	1,8	2,0	1730
VH23 370/4	370	504	444	605	188,78	42.440	680,2 Δ	561,9 Δ	674,3 Δ	1480	1776	0,87	0,87	0,81	95,0	96,0	95,0	2.387,5	1.989,6	6,0	1,7	2,0	1800

- Dimensions are in mm's.
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Motor Type	Rated Power				Axial Load / Thrust		Rated Current [A]			Rated Speed [rpm]		Power Factor (Cos φ)			Efficiency [%]			Rated Torque [Nm]		Starting Current	Starting Torque	Breakdown Torque	Weight
	[kW]	[hp]	[kW]	[hp]	[kN]	[lbs]	380 V - 50 Hz	460 V - 50 Hz	460 V - 60 Hz	50 Hz	60 Hz	%100	%75	%50	%100	%75	%50	50 Hz	60 Hz	I_K/I_N	M_K/M_N	M_D/M_N	[kg]
	380 V - 50 Hz		460 V - 60 Hz																				
4 POLES															IP55 PROTECTION CLASS - TEFC								
VH55 37/4	37	50	44	60	21,68	4.874	69,2 Δ	57,2 Δ	68,6 Δ	1472	1766	0,89	0,87	0,80	91,3	92,1	91,4	240,0	200,0	6,6	2,7	2,7	-
VH55 45/4	45	60	54	72	21,68	4.874	82,8 Δ	68,4 Δ	82,0 Δ	1472	1766	0,90	0,87	0,81	91,8	92,0	91,0	291,9	243,3	6,6	2,7	2,8	-
VH55 55/4	55	75	66	90	21,68	4.874	103,0 Δ	85,1 Δ	102,1 Δ	1470	1764	0,88	0,84	0,75	92,2	92,4	91,0	357,3	297,8	6,8	2,5	2,7	394
VH55 75/4	75	100	90	120	32,95	7.407	139,5 Δ	115,3 Δ	138,3 Δ	1480	1776	0,88	0,85	0,76	92,8	93,5	93,5	484,0	403,3	7,0	2,8	2,6	468
VH55 90/4	90	125	108	150	32,95	7.407	167,1 Δ	138,0 Δ	165,6 Δ	1476	1771	0,88	0,84	0,76	93,0	94,1	93,7	582,3	485,3	6,7	2,2	2,6	648
VH55 110/4	110	150	132	180	32,95	7.407	203,7 Δ	168,3 Δ	201,9 Δ	1488	1786	0,86	0,86	0,79	95,4	91,9	90,6	706,0	588,3	6,0	1,8	2,5	654
VH55 132/4	132	180	158	216	33,68	7.572	238,4 Δ	196,9 Δ	236,3 Δ	1488	1786	0,88	0,85	0,77	95,6	92,6	90,7	847,2	706,0	7,0	2,1	2,4	785
VH55 150/4	150	200	180	240	33,68	7.572	278,5 Δ	230,0 Δ	276,1 Δ	1488	1786	0,88	0,84	0,76	93,0	94,1	93,7	962,7	802,3	6,7	2,2	2,6	-
VH55 160/4	160	220	192	264	33,68	7.572	288,4 Δ	238,2 Δ	285,8 Δ	1488	1786	0,88	0,86	0,78	95,8	94,0	92,3	1.026,9	855,7	7,0	2,0	2,3	860
VH55 185/4	185	250	222	300	33,68	7.572	333,1 Δ	275,1 Δ	330,2 Δ	1488	1786	0,88	0,85	0,76	95,9	92,7	92,7	1.187,3	989,4	7,2	2,1	2,1	920
VH55 200/4	200	270	240	324	33,68	7.572	347,8 Δ	287,3 Δ	344,8 Δ	1489	1787	0,91	0,90	0,85	96,0	93,9	93,6	1.282,7	1.069,0	7,5	2,0	2,2	970
VH55 220/4	220	300	264	360	İHTİYAÇ HÂLİNDE DANIŞINIZ		387,7 Δ	320,3 Δ	384,3 Δ	1490	1788	0,90	0,87	0,86	95,8	93,0	92,5	1.410,1	1.175,1	7,2	1,9	2,2	-
VH55 250/4	250	340	300	408			444,6 Δ	367,2 Δ	440,7 Δ	1490	1788	0,89	0,88	0,83	96,0	93,8	91,9	1.602,3	1.335,3	7,0	2,0	2,0	1110
VH55 260/4	260	350	312	420			462,3 Δ	381,9 Δ	458,3 Δ	1490	1788	0,89	0,87	0,84	96,0	94,1	92,2	1.666,4	1.388,7	7,1	2,0	2,3	-
VH55 280/4	280	380	336	456			487,5 Δ	402,7 Δ	483,2 Δ	1490	1788	0,91	0,88	0,84	95,9	94,0	91,8	1.794,6	1.495,5	7,0	1,9	2,2	1205
VH55 300/4	300	400	360	480			527,5 Δ	435,8 Δ	523,0 Δ	1490	1788	0,90	0,88	0,83	96,0	94,5	92,5	1.922,8	1.602,3	7,0	2,0	2,3	-
VH55 315/4	315	430	378	516			547,0 Δ	451,9 Δ	542,3 Δ	1490	1788	0,92	0,90	0,84	95,1	95,1	90,3	2.019,0	1.682,5	7,3	1,9	2,2	1595
VH55 330/4	330	450	396	540			581,5 Δ	480,4 Δ	576,5 Δ	1490	1788	0,90	0,87	0,84	95,8	94,7	90,0	2.115,1	1.762,6	7,1	2,0	2,4	-
VH55 355/4	355	485	426	582			617,4 Δ	510,0 Δ	612,0 Δ	1490	1788	0,91	0,89	0,83	96,0	93,6	94,2	2.275,3	1.896,1	7,3	2,0	2,2	1730
VH55 370/4	370	505	444	606			646,9 Δ	534,4 Δ	641,2 Δ	1490	1788	0,91	0,89	0,84	95,5	94,0	92,7	2.371,5	1.976,2	7,2	2,0	2,3	1800

