

# Linear Motion Technology Handbook

The Drive & Control Company



# Linear Motion and Assembly Technologies



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## 1 Introduction

# 1.1 Foreword

Reliable guidance and precise positioning – Rexroth provides a complete linear motion technology range for these tasks, from guides through to drive units. Linear motion technology components are the interface between static and moving machine elements. They significantly affect the machine characteristics. Linear motion technology comes into play whenever precision and high load-bearing capability are required, as is above all the case in machine construction and automation. Rexroth's guidance components are profiled rail systems and linear bushings and shafts. Ball screw assemblies are the drive components used for positioning. Both of these functions are combined in linear motion systems. However, Rexroth offers much more than just linear motion products. As a global equipment provider for machinery and plant construction, Rexroth provides all the relevant drive, control and motion technologies – from mechanics, hydraulics and pneumatics through to electronics.

This linear motion technology handbook provides specialized knowledge about Rexroth's linear motion technology products, giving users insights into the world of linear motion. The handbook is not designed to replace the Rexroth product catalogs but simply as a supplement to them. The dimensions, performance data and product versions, etc. must still be taken from the catalogs. The handbook, however, contains extensive advice on system characteristics, product selection, design and calculation. It is designed for all linear motion technology users.

The handbook is divided into a general Principles chapter, equally applicable to all Rexroth products, and into additional special chapters on the individual linear motion technology components.

The Principles chapter describes the physical background knowledge for linear motion technology. This includes rolling contact with all its usual practical manifestations, as well as generally accepted methods for calculating nominal life. Also described are system characteristics common to all products, such as preload, rigidity, accuracy and friction. The following chapters on Profiled Rail Systems, Linear Bushings and Shafts, Ball Screw Drives and Linear Motion Systems refer to the respective Rexroth products and their characteristics. These chapters cover additional basic knowledge, system properties, advice on product selection, and design hints for users of these products. A substantial part of the handbook covers how to calculate, dimension and configure the guidance and drive components. This includes detailed calculation of the components' life expectancy, calculation of the static load safety factors, determination of the critical screw speed, and drive dimensioning. The structural design and the functionalities of the individual types, versions and components are also described. The reader is therefore provided with an overview of each product's special characteristics.

We hope that you will enjoy reading and using this handbook.

Bosch Rexroth AG  
The Drive & Control Company  
Linear Motion and Assembly Technologies

## 1.2 Contents

<b>1</b>	<b>Introduction</b> .....	<b>1-3</b>	<b>2</b>	<b>Prinziples</b> .....	<b>2-1</b>
1.1	Foreword .....	1-3	2.1	Historical development .....	2-1
1.2	Contents .....	1-4	2.2	Technical principles .....	2-3
			2.2.1	Elements of a machine .....	2-3
			2.2.2	Guides .....	2-5
			2.2.2.1	Differentiation of guides according to the type of motion .....	2-5
			2.2.2.2	Differentiation of linear guides according to the type of contact points .....	2-5
			2.2.2.3	Operating principle of linear guides .....	2-6
			2.2.2.4	Linear guide characteristics .....	2-7
			2.2.2.5	Differentiation of rolling contact guides according to rolling element recirculation .....	2-7
			2.2.3	Drive .....	2-8
			2.2.3.1	Drive types .....	2-8
			2.2.3.2	Screw drive .....	2-9
			2.3	Rolling contact .....	2-10
			2.3.1	Rolling contact of balls and rollers .....	2-10
			2.3.1.1	Contact areas in balls and rollers .....	2-10
			2.3.1.2	Ball contact conformity .....	2-11
			2.3.1.3	Logarithmic and cylindrical roller profiles .....	2-11
			2.3.1.4	Elastic deflection of balls and rollers .....	2-12
			2.3.2	Running track geometry for ball rolling elements .....	2-13
			2.3.2.1	Arc-shaped raceways .....	2-13
			2.3.2.2	Differential slip .....	2-14
			2.4	Life expectancy .....	2-15
			2.4.1	Calculation principles .....	2-15
			2.4.1.1	Nominal life .....	2-15
			2.4.1.2	Dynamic and static load capacities .....	2-16
			2.4.1.3	Equivalent load on bearing .....	2-18
			2.4.1.4	Static load safety factor .....	2-21
			2.4.2	Conditions of use .....	2-22
			2.4.2.1	Environmental conditions .....	2-22
			2.4.2.2	Operating conditions .....	2-24
			2.4.2.3	Installation conditions .....	2-25
			2.4.2.4	Normal conditions of use .....	2-25
			2.4.3	Damage profiles .....	2-26
			2.5	System technology .....	2-28
			2.5.1	Preload and rigidity .....	2-28
			2.5.2	Friction .....	2-29
			2.5.3	Sealing .....	2-30
			2.5.4	Lubrication .....	2-31
			2.5.4.1	Lubrication principles .....	2-31
			2.5.4.2	Lubricants .....	2-33
			2.5.4.3	Lubrication intervals .....	2-35
			2.5.5	Accuracy .....	2-36
			2.5.5.1	Accuracy levels in guides and drive units .....	2-36
			2.5.5.2	Accuracy types in linear motion systems .....	2-36
			2.6	Product overview .....	2-37

