

# Three Phase Synchronous Generators

## MARINE APPLICATION



**MarelliGenerators®**

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# **Company Profile**





## the company

**MarelliMotori** manufacturing facility and worldwide headquarters is located in Arzignano, city of Vicenza, Italy.

**MarelliMotori** has a tradition dating back to 1891 when Ercole Marelli founded the company. Today **MarelliMotori** is recognised internationally as a leading supplier of Generators and Electric Motors.

These quality products are backed by an organisation of skilled people providing sales, service, parts and technical support.



## the products

**MarelliMotori** designs and manufactures a wide range of generators and electric motors to meet customers special applications. Some of the various configurations include:

- Low Voltage and High Voltage
- Horizontal and Vertical Mounting
- Polarity from 2 to 24
- Heat Exchangers, Air and Water
- Degrees of Protection
- Explosion Proof (ATEX)

## market sectors

**MarelliMotori** applications include:



### Conventional Power

Gensets, Cogeneration, Combined Heat & Power, Turbines



### Renewable Power

Hydro Electric Generators, Wind Generators



### Oil & Gas

Petrochemical Refineries, Oil Production, Mines



### Marine

Main Propulsion, Bow Thrusters, Power Generation, Auxiliaries



### Industrial Power

Pumps, Compressors, Fans, Agitators, Mixers, Conveyors



## the customers

**MarelliMotori** recognises that its **customer** base is its greatest asset.

**Continued Customer Satisfaction** remains the **Number 1 Priority** of **MarelliMotori**.

So too is the ability to provide products to suit diverse applications and market sectors. **MarelliMotori** has over 100 years of experience in the design and manufacture of specialised generators and electric motors to meet the needs of an ever changing market.



The most advanced automatic winding machines.

Superior laser engraving technology.

## global support

As part of its commitment to its customers **MarelliMotori** has in place a global support structure through the **MarelliMotori** sales, service and distribution offices located in:

**Italy, Great Britain, Germany, Malaysia, U.S.A., and South Africa.**

From these international locations **MarelliMotori** qualified personnel can travel to all parts of the world in response to its customers' needs.

## the production

**MarelliMotori** Arzignano is a modern, sophisticated, manufacturing and testing facility respecting the high expectations of its customers and industry standards through its **ISO 9001:2000** "Certificate of Quality System".

At the same time **MarelliMotori** is committed to respect the environment and is accredited with the **ISO 14001** "Certificate of Environmental Management System".

VPI systems for the highest reliability.

High precision NC work centres.



## ASYNCHRONOUS MOTORS T.E.F.C.

L.V. Range: 0.12 to 2800 kW

M.V. Range: 110 to 2000 kW



## DRIP PROOF MOTORS

L.V. Range: 90 to 4000 kW

M.V. Range: 150 to 3500 kW



## WATER JACKET MOTORS

L.V. Range: 230 to 3200 kW



## FLAMEPROOF MOTORS

*In compliance with ATEX Directive 94/9/EC*



L.V. Range: 0.12 to 560 kW

M.V. Range: 110 to 500 kW



## SYNCHRONOUS GENERATORS

L.V. Range: 10 to 5000 kVA

M.V. and H.V. Range: 500 to 8000 kVA



## GENERATORS FOR HYDROPOWER APPLICATIONS

L.V., M.V. and H.V. Range: 500 to 8000 kVA



**L.V.** Low Voltage up to 690 V  
**M.V.** Medium Voltage up to 6,6 kV  
**H.V.** High Voltage up to 13,8 kV




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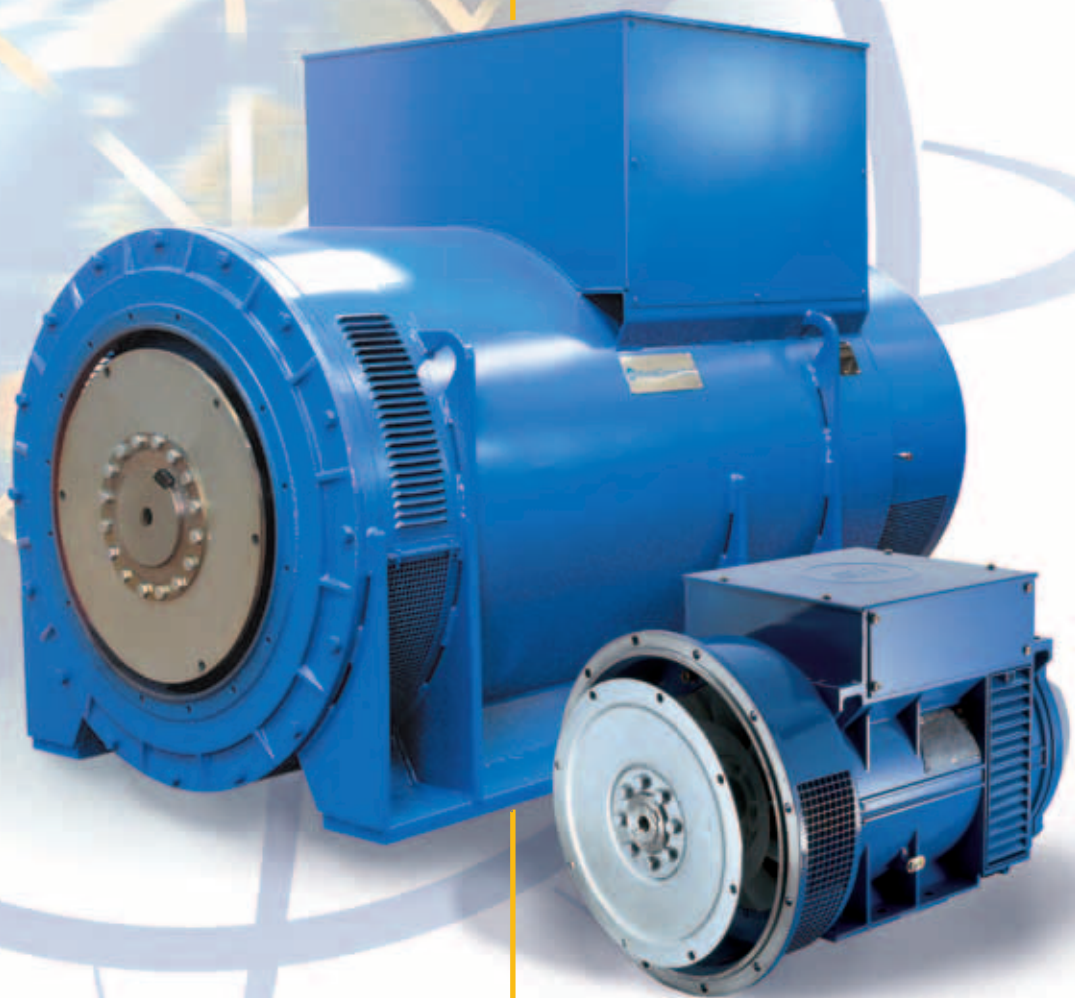
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**Generators  
catalogue  
Industrial  
&  
Marine**

# Three Phase Synchronous Generators

160 - 710 FRAME SIZES  
INDUSTRIAL / MARINE APPLICATIONS



## GENERATING SATISFACTION

MarelliGenerators is a division of Marelli Motori SpA, an international manufacturer of electrical machines. MarelliGenerators offers a complete selection of low and medium voltage three-phase synchronous generators for continuous prime power and stand-by power applications. Whatever your needs, our qualified engineers will offer the best solutions to suit your requirements. High efficiency, life-long reliability and in compliance with the international standards give MarelliGenerators the right to be a worldwide leader.

## APPLICATION FIELDS

MarelliGenerators offers the best technical solutions for the applications you need. The main application fields are: general industry, prime power, cogeneration, UPS, marine, petrochemical and hydroelectric.

## RELIABILITY

- Long life endurance of electrical components and housing.
- Generators are impregnated with high-grade resin by a VPI process and an additional protection against tough environmental conditions.
- Generous design allowances to ensure reliability under difficult operating conditions.

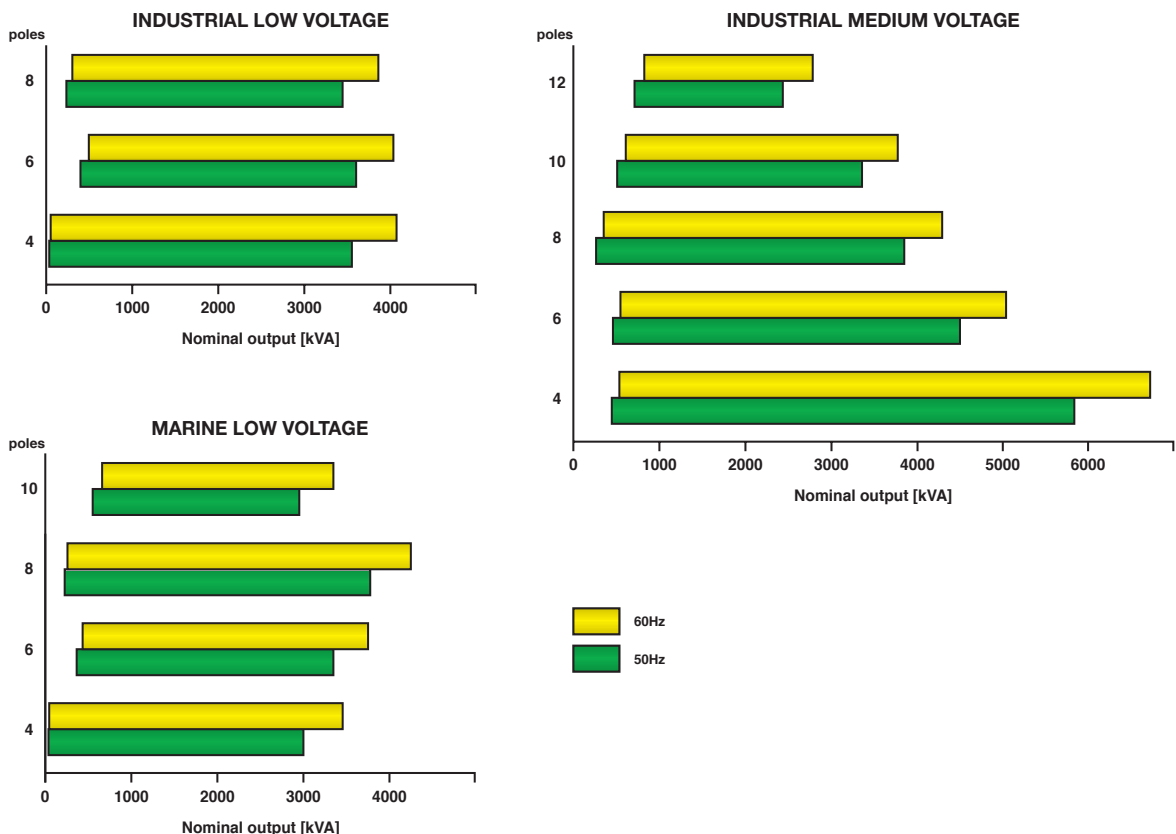
## PERFORMANCE

- Active parts are designed by using the latest technologies and the best materials available to guarantee high efficiency values.

## TOTALLY CUSTOMISABLE

- All generators are completely customisable.
- Nominal voltage from 380 to 13.800 Volts.
  - Polarities not mentioned in the following pages are available on request.
  - Degree of protection up to IP 55.
  - Auxiliary and neutral point terminal boxes.
  - Single and double bearings solutions.
  - Ball, roller or sleeve bearings are available.
  - Equipped for vibration sensors.
  - Three on-board neutral point current transformers (CT) are available both with either single or double core.
  - Anti-condensation heaters are available for all frame sizes.
  - Wide range of sensors to monitor the temperature of the stator winding and the bearings.

## PERFORMANCE ENVELOPE



## TECHNICAL INFORMATION

### STANDARDS

The generators are designed in compliance with: IEC 60034-1; CEI EN 60034-1; BS 4999-5000; VDE 0530, NF 51-100, 111; OVE M-10; NEMA MG 1.22; UL 1446, and UL1004B is available on request. MarelliGenerators bear the "CE" mark for all generators. Vibration level in accordance to IEC 60034-14.

### VOLTAGE AND FREQUENCY

The generators can operate at 50 and 60 Hz.

Frame Size	Connection	Voltage at 50 Hz [V]	Voltage at 60 Hz [V]
160 ÷ 355 MA	Series star	380 - 440	380 - 480
	Parallel star	190 - 220	190 - 240
	Series delta	220 - 254	220 - 277
355 MB ÷ 500*	Star	380 - 415	416 - 480
	Delta	220 - 240	240 - 277
	Star (medium voltage)	3.000 - 11.000	3.000 - 13.800
630 ÷ 710	Star	380 - 415	440 - 480
	Star (medium voltage)	3.000 - 11.000	3.000 - 13.800

\*: medium voltage 400 ÷ 500 Frame size

### EXCITATION SYSTEM

The generators are self-exciting, by means of a brushless type excitation system.

The voltage is maintained within  $\pm 0,5\%$  of the nominal value in steady state condition with a balanced and non distorting load.

#### Auxiliary winding

The excitation system of generators from frame sizes 200 to 450 are fed by an auxiliary winding which gives a better response to the variation in loads and sustains the power supply in the case of a short-circuit. Auxiliary winding on the 160 frame is available on request.

#### Permanent Magnet Generators (PMG)

Generators from frame sizes 225 to 560 can be supplied with a Permanent Magnet Generator (PMG) if required, which gives an independent supply to the excitation system. PMG is advisable for use with generators in particular applications such as unbalanced loads and distorting loads.

#### Manual voltage regulation

Available within  $\pm 5\%$  of the rated value by means of a potentiometer placed inside the voltage regulator. A remote voltage setting is possible by means of an external potentiometer, which can be supplied on request.

#### Over-excitation protection

Generators from frame sizes 160 to 450 are supplied with adjustable over-excitation protection which will protect the alternator in the event of over-excitation when combined with an external protection system.

Automatic Voltage Regulator (AVR)		ANALOGUE					DIGITAL*
		M16FA655A - MARK V	M40FA640A - MARK I	M40FA610A - MGC I	M63FA310A - MGC II	M40FA644A - MARK X	M71FA300 - MEC 100
Generator frame size	Standard	160 ÷ 225	250 ÷ 450	500 ÷ 560	630 ÷ 710		
	On request	250	160 ÷ 225 and 500 ÷ 630			225 ÷ 560	400 ÷ 710
AVR supply	Auxiliary winding, mains					PMG	Auxiliary winding, mains, PMG
Voltage sensing	Single phase	Three phase	Single phase		Three phase		
Voltage remote control	Arrangement						
Radio interference suppressor	Internal						Arrangement for external filter
Over-excitation device	Arrangement for VARICOMP						
Parallel operation with the mains	Arrangement for external device						Internal
Parallel operation with similar generators	Arrangement						Internal
Standard protections	Over-excitation					Over-excitation	Field over-current Field over-voltage Generator over/under voltage Generator over-current Loss of sensing
Limiters	Underfrequency						Underfrequency Over/under-excitation
Functions	Auxiliary inputs						PC interface Soft start Auxiliary inputs Contact inputs

## WINDINGS

Generators from frame sizes 160 to 500 for industrial application are supplied with 2/3 pitch winding to reduce the voltage harmonic content in applications with non-linear loads. The no-load voltage waveform is sinusoidal with a residual harmonic  $\leq 2\%$ . Total Harmonic Distortion (THD)  $\leq 2\%$ .

## TELEPHONE INTERFERENCE

The Telephonic Harmonic Factor (THF) is less than 2% as defined by IEC 60034-1.

## RADIO INTERFERENCE

Radio interference conforms to Class B Group 1 as defined by EN55011.

## THREE PHASE SHORT CIRCUIT CURRENT

Generators with auxiliary windings or PMG ensure a three phase short-circuit current ( $I_{cc}$ ) higher than 3 times the rated current ( $I_n$ ):  $I_{cc} > 3 I_n$ . Generators from 500 to 710 frame size are supplied with an overexcitation device VARICOMP which ensures a three phase short circuit current higher than 3 times the rated current.

## OVERLOADS

The following overloads are allowed (only for continuous duty): 10% for 1 hour, 15% for 10 minutes, 30% for 4 minutes, 50% for 2 minutes. These overloads must be occasional and followed by at least one hour of running at nominal load or less.

## OPERATING CONDITIONS

### Single phase operation

Three phase (12-wire) wound generators can be reconnected and de-rated to 66% for single phase operation (with a zig-zag connection). Otherwise generators with dedicated (4-wire) single phase windings can be supplied on request.

### Parallel operation

All generators are provided with a largely sized damper cage and are suitable for parallel operation with other generators, when equipped with the paralleling unit. A power factor regulator is available on request.

### No-load operation at reduced speed

All regulators work to reduce the excitation current in order to protect the excitation system when the generator is being used at reduced speed.

### Transient ratings

The voltage drop due to the application of full load at 0,8 power factor inductive on industrial 160 - 400 frame size generators varies between 16 and 20% of the rated voltage: the output voltage recovers to within 3% of the rated value in less than 0,3 seconds.

### Altitude

The rated outputs refer to installation up to 1.000 m a.s.l.  
Above this level the following derating factors must be applied.

Altitude (m asl)	< 1.000	< 1.500	< 2.000	< 2.500	< 3.000
K Factor	1,00	0,96	0,93	0,90	0,86

### Ambient temperature

The rated outputs given in this catalogue are based on a maximum ambient temperature of 40°C.  
When operating at different ambient temperatures the output rating can be obtained by applying the factors as in the following table.

Ambient Temperature [°C]	30	35	40	45	50	55
K Factor	1,04	1,00	1,00	0,96	0,93	0,90

### Power factor

The nominal power factor 0,8 lagging.  
For different power factor values the following derating factors must be applied.

Power Factor	1,0	0,8	0,7	0,6	0,5	0,3	0
K Factor	1,00	1,00	0,93	0,88	0,84	0,82	0,80

### **INSULATION, IMPREGNATION AND PROTECTIVE TREATMENT OF WINDING**

Class H insulation system. The generators are impregnated with high grade resin, using the latest technologies (VPI). A further protective treatment is applied on the whole range, making the generators suitable for tough environmental conditions. Special degrees of protection and tropicalisation are available on request.

### **PROTECTION DEGREE**

The standard protection degree is IP 23. Generators can be supplied with protection degree IP 55 on request. Higher protection degrees are available for frame sizes 250 to 710 through the application of air-to-air or air-to-water heat exchangers.

### **VENTILATION AND DIRECTION OF ROTATION**

Generators are axially self-cooled and can run in both directions of rotation.

Air inlet is:

- Radial - Frame size 160.
- Advanced axial + radial - Frame sizes 200 ÷ 355.
- Axial + radial - Frame radial sizes 400 ÷ 710.

### **ROTOR BALANCING**

Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034 - 14 to vibration grade normal (N) in standard configuration. Generators can be supplied with reduced (R) or special (S) vibration levels on request.

### **BEARINGS AND OVERSPEED**

Generously oversized roller bearings. The permissible overspeed is 1,5 times the rated speed (referred to 50 Hz). Sleeve bearings from 400 to 710 frame sizes are available on request.

### **SPECIFICATION**

All specifications are correct at time of publication and are subject to change without notice.



