

Marathon MV Flame Proof Motors (IEC Frame)

May 2025
India

Industrial Motors

Commercial &
Appliance Motors

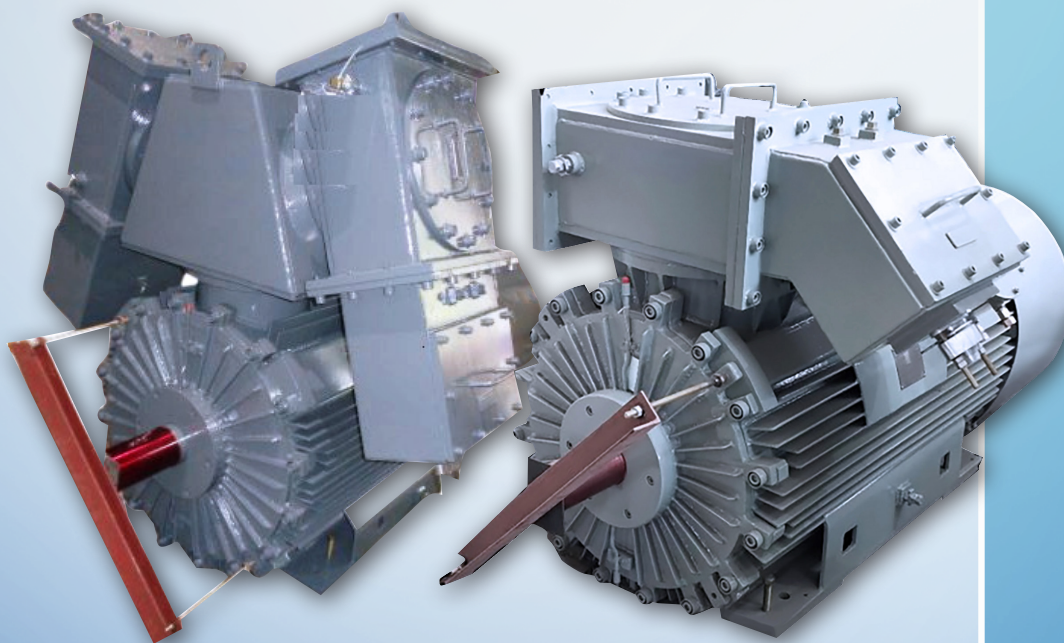
Automation

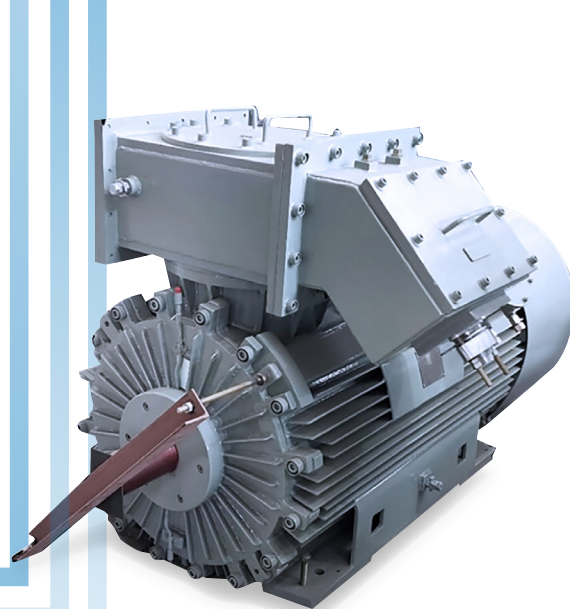
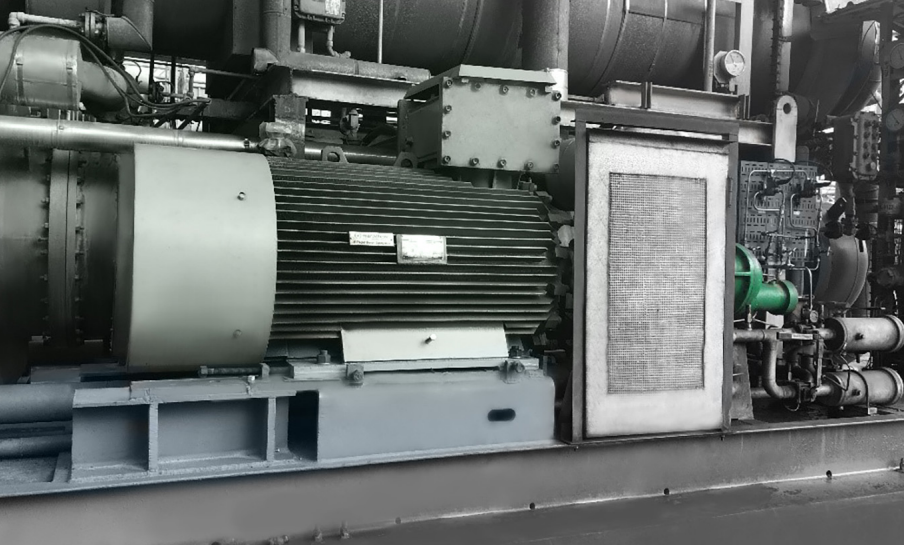
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Picture from Refinery Application