- Dimensions are in mm's.
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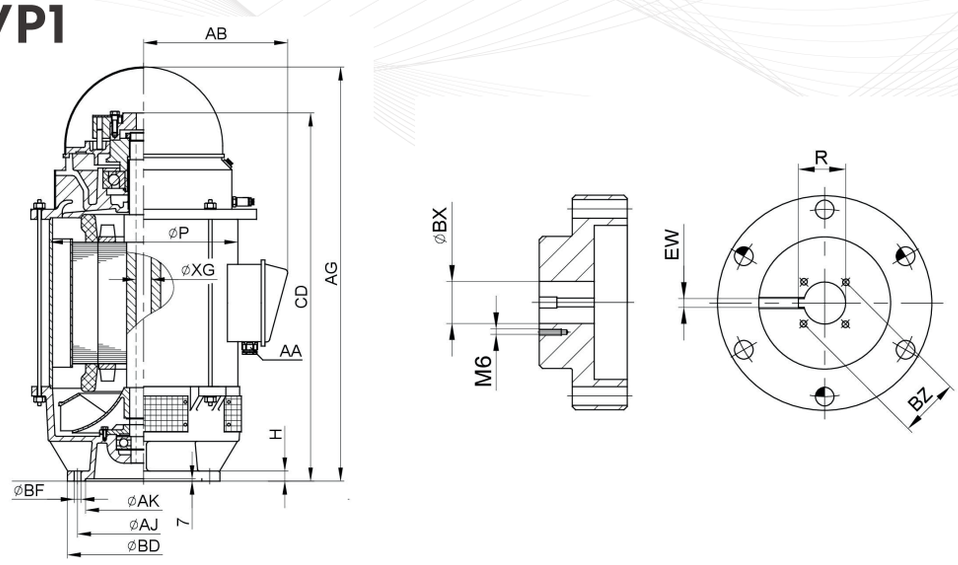
MECHANICAL DIMENSIONS

