MarelliMotori

Inspired solutions

HYDROPOWER

COMCATHYD001_C Ed. 04/2019

MarelliMotori Hydropower

COMCATHYD001_B - 11/2018

INSPIRED PEOPLE

OUR VISION

To become the global market leader of electric rotating machines in all our core markets.

OUR MISSION

Our mission is to aid the sustainable growth of our customers' businesses.
We will provide innovative solutions inspired by relentless efforts to understand our customers' needs and their specific applications.
We will leverage our extensive technical knowledge, product performance and service to increase the competitiveness, efficiency and productivity of our partners worldwide.

INSPIRED SOLUTIONS

Marelli Motori is a leading designer and manufacturer of generators and electric motors.
Nowadays the company enjoys worldwide brand recognition thanks to our extended sales, distribution and service networks across four continents and two manufacturing facilities, in Italy and Malaysia.

MARELLI MOTORI OPERATES IN SIX CORE INDUSTRIES






Power generation
Generators up to 14.000 kVA

Cogeneration
Generators up to 14.000 kVA

Hydropower
Asynchronous generators up to 3.000 kW
Synchronous generators up to 11.000 kVA

Oil & gas
Generators up to 14.000 kVA
Motors up to 1.600 kW

Industrial motors
Motors up to 10.000 kW

Marine
Generators up to 12.500 kVA
Motors up to 10.000 kW

Synchronous generator range

	LV		MV /HV	
				
Enclosure	**TEWAC**	**ODP**	**TEWAC**	**ODP**
Series	**MJRT**	**MXT - MJT**	**MJHRT**	**MJHT**
Power	up to 5.000 kVA	up to 5.200 kVA	up to 11.000 kVA	up to 11.000 kVA

Asynchronous generator range

	LV
	
Enclosure	**ODP**
Series	**C3G - C4G**
Power	up to 3.000 kW

Key

ODP	Open Drip Proof
TEWAC	Totally Enclosed Water to Air Cooled

AVR - SELECTION TABLE

		ANALOGUE				DIGITAL	
AVR type		**MARK VX**	**MARK V**	**MGC I**	**MGC II**	**MEC 20**	**D-Vo**
Code		**11000013**	**10005388**	**10001467**	**10004378**	**11000317**	**10024470**
Generator frame size	**standard**	160 - 225	250	500 ÷ 560	630 ÷ 800	315 ÷ 450	≥ 800(1)
	on request	-	-	-	-	160 ÷ 250	160 ÷ 710(1)
AVR supply		Aux winding	Aux winding			Aux winding, mains	
Voltage sensing		Single phase				Three phase*	Single Phase std, Three phase on request
Voltage remote control		Arrangement					
Radio interference suppressor		Internal					Arrangement for external filters
Over-excitation device		-	-	Arrangement for VARICOMP			
Parallel operation with the mains		-	-	Arrangement for external A.P.F.R			Internal
Parallel operation with similar generators		-	-	Arrangement			
Standard protections		-	Over excitation	-	-	Over excitation	Field over-current, field over-voltage, generator over/under voltage, generator over-current, loss of sensing
Limiters		Under-frequency					Under-frequency, over/under-excitation
Functions		-	-	Auxiliary inputs			PC interface, Modbus TCP, FRT function, soft start, auxiliary inputs, contact inputs, DMS

(*) For MV, single phase is standard, three-phase sensing is optional.

(1): standard on all M.V. generators ≥ 400 frame with rated voltage >6900V

Industry standards

IP Code - Degree of protection (IEC - 60034 - 5)

First number		Second number	
2	Machine protected against solid objects greater than 12 mm	**2**	Dripping water shall have no harmful effect from the vertical up to an angle up to 15°
3	Machine protected against solid objects greater than 2,5 mm	**3**	Spraying water shall have no harmful effect from the vertical up to an angle up to 60°
4	Machine protected against solid objects greater than 1 mm	**4**	Splashing water from any direction shall have no harmful effect
5	Machine protected against cust	**5**	Jets of water from any direction shall have no harmful effect
6	Machine totally protected against tight dust	**6**	Jets of water from heavy seas from any direction shall have no harmful effect

Example of designation - IP 44	
IP	Code IP
4	First number (protection against dust)
4	Second number (protection against liquid)

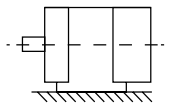
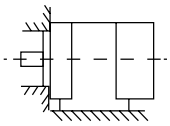
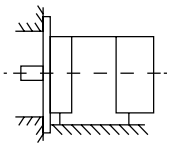
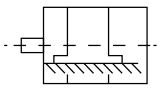
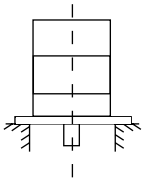
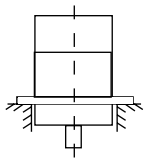
IC Code - Cooling (IEC - 60034 - 6)

Typical fluids	
A	Air
W	Water

Typical circuit arrangements	
0	Free circulation
4	Machine surface - cooled
6	Heat exchanger machine mounted (using the motor surrounding coolant)
7	Heat exchanger built in the machine (not using the motor surrounding coolant)
8	Heat exchanger machine mounted (not using the motor surrounding coolant)

Typical methods of circulation	
0	Free circulation
1	Self circulation
6	Circulation with independent device

Example of designation - IC 411	
IC	Code IC
4	Circuit arrangement
A	Primary fluid
1	Method of circulation for primary fluid
A	Secondary fluid
1	Method of circulation for secondary fluid

IEC - 60034 - 7			
IM B3		Code II: Bearings: Feet: Flange: Details: Mounting:	IM 1001 2 With feet - - Mounting by feet (Feet down)
IM B34		Code II: Bearings: Feet: Flange: Details: Mounting:	IM 2101 2 With feet With flange End Shield spigot / No access to back / Flange at D - End Mounting by feet (Feet down with additional mounting on D - End Side of flange)
IM B35		Code II: Bearings: Feet: Flange: Details: Mounting:	IM 2001 2 With feet With flange End Shield spigot / No access to back / Flange at D - End Mounting by feet / (Feet down with additional mounting on D - End Side)
IM B20		Code II: Bearings: Feet: Flange: Details: Mounting:	IM 1101 2 With raised feet - - Mounting by feet (Feet down)
IM V1		Code II: Bearings: Feet: Flange: Details: Mounting:	IM 3011 2 - with flange vertical shaft - two bearing Mounted on: D - end side of flange, D - end down
IM V10		Code II: Bearings: Feet: Flange: Details: Mounting:	IM 4011 2 - with flange Special flange at D-end Mounted on: D - end side of flange, D - end down

TEWAC synchronous generators: MJRT

Model	MJRT
Output	Up to 5.000 kVA
Voltages	Up to 1.000 V
Frame	250 ÷ 900
Pole	From 4 to 28 poles
Cooling	IC 81W / IC 86W
IP	IP 44. Available up to IP 56.