MEDIUM VOLTAGE FLAME PROOF MOTORS

Ready For Flameproof Environment Applications

An explosive atmosphere is one where a mixture with air under atmospheric conditions of flammable substances in the form of gas, vapour or mist, exists in such proportion that it may explode due to excessive temperature, arcs or sparks.

Flameproof motors were once manufactured with an enclosure constructed in such a manner that any explosion inside is not capable of igniting an explosive atmosphere outside the enclosure and the surface temperature is safe enough not to ignite the outside explosive atmosphere.

STANDARDS AND SPECIFICATIONS

Flameproof Motors (type Ex d) conform to the following standards.

I.	Enclosure	IS/IEC 60079-1
II.	Performance	IS/IEC 60034
III.	Dimension	IS 1231
		IS 2223
IV.	Protection	IS 4691
V.	Mounting	IS 2253

Zones

Hazardous areas have been classified into three zones as follows:

Zone 0	explosive gas-air mixture is continuously present or present for long periods. Note: No Electric motors may be used in Zone 0.
Zone 1	explosive gas-air mixture is likely to occur in normal operation.
Zone 2	explosive gas-air mixture is not likely to occur in normal operation and if it occurs it will exist only for a short time.

By implication an area other than zone 0, 1 or 2 is deemed to be a non-hazardous or safe area.

TEMPERATURE CONSIDERATIONS

Ignition Temperature

The minimum temperature at which a gas, vapour or mist ignites spontaneously at atmospheric pressure is known as the Ignition Temperature. As the gases and vapours encountered in industry have a wide spread of Ignition Temperatures, it has been agreed internationally to group together those which lie within certain temperature classes. The classification of these temperature classes is detailed in Table 1.

Table 1. Temperature Class

Temperature Class	Maximum Surface Temperature (°C)
T1	450
T2	300
T3	200
T4	135
T5	100
T6	85

Standard motors are suitable for T3 temperature class.



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Flash Point

Ignition by flames or sparks is another concern of a gas mixture in the atmosphere. This is a temperature known as Flash Point.

This Flash Point of a compound is the minimum temperature of which it gives up sufficient vapour to form a flammable mixture near the surface of the compound or within the enclosure used for Flash Point determination. Motor selection must therefore ensure that maximum surface temperature class must not exceed the Ignition Temperature of the explosive mixture.

FLAME PROPAGATION

A further property of an explosive mixture is the ability to spread or propagate a flame, once ignited, around, through or past obstacles placed in its path. Based on the tests conducted at various international laboratories Maximum Experimental Safe Gap (MESG) for different gas/air mixtures have been obtained and the guidelines indicating gaps permitted for joints and seals for flameproof enclosure are set.

According to the international norms electrical apparatus for hazardous atmosphere is divided into following groups:

Group 1	Coal Mines
Group 2	All Hazardous Atmospheres other than Coal Mines.

SUPPLY VOLTAGE AND FREQUENCY

Motors can be wound for any voltage from up to 6.6KV and for 50 Hz frequency with preferred voltage of 415V, 690V, 3300V, 6600V.

Motors are suitable for operation $\pm 10\%$ voltage variation and $\pm 5\%$ frequency variation with permissible combined variation of 10%.

SITE CONDITIONS

Standard motors are suitable for operation of rated output with an ambient temperature upto 45°C and altitude not exceeding 1000 meters.

For higher ambient temperature and altitude following correction factors should be applied.

Ambient Temperature	50°C	55°C	60°C
Rated output reduced to	95%	90%	85%
Altitude	1500m	2000m	2500m
Rated output reduced to	95%	90%	85%

INSULATION

The winding insulations system is class F in accordance with IEC 85. More detail information on insulation & vacuum pressure impregnation system (VPI)/ Processes may be provided on request.

MOUNTING

Standard motors are provided with horizontal foot mounted construction (IMB3) with single cylindrical shaft extension at driven-end side. Other mounting options are IMV1, IMB35.

VIBRATION LIMITS

All rotors are dynamically balanced with half key to ensure normal class of vibration level as per IEC[®]* 60034-14.

OVERSPEED

All standard motors are suitable for withstanding mechanical over speed of 120 % for 2 Minutes.

MOMENTARY OVER LOAD

Standard motors will withstand momentary overload of 1.6 times normal full load torque for a time not exceeding 15 seconds, provided the supply is maintained at the rated values.

NOISE LEVEL

Noise level for KF series flameproof motors conforms to the requirement of IEC 60034-9.

Reduced noise levels may be offered on specific enquiry.

CONSTRUCTION

Frame

KF series flameproof motors have specifically been designed in view of the underground mine service requirements. The motors have rugged and robust construction using IS:2062 grade of structural steel. For foot mounted construction integrally inbuilt feet of sufficient thickness are provided. The rugged and robust construction has been designed to withstand rough handling of motors specially in underground mines in hazardous site conditions complicated by lack of space, light, cleanliness, retaining the flameproof construction of the enclosures. The recess for end bracket locations are accurately turned and machined to fine limits. Standard motors have a single cylindrical shaft extension with keyway. Standard KF series flameproof motor offer copper cage rotor. Frame enclosure is hydraulically tested.

*IEC is a trademark or trade name of International Electrotechnical Commission and is not owned or controlled by Marathon Electric.

Cooling Fan

A fabricated mild steel construction cooling fan is used for the entire range of motors. Cooling fans are uni-directional for 2 pole motor & uni or bi-directional for other motors based on requirements.

Bearings

Metric size medium series (C3) ball and roller bearings are used in general. The bearings are lubricated with premium grade lithium based grease containing oxidation and corrosion inhibitors. Regreasing facility is provided as standard for motors. The non-drive end bearing is normally located to eliminate axial movement of rotor sub-assembly. In vertical mounted motors (VI construction) the rotor weight is supported by angular contact ball bearing at top end.

End shields/Bearing Housing

The End shield/ Bearing Housing have a rugged and robust construction fabricated from hot rolled structural steel conforming to IS:2062 which are duly stress relieved. For frame size KF280 – KF450 bearings are directly mounted in end shield bore.

The accurately machined location spigots and bearing housing ensures accurate alignment and concentricity of rotor assembly.

Lamination

High grade low loss electrical grade steel laminations are used. The choice of lamination grade and insulation coating on lamination depends on the performance requirement of the motor.

Termination Arrangement

Standard foot mounted motor in frame sizes KF280-KF450 are provided with a single entry or double entry terminal box depending upon the cable sizing requirements. Terminal box placed on top. In case of single-entry terminal box, cable entry is generally located at right hand side looking from drive end side for standard foot mounted motors. Terminal box can be located at left hand side looking from driven end side by rotating the terminal box by 180 degree.