**INDUSTRIAL APPLICATION / LOW VOLTAGE - 50/60Hz**

Type	Leads	kVA rating @ Temperature rise / Ambient temp. [°C]				Efficiency 125 / 40 pf = 0,8 4/4 [%]	kVA rating @ Temperature rise / Ambient temp. [°C]				Efficiency 125 / 40 pf = 0,8 4/4 [%]	Inertia B3 Approx. [kgm <sup>2</sup> ]	Weight Approx. [kg]
		Continuous duty		Stand-by			Continuous duty		Stand-by				
		125 / 40 ΔT cl. H	105 / 40 ΔT cl. F	163 / 27	150 / 40		125 / 40 ΔT cl. H	105 / 40 ΔT cl. F	163 / 27	150 / 40			

**4 pole**

**400V @ 50Hz - 1.500 min<sup>-1</sup>**

**480V @ 60Hz - 1.800 min<sup>-1</sup>**

MJB 160 SA4	12	17,0	15,6	18,7	18,0	85,6	21,4	19,7	23,5	22,7	86,4	0,109	120
160 SB4	12	20,0	18,4	22,0	21,2	87,4	24,7	22,7	27,2	26,2	88,2	0,124	130
160 SC4	12	23,0	21,1	25,3	24,4	87,5	29,9	27,5	32,9	31,7	88,3	0,135	140
160 MA4	12	28,0	25,7	30,8	29,7	88,2	34,2	31,4	37,6	36,3	89,2	0,160	165
160 MB4	12	32,0	29,4	35,2	33,9	88,3	40,0	36,7	44,0	42,4	89,1	0,170	175
200 SA4	12	42,0	38,5	46,0	44,5	88,5	51,0	46,8	56,0	54,0	89,5	0,275	215
200 SB4	12	48,0	44,0	53,0	51,0	88,7	59,5	54,6	65,5	63,0	89,3	0,301	220
200 MA4	12	62,0	57,0	68,0	65,5	90,1	76,0	69,7	83,5	80,5	90,7	0,361	260
200 MB4	12	72,0	66,0	80,0	76,5	90,5	87,0	79,8	95,5	92,0	90,9	0,426	300
225 SA4	12	85	78	94	90	91,0	108	99	118	114	91,5	0,632	345
225 SB4	12	92	84	101	98	91,5	114	104	125	120	92,0	0,698	350
225 MA4	12	105	96	116	111	91,8	131	120	144	139	92,6	0,789	390
225 LA4	12	132	121	145	140	92,2	158	145	174	168	93,0	0,924	420
250 MA4	12	165	150	180	175	92,9	205	190	225	215	93,6	1,41	530
250 MB4	12	185	170	205	195	93,0	230	215	255	245	93,6	1,66	590
250 LA4	12	220	200	240	235	93,2	270	250	295	285	93,9	1,89	660
250 LB4	12	250	230	275	265	93,4	300	275	330	320	93,9	2,06	710
315 SA4	12	300	275	330	320	93,1	370	340	405	390	93,8	3,66	830
315 SB4	12	350	320	385	370	93,4	425	390	470	450	94,0	4,25	920
315 MA4	12	410	375	450	435	93,7	500	460	550	530	94,2	4,80	1060
315 MB4	12	450	415	495	475	94,0	550	505	605	585	94,8	5,68	1200
355 SA4	12	510	470	560	540	94,0	625	575	690	665	94,5	7,97	1250
355 SB4	12	570	520	625	605	94,6	695	640	765	735	95,1	9,29	1550
355 MA4	12	680	625	750	720	94,7	825	760	910	875	95,1	11,69	1800
355 MB4	6	800	730	880	850	95,0	960	880	1055	1020	95,3	13,12	2050
400 MA4	6	930	850	1025	985	95,2	1175	1080	1295	1245	95,7	16,3	2250
400 MB4	6	1050	960	1155	1115	95,3	1320	1210	1450	1400	95,7	17,0	2300
400 LA4	6	1150	1055	1265	1220	95,6	1420	1305	1560	1505	96,0	19,3	2550
400 LB4	6	1300	1190	1430	1380	95,8	1625	1490	1790	1725	96,3	22,5	2800
450 MB4	6	1500	1375	1650	1590	95,9	1800	1650	1980	1910	96,3	29,0	3200
450 LA4	6	1650	1510	1815	1750	96,0	1980	1815	2180	2100	96,3	34,0	3600
450 LB4	6	1875	1720	2065	1990	96,2	2250	2065	2470	2380	96,4	38,0	4000
500 SC4	6	2000	1835	2200	2110	96,1	2400	2200	2640	2540	96,5	46,7	4000
500 MB4	6	2200	2020	2420	2330	96,2	2640	2420	2900	2795	96,5	52,5	4400
500 LA4	6	2500	2290	2750	2650	96,4	3000	2750	3300	3180	96,7	61,5	5100
560 MA4*	6	2650	2430	on request	on request	96,4	3050	2800	on request	on request	96,5	83	5200
560 LA4*	6	3200	2935	on request	on request	96,5	3680	3375	on request	on request	96,6	95	5700
630 SA4*	6	3000	2750	on request	on request	96,2	3450	3165	on request	on request	96,5	117	6350
630 MB4*	6	3300	3025	on request	on request	96,4	3795	3480	on request	on request	96,7	140	7000
630 LA4*	6	3600	3300	on request	on request	96,5	4140	3795	on request	on request	96,8	158	7800
710 SC4**	6	4000	3670	on request	on request	96,2	4400	4035	on request	on request	96,5	on request	on request
710 MB4**	6	4300	3940	on request	on request	96,4	4730	4340	on request	on request	96,7	on request	on request

\*: 690 V recommended

\*\* : 690 V only. For different voltages please contact MarelliMotori.

Ratings refer to following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.



**INDUSTRIAL APPLICATION / LOW VOLTAGE - 50/60Hz**

Type	Leads	kVA rating @ Temp. Rise / Ambient temp. [°C]		Efficiency 125 / 40 pf = 0,8 4/4 [%]	kVA rating @ Temp. Rise / Ambient temp. [°C]		Efficiency 125 / 40 pf = 0,8 4/4 [%]	Inertia B3 Approx. [kgm <sup>2</sup> ]	Weight Approx. [kg]
		Continuous duty			Continuous duty				
		125 / 40 ΔT cl. H	105 / 40 ΔT cl. F		125 / 40 ΔT cl. H	105 / 40 ΔT cl. F			
<b>6 pole</b>		<b>400V @ 50Hz - 1.000 min<sup>-1</sup></b>			<b>480V @ 60Hz - 1.200 min<sup>-1</sup></b>				
MJB 400 SA6	6	400	365	92,6	500	460	93,0	11,8	1450
400 SB6	6	450	410	92,9	565	520	93,4	14,1	1600
400 SC6	6	500	460	93,6	625	575	94,0	16,8	1800
400 MA6	6	620	570	94,0	775	710	94,4	17,9	2000
400 MB6	6	700	640	94,2	875	800	94,6	19,4	2260
400 LA6	6	800	735	94,5	1000	915	94,9	20,9	2530
400 LB6	6	970	890	94,7	1215	1115	95,1	24,2	2750
450 MB6	6	1040	950	94,8	1300	1190	95,5	49,9	3200
450 LA6	6	1200	1100	95,0	1500	1375	95,7	55,0	3600
450 LB6	6	1360	1250	94,9	1700	1560	95,6	61,4	3900
500 SC6	6	1330	1220	94,9	1665	1525	95,6	64,7	3800
500 MB6	6	1600	1465	95,1	2000	1835	95,8	73,6	4400
500 LA6	6	1870	1715	95,3	2340	2145	96,0	88,9	5100
560 MA6	6	1930	1770	96,0	2220	2035	96,0	115	5000
560 LA6	6	2300	2110	96,2	2645	2425	96,2	135	5700
630 SC6	6	2300	2110	95,5	2580	2365	96,0	170	6200
630 MA6*	6	2750	2525	95,8	3080	2825	96,2	190	6900
630 LA6*	6	3000	2750	96,0	3360	3080	96,4	230	7500
710 SC6*	6	3400	3120	on request	3740	3430	on request	on request	on request
710 MA6*	6	3800	3485	on request	4180	3835	on request	on request	on request
<b>8 pole</b>		<b>400V @ 50Hz - 750 min<sup>-1</sup></b>			<b>480V @ 60Hz - 900 min<sup>-1</sup></b>				
MJB 400 SA8	6	240	220	91,5	300	275	92,0	13,5	1450
400 SB8	6	310	285	92,0	400	365	92,5	16,2	1600
400 SC8	6	360	330	92,3	450	410	92,8	19,1	1800
400 MA8	6	430	395	92,5	540	495	93,0	20,6	2000
400 MB8	6	510	465	93,0	640	585	93,5	22,4	2260
400 LA8	6	600	550	93,2	750	685	93,7	24,1	2530
400 LB8	6	740	680	93,5	925	850	94,0	25,4	2750
500 SA8	6	820	750	94,5	1025	940	95,1	55,1	3200
500 SC8	6	1020	935	95,0	1275	1170	95,5	74,2	3800
500 MB8	6	1270	1165	95,1	1590	1455	95,6	82,2	4400
500 LA8	6	1500	1375	95,2	1875	1720	95,9	95,0	5100
560 MA8	6	1510	1385	95,6	1735	1590	95,6	130	5000
560 LA8	6	1800	1650	95,9	2070	1895	95,9	155	5700
630 SC8	6	1850	1700	95,1	2035	1870	95,9	150	6500
630 MA8	6	2000	1835	95,4	2250	2065	96,2	190	6900
630 LA8	6	2450	2250	96,1	2760	2530	96,5	240	7600
710 SA8*	6	2650	2430	on request	2940	2695	on request	on request	on request
710 SC8*	6	3000	2750	on request	3300	3025	on request	on request	on request
710 MA8*	6	3400	3120	on request	3740	3430	on request	on request	on request
710 MB8*	6	3800	3485	on request	4180	3835	on request	on request	on request
<b>10 pole</b>		<b>400V @ 50Hz - 600 min<sup>-1</sup></b>			<b>480V @ 60Hz - 720 min<sup>-1</sup></b>				
MJB 500 SA10	6	595	550	93,9	740	680	94,4	63,8	3300
500 SC10	6	745	685	94,2	935	860	94,7	81,6	3800
500 MB10	6	870	800	94,7	1050	965	95,2	89,7	4500
500 LA10	6	965	885	95,0	1210	1110	95,5	106	4900
630 SC10	6	1200	1100	95,0	1380	1265	95,5	180	7300
630 MA10	6	1435	1320	95,4	1650	1515	95,9	200	7700
630 MB10	6	1690	1550	95,5	1945	1785	96,0	230	7900
630 LA10	6	1750	1605	95,7	2010	1845	96,2	260	8200
710 SC10	6	2470	2265	on request	2765	2535	on request	on request	on request
710 MA10*	6	2960	2715	on request	3315	3040	on request	on request	on request
710 MB10*	6	3160	2900	on request	3540	3245	on request	on request	on request
710 LB10*	6	3415	3130	on request	3825	3510	on request	on request	on request
<b>12 pole</b>		<b>400V @ 50Hz - 500 min<sup>-1</sup></b>			<b>480V @ 60Hz - 600 min<sup>-1</sup></b>				
MJB 630 SC12	6	920	845	95,0	1050	965	95,5	220	7600
630 MA12	6	1140	1045	95,4	1300	1195	95,9	260	8000
630 MB12	6	1530	1405	95,5	1760	1615	96,0	290	8200
630 LB12	6	1880	1725	95,6	2150	1975	96,1	320	8600
710 SA12	6	2000	1835	on request	2300	2110	on request	on request	on request
710 MA12	6	2180	2000	on request	2500	2295	on request	on request	on request
710 LA12*	6	2700	2475	on request	3100	2845	on request	on request	on request

\*: 690 V recommended

Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.

**MARINE APPLICATION / LOW VOLTAGE - 50/60Hz**

Type	Leads	kVA rating @ Temp. Rise / Ambient temp. [°C]			Efficiency 95 / 50 pf = 0,8 4/4 [%]	kVA rating @ Temp. Rise / Ambient temp. [°C]			Efficiency 95 / 50 pf = 0,8 4/4 [%]	Inertia B3 Approx. [kgm <sup>2</sup> ]	Weight Approx. [kg]
		Continuous duty				Continuous duty					
		95 / 50 ΔT cl. F	70 / 50 ΔT cl. B	Air-to-water exchanger 95 / 50 ΔT cl. F		95 / 50 ΔT cl. F	70 / 50 ΔT cl. B	Air-to-water exchanger 95 / 50 ΔT cl. F			

4 pole		400V @ 50Hz - 1.500 min <sup>-1</sup>				450V @ 60Hz - 1.800 min <sup>-1</sup>					
MJBM 160 SA4	12	14,8	12,7	-	80,9	17,6	15,1	-	81,4	0,109	120
160 SB4	12	17,4	14,9	-	82,3	20,5	17,6	-	82,5	0,124	130
160 SC4	12	20,1	17,3	-	83,9	24,1	20,7	-	83,9	0,135	140
160 MA4	12	24,4	20,9	-	85,5	28,9	24,8	-	86,0	0,160	165
160 MB4	12	27,9	23,9	-	86,1	33,5	28,7	-	86,7	0,170	175
200 SA4	12	36,5	31,3	-	86,0	44,5	38,2	-	86,7	0,275	215
200 SB4	12	42,0	36,1	-	87,2	52,0	44,6	-	87,3	0,301	220
200 MA4	12	54,0	46,4	-	88,3	64,0	54,9	-	88,4	0,361	260
200 MB4	12	63,0	54,1	-	89,5	76,0	65,2	-	89,6	0,426	300
225 SA4	12	74	64	-	89,0	91	78	-	89,2	0,632	345
225 SB4	12	80	69	-	89,4	99	85	-	89,5	0,698	350
225 MA4	12	92	79	-	90,2	112	96	-	90,4	0,802	390
225 LA4	12	115	99	-	91,2	136	117	-	91,3	0,924	420
250 MA4	12	145	125	130	91,8	165	145	150	92,3	1,13	530
250 MB4	12	160	140	145	92,1	190	165	170	92,5	1,30	590
250 LA4	12	190	165	170	92,3	220	190	200	92,7	1,47	660
200 LB4	12	220	190	200	92,6	245	215	220	92,8	1,77	710
315 SA4	12	260	225	230	92,0	310	270	280	92,6	3,66	830
315 SB4	12	305	265	270	92,5	355	305	320	93,2	4,25	920
315 MA4	12	355	305	320	93,1	420	365	380	93,7	4,80	1060
315 MB4	12	390	335	350	93,5	460	395	410	94,2	5,68	1200
355 SA4	12	445	385	400	93,6	515	445	460	94,0	7,97	1250
355 SB4	12	495	425	450	93,9	590	510	530	94,5	9,29	1550
355 MA4	12	595	515	540	94,5	690	595	620	94,9	11,69	1800
355 MB4	6	695	600	630	94,8	815	700	730	95,1	13,12	2050
400 MA4	6	810	700	730	94,8	975	840	880	95,0	16,3	2250
400 MB4	6	915	790	820	95,2	1090	940	980	95,4	17,0	2300
400 LA4	6	1005	865	900	95,3	1205	1035	1080	95,6	19,3	2550
400 LB4	6	1135	975	1020	95,6	1345	1155	1210	95,8	22,5	2800
450 MB4	6	1310	1125	1180	95,6	1510	1300	1360	96,4	29,0	3200
450 LA4	6	1440	1240	1300	96,6	1655	1425	1490	96,4	34,0	3600
450 LB4	6	1635	1405	1470	97,6	1875	1610	1690	96,5	38,0	4000
500 SC4	6	1740	1495	1570	95,7	2000	1720	1800	95,9	46,7	4100
500 MB4	6	1930	1660	1740	95,9	2220	1910	2000	96,1	52,5	4400
500 LA4	6	2200	1890	1980	96,1	2580	2215	2320	96,3	61,5	5100
560 MA4	6	2450	2105	2210	96,3	2750	2365	2480	96,3	83	5200
560 LA4*	6	2950	2535	2660	96,5	3300	2835	2970	96,5	95	5700
630 SA4*	6	2780	2390	2500	96,3	3200	2750	2880	96,4	117	6350
630 MB4*	6	3050	2620	2750	96,5	3500	3005	3150	96,6	140	7000
630 LA4*	6	3320	2850	2990	96,6	3810	3275	3430	96,7	158	7800
710 SC4**	6	3680	3160	3310	96,3	4050	3480	3650	96,4	on request	
710 MB4**	6	3950	3395	3560	96,5	4350	3735	3920	96,6	on request	

6 pole		400V @ 50Hz - 1.000 min <sup>-1</sup>				450V @ 60Hz - 1.200 min <sup>-1</sup>					
MJBM 400 SA6	6	350	305	320	92,7	415	360	370	92,9	11,8	1450
400 SB6	6	390	335	350	93,0	465	400	420	93,3	14,1	1600
400 SC6	6	435	375	390	93,7	515	445	460	93,9	16,8	1800
400 MA6	6	540	465	490	94,1	640	550	580	94,3	17,9	2000
400 MB6	6	610	525	550	94,3	725	625	650	94,5	19,4	2260
400 LA6	6	695	600	630	94,6	825	710	740	94,8	20,9	2530
400 LB6	6	845	730	760	94,8	1000	860	900	95,0	24,2	2750
450 MB6	6	890	765	800	94,6	1050	905	950	95,1	49,9	3200
450 LA6	6	1040	895	940	95,2	1230	1060	1110	95,7	55,0	3600
450 LB6	6	1180	1015	1060	95,4	1395	1200	1260	95,9	61,4	3900
500 SC6	6	1160	1000	1040	95,0	1375	1185	1240	95,5	64,7	3800
500 MB6	6	1395	1200	1260	95,2	1655	1425	1490	95,7	73,6	4400
500 LA6	6	1630	1400	1470	95,4	1930	1660	1740	95,9	88,9	5100
560 MA6	6	1785	1535	1610	96,0	2035	1750	1830	96,0	115	5000
560 LA6	6	2125	1825	1910	96,2	2450	2105	2210	96,2	135	5700
630 SC6*	6	2120	1820	1910	95,7	2420	2080	2180	96,3	170	7000
630 MA6*	6	2525	2170	2270	95,7	2880	2475	2590	96,3	190	7500
630 LA6*	6	2750	2365	2480	96,5	3150	2705	2840	96,8	230	8100
710 SC6*	6	3120	2680	2810	96,0	3450	2965	3110	96,3	on request	
710 MA6*	6	3485	2995	3140	96,7	3830	3290	3450	96,7	on request	

-: Not available  
 \*: 690 V recommended  
 \*\*: 690 V only. For different voltages please contact MarelliMotori.  
 Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.

## MARINE APPLICATION / LOW VOLTAGE - 50/60Hz

Type	Leads	kVA rating @ Temp. Rise / Ambient temp. [°C]			Efficiency 95 / 50 pf = 0,8 4/4 [%]	kVA rating @ Temp. Rise / Ambient temp. [°C]			Efficiency 95 / 50 pf = 0,8 4/4 [%]	Inertia B3 Approx. [kgm <sup>2</sup> ]	Weight Approx. [kg]
		Continuous duty				Continuous duty					
		95 / 50 ΔT cl. F	70 / 50 ΔT cl. B	Air-to-water exchanger 95 / 50 ΔT cl. F		95 / 50 ΔT cl. F	70 / 50 ΔT cl. B	Air-to-water exchanger 95 / 50 ΔT cl. F			

### 8 pole

400V @ 50Hz - 750 min<sup>-1</sup>

450V @ 60Hz - 900 min<sup>-1</sup>

MJBM 400 SA8	6	210	185	190	91,6	250	215	230	91,9	13,5	1450
400 SB8	6	270	235	240	92,1	330	285	300	92,4	16,2	1600
400 SC8	6	315	275	280	92,4	370	320	330	92,7	19,1	1800
400 MA8	6	375	325	340	92,6	445	385	400	92,9	20,6	2000
400 MB8	6	445	385	400	93,1	525	455	470	93,4	22,4	2260
400 LA8	6	525	455	470	93,3	620	535	560	93,6	24,1	2530
400 LB8	6	645	555	580	93,6	765	660	690	93,9	25,4	2750
500 SA8	6	715	615	640	94,6	845	730	760	95,0	55,1	3200
500 SC8	6	890	765	800	95,1	1055	910	950	95,4	74,2	3800
500 MB8	6	1105	950	990	95,2	1310	1125	1180	95,5	82,2	4400
500 LA8	6	1310	1125	1180	95,3	1550	1335	1400	95,8	95,0	5100
560 MA8	6	1395	1200	1260	95,6	1605	1380	1440	95,6	130	5000
560 LA8	6	1665	1430	1500	95,9	1915	1645	1720	95,9	155	5700
630 SC8	6	1620	1395	1460	95,4	1860	1600	1670	96,2	170	7100
630 MA8	6	1835	1580	1650	95,9	2130	1830	1920	96,4	200	7500
630 LA8*	6	2250	1935	2030	96,1	2650	2275	2390	96,5	240	8200
710 SA8*	6	2430	2090	2190	96,3	2750	2365	2480	96,5	on request	
710 SC8*	6	2620	2250	2360	96,5	2950	2535	2660	96,7	on request	
710 MA8*	6	3100	2665	2790	96,6	3470	2980	3120	96,8	on request	
710 MB8*	6	3350	2880	3020	96,7	3750	3220	3380	96,9	on request	

### 10 pole

400V @ 50Hz - 600 min<sup>-1</sup>

450V @ 60Hz - 720 min<sup>-1</sup>

MJBM 500 SA10	6	520	450	470	94,0	645	555	580	94,5	63,8	3300
500 SC10	6	650	560	590	94,3	815	700	730	94,7	81,6	3800
500 MB10	6	760	655	680	94,8	915	790	820	95,2	89,7	4500
500 LA10	6	840	725	760	95,1	1055	910	950	95,5	106,0	4900
630 SC10	6	1060	910	950	95,1	1220	1050	1100	95,4	180	7300
630 MA10	6	1320	1135	1190	95,5	1510	1300	1360	95,8	200	7700
630 MB10	6	1480	1275	1330	95,6	1700	1460	1530	95,9	230	7900
630 LA10	6	1530	1315	1380	95,8	1780	1530	1600	96,1	260	8200
710 SC10	6	2150	1850	1940	95,9	2410	2070	2170	96,3	on request	
710 MA10*	6	2590	2225	2330	95,9	2900	2490	2610	96,3	on request	
710 MB10*	6	2760	2370	2480	96,4	3100	2665	2790	96,7	on request	
710 LB10*	6	3000	2580	2700	96,4	3360	2885	3020	96,7	on request	

### 12 pole

400V @ 50Hz - 500 min<sup>-1</sup>

450V @ 60Hz - 600 min<sup>-1</sup>

MJBM 630 SC12	6	810	700	730	95,1	930	800	840	95,4	220	8200
630 MA12	6	995	855	900	95,4	1150	990	1040	95,7	260	8600
630 MB12	6	1320	1135	1190	95,5	1520	1305	1370	95,8	290	8800
630 LA12	6	1400	1205	1260	95,7	1620	1395	1460	96,0	320	9200
710 SC12*	6	1750	1505	1580	95,8	1960	1685	1760	96,2	on request	
710 MA12*	6	1900	1635	1710	95,9	2130	1830	1920	96,4	on request	
710 LB12*	6	2360	2030	2120	96,3	2640	2270	2380	96,7	on request	

\*: 690 V recommended

Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.