IP23-WP1



Motor Type	Rated Power		Axial Load / Thrust		Bearings		Motor Dimensions											Coupling Dimensions			
	[kW]	[hp]			Thrust (Upper) Bearing	Guide (Lower) Bearing	CD	XG	AK	AJ	BF	AG	BD	H	P	AB	AA	BX +0,03	EW	R	BZ
	380 V - 50 Hz		[kN]	[lbs]																	
2 POLES							IP23 PROTECTION CLASS - WP1														
VH23 3/2	3	4	10,21	2.295	7310	6307	505	22	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 4/2	4	5,5	10,21	2.295	7310	6307	505	22	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 5,5/2	5,5	7,5	10,21	2.295	7310	6308	505	22	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 7,5/2	7,5	10	10,21	2.295	7310	6308	505	22	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 11/2	11	15	12,99	2.920	7312	6310	653	33,5	209,55	232	11	740	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 15/2	15	20	12,99	2.920	7312	6310	653	33,5	209,55	232	11	740	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 18,5/2	18,5	25	12,99	2.920	7312	6310	653	33,5	209,55	232	11	740	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 22/2	22	30	12,99	2.920	7312	6310	738	33,5	209,55	232	11	825	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 30/2	30	40	17,91	4.026	7220	6310	818	33,5	343	375	17,5	900	420	20	340	270	Pg29	30,2	6,35	33,2	44,5
VH23 37/2	37	50	17,91	4.026	7220	6310	818	33,5	343	375	17,5	900	420	20	340	270	Pg29	30,2	6,35	33,2	44,5
VH23 45/2	45	60	17,91	4.026	7220	6212	796	33,5	343	375	17,5	875	430	24	370	305	Pg29	30,2	6,35	33,2	44,5
VH23 55/2	55	75	17,91	4.026	7220	6212	846	33,5	343	375	17,5	925	430	24	370	305	Pg29	30,2	6,35	33,2	44,5
VH23 75/2	75	100	20,60	4.631	7222	6315	896	38,5	343	375	17,5	1000	430	30	442	319	Pg36	38,2	9,52	42,4	54
VH23 90/2	90	125	20,60	4.631	7222	6315	946	38,5	343	375	17,5	1050	430	30	442	319	Pg36	38,2	9,52	42,4	54
VH23 110/2	110	150	28,54	6.416	7322	6315	1120	45	343	375	17,5	1240	450	30	560	440	Pg36	42,9	9,52	47,22	63,5
VH23 132/2	132	180	28,54	6.416	7322	6315	1170	45	343	375	17,5	1290	450	30	560	440	Pg36	42,9	9,52	47,22	63,5
VH23 150/2	150	200	CUSTOM DESIGNED ON REQUEST		CUSTOM DESIGNED ON REQUEST		CUSTOM DESIGNED ON REQUEST											CUSTOM DESIGNED ON REQUEST			
VH23 160/2	160	220																			
VH23 185/2	185	250																			
VH23 200/2	200	270																			
VH23 220/2	220	300																			
VH23 250/2	250	340																			

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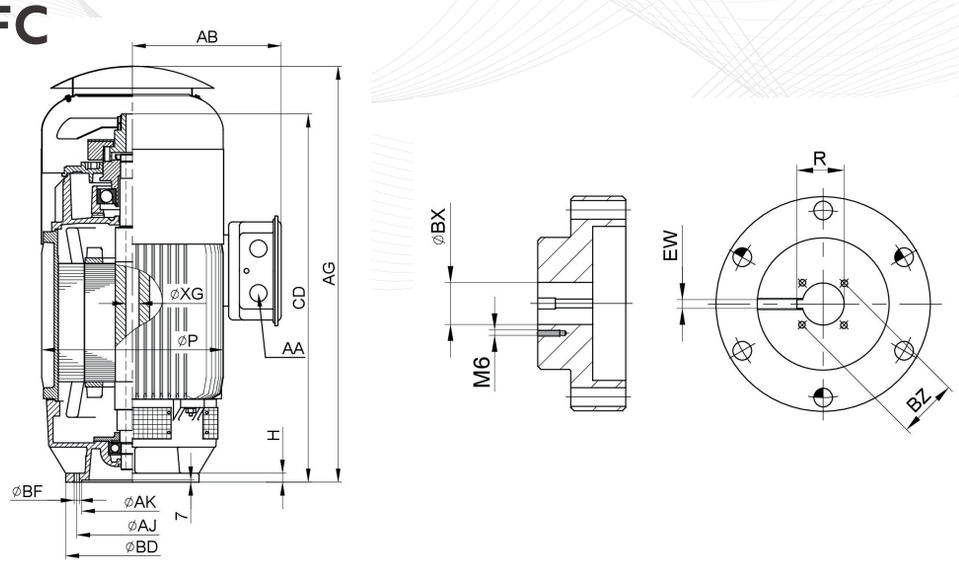
MECHANICAL DIMENSIONS