## 1 Introduction

## 1.2 Contents

<b>3</b>	<b>Profiled rail systems</b> .....	<b>3-1</b>	<b>3.4</b>	<b>eLINE ball rail systems</b> .....	<b>3-112</b>
<b>3.1</b>	<b>Principles</b> .....	<b>3-1</b>	<b>3.4.1</b>	<b>System characteristics</b> .....	<b>3-112</b>
<b>3.1.1</b>	<b>System technology</b> .....	<b>3-1</b>	<b>3.4.2</b>	<b>Structural design</b> .....	<b>3-113</b>
3.1.1.1	Structural design of a profiled rail system .....	3-2	<b>3.4.3</b>	<b>Product selection guide</b> .....	<b>3-116</b>
3.1.1.2	Load-bearing capability .....	3-9	3.4.3.1	Versions .....	3-116
3.1.1.3	Preload .....	3-14	3.4.3.2	Application areas .....	3-116
3.1.1.4	Rigidity .....	3-16	3.4.3.3	Simplified calculations .....	3-116
3.1.1.5	Accuracy .....	3-18	<b>3.5</b>	<b>Roller rail systems</b> .....	<b>3-117</b>
3.1.1.6	Travel accuracy .....	3-21	<b>3.5.1</b>	<b>System characteristics</b> .....	<b>3-117</b>
3.1.1.7	Friction .....	3-24	<b>3.5.2</b>	<b>Structural design</b> .....	<b>3-118</b>
<b>3.1.2</b>	<b>Product selection</b> .....	<b>3-26</b>	<b>3.5.3</b>	<b>Product selection guide</b> .....	<b>3-121</b>
3.1.2.1	Product selection aids .....	3-26	3.5.3.1	Versions .....	3-121
3.1.2.2	Product selection procedure .....	3-30	3.5.3.2	Application areas .....	3-121
<b>3.1.3</b>	<b>Profiled rail system layout</b> .....	<b>3-33</b>	<b>3.6</b>	<b>Cam roller guides</b> .....	<b>3-122</b>
3.1.3.1	Number of runner blocks and guide rails .....	3-33	<b>3.6.1</b>	<b>System characteristics</b> .....	<b>3-122</b>
3.1.3.2	Mounting orientation of the profiled rail guide .....	3-34	<b>3.6.2</b>	<b>Structural design</b> .....	<b>3-123</b>
3.1.3.3	Guide rail mounting .....	3-34	<b>3.6.3</b>	<b>Product selection guide</b> .....	<b>3-125</b>
3.1.3.4	Runner block mounting .....	3-40	3.6.3.1	Versions .....	3-125
3.1.3.5	Design of the adjoining structure .....	3-41	3.6.3.2	Application areas .....	3-126
3.1.3.6	Installation scenarios .....	3-47	3.6.3.3	Different calculation procedure .....	3-126
<b>3.1.4</b>	<b>Design notes</b> .....	<b>3-50</b>	<b>3.7</b>	<b>Integrated measuring system</b> .....	<b>3-127</b>
3.1.4.1	Installation tolerances .....	3-50	<b>3.7.1</b>	<b>Position measuring systems principles</b> .....	<b>3-127</b>
3.1.4.2	Guidelines for economical designs .....	3-55	<b>3.7.2</b>	<b>System characteristics</b> .....	<b>3-129</b>
<b>3.1.5</b>	<b>Calculations</b> .....	<b>3-57</b>	<b>3.7.3</b>	<b>Structural design</b> .....	<b>3-130</b>
3.1.5.1	Procedure for manual calculations .....	3-57	3.7.3.1	Components functions .....	3-131
3.1.5.2	Define the operating conditions .....	3-59	3.7.3.2	Function description of the inductive sensors ..	3-134
3.1.5.3	Loads due to forces and moments .....	3-64	<b>3.7.4</b>	<b>Electronics</b> .....	<b>3-136</b>
3.1.5.4	Combined equivalent load on bearing .....	3-71	<b>3.7.5</b>	<b>Product selection guide</b> .....	<b>3-138</b>
3.1.5.5	Taking the preload into account .....	3-74	3.7.5.1	Accuracy of the measuring system .....	3-138
3.1.5.6	Equivalent dynamic load on bearing .....	3-75	3.7.5.2	Application areas .....	3-138
3.1.5.7	Life expectancy .....	3-76			
3.1.5.8	Equivalent static load on bearing .....	3-79			
3.1.5.9	Static load safety factor .....	3-81			
3.1.5.10	Example of a nominal life calculation .....	3-81			
<b>3.1.6</b>	<b>Defining the peripherals</b> .....	<b>3-94</b>			
3.1.6.1	Lubrication .....	3-94			
3.1.6.2	Sealing .....	3-96			
3.1.6.3	Corrosion protection .....	3-98			
3.1.6.4	Additional functions .....	3-99			
<b>3.2</b>	<b>Ball rail systems</b> .....	<b>3-101</b>			
<b>3.2.1</b>	<b>System characteristics</b> .....	<b>3-101</b>			
<b>3.2.2</b>	<b>Structural design</b> .....	<b>3-102</b>			
<b>3.2.3</b>	<b>Product selection guide</b> .....	<b>3-106</b>			
3.2.3.1	Versions .....	3-106			
3.2.3.2	Application areas .....	3-106			
<b>3.3</b>	<b>Miniature ball rail systems</b> .....	<b>3-107</b>			
<b>3.3.1</b>	<b>System characteristics</b> .....	<b>3-107</b>			
<b>3.3.2</b>	<b>Structural design</b> .....	<b>3-108</b>			
<b>3.3.3</b>	<b>Product selection guide</b> .....	<b>3-111</b>			
3.3.3.1	Versions .....	3-111			
3.3.3.2	Application areas .....	3-111			