## INDUSTRIAL APPLICATION / MEDIUM AND HIGH VOLTAGE - 50Hz

Type	Leads	kVA rating @ Temperature rise / Ambient temp. [°C] - Continuous duty					
		3.000 V		6.000 V		11.000 V	
		105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B

### 4 pole 50Hz - 1.500 min<sup>-1</sup>

MJH 400 MA4	6	600	525	555	485	475	415
400 LA4	6	835	730	740	650	630	550
400 LB4	6	1020	895	925	810	790	690
450 MB4	6	960	840	895	785	765	670
450 LA4	6	1060	930	985	860	840	735
450 LB4	6	1185	1035	1105	965	940	825
500 MA4	6	1435	1255	1225	1070	1045	915
500 MB4	6	1710	1495	1435	1255	1220	1065
500 LA4	6	1850	1615	1700	1485	1445	1265
560 MA4	6	2200	1925	2000	1750	1700	1485
560 LA4	6	2500	2185	2270	1985	1930	1685
630 SA4	6	2000	1750	1815	1585	1545	1350
630 MA4	6	2270	1985	2060	1800	1755	1535
630 MB4	6	2560	2235	2330	2035	1985	1735
630 LA4	6	2930	2560	2660	2325	2265	1980
630 LB4	6	3440	3005	3120	2725	2655	2320
710 SC4	6	4200	3670	3780	3300	3215	2810
710 MB4	6	4800	4190	4320	3775	3675	3210
710 LB4	6	5500	4820	4970	4340	4220	3690

### 6 pole 50Hz - 1.000 min<sup>-1</sup>

MJH 400 LA6	6	615	540	540	475	460	405
400 LB6	6	660	580	575	505	490	430
450 MB6	6	675	590	590	515	500	440
450 LA6	6	750	655	655	575	560	490
450 LB6	6	840	735	730	640	625	550
500 MA6	6	925	810	805	705	685	600
500 MB6	6	1100	965	960	840	820	720
500 LA6	6	1235	1080	1100	965	935	820
560 MA6	6	1900	1660	1750	1530	1490	1305
560 LA6	6	2100	1835	1930	1685	1645	1440
630 SA6	6	1700	1485	1550	1355	1320	1155
630 MA6	6	1850	1615	1700	1485	1445	1265
630 MB6	6	2100	1835	1900	1660	1615	1410
630 LA6	6	2300	2010	2050	1790	1745	1525
630 LB6	6	2500	2185	2200	1925	1870	1635
710 SA6	6	3300	2885	3000	2620	2550	2230
710 MA6	6	4000	3495	3500	3060	2975	2600
710 LA6	6	4700	4105	4200	3670	3570	3120
710 LB6	6	5400	4720	4600	4020	3910	3415

Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.  
High voltage generators (11.000 V) will have initial MJJ

## INDUSTRIAL APPLICATION / MEDIUM AND HIGH VOLTAGE - 50Hz

Type	Leads	kVA rating @ Temperature rise / Ambient temp. [°C] - Continuous duty					
		3.000 V		6.000 V		11.000 V	
		105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B

### 8 pole 50Hz - 750 min<sup>-1</sup>

MJH 400 LA8	6	440	385	380	335	325	285
400 LB8	6	505	445	440	385	375	330
500 SA8	6	640	560	560	490	480	420
500 MA8	6	780	685	680	595	580	510
500 MB8	6	915	800	795	695	680	595
500 LA8	6	1055	925	915	800	780	685
560 MA8	6	1400	1225	1300	1135	1105	965
560 LA8	6	1550	1355	1440	1260	1225	1070
630 SA8	6	1300	1135	1200	1050	1020	895
630 MA8	6	1450	1270	1400	1225	1190	1040
630 MB8	6	1700	1485	1600	1400	1360	1190
630 LA8	6	1850	1615	1680	1470	1430	1250
630 LB8	6	2000	1750	1750	1530	1490	1305
710 SA8	6	2600	2270	2400	2095	2040	1785
710 MA8	6	3200	2795	3000	2620	2550	2230
710 LA8	6	3700	3230	3500	3060	2975	2600
710 LB8	6	4100	3580	3800	3320	3230	2820

### 10 pole 50Hz - 600 min<sup>-1</sup>

MJH 500 SA10	6	460	405	400	350	340	300
500 MA10	6	560	490	485	425	415	365
500 MB10	6	660	580	575	505	490	430
500 LA10	6	735	645	640	560	545	480
630 SA10	6	950	830	900	790	765	670
630 MA10	6	1100	965	1000	875	850	745
630 MB10	6	1300	1135	1200	1050	1020	895
630 LA10	6	1500	1310	1330	1165	1135	995
630 LB10	6	1700	1485	1450	1270	1235	1080
710 SA10	6	2000	1750	1800	1575	1530	1340
710 MA10	6	2400	2095	2200	1925	1870	1635
710 LA10	6	2700	2360	2400	2095	2040	1785
710 LB10	6	3400	2970	3200	2795	2720	2375

### 12 pole 50Hz - 500 min<sup>-1</sup>

MJH 630 SA12	6	700	615	700	615	595	520
630 MA12	6	800	700	750	655	640	560
630 MB12	6	950	830	900	790	765	670
630 LA12	6	1100	965	1000	875	850	745
630 LB12	6	1250	1095	1150	1005	980	860
710 SA12	6	1500	1310	1400	1225	1190	1040
710 MA12	6	1800	1575	1650	1445	1405	1230
710 LA12	6	2250	1965	2050	1790	1745	1525
710 LB12	6	2500	2185	2300	2010	1955	1710

Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.  
High voltage generators (11.000 V) will have initial MJJ

## INDUSTRIAL APPLICATION / MEDIUM AND HIGH VOLTAGE - 60Hz

Type	Leads	kVA rating @ Temperature rise / Ambient temp. [°C] - Continuous duty					
		4.160 V		6.000 V		13.800 V	
		105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B

### 4 pole 60Hz - 1.800 min<sup>-1</sup>

MJH 400 MA4	6	695	610	665	585	565	495
400 LA4	6	965	845	895	785	760	665
400 LB4	6	1180	1030	1120	980	950	835
450 MB4	6	1125	935	1070	935	910	795
450 LA4	6	1240	1085	1180	1030	1005	880
450 LB4	6	1390	1215	1325	1160	1125	985
500 MA4	6	1660	1450	1500	1310	1275	1115
500 MB4	6	1980	1730	1750	1530	1490	1300
500 LA4	6	2135	1865	2000	1750	1700	1485
560 MA4	6	2440	2130	2320	2030	1970	1725
560 LA4	6	2770	2420	2620	2290	2225	1945
630 SA4	6	2135	1865	2025	1770	1720	1505
630 MA4	6	2430	2125	2305	2015	1960	1710
630 MB4	6	2740	2395	2595	2270	2205	1930
630 LA4	6	3125	2730	2960	2585	2515	2200
630 LB4	6	3645	3185	3445	3010	2930	2560
710 SC4	6	4385	3830	4140	3615	3520	3075
710 MB4	6	4980	4350	4735	4135	4025	3515
710 LB4	6	5580	4870	5030	4630	4500	3940

### 6 pole 60Hz - 1.200 min<sup>-1</sup>

MJH 400 LA6	6	710	620	650	570	550	485
400 LB6	6	760	665	700	615	595	520
450 MB6	6	775	680	715	625	605	535
450 LA6	6	860	755	795	695	675	595
450 LB6	6	965	845	890	780	755	665
500 MA6	6	1070	935	970	850	825	725
500 MB6	6	1270	1110	1160	1015	985	865
500 LA6	6	1430	1250	1330	1165	1130	990
550 MA6	6	2100	1835	2020	1765	1720	1500
560 LA6	6	2330	2035	2240	1960	1905	1665
630 SA6	6	1830	1600	1740	1520	1480	1295
630 MA6	6	2000	1750	1900	1660	1615	1410
630 MB6	6	2270	1985	2160	1890	1835	1605
630 LA6	6	2430	2125	2310	2020	1965	1715
630 LB6	6	2650	2315	2520	2200	2145	1870
710 SA6	6	3445	3010	3260	2850	2770	2420
710 MA6	6	4150	3625	3925	3430	3340	2915
710 LA6	6	4880	4260	4615	4030	3925	3425
710 LB6	6	5340	4665	5050	4410	4295	3750

Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.  
High voltage generators (13.800 V) will have initial MJJ

## INDUSTRIAL APPLICATION / MEDIUM AND HIGH VOLTAGE - 60Hz

Type	Leads	kVA rating @ Temperature rise / Ambient temp. [°C] - Continuous duty					
		4.160 V		6.000 V		13.800 V	
		105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B	105 / 40 ΔT cl. F	80 / 40 ΔT cl. B

### 8 pole 60Hz - 900 min<sup>-1</sup>

MJH 400 LA8	6	510	450	470	415	400	350
400 LB8	6	585	515	540	475	460	405
500 SA8	6	740	650	670	585	570	500
500 MA8	6	905	790	820	720	695	610
500 MB8	6	1060	930	970	850	825	725
500 LA8	6	1220	1065	1100	965	935	820
560 MA8	6	1550	1355	1500	1310	1275	1115
560 LA8	6	1720	1505	1655	1445	1405	1230
630 SA8	6	1405	1230	1335	1170	1135	995
630 MA8	6	1565	1370	1490	1305	1270	1110
630 MB8	6	1835	1605	1745	1525	1485	1295
630 LA8	6	1955	1710	1860	1625	1580	1385
630 LB8	6	2120	1855	2015	1760	1715	1500
710 SA8	6	2715	2370	2570	2245	2185	1910
710 MA8	6	3325	2905	3145	2750	2675	2335
710 LA8	6	3840	3355	3630	3170	3085	2695
710 LB8	6	4165	3640	3940	3440	3350	2925

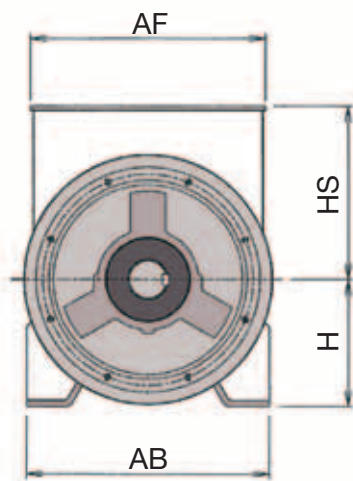
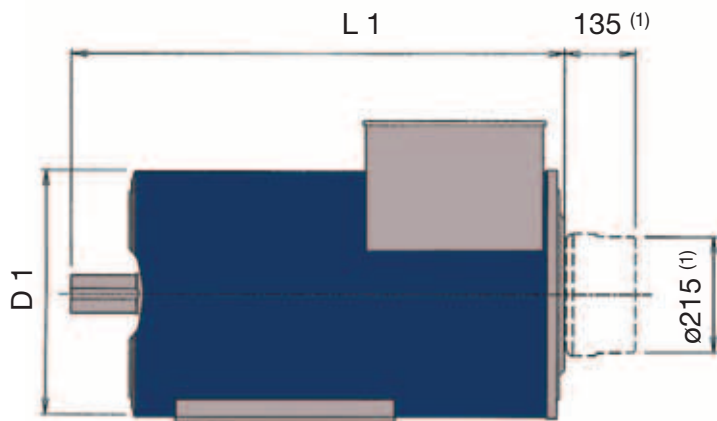
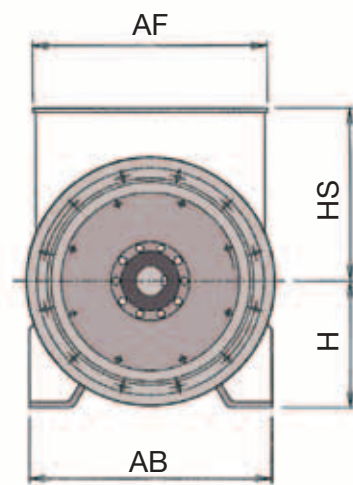
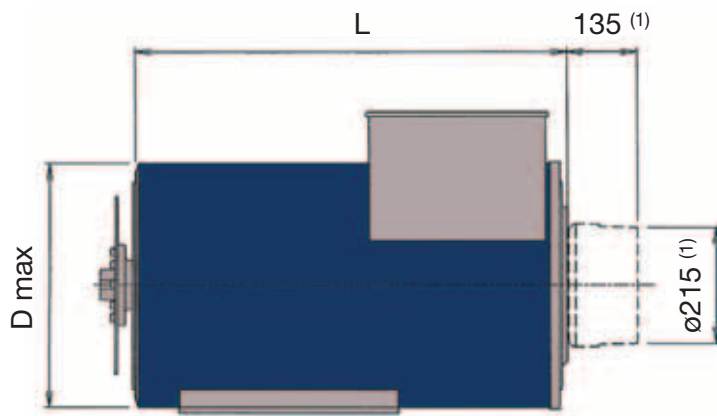
### 10 pole 60Hz - 720 min<sup>-1</sup>

MJH 500 SA10	6	530	465	470	415	400	350
500 MA10	6	650	570	585	515	495	435
500 MB10	6	765	670	690	605	585	515
500 LA10	6	850	745	765	670	650	570
630 SA10	6	1025	895	975	855	830	725
630 MA10	6	1190	1040	1135	995	965	845
630 MB10	6	1410	1235	1340	1170	1140	995
630 LA10	6	1585	1385	1510	1320	1285	1125
630 LB10	6	1800	1575	1710	1495	1454	1270
710 SA10	6	2085	1820	1960	1715	1665	1455
710 MA10	6	2495	2180	2350	2055	2000	1745
710 LA10	6	2805	2450	2640	2305	2245	1960
710 LB10	6	3740	3265	3520	3075	2990	2615

### 12 pole 60Hz - 500 min<sup>-1</sup>

MJH 630 SA12	6	755	660	720	630	615	535
630 MA12	6	870	760	830	725	705	620
630 MB12	6	1030	900	980	860	835	730
630 LA12	6	1165	1020	1110	970	945	825
630 LB12	6	1325	1160	1260	1100	1070	935
710 SA12	6	1565	1370	1475	1290	1255	1095
710 MA12	6	1870	1635	1760	1540	1500	1310
710 LA12	6	2335	2040	2195	1920	1865	1630
710 LB12	6	2615	2285	2460	2150	2090	1830

Ratings refer to the following conditions: balanced non-deforming load, altitude below 1.000 m asl, minimum power factor 0,8.  
High voltage generators (13.800 V) will have initial MJJ



**STANDARD TYPE OF CONSTRUCTION**

Series	Construction					
	B3	B34	B35	B20/B14	B2*	B16*
MJB	●	●	●	●	●	●
MJH	●	●	●	●	●	●
MJBM	●	●	●	●	●	●
MJR	●	●	●	●	●	●

\* Single bearing configuration.

Special configuration and shaft extensions are available on request.

**COUPLING**

Adaptor	Coupling																											
	MJB 160			MJB 200				MJB 225			MJB 250			MJB 315				MJB 355			MJB 400			MJB 450		MJB 500		MJB 560
	5	4	3	4	3	2	1	4	3	2	3	2	1	3	2	1	1/2	0	1	1/2	0	00	0	00	0	00	00	
6 1/2	●	●																										
7 1/2	●	●																										
8	●	●	●	●	●	●																						
10		●	●	●	●	●		●																				
11 1/2			●		●	●			●	●	●	●	●	●	●	●												
14							●							●				●	●	●	●	●	●	●	●	●		
16																		●	●	●	●	●	●	●	●	●	●	
18																			●		●	●	●	●	●	●	●	
21																					●	●	●	●	●	●	●	

● Available ● Most common

(1) Dimensions for optional PMG



## OVERALL DIMENSIONS [mm]

Dimension	MJB 160 COMPACT					MJB 160					MJB 200			
	SA	SB	SC	MA	MB	SA	SB	SC	MA	MB	SA	SB	MA	MB
H	160					160					200			
HS	257					257					323			
AB	300					300					405			
AF	328					328					410			
L	547		592			587		632			615		710	
D (MAX)	451					451					552			
L1	627		672			627		672			685		780	
D1	354					354					432			

Dimension	MJB 225				MJB 250				MJB 315			
	SA	SB	MA	LA	MA	MB	LA	LB	SA	SB	MA	MB
H	225				250				315			
HS	412				468				555			
AB	446				505				600			
AF	460				502				632			
L	645		790	845	858		998		945		1105	
D (MAX)	492				552				711			
L1	805		850	905	918		1050		1052		1212	
D1	492				532				624			

Dimension	MJB 355				MJB 400				MJB 450			
	SA	SB	MA	MB	SA	SB	MA	MB	LA	LB	MB	LA
H	355				400				450			
HS	620				675				740			
AB	670				800				900			
AF	700				800				800			
L	1136		1366		1200		1400	1600	1517	1777		
D (MAX)	711				883				883			
L1	1298		1528		1370		1570	1770	1807	1987		
D1	690				780				882			

Dimension	MJB 500					MJB 560		MJB 630					MJB 710				
	SA	SC	MA	MB	LA	MA	LA	SA	SB	MA	MB	LA	SA	SC	MA	MB	LA
H	500					560		630					710				
HS	867					870		948					1170				
AB	1000					1100		1280					1500				
AF	900					900		Dimensions available on request					Dimensions available on request				
L	1720		1920	2020	2035	2135											
D (MAX)	970					1070											
L1	1970		2170	2270	2035	2405	2160		2360	2460	2450		2650	2900			
D1	970					1070		1200					1413				

D (max) dimensions shown refers to biggest adaptor/coupling


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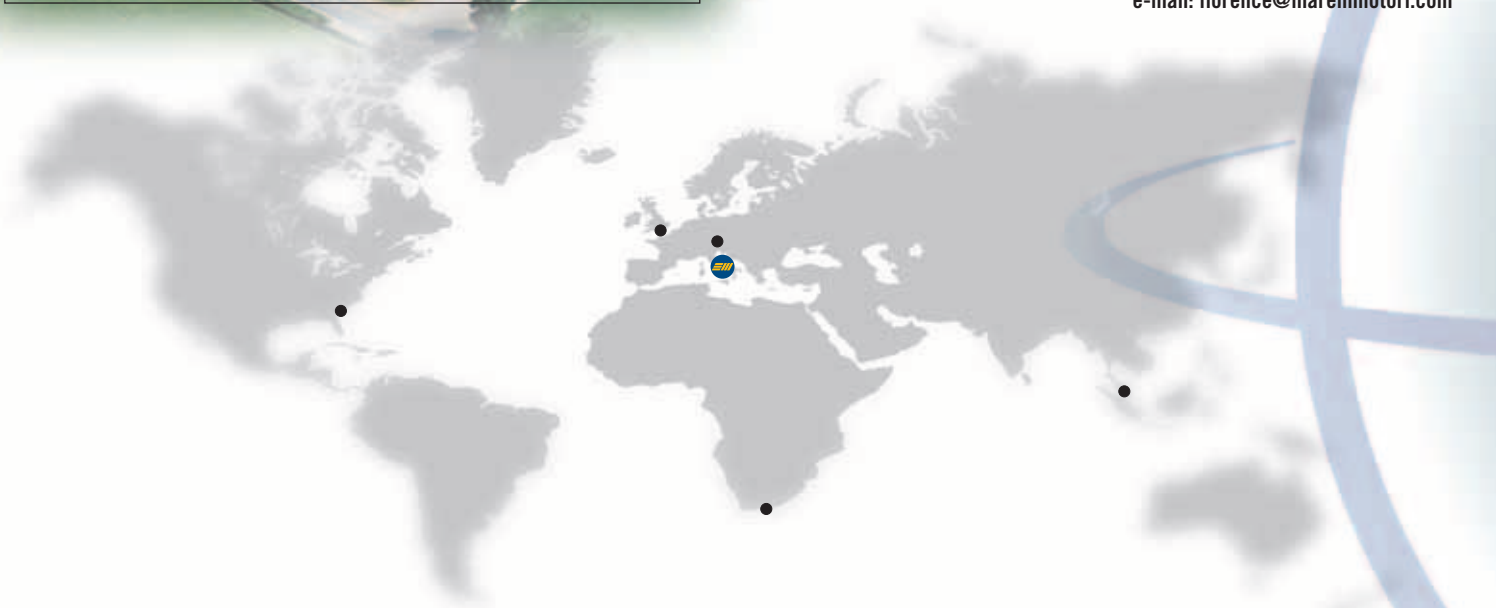
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**SOUTH AFRICA**

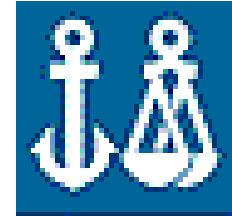
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(F) +27.11.8288089  
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**CERTIFICATO N. 250/95/S**  
**CERTIFICATE No**

SI CERTIFICA CHE IL SISTEMA DI GESTIONE PER LA QUALITÀ DI  
IT IS HEREBY CERTIFIED THAT THE QUALITY MANAGEMENT SYSTEM OF

**MARELLI MOTORI S.p.a.**

VIA SABBIONARA 1 36071 ARZIGNANO VI ITALIA

NELLE SEGUENTI UNITA' OPERATIVE / IN THE FOLLOWING OPERATIONAL UNITS

VIA SABBIONARA 1  
36071 ARZIGNANO VI ITALIA

E' CONFORME ALLA NORMA  
IS IN COMPLIANCE WITH THE STANDARD

**ISO 9001:2000**

PER I SEGUENTI CAMPI DI ATTIVITÀ / FOR THE FOLLOWING FIELD(S) OF ACTIVITIES EA: 18

PROGETTAZIONE E PRODUZIONE DI MOTORI ASINCRONI TRIFASI E SERIE DERIVATE - GENERATORI SINCRONI ED ASINCRONI - MOTORI A CORRENTE CONTINUA E SERIE DERIVATE.

DESIGN AND MANUFACTURE OF THREE-PHASE ASYNCHRONOUS MOTORS AND THEIR DERIVATIVES - SYNCHRONOUS AND ASYNCHRONOUS GENERATORS - DIRECT CURRENT MOTORS AND THEIR DERIVATIVES.

