

# ***Hazardous Area Motors***

*Protecting production and life*

***Empowering the Future***



# World Leader in Internationally Certified Hazardous Area Motors

## 1 Certified for Use Worldwide

TMEIC hazardous area motors are a vital element in protecting human life and productivity during the manufacturing, processing, transportation and storage of combustible gases and materials. Regardless of the application or industry, be it oil and gas, chemical or mining, we have an ideal product to meet your needs. As testimony to the high level of safety our hazardous area motors provide, TMEIC has acquired certification for most regions worldwide.



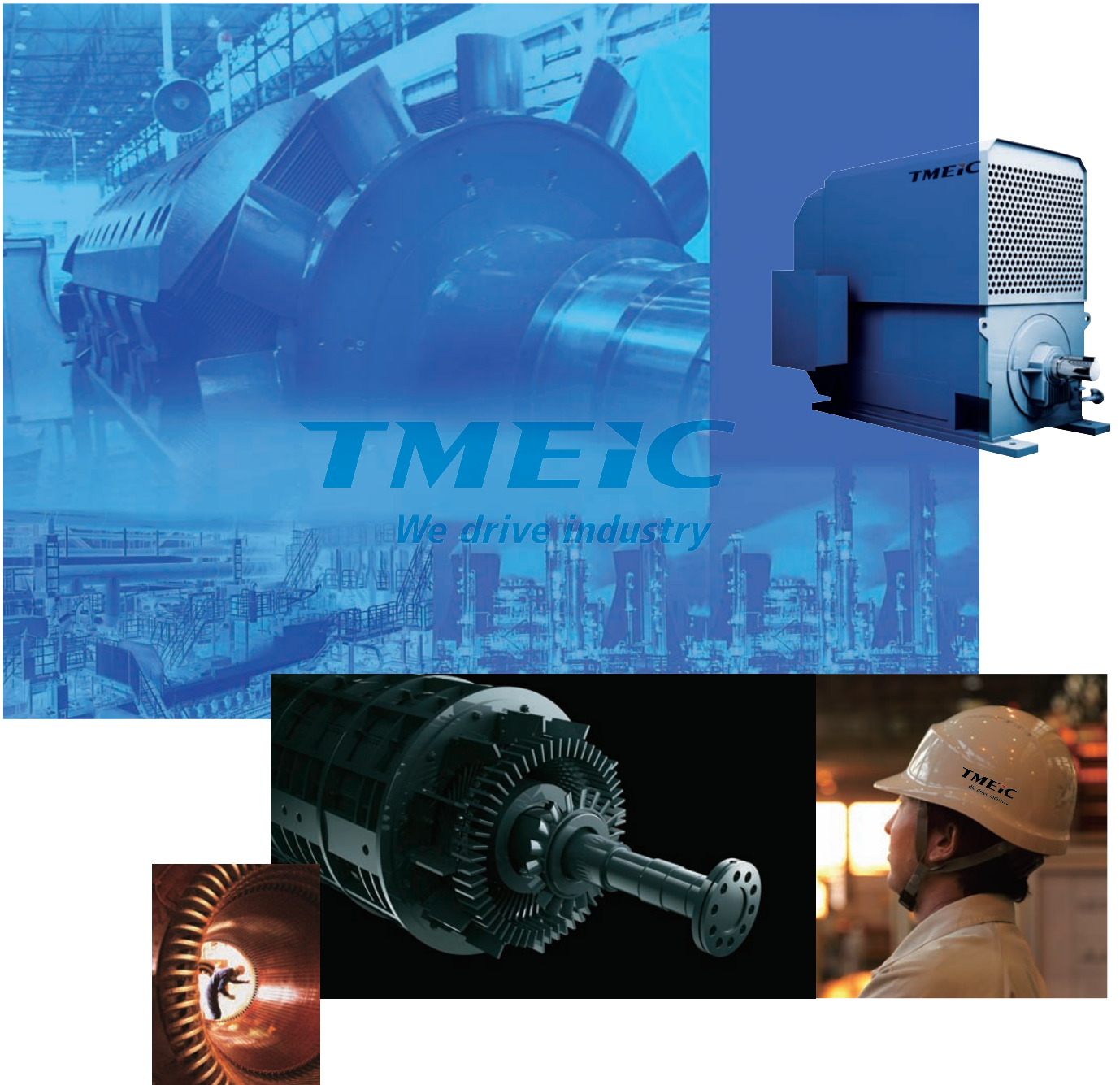
## 2 Enhanced Performance (Drive Integration)