## 1.2 Contents

<b>4</b>	<b>Linear bushings and shafts</b> . . . . .	<b>4-1</b>	<b>5</b>	<b>Ball screw drives</b> . . . . .	<b>5-1</b>
<b>4.1</b>	<b>Principles</b> . . . . .	<b>4-1</b>	<b>5.1</b>	<b>Principles</b> . . . . .	<b>5-1</b>
<b>4.1.1</b>	<b>System technology</b> . . . . .	<b>4-1</b>	<b>5.1.1</b>	<b>System technology</b> . . . . .	<b>5-1</b>
4.1.1.1	Structural design of a linear bushing . . . . .	4-1	5.1.1.1	Structural design of a ball screw assembly . . . . .	5-2
4.1.1.2	Structural design of a linear set . . . . .	4-2	5.1.1.2	Load ratings . . . . .	5-9
4.1.1.3	Structural design of shafts, shaft support blocks and shaft support rails . . . . .	4-3	5.1.1.3	Preload . . . . .	5-10
4.1.1.4	Standards . . . . .	4-3	5.1.1.4	Rigidity . . . . .	5-12
4.1.1.5	Type designations and forms of linear bushings . . . . .	4-4	5.1.1.5	Accuracy . . . . .	5-14
<b>4.1.2</b>	<b>Product selection</b> . . . . .	<b>4-6</b>	5.1.1.6	Dynamic drag torque . . . . .	5-16
4.1.2.1	Linear bushing applications . . . . .	4-6	5.1.1.7	Characteristic speed and maximum linear speed . . . . .	5-17
4.1.2.2	Linear bushing characteristics and technical data . . . . .	4-7	5.1.1.8	Mechanical efficiency . . . . .	5-17
4.1.2.3	Application parameters . . . . .	4-8	5.1.1.9	Lubrication . . . . .	5-18
4.1.2.4	Selection of appropriate linear bushings . . . . .	4-8	<b>5.1.2</b>	<b>Product selection</b> . . . . .	<b>5-19</b>
<b>4.1.3</b>	<b>Design notes</b> . . . . .	<b>4-10</b>	5.1.2.1	Guide to choosing the right product . . . . .	5-19
4.1.3.1	Influence of the direction of loading on the load capacity . . . . .	4-10	5.1.2.2	Product selection procedure . . . . .	5-20
4.1.3.2	Design measures . . . . .	4-11	5.1.2.3	Pre-selection . . . . .	5-20
4.1.3.3	Lubrication . . . . .	4-14	<b>5.1.3</b>	<b>Calculations</b> . . . . .	<b>5-21</b>
<b>4.1.4</b>	<b>Calculations</b> . . . . .	<b>4-16</b>	5.1.3.1	Defining the requirements . . . . .	5-21
4.1.4.1	Nominal life . . . . .	4-16	5.1.3.2	Life expectancy . . . . .	5-23
4.1.4.2	Equivalent dynamic load on bearing . . . . .	4-19	5.1.3.3	Critical speed . . . . .	5-27
4.1.4.3	Resulting load . . . . .	4-19	5.1.3.4	Permissible axial load on screw (buckling load) . . . . .	5-28
4.1.4.4	Varying bearing loads from varying load directions . . . . .	4-20	5.1.3.5	End bearings . . . . .	5-29
4.1.4.5	Torque considerations for torque-resistant linear bushings . . . . .	4-21	5.1.3.6	Drive torque and drive power . . . . .	5-29
4.1.4.6	Static load safety factor . . . . .	4-22	5.1.3.7	Calculation example . . . . .	5-30