Riferirsi al Manuale della Qualità per i dettagli delle esclusioni ai requisiti della norma

Reference is to be made to the Quality Manual for details regarding the exemptions from the requirements of the standard

L'uso e la validità del presente certificato sono soggetti al rispetto del documento RINA: Regolamento per la certificazione di Sistemi Qualità  
The use and validity of this certificate are subject to compliance with the RINA document: Rules for the certification of Quality Systems

Per informazioni sulla validità del certificato, visitare il sito [www.rina.org](http://www.rina.org)

For information concerning validity of the certificate, you can visit the site [www.rina.org](http://www.rina.org)

Prima Emissione 02.10.1995  
First Issue  
Emissione corrente 10.07.2003  
Current Issue

Dott. Ing. Domenico Andreis  
(Direttore Certificazione e Servizi Industriali)

**RINA SpA**  
Via Corsica 12 - 16128 Genova Italy



CISQ è la Federazione Italiana di Organismi di Certificazione dei sistemi di gestione aziendale

CISQ is the Italian Federation of management system Certification Bodies

**SINCERT**

ACCORDAMENTO ORGANISMI DI CERTIFICAZIONE E ISPEZIONE

SGQ N° 002A - SGA N° 002D  
PRD N° 002B - PRS N° 006C  
SCR N° 003F - SSI N° 001G

Memore degli Accordi di Mutuo Riconoscimento EA e IAF  
Signatory of EA and IAF Mutual Recognition Agreements

La validità del presente certificato è subordinata a sorveglianza periodica annuale / semestrale ed al riesame completo del sistema di gestione con periodicità triennale

The validity of this certificate is dependent on an annual/six monthly audit and on a complete review, every three years, of the management system

FEDERAZIONE  
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Form. CERSISGE-10/02



THE INTERNATIONAL CERTIFICATION NETWORK<sup>®</sup>

# CERTIFICATE

IQNet and its partner  
**CISQ/RINA**  
hereby certify that the organization  
**MARELLI MOTORI S.p.a.**

VIA SABBIONARA 1 36071 ARZIGNANO VI ITALIA

in the following operative units  
VIA SABBIONARA 1 36071 ARZIGNANO VI ITALIA

for the following field of activities

DESIGN AND MANUFACTURE OF THREE-PHASE ASYNCHRONOUS MOTORS AND THEIR DERIVATIVES - SYNCHRONOUS AND ASYNCHRONOUS GENERATORS - DIRECT CURRENT MOTORS AND THEIR DERIVATIVES.

has implemented and maintains a

## Quality Management System

which fulfills the requirements of the following standard

## ISO 9001:2000

Registration Number: **IT-2774**

First Issue : 1995-10-02

Current issue : 2003-07-10

ε



*Fabio Roversi*  
President of IQNet



*Gianrenzo Prati*  
President of CISQ

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## CERTIFICATO N. EMS-4/S CERTIFICATE No

SI CERTIFICA CHE IL SISTEMA DI GESTIONE AMBIENTALE DI  
WE HEREBY CERTIFY THAT THE ENVIRONMENTAL MANAGEMENT SYSTEM OPERATED BY

### MARELLI MOTORI S.p.a.

VIA SABBIONARA 1 36071 ARZIGNANO VI ITALIA

NELLE SEGUENTI UNITA' OPERATIVE / IN THE FOLLOWING OPERATIONAL UNITS

VIA SABBIONARA 1  
36071 ARZIGNANO VI ITALIA

E' CONFORME ALLA NORMA  
IS IN COMPLIANCE WITH THE STANDARD

### ISO 14001:1996

PER I SEGUENTI CAMPI DI ATTIVITÀ / FOR THE FOLLOWING FIELD(S) OF ACTIVITIES  
PROGETTAZIONE E PRODUZIONE DI MOTORI ASINCRONI TRIFASI E SERIE DERIVATE - GENERATORI  
SINCRONI ED ASINCRONI - MOTORI A CORRENTE CONTINUA E SERIE DERIVATE MEDIANTE LE FASI  
DI FUSIONE E PRESSO-FUSIONE, LAVORAZIONI MECCANICHE, TRANCIATURA, ASSEMBLAGGIO E  
VERNICIATURA.

DESIGN AND MANUFACTURE OF THREE-PHASE ASYNCHRONOUS MOTORS AND THEIR  
DERIVATIVES-SYNCHRONOUS AND ASYNCHRONOUS GENERATORS - DIRECT CURRENT MOTORS  
AND THEIR DERIVATES THROUGH THE PHASES OF CASTING AND PRESSURE DIE-CASTING,  
MECHANICAL WORKING, BLANKING, ASSEMBLY AND PAINTING.

L'uso e la validità del presente certificato sono soggetti al rispetto del documento RINA: Regolamento per la certificazione di sistemi di gestione ambientale

The use and validity of this certificate are subject to compliance with the RINA document: Rules for the certification of environmental management systems

Prima Emissione 13.06.1997  
First Issue  
Emissione corrente 04.07.2003  
Current Issue

Dott. Ing. Domenico Andreis  
(Direttore Certificazione e Servizi Industriali)

**RINA SpA**  
Via Corsica 12 - 16128 Genova Italy

Per informazioni sulla validità del certificato, visitare il sito [www.rina.org](http://www.rina.org)

For information concerning validity of the certificate, you can visit the site [www.rina.org](http://www.rina.org)



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CISQ is the Italian Federation of management system Certification Bodies

## SINCERT

ACCREDITAMENTO ORGANISMI DI CERTIFICAZIONE E SPEZIAZIONE

SGO N° 002A - SGA N° 002D  
PRD N° 002B - PPS N° 066C  
SCR N° 003F - SSI N° 001G

Membro degli Accordi di Mutuo Riconoscimento EA e IAF  
Signatory of EA and IAF Mutual Recognition Agreements

La validità del presente certificato è subordinata a sorveglianza periodica annuale / semestrale ed al riesame completo del sistema di gestione con periodicità triennale

The validity of this certificate is dependent on an annual/six monthly audit and on a complete review, every three years, of the management system



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# CERTIFICATE

IQNet and its partner  
**CISQ/RINA**  
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**MARELLI MOTORI S.p.a.**

VIA SABBIONARA 1 36071 ARZIGNANO VI ITALIA

in the following operative units  
VIA SABBIONARA 1 36071 ARZIGNANO VI ITALIA

for the following field of activities

DESIGN AND MANUFACTURE OF THREE-PHASE ASYNCHRONOUS MOTORS AND THEIR DERIVATIVES-SYNCHRONOUS AND ASYNCHRONOUS GENERATORS - DIRECT CURRENT MOTORS AND THEIR DERIVATES THROUGH THE PHASES OF CASTING AND PRESSURE DIE-CASTING, MECHANICAL WORKING, BLANKING, ASSEMBLY AND PAINTING.

has implemented and maintains a

## Environment Management System

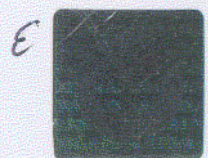
which fulfills the requirements of the following standard

### ISO 14001:1996

Registration Number: **IT-6004**

First Issue : 1997-06-13

Current issue : 2003-07-04



*Fabio Roversi*  
President of IQNet



*Gianrenzo Prati*  
President of CISQ

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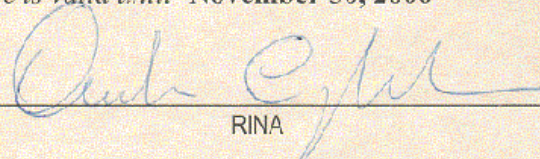
**TYPE APPROVAL CERTIFICATE**  
No. ELE/112998DG1



**This is to certify** that the product below is found to be in compliance with the applicable requirement of the RINA type approval system.

<i>Description</i>	<b>Synchronous generators</b>
<i>Type</i>	<b>SERIE M8B</b>
<i>Applicant</i>	<b>MARELLI MOTORI S.p.A. VIA SABBIONARA, 1 36071 ARZIGNANO - VICENZA (VI) ITALY</b>
<i>Manufacturer</i>	<b>MARELLI MOTORI S.p.A.</b>
<i>Place of manufacture</i>	<b>VIA SABBIONARA, 1 36071 ARZIGNANO - VICENZA (VI) ITALY</b>
<i>Reference standards</i>	<b>IEC 60034-1 , RINA Part C, Cap 2, Sez 4.</b>

*Issued in Genoa on November 30, 2001. This Certificate is valid until November 30, 2006*

  
\_\_\_\_\_  
RINA

**Andrea Cogliolo**

This certificate consists of this page and 1 enclosure





**TYPE APPROVAL CERTIFICATE**

**No. ELE/112998DG1**

**Enclosure - Page 1 of 1**

**SERIE M8B**

**Components:** *synchronous generators*

**Rated Voltage:** *220 - 690 V*

**Frequency :** *50 - 60 Hz*

**Insulation class:** *H with over temperature class F (95°C)*

**Power factor:** *0.8*

**Duty:** *S1*

**Degree of protection:** *IP 23*

**Ambient temperature:** *50 °C*

**Sizes:** *160, 200, 250, 315, 400.*

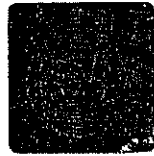
**Reference Standards:** *IEC 60034-1, RINA Parte C, Cap 2, Sez 4 .*

**Tecnichal specification:** *n. MOCAV228A rev 0 dated 07/11/00; n. SIN.CT.002.1;  
n. SIN.CT.003.1; n. SIN.CT.004.1; n. SIN.CT.005.1.*

**Genoa November 30, 2001**



RINA



## Certificate of Design Assessment

N. ELE93404CS/CDA/01

This is to certify that, at request of the Applicant, design plans and data for the products listed below have been examined against applicable sections of the Rules. This certificate is not a type approval certificate or a production control certificate and does not exempt the product from being tested in accordance with applicable RINA rules and procedures for its installation on board. It will remain valid until the expiring date and will automatically become invalid in case of, either changes in the applicable Rules or changes in the product carried out without RINA approval.

### DESCRIPTION

Series of Synchronous Generators

### TYPE

MJBM – MJR - MJV

### APPLICANT

**MARELLI MOTORI S.P.A.**  
**MarelliGenerators**  
**Via Sabbionara, 1**  
**36071 Arzignano (VI)**  
**ITALIA**

### RULES

Rules for the Classification of Ships – Part C Ch. 2 Sec. 4

Issued in Genova on 09.10.2005

This Certificate is valid until 05.05.2010

and annuls and replaces Certificate N. ELE93404CS/CDA

---

RINA  
Andrea COGLIOLO

This certificate consists of this page and 1 enclosure

RINA Società per azioni  
Gruppo REGISTRO ITALIANO NAVALE

Via Corsica, 12 – 16128 GE – Italia  
Tel +39 010 53851  
Fax +39 010 5351000



RINA



**Enclosure to Certificate of Design Assessment  
N. ELE93404CS/CDA/01**

Page 1/1

**Description and characteristics:**

**Low Voltage Synchronous Generators Series MJ:**

Type	MJ	MJ	MJ	MJ	MJ
Frame size	160 SA - MB	200 SA - MB	225 SA - LA	250 MA - LB	315 SA - MB
Rated Power (kVA)	12-31,5	33-75	71-132	143-255	260-465
Rated Voltage (V)	220-690	220-690	220-690	220-690	220-690
Rated Frequency (Hz)	50-60	50-60	50-60	50-60	50-60
N. of poles	4	4	4	4	4
IP	(1)	(1)	(1)	(1)	(1)

Type	MJ	MJ	MJ	MJ	MJ
Frame size	355 SA - MB	400 SA - LB	500 SA - LB	560 MA - LA	630 SA - LA
Rated Power (kVA)	435-830	575-1375	715-2940	2315-3165	1360-3680
Rated Voltage (V)	220-690	220-690	220-690	220-690	220-690
Rated Frequency (Hz)	50-60	50-60	50-60	50-60	50-60
N. of poles	4	4	4 - 6 - 8	4	4 - 6 - 8
IP	(1)	(1)	(1)	(1)	(1)

- (1): MJBM IP23 Std application  
 MJBM IP43 or IP44 when air filters are provided  
 MJR IP44 or IP54 when air / water heat exchanger is provided  
 MJV IP44 or IP55 when air / air heat exchanger is provided

**Documentation:**

Technical specification SIN.NT.005.4 identified with RINA number MAC – 16723

**Condition for acceptance on board:**

All motors are to be tested by the Manufacturer according to Part C Ch. 2 Sec. 4 of RINA rules.  
 All motors having rated power of 100 kW and above, intended for essential services are to be surveyed by the Society during testing unless an alternative inspection scheme is agreed by the Society with the Manufacturer whereby the attendance of the Surveyor will not be required as indicated above.  
 Type tests are to be carried out on a prototype motor or on the first of a batch of motor, and routine tests carried out on subsequent motors.

RINA Società per azioni  
 Gruppo REGISTRO ITALIANO NAVALE

Via Corsica, 12 – 16128 GE – Italia  
 Tel +39 010 53851  
 Fax +39 010 5351000

CERTIFICATE OF CONFORMITY  
CERTIFICATO DI CONFORMITÀ

No. 2007/VE/01/9/14



RINA file No. 2007/VE/01/9  
*Pratica RINA N.*  
Manufacturer MARELLI MOTORI S.p.A.  
*Fabbricante*  
Work order No. 621579 - 10  
*Commessa N.*  
Purchaser FKI ENERGY TECHNOLOGY  
*Committente*  
Order No. 0694 Intended for STOCK  
*Ordine N.* *Destinazione*  
Material description: N° 2 Generator/s 3 phase Type MJBM 315 SA4-KVA 250-Volt 400-Hz 50-Duty S1  
*Descrizione del materiale:*  
Amb. Temp. °C 45 - IP 23  
Serial No. MT 19436 - MT 19437

**SAMPLE**

Identification marks:  2007/VE/01/9/14 13/03/2007  
*Marche di identificazione:*

**THIS IS TO CERTIFY** that the material described above has been constructed and tested with satisfactory results in accordance with the applicable RINA Rules.  
The results of the tests and control carried out are shown on the attached test certificates.  
*SI CERTIFICA che il materiale sopra descritto è stato costruito e collaudato in conformità ai regolamenti del RINA con esito soddisfacente.*  
*I risultati degli accertamenti e prove effettuati sono indicati nei certificati di prova allegati.*

Enclosures: Tests Reports  
*Allegati:*

Date 13 March 2007  
*Data:*

  
MARELLI MOTORI spa  
THE MANUFACTURER  
IL FABBRICANTE

This certificate is issued by the manufacturer in accordance with the arrangements authorized by RINA in the statement of admission to alternative testing system No. 04VE01/1138 dated 03/06/2004 on the basis of the certified Quality System.

*THIS IS TO CERTIFY Questo certificato è rilasciato dal fabbricante in accordo a quanto previsto nella dichiarazione di ammissione a sistema di collaudo alternativo N. 04VE01/1138 del 03/06/2004 rilasciata sulla base del Sistema di Qualità certificato.*

**THIS IS TO CERTIFY** that these arrangements are being kept under review by regular and systematic auditing of the approved manufacturing and quality control procedures.

The above material will be accepted for fitting in a ship classed or intended to be classed with RINA subject to satisfactory installation under the usual survey and testing conditions.

*Si certifica che il Sistema di Qualità ed il prodotto sono tenuti sotto controllo mediante verifiche periodiche.*  
*Il suddetto materiale sarà accettato a bordo di navi classificate o da classificare dal RINA subordinatamente a soddisfacente installazione come previsto per i singoli prodotti.*

Issued at: VENICE  
*Rilasciato a:*



on: 13 March 2007  
il: 

RINA - REGISTRO ITALIANO NAVALE

RINA carries out its duties through officers or other persons it considers possess all the requirements of suitability and competence for the tasks which have been assigned to them. In its capacity as expert RINA only expresses opinions and evaluations of compliance with its own rule requirements and does not, in any case whatsoever, (even if its opinions are requested on matters not expressly covered by Rules) assume the liabilities pertaining to the designers, shipowners, builders, test inspectors, shipyards or any person or organization responsible by law or contractually for providing guarantees for all of whom the respective liabilities remain unchanged even in the case of consultative actions by RINA. For what concerns the tasks taken on and carried out directly, other than those delegated, dealt with in the following sentence, RINA is answerable in law terms. Within the context of the tasks under the responsibility of RINA as delegate of the Italian Merchant Marine Ministry, liability can only be recognized in the case of fraud or gross negligence by the officers or the persons encharged. In no case shall the liability, regardless of the amount of damage reported, exceed a value equal to 5 times the total of the fees received by RINA as consideration of the services rendered from which the damage reported derives.  
*Il RINA esplica le sue mansioni a mezzo di funzionari o altre persone che giudica munite di ogni requisito di idoneità e competenza per i compiti loro affidati. Nella sua qualità di perito il RINA esprime esclusivamente opinioni e valutazioni di conformità alle proprie norme regolamentari e non assume in alcun caso (ove pure i suoi pareri fossero richiesti in materia non espressamente regolamentata) le responsabilità facenti capo ai progettisti, agli armatori, ai costruttori, ai collaudatori, ai cantieri e ad ogni persona od Ente tenuta per legge o per contratto a fornire garanzie, soggetti tutti che mantengono inalterate le rispettive responsabilità anche nel caso di interventi consultivi del RINA. Per quanto attiene ai compiti direttamente assunti e svolti al di fuori di quelli delegati di cui al punto successivo, il RINA risponde a termini di legge. Nell'ambito dei compiti che al RINA fanno capo in qualità di delegato del Ministero dei Trasporti e della Navigazione eventuali responsabilità possono essere ravvisate solo in caso di dolo o colpa grave dei funzionari o dei soggetti incaricati. In nessun caso la responsabilità - quale che sia l'entità del danno lamentato - potrà eccedere un valore pari a 5 volte la misura dei compensi percepiti dal RINA come corrispettivo dei servizi prestati o prestazioni rese, dai quali o dalle quali sia derivato il danno lamentato.*



# AMERICAN BUREAU OF SHIPPING

Customer Name	MARELLI MOTORI SPA	Purchase Order No.	920017 pos. 5
Attending Office	Venice Station	Report Number	VE1646380
First Visit Date	24-Mar-2009	Last Visit Date	24-Mar-2009

**Certification Of:** Generator Quantity: Three (3)  
Manufacturer: MARELLI MOTORI SPA Model No.: MJBМ 500 MA8

**Survey Location :** Arzignano, Italy

## Equipment Data

Item Name	Generator 1/ Generator 2/ Generator 3
Manufacturer Number(S. No.)	MW17435/MW17436/MW17437
Destination Vessel (Name)	NOT SPECIFIED - REQST: CHINA OPR/NOT SPECIFIED - REQST: CHINA OPR/NOT SPECIFIED - REQST: CHINA OPR
Destination Vessel (Class Number)	YY208062/YY208062/YY208062
Builder/Shipyard	SHANGHAI JIANGNAN-CHANGXING SHIPBUILDING CO., LTD.

# SAMPLE

## Design Details

Design State	Design Approved
ABS Reviewing Organization	Genoa Engineering
Drawing Number	see letter

**This is to Certify** that the undersigned surveyor(s) to this Bureau did, at the request of the customer, carry out the following survey and report as follows:

## Inspections

Traceability of materials used on this project has been verified.  
The principal data has been verified in accordance with the applicable Rules/specifications and approved plans, and confirmed to be within acceptable tolerances.  
All testing (pressure/load/operational/etc.) has been carried out as applicable and verified in accordance with the applicable Rules/specifications.  
Testing machines are maintained in a satisfactory condition and records of their recheck or calibration dates confirmed.  
Final markings for identification confirmed.

## Observations

Three (3) three-phase synchronous electric generator type MJBМ 500 MA8 having the following main characteristics:

P = 1125 KVA  
I = 1443 A  
Duty = S1  
Cosφ = 0.8  
Amb T = +50 degC  
Conn. Star  
Rotation: Counter Clock Wise

Final acceptance of the generator is subjected to verification by our local attending Surveyor of the suitability of the degree of protection IP23 with respect to the actual location onboard in accordance with 4-8-3/Table 2 of the Rules.

NOTE: This report evidences that the survey reported herein was carried out in compliance with one or more of the Rules, guides, standards or other criteria of the American Bureau of Shipping and is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. This Report is a representation only that the vessel, structure, item or material equipment, machinery or any other item covered by this Report has been examined for compliance with, or has met one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping. The validity, applicability and interpretation of this report is governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof. Nothing contained in this Report or in any notation made in the contemplation of this Report shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied.

Customer Name **MARELLI MOTORI SPA**  
Attending Office **Venice Station**  
First Visit Date **24-Mar-2009**

Purchase Order No. **920017 pos. 5**  
Report Number **VE1646380**  
Last Visit Date **24-Mar-2009**

**Additional Data**

ABS Stamping ⌘ VE1646380  
Rated Voltage 450 V  
Rated Power 900 kW  
Rated Frequency 60 Hz  
Number of Phase Three  
Rated Speed 900 rpm  
Rated Power Factor (AC Generator)  
Class of Insulation (Stator Windings) H  
Type of Enclosure IP23

**SAMPLE**

**Surveyor(s) to The American Bureau of Shipping**  
**Attending Surveyors**

**Reviewed By**  
Bottino, Daniele

Electronically Signed on 01-Apr-2009, Trieste Station

NOTE: This report evidences that the survey reported herein was carried out in compliance with one or more of the Rules, guides, standards or other criteria of the American Bureau of Shipping and is issued solely for the use of the Bureau, its committees, its clients or other authorized entities. This Report is a representation only that the vessel, structure, item or material equipment, machinery or any other item covered by this Report has been examined for compliance with, or has met one or more of the Rules, guides, standards or other criteria of American Bureau of Shipping. The validity, applicability and interpretation of this report is governed by the Rules and standards of American Bureau of Shipping who shall remain the sole judge thereof. Nothing contained in this Report or in any notation made in the contemplation of this Report shall be deemed to relieve any designer, builder, owner, manufacturer, seller, supplier, repairer, operator or other entity of any warranty express or implied.



**DNV**

# DET NORSKE VERITAS

Certificate No.:  
**VEN-09-0324-1**

## CERTIFICATE FOR ELECTRIC GENERATOR

<b>Manufacturer</b> <b>MARELLI MOTORI S.P.A.</b> <b>Arzignano (VI), ITALY</b>	<h1>SAMPLE</h1>	<b>Works order No.</b> <b>820648 pos. 15</b>
		<b>Generator type</b> <b>MJR 630 LB6</b>
		<b>Serial No.</b> <b>MW 16294</b>
<b>Ordered by</b> <b>MARELLI ASIA PACIFIC Sdn. Bhd.</b>		<b>Order No.</b> <b>0847 rev. 2</b>
<b>Intended for</b> <b>SEKWANG Heavy Ind. Co.,Ltd., SOUTH KOREA</b>		<b>Yard No.</b> <b>DNV ID D28839</b>

THIS IS TO CERTIFY that the electrical Generator described below, has been built and tested in accordance with Det Norske Veritas' current Rules for Classification of "Ships / High Speed, Light Craft and Naval Surface Craft" and Det Norske Veritas' "Offshore Standard"

The test results can be seen from enclosed test report.