Incorporating the best technologies and accumulated experience of Toshiba and Mitsubishi Electric, in addition to being manufactured for reliability and safety in harsh operating environments, TMEIC hazardous area motors are designed for easy variable-speed drive integration. Combined with highly efficient inverters equipped with the latest control technologies, our systems ensure precise motor operation that contributes to optimum productivity for our customers. They're eco-conscious too, consuming less power, and that means lower operating costs and a reduction in CO<sub>2</sub> emissions. All TMEIC integrated motor-drive systems are certified, which eliminates the need for additional testing; saving both time and money.

## 3 Pre-start Air Purging Eliminated

The advanced designs of TMEIC Exn and Exe motors have led to some models passing standard IEC/EN gas tests. Exn motors up to 11kV and Exe motors up to 6.6kV no longer require air purging before starting.

*Wide-ranging lineup of motors designed for production and employee safety*



# Manufactured in Accordance with International Certification Bodies and Global Standards

To ensure maximum safety, most countries have passed legislation and implemented regulations and laws based on national and international standards. TMEIC motors are certified for operation in hazardous areas in most regions around the world.

## Global Protection and Certification

	Standard	Certification Body
Europe	EN & ATEX	Baseefa
Russia	IEC or GOST	Nanio CCVE
China	GB	CQST or NEPST
Korea	IEC	KOSHA or KGS
Australia	IEC	Baseefa
India	IEC or EN&ATEX	CCOE
USA	NEC & ISA	FM
Canada	CSA	CSA
Brazil	ABNT & IEC	CEPEL or NCC
Others	IEC or EN&ATEX	Baseefa

Hazardous area motors are categorized according to the zone, type of protection and frame size. The table above shows the certifications that TMEIC has received from various authoritative bodies, in many cases the certifications apply to both constant and variable-speed motors.



## Classification of Hazardous Area



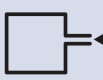

### Zone definition according to EN 60079-10-1/IEC 60079-10-1 and EN 60079-10-2/IEC 60079-10-2

<b>Zone 0</b>	Area in which an explosive gas atmosphere is present continuously or for long periods or frequently
<b>Zone 1</b>	Area in which an explosive gas atmosphere is likely to occur in normal operation occasionally
<b>Zone 2</b>	Area in which an explosive gas atmosphere is not likely to occur in normal operation but, if it does occur, will persist for a short period only
<b>Zone 22</b>	Area in which an explosive atmosphere in the form of a cloud of combustible dust in air is not likely to occur in normal operation but, if it does occur, will persist for a short period only

Potentially explosive atmospheres are divided into zones based on the chronological and geographical probability of the presence of a hazard. Information and specifications regarding zone subdivision for gas atmospheres can be found in EN 60079-10-1/IEC 60079-10-1, and that for potentially explosive dust atmospheres can be found in EN 60079-10-2/IEC 60079-10-2. Further, a distinction is made between various explosion groups and temperature classes, and these are included in the hazard assessment.