4.1.4.7	Shaft deflection . . . . .	4-22	<b>5.1.4</b>	<b>Design notes</b> . . . . .	<b>5-36</b>
<b>4.1.5</b>	<b>Calculation example</b> . . . . .	<b>4-23</b>	5.1.4.1	Adjoining structures and installation tolerances . . . . .	5-36
<b>4.2</b>	<b>Linear bushings</b> . . . . .	<b>4-26</b>	5.1.4.2	Guidelines for economical constructions . . . . .	5-37
<b>4.2.1</b>	<b>Compact and eLINE linear bushings</b> . . . . .	<b>4-26</b>	5.1.4.3	Safety nuts for vertical applications . . . . .	5-38
<b>4.2.2</b>	<b>Super linear bushings A and B</b> . . . . .	<b>4-27</b>	<b>5.1.5</b>	<b>Mounting instructions</b> . . . . .	<b>5-39</b>
<b>4.2.3</b>	<b>Standard linear bushings</b> . . . . .	<b>4-29</b>	<b>5.2</b>	<b>Ball nuts</b> . . . . .	<b>5-40</b>
<b>4.2.4</b>	<b>Segmental linear bushings</b> . . . . .	<b>4-30</b>	<b>5.2.1</b>	<b>Single nuts</b> . . . . .	<b>5-40</b>
<b>4.2.5</b>	<b>Super linear bushings H and SH</b> . . . . .	<b>4-31</b>	5.2.1.1	System characteristics . . . . .	5-40
<b>4.2.6</b>	<b>Radial linear bushings</b> . . . . .	<b>4-32</b>	5.2.1.2	Application areas . . . . .	5-40
<b>4.2.7</b>	<b>Torque-resistant linear bushings</b> . . . . .	<b>4-33</b>	<b>5.2.2</b>	<b>Standard series single nuts</b> . . . . .	<b>5-41</b>
<b>4.2.8</b>	<b>Linear bushings for combined linear and rotary motion</b> . . . . .	<b>4-34</b>	5.2.2.1	System characteristics . . . . .	5-41
<b>4.3</b>	<b>Linear sets</b> . . . . .	<b>4-35</b>	5.2.2.2	Application areas . . . . .	5-41
<b>4.4</b>	<b>Precision steel shafts</b> . . . . .	<b>4-37</b>	<b>5.2.3</b>	<b>Miniature series single nuts</b> . . . . .	<b>5-42</b>
<b>4.5</b>	<b>Shaft support rails</b> . . . . .	<b>4-38</b>	5.2.3.1	System characteristics . . . . .	5-42
<b>4.6</b>	<b>Shaft support blocks</b> . . . . .	<b>4-39</b>	5.2.3.2	Application areas . . . . .	5-42
			<b>5.2.4</b>	<b>eLINE series single nuts</b> . . . . .	<b>5-43</b>
			5.2.4.1	System characteristics . . . . .	5-43
			5.2.4.2	Application areas . . . . .	5-43
			<b>5.2.5</b>	<b>Double nuts</b> . . . . .	<b>5-44</b>
			5.2.5.1	System characteristics . . . . .	5-44
			5.2.5.2	Application areas . . . . .	5-44
			<b>5.3</b>	<b>Drive units</b> . . . . .	<b>5-45</b>
			<b>5.3.1</b>	<b>Drive units with driven screw</b> . . . . .	<b>5-45</b>
			5.3.1.1	System characteristics . . . . .	5-45
			5.3.1.2	Application areas . . . . .	5-47
			<b>5.3.2</b>	<b>Drive units with driven nut</b> . . . . .	<b>5-48</b>
			5.3.2.1	System characteristics . . . . .	5-48
			5.3.2.2	Application areas . . . . .	5-49