IP55-TEFC



Motor Type	Rated Power		Axial Load / Thrust		Bearings		Motor Dimensions										Coupling Dimensions			
	[kW]	[hp]			Thrust (Upper) Bearing	Guide (Lower) Bearing	CD	XG	AK	AJ	BF	AG	BD	H	P	AB	AA	BX +0,03	EW	R	BZ
	380 V - 50 Hz		[kN]	[lbs]																	
2 POLES							IP55 PROTECTION CLASS - TEFC														
VH55 37/2	37	50	CUSTOM DESIGNED ON REQUEST		CUSTOM DESIGNED ON REQUEST		CUSTOM DESIGNED ON REQUEST											CUSTOM DESIGNED ON REQUEST			
VH55 45/2	45	60																			
VH55 55/2	55	75																			
VH55 75/2	75	100																			
VH55 90/2	90	125																			
VH55 110/2	110	150																			
VH55 132/2	132	180																			
VH55 150/2	150	200																			
VH55 160/2	160	220																			
VH55 185/2	185	250																			
VH55 200/2	200	270																			
VH55 220/2	220	300																			
VH55 250/2	250	340																			

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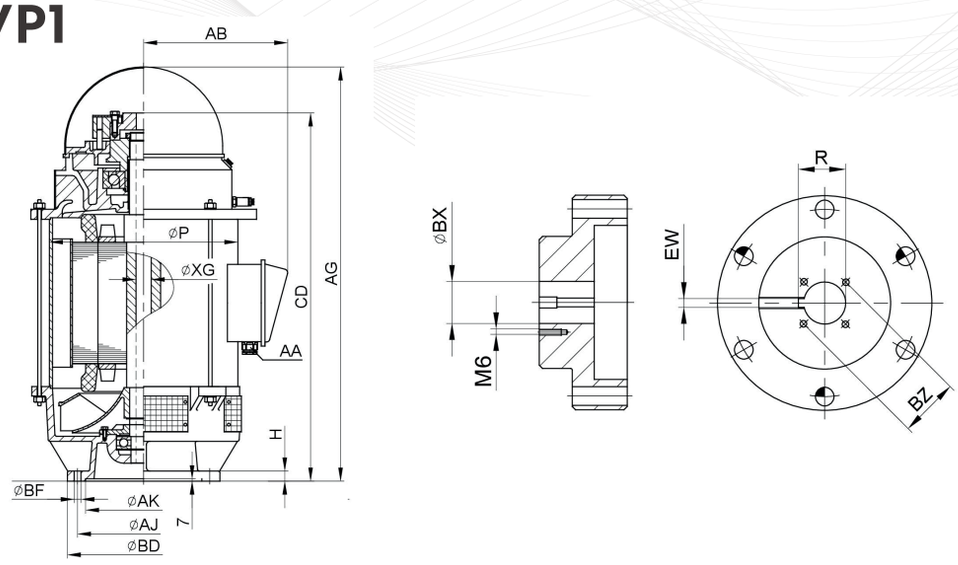
MECHANICAL DIMENSIONS