## Types of Explosion-protected Machines

### Type of protection and prevention

<b>Exn</b>		<b>Non-sparking in accordance with EN 60079-15/IEC 60079-15</b> Machines not capable of igniting a surrounding explosive atmosphere during normal operation. Applicable zones: Zone 2
<b>Exe</b>		<b>Increased safety in accordance with EN 60079-7/IEC 60079-7</b> Machines that do not emit dangerous sparks or temperatures when starting or during normal operation. Special additional safety measures are taken. Applicable zones: Zone 1 and 2
<b>Exp</b>		<b>Pressurized in accordance with EN 60079-2/IEC 60079-2</b> Explosive gases that may result in fire are prevented from permeating inside the machine. Applicable zones: Zone 1 and 2
<b>Exd</b>		<b>Flameproof enclosure in accordance with EN 60079-1/IEC 60079-1</b> Machines constructed to contain an internal explosion and prevent the transmission of flame to the external atmosphere. Operating temperature is such that it cannot ignite any surrounding gases. Applicable zones: Zone 1 and 2
<b>Extc</b>		<b>Enclosure in accordance with EN 60079-31/IEC 60079-31</b> Machines enclosed for the purpose of protecting electrical equipment. The surface temperature is limited to enable use in areas where combustible dust may be present in concentrated levels that could cause a fire or explosion. Applicable zones: Zone 22

Depending on the zone and associated hazard, operating equipment must comply with defined minimum protection requirements. The various types of protection require that motors be subjected to appropriate measures that will prevent them from igniting the surrounding potentially explosive atmosphere.