## 1.2 Contents

<b>6</b>	<b>Linear motion systems</b> .....	<b>6-1</b>	<b>6.5.3</b>	<b>Ball rail tables TKL with ball rail systems and linear motor</b> .....	<b>6-47</b>
<b>6.1</b>	<b>Principles</b> .....	<b>6-1</b>	<b>6.6</b>	<b>Linear motion slides</b> .....	<b>6-48</b>
<b>6.1.1</b>	<b>System technology</b> .....	<b>6-1</b>	<b>6.6.1</b>	<b>System characteristics</b> .....	<b>6-48</b>
6.1.1.1	Basic structural design of linear motion systems ..	6-3	<b>6.7</b>	<b>Cartesian motion systems</b> .....	<b>6-49</b>
6.1.1.2	Type and size designations .....	6-10	<b>6.7.1</b>	<b>System characteristics</b> .....	<b>6-49</b>
6.1.1.3	Guideway types .....	6-11	<b>6.7.2</b>	<b>Basic structure of the CMS</b> .....	<b>6-50</b>
6.1.1.4	Drive unit types .....	6-14	<b>6.8</b>	<b>Electrical components</b> .....	<b>6-51</b>
<b>6.1.2</b>	<b>Product selection</b> .....	<b>6-18</b>	<b>6.8.1</b>	<b>Overview</b> .....	<b>6-51</b>
6.1.2.1	Application parameters .....	6-18	<b>6.8.2</b>	<b>Motors</b> .....	<b>6-52</b>
6.1.2.2	Product selection aids .....	6-20	6.8.2.1	Servo motors .....	6-53
6.1.2.3	Motor, controller and control system .....	6-21	6.8.2.2	Linear motors .....	6-54
6.1.2.4	Conditions of use .....	6-21	6.8.2.3	Three-phase motors .....	6-55
<b>6.1.3</b>	<b>Design notes</b> .....	<b>6-23</b>	6.8.2.4	Stepping motors .....	6-55
6.1.3.1	General design notes for linear motion systems ..	6-23	<b>6.8.3</b>	<b>Controllers and control systems</b> .....	<b>6-56</b>
6.1.3.2	Fastening linear motion systems to the mounting base .....	6-25	6.8.3.1	Servo controllers .....	6-57
<b>6.1.4</b>	<b>Calculations</b> .....	<b>6-26</b>	6.8.3.2	Frequency inverters .....	6-58
6.1.4.1	External loads and nominal life calculation .....	6-26	6.8.3.3	Positioning control .....	6-58
6.1.4.2	Motor design calculations, including cycle times ..	6-27	6.8.3.4	Path control .....	6-59
6.1.4.3	Deflection .....	6-30	6.8.3.5	Control cabinet solutions .....	6-59
<b>6.2</b>	<b>Linear modules</b> .....	<b>6-31</b>	<b>6.8.4</b>	<b>Switches and sensors</b> .....	<b>6-60</b>
<b>6.2.1</b>	<b>System characteristics</b> .....	<b>6-31</b>	6.8.4.1	Mechanical switches .....	6-61