<i>Generator specification</i>	Voltage (V)	<b>440/380</b>	Power (kVA)	<b>3000/2500</b>	Insulation class	<b>H/overt. F</b>
	Frequency (Hz)	<b>60/50</b>	Power factor	<b>0.8</b>	Degree of protection (IP)	<b>44</b>
	Current (Amps)	<b>3936/3798</b>	Speed (r.p.m.)	<b>1200/1000</b>	Ambient temperature (°C)	<b>55</b>
	Type of cooling	<b>IC 8A1W7</b>	Excitation Voltage	<b>20</b>	Excitation current	<b>5</b>

This column is only to be filled in when the Manufacturer or his representative is authorized by Det Norske Veritas to stamp the generator.  
The undersigned authorized person declares that the generator is manufactured and tested in accordance with the conditions given in Manufacturing Survey Arrangement.

No.: .....

Quality System Certificate

Marking: .....

For the identification the generator was stamped: .....

by authorised person .....

Place: .....

Date: .....

Name: .....

(Name)

**Marking:**

For identification the generator was stamped (Fill inn as applicable):

**NV VEN-09-0324-1 2009-02-20**

By DNV surveyor

This product certificate is only valid when signed by a DNV surveyor:

Place: **Arzignano (VI), Italy**

Date: **2009-02-20**

Surveyor: **Dino Flavio Vettore**

**DINO FLAVIO VETTORE**  
DNV  
VENICE

**Remarks:**

**Identification hardstamped close to nameplate.**

**Duty type : S1 (continuous full load).**

**Routine tests carried out, according to DNV Rules Pt.4 Ch.8 Sec.5, table C1.**

**Type tests carried out on generator s/n MV 35093 - Certificate VEN-08-2311-2 dated 2008-12-15.**

**Air/water cooler : Certificate LDN-31263201-24 dated 2008-06-03, s/n 082038-1. ACCEPTED SEE MCT E-MAIL DATED 10/07/2008.**

**The generator may be used as a synchronous motor under the following conditions:**

**Voltage (V) = 440/380; Frequency (Hz) = 60/50; Current (Amps) = 2493/2431; Power (kW) = 1900/1600; Power factor = 1; Speed (r.p.m.) = 1200/1000.**

If any person suffers loss or damage which is proved to have been caused by any negligent act or omission of Det Norske Veritas, then Det Norske Veritas shall pay compensation to such person for his proved direct loss or damage. However, the compensation shall not exceed an amount equal to ten times the fee charged for the service in question, provided that the maximum compensation shall never exceed USD 2 million. In this provision "Det Norske Veritas" shall mean the Foundation Det Norske Veritas as well as all its subsidiaries, directors, officers, employees, agents and any other acting on behalf of Det Norske Veritas.



# **Selection Guide**

# Selection Guide

## Synchronous Generators

MARINE APPLICATION



**Site altitude**

Generators are designed for installation height up to 1000 m asl.  
Above this altitude the output must be derated using the following derating factors.

Altitude [m asl]	1000	1500	2000	2500	3000
K factor	1	0,96	0,93	0,90	0,86

**Ambient temperature**

Marelli generators are manufactured with class H insulation and based on an ambient temperature of 40 °C.  
For different ambient temperatures, the output must be derated using the following derating factors.

Ambient temperature [°C]	30	35	40	45	50	55
K factor	1,04	1	1	0,96	0,93	0,90

**Power factor**

The nominal power factor is 0,8 lagging. For operation outside this value the output must be derated using the following derating factors.

Power factor	1,0	0,8	0,7	0,6	0,5	0,3
K factor	1,0	1,0	0,93	0,88	0,84	0,82

**Overloads**

During continuous duty (S1), the following overloads are allowed :

- 10% for 1 hour
- 15% for 10 minutes
- 30% for 4 minutes
- 50% for 2 minutes

These overloads must be occasional and followed by one hour of running at normal load or less.

Stand-by ratings are based on continuous supply of loads for any utility power failure.

No overloads are allowed in stand-by duty.

**Single phase operation**

Three phase wound generators can be reconnected for single phase operation. In such cases power outputs are given by applying the following derating factors.

Connection	Star series	Delta series	Star parallel	Zig - zag
K factor (L - L)	0,60	0,50	0,60	0,66
K factor (L - N)	0,33	-	0,33	0,33

**Air filters**

When dust or moisture are present in the environment, it is strongly recommended to install air filters on the generator.

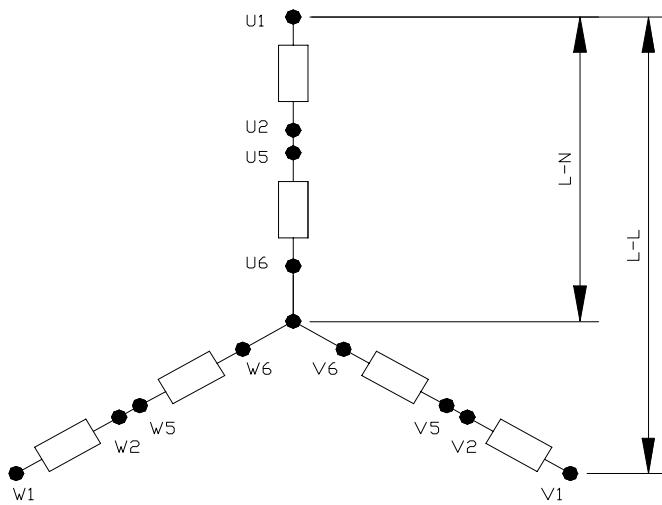
When air filters are used, consider the following derating factors to determinate the maximum output available

- Inlet air filter: 0,92
- Inlet and outlet air filters: 0,85

**4 Pole**

**12 Leads / Winding code M0**

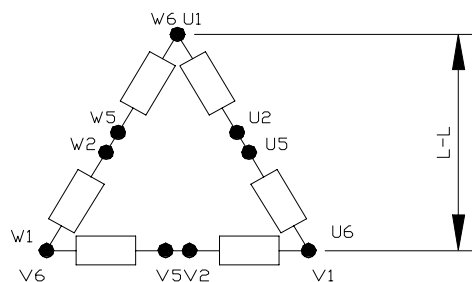
**Series Star (High Wye)**



**Voltages**

Frequency	L - L	L - N
50 Hz	380	220
	400	230
	415	240
	440	254
60 Hz	380*	220*
	416	240
	440	254
	460	266
	480	277

**Series Delta (High Delta)**



**Voltages**

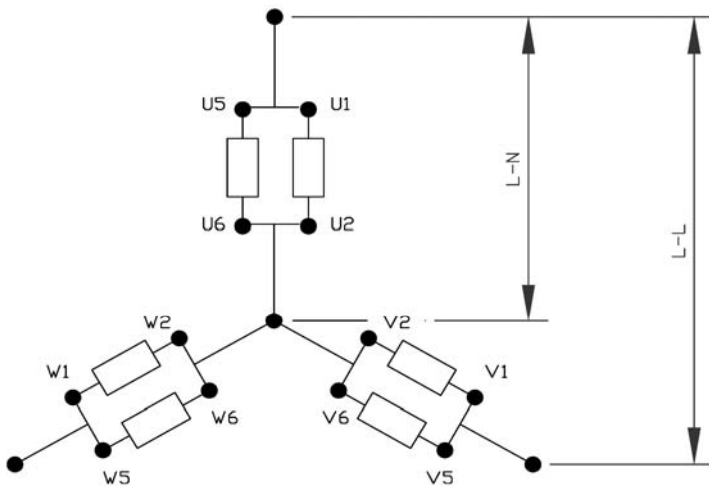
Frequency	L - L	L - N
50 Hz	220	-
	230	-
	240	-
	254	-
60 Hz	220*	-
	240	-
	254	-
	266	-
	277	-

\* voltage not available on MJB 400 frame  
 - neutral not available

**4 Pole**

**12 Leads / Winding code M0**

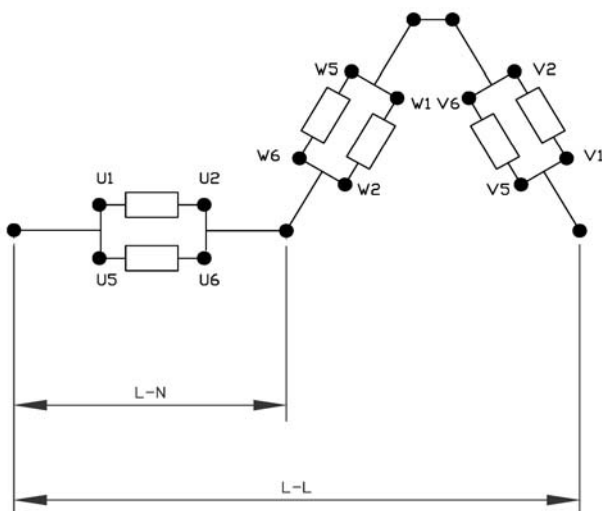
**Parallel Star (Low Wye)**



**Voltages**

Frequency	L - L	L - N
50 Hz	190	110
	200	115
	208	120
	220	127
60 Hz	190*	110*
	208	120
	220	127
	230	133
	240	138

**Zig - Zag**



**Voltages**

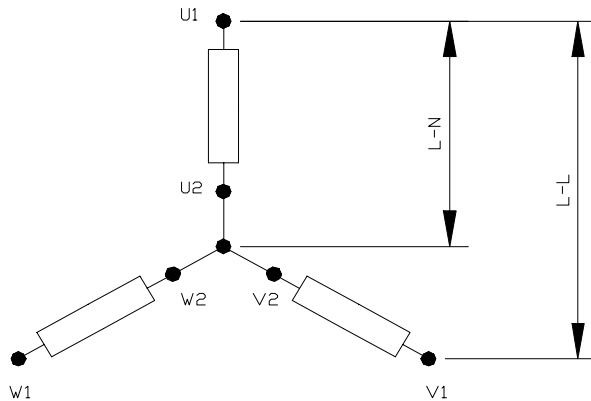
Frequency	L - L	L - N
50 Hz	220	110
	230	115
	240	120
60 Hz	220*	110*
	240	120
	254	127
	266	133

\* voltage not available on MJB 400 frame

**4 Pole**

**6 Leads / Winding code 17 - 80**

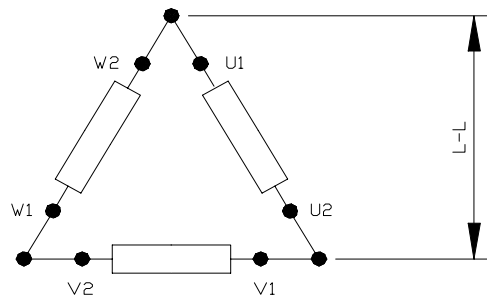
**Star (Wye)**



**Voltages**

Frequency	L - L	L - N
50 Hz	380	220
	400	230
	415	240
60 Hz	416	240
	440	254
	460	266
	480	277

**Delta**



**Voltages**

Frequency	L - L	L - N
50 Hz	220	-
	230	-
	240	-
60 Hz	240	-
	254	-
	266	-
	277	-

- neutral not available

Frame size	Standard features
160 - 200 - 225	<ul style="list-style-type: none"> <li>- 12 leads winding</li> <li>- Auxiliary winding</li> <li>- Single phase sensing AVR Mark V (M16FA655A)</li> <li>- Anti-condensation heaters</li> <li>- IP23 Degree of protection</li> <li>- Special impregnation for damp-corrosive environment</li> <li>- Special painting cycle (MM ref. F96831)</li> <li>- Certified shaft (on request)</li> </ul>
250 - 315 - 355	<ul style="list-style-type: none"> <li>- 12 leads winding<sup>(1)</sup></li> <li>- Auxiliary winding</li> <li>- Three phase sensing AVR Mark I (M40FA640A)</li> <li>- Provision for parallel operation with similar generators</li> <li>- Anti-condensation heaters</li> <li>- IP23 Degree of protection</li> <li>- Special impregnation for damp-corrosive environment</li> <li>- Special painting cycle (MM ref. F96831)</li> <li>- Certified shaft (on request)</li> </ul>
400	<ul style="list-style-type: none"> <li>- 6 leads winding</li> <li>- Auxiliary winding</li> <li>- Three phase sensing AVR Mark I (M40FA640A)</li> <li>- Provision for parallel operation with similar generators</li> <li>- Anti-condensation heaters</li> <li>- IP23 Degree of protection</li> <li>- Special impregnation for damp-corrosive environment</li> <li>- Special painting cycle (MM ref. F96831)</li> <li>- Certified shaft (on request)</li> </ul>
500 - 560	<ul style="list-style-type: none"> <li>- 6 leads winding</li> <li>- Single phase sensing AVR M40FA610A</li> <li>- Provision for parallel operation with similar generators</li> <li>- Overexcitation device VARICOMP</li> <li>- Anti-condensation heaters</li> <li>- IP23 Degree of protection</li> <li>- Special impregnation for damp-corrosive environment</li> <li>- Special painting cycle (MM ref. F96831)</li> <li>- Certified shaft (on request)</li> </ul>
630 - 710	<ul style="list-style-type: none"> <li>- 6 leads winding</li> <li>- Single phase sensing AVR M63FA310A</li> <li>- Provision for parallel operation with similar generators</li> <li>- Overexcitation device VARICOMP</li> <li>- Anti-condensation heaters</li> <li>- N° 3 PT100 resistance temperature detector in stator winding</li> <li>- IP23 Degree of protection</li> <li>- Special impregnation for damp-corrosive environment</li> <li>- Special painting cycle (MM ref. F96831)</li> <li>- Certified shaft (on request)</li> </ul>

(1) 6 leads winding on 355 MB

**MJBM****400V @ 50Hz / 1500 min<sup>-1</sup>****450V @ 60Hz / 1800 min<sup>-1</sup>****Cos φ = 0,8  
Insulation Class H****4 Pole****MARINE**

Type	Leads	Winding code	kVA rating @ Temperature rise / Ambient temp. [°C]			
			Continuous duty			
			50 Hz		60 Hz	
			95 / 50	70 / 50	95 / 50	70 / 50

**Standard winding configuration**

MJBM 160 SA4	12	M0	14,8	12,7	17,6	15,1
160 SB4	12	M0	17,4	15,0	20,5	17,6
160 SC4	12	M0	20,1	17,2	24,1	20,7
160 MA4	12	M0	24,4	21,0	28,9	24,8
160 MB4	12	M0	27,9	23,9	33,5	28,7
MJBM 200 SA4	12	M0	36,5	31,5	44,5	38,0
200 SB4	12	M0	42,0	36,0	52,0	44,5
200 MA4	12	M0	54,0	46,5	64,0	55,0
200 MB4	12	M0	63,0	54,0	76,0	65,0
MJBM 225 SA4	12	M0	74	64	91	78
225 SB4	12	M0	80	69	99	85
225 MA4	12	M0	92	79	112	96
225 LA4	12	M0	115	99	136	117
MJBM 250 MA4	12	M0	145	125	165	140
250 MB4	12	M0	160	135	190	165
250 LA4	12	M0	190	165	220	190
250 LB4	12	M0	220	190	245	210
MJBM 315 SA4	12	M0	260	225	310	265
315 SB4	12	M0	305	260	355	305
315 MA4	12	M0	355	305	420	360
315 MB4	12	M0	390	335	460	395
MJBM 355 SA4	12	M0	445	380	515	440
355 SB4	12	M0	495	425	590	505
355 MA4	12	M0	595	510	690	590
355 MB4	6	17	695	595	815	700
MJBM 400 MA4	6	80	810	695	975	835
400 MB4	6	80	915	785	1090	935
400 LA4	6	80	1005	865	1205	1035
400 LB4	6	80	1135	975	1345	1155
MJBM 500 SA4	6	80	1395	1195	1665	1430
500 SC4	6	80	1635	1405	1895	1625
500 MB4	6	80	1875	1610	2160	1855
500 LA4	6	80	2180	1870	2570	2205
MJBM 560 MA4	6	80	2405	2065	2700	2320
560 LA4	6	80	2865	2460	3220	2765
MJBM 630 SA4	6	80	2770	2380	3190	2740
630 MA4	6	80	3000	2580	3450	2960
630 LA4	6	80	3280	2820	3770	3240

**Special winding configuration**

MJBM 400 MB4	12	M0	900	775	1075	925
400 LA4	12	M0	995	855	1165	1000
400 LB4	12	M0	1045	895	1220	1045



**MJBM**

400V @ 50Hz / 1000 min<sup>-1</sup>  
450V @ 60Hz / 1200 min<sup>-1</sup>

Cos φ = 0,8  
Insulation Class H

6 Pole

MARINE

Type	Leads	Winding code	kVA rating @ Temperature rise / Ambient temp. [°C]			
			Continuous duty			
			50 Hz		60 Hz	
			95 / 50	70 / 50	95 / 50	70 / 50

**Standard winding configuration**

MJBM 400 SA6	6	80	350	300	415	355
400 SB6	6	80	390	335	465	400
400 SC6	6	80	435	375	515	440
400 MA6	6	80	540	465	640	550
400 MB6	6	80	610	525	725	620
400 LA6	6	80	695	595	825	710
400 LB6	6	80	845	725	1000	860
MJBM 500 SA6	6	80	915	785	1085	930
500 SC6	6	80	1160	995	1375	1180
500 MB6	6	80	1395	1195	1655	1420
500 LA6	6	80	1630	1400	1930	1655
MJBM 560 MA6	6	(1)	1785	1530	2035	1745
560 LA6	6	(1)	2125	1825	2445	2100
MJBM 630 SC6	6	(1)	1890	1620	2180	1870
630 MA6	6	(1)	2260	1940	2610	2240
630 LA6	6	(1)	2680	2300	3090	2650
MJBM 710 SC6	6	(1)	2860	2460	3210	2760
710 MA6	6	(1)	3330	2860	3720	3190

**MJBM**

400V @ 50Hz / 750 min<sup>-1</sup>  
450V @ 60Hz / 900 min<sup>-1</sup>

Cos φ = 0,8  
Insulation Class H

8 Pole

MARINE

Type	Leads	Winding code	kVA rating @ Temperature rise / Ambient temp. [°C]			
			Continuous duty			
			50 Hz		60 Hz	
			95 / 50	70 / 50	95 / 50	70 / 50

**Standard winding configuration**

MJBM 400 SA8	6	80	210	180	250	215
400 SB8	6	80	270	230	330	285
400 SC8	6	80	315	270	370	320
400 MA8	6	80	375	320	445	380
400 MB8	6	80	445	380	525	450
400 LA8	6	80	525	450	620	530
400 LB8	6	80	645	555	765	655
MJBM 500 SA8	6	80	715	615	845	725
500 SC8	6	80	890	765	1055	905
500 MB8	6	80	1105	950	1310	1125
500 LA8	6	80	1310	1125	1550	1330
MJBM 560 MA8	6	(1)	1395	1195	1605	1380
560 LA8	6	(1)	1665	1430	1915	1645
MJBM 630 SC8	6	(1)	1430	1230	1640	1410
630 MA8	6	(1)	1710	1470	1970	1690
630 LA8	6	(1)	2260	1940	2610	2240
MJBM 710 SC8	6	(1)	2540	2180	2850	2450
710 MA8	6	(1)	2960	2540	3310	2840
710 MB8	6	(1)	3190	2740	3570	3060
710 LA8	6	(1)	3780	3240	4234	3630

(1) Dedicated winding code

**MJBM****400V @ 50Hz / 600 min<sup>-1</sup>****450V @ 60Hz / 720 min<sup>-1</sup>**Cos φ = 0,8  
Insulation Class H**10 Pole****MARINE**

Type	Leads	Winding code	kVA rating @ Temperature rise / Ambient temp. [°C]			
			Continuous duty			
			50 Hz		60 Hz	
			95 / 50	70 / 50	95 / 50	70 / 50

**Standard winding configuration**

MJBM 500 SA10	6	(1)	520	445	645	555
500 SC10	6	(1)	650	560	815	700
500 MB10	6	(1)	760	650	915	785
500 LA10	6	(1)	840	720	1055	905
MJBM 630 SC10	6	(1)	1040	890	1200	1030
630 MA10	6	(1)	1240	1060	1420	1220
630 MB10	6	(1)	1460	1250	1680	1440
630 LA10	6	(1)	1520	1300	1760	1510
MJBM 710 SC10	6	(1)	2140	1840	2390	2050
710 MA10	6	(1)	2570	2210	2880	2470
710 MB10	6	(1)	2740	2350	3070	2640
710 LB10	6	(1)	2960	2540	3315	2850

**MJBM****400V @ 50Hz / 500 min<sup>-1</sup>****450V @ 60Hz / 600 min<sup>-1</sup>**Cos φ = 0,8  
Insulation Class H**12 Pole****MARINE**

Type	Leads	Winding code	kVA rating @ Temperature rise / Ambient temp. [°C]			
			Continuous duty			
			50 Hz		60 Hz	
			95 / 50	70 / 50	95 / 50	70 / 50

**Standard winding configuration**

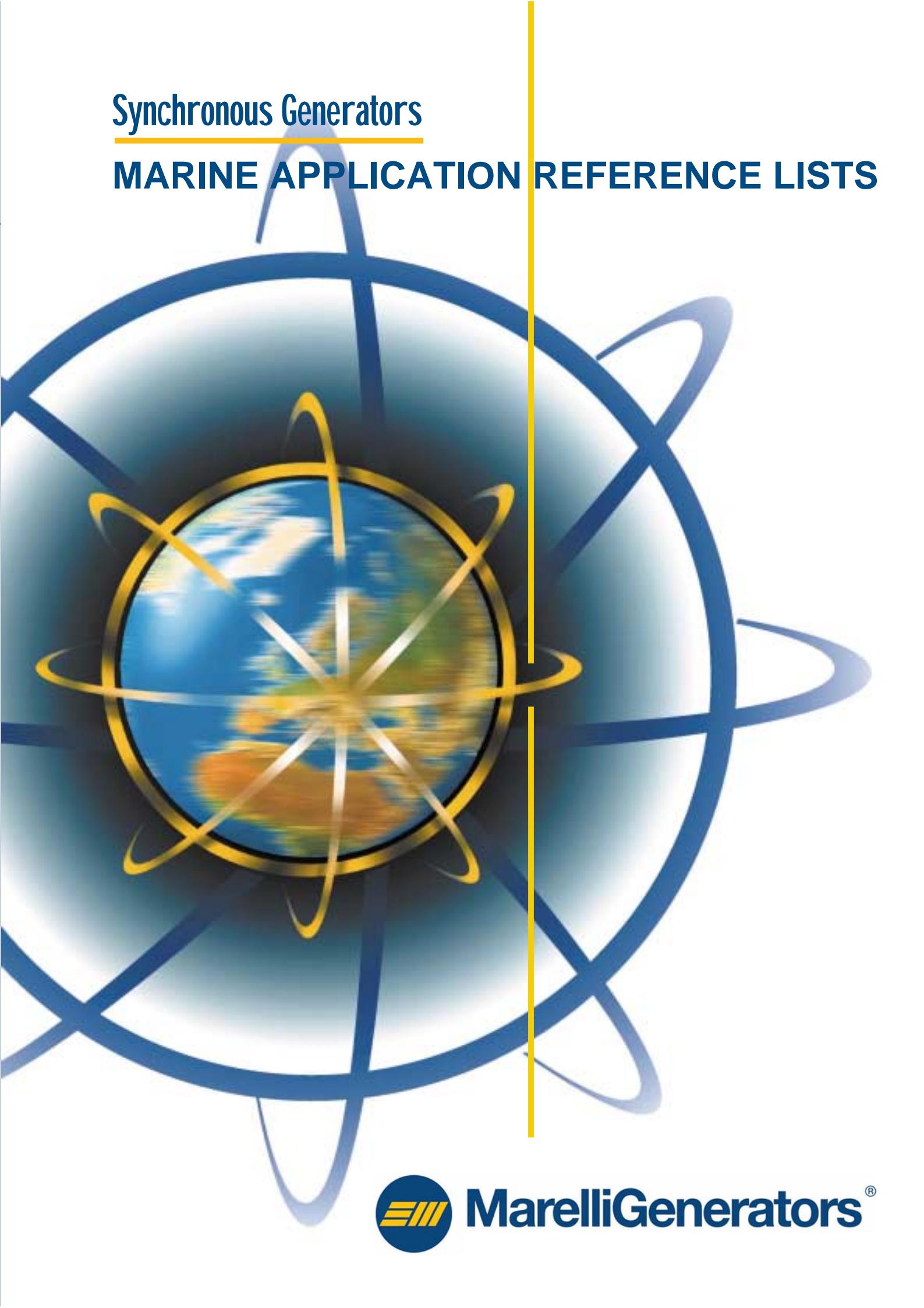
MJBM 630 SC12	6	(1)	790	680	920	790
630 MA12	6	(1)	970	830	1120	960
630 MB12	6	(1)	1230	1060	1420	1220
630 LA12	6	(1)	1450	1240	1660	1420
MJB 710 SA12	6	(1)	1540	1320	1770	1520
710 MA12	6	(1)	2000	1720	2290	1970
710 LA12	6	(1)	2470	2120	2850	2450

(1) Dedicated winding code

# Reference List

# Synchronous Generators

## MARINE APPLICATION REFERENCE LISTS





# MARINE APPLICATION



## MARINE APPLICATION



**A.C Motors & Auxiliary Generators for the greatest Grand Princess  
(by kind permission of Fincantieri – Cantieri Navali Italiani S.p.A.)**

## MARINE APPLICATION



**Synchronous Generators 2 x 1375 kVA / M7BM 630 SC10  
450V 60Hz 720RPM for Fincantieri Ship, Trieste (Italy)**

## **MARINE APPLICATION**



**ROYAL MALAYSIAN NAVY**

**Fast Attack Missile Corvette (650 t)**

**12 Generators Model M2B 315 MB, 350 kVA**





## MARELLI ALTERNATORS

### MAIN REFERENCE LIST MARINE APPLICATION

<b>Generator Model</b>	<b>Rated Power kVA/HZ</b>	<b>Shipyard (Customer)</b>	<b>Qty</b>	<b>Survey Company</b>
<b>1986-1991</b>				
M5R 710 MA 10	2687/60	C.N.APUANIA	6	RINA
M5R 710 MA 10	2687/60	C.N.APUANIA	3	RINA
MXM 630 SC 10	1375/60	FINCANTIERI	2	RINA-ABS
MXR 630 SB 10	1112/60	FINCANTIERI	4	RINA-DNV
MXR 630 MB 10	1500/60	FINCANTIERI	12	RINA-DNV
MXM 630 MD 10	1700/60	FINCANTIERI	8	RINA-DNV
MXR 630 MD 10	1750/60	S.GIORGIO	2	RINA
MXR 500 CH 6	1800/60	FINCANTIERI	4	RINA-ABS
MXR 500 CG 8	1125/60	FINCANTIERI	12	RINA-ABS
MXR 500 CH 8	1500/60	FINCANTIERI	2	RINA
MXR 500 CH 4	2060/50	S.E.C. VIAREGGIO	4	RINA-ABS
MXR 500 BH 6	1187/60	FINCANTIERI	6	RINA
MXM 500 AH 8	1005/60	FINCANTIERI	1	RINA-LLR
MXM 500 AG 6	1000/60	FINCANTIERI	3	RINA-LLR
MXR 500 CH 6	1281/60	S.E.C.VIAREGGIO	4	RINA-ABS
MXR 500 AH 6	1000/60	C.N. FERRARI	1	RINA

## MARELLI ALTERNATORS

### MAIN REFERENCE LIST MARINE APPLICATION

<b>Generator Model</b>	<b>Rated Power kVA/HZ</b>	<b>Shipyard (Customer)</b>	<b>Qty</b>	<b>Survey Company</b>
<b>1992</b>				
M7BM 500 SA 8	740/60	WARTSILA	3	RINA-ABS
M7R 500 MB 6	1187/60	KLEVEN	16	LLRS
M7BM 500 MB 8	1005/60	FINCANTIERI	1	RINA-LLR
M7BM 500 MA 6	1175/60	FINCANTIERI	3	RINA
M7BM 500 MA 6	1281/60	GTI (NDL)	3	Z.C.
M7BM 710 MD 6	3100/50	GTI (NDL)	2	RINA
<b>1994</b>				
M7BM 500 SA 8	740/60	FINCANTIERI	10	RINA-ABS
M7R 500 MC 4	1667/60	S.E.C. VIAREGGIO	1	RINA-ABS
M7BM 500 MB 8	1069/60	WARTSILA	1	RINA-ABS
M7R 500 MC 8	1250/60	FINCANTIERI	5	RINA
M7BM 500 SA 8	800/50	WARTSILA	3	RINA
<b>1995</b>				
M7BM 500 SA 8	740/60	WARTSILA	3	RINA-ABS
M7R 500 MC 6	1500/60	STORK/WARTS.	2	RINA-LLR
M7R 500 MC 4	1500/60	SCAND.ELECT.	2	DNV
M7R 500 LA 8	1400/60	FINCANTIERI	3	RINA-ABS
M7BM 500 SC 6	1560/60	SCAND.ELECT.	1	DNA
M7BM 500 MB 8	1160/60	WARTSILA	3	RINA
M7R 500 MC 4	1700/50	WARTSILA	1	RINA
M7R 710 MB10	2925/60	WARTSILA	3	RINA

POS	DATE	QTY	GENERATOR TYPE	POWER (kVA)	VOLT.	FRE.	DEG. IP	POL.	IM	HULL NO. / PROJECT	SHIPYARD	REG.	TYPE OF SHIP
1	01/99	1	M7BM 500 SC4	1560	450	60	23	4	B3/B14	168	ORLANDO	RINA	CHEM./OIL TANKER
2	01/99	1	M7BM 500 SC4	1560	450	60	23	4	B3/B14	169	ORLANDO	RINA	CHEM./OIL TANKER
3	01/99	1	M7BM 630 MA 6	2000	450	60	23	6	B3	169	DE POLI	RINA	
4	01/99	4	M7R 315 SA4	150	380	50	44	4	B3/B14				
5	01/99	4	M7R 400 MA4	700	380	50	44/54	4	B3/B14				
6	02/99	4	M7BM 315 MA4	360	400	50	23	4	B3/B5				
7	02/99	1	M7BM 315 MB4	200	450	60	23	4	B3/B14				
8	02/99	2	M7BM 315 MC4	350	450	60	55	4	B3/B14			RINA	
9	03/99	4	M8BM 200 LB2	90	380	50	23	2	B2 SAE 4/8			RINA	
10	03/99	1	M7BM 315 MA4	375	440	60	44	4	B3/B14				
11	03/99	2	M7BM 500 SC4	1600	450	60	23	4	B3/B14	1	ESTALEIRO PROMAR	GL	SUPPLY
12	03/99	1	M7R 500 MC4	2400	450	60	44	4	B3	125	SOVIKNES VERFT A/S - NORWAY	DNV	SUPPLY
13	03/99	1	M7R 500 MC4	2400	450	60	44	4	B3	126	SOVIKNES VERFT A/S - NORWAY	DNV	SUPPLY
14	04/99	6	M7R 500 LF8	1100	400	50	44	8	B16				
15	04/99	2	M7BM 500 SC4	1600	450	60	23	4	B3/B14	2	ESTALEIRO PROMAR	GL	SUPPLY
16	04/99	3	M7BM 500 MB 8	1105	450	60	23	8	B20/B14	169	DE POLI	RINA	
17	05/99	6	M8BM 200 MB2	65	400	50	23	2	B2 SAE 4/8			RINA	
18	06/99	4	M7BM 315 SB4	325	440	60	23	4	B2	1	ESTALEIRO PROMAR	GL	SUPPLY
19	06/99	1	M7BM 315 MB4	450	440	60	23	4	B3/B14				
20	06/99	3	M8BM 400 SB 4	768	450	60	23	4	B3/B5	266	MORINI	RINA	OIL TANKER
21	06/99	3	M7R 710 MB10	2875	450	60	44	10	B16	6059	FINCANTIERI	DNV	FERRY
22	07/99	1	M7BM 500 SB6	1250	450	60	23	6	B3/B14	266	MORINI	RINA	OIL TANKER
23	07/99	1	M7BM 630 MD8	1980	690	60	23	8	B20		BATBYGG AS, MALOY, NORWAY	DNV	SEISMIC
24	09/99	1	M7BM 250 MA4	150	400	50	23	4	B3/B14	235	FLYDEDOK, DENMARK		
25	09/99	2	M7BM 250 MD4	200	380	50	23	4	B3/B14				
26	09/99	1	M7V 500 LA4	1250	450	60	44	4	B3				
27	09/99	4	M7BM 710 MA6	3125	450	60	23	6	B3	273	ORLANDO		
28	09/99	2	M7BM 315 SB4	330	440	60	23	4	B3/B14				
29	09/99	1	M7BM 315 MA4	330	400	50	23	4	B3/B14				
30	10/99	2	M8BM 200 LB2	90	400	50	23	2	B2 SAE 4/8			RINA	
31	10/99	1	M7BM 315 MC4	460	400	50	23	4	B3/B14	25	CELIK TEKNE	ABS	
32	10/99	1	M8BM 200 MA2	54	400	50	23	2	B2			RINA	
33	10/99	3	M7R 500 SA4	1125	380	50	44	4	B3/B14	6063	FINCANTIERI	RINA	
34	10/99	2	M7R 315 MB4	300	380	50	54	4	B3/B14				

POS	DATE	QTY	GENERATOR TYPE	POWER (kVA)	VOLT.	FRE.	DEG. IP	POL.	IM	HULL NO. / PROJECT	SHIPYARD	REG.	TYPE OF SHIP
35	10/99	3	M7R 710 MB10	2925	690	60	44	10	B16	6060	FINCANTIERI	DNV	FERRY
36	11/99	1	M8BM 400 MA4	783	450	60	23	4	B34	1556	KROGER	GL	
37	11/99	2	M8R 630 LB6	2875	690	60	44	6	B3				
38	12/99	1	M8BM 400 MB4	750	380	50	23	4	B34	28	CELIK TEKNE	BV	CHEMICAL TANKER
39	12/99	6	M7R 500 SA4	1125	380	50	44	4	B3/B14	6064	FINCANTIERI	RINA	
40	01/00	2	M7R 500 LF8	1100	400	50	44	8	B16	4554	FINCANTIERI	RINA	
41	03/00	1	M7BM 315 MC4	500	440	60	23	4	B3/B14	MOTON. ALNILAM		RINA	
42	03/00	2	M8R 630 LB6	2875	690	60	44	6	B3	6060	FINCANTIERI	DNV	FERRY
43	03/00	1	M7BM 250 MA4	125	415	50	44	4	B3/B14	1223	IHC	LLRR	TRAIL. HOPP. DREDGER
44	03/00	4	M7BM 315 LD4	410	415	50	44	4	B3/B14	1223	IHC	LLRR	TRAIL. HOPP. DREDGER
45	03/00	2	M7BM 500 MA4	1563	415	50	44	4	B3/B14	1223	IHC	LLRR	TRAIL. HOPP. DREDGER
46	03/00	3	M7R 500 SA4	1125	380	50	44	4	B3/B14			RINA	
47	04/00	1	M7BM 315 MB4	400	400	50	23	4	B3/B14		M/PITTIPESCA QUINTO	RINA	
48	05/00	1	M8BM 500 MC6	2000	450	60	23	6	B3/B14	11	KARMSUND MARITIME SERVICE	DNV	FISHING VESSEL
49	05/00	4	M8BM 400 MB4	750	380	50	23	4	B3/B14	62	TORGEM, TURKEY	BV	
50	05/00	1	M8R 710 MB10	2925	690	60	44	10	B16	6069	FINCANTIERI	RINA	RORO PASS. VESSEL
51	06/00	3	M7R 710 MB 10	2925	690	60	44	10	B16	6073	FINCANTIERI	GL	FERRY
52	06/00	1	M7BM 250 MA4	125	415	50	44	4	B3/B5	1224	IHC	LLRR	TRAIL. HOPP. DREDGER
53	06/00	4	M7BM 315 LD4	410	415	50	44	4	B3/B5	1224	IHC	LLRR	TRAIL. HOPP. DREDGER
54	06/00	2	M7BM 500 MA4	1563	415	50	44	4	B3/B14	1224	IHC	LLRR	TRAIL. HOPP. DREDGER
55	06/00	4	M7R 710 MB10	2925	690	60	44	10	B16	1220	APUANIA	RINA	RORO PASS. VESSEL
56	06/00	2	M8R 710 LB10	3910	690	60	44	10	B20	6069	FINCANTIERI	RINA	RORO PASS. VESSEL
57	07/00	1	M8BM 400 LA4	1000	380	50	23	4	B3/B14	CTC99180-PT1	JIANGYANG	RINA	
58	07/00	4	M8BM 400 SA4	500	400	50	23	4	B2	CTC99180-PT1	JIANGYANG	RINA GL	
59	07/00	1	M7BM 315 SB4	310	400	50	23	4	B3/B14	26	TORLAK	RINA GL	
60	08/00	1	M7BM 250 SC4	100	400	50	23	4	B2	99180	JIANGYANG	RINA	
61	08/00	4	M8BM 400 SA4	500	400	50	23	4	B2	CTC99180-PT2	JIANGYANG	RINA	
62	09/00	3	M7R 710 MB10	2925	690	60	44	10	B16	6073	FINCANTIERI	GL	FERRY
63	09/00	1	M7BM 315 SB4	330	440	60	23	4	B3/B14	184	DE POLI	RINA	
64	09/00	1	M8BM 400 LA4	1000	380	50	23	4	B3/B14	CTC99180-PT2	JIANGYANG	RINA	
65	09/00	2	M8R 630 LB6	2875	690	60	44	6	B3	6073	FINCANTIERI	GL	FERRY
66	10/00	3	M8BM 400 LB6	860	400	50	23	6	B16				
67	10/00	2	M8R 710 LB10	3910	690	60	44	10	B20	6070	FINCANTIERI	RINA	RORO PASS. VESSEL
68	11/00	3	M8BM 500 MB8	1105	450	60	23	8	B20/B14	184	DE POLI	RINA	

POS	DATE	QTY	GENERATOR TYPE	POWER (kVA)	VOLT.	FRE.	DEG. IP	POL.	IM	HULL NO. / PROJECT	SHIPYARD	REG.	TYPE OF SHIP
69	11/00	3	M8BM 630 SB8	1600	450	60	23	8	B20/B3	277	ORLANDO	RINA	TANKER
70	11/00	1	M8R 710 MB10	2925	690	60	44	10	B16	6070	FINCANTIERI	RINA	RORO PASS. VESSEL
71	12/00	1	M8BM 630 MA6	2000	450	60	23	6	B3	184	DE POLI	RINA	
72	12/00	1	M8BM 630 MB6	2500	450	60	23	6	B3	277	ORLANDO	RINA	TANKER
73	12/00	1	M7BM 315 MC4	475	400	50	23	4	B3/B14	32	CELIK TEKNE	BV	CHEMICAL TANKER
74	12/00	3	M7R 710 MB10	2925	690	60	44	10	B16	6074	FINCANTIERI	GL	FERRY
75	12/00	1	M7BM 250 MA4	120	400	50	23	4	B3/B14	6080	FINCANTIERI	RINA	
76	01/01	1	M8BM 400 LB4	625	690	60	23	4	B35	6069	FINCANTIERI	RINA	RORO PASS. VESSEL
77	01/01	1	M8BM 400 LB4	625	690	60	23	4	B35	6070	FINCANTIERI	RINA	RORO PASS. VESSEL
78	01/01	2	M8R 400 MB4	120	400	50	23	4	B3/B14	6080	FINCANTIERI	RINA	RORO PASS. VESSEL
79	02/01	2	M8R 630 LB6	2875	690	60	44	6	B3	6074	FINCANTIERI	GL	FERRY
80	03/01	3	M8BM 315 SA4	265	390	50	23	4	B3/B14	6083	APUANIA	RINA	RORO PASS. VESSEL
81	03/01	2	M8R 500 MA4	1600	450	60	44	4	B3/B14	3	ESTALEIRO PROMAR	GL	SUPPLY VESSEL
82	05/01	3	M8BM 315 SA4	265	390	50	23	4	B3/B14	6084	APUANIA	RINA	RORO PASS. VESSEL
83	05/01	4	M7R 710 MB 10	2925	690	60	44	10	B16	1221	APUANIA	RINA-ABS	RORO PASS. VESSEL
84	05/01	4	M7R 710 MB10	2925	690	60	44	10	B16	1221	APUANIA	RINA ABS	RORO PASS. VESSEL
85	06/01	3	M8BM 500 MB8	1105	450	60	23	8	B20/B14	187	DE POLI	RINA	
86	06/01	4	M8R 500 SA6	962	450	60	44	6	B3		ELEFSIS	RINA	
87	07/01	2	M8R 500 MC4	2400	450	60	44	4	B3	134	SOVINKES VERFT AS, NORWAY	DNV	
88	07/01	2	M8R 500 MC4	2400	450	60	44	4	B3	101	SIMEK AS	DNV	SUPPLY VESSEL
89	07/01	1	M8BM 630 MA6	2000	450	60	23	6	B3	187	DE POLI	RINA	
90	08/01	4	M8R 400 MA4	750	390	50	44	4	B3/B14	6088	FINCANTIERI	RINA	RORO PASS. VESSEL
91	08/01	2	M8R 400 MA4	750	390	50	44	4	B3/B14	6089	FINCANTIERI	RINA	RORO PASS. VESSEL
92	08/01	3	M8BM 315 SA4	265	390	50	23	4	B3/B14	6085	APUANIA	RINA	RORO PASS. VESSEL
93	08/01	1	M8V 500 MC4	1000	450	60	54	4	B3	6057	FINCANTIERI	LLRR/RINA	
94	09/01	4	M7R 500 LF8	1350	450	60	44	8	B16	6091	FINCANTIERI	RINA	RORO PASS. VESSEL
95	10/01	1	M8BM 400 MB4	1000	450	60	23	4	B34	24	KARMSUND MARITIME SERV. AS	DNV	
96	10/01	2	M8V 630 LA4	1500	69	60	44	4	B20/B14	6075	FINCANTIERI	LLRR	RORO PASS. VESSEL
97	11/01	2	M8R 500 SC4	1600	450	60	44	4	B3	21	BREVIK, CONSTRUCTION AS. NORWAY	DNV	SUPPLY VESSEL
98	12/01	4	M8R 630 SC4	3000	440	60	44	4	B3	78	HAUYARD LEIRVIK AS, NORWAY	DNV	
99	01/02	2	M8BM 500 SC4	1800	440	60	23	4	B34		WILSON AND SONS, SANTON-BRAZIL	LLRR	
100	01/02	2	M8BM 315 MA4	350	400	50	23	4	B2 SAE 1/14				
101	01/02	3	M8BM 315 SA4	265	390	50	23	4	B34	6086	FINCANTIERI	RINA	RORO PASS. VESSEL
102	01/02	4	M7R 500 LF8	1350	450	60	44	8	B16	6092	FINCANTIERI	RINA	GENER. DRY CARGO