Certificates and testing

Applicable standards

Generators are designed in compliance with:
IEC EN 60034 - 1
BS 4999 - 5000
VDE 0530
NF 51 - 100
NF 51 - 111
OVE M - 10
NEMA MG 1.32
Generators conform to EU rules.
UL/CSA certifications available on request.

Certificate

Test Certificate supplied with the machine.
Material certificates in accordance with EN 10204 : 2001 can be supplied.

Main components

Housing

Rigid frame, rugged welded steel fabrication (EN 10025 - S235 JR).
Frame is provided with side ribs to increase the strength.
Marelli Motori generators for continuous duty operation are designed to meet vibration levels per IEC 60034-14, ISO 10816-1 and BS 5000-3.

Shield

Made of spheroidal graphite cast-iron (EN 1563) or grey cast-iron (EN 1561) up to 630 frame size.
Made of structural steel (EN 10025 – S235 JR) above.

Shaft

General data
Made in carbon steel and obtained by lamination (EN 10083 – 2 C40 – TN). Shaft is obtained by forging from 290 mm diameter and above. The shaft is tested at the manufacturer in order to check it is defect-free.

Shaft design
Double bearing generator: cylindrical shaft with key.
Dedicated shaft design available on request.
Special shaft design for direct coupling with runner are available on request.

Main terminal box	Mounted on side from 710 frame size. Made of formable steels EN 10130.
Fan	Made of aluminum alloy (EN 1706) or structural steel (EN 10025–S235 JR) depending on application requirements.
Heat Exchanger	**Construction** • Mounted on top of alternator. • Double tube made of CuNi 90/10. • Copper fins housing. • Equipped with water leakage detector. **Exchanger data** • Designed pressure 6 bar. • Test pressure 10 bar • Power: up to 200 kW • Water flow: up to 18 m^3/h • Max glycol: 30% • Type of water: fresh water • Flanges: PN6 – PN10 – Special (ANSI) Position can be adjusted to site conditions.

Construction

Enclosure	TEWAC - Totally Enclosed Water to Air Cooled
Cooling system	IC81W as per IEC60034-6. Primary fluid (water) is flowing by external water system. Internal air is flowing by a fan mounted on the shaft of the generator at the driven side.
Degree of protection	IP 44 as per IEC60034-5. (Available up to IP 56)
Mounting	Horizontal - IM 1001 or IM 1101 as per IEC 60034-7. Vertical IM 3011 as per IEC 60034-7. Other mounting available on request.

Technical data

Stator/Rotor core	Laminated and enamel-insulated on both sides to minimise eddy-current losses.
Rotor	• Salient pole type. • Made by copper flat wire. • H class insulated with enamel coating. • Winding retaining by pass-through bars of high quality steel. • Rotating rectifier: Graetz diode bridge with 6 diodes. • Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal. A. • Special vibration level construction are available.
Bearing	**General data** Double antifriction bearing grease lubricated (ball or roller type) or oil lubricated sleeve bearing. The theoretical lifetime of bearings, L10h according to ISO 281/1 standard, of standard horizontal construction generators, without external forces (radial and / or axial) is in excess of 20.000 hours (250 ÷ 355 frame size) and 50.000 hours (400 ÷ 630 frame size). On request, the lifetime of bearings, L10h can be in excess of 100.000 hours.
Impregnation system	Stator and rotor of generators ≥ 315 frame size are VPI treated.

Insulation system

Stator: H class insulated with a synthetic enamel.
Rotor: H class insulated with a synthetic enamel.

Protective treatments

Epoxivinilic and polyacrylic. Total minimum thickness 120 micromillimeters.
Epoxivinilic: Epoxy two component products, with vinyl change.
Polyacrylic: Two components polyurethane product formulated with unmodified hydroxyl acrylic resin.

Operating conditions

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.

Parallel operations

All generators are provided with a amply sized damper cage and are suitable for parallel operations with other generators, when equipped with the paralleling unit. A power factor regulator (to work in parallel with the main) is available on request.

Transient ratings

All generators can be designed to meet specific SCR.
Values can be confirmed by contacting Marelli Motori.

Three phase short circuit current

All generators equipped with overboosting device ensure a three phase short circuit current (Icc) higher than 3 times the rated current (In):
Icc > 300% In

Radio interference

All generators are equipped with Class B Group 1 radio interference filters as defined by EN 55011.

THD (Total Harmonic Distortion)

The no-load voltage wave form is sinusoidal with THD content less than 2%.

Vibrations

Vibration level is in accordance with ISO 10816.
Measurement, evaluation and limits of vibration severity are in accordance with IEC 60034-14.

Inertia

All generators can be designed to meet specific inertia value also through flywheel.
Values can be confirmed by contacting Marelli Motori.

Auxiliary devices

Overboosting device

	SIZE	TYPE
LOW VOLTAGE	250 - 400 (4 POLES)	AUXILIARY WINDING
	400 (>4 POLES)	VARICOMP
	500 - 710 (ALL POLARITIES)	VARICOMP
	800 - 900	VARICOMP

Space heaters

HEATERS INSTALLED AT ND END SIDE	
SIZE	POWER (W)
250	125
315 - 355	200
400 - 560	400
630 - 800	600
900 >900	1000

Optional features

MJRT											
	250	**315**	**355**	**400**	**500**	**560**	**630**	**710**	**800**	**900**	**>900**
12 leads winding	s	s	s -n/a [1]	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Anticondensation heaters, with terminals in main terminal box	s	s	s	s	s	s	s	s	s	s	s
Anticondensation heaters, with terminals in auxiliary terminal box	o	o	o	o	o	o	o	o	o	o	o
N, 3 PT1000 resistance temperature detectors in stator windings	o	o	o	o	o	o	o	o	o	o	o
PTC thermistors with terminals in main terminal box	o	o	o	o	o	o	o	o	o	o	o
N.3 PT100 Thermistors with terminals in main terminal box	o	o	o	o	o	o	o	o	o	o	o
N. 3 PT100 thermistors with terminals in auxiliary terminal box	s	s	s	s	s	s	s	s	s	s	s
Provision for parallel operation with simila generators	o	s	s	s	s	s	s	s	s	s	s
Thermodetectors PT100 in Bearings	o	o	o	o	s	s	s	s	s	s	s
Thermodetectors PT100 duplex in Bearings	o	o	o	o	o	o	o	o	o	o	o
N. 1 PT1000 on one bearing	o	o	o	o	o	o	o	o	o	o	o
N. 1 PT 1000 duplex type on one bearing	o	o	o	o	o	o	o	o	o	o	o
N. 1 +1 PT100 air inlet/outlet	o	o	o	o	o	o	o	o	o	o	o
N.D.E. grease nipple	s	s	s	s	s	s	s	s	s	s	s
D.E. grease nipple	s	s	s	s	s	s	s	s	s	s	s
Arrangement for vibration sensor	n/a	x	x	o	o	o	o	o	o	o	o
B5 adaptor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Three phase sensing AVR with MEC20 AVR mounted	o	s	s	s	x	x	x	x	x	x	x
Complete with PMG and MEC20 mounted	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Complete with PMG and MEC100 mounted	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Three phase sensing AVR with MEC100 mounted	n/a	o	o	o	o	o	o	o	s	s	s
APFC mounted	x	o	o	o	o	o	o	o	o	o	o
N. 3 CT single core on neutral point (only available with 6 leads gen.)	x	x	x	o	o	o	o	o	o	o	o
Insulated ND-end bearing	o	o	o	o	o	o	s	s	s	s	s
Digital AVR MEC100D	o	o	o	o	o	o	o	o	o	o	o
Digital AVR UNITROL 1005	o	o	o	o	o	o	o	o	o	o	o
Digital AVR UNITROL 1010	o	o	o	o	o	o	o	o	o	o	o
Digital AVR UNITROL 1020	o	o	o	o	o	o	o	o	o	o	o
Digital AVR DECS 100	o	o	o	o	o	o	o	o	o	o	o
Digital AVR DECS 150	o	o	o	o	o	o	o	o	o	o	o
IP55 terminal box	o	o	o	o	o	o	o	o	o	o	o
Non magnetic exit cable panel	x	x	x	o	o	o	o	o	o	o	o
Special voltage: R3 winding, 690 V 50 Hz or 60 Hz	o	o	o	o	o	o	o	o	o	o	o
Non standard RAL paint colour	o	o	o	o	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96831)	o	o	o	o	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96819)	o	o	o	o	o	o	o	o	o	o	o
Special painting process F96827	n/a	o	o	o	o	o	o	o	o	o	o
Special painting process F96826	n/a	o	o	o	o	o	o	o	o	o	o
Auxiliary winding for power supply and overboosting	s	s	s	o[2]	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overboosting with Varicomp	n/a	n/a	n/a	o[3]	o	o	o	o	o	o	o
Separate auxiliary terminal box	o	o	o	o	s	s	s	s	s	s	s

(1) MB core

(2) only 4 poles

(3) >4 poles

s = standard
x = contact Marelli Motori
n/a = not available
o = optional
- = not applicable

ODP synchronous generators: MXT-MJT

Model	MXT MJT
Output	Up to 5.200 kVA
Voltages	Up to 1.000 V
Frame	180 ÷ 900
Pole	From 4 to 28 poles
Cooling	IC 01
IP	IP 23. Available up to IP 44 with filters.

Certificates and testing

Applicable standards

Generators are designed in compliance with:
IEC EN 60034 - 1
BS 4999 - 5000
VDE 0530
NF 51 - 100
NF 51 - 111
OVE M - 10
NEMA MG 1.32
Generators conform to EU rules.
UL/CSA certifications available on request.

Certificate

Test Certificate supplied with the machine.
Material certificates in accordance with EN 10204 : 2001 can be supplied.

Main components

Housing

Rigid frame, rugged welded steel fabrication (EN 10025 - S235 JR).
Frame is provided with side ribs to increase the strength.
Marelli Motori generators for continuous duty operation are designed to meet vibration levels per IEC 60034-14, ISO 10816-1 and BS 5000-3.

Shield

Made of spheroidal graphite cast-iron (EN 1563) or grey cast-iron (EN 1561) up to 630 frame size.
Made of structural steel (EN 10025 – S235 JR) above.

Shaft

General data
Made in carbon steel and obtained by lamination (EN 10083 – 2 C40 – TN). Shaft is obtained by forging from 290 mm diameter and above. The shaft is tested at the manufacturer in order to check it is defect-free.

Shaft design
Double bearing generator: cylindrical shaft with key.
Dedicated shaft design available on request.
Special shaft design for direct coupling with runner are available on request.

Main terminal box

Mounted on top up to 900 frame size.
Made of formable steels EN 10130.

Fan	Above MXB 180 SC4, PA 6.6 up to MXT 180 SC4 included, made of aluminum alloy (EN 1706) or structural steel (EN 10025–S235 JR) depending on application requirements.

Construction

Enclosure	ODP - Open Drip Proof
Cooling system	IC 01 as per IEC60034-6
Degree of protection	IP 23 as per IEC60034-5
Mounting	Horizontal - IM 1001 or IM 1101 as per IEC 60034-7. Vertical IM 3011 as per IEC 60034-7 (from 400 frame and above). Other mounting available on request.

Technical data

Stator/Rotor core	Laminated and enamel-insulated on both sides to minimise eddy-current losses
Rotor	• Salient pole type. • H class insulated with enamel coating. • Winding retaining by pass-through bars of high quality steel. • Rotating rectifier: Graetz diode bridge with 6 diodes. • Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal. A. Special vibration level construction are available.
Bearing	**General data** Double antifriction bearing grease lubricated (ball or roller type) or oil lubricated sleeve bearing. The theoretical lifetime of bearings, L10h according to ISO 281/1 standard, of standard horizontal construction generators, without external forces (radial and / or axial) is in excess of 20.000 hours (250 ÷ 355 frame size) and 50.000 hours (400 ÷ 630 frame size). On request, the lifetime of bearings, L10h can be in excess of 100.000 hours.
Impregnation system	Stator and rotor of generators ≥ 315 frame are VPI treated.
Insulation system	160-250 frame sizes: epoxy resin through high quality process. 315 frame size and above: VPI treated.

Operating conditions

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.

Parallel operations

All generators are provided with a amply sized damper cage and are suitable for parallel operations with other generators, when equipped with the paralleling unit. A power factor regulator (to work in parallel with the main) is available on request.

Transient ratings

All generators can be designed to meet specific SCR. Values can be confirmed by contacting Marelli Motori.

Three phase short circuit current

All generators equipped with overboosting device ensure a three phase short circuit current (Icc) higher than 3 times the rated current (In):
Icc > 300% In

Radio interference

All generators are equipped with Class B Group 1 radio interference filters as defined by EN 55011.

THD (Total Harmonic Distortion)

The no-load voltage wave form is sinusoidal with THD content less than 2%.

Vibrations

Vibration level is in accordance with ISO 10816.
Measurement, evaluation and limits of vibration severity are in accordance with IEC 60034-14.

Inertia

All generators can be designed to meet specific inertia value also through flywheel. Values can be confirmed by contacting Marelli Motori.

Auxiliary devices

Overboosting device

	SIZE	TYPE
LOW VOLTAGE	180 (optional)	AUXILIARY WINDING
	180 - 400 (>4 POLES)	VARICOMP
	500 - 710 (ALL POLARITIES)	VARICOMP
	800 - 900	VARICOMP

Space heaters

HEATERS INSTALLED AT ND END SIDE	
SIZE	POWER (W)
180	45
225	125
250	125
315 - 355	200
400 - 560	400
630 - 800	600
900 >900	1000

Optional features

	MXT		MJT										
	180	225	250	315	355	400	500	560	630	710	800	900	>900
12 leads winding	s	s	s	s	s -n/a [1]	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Anticondensation heaters, with terminals in main terminal box	o	o	s	s	s	s	s	s	s	s	s	s	s
Anticondensation heaters, with terminals in auxiliary terminal box	o	o	o	o	o	o	o	o	o	o	o	o	o
N. 3 PT1000 in stator windings	-		o	o	o	o	o	o	o	o	o	o	o
PTC thermistors with terminals in main terminal box	o	o	o	o	o	o	o	o	o	o	o	o	o
N. 3 PT100 Thermoresistors with terminals in main terminal box	o	o	o	o	o	o	o	o	o	o	o	o	o
N. 3 PT100 thermistors with terminals in auxiliary terminal box	o	o	s	s	s	s	s	s	s	s	s	s	s
Separate auxiliary terminal box	o	o	o	o	o	o	s	s	s	s	s	s	s
Provision for parallel operation with similar generators	o*	o	o	s	s	s	s	s	s	s	s	s	s
Thermodetectors PT100 on one bearing	-		o	o	o	o	s	s	s	s	s	s	s
Thermodetectors PT100 duplex in bearings	-		o	o	o	o	o	o	o	o	o	o	o
N. 1 PT1000 on one bearing	-		o	o	o	o	o	o	o	o	o	o	o
N. 1 PT1000 duplex type on one bearing	-		o	o	o	o	o	o	o	o	o	o	o
N. 1+1 PT100 air inlet/outlet	-		o	o	o	o	o	o	o	o	o	o	o
N.D.E. grease nipple	-		s	s	s	s	s	s	s	s	s	s	s
D.E. grease nipple	-		s	s	s	s	s	s	s	s	s	s	s
Arrangement for vibration sensor	-		n/a	x	x	o	o	o	o	o	o	o	o
B5 adaptor	-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Single-phase sensing AVR (Mark VX), side mounted	s	o	-										
Single-phase sensing AVR (Mark VX), front mounted	o*	s	-										
Three-phase sensing AVR (MEC-20,) side mounted	o*	o	-										
Three phase sensing AVR with MEC20 AVR mounted	o*	n.a.	o	s	s	s	x	x	x	x	x	x	x
PMG with single-phase AVR (Mark XX) side mounted	o	o	-										
PMG with single-phase AVR (Mark XX) front mounted	o*	o	-										
PMG with three-phase AVR (MEC-20) side mounted	o*	o	-										
Complete with PMG and MEC20 mounted	o*	n.a.	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Complete with PMG and MEC100 mounted	-		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Three phase sensing AVR with MEC100 mounted	-		n/a	n/a	n/a	o	o	o	o	o	s	s	s
APFC mounted	-		x	o	o	o	o	o	o	o	o	o	o
N. 3 CT single core on neutral point (only available with 6 leads gen.)	-		x	x	x	o	o	o	o	o	o	o	o
Insulated ND-end bearing	-		o	o	o	o	o	o	s	s	s	s	s
Digital AVR MEC100D	-		o	o	o	o	o	o	o	o	o	o	o
Digital AVR UNITROL 1005	-		o	o	o	o	o	o	o	o	o	o	o
Digital AVR UNITROL 1010	-		o	o	o	o	o	o	o	o	o	o	o
Digital AVR UNITROL 1020	-		o	o	o	o	o	o	o	o	o	o	o
Digital AVR DECS 100	-		o	o	o	o	o	o	o	o	o	o	o
Digital AVR DECS 150	-		o	o	o	o	o	o	o	o	o	o	o
Protection degree IP23 with inlet filters	o	o	o	o	o	o	o	o	o	o	o	o	o
Protection degree IP43 with inlet/outlet filters	o	o	x	x	x	x	x	x	x	x	x	x	x
Protection degree IP44 with inlet/outlet filters	o	o	x	x	x	x	x	x	x	x	x	x	x
IP55 terminal box	o	o	o	o	o	o	o	o	o	o	o	o	o
Non magnetic exit cable panel	-		x	x	x	o	o	o	o	o	o	o	o
Tropicalization (CW1081)	o	o	s	s	s	s	s	s	s	s	s	s	s
Large Terminal Box	o	n.a.	-										
Special voltage: R3 winding, 690 V 50 Hz or 60 Hz	o	o	o	o	o	o	o	o	o	o	o	o	o
Non standard RAL paint colour	o	o	o	o	o	o	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96831)	o	o	o	o	o	o	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96819)	o	o	o	o	o	o	o	o	o	o	o	o	o
Special painting process F96826	o	o	n/a	o	o	o	o	o	o	o	o	o	o
Auxiliary winding for power supply and overboosting	s	s	s	s	s	o[2]	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Overboosting with Varicomp	-		n/a	n/a	n/a	o[3]	o	o	o	o	o	o	o

s = standard
x = contact Marelli Motori
n/a = not available
o = optional
- = not applicable

(*) Available only with Large terminal box
(1) MB core
(2) only 4 poles
(3) >4 poles

TEWAC synchronous generators: MJHRT

Model	MJHRT
Output	Up to 11.000 kVA
Voltages	Up to 15.000 V
Frame	400 ÷ 1.250
Pole	From 4 to 20 poles (over contact MM)
Cooling	IC 81W
IP	IP 44. Available up to IP 56

Certificates and testing

Applicable standards

Generators are designed in compliance with:
IEC EN 60034 - 1
BS 4999 - 5000
VDE 0530
NF 51 - 100
NF 51 - 111
OVE M - 10
NEMA MG 1.32
Generators conform to EU rules.
UL/CSA certifications available on request.

Certificate

Test Certificate supplied with the machine.
Material certificates in accordance with EN 10204 : 2001 can be supplied.

Main components

Housing

Rigid frame, rugged welded steel fabrication (EN 10025 - S235 JR).
Frame is provided with side ribs to increase the strength.
Marelli Motori generators for continuous duty operation are designed to meet vibration levels per IEC 60034-14, ISO 10816-1 and BS 5000-3.

Shield

Made of spheroidal graphite cast-iron (EN 1563) or grey cast-iron (EN 1561) up to 630 frame size. Made of structural steel (EN 10025 – S235 JR) above.

Shaft

General data
Made in carbon steel and obtained by lamination (EN 10083 – 2 C40 – TN).
Shaft is obtained by forging from 290 mm diameter and above.
The shaft is tested at the manufacturer in order to check it is defect-free.

Shaft design
Double bearing generator: cylindrical shaft with key.
Dedicated shaft design available on request.
Special shaft design for direct coupling with runner are available on request.

Main terminal box

Mounted on side (right or left will b eselected).
Made of formable steels EN 10130.

Fan	Made of aluminum alloy (EN 1706) or structural steel (EN 10025–S235 JR) depending upon application requirements.
Heat Exchanger	**Construction** • Mounted on top of alternator • double tube made of CuNi 90/10 • copper fins housing • equipped with water leakage detector. **Exchanger data** • Designed pressure 6 bar • Test pressure 10 bar • Power: up to 200 kW • Water flow: up to 18 m^3/h • Max glycol: 30% • Type of water: fresh water • Flanges: PN6 – PN10 – Special (ANSI) • Position can be adjusted to site conditions.

Construction

Enclosure	TEWAC - Totally Enclosed Water to Air Cooled
Cooling system	IC 81W as per IEC60034-6. Primary fluid (water) is flowing by external water system. Internal air is flowing by a fan mounted on the shaft of the generator at the driven side.
Degree of protection	IP 44 as per IEC60034-5. (Available up to IP 56)
Mounting	Horizontal - IM 1001 or IM 1101 as per IEC 60034-7. Vertical IM 3011 as per IEC 60034-7 Other mounting available on request.

Technical data

Stator/Rotor core	Laminated and enamel-insulated on both sides to minimise eddy-current losses
Rotor	• Salient pole type. • Made by copper flat wire. • H class insulated with enamel coating. • Winding retaining by pass-through bars of high quality steel. • Rotating rectifier: Graetz diode bridge with 6 diodes. • Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal. A. • Special vibration level construction are available.
Bearing	**General data** Double antifriction bearing grease lubricated (ball or roller type) or oil lubricated sleeve bearing. The theoretical lifetime of bearings, L10h according to ISO 281/1 standard, of standard horizontal construction generators, without external forces (radial and / or axial) is in excess of 20.000 hours (250 ÷ 355 frame size) and 50.000 hours (400 ÷ 630 frame size). On request, the lifetime of bearings, L10h can be in excess of 100.000 hours.
Impregnation system	Stator and rotor of generators ≥ 315 frame are VPI treated.
Insulation system	Stator: F class insulated with a synthetic enamel. Rotor: H class insulated with a synthetic enamel.

Protective treatments

Epoxivinilic and polyacrylic. Total minimum thickness 120 micromillimeters.
Epoxivinilic: Epoxy two component products, with vinyl change.
Polyacrylic: Two components polyurethane product formulated with unmodified hydroxyl acrylic resin.

Operating conditions

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.

Parallel operations

All generators are provided with a amply sized damper cage and are suitable for parallel operations with other generators, when equipped with the paralleling unit. A power factor regulator (to work in parallel with the main) is available on request.

Transient ratings

All generators can be designed to meet specific SCR. Values can be confirmed by contacting Marelli Motori.

Three phase short circuit current

All generators equipped with overboosting device ensure a three phase short circuit current (Icc) higher than 3 times the rated current (In): Icc > 300% In

Radio interference

All generators are equipped with Class B Group 1 radio interference filters as defined by EN 55011.

THD (Total Harmonic Distortion)

The no-load voltage wave form is sinusoidal with THD content less than 2%.

Vibrations

Vibration level is in accordance with ISO 10816.
Measurement, evaluation and limits of vibration severity are in accordance with IEC 60034-14.

Inertia

All generators can be designed to meet specific inertia value also through flywheel. Values can be confirmed by contacting Marelli Motori.

Auxiliary devices

Overboosting device

On request:

	SIZE	TYPE
MEDIUM VOLTAGE	ALL	CT + OVERBOOSTING DEVICE
HIGH VOLTAGE	ALL	VT + CT + OVERBOOSTING DEVICE

Space heaters

SIZE	POWER (W)
400 - 560	400
630 - 710	600
800 > 800	800

Optional features

MJHRT							
	400	500	560	630	710	800	> 800
Anticondensation heaters, with terminals in main terminal box	o	o	o	o	o	o	o
Anticondensation heaters, with terminals in auxiliary terminal box	s	s	s	s	s	s	s
N. 3 PT1000 resistence temperature detectors in stator windings	o	o	o	o	o	o	o
N. 3 PT100 in stator windings with terminals in main terminal box	o	o	o	o	o	o	o
N. 3 PT100 thermistors with terminals in auxiliary terminal box	s	s	s	s	s	s	s
N.1 separate auxiliary terminal box	s	s	s	s	s	s	s
Provision for parallel operation with similar generators	s	s	s	s	s	s	s
Thermodetectors PT100 in Bearings	o	o	o	s	s	s	s
Thermodetectors PT100 duplex in Bearings	o	o	o	o	o	o	o
N. 1 PT1000 on one bearing	o	o	o	o	o	o	o
N. 1 PT1000 duplex type on one bearing	o	o	o	o	o	o	o
N. 1+1 PT100 air inlet/outlet	o	o	o	o	o	o	o
Protection degree IP55 for air-to-fresh water heat exchanger	o	o	o	o	o	o	o
Protection degree IP56 for air-to-fresh water heat exchanger	o	o	o	o	o	o	o
D-end special shaft extension	o	o	o	o	o	o	o
N.D.E. grease nipple	s	s	s	s	s	s	s
D.E. grease nipple	s	s	s	s	s	s	s
Second shaft extension	o	o	o	o	o	o	o
Arrangement for vibration sensor	o	o	o	o	o	o	o
B5 adaptor	o	o	o	o	o	o	o
Complete with PMG and MEC100 mounted	x	x	x	x	x	x	x
APFC mounted	o	o	o	o	o	o	o
Three phase sensing AVR with MEC100 mounted	o	o	o	o	o	o	o
N. 3 CT single / double / triple core on neutral point	o	o	o	o	o	o	o
Insulated ND-end bearing	o	o	o	s	s	s	s
D-End insulated bearing+earthing brush	o	o	o	o	o	o	o
64R - brush connection with rotor for earth fault detection (without any protection device)	o	o	o	o	o	o	o
Digital AVR MEC100D	o	o	o	o	o	o	o
Digital AVR UNITROL 1005	o	o	o	o	o	o	o
Digital AVR UNITROL 1010	o	o	o	o	o	o	o
Digital AVR UNITROL 1020	o	o	o	o	o	o	o
Digital AVR DECS 100	o	o	o	o	o	o	o
Digital AVR DECS 150	o	o	o	o	o	o	o
Sleeve bearings	o	o	o	o	o	o	o
IP55 terminal box	o	o	o	o	o	o	o
Non magnetic exit cable panel	o	o	o	o	o	o	o
Separate Neutral point terminal box	o	o	o	o	o	o	o
Special voltage	o	o	o	o	o	o	o
Non standard RAL paint colour	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96831)	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96819)	o	o	o	o	o	o	o
Special painting process F96826	o	o	o	o	o	o	o
Special painting process F96827	o	o	o	o	o	o	o
Multiple separate auxiliary terminal boxes	o	o	o	o	o	o	o
Protection degree IP55	o	o	o	o	o	o	o
Single tube Al heat exchanger IP44	s	s	s	s	s	s	s
Double tube heat exchanger IP44	o	o	o	o	o	o	o
Stainless steel heat exchanger	o	o	o	o	o	o	o
Basler or ABB AVR	o	o	o	o	o	o	o
12 diodes rotating rectifier	o	o	o	o	o	o	o
Surge capacitors	x	x	x	o	o	o	o
Surge arrestors	x	x	x	o	o	o	o

s = standard
x = contact Marelli Motori
n/a = not available
o = optional
- = not applicable

ODP synchronous generators: MJHT

Model	MJHT
Output	Up to 11.000 kVA
Voltages	Up to 15.000 V
Frame	400 ÷ 1.250
Pole	From 4 to 28 poles (over contact MM)
Cooling	IC 01
IP	IP 23. Available up to IP 44 with filters.

Certificates and testing

Applicable standards

Generators are designed in compliance with:
IEC EN 60034 - 1
BS 4999 - 5000
VDE 0530
NF 51 - 100
NF 51 - 111
OVE M - 10
NEMA MG 1.32
Generators conform to EU rules.
UL/CSA certifications available on request.

Certificate

Test Certificate supplied with the machine.
Material certificates in accordance with EN 10204 : 2001 can be supplied.

Main components

Housing

Rigid frame, rugged welded steel fabrication (EN 10025 - S235 JR).
Frame is provided with side ribs to increase the strength.
Marelli Motori generators for continuous duty operation are designed to meet vibration levels per IEC 60034-14, ISO 10816-1 and BS 5000-3.

Shield

Made of spheroidal graphite cast-iron (EN 1563) or grey cast-iron (EN 1561) up to 630 frame size.
Made of structural steel (EN 10025 – S235 JR) above.

Shaft

General data
Made in carbon steel and obtained by lamination (EN 10083 – 2 C40 – TN).
Shaft is obtained by forging from 290 mm diameter and above.
The shaft is tested at the manufacturer in order to check it is defect-free.

Shaft design
Double bearing generator: cylindrical shaft with key.
Dedicated shaft design available on request.
Special shaft design for direct coupling with runner are available on request.

Main terminal box

Mounted on top up to 900 frame size.
Made of formable steels EN 10130.

Fan

Made of aluminum alloy (EN 1706) or structural steel (EN 10025–S235 JR) depending on application requirements.

Construction

Enclosure	ODP - Open Drip Proof
Cooling system	IC 01 as per IEC60034-6
Degree of protection	IP 23 as per IEC60034-5
Mounting	Horizontal - IM 1001 or IM 1101 as per IEC 60034-7. Vertical IM 3011 as per IEC 60034-7 Other mounting available on request.

Technical data

Stator/Rotor core	Laminated and enamel-insulated on both sides to minimise eddy-current losses
Rotor	• Salient pole type. • Made by copper flat wire. • H class insulated with enamel coating. • Winding retaining by pass-through bars of high quality steel. • Rotating rectifier: Graetz diode bridge with 6 diodes. • Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal. A. • Special vibration level construction are available.
Bearing	**General data** Double antifriction bearing grease lubricated (ball or roller type) or oil lubricated sleeve bearing. The theoretical lifetime of bearings, L10h according to ISO 281/1 standard, of standard horizontal construction generators, without external forces (radial and / or axial) is in excess of 20.000 hours (250 ÷ 355 frame size) and 50.000 hours (400 ÷ 630 frame size). On request, the lifetime of bearings, L10h can be in excess of 100.000 hours.
Impregnation system	Stator and rotor of generators ≥ 315 frame are VPI treated.
Insulation system	Stator: F class insulated with a synthetic enamel. Rotor: H class insulated with a synthetic enamel.
Protective treatments	Epoxivinilic and polyacrylic. Total minimum thickness 120 micromillimeters. Epoxivinilic: Epoxy two component products, with vinyl change. Polyacrylic: Two components polyurethane product formulated with unmodified hydroxyl acrylic resin.

Operating conditions

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.
Parallel operations	All generators are provided with a amply sized damper cage and are suitable for parallel operations with other generators, when equipped with the paralleling unit. A power factor regulator (to work in parallel with the main) is available on request.
Transient ratings	All generators can be designed to meet specific SCR. Values can be confirmed by contacting Marelli Motori.

Three phase short circuit current	All generators equipped with overboosting device ensure a three phase short circuit current (Icc) higher than 3 times the rated current (In): Icc > 300% In
Radio interference	All generators are equipped with Class B Group 1 radio interference filters as defined by EN 55011.
THD (Total Harmonic Distortion)	The no-load voltage wave form is sinusoidal with THD content less than 2%.
Vibrations	Vibration level is in accordance with ISO 10816. Measurement, evaluation and limits of vibration severity are in accordance with IEC 60034-14.
Inertia	All generators can be designed to meet specific inertia value also through flywheel. Values can be confirmed by contacting Marelli Motori.

