The purpose of this document is to identify the main input data required by 5LM for dimensioning a brushless permanent magnet motor. This form is not necessarily exhaustive but constitute a support document for 5LM and its customer to define the main requirements at the beginning of the collaboration.
Please return this completed form with the information you have to your usual 5LM contact or to contact@5LM.fr.
Should some of requirements being free, unknown or hardly quantified by customer, 5LM can provide assistance to determine or propose such important input data.

** This form can also be used largely as a support for other synchronous motor technologies.*

The cells colored as follows have to be filled (checkbox, drop-down list, text box): Example

1 Identification

Society		
Project		
Contact	Name	
	Phone	
	E-mail	
Date		

2 Applicable standards

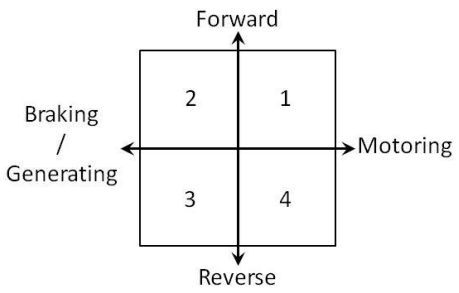
Appropriate standards to be complied with:

3 Performance

3.1 Operation

Several of the choices presented below may be selected (click on the appropriate checkboxes):

☐	Quadrant 1 (Motoring – Forward)
☐	Quadrant 2 (Braking/Generating – Forward)
☐	Quadrant 3 (Braking/Generating – Reverse)
☐	Quadrant 4 (Motoring – Reverse)



3.2 Continuous requirements

An operation exceeding a period of 10 min is considered as a continuous operation.

Designation	***Torque***	***Rotation speed***
Continuous 1	N.m	rpm
Continuous 2	N.m	rpm
Continuous 3	N.m	rpm

Maximum rotation speed	rpm

3.3 Peak and dynamic requirements

Moment of inertia driven	kg.m²
Acceleration / Deceleration capability	rad/s²
Is dynamic torque (from acceleration/deceleration needed with inertia driven) considered in the peak torque values defined on the following table?	Yes

Designation	***Torque***	***Speed***	***Duty cycle***	
Peak 1	N.m	rpm	Short time	If “Short time”: indicate here TON value (s) If “Intermittent periodic”: indicate here TON and TOFF values (s) If “Mixed”: Chart with Torque & Speed vs time to be attached
Peak 2	N.m	rpm	Short time	If “Short time”: indicate here TON value (s) If “Intermittent periodic”: indicate here TON and TOFF values (s) If “Mixed”: Chart with Torque & Speed vs time to be attached
Peak 3	N.m	rpm	Short time	If “Short time”: indicate here TON value (s) If “Intermittent periodic”: indicate here TON and TOFF values (s) If “Mixed”: Chart with Torque & Speed vs time to be attached

Stall torque	Max torque N.m

4 Input power source

On a DC source basis (battery type):

	Lower limit	***Nominal***	***Upper limit***
Supply voltage	V_{DC}	V_{DC}	V_{DC}
Max instant current (instantaneous power)	-	-	A_{MAX}
Average current per cycle (mean power consumption)	-	A_{MEAN}	-

5 Drive

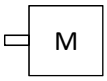
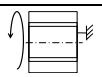
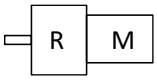
Number of phases		
Winding connection (Δ/Y)	Delta	
Neutral point Floating or Fix?	Floating	
Drive configuration	Squarewave (6 steps 1	If "Sinewave drive", precise if possible the command type: - Hysteresis-band current regulator - Sine-triangle voltage PWM - Space Vector Modulation (SVM) - Direct Torque Control (DTC) - ...

If a standard driver is used, precise its reference here below and attach associated data sheet and technical documents. Else, precise the main properties of the specific driver used here below:

6 Motor configuration

6.1 Motor design

If a design is already intended, precise the matching items (design requirements):

☐	Housed 	☐	Frameless 
☐	Internal rotor 	☐	Outrunner rotor 
☐	Gearbox 	☐	Direct drive 

Or else:

☐	No specific design requirement for the motor

6.2 Components to integrate

☐	Sensor	Digital hall effect sensors		Precise here details and/or references if specific requirements needed
☐	Brake	Nominal voltage	V $_{DC}$	Precise here details and/or references if specific requirements needed
		Brake mode	Static only ("parking device")	
		Holding torque	N.m	
		Duty cycle	Short time	If “Short time”: indicate here TON value (s) If “Intermittent periodic”: indicate here TON and TOFF values (s) If “Mixed”: Chart with Torque & Speed vs time to be attached
☐	Torque limitation	Torque to be limited from	N.m	Precise here details and/or references if specific requirements needed
☐	Thermal protection	Thermistor		Precise here details and/or references if specific requirements needed
☐	Other components to be precised here			

7 Mechanical interface

Dimension Space envelop	Indicate here Length x Width x Height (mm)
Weight	kg Max
Bonding resistance	mΩ Max
Marking identification	Precise here specific marking identification if necessary

Mechanical interface drawing to be attached:

Indicate the reference of the mechanical interface drawing attached with this document

Precise all the external loads applied to the motor (forces on the shaft, on the case, axial loads, radial loads/moments or their point of application).
Attach a detailed description (especially with schemes) if possible.

Description of all the external loads applied to the motor and attached document reference

8 Electrical interface

Connector	Yes	Precise here connector reference if yes
Wires	Precise here color definition, AWG, length…	

Electrical interface drawing to be attached

Indicate the reference of the electrical interface drawing attached with this document

9 Cooling conditions

☐	Air natural convection		
☐	Forced air cooling	Speed	m/s
☐	Immerged motor	Liquid type	Precise here viscosity, density…
		Temperature Max	°C
		Temperature min	°C
		Flow rate	L/s
☐	Liquid cooling	Liquid type	Precise here viscosity, density…
		Temperature Max	°C
		Flow rate	L/s

10 Environment

Select the environment requirements applicable to the motor and precise for each one the detailed specification. Attach specific documents accordingly if necessary.

☐	Operating ambient temperature	Temperature min	°C
		Temperature Max	°C
☐	Other temperature requirements	Precise here any other requirements if applicable: - temperature variation rate (°C/s) - storage temperature range - maximum allowable motor case temperature - …	
☐	Solid particle and liquid ingress withstand levels (IP)	Precise here the detailed requirement	
☐	Corrosive atmosphere (humidity, salt fog…)	Precise here the detailed requirement	
☐	Fluid compatibility	Precise here the detailed requirement	
☐	Vibrations / Shocks withstand levels	Precise here the detailed requirement	
☐	Electromagnetic compatibility	Precise here the detailed requirement	
☐	Ambient pressure/altitude	Precise here the requirements for ambient pressure min and max	
☐	Acoustic noise levels	Precise here the detailed requirement	

11 Life and reliability

Duty cycle to be considered	Short time	If “Short time”: indicate here TON value (s) If “Intermittent periodic”: indicate here TON and TOFF values (s) If “Mixed”: Chart with Torque & Speed vs time to be attached
Life expectancy	Precise here the detailed requirement	
MTBF (Mean Time Between Failures)	Precise here the detailed requirement	

12 Other

Precise here below any other requirements and comments not dealt with previous sections of this document:
