



## SYNCHRONOUS GENERATORS

### STANDARDS

All generators are designed according to the IEC 60034-1, CEI EN 60034-1

### AVAILABLE VOLTAGE

Generators can be supplied with the following voltage range:

- Low voltage ( V.380 - 480 )
- Medium voltage ( V.3000-6600 )

Voltages not listed can be supplied on request.

### EXCITATION SYSTEM

Generators are self-excited through a brushless type excitation system.

### OVERLOADS

The following overloads are permitted: 10% for one hour, 15% for ten minutes, 30% for four minutes and 50% for two minutes. All overloads must occur occasionally and must be followed by a minimum of one hour of running at nominal load or less.

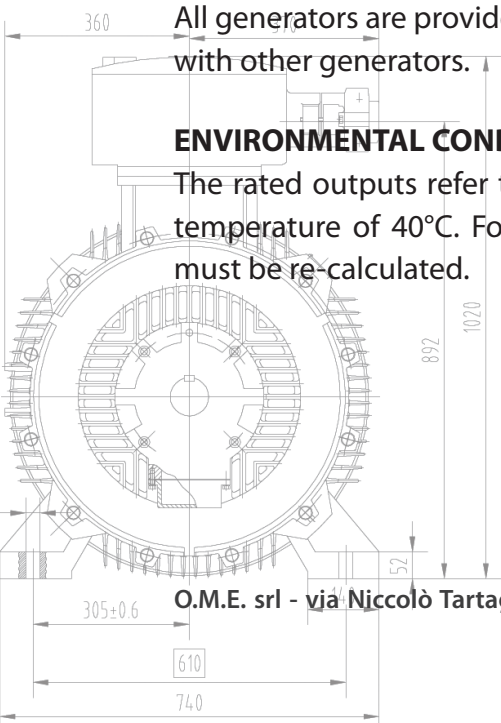
## OPERATING CONDITIONS

### PARALLEL OPERATION

All generators are provided with an oversized damper cage and are suitable for parallel operation with other generators.

### ENVIRONMENTAL CONDITIONS

The rated outputs refer to an installation height up to 1.000 m asl and to a maximum ambient temperature of 40°C. For higher altitudes and different temperature values the rated outputs must be re-calculated.





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### DEGREE OF PROTECTION

Standard generators are air-cooled with an IP 23 degree of protection (IC 01 cooling type). Inlet and outlet air filters (IC 01 cooling type) are available on request to upgrade the index to IP 44. To obtain a higher index of protection (IP 44, IP 54) generators can be supplied with an air-to-water heat exchanger installed on the body of the machinery (IC81W cooling type).

### SHAFT ORIENTATION

Generators are supplied with a horizontal (IM B3) or vertical (IM V1) shaft configuration. The vertical generators are equipped with a thrust bearing on the no drive-end (NDE) side.

### BEARINGS

Standard generators are supplied with grease-lubricated rolling bearings. All bearings are oversized to guarantee a minimum lifetime of 100.000 h (L10h = 100.000h), value obtained concerning to an unloaded standard shaft.

### RUNNER DIRECTLY CONNECTED TO THE SHAFT

Generators can be equipped with a special shaft extension to directly connect the hydraulic turbine runner. In this configuration all bearings and the shaft are designed to withstand to axial and radial loads caused by the hydraulic thrust and by the weight of the runner.

### ROTOR BALANCING

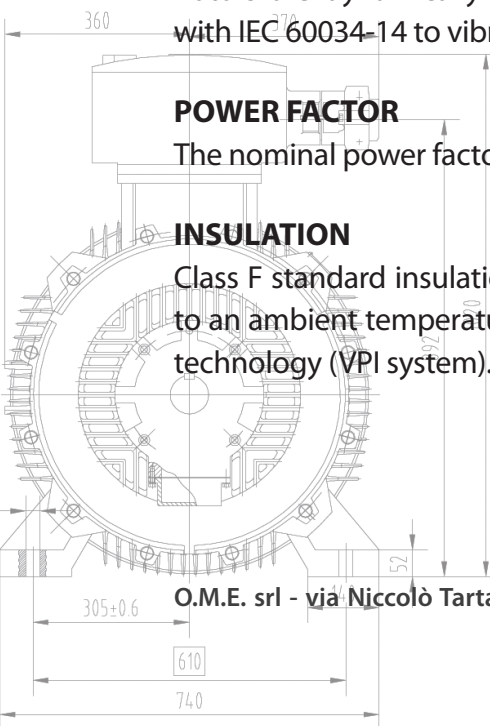
Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal (N) in standard execution.

### POWER FACTOR

The nominal power factor is 0,8 lagging.

### INSULATION

Class F standard insulation system allows a maximum winding temperature rise of 105°C referring to an ambient temperature of 40°C. Windings are impregnated with polyester resin using the latest technology (VPI system).





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### TEMPERATURE SENSORS

Generators are equipped with three PT100 temperature sensors (one for each phase) installed into the slots to supervise the stator winding temperature and with a PT100 for each bearing to monitor its temperature. To control inlet and outlet air temperature of the air-to-water heat exchanger, PT100's are installed both on the NDE side and on the drive-end (DE) side on request. If the air-to-water heat exchanger is installed, PT100's are used to control the inlet and outlet water temperature.

### FLYWHEEL

When the requested inertial momentum is higher than the actual inertial momentum of the generator, it is possible to extend the shaft on the NDE side in order to connect a flywheel.

### TERMINAL BOXES

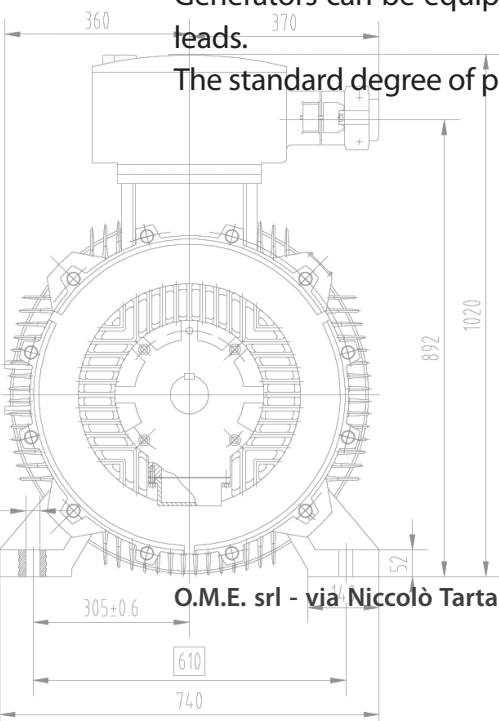
Rotors are dynamically balanced with a half key applied to the shaft extension in accordance with IEC 60034-14 to vibration grade normal (N) in standard execution.

### POWER FACTOR

Generators are supplied with terminal boxes of appropriate dimensions in order to allow easy connection to the main leads. All generators allow the connection to the main leads and to the star point. Two different terminal boxes, one for the star point and one for the leads for the auxiliary devices, are available on request.

Generators can be equipped with current transformers both on the main leads and the star point leads.

The standard degree of protection for terminal boxes is IP 44; the IP 55 can be installed on request.





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### EQUIPMENT

#### STANDARD

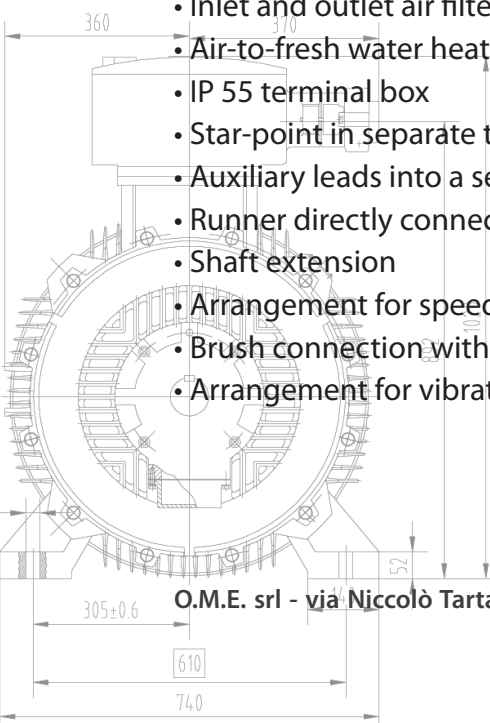
- Class F insulation
- VPI impregnation type
- Windings protected from corrosion (tropicalization)
- Six leads stator winding into the terminal box
- No 3 PT100 into the stator winding
- No 1 PT100 for each bearing (\*\*)
- Anti-condensation thermal heaters
- IP 23 degree of protection
- IP 44 degree of protection for the terminal box
- Bearings: more than 100.000 h lifetime

#### ELECTRIC OPTIONS

- Digital AVR
- In-terminal-box measurement transformers
- Encoder
- Tachometric dynamo

#### MECHANICAL OPTIONS

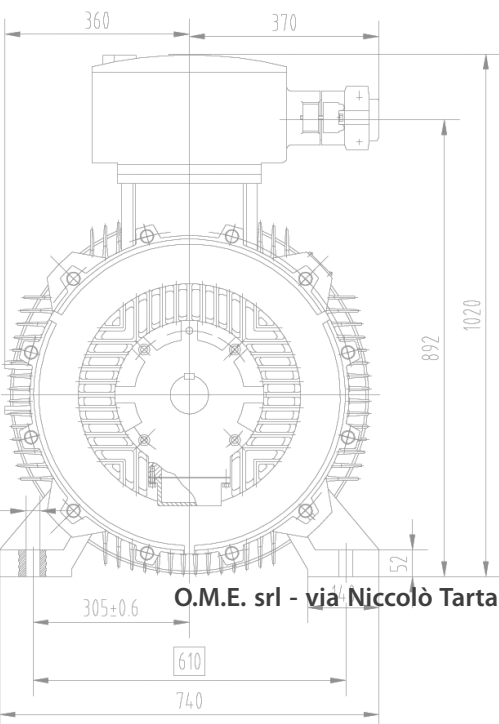
- Inlet and outlet air filters (IP 44)
- Air-to-fresh water heat exchanger top mounted on generator
- IP 55 terminal box
- Star-point in separate terminal box
- Auxiliary leads into a separate terminal box
- Runner directly connected to the shaft of the generator
- Shaft extension
- Arrangement for speed sensors
- Brush connection with rotor for earth fault detection
- Arrangement for vibration sensors into bearing box





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<b>OUTPUTS</b>	<b>KVA 160 ~ KVA 3250</b>
<b>RATED VOLTAGE</b>	<b>V 400 ~ V 6600</b>
<b>FREQUENCY</b>	<b>HZ 50 ~ HZ 60</b>
<b>COOLING METHOD</b>	<b>IC 01; IC 611; IC 81W</b>
<b>MOUNTING ARRANGEMENT</b>	<b>B3; V1</b>
<b>ASYNCRONOUS SPEED</b>	<b>RPM 176 ~ 1800</b>



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