IP23-WP1

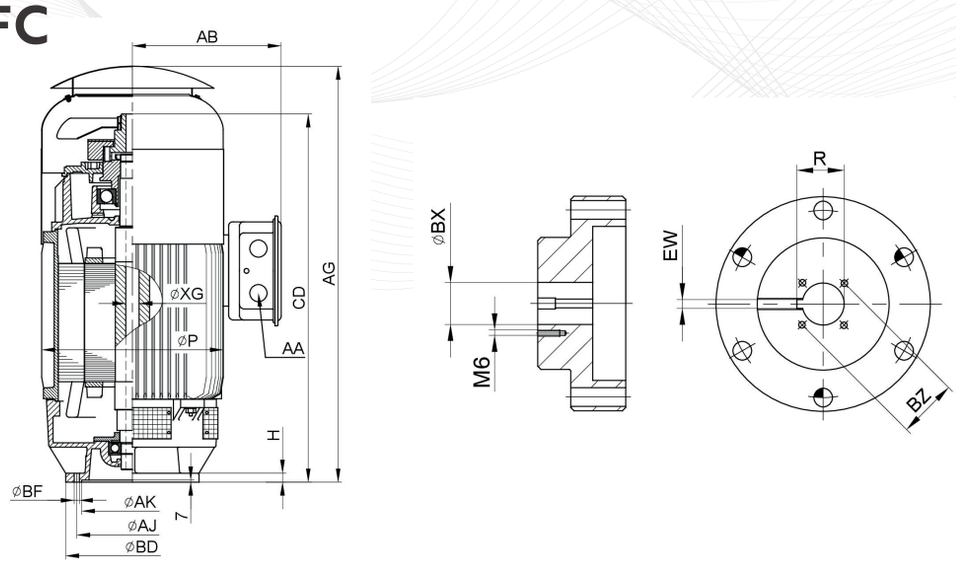


Motor Type	Rated Power		Axial Load / Thrust		Bearings		Motor Dimensions											Coupling Dimensions			
	[kW]	[hp]			Thrust (Upper) Bearing	Guide (Lower) Bearing	CD	XG	AK	AJ	BF	AG	BD	H	P	AB	AA	BX +0,03	EW	R	BZ
	380 V - 50 Hz		[kN]	[lbs]																	
4 POLES							IP55 PROTECTION CLASS - TEFC														
VH23 3/4	3	4	12,73	2.862	7310	6307	505	27	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 4/4	4	5,5	12,73	2.862	7310	6307	505	27	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 5,5/4	5,5	7,5	12,73	2.862	7310	6308	505	27	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 7,5/4	7,5	10	12,73	2.862	7310	6308	505	27	209,55	232	11	600	265	15	264	202	M20	19,05	4,76	21,26	35
VH23 11/4	11	15	15,93	3.581	7312	6310	653	33,5	209,55	232	11	740	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 15/4	15	20	15,93	3.581	7312	6310	653	33,5	209,55	232	11	740	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 18,5/4	18,5	25	15,93	3.581	7312	6310	738	33,5	209,55	232	11	825	265	20	360	270	Pg29	25,4	6,35	28,3	35
VH23 22/4	22	30	21,68	4.874	7220	6310	818	33,5	343	375	17,5	900	420	20	340	270	Pg29	30,2	6,35	28,3	44,5
VH23 30/4	30	40	21,68	4.874	7220	6310	818	33,5	343	375	17,5	900	420	20	340	270	Pg29	30,2	6,35	33,2	44,5
VH23 37/4	37	50	21,68	4.874	7220	6212	796	33,5	343	375	17,5	875	430	24	370	305	Pg29	30,2	6,35	33,2	44,5
VH23 45/4	45	60	21,68	4.874	7220	6212	846	33,5	343	375	17,5	925	430	24	370	305	Pg29	30,2	6,35	33,2	44,5
VH23 55/4	55	75	32,95	7.407	7320	6315	831	38,5	343	375	17,5	930	430	30	442	319	Pg36	38,2	9,52	33,2	54
VH23 75/4	75	100	32,95	7.407	7320	6315	896	38,5	343	375	17,5	1000	430	30	442	319	Pg36	38,2	9,52	42,4	54
VH23 90/4	90	125	33,68	7.572	7322	6315	1030	45	343	375	17,5	1150	450	30	560	440	Pg36	38,2	9,52	42,4	54
VH23 110/4	110	150	33,68	7.572	7322	6315	1030	45	343	375	17,5	1150	450	30	560	440	Pg36	42,9	9,52	47,22	63,5
VH23 132/4	132	180	33,68	7.572	7322	6315	1170	45	343	375	17,5	1290	450	30	560	440	Pg36	42,9	9,52	47,22	63,5
VH23 150/4	150	200	33,68	7.572	7322	6315	-	45	343	375	17,5	-	450	30	560	440	Pg36	42,9	9,52	47,22	63,5
VH23 160/4	160	220	74,78	16.811	2x7324	7316+6316	1302	58	343	375	17,5	1420	508	35	580	425	Pg48	49,2	12,7	54,9	63,5
VH23 185/4	185	250	74,78	16.811	2x7324	7316+6316	1302	58	343	375	17,5	1420	508	35	580	425	Pg48	49,2	12,7	54,9	63,5
VH23 200/4	200	270	74,78	16.811	2x7324	7316+6316	1382	58	343	375	17,5	1500	508	35	580	425	Pg48	49,2	12,7	54,9	63,5
VH23 220/4	220	300	74,78	16.811	2x7324	7316+6316	-	58	343	375	17,5	-	508	35	580	425	Pg48	49,2	12,7	54,9	63,5
VH23 250/4	250	340	188,78	42.440	29428	7318+6318	1462	58	343	375	17,5	1580	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 260/4	260	350	188,78	42.440	29428	7318+6318	-	58	343	375	17,5	-	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 280/4	280	380	188,78	42.440	29428	7318+6318	1512	58	343	375	17,5	1630	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 300/4	300	400	188,78	42.440	29428	7318+6318	-	58	343	375	17,5	-	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 315/4	315	430	188,78	42.440	29428	7318+6318	1627	58	343	375	17,5	1745	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 330/4	330	450	188,78	42.440	29428	7318+6318	-	58	343	375	17,5	-	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 355/4	355	485	188,78	42.440	29428	7318+6318	1627	58	343	375	17,5	1745	508	35	580	425	M63	55,6	12,7	61,3	82,6
VH23 370/4	370	504	188,78	42.440	29428	7318+6318	1682	58	343	375	17,5	1800	508	35	580	425	M63	55,6	12,7	61,3	82,6