# Features of Hazardous Area Motors

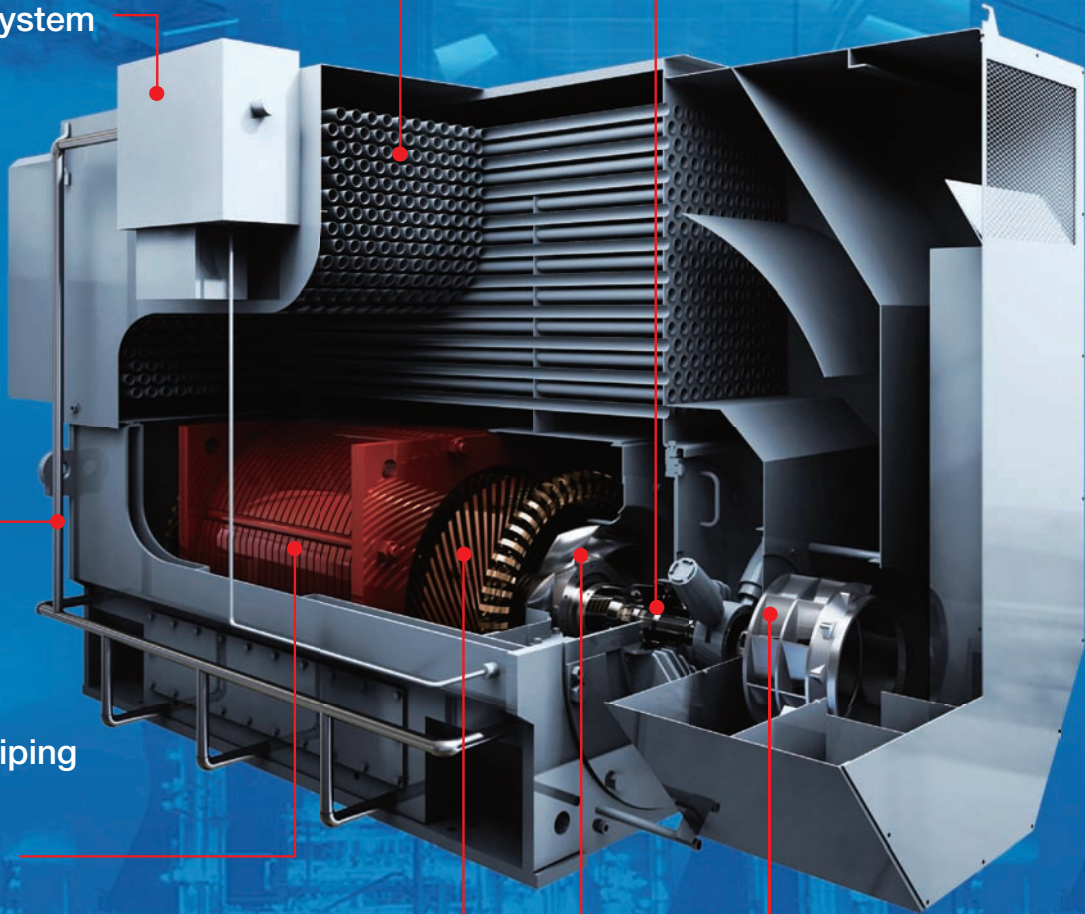
**Ex** *p* *Pressurised*

**IC611/IM B3**

Heat Exchanger

Air Purge System

Oil-fed Sleeve Bearing



Air Purge Piping

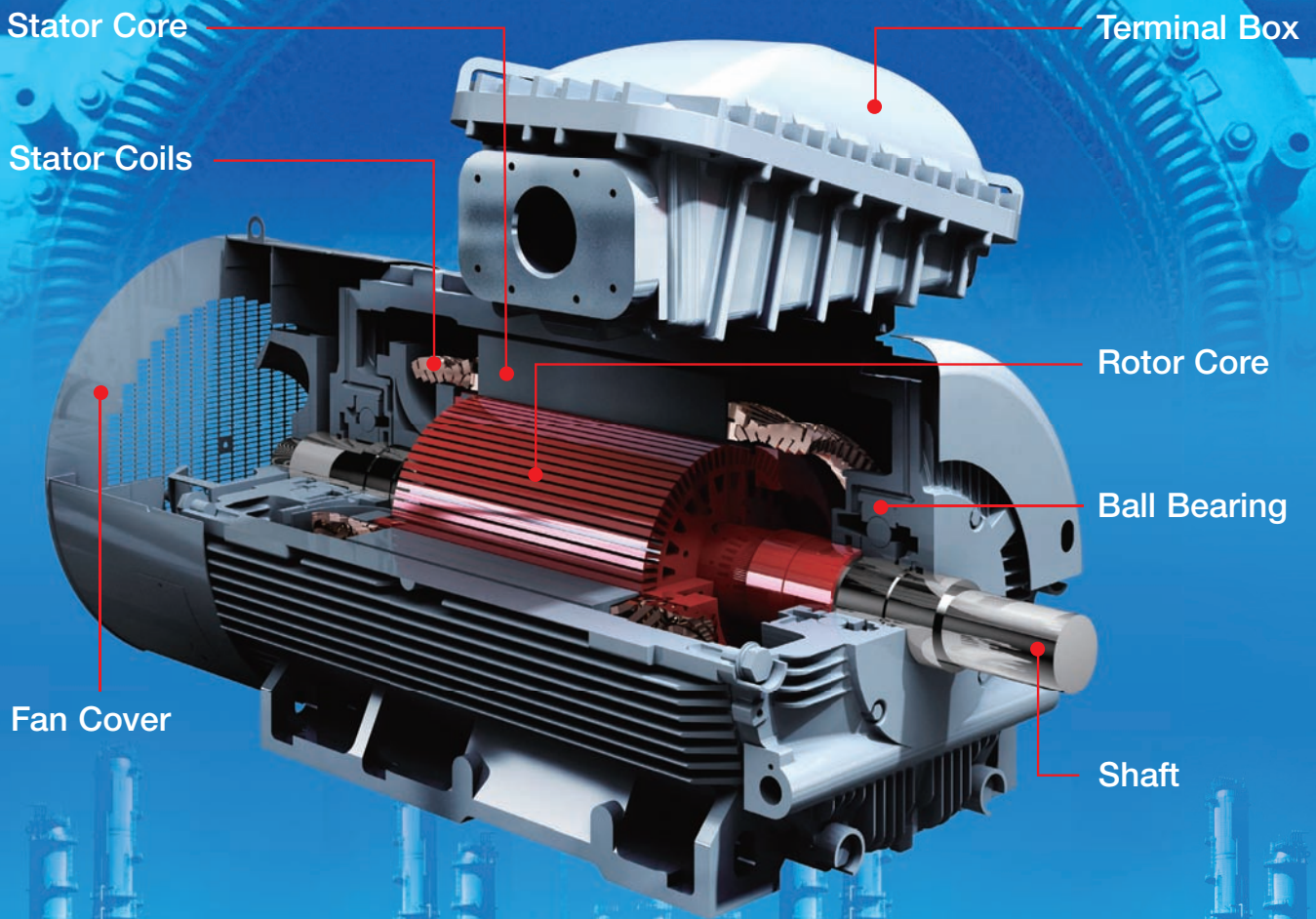
Stator Core

Stator Coils

Cooling Fan

**Ex** *d* Flameproof Enclosure

# IC411/IM B3



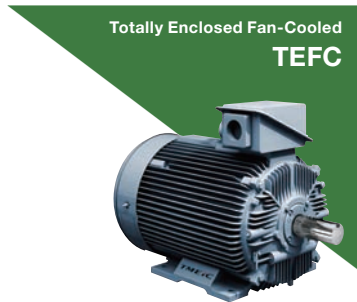
# Full Lineup Specially Designed for Performance, Safety and Reliability

## *Ex n* Non-sparking

Degree of protection  
**IP54/IP55**

Cooling method  
**IC411/IC416**

Construction  
**IM B3/IM V1**



TEFC	
Motor type	IM
Rated voltage	up to 6.9kV
Hazardous area classification	Zone 2
Stator winding insulation	Thermal class 155 (F)
Shaft height	250 to 450mm
Bearings	Antifriction
Cage material	Aluminum/Copper
Frame material	Cast iron
Standards	IEC, EN, JEC

Degree of protection  
**IP54/IP55**

Cooling method  
**IC611/IC616  
IC81W/IC86W**

Construction  
**IM B3/IM V1**



TEAAC, TEWAC	
Motor type	IM/SM
Rated voltage	up to 13.8kV
Hazardous area classification	Zone 2
Stator winding insulation	Thermal class 155 (F)
Shaft height	315 to 1200mm
Bearings	Antifriction/Sleeve
Cage material	Copper
Frame material for shaft height 315 to 450mm	Frame: Cast iron Top cover: Steel
Frame material for shaft height 500 to 1200mm	Frame: Steel Top cover: Steel
Standards	IEC, EN, JEC

## *Ex e* Increased Safety

Degree of protection  
**IP54/IP55**

Cooling method  
**IC611/IC616**

Construction  
**IM B3/IM V1**



TEAAC, TEWAC	
Motor type	IM
Rated voltage	up to 11kV
Hazardous area classification	Zone 1, 2
Stator winding insulation	Thermal class 155 (F)
Shaft height	315 to 1200mm
Bearings	Antifriction/Sleeve
Cage material	Copper
Frame material for shaft height 315 to 450mm	Frame: Cast iron Top cover: Steel