POS	DATE	QTY	GENERATOR TYPE	POWER (kVA)	VOLT.	FRE.	DEG. IP	POL.	IM	HULL NO. / PROJECT	SHIPYARD	REG.	TYPE OF SHIP
103	02/02	1	M8V 500 MC4	1000	450	60	44	4	B3			LLRR	
104	02/02	3	M8BM 500 SC4	1600	440	60	23	4	B34		WILSON AND SONS, SANTON-BRAZIL	LLRR	
105	02/02	1	M8BM 400 MB4	1000	440	60	23	4	B35				
106	03/02	3	M8BM 500 MB8	1105	450	60	23	8	B20/B14	191	DE POLI	RINA	CHEMICAL TANKER
107	03/02	3	M8BM 500 MB8	1210	450	60	23	8	B20/B14			RINA /ABS	
108	03/02	1	M8R 710 MB10	2925	690	60	44	10	B16	6096	FINCANTIERI	RINA/SURVEY	RORO PASS. VESSEL
109	03/02	2	M8R 710 LB10	3910	690	60	44	10	B20	6096	FINCANTIERI	RINA/SURVEY	RORO PASS. VESSEL
110	03/02	2	M8R 500 MA4	1600	440	60	44	4	B3/B14	4	ESTAILERO PROMAR BRASIL		
111	04/02	1	M8BM 400 LB4	625	690	60	23	4	B35			RINA	
112	05/02	1	M8BM 630 SD6	2500	450	60	23	6	B3			RINA /ABS	
113	05/02	2	M8BM 400 SA4	400	400	50	44	4	B34		IHC	CCS	
114	05/02	6	M8BM 400 SB4	768	450	60	23	4	B35	258 / 266	MORINI	RINA	SMERALDO
115	05/02	1	M8R 500 SC4	813	400	47,5	44	4	B34		IHC	CCS	
116	05/02	1	M8V 500 MC4	1000	450	60	44	4	B3			LLRR	
117	05/02	1	M8R 500 SA4	813	400	50	44	4	B34		IHC	CCS	
118	05/02	2	M8BM 400 MB4	450	415	50	44	4	B34			LLRR	
119	05/02	1	M8BM 250 SB4	99	230	60	23	4	B3/B14				
120	05/02	3	M8R 500 LA4	2800	450	60	44	4	B3	139	SOVIKNES VERFT AS, NORWAY	DNV	DREDGER
121	06/02	4	M7R 500 LF8	1350	450	60	44	8	B16	6094	FINCANTIERI	RINA	GENER. DRY CARGO
122	06/02	2	M8BM 500 LA4	2000	500	50	23	4	B34	CO 1235	IHC	BV	
123	06/02	3	M8BM 315 SA4	265	390	50	23	4	B34	6107	FINCANTIERI	RINA	
124	07/02	24	M8BM 200 LB2	100	400	50	23	2	B2 SAE 4/8		INTERMARINE	RINA	MOTOVEDETTA G.d F.
125	07/02	1	M8BM 630 MA6	2000	450	60	23	6	B3	191	DE POLI	RINA	CHEMICAL TANKER
126	08/02	3	M8R 500 LA8	1250	450	60	44	8	B16	6106	FINCANTIERI	RINA	
127	08/02	2	M8BM 250 SA4	88	3x230	60	23	4	B34	BN 324	IZAR Construcciones Navales, S. A.	BV	DREDGER
128	09/02	2	M8R 500 SC4	1600	450	60	44	4	B3	97	BRATTVAAG	DNV	
129	09/02	4	M7R 500 LF8	1350	450	60	44	8	B16	6093	FINCANTIERI	RINA	GENER. DRY CARGO
130	09/02	4	M8BM 315 SA4	250	3x230	60	23	4	B34	BN 324	IZAR Construcciones Navales, S. A.	BV	DREDGER
131	10/02	4	M8BM 315 MA4	300	400	50	23	4	B34				
132	11/02	2	M8R 500 MA4	1600	450	60	44	4	B3/B14	6	ESTAILERO PROMAR BRASIL	DNV	
133	11/02	1	M8R 500 LA4	2800	450	60	44	4	B3	140	SOVIKNES VERFT AS, NORWAY	DNV	DREDGER
134	12/02	2	M8BM 630 MB8	2000	690	60	23	8	B20	62	SLIPEN VERFT SANDNESSJOEN	DNV	
135	12/02	2	M8BM 710 LB10	3420	690	60	23	10	B20	62	SLIPEN VERFT SANDNESSJOEN	DNV	
136	12/02	4	M7R 500 LF8	1350	450	60	44	8	B16	6095	FINCANTIERI	RINA	GENER. DRY CARGO

POS	DATE	QTY	GENERATOR TYPE	POWER (kVA)	VOLT.	FRE.	DEG. IP	POL.	IM	HULL NO. / PROJECT	SHIPYARD	REG.	TYPE OF SHIP
137	12/02	1	M8V 500 MC4	1000	450	60	44	4	B3			LLRR	
138	03/02	1	M8BM 400 SB4	750	440	60	23	4	IM B34	23	KARMSUND MARITIME SERVICE AS	DNV	

Item	Qty	Year	Generator type	Output [kVA]	Voltage [V]	Frequency [Hz]	Protection Degree	Poles	Survey	Hull No.	Shipyard
1	1	2005	MJBM 355 SA4	380	400	50	23	4	KR	86	TURGEM
2	1	2005	MJBM 355 SB4	500	440	60	23	4	BV	30	CEKSAM
3	1	2005	MJBM 355 SB4	500	440	60	23	4	BV	32	CEKSAM
4	2	2004	MJBM 355 MB4	625	440	60	23	4	BV	19	TURKTER
5	2	2004	M8BM 315 LA4	462	690	60	23	4	DNV	102	AKER BRATTVAG SHIPVERFT
6	1	2005	MJBM 315 SA4	250	440	60	23	4	DNV	274	ULSTEIN VERFT
7	1	2005	MJV 500 SC4	1100	400	50	44	4	RINA	27	GEMAK
8	3	2003	M8BM 315 SA4	265	390	50	23	4	RINA	6085	APUANIA
9	2	2003	M8BM 400 SA4	400	400	50	44	4	CCS	-	IHC
10	5	2005	MJBM 355 SB4	511	440	60	23	4	DNV	TBA	GRYFIA SHIP YARD
11	1	2004	MJBM 400 LA4	950	450	60	23	4	BV	80	TORGEM
12	1	2005	MJBM 400 LA4	950	450	60	23	4	BV	80	TORGEM
13	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	261	ZELENODOSK
14	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	262	ZELENODOSK
15	2	2004	MJB 500 SA4	1250	440	60	23	4	RINA	180	TERMOLI
16	1	2005	MJBM 500 SC6	1200	440	60	23	6	DNV	200131	III INTERNATIONAL
17	1	2005	MJBM 500 SC6	1200	440	60	23	6	DNV	TBA	TBA
18	1	2004	MJV 500 SC4	1100	400	50	23	4	RINA	27	GEMAK
19	1	2005	MJV 500 SC4	1100	400	50	23	4	RINA	27	GEMAK
20	1	2003	M8R 630 SC6	1625	450	60	44	6	RINA	YZJ02-651-Y1	JIANGSU YANGZIJANG SHIPBUILDING
21	3	2003	M8R 710 MB8	2460	690	50	44	8	RINA	6116	FINCANTIERI
22	3	2003	M8R 710 MB10	2925	690	60	44	10	RINA	6114	FINCANTIERI
23	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	3001	KRASNOE SORMOVO
24	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	3002	KRASNOE SORMOVO
25	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	3003	KRASNOE SORMOVO
26	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	3004	KRASNOE SORMOVO
27	1	2005	MJBM 400 LB6	825	400	50	23	6	RMRS	3005	KRASNOE SORMOVO
28	1	2004	MJBM 500 SA8	810	440	60	23	8	ABS	37	YARDIMCI
29	1	2004	MJBM 500 SA8	810	440	60	23	8	ABS	39	YARDIMCI
30	1	2004	MJBM 500 SA8	810	440	60	23	8	ABS	38	YARDIMCI



Item	Q.ty	Year	Generator type	Output [kVA]	Voltage [V]	Frequency [Hz]	Protection Degree	Poles	Survey	Hull No.	Shipyard
31	2	2004	MJBM 500 MA8	1020	440	60	23	8	LLRR	E4-080	ROPAX VESSEL
32	2	2005	MJBM 500 LA6	1425	400	50	23	6	LLRR	M/02502.M11	VILNIUS
33	3	2004	MJBM 500 LA6	1425	690	50	23	6	DNV	6123	FINCANTIERI
34	3	2004	MJBM 500 LA6	1425	690	50	23	6	DNV	6125	FINCANTIERI
35	3	2004	MJBM 500 LA6	1425	690	50	23	6	DNV	6124	FINCANTIERI
36	3	2005	MJBM 500 LA6	1425	690	50	23	6	DNV	6133	FINCANTIERI
37	3	2005	MJBM 500 LA6	1425	690	50	23	6	DNV	6134	FINCANTIERI
38	3	2004	MJBM 500 LC10	940	440	60	23	10	DNV	114	AKER TULCEA
39	1	2005	MJR 400 LB4	1250	440	60	44	4	LLRR	241	ABG SHIPYARD
40	1	2004	MJR 630 SD6	1920	380	50	44	6	RINA	-	MOBY FREEDOM
41	1	2005	MJR 500 SA4	1625	450	60	44	4	RINA	45	SELAH
42	1	2005	MJR 500 SA4	1625	450	60	44	4	RINA	48	SELAH
43	2	2004	MJR 500 SC4	1620	440	60	44	4	ABS	39	YARDIMCI
44	2	2005	MJR 500 SC4	1620	440	60	44	4	ABS	38	YARDIMCI
45	2	2005	MJR 500 MB4	2250	440	60	44	4	RINA	83	ROSETTI
46	2	2005	MJR 500 MB4	2250	440	60	44	4	RINA	84	ROSETTI
47	2	2004	MJR 500 MB8	1211	440	60	44	8	DNV	6119	FINCANTIERI
48	2	2004	MJR 500 MB8	1211	440	60	44	8	DNV	6120	FINCANTIERI
49	2	2004	MJR 500 MC4	2400	440	60	44	4	ABS	37	YARDIMCI
50	2	2004	MJR 500 LA6	1625	450	60	44	6	DNV	306	KLEVEN
51	2	2004	MJR 500 LA6	1625	450	60	44	6	DNV	307	KLEVEN
52	1	2005	MJR 500 LA6	1625	450	60	44	6	DNV	309	KLEVEN
53	1	2005	MJR 500 LA6	1625	450	60	44	6	DNV	308	KLEVEN
54	3	2005	MJBM 500 LC10	940	440	60	23	10	DNV	114	AKER TULCEA
55	1	2005	MJBM 500 SA8	810	440	60	23	8	ABS	38	YARDIMCI
56	2	2005	MJR 710 MA6	3125	690	50	44	6	RINA	6136	FINCANTIERI
57	1	2005	MJBM 500 SA4	1800	440	60	23	4	RINA	180	TERMOLI
58	3	2005	MJR 710 MA6	3125	690	50	44	6	RINA	6137	FINCANTIERI
59	1	2004	MJR 400 LB4	1250	440	60	44	4	RINA	C78	ROSETTI
60	1	2004	MJR 400 LB4	1250	440	60	44	4	RINA	C78	ROSETTI

Item	Q.ty	Year	Generator type	Output [kVA]	Voltage [V]	Frequency [Hz]	Protection Degree	Poles	Survey	Hull No.	Shipyard
61	1	2005	MJR 400 LA4	1000	440	60	44	4	KR	85	USTAOGLA
62	2	2005	MJR 710 LB8	3600	415	50	44	8	LLRR	23007	MAZAGON DOCK LTD-MUMBAI-INDIA
63	2	2003	M8BM 500 SB4	1600	440	60	23	4	ABS	10	AKER YARD POMAR 1
64	2	2003	M8BM 500 SB4	1600	440	60	23	4	ABS	11	AKER YARD POMAR 1
65	2	2003	M8R 500 SC4	1800	440	60	44	4	DNV	104	BRATTVAGG SKIPSVERFT
66	2	2003	M8R 500 SC4	1800	440	60	44	4	DNV	105	BRATTVAGG SKIPSVERFT
67	2	2003	M8R 500 SC4	1800	440	60	44	4	DNV	01	EBIN
68	2	2003	M8R 630 LB6	3000	440	60	44	6	DNV	12	ESTALEIRO PROMAR 1, BRAZIL
69	2	2003	M8R 630 LB6	3000	440	60	44	6	DNV	ETH 002	EBIN, BRAZIL
70	2	2003	M8R 630 LB6	3000	440	60	44	6	DNV	142	ESTALEIRO ITAJAI, BRAZIL
71	2	2003	M8R 630 LB6	3000	440	60	44	6	DNV	143	ESTALEIRO ITAJAI, BRAZIL
72	1	2005	MJBM 400 SB4	750	440	60	23	4	DNV	23	KARMSUND MARITIME SERVICE AS
73	3	2004	MJBM 400 MA4	662,5	400	50	23	4	BV	39	MIKELBUST
74	3	2004	MJBM 400 MA4	662,5	400	50	23	4	BV	40	MIKELBUST
75	5	2005	MJBM 400 LA4	1041	440	60	23	4	DNV	TBA	GRYFIA SHIP YARD
76	1	2005	MJBM 500 SC4	2000	450	60	23	4	DNV	STOCK	STOCK
77	2	2005	MJBM 500 MA4	2100	450	60	23	4	DNV	136	SOVIKNES VERFT
78	1	2005	MJBM 500 MA4	1800	450	60	23	4	DNV	56	NAMECOCHIN SHIPYARD LTD
79	2	2005	MJBM 500 MA4	1800	450	60	23	4	DNV	57	NAMECOCHIN SHIPYARD LTD
80	1	2005	MJBM 500 MA4	1800	450	60	23	4	DNV	58	NAMECOCHIN SHIPYARD LTD
81	1	2005	MJBM 500 MA4	1800	450	60	23	4	DNV	59	NAMECOCHIN SHIPYARD LTD
82	2	2005	MJR 630 LB4	2750	690	50	44	4	RINA+DNV	6133	FINCANTIERI
83	2	2005	MJR 630 LB4	2750	690	50	44	4	RINA+DNV	6134	FINCANTIERI
84	2	2003	M8R 500 LB4	2000	690	50	23	4	RINA+ABS	6116	FINCANTIERI
85	1	2005	MJR 500 SC4	1750	450	60	44	4	DNV	4	EBIN
86	1	2004	MJR 500 SC4	1800	440	60	44	4	DNV	110	SIMEK AS
87	2	2005	MJR 500 SC4	1800	440	60	44	4	DNV	111	SIMEK AS
88	1	2005	MJR 500 SC4	1800	440	60	44	4	DNV	102	SIMEK AS
89	2	2003	M8R 630 SD6	2250	690	60	23	6	RINA	6114	FINCANTIERI
90	2	2005	MJR 500 SC4	1750	450	60	54	4	DNV	5	ALIANCA

Item	Q.ty	Year	Generator type	Output [kVA]	Voltage [V]	Frequency [Hz]	Protection Degree	Poles	Survey	Hull No.	Shipyard
91	1	2004	MJR 500 SC4	1800	440	60	44	4	ABS	16	PROMAR 1
92	2	2005	MJR 500 SC4	1800	440	60	44	4	ABS	19	PROMAR 1
93	1	2004	MJR 500 SC4	1800	440	60	44	4	ABS	16	PROMAR 1
94	1	2003	MJR 500 MB4	2250	440	60	44	4	DNV	TBA	SOVIKNES VERFT
95	1	2004	MJR 500 LA4	2350	450	60	44	4	DNV	M/S FAR SEA	FARSTAD SHIPPING
96	1	2004	MJR 500 LB4	2400	400	50	44	4	BV	39	MIKELBUST VERFT, NORWAY
97	1	2004	MJR 500 LB4	2400	400	50	44	4	BV	39	MIKELBUST VERFT, NORWAY
98	2	2005	MJR 630 LA6	3000	450	60	44	6	DNV	112	SIMEK AS
99	2	2005	MJR 630 LA6	3000	450	60	44	6	DNV	42	BREVIK CONSTRUCTION
100	1	2005	MJR 630 LA6	3000	450	60	44	6	DNV	43	BREVIK CONSTRUCTION
101	1	2005	MJR 630 LA6	3000	450	60	44	6	DNV	44	BREVIK CONSTRUCTION
102	1	2005	MJR 630 LA6	3000	450	60	44	6	DNV	43	BREVIK CONSTRUCTION
103	2	2004	MJBM 500 MA8	1210	440	60	23	8	IR	-	PRINCESS OF SCANDINAVIA
104	2	2005	MJR 630 LA6	3000	440	60	54	6	DNV	274	ULSTEIN VERFT
105	2	2004	MJR 630 LA8	2500	690	60	44	8	DNV	102	AKER BRATTVAG SHIPVERFT, NORWAY
106	1	2005	MJR 630 LB6	3000	440	60	44	6	DNV	17	ESTALEIRO PROMAR 1, BRAZIL
107	1	2005	MJR 630 LB6	3000	440	60	44	6	DNV	18	AKER PROMAR 1, BRAZIL
108	1	2005	MJR 630 LB6	3000	440	60	44	6	DNV	20	AKER PROMAR 1, BRAZIL
109	1	2005	MJR 630 LB6	3000	440	60	44	6	DNV	17	ESTALEIRO PROMAR 1, BRAZIL
110	1	2005	MJR 630 LB6	3000	440	60	44	6	DNV	18	AKER PROMAR 1, BRAZIL
111	1	2005	MJR 630 LB6	3000	440	60	44	6	DNV	20	AKER PROMAR 1, BRAZIL
112	1	2003	M8BM 500 MA4	2200	440	60	23	4	DNV	-	-
113	2	2003	MJR 500 MB4	2250	440	60	44	4	DNV	TBA	SOVIKNESET VERFT, NORWAY
114	2	2004	MJR 500 LB4	2400	400	50	44	4	BV	40	MYKLEBUST VERFT, NORWAY
115	1	2004	MJR 500 LA4	2350	450	60	44	4	DNV	-	FARSTAD SHIPPING
116	4	2005	MJR 500 SC4	1750	450	60	54	4	DNV	6	ALIANCA
117	2	2005	MJR 500 SC4	1800	440	60	55	4	DNV	89	HAVYARD
118	2	2005	MJR 630 LB6	3000	440	60	44	6	DNV	085	HAVYARD LEIRVIK
119	2	2005	MJR 630 LB6	3000	440	60	44	6	DNV	086	HAVYARD LEIRVIK
120	1	2005	M8R 630 LB6	3000	450	60	44	6	DNV	NA	STOCK

Item	Q.ty	Year	Generator type	Output [kVA]	Voltage [V]	Frequency [Hz]	Protection Degree	Poles	Survey	Hull No.	Shipyard
121	2	2005	MJR 710 LC10	4200	690	60	44	10	DNV	160	BERGEN MEKANISKE VERKSTED
122	1	2005	MJVM 500 SC6	750	480	60	55	6	ABS	-	-
123	1	2004	MJBM 400 SA4	690	450	60	23	4	BV	-	SCHEPERS
124	1	2004	MJBM 400 MA4	700	450	60	23	4	BV	-	-
125	1	2003	M8V 500 LA4	1500	450	60	44	4	LLRR	6111	FINCANTIERI
126	1	2004	MJV 500 LA4	1500	450	60	44	4	LLRR	6122	FINCANTIERI
127	1	2005	MJV 500 LA4	1500	450	60	44	4	LLRR	6129	FINCANTIERI
128	1	2005	MJV 500 LA4	1500	450	60	44	4	LLRR	6130	FINCANTIERI
129	1	2005	MJR 630 MB8	2250	440	60	44	8	DNV	TBA	TBA
130	3	2005	MJR 400 LB4	1140	480	60	54	4	RINA	228	-
131	1	2004	MJR 500 LA4	2350	450	60	44	4	DNV	M/S FAR SEA	FARSTAD SHIPPING
132	12	2004	MJBM 400 LA4	1041	440	60	23	4	DNV	NB 301/01	GRYFIA SHIP YARD
133	5	2005	MJBM 315 SA4	244	440	60	23	4	DNV	TBA	GRYFIA SHIP YARD
134	1	2004	MJBM 400 LC4	625	690	50	23	4	RINA+ABS	6116	FINCANTIERI
135	1	2004	MJR 630 LA6	2750	450	60	23	6	DNV	6119	FINCANTIERI
136	1	2004	MJR 630 LA6	2750	450	60	23	6	DNV	6120	FINCANTIERI
137	1	2003	M8BM 400 LB4	625	690	60	23	4	RINA	6113	FINCANTIERI
138	1	2004	MJBM 400 MB4	490	400	50	23	4	RINA	-	FINCANTIERI
139	1	2005	MJBM 400 LC4	625	690	50	23	4	DNV	6123	FINCANTIERI
140	1	2005	MJBM 400 LC4	625	690	50	23	4	DNV	6124	FINCANTIERI
141	1	2005	MJBM 400 LC4	625	690	50	23	4	DNV	6125	FINCANTIERI
142	1	2005	MJBM 400 LC4	625	690	50	23	4	DNV	6133	FINCANTIERI
143	1	2005	MJBM 400 LC4	625	690	50	23	4	DNV	6134	FINCANTIERI
144	1	2004	MJV 630 LA4	1500	690	60	44	4	LLRR	6075	FINCANTIERI
145	2	2004	MJR 630 LB4	2750	690	50	44	4	DNV	6123	FINCANTIERI
146	2	2004	MJR 630 LB4	2750	690	50	44	4	DNV	6124	FINCANTIERI
147	2	2004	MJR 630 LB4	2750	690	50	44	4	RINA+DNV	6125	FINCANTIERI
148	1	2005	MJBM 315 MB4	400	400	50	23	4	BV	311	BARKMEIJER STROOBOS
149	2	2005	MJBM 315 MB4	400	400	50	23	4	BV	312	BARKMEIJER STROOBOS
150	2	2005	MJBM 315 MB4	400	400	50	23	4	BV	308	BARKMEIJER STROOBOS