Auxiliary devices

Overboosting device

	SIZE	TYPE
MEDIUM VOLTAGE	ALL	CT + OVERBOOSTING DEVICE
HIGH VOLTAGE	ALL	VT + CT + OVERBOOSTING DEVICE

Space heaters

HEATERS INSTALLED AT ND END SIDE	
SIZE	POWER (W)
400 - 560	400
630 - 710	600
800 > 800	800

Optional features

MJHT							
	400	500	560	630	710	800	> 800
Anticondensation heaters, with terminals in main terminal box	o	o	o	o	o	o	o
Anticondensation heaters, with terminals in auxiliary terminal box	s	s	s	s	s	s	s
N. 3 PT1000 in stator windings	o	o	o	o	o	o	o
N. 3 PT100 in stator windings with terminals in main terminal box	o	o	o	o	o	o	o
N. 3 PT100 thermistors with terminals in auxiliary terminal box	s	s	s	s	s	s	s
N.1 separate auxiliary terminal box	s	s	s	s	s	s	s
Provision for parallel operation with similar generators	s	s	s	s	s	s	s
Thermodetectors PT100 in Bearings	o	o	o	s	s	s	s
Thermodetectors PT100 duplex in Bearings	o	o	o	o	o	o	o
N. 1 PT1000 on one bearing	o	o	o	o	o	o	o
N. 1 PT1000 duplex type on one bearing	o	o	o	o	o	o	o
Protection degree IP56 for air-to-fresh water	n/a	n/a	n/a	n/a	n/a	n/a	n/a
D-end special shaft extension	o	o	o	o	o	o	o
N.D.E. grease nipple	s	s	s	s	s	s	s
D.E. grease nipple	s	s	s	s	s	s	s
Second shaft extension	o	o	o	o	o	o	o
Flanged shaft extension	o	o	o	o	o	o	o
Arrangement for vibration sensor	o	o	o	o	o	o	o
B5 adaptor	o	o	o	o	o	o	o
PMG with dedicated AVR	o	o	o	o	o	o	o
Complete with PMG and MEC100 mounted	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Digital AVR MEC100 (Standard for MJHT with Vn > 6900 [V])	o	o	o	o	o	o	o
APFC mounted	o	o	o	o	o	o	o
Three phase sensing AVR with MEC100 mounted	o	o	o	o	o	o	o
N. 3 CT single / double / triple core on neutral point	o	o	o	o	o	o	o
Toothed wheel (n° 60 teeth) with provision for speed sensor (sensor not included)	o	o	o	o	o	o	o
Insulated ND-end bearing	o	o	o	s	s	s	s
D-End insulated bearing+earthing brush	o	o	o	o	o	o	o
64R - brush connection with rotor for earth fault detection (without any protection device)	o	o	o	o	o	o	o
Digital AVR MEC100D	o	o	o	o	o	o	o
Digital AVR UNITROL 1005	o	o	o	o	o	o	o
Digital AVR UNITROL 1010	o	o	o	o	o	o	o
Digital AVR UNITROL 1020	o	o	o	o	o	o	o
Digital AVR DECS 100	o	o	o	o	o	o	o
Digital AVR DECS 150	o	o	o	o	o	o	o
Sleeve bearings	o	o	o	o	o	o	o
Protection degree IP23 with inlet filters	o	o	o	o	o	o	o
Protection degree IP43 with inlet/outlet filters	o	o	o	o	o	o	o
Protection degree IP44 with inlet/outlet filters	o	o	o	o	o	o	o
IP55 terminal box	o	o	o	o	o	o	o
Non magnetic exit cable panel	o	o	o	o	o	o	o
Separate Neutral point terminal box	o	o	o	o	o	o	o
Special voltage	o	o	o	o	o	o	o
Non standard RAL paint colour	o	o	o	o	o	o	o
Special painting cycle (MM ref. F96831)	o	o	o	o	o	o	o
Special painting process F96819	o	o	o	o	o	o	o
Special painting process F96826	o	o	o	o	o	o	o
Multiple separate auxiliary terminal boxes	o	o	o	o	o	o	o
Basler or ABB AVR	o	o	o	o	o	o	o
12 diodes rotating rectifier	o	o	o	o	o	o	o
Surge capacitors	x	x	x	o	o	o	o
Surge arrestors	x	x	x	o	o	o	o

s = standard
x = contact Marelli Motori
n/a = not available
o = optional
- = not applicable

Three phase asynchronous generators: C3G - C4G

Model	C3G - C4G
Output	Up to 3.000 kW
Voltages	Up to 6.600 V
Frame	250 ÷ 710
Pole	From 4 to 16 poles (over contact MM)
Cooling	IC 01
IP	IP 23. Available up to IP 56.

Certificates and testing

Certificate

Test Certificate supplied with the machine.
Material certificates in accordance with EN 10204 : 2001 can be supplied.

Main components

Housing

Rigid frame, rugged welded steel fabrication (EN 10025 - S235 JR).
Frame is provided with side ribs to increase the strength.

Shield

Made of grey cast-iron (EN 1561 – GJL 200) up to 500 frame size asynchronous generators.
Made of hot-rolled structural steel (EN 10025 – S235 JR) from size 560 and above.

Shaft

General data
Made in carbon steel (EN 10083 – 2 C40 – TN) up to 450 frame and hot-rolled structural steel from 500 frame (EN 10025 – S355 JR).

Shaft design
Cylindrical shaft with key.
The shaft can be designed to install the flywheel, the brake or the specific client's requirements (hollow shaft)

Main terminal box

Usually mounted on top can be located on the sides of the frame.
An oversized terminal box can be supplied according to customer requirements.

FRAME SIZE	Material
≤ 450	cast iron
> 450	steel

Internal fan

Made of aluminum alloy up to 400 frame.
Made of hot-rolled structural steel above (EN 10025 – S235 JR).

Construction

Enclosure

ODP – Open Drip Proof

Cooling system

IC 01 as per IEC60034-6
Free circulation.
Internal air is flowing by a fan mounted on the shaft of the asynchronous generators at the driven side.
The cooling air is taken on the ND-end, the air outlet is on the D-end.
On request for variable speed application an external ventilation unit can be supplied to get the IC 06 cooling type.

Degree of protection

IP 23 as per IEC60034-5.
The series can be supplied with air inlet filters to achieve the IP 44 rating.
Higher IP is available on request with different construction (TEFC, TEAAC, TEWAC)

Mounting

IM B3, V1 and V10 as per IEC60034-7.

Technical data

Stator/Rotor core

Laminated and enamel-insulated on both sides to minimise eddy-current losses.
The subsequent heat treatment hardens the resin.

FRAME SIZE	Treatment
≤ 315	roll dip impregnation
≥ 355	VPI treatment

Rotor

- Short circuit rotor type.
- Depending on machine size, the rotor construction is either a solid shaft or welded ribbed shaft.
- The rotor winding can be either a pressure die cast aluminum or a copper bar construction.
- Full shaft or drilled shaft according to turbine type. Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal. A.

Bearing

Asynchronous generators are supplied with rolling bearing as standard. The theoretical lifetime of bearings, L10h according to ISO 281/1 standard, of standard horizontal construction generators, without external forces (radial and / or axial) is in excess of 50.000 hours. On request, the lifetime of bearings, L10h can be in excess of 100.000 hours.
Usually locating bearing is on the D-end side and floating bearing on the ND end side on horizontal machines.
Both bearings are fitted with a regreasing system.The used grease is removed through a valve locked in the outer bearing cover.

Rolling bearings are lubricated with grease or oil; sliding bearings are lubricated with internal oil or with oil circulated by an external lubrication unit specially developed for hydro generators.

Special bearings available according to customer requirements.