Frame material for shaft height 500 to 1200mm	Frame: Steel Top cover: Steel
Standards	IEC, EN, JEC

Degree of protection  
**IP54/IP55**

Cooling method  
**IC81W/IC86W**

Construction  
**IM B3/IM V1**





## **Ex** *p* *Pressurised*

Degree of protection  
**IP54/IP55**

Cooling method  
**IC611/IC616**

Construction  
**IM B3/IM V1**

Totally Enclosed Air-to-Air-Cooled  
**TEAAC**



Degree of protection  
**IP54/IP55**

Cooling method  
**IC81W/IC86W**

Construction  
**IM B3/IM V1**

Totally Enclosed Water-to-Air-Cooled  
**TEWAC**



### TEAAC, TEWAC

Motor type	IM/SM
Rated voltage	up to 13.8kV
Hazardous area classification	Zone 1, 2
Stator winding insulation	Thermal class 155 (F)
Shaft height	315 to 1200mm (unlimited)
Bearings	Antifriction/Sleeve
Cage material	Copper
Frame material	Frame: Steel Top cover: Steel
Standards	IEC, EN, JEC

## **Ex** *d* *Flameproof Enclosure*

Degree of protection  
**IP54/IP55**

Cooling method  
**IC411/IC416**

Construction  
**IM B3/IM V1**

Totally Enclosed Fan-Cooled  
**TEFC**



### TEFC

Motor type	IM
Rated voltage	up to 6.9kV
Hazardous area classification	Zone 1, 2
Stator winding insulation	Thermal class 155 (F)
Shaft height	250 to 400mm
Bearings	Antifriction
Cage material	Aluminum/Copper
Frame material	Cast iron
Standards	IEC, EN, JEC



# Providing the Best Products and Solutions

## Satisfying Diversified Customer Needs

Over the years, TMEIC has delivered numerous hazardous area motors for use in a variety of industries. Designed with the durability to withstand even harsh outdoor hazardous area environments and the reliability to ensure continuous operation, our motors are contributing to stable productivity at customers' facilities around the world.