Item	Q.ty	Year	Generator type	Output [kVA]	Voltage [V]	Frequency [Hz]	Protection Degree	Poles	Survey	Hull No.	Shipyard
151	4	2003	M8BM 400 LA4	500	400	50	23	4	RINA GL	CTC99180-PT1	JIANGYANG
152	1	2003	M8BM 400 LA4	1000	380	50	23	4	RINA	CTC99180-PT2	JIANGYANG
153	1	2005	MJBM 315 MB4	438	450	60	23	4	DNV	-	TBA
154	2	2005	MJBM 355 SA4	450	450	60	23	4	DNV	-	TBA
155	1	2003	M8R 630 SC6	1625	450	60	44	6	RINA	YZJ02-651-Y1	JIANGSU YAHGZIJANG SHIPBUILDING
156	2	2003	M8R 630 SD6	2250	690	60	23	6	RINA	6113	FINCANTIERI

## Reference List WARTSILA

CUSTOMER	FRAME SIZE	RATING	Q.TY	YARD	OWNER	YEAR	APPLICATION
Wartsila - FR	M7B 500 SA8	1000 kVA	3	De Poli 153	Arcoia Giada	1994	
Wartsila - FR	M7BM 710 MB10	2750 kVA	3	Apuania 1182	Grimaldi	1995	
Wartsila - FR	M7BM 400 MC4	1200 kVA	1	Morini 244	Marnavi	1994	Shaft generator
Wartsila - FR	M7BM 400 SC4	800 kVA	1	Fincantieri 5910	Snam Agip (Portovenere)	1994	
Wartsila - FR	M7BM 400 MC8 + M7BM 500 MB8	600 kVA+1105 kVA	2 + 1	INMA 4139	Pugliola Gaz (VE)	1994	
Wartsila - FR	M7B 400 SC4	800 kVA	3	Morini 244	Marnavi	1994	Diesel generator
Wartsila - FR	M7BM 500 MB10	925 kVA	3	Morini 253	Finbeta	1994	Diesel generator
Wartsila - FR	M7BM 315 SB4	400 kVA		INMA 4139	Pugliola Gaz (VE)	1994	
Wartsila - FR	M7R 500 MC6 + B4M315MB6	1500kVA + 120kW	1+1	Morini 253	Finbeta	1995	Shaft generator+pony motor
Stork Wartsila	M7BM 400 MC4	1250 kVA	1	Orlando 161	Marittima Fluviale	1996	Diesel generator
Stork Wartsila	M7BM 500 MC6	1550 kVA	1	De Poli 161	Arcoia	1996	Shaft generator
Stork Wartsila	M7BM 500 SB6	1250 kVA	1	Morini 258	Finbeta	1997	Shaft generator
Stork Wartsila	GRUPPO M7R 500 SC4 + A4M 280 M4	1500 kVA + 45kW	1 + 1	Morini 259	Marnavi	1997	Shaft generator + pony motor
Stork Wartsila	GRUPPO M7R 500 MA4 + A4M 280 M4	1500kVA + 90 kW	1 + 1	Orlando 163	Marnavi	1997	Shaft generator + pony motor
Stork Wartsila	GRUPPO M7R 500 MA4 + A4M 280 M5	1500kVA + 90 kW	2 + 1	Orlando 162	Marnavi	1997	Shaft generator + pony motor
Stork Wartsila	M7BM 315 MC4	500 kVA	1	San Giorgio 111	Siba	1997	Emergency generator

## Reference List WARTSILA

CUSTOMER	FRAME SIZE	RATING	Q.TY	YARD	OWNER	YEAR	APPLICATION
Stork Wartsila	M7R 500 MA4 + A4M 280 M4	1500kVA + 90kW	1+1	Orlando 165	Marnavi	1997	Shaft generator + pony motor
Stork Wartsila	GRUPPO M7BM 500 MC6 + A4M 280 M6	1550 kVA + 66 kW	1 + 1	De Poli 162	Arcoin	1997	Shaft generator + pony motor
Stork Wartsila	A4M 280 M6	55 kW	1	De Poli 161	Arcoin	1996	Pony motor
Stork Wartsila	A4M 280 M6	55 kW	1	Morini 258	Finbeta	1997	Pony motor
Stork Wartsila	INVERTER M1A 4055	55 kW	1	De Poli 161	Arcoin	1996	Inverter
Stork Wartsila	INVERTER	90 kW	1	Orlando 162	Marnavi	1997	Inverter
Stork Wartsila	INVERTER	90 kW	1	Orlando 163	Marnavi	1997	Inverter
Stork Wartsila	INVERTER	90 kW	1	Morini 259	Marnavi	1997	Inverter
Stork Wartsila	INVERTER	90 kW	1	Orlando 165	Marnavi	1997	Inverter
Stork Wartsila	INVERTER	55 kW	1	De Poli 162	Arcoin	1997	Inverter
Stork Wartsila	M7R 630 MD8	2120 kVA/1700 kW	3	INMA 3267	Tirrenia	1998	Diesel generator
Stork Wartsila	M7R 630 MD8	2120 kVA/1700 kW	3	INMA 3268	Tirrenia	1997	Diesel generator
Stork Wartsila	GRUPPO M7R 500 MA4 + A4M 280 M4	1500kVA + 90 kW	1 + 1	Orlando 164	Marnavi	1998	Shaft generator + pony motor
Stork Wartsila	INVERTER	90 kW	1	Orlando 164	Marnavi	1998	Inverter
Stork Wartsila	M7B4062G06180		1	Orlando 166	Livorno	1998	Diesel generator
Wartsila - FR	M7BM 400 MC4	475 kVA	1	Fincantieri 5951	Telecom	1995	"Teliri"
Wartsila - FR	M7BM 400 SC6	570 kVA	1	Apuania 1182	Grimaldi	1995	"Fantastic"

## Reference List WARTSILA

CUSTOMER	FRAME SIZE	RATING	Q.TY	YARD	OWNER	YEAR	APPLICATION
Wartsila - FR	M7BM 315 LD4	500 kVA	1	Mariotti	V.Ship	1995	Emergency generator
Wartsila - FR	M7BM 400 SB4	912 kVA	3	Morini 258	Finbeta	1997	Diesel
Wartsila - FR	M7BM 400 MA4 + A4M225M	912 kVA + 45kW	1+1	Morini 259	Marnavi	1997	Shaft generator + pony motor
Wartsila - FR	M7BM 400 MC4	968 kVA	3	Orlando 162	Marnavi	1997	Diesel generator
Wartsila - FR	M7BM 400 MC4	968 kVA	3	Orlando 163	Marnavi	1997	Diesel generator
Wartsila - FR	M7BM 400 SC4	375 kVA	1	Fincantieri 5911		1997	Diesel generator
Wartsila - FR	M7BM 400 SA4	556 kVA	3	Marnavi 231	Nordsea	1997	
Wartsila - FR	M7B 400 MC4	968 kVA	3	Orlando 164	Marnavi	1998	Diesel generator
Wartsila - FR	M7B 400 MC4	968 kVA	3	Orlando 165	Marnavi	1998	
Wartsila - FR	M7BM 400 SC6	547 KVA	1	Apuania 1206	Grimaldi	1997	Shaft generator
Wartsila - FR	M7BM 400 SA4	480 kVA	3	Marnavi 229		1997	Diesel generator
Wartsila - FR	M7BM 315 MC4	375 kVA	1	Marnavi 229		1997	Emergency generator
Wartsila - FR	M7BM 400 SA4	480 kVA	3	Marnavi 230		1997	Diesel
Wartsila - FR	M7BM 315 MC4	375 kVA	1	Marnavi 230		1997	Emergency generator
Wartsila - FR	M7BM 400 MA4	825 KVA	2	Marnavi 231	Nordsea	1998	Diesel generator
Wartsila - FR	M7BM 400 MA4	818 kVA	3	Aarhus 227	Marnavi	1997	Diesel generator



## Reference List WARTSILA

CUSTOMER	FRAME SIZE	RATING	Q.TY	YARD	OWNER	YEAR	APPLICATION
Wartsila - FR	M7BM 400 MA4	818 kVA	3	Aarhus 228	Marnavi	1998	Diesel generator
Wartsila - FR	M7BM 400 MA4	825 kVA	2	Marnavi 232	Nordsea	1998	Diesel generator
Wartsila - FR	M7BM 400 MA4	825 kVA	2	Marnavi 233	Nordsea	1998	
Wartsila - FR	M7B315L90080	547kVA	1	Fincantieri 60030	Grimaldi	1998	
Wartsila - SF	M7BM 500 MB8	1105 kVA	3	Apuania 1201	Finaval	1996	Diesel generator
Wartsila - SF	M7BM 500 MC4	2250 kVA	1	Apuania 1201	Finaval	1996	Shaft generator
Wartsila - SF	B4M 315 MA4	158 kW	1	Apuania 1201	Finaval	1996	Pony motor
Wartsila - SF	M7BM 500 MB8	1105 kVA	3	De Poli 161	Arcoin	1996	Diesel generator
Wartsila - SF	M7BM 500 MB10	925 kVA	3	Orlando 161	Marittima Fluviale	1996	Diesel generator
Wartsila - SF	M7R 710 MB10	2925 kVA	3	Apuania 1206	Grimaldi	1997	Diesel generator
Wartsila - SF	M7BM 500 MB8	1105 kVA	3	De Poli 162	Arcoin	1997	Diesel generator
Wartsila - SF	M7BM 500 MC6	1875 kVA	2	INMA 3267	Tirrenia	1997	Shaft generator
Wartsila - SF	M7BM 500 MC6	1875 kVA	2	INMA 3268	Tirrenia	1997	Shaft generator
Wartsila - SF	M7R 630 MA8	1655 kVA	4	Fincantieri 6027	Orsero	1998	Diesel generator
Wartsila - SF	M7R 630 MA8	1655 kVA	4	Fincantieri 6028	Orsero	1998	
Wartsila - SF	M7R 630 MA8	1655 kVA	4	Fincantieri 6029	Orsero	1998	Diesel generator

## Reference List WARTSILA

CUSTOMER	FRAME SIZE	RATING	Q.TY	YARD	OWNER	YEAR	APPLICATION
Wartsila - SF	M7R 630 MA8	1655 kVA	4	Fincantieri 6030	Orsero	1998	
Wartsila - SF	M7R 710 MB10	2925 kVA	3	Fincantieri 1209	Grimaldi	1998	Diesel generator
Wartsila - SF	M7B 500 MB8	1105 kVA	3	Apuania 1204		1998	Diesel generator
Wartsila - SF	M7BM 500 MC4	1500 kW	1	Apuania 1204		1998	Shaft generator
Wartsila - SF	B4M 315 MA4	158 kW	1	Apuania 1204		1998	Pony motor
Wartsila NSD Finland	M7BM 500 MB10	925 kVA	3	Orlando 166		1998	Diesel generator
Wartsila NSD Finland	M7BM 500 MB8	1105 kVA	3	De Poli 169		1999	
Wartsila NSD Finland	M7BM 500 MB8	1100 kVA	3	Orlando 169		1998	
Wartsila NSD Finland	M7BM 500 MB8	1100 kVA	3	Orlando 168		1998	
Wartsila Finland	INVERTER	130 kW	1	De Poli 169		1999	89,051
Wartsila Finland	M7BM 630 MB6	2000 kVA	1	De Poli 169		1999	
Wartsila Finland	B4M 315 MB6	130 kW	1	De Poli 169		1999	
Wartsila NSD Finland	M7R 710 MB10	2925 kVA	3	Fincantieri 6059	Minoan	1999	Diesel generator
Wartsila NSD Finland	M7R 710 MB10	2925 kVA	3	Fincantieri 6060	Minoan	1999	Diesel generator
Wartsila NSD Holland	M7BM 500 SC4	1560 kVA	1	Orlando 169		1999	Shaft generator
Wartsila NSD Holland	A4M 315 S4	110 kW	1	Orlando 169		1999	Pony motor

## Reference List WARTSILA

CUSTOMER	FRAME SIZE	RATING	Q.TY	YARD	OWNER	YEAR	APPLICATION
Wartsila NSD Holland	INVERTER VT130G3+420K	110 kW	1	Orlando 169		1999	Inverter
Wartsila NSD Holland	M7BM 500 SC4	1560 kVA	1	Orlando 168		1998	Shaft generator
Wartsila NSD Holland	A4M 315 S4	110 kW	1	Orlando 168		1998	Pony motor
Wartsila NSD Holland	INVERTER VT130G3+420K	110 kW	1	Orlando 168		1999	Inverter
Wartsila- FR	M8BM 400 MB4	818kVA	3	Aarhus 235		1999	
Wartsila- FR	M8BM 400 SB4	768kVA	3	Morini 266		1999	Generators
Wartsila NSD Holland	M7BM500SB6	1250kVA	1	Morini 266		1999	Shaft generator
Wartsila NSD Holland	A4M280M6	66kW	1	Morini 266		1999	Pony motor
Wartsila NSD Finland	M8R 710 MB10	2925 kVA	4	Apuania 1220	Grimaldi	2000	Generators
Wartsila NSD Finland	M8R 710 MB10	2925 kVA	1	Fincantieri 6070	Tirrenia	2000	Shaft generator
Wartsila NSD Finland	M8R 710 LB10	3910 kVA	2	Fincantieri 6070	Tirrenia	2000	Shaft generator
Wartsila NSD Finland	M8R 710 MB10	2925 kVA	1	Fincantieri 6069	Tirrenia	2000	Shaft generator
Wartsila NSD Finland	M8R 710 LB10	3910 kVA	2	Fincantieri 6069	Tirrenia	2000	Shaft generator

## GENERATOR REFERENCE LIST ABOVE 1000 KVA - SCANDINAVIAN ELECTRIC

Deliv.	Shipyard/ Yard no.	Name of ship/ Ship	Shipowner	Class	No.	Equipment type
Jan. -93	Kværner Kleven, Ulsteinvik, Norway Y.no. 245	M/S "Chiquita Jean"	Great White Fleet Ltd., USA	LRS 100A1 Reefer	4	Auxiliary generators M7R500MB8 1175 KVA 440V 60 Hz IP44 900 rpm Single bearing. Sea water cooler.
Feb. -93	Kværner Kleven, Ulsteinvik, Norway Y.no. 249	M/S "Chiquita Brenda"	Great White Fleet Ltd., USA	LRS 100A1 Reefer	4	Auxiliary generators M7R500MB8 1175 KVA 440V 60 Hz IP44 900 rpm Single bearing. Sea water cooler.
March-93	Nuova Canteri, Apunania, Italy Y.no. 1159	M/S "Majestic" Cruise Vessel	Gremaldi Group, Genoa	ABS	3	Generators MXR710MA10 2700 KVA 440V 60 Hz IP44 720 rpm. Single bearing. Sea water cooler.
April -93	Termoli, Italy Y.no. 81	M/S "Monte Carmelo"	Marittma, Fluviali	LRS RINA	3	Generators M7B500MA6 1175 KVA 380V 50Hz IP23 1200 rpm Single roller bearing.
May -93	Fincantieri Y.no. 5889	M/S "Isola Blu" Cargo fruit vessel	Finaval	ABS RINA	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Sleeve bearing.

## GENERATOR REFERENCE LIST ABOVE 1000 KVA - SCANDINAVIAN ELECTRIC

Deliv.	Shipyard/ Yard no.	Name of ship/ Ship	Shipowner	Class	No.	Equipment type
June -93	Fincantieri Y.no. 5902	M/S "Dole Omdurras" Reefer	Dole USA, Italy	DNV RINA	6	<p>2 x auxiliary generators MXR630MD10 1700 KVA 450V 60 Hz IP44 720 rpm Single bearings. Sea water cooled.</p> <p>3 x auxiliary generators MXR630MD10 1500 KVA 450V 60 Hz IP44 720 rpm Single bearings. Sea water cooled.</p> <p>1 auxiliary generator MXR630MD10 1125 KVA 450V 60 Hz IP44 720 rpm Single bearings. Sea water cooled.</p>
July -93	Fincantieri Y.no. 5890	M/S "Guglielmo" Cargo	Fermar	ABS	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Double bearing.
Aug. -93	Fincantieri Y.no. 5891	M/S "Mare Dorico" Cargo	D` AMICO	ABS	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Double bearing.
Sept. -93	Fincantieri Y.no. 5892	M/S "Framura"	Premura	ABS RINA	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Double bearing.

## GENERATOR REFERENCE LIST ABOVE 1000 KVA - SCANDINAVIAN ELECTRIC

Deliv.	Shipyard/ Yard no.	Name of ship/ Ship	Shipowner	Class	No.	Equipment type
Jan. -94	Kværner Kleven, Ulsteinvik, Norway Y.no. 256	M/S "Chiquita Elke"	Great White Fleet Ltd., USA	LRS 100A1 Reefer	4	Auxiliary generators M7R500MB8 1175 KVA 440V 60 Hz IP44 900 rpm Single bearing. Sea water cooler.
Feb. -94	Kværner Kleven, Ulsteinvik, Norway Y.no. 257	M/S "Chiquita Joy"	Great White Fleet Ltd., USA	LRS	4	Auxiliary generators M7R500MB8 1175 KVA 440V 60 Hz IP44 900 rpm Single bearing. Sea water cooler.
March-94	Turku Shiprepair Yard	M/S "Protector" Tug Type Vessel	Alfons Håkons OY, Turku	DNV	1	310 KVA 50 Hz 380V B3 kl.F IP23 1500 rpm Heating 220V PT100-Constant U/F PTO output UP
April -94	Nuova Canteri Apunania, Italy Y.no. 1160	M/S "Splendid" Cruise Vessel	Gremaldi Group, Genoa	ABS	3	Generators MXR710MA10 2700 KVA 440V 60 Hz IP44 720 rpm Single bearing. Sea water cooler.
May -94	Fincantieri Y.no. 5903	M/S "Dole Costarica" Reefer	Dole USA, Italy	DNV RINA	6	2 x MXR630MD10 1700 KVA B20 3 x MXR630MB10 1500 KVA B20 1 x MXR630MB10 1125 KVA B20 All: 10 pole 20 rpm 450V 60 Hz Single bearing. Sea water cooler.

## GENERATOR REFERENCE LIST ABOVE 1000 KVA - SCANDINAVIAN ELECTRIC

Deliv.	Shipyard/ Yard no.	Name of ship/ Ship	Shipowner	Class	No.	Equipment type
June -94	Fincantieri Y.no. 5904	M/S "Lemis" Cargo	Almare	ABS RINA	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Double sleeve bearing.
July -94	Fincantieri Y.no. 5904	M/S "Almare VIII" Cargo	Almare	RINA	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Double sleeve bearing.
Aug. -94	Fincantieri Y.no. 5905	M/S "Scorpius"	Almare	RINA	2	Auxiliary generators MXM630SC10 1375 KVA 450V 60 Hz IP23 720 rpm Double sleeve bearing.
Sept. -94	Flatsetsund Slip, Norway	M/S "Lopus"	Morten Tøkje, Austevoll, Norway		1	Auxiliary generator 450V 60 Hz B3 IP23 1800 rpm.
Jan. -95	Nuova Canteri Apunanaia, Italy Y.no. 1161	M/S "Fantastic" Cruise Vessel	Gremaldi Group, Genoa	ABS	3	Generators MXR710MA10 2900 KVA 440v 60 hZ IP44 720 rpm Single bearing. Sea water cooler.
Jan. -95	Y.no. 5907	Testplant	Brunvoll AS, Norway		1	Generator 450V 60 Hz B3 IP23 1800 rpm

## GENERATOR REFERENCE LIST ABOVE 1000 KVA - SCANDINAVIAN ELECTRIC

Deliv.	Shipyard/ Yard no.	Name of ship/ Ship	Shipowner	Class	No.	Equipment type
Feb. -95	Brattvåg Skipsverft, Norway Y.no. 88	M/S "Remstadt" Supply Vessel	Remøy Shipping, Norway	DNV	2	Shaft generators M7R500MC4 IP44 2600 KVA 450V 60 Hz B3 Fresh water cooled. Water cooled sleeved bearings.
Jan. -96	Kopervik Slip, Norway Y.no. 7	M/S "Chris Andra"	Taits Partnership, Frazerburg, Scotland	DNV	1	Shaftgenerator M7M500SB6 IP 23 1560 KVA 450V 60Hz 1200 rpm
Dec. -96	Ulstein Verft, Norway Yard no. 251		Swire Pacific Offshore Ships	DNV	2	Generators M7R500MC4 2250 KVA 450V 60Hz 1800 rpm
Dec. -96	Ulstein Verft, Norway Yard no. 252		Swire Pacific Offshore Ships	DNV	2	Generators M7R500MC4 2250 KVA 450V 60Hz 1800 rpm
April -97	Ulstein Verft, Norway Yard no. 253		Swire Pacific Offshore Ships	DNV	2	Generators M7R500MC4 2250 KVA 450V 60Hz 1800 rpm
May -97	Ulstein Verft, Norway Yard no. 254		Swire Pacific Offshore Ships	DNV	2	Generators M7R500MC4 2250 KVA 450V 60Hz 1800 rpm
Aug. -97	Myklebust Mek. Verksted, Norway Yard no. 18		Rovde Shipping	DNV	2	Generators M7R500MC4 2400 KVA 450V 60Hz 1800 rpm



## GENERATOR REFERENCE LIST ABOVE 1000 KVA - SCANDINAVIAN ELECTRIC

Deliv.	Shipyard/ Yard no.	Name of ship/ Ship	Shipowner	Class	No.	Equipment type
Nov -97	Ulstein Verft, Norway Yard no. 255		Swire Pacific Offshore Ships	DNV	2	Generators M7R500MC4 2250 KVA 450V 60Hz 1800 rpm
Jan-98	Ulstein Verft, Norway Yard no. 256		Swire Pacific Offshore Ships	DNV	2	Generators M7R500MC4 2250 KVA 450V 60Hz 1800 rpm