Terminal box is made of fabricated steel and has its own flameproof enclosure capable of containing the internal explosion without transmitting the flame to the surrounding atmosphere or to the motor main enclosure.

Terminal box can be rotated in steps of 90° so that cable can be terminated from any of the four directions.

EARTHING TERMINALS

All motors are provided with internal earthing terminal in terminal box assembly with two external earthing terminals on frame housing.

CERTIFICATION

Entire range of MV flameproof motors have been tested and certified by Central Institute of Mining and Fuel Research®* (CIMFR), Dhanbad for gas group I, IIA and IIB in accordance with IS / IEC®* 60079 - 1 .

Separate approvals are also available from respective statutory authorities for operation in respective gas groups for areas under their jurisdiction as per table below.

Zone	Gas Group	Area	Statutory Authority
1	I, IIA & IIB	Underground Coal Mines	Directorate General of Mines Safety®* (DGMS), Dhanbad, Jharkhand
2	IIA & IIB	Petro-Chemical Industries/ Refineries	Petroleum and Explosives Safety Organization®* (PESO), Nagpur, Maharashtra

Note: All flameproof motors are covered by BIS license.

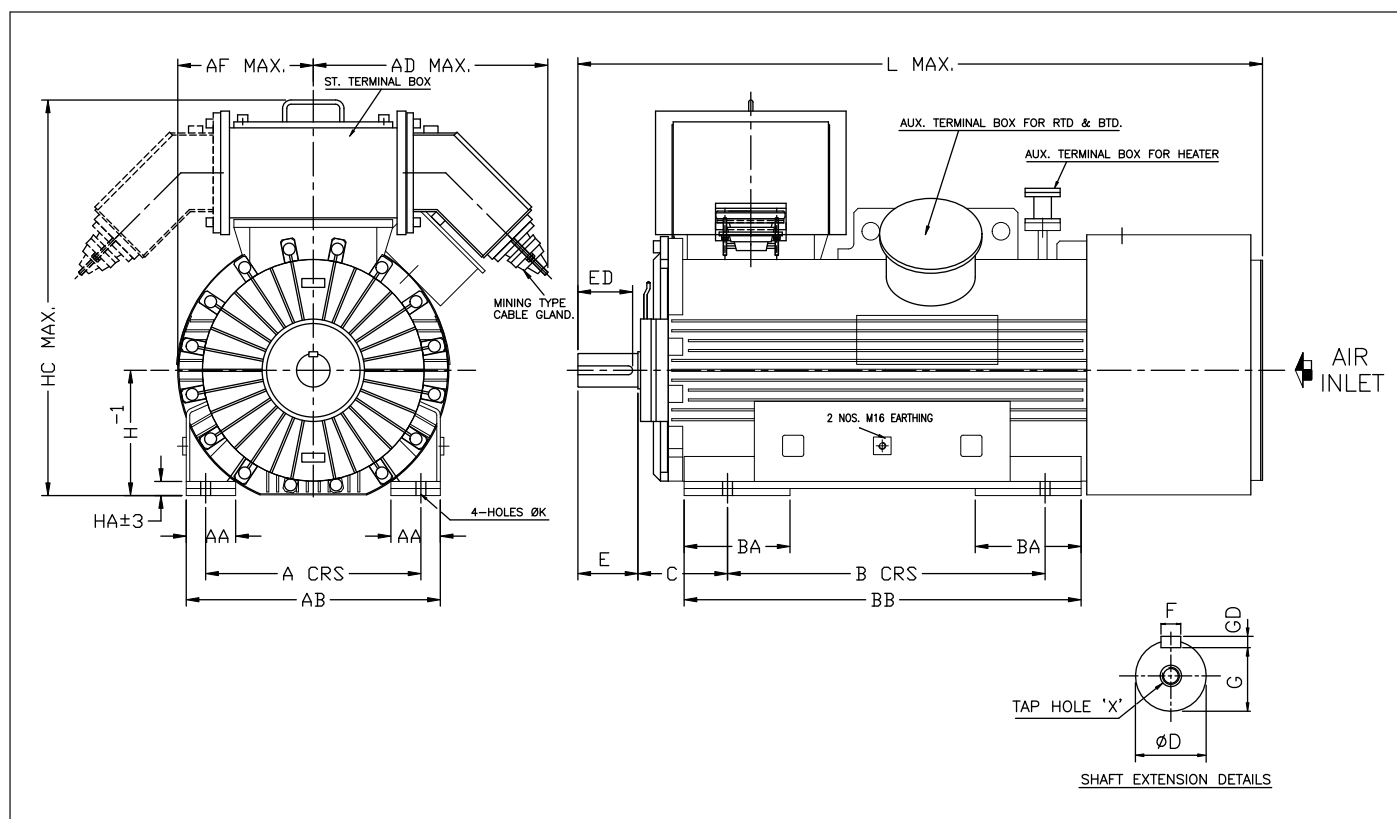
PAINT SYSTEM

Standard motors are provided with synthetic enamel finish paint. All steel components are shot blasted and fettled prior to application of red oxide primer before application of final paint.

For highly corrosive atmosphere special winding treatment is provided against specific order.

To ensure good corrosion resistance under such environment motors may be provided with chlorinated rubber based paint or epoxy based paint on request.

General Arrangement Drawing For Mining Application



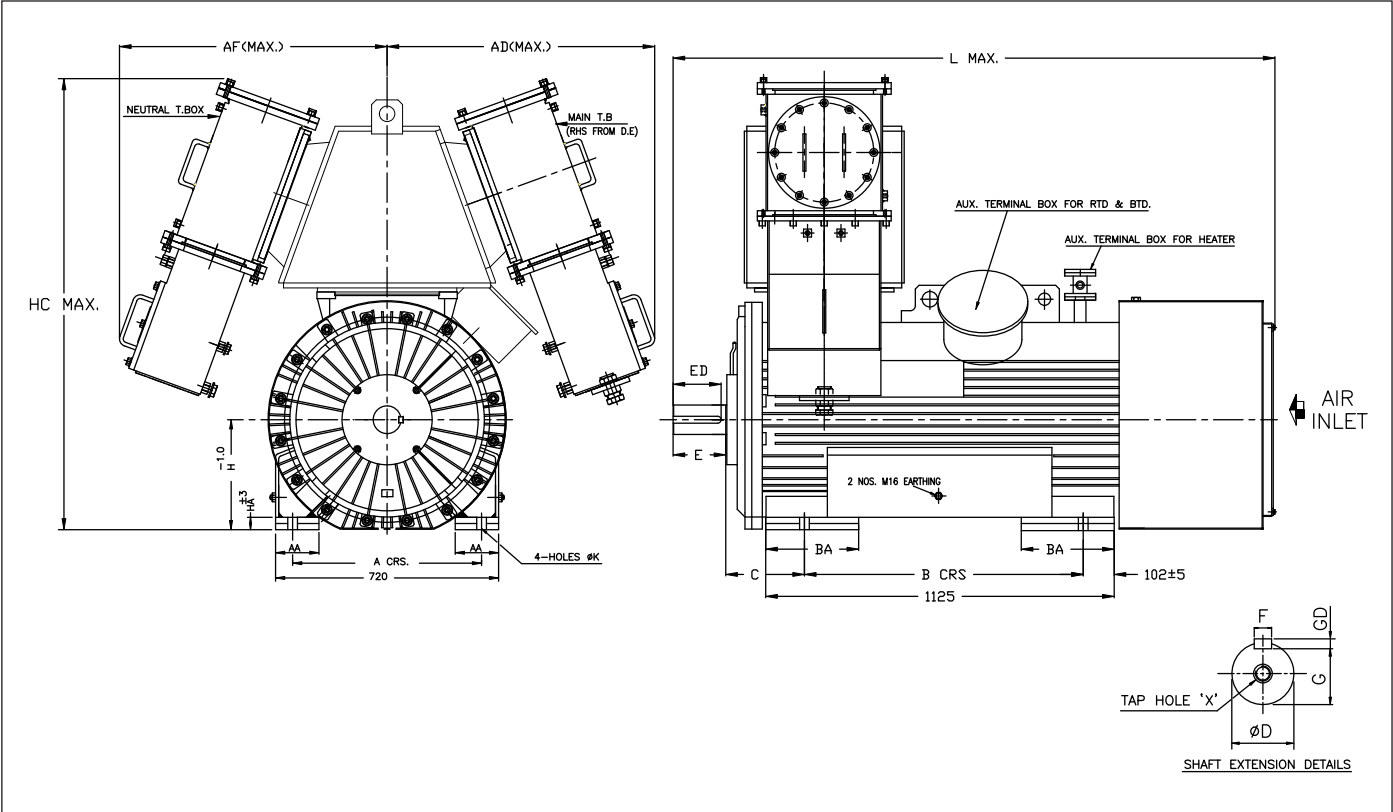
Frame	Pole	A	B	C	K	BB	BA	AB	AA	HA	H TOL.-1	HC	AD	AF	D		E	ED	F	GD	G TOL.-0.2	X	L (Max)
															Nom.	Tol.							
KF280	4-12	457	710	190	24	810	140	536	100	31	280	1050	700	400	75	+ .030 + .011	140	120	20	12	67.4	M20	1750
KF355	4-12	610	900	254	28	1125	300	720	140	40	355	1150	700	400	95	+ .035 + .013	170	155	25	14	86	M24	2000
KF400	4-12	686	1000	280	35	1100	250	786	140	40	400	1200	700	400	100	+ .035 + .013	210	175	28	16	90	M24	2000

Certified Ratings of Mining Type FIp Motor

Frame	Pole	Voltage	Certified Rating
KF280	2P, 4P, 6P	3300 V	75KW, 90KW, 110KW, 125KW, 140KW, 150KW
KF355	2P, 4P, 6P, 8P	Up tp 6600 V	110K, 132KW, 150KW, 160KW, 170KW, 175KW, 180KW, 185KW, 190KW, 200KW, 210KW, 220KW, 225KW, 235KW, 240KW, 250KW
KF400	2P, 4P, 6P, 8P, 10P, 12P	Up tp 6600 V	110K, 132KW, 150KW, 160KW, 170KW, 175KW, 180KW, 185KW, 190KW, 200KW, 210KW, 220KW, 225KW, 235KW, 240KW, 250KW
KF450	4P, 6P, 8P, 10P	Up tp 6600 V	450KW, 500KW, 550KW, 600KW, 650KW, 700KW, 750KW

NOTE: For other ratings or bespoke dimensions, please contact manufacturer.

General Arrangement Drawing For Oil & Gas Application



Frame	Pole	A	B	C	K	BB	BA	AB	AA	HA	H TOL. - 1	HC	AD	AF	D		E	ED	F	GD	G TOL. - 0.2	X	L (MAX)
															Nom.	Tol.							
KF280	4-12	457	710	190	24	810	140	536	100	31	280	1450	900	400	75	+ .030 + .011	140	120	20	12	67.4	M20	1750
KF355	4-12	610	900	254	28	1125	300	720	140	40	355	1550	900	400	95	+ .035 + .013	170	155	25	14	86	M24	2000
KF400	4-12	686	1000	280	35	1100	250	786	140	40	400	1650	900	400	100	+ .035 + .013	210	175	28	16	90	M24	2000
KF450	4-12	750	1120	315	35	1220	250	900	170	45	450	1685	900	400	120	+ .035 + .013	210	205	32	18	109	M24	2375

NOTE: For other ratings or bespoke dimensions, please contact manufacturer.

NOTES

The scope of WEG Group solutions
is not limited to products and solutions
presented in this catalogue.

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The values shown are subject to change without prior notice.
The information contained is reference values.