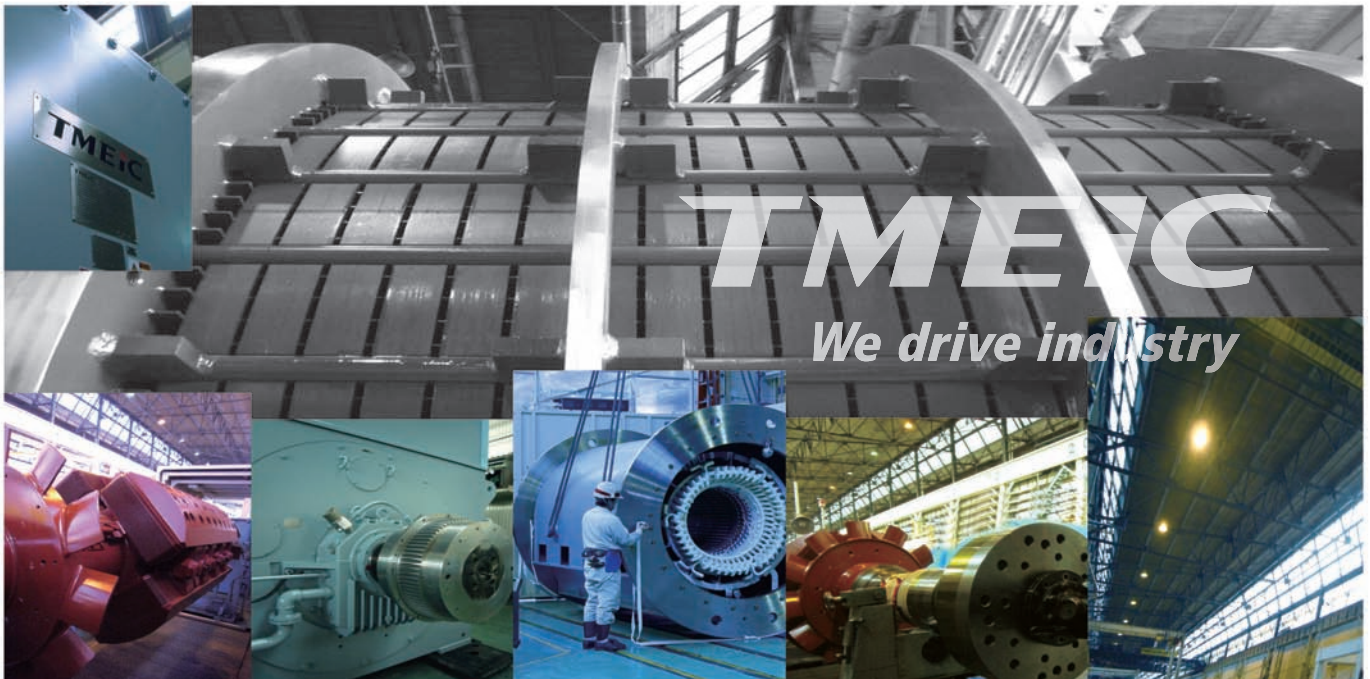
Photos: TMEIC inverter-driven Exp 4-pole, 1,900kW variable-speed induction motor and compressor