<b>6.2.2</b>	<b>Linear modules MKK with ball rail system and ball screw drive</b> .....	<b>6-32</b>	6.8.4.2	Proximity switches .....	6-61
<b>6.2.3</b>	<b>Linear modules MKR/MLR with ball rail system/cam roller guide and toothed belt drive</b> .....	<b>6-33</b>	6.8.4.3	Hall sensors .....	6-61
<b>6.2.4</b>	<b>Linear modules MKR/MKZ with two ball rail systems and toothed belt/rack and pinion drive</b> .....	<b>6-34</b>	6.8.4.4	Reed sensors .....	6-62
<b>6.2.5</b>	<b>Linear modules MKP with ball rail system and pneumatic drive</b> .....	<b>6-35</b>	6.8.4.5	Switch mounting arrangements .....	6-62
<b>6.2.6</b>	<b>Linear modules MKL and LKL with ball rail systems and linear motor</b> .....	<b>6-36</b>			
<b>6.2.7</b>	<b>Connection elements for linear modules</b> .....	<b>6-37</b>			
<b>6.3</b>	<b>Compact modules</b> .....	<b>6-38</b>			
<b>6.3.1</b>	<b>System characteristics</b> .....	<b>6-38</b>			
<b>6.3.2</b>	<b>Compact modules CKK with ball rail systems and ball screw drive</b> .....	<b>6-39</b>			
<b>6.3.3</b>	<b>Compact modules CKR with ball rail systems and toothed belt drive</b> .....	<b>6-40</b>			
<b>6.3.4</b>	<b>Compact modules CKL with ball rail systems and linear motor</b> .....	<b>6-41</b>			
<b>6.3.5</b>	<b>Connection elements and Easy-2-Combine automation system</b> .....	<b>6-42</b>			
<b>6.4</b>	<b>Precision modules</b> .....	<b>6-43</b>			
<b>6.4.1</b>	<b>System characteristics</b> .....	<b>6-43</b>			
<b>6.5</b>	<b>Ball rail tables</b> .....	<b>6-45</b>			
<b>6.5.1</b>	<b>System characteristics</b> .....	<b>6-45</b>			
<b>6.5.2</b>	<b>Ball rail tables TKK with ball rail systems and ball screw drive</b> .....	<b>6-46</b>			

1 Introduction

## 1.2 Contents

<b>7</b>	<b>Appendix .....</b>	<b>7-1</b>
<b>7.1</b>	<b>Bosch Rexroth AG: The Drive &amp; Control Company.....</b>	<b>7-1</b>
<b>7.1.1</b>	<b>A strong partner worldwide .....</b>	<b>7-1</b>
<b>7.1.2</b>	<b>Linear motion and assembly technologies .....</b>	<b>7-1</b>
7.1.2.1	Linear motion technology .....	7-2
7.1.2.2	Assembly technology .....	7-4
<b>7.2</b>	<b>Glossary .....</b>	<b>7-6</b>
<b>7.3</b>	<b>Index .....</b>	<b>7-9</b>