- Dimensions are in mm's.
- Please visit our web site (www.emtas.com.tr) for the current dimensions and values.

MECHANICAL DIMENSIONS

IP55-TEFC



Motor Type	Rated Power		Axial Load / Thrust		Bearings		Motor Dimensions											Coupling Dimensions			
	[kW]	[hp]			Thrust (Upper) Bearing	Guide (Lower) Bearing	CD	XG	AK	AJ	BF	AG	BD	H	P	AB	AA	BX +0,03	EW	R	BZ
	380 V - 50 Hz		[kN]	[lbs]																	
4 POLES							IP23 PROTECTION CLASS - WP1														
VH55 37/4	37	50	21,68	4.874	7220	6310	930,5	33,5	343	375	17,5	1057	430	24	434	300	Pg36	30,2	6,35	33,2	44,5
VH55 45/4	45	60	21,68	4.874	7220	6310	930,5	33,5	343	375	17,5	1057	430	24	434	300	Pg36	30,2	6,35	33,2	44,5
VH55 55/4	55	75	21,68	4.874	7220	6310	930,5	33,5	343	375	17,5	1057	430	24	434	300	Pg36	30,2	6,35	33,2	44,5
VH55 75/4	75	100	32,95	7.407	7320	6315	1051	38,5	343	375	17,5	1171	430	24	536	381	Pg36	38,2	9,52	42,4	54
VH55 90/4	90	125	32,95	7.407	7320	6315	1051	38,5	343	375	17,5	1171	430	24	536	381	Pg36	38,2	9,52	42,4	54
VH55 110/4	110	150	32,95	7.407	7320	6315	1153	38,5	343	375	17,5	1273	430	24	536	381	Pg36	38,2	9,52	42,4	54
VH55 132/4	132	180	33,68	7.572	7322	6315	1252	45	343	375	17,5	1414	450	30	612	501	Pg48	42,9	9,52	47,22	63,5
VH55 150/4	150	200	33,68	7.572	7322	6315	1252	45	343	375	17,5	1414	450	30	612	501	Pg48	42,9	9,52	47,22	63,5
VH55 160/4	160	220	33,68	7.572	7322	6315	1252	45	343	375	17,5	1414	450	30	612	501	Pg48	42,9	9,52	47,22	63,5
VH55 185/4	185	250	33,68	7.572	7322	6315	1303	45	343	375	17,5	1465	450	30	612	501	Pg48	42,9	9,52	47,22	63,5
VH55 200/4	200	270	33,68	7.572	7322	6315	1303	45	343	375	17,5	1465	450	30	612	501	Pg48	42,9	9,52	47,22	63,5
VH55 220/4	220	300	CUSTOM DESIGNED ON REQUEST		CUSTOM DESIGNED ON REQUEST	CUSTOM DESIGNED ON REQUEST	CUSTOM DESIGNED ON REQUEST														
VH55 250/4	250	340																			
VH55 260/4	260	350																			
VH55 280/4	280	380																			
VH55 300/4	300	400																			
VH55 315/4	315	430																			
VH55 330/4	330	450																			
VH55 355/4	355	485																			
VH55 370/4	370	505																			

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MOTOR PARTS

IP23 PROTECTION CLASS / WP1

IP55 PROTECTION CLASS / TEFC

QUALITY MANAGEMENT SYSTEM

TÜRK STANDARDLARI ENSTİTÜSÜ
TÜRK STANDARDLARINA UYGUNLUK BELGESİ
TURKISH STANDARDS INSTITUTION
CERTIFICATE OF CONFORMITY TO TURKISH STANDARDS

TÜRK STANDARDLARI ENSTİTÜSÜ
HİZMET YETERLİLİK BELGESİ

Etiler Mahallesi 1458. Cadde No: 40 Etimesgut / ANKARA

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