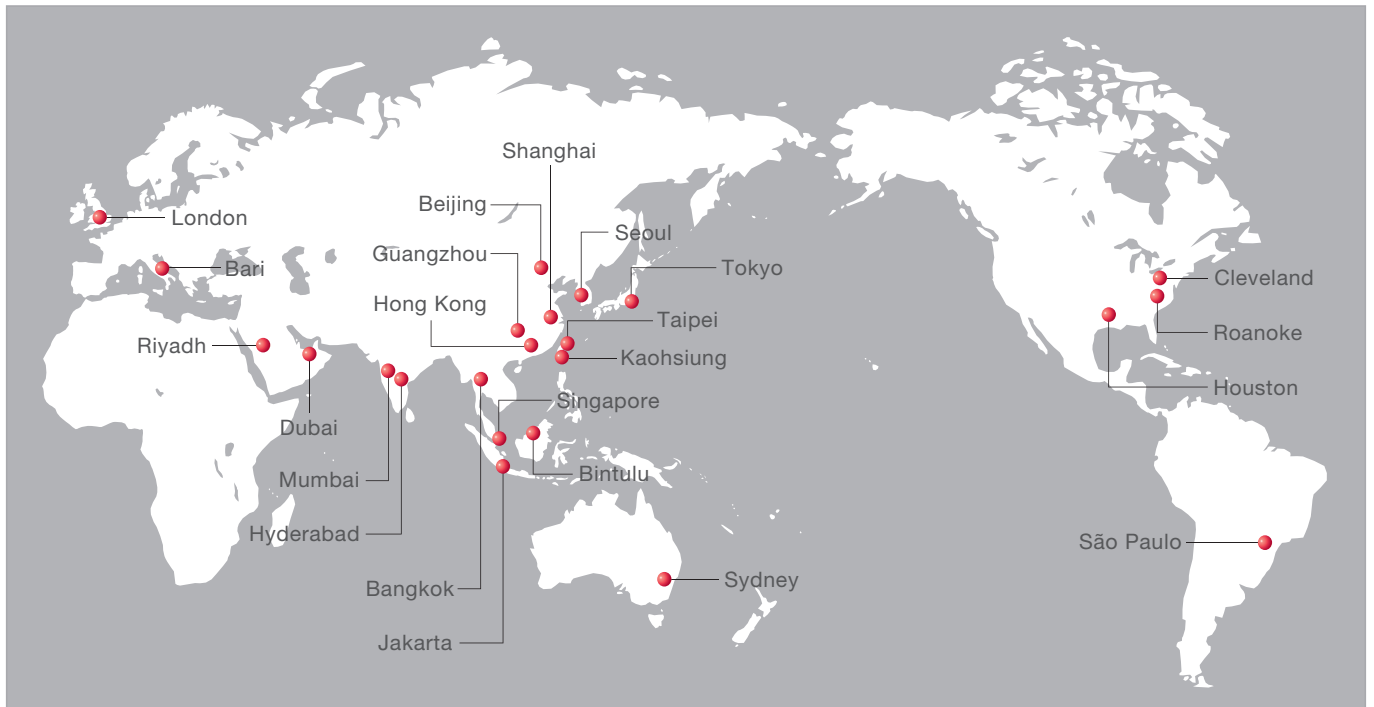


Upon request, TMEIC packages its hazardous area motor and drive systems in protective casings. Encased systems are subjected to actual operational testing before delivery to assure optimal performance.

