

# Choosing the proper lubricant

## Introduction

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When it is all about reducing the friction of a stepper motor, there is a necessity to lubricate or grease the bearings. FAULHABER PRECISTEP SA proposes different lubricants, oils or greases to facilitate the movement of the motor and obtain the best performances in any environmental condition.

In this sense, the idea of this application note is to present the different lubricant options and help the user to choose the proper one.

## Ball bearing (BB) and sintered sleeve bearing (SSB)

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FAULHABER stepper motors can include either sintered sleeve bearings or ball bearings, which makes them more attractive than the low cost designs which are mostly produced with sleeve bearings exclusively. This does not include the DM0620 and the DM1220, which cannot be delivered with 2 sleeve bearings. Ball bearings provide reduced friction, higher radial and axial maximal shaft load and longer life time. Sintered sleeve bearing have the advantage to be less expensive.

If the user may choose between SSB and BB, it might be interesting to ask the following questions:

1. Will I apply high loads on the shaft? yes => BB
2. Is friction a limiting factor? yes => BB
3. Is price a limiting factor? yes => SSB
4. Does my application deal with vacuum? yes => BB recommended
5. Is long life a must? yes => BB (BB provide a life time that is approximately 4x higher than with SSB)

## Lubricants and their options

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Once the nature of the bearing is selected, the lubricant may be chosen from the list presented in Table 1 in accordance with the requirements of the application.

**Table 1** : Overview of the lubricant options proposed by FAULHABER PRECISTEP.

lubricant service temperature	Motor recommended ambient temperature range	Comment	Ordering code	
			2 Sintered sleeve bearings	2 Ball bearings
-50....+140°C	-35...+70°C	Standard lubricant		<b>-2R<sup>(1)</sup></b>
-40....+140°C	-35...+70°C	Standard lubricant	<b>-SB<sup>(1)</sup></b>	
-72....+204°C	-70...+70°C	Low outgassing	-AC	-RC <sup>(1)</sup>
-65....+100°C	-45...+70°C	Long term	-AE	
-180....+350°C	-180...+70°C	Dry lubricant, powder	-AT	-

<sup>(1)</sup> Standard lubricants for which a stock is established (better lead-time)

### Notes

- RC, AC** Used for vacuum, low temperature, low out-gassing  
 Vacuum down to 10<sup>-6</sup> Torr.  
 Temperature down to -72°C.  
 Warning: the bearings are not the only parts in the motor that are liberating gas particles. The use of RC does not ensure the suitability for sensitive environments. Customer **MUST** verify in his application environment.
- AT** Used for extremely low temperature with sleeve bearings  
 The motor may be noisy.
- AE** Lower temperature range than the standard sleeve bearing lubricant  
 This option is available on the AM1524 stepper motor only.

The list is not exhaustive and there is always the possibility to implement a new lubricant for a specific application. Please contact your point of sales for more support.

### How to order?

The bearing code of Table 1 is useful when ordering a motor and is part of the motor designation as followed:

AM15242R025007      Bearing/lubricant type

Please note that the temperature range of a bearing alone will not provide the temperature range of the whole motor including the bearing because other components may influence its behavior.

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