Frame design

Motors can be supplied depending on the motor series in a corrosion-resistant aluminum housing and in a rugged low-vibration cast-iron version.

Motor connection

Cable glands are not included in the standard scope of supply with the exception of explosion-proof motors (see “Special versions”).

All marine motors generally have an external earthing terminal.

Standards and specifications

In addition to the relevant standards and regulations, IEC 92-301 also applies for electrical installation on board ship as well as the regulations of the marine classification authorities.

Specifications of the IEC standards

	Coolant temperature CT	Admissible temperature for temperature class	
		130 (B)	155 (F)
	°C	Cl	Cl
IEC/EN 60034-1	40	80	105
IEC 92-301	50	70	90

Specifications of the individual classification authorities with order codes for ordering

Classification authorities	Coolant temperature CT	Admissible temperature for relevant classification authorities		Individual acceptance for "essential services" drive	Supervision of construction for "essential services" drive	Order codes for surface-cooled motors up to frame size 315L		Order codes for surface-cooled motors frame size 315 and above		
		Temperature class		Required from a rated output	Required from a rated output	**With** type test certificate	**Without** type test certificate	Without type test certificate	**With** type test certificate and individual acceptance	**With** type test certificate and individual acceptance and supervision of construction
		130 (B)	155 (F)							
	°C	Cl	Cl	kW	kW					
GL	45	75	100	≥ 50	–	**E11**	–	**E11**	**E11+E10**	**E11+E09**
LR	45	70	95	≥100	≥100	**E21**	–	**E21**	**E21+E10**	**E21+E09**
BV	45	75	100	≥100	–	**E31**	–	**E31**	**E31+E10**	**E31+E09**
DNV	45	75	100	≥300	–	**E51**	–	**E51**	**E51+E10**	**E51+E09**
ABS	50	70	95	≥100	≥100	–	**E00**	**E61**	**E61+E10**	**E61+E09**
RINA	45	75	95	≥100	–	–	**E00**	–	–	–
CCS	45	75	100	≥100	–	–	**E00**	**E71**	**E71+E10**	**E71+E09**

Type test certificates

Temperature class and coolant temperature

Marine motors are designed in general for a coolant temperature CT 45 °C in temperature class 155 (F) – used according to 155 (F) – with thermal reserve. When used according to temperature class 130 (B), order code **C22**, derating of approximately 4 % (for order codes **E00** and **E21** approximately 8 %) necessary.

1MA and 1MJ motors as well as motors in Zones 2, 21 and 22 are designed in temperature class 155 (F) – used according to temperature class 130 (B) – with derating of approximately 4 % (for order code **E00** approximately 8 %). 1MA motors are designed for the maximum possible and certified outputs.

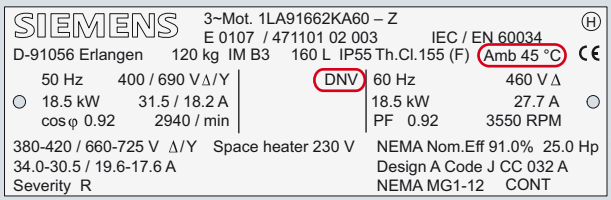
1LA9 motors with increased output in temperature class 155 (F) – used according to temperature class 155 (F) – are also derated by approximately 4 % (for order code **E00**/**E21** approximately 8 %).
If temperature class 155 (F) is used according to 130 (B), further derating of approximately 10 % (for non-standard motors 1LA8, 1PQ8 15 %) is required.
Please inquire for further details.

Coolant temperatures that exceed 45 °C require appropriate derating as shown in the table below:

	Coolant temperature CT (for temperature class 155 (F) used according to 155 (F)) °C			
	45	50	55	60
Derating factor	1.00	0.96	0.92	0.87

Rating plate and acceptance test certificate

The metal rating plate indicates the relevant classification authority and the associated coolant temperature.



Rating plate for a marine motor according to DNV

In addition, an acceptance test certificate 3.1 according to EN 10204 complete with the certificate number of the marine classification authority will be supplied.

Degree of protection

The standard version is IP55 degree of protection or IP23 for motors with through ventilation (series 1LL8), IP56 (non-heavy sea) – not for 1PQ8 and 1LL8) or IP65 (not possible for "Non-standard motors frame size 315 and above") are available optionally (see "Special versions").

Winding and motor protection

For monitoring the winding and bearings, the motors can be equipped with thermistors, temperature sensors and resistance thermometers. Anti-condensation heaters can also be fitted to the marine motors to prevent condensation building up on the winding.

Paint finish

The standard paint finish is suitable for indoor installations or outdoor installations which are roof-protected against weathering.

When standard motors are installed in sea atmospheres or in rooms that are constantly wet, the special paint finish for the "world wide" climatic group according to DIN IEC 60721-2-1 is suitable because this ensures a higher degree of corrosion protection. Most marine motors are finished in this special paint type as standard (see "Special versions").

The sea air resistant special finish (order code **M94**) or the Offshore special finish (order code **M91**) are recommended for excessively aggressive atmospheres.

Special finish with thicker layers are available on request.

Converter-fed operation

The standard insulation of the marine motors is implemented such that converter-fed operation is possible without limits for mains voltages of 460 V (for motor series 1LA8, 1PQ8, 1LL8 and 1LH8 up to 500 V) +10 %; exception: 1MA motors are only certified for mains operation.

At higher voltages, the motors require greater insulation resistance.

1LA5, 1LA7 and 1LG6 standard motors as well as 1LA8 and 1PQ8 non-standard motors are also available for converter-fed operation with supply voltages of up to 690 V also with improved insulation in the winding system.

It is important to note the extent to which the converter used must also be acceptance tested by the marine classification authority.