Impregnation system	Stator is VPI treated with an epoxy resin.
Insulation system	Low voltage. Stator: F class insulated with a synthetic enamel. (H class insulation available on request)
Protective treatments	Dedicated protective enamel is applied on the winding.
Parallel operation	The most common operation for the asynchronous generators is connected with the electrical grid. In this case the generator takes the necessary reactive power from the mains, and additional excitation systems are not necessary. The mains maintains voltage and frequency so that separate regulators are not necessary.
Isolated operation	When using asynchronous generators in isolated operation, the excitation is realized through the parallel connection of a capacitor bank. Its dimensioning depends on the generator power and on the generator parameters. The operating mode is considerably more expensive than the parallel operation with the mains and is only used for lower outputs.
Isolated operation	When compared to a synchronous generator,the induction generator has several advantages: • No voltage regulator is required, nor the exciter. Voltage and frequency are controlled by the electrical grid. • Exciter is not required. Reactive power is provided by the grid. • Simple construction;no brushes, diodes, or collector rings. • Lower maintenance costs.

Optional features

C3G - C4G										
	250	280	315	355	400	450	500	560	630	710
Insulation class H	o	o	o	o	o	o	o	o	o	o
N° 9 Terminals	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N° 12 Terminals	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Flying Leads = L mm	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tropicalisation	s	s	s	s	s	s	s	s	s	s
Anticondensation heaters, with terminals in main terminal box	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Anticondensation heaters, with terminals in auxiliary terminal box	o	o	o	o	o	o	o	o	o	o
Bi-metal cut-out switch with terminals in main terminal box	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N°3 PTC thermistors with terminals in main terminal box	s	s	s	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N°3 PT100 thermodetectors with terminals in main terminal box	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bi-metal cut-out switch with terminals in auxiliary terminal box	o	o	o	n/a	n/a	n/a	n/a	n/a	n/a	n/a
N°3 PTC thermistors with terminals in auxiliary terminal box	o	o	o	s	s	s	s	o	o	o
N°3 PT100 thermodetectors with terminals in auxiliary terminal box	o	o	o	o	o	o	o	s	s	s
Transducer for thermodetectors PT100	o	o	o	o	o	o	o	o	o	o
Thermodetectors PT100 in DE bearing - single element	o	o	o	o	o	o	o	o	o	o
Thermodetectors PT100 in NDE bearings - single element	o	o	o	o	o	o	o	o	o	o
Thermodetectors PT100 in DE bearing - double element	o	o	o	o	o	o	o	o	o	o
Thermodetectors PT100 in NDE bearing - double element	o	o	o	o	o	o	o	o	o	o
Protection degree IP56	-	-	-	-	-	-	-	-	-	-
Protection degree IP65	-	-	-	-	-	-	-	-	-	-
Second shaft end	o	o	o	o	o	o	o	o	o	o
Sealed bearings	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Roller bearings on D-end	o	o	o	o	o	o	o	s	s	s
Drainage hole	s	s	s	s	s	s	s	s	s	s

C3G - C4G										
	250	280	315	355	400	450	500	560	630	710
Vibration level B	o (2)	o (2)	o (2)	o (2)	o (2)	o (2)	o (2)	o (2)	o (2)	o (2)
Metallic Fan	s	s	s	s	s	s	s	s	s	s
Stainless steel screws	o	o	o	o	o	o	o	o	o	o
Low temperature duty -25°C. -40°C	o	o	o	o	o	o	o	o	o	o
D-end and N-end grease nipples	s	s	s	s	s	s	s	s	s	s
Arrangement for SPM	o	o	o	s	s	s	s	s	s	s
Complete with vibration transducer D-end side standard type (CEMB)	o	o	o	o	o	o	o	o	o	o
Complete with vibration transducer D-end side Bently Nevada type	o	o	o	o	o	o	o	o	o	o
Complete with encoder standard type	o	o	o	o	o	o	o	o	o	o
Sun canopy	-	-	-	-	-	-	-	-	-	-
Locked D-end bearing	s	s	s	s	s	s	s	s	s	s
Forced ventilation	o	o	o	o	o	o	o	o	o	o
Enhanced insulation system for Inverter < 500V	n/a	n/a	n/a	o	o	o	o	o	o	o
Special fan for reduced noise level	x	x	x	x	x	x	x	x	x	x
Insulated N-end bearing	o	o	o	o	o	o	o	o	o	o
Enhanced insulation system for Inverter ≥ 500V (< 690V)	o	o	o	o	o	o	o	o	o	o
Special direction of cable entry (Std on the right side seen from D-End)	o	o	o	o	o	o	o	o	o	o
Special voltage and/or frequency	o	o	o	o	o	o	o	o	o	o
Special cable entry	o	o	o	o	o	o	o	o	o	o
Brass cable glands	o	o	o	o	o	o	o	o	o	o
Non standard RAL paint colour	o	o	o	o	o	o	o	o	o	o
Special painting process for agressive environments F96819	o	o	o	o	o	o	o	o	o	o
Special painting process for agressive environments F96826	o	o	o	o	o	o	o	o	o	o
Special painting process for agressive environments F96827	o	o	o	o	o	o	o	o	o	o
Special painting process for agressive environments F96831	o	o	o	o	o	o	o	o	o	o
Vibration level B for 2 poles motors	x	x	x	x	x	x	x	x	x	x
Form wound stator winding	n/a	n/a	n/a	x	x	x	x	s	s	s
D-end special shaft extension	x	x	x	x	x	x	x	x	x	x
N-end special shaft extension	x	x	x	x	x	x	x	x	x	x
Special dimensions for mechanical interface	x	x	x	x	x	x	x	x	x	x
Special NDE end-shield suitable for brake installation	x	x	x	x	x	x	x	x	x	x
Special bearing	x	x	x	x	x	x	x	x	x	x
Sleeve bearings	n/a	n/a	n/a	x	x	x	x	x	x	x
Hoothed Wheel And Provision For Speed Sensor	o	o	o	o	o	o	o	o	o	o
Thoothed Wheel And N. 1 Speed Sensor	o	o	o	o	o	o	o	o	o	o
D-End Insulated Bearing+Earthing Brush	o	o	o	o	o	o	o	o	o	o
Brake System	o	o	o	o	o	o	o	o	o	o
Oil Lubrication System For Sleeve Bearings	o	o	o	o	o	o	o	o	o	o
N. 1+1 Pt100 Air Inlet/Outlet	o	o	o	o	o	o	o	o	o	o
Protection Degree Ip44 With Inlet/Outlet Filters	o	o	o	o	o	o	o	o	o	o
Non Magnetic Exit Cable Panel	o	o	o	o	o	o	o	o	o	o
Tachogenerator	o	o	o	o	o	o	o	o	o	o
Cooling Air Conveyor	o	o	o	o	o	o	o	o	o	o

s = standard
x = contact Marelli Motori
n/a = not available
o = optional
o (2) = for 2 poles motors contact Marelli Motori
- = not applicable

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