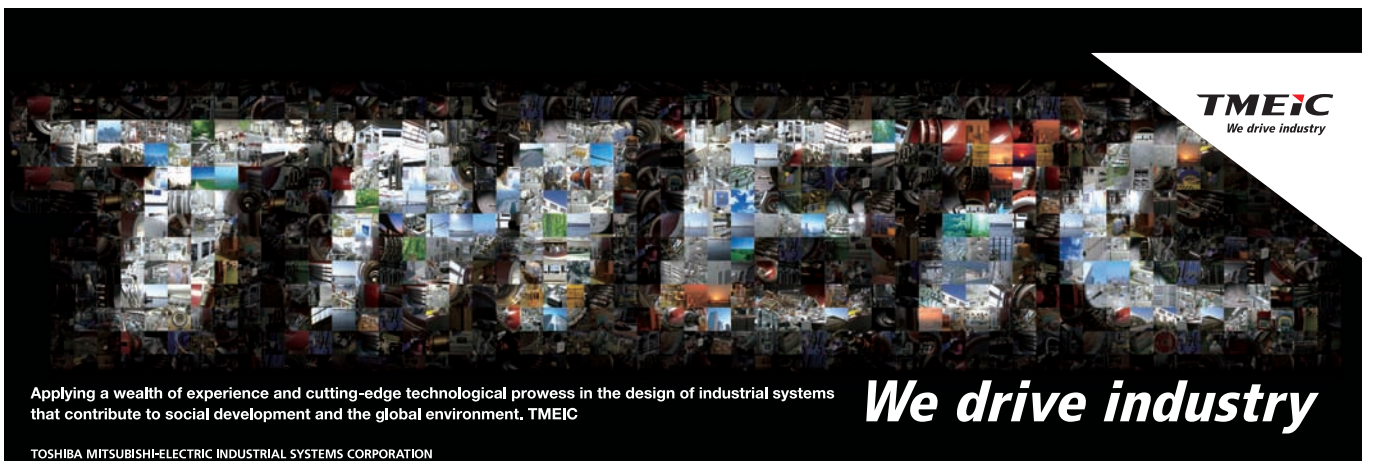
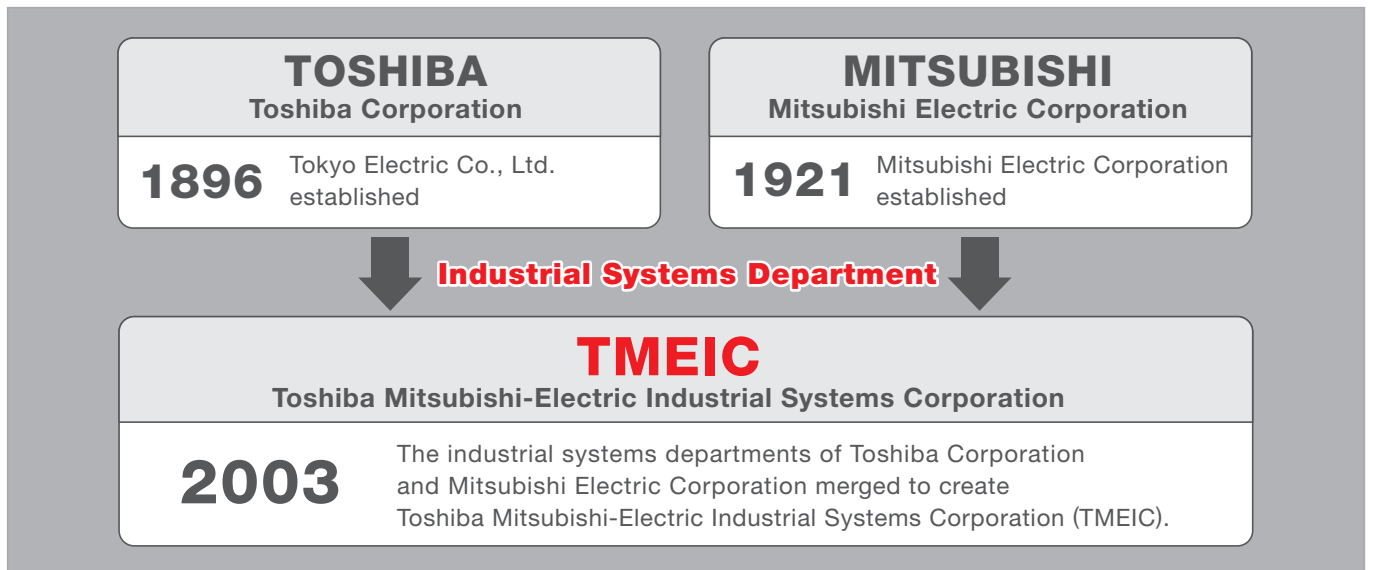
Photos: TMEIC inverter-driven Exp 4,900kW/5,000rpm super-high-speed induction motor for compressor



# Global Sales/Service Network



## Corporate Profile



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