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To order components, see catalogs "Cartesian Motion Systems CMS" R310A 2625 and "ARS, ECODRIVE Cs" RDE 82 725.

The catalogs supplement these instructions and should therefore be kept handy for easy reference.

- Please order the latest publications from your local sales partner.
- More detailed documentation is available on request.
1. Safety, Cross-References and Symbols

1.1 Safety notes and their symbols

The following symbols are used to identify safety notes:

- **DANGER!**
  Risk of coming into contact with power-conducting parts! Cut off power supply!

- **WARNING!**
  Risk of injury!

- **Caution!**
  Danger for Compact Modules or adjacent structures!

- **Caution!**
  Keep Compact Modules clean! Cover if necessary!

1.2 Cross-referencing symbols

The symbols below are used to refer to repeat or follow-on work operations:

- **→** 7.1 See Section 7.1

- **→ 7.1.2** See Figure 7.1.2 (Figure 2 in Section 7.1)

- **✍** Note, recommendation

1.3 Symbols

- **Screw**

- **Tightening torque**

- **Clean!**
2. Overview of CMS

2.1 Model overview

Rexroth CMS systems are available in different models. For the exact data and dimensions, see the “Cartesian Motion Systems” catalog.

⚠️ These instructions will help appropriately trained specialists to mount, start up and maintain Rexroth CMS systems. Do not exceed the limit values (max. loading, max. velocity, etc.) as specified in the catalog.

2.2 Nameplate, ordering of replacement parts

1. Part number
2. System part number
3. Customer order number
4. Date of manufacture
5. Axis number (A1, A2, etc.)
6. Cable length

• When ordering replacement parts, please always state all data given on the nameplate.
3. Installing the CMS

3.1 Mounting preparations

The CMS is attached using clamps (see also "Cartesian Motion Systems" catalog R310A 2625).

⚠️ Do not secure or support the CMS at the end blocks. The frame is the load bearing structure. Do not exceed the maximum tightening torques specified in the table on page 6, section 3.3, when mounting the systems.

⚠️ Make sure the clamps are evenly distributed along the entire length.

3.2 Fastening the CMS to the supporting structure

CMS systems are fixed in place using clamps.

<table>
<thead>
<tr>
<th>Profile width (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>90</td>
<td>102</td>
<td>112</td>
</tr>
<tr>
<td>110</td>
<td>126</td>
<td>140</td>
</tr>
<tr>
<td>145</td>
<td>161</td>
<td>175</td>
</tr>
</tbody>
</table>
3.3 Clamps

Recommended number of clamps:
- with 1 hole: 6 pieces per meter on each side
- with 4 holes: 3 pieces per meter on each side

Tightening torques for the fastening screws at friction factor 0.125, strength class 8.8

<table>
<thead>
<tr>
<th>M4</th>
<th>M5</th>
<th>M6</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7</td>
<td>5.5</td>
<td>9.5</td>
</tr>
</tbody>
</table>

1 Countersink for thread M, ISO 4762, number of holes N

---

### Clamps

<table>
<thead>
<tr>
<th>Profile width</th>
<th>for thread</th>
<th>Type</th>
<th># of holes</th>
<th>Dimensions (mm)</th>
<th>Part number</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>A  B  C  D  E  F  G  H</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>M4</td>
<td>1 1</td>
<td>25 – –</td>
<td>4.6</td>
<td>R0375 310 00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 4</td>
<td>87 6 25</td>
<td>4.6</td>
<td>R0375 310 02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 4</td>
<td>107 8.5 30</td>
<td>4.6</td>
<td>R0375 310 03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 2</td>
<td>72 11 50</td>
<td>3.2</td>
<td>R0375 310 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 2</td>
<td>62 11 40</td>
<td>3.2</td>
<td>R0375 310 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 4</td>
<td>77 8.5 20</td>
<td>4.6</td>
<td>R0375 310 26</td>
</tr>
<tr>
<td>110 145</td>
<td>M5</td>
<td>3 4</td>
<td>107 8.5 30</td>
<td>11.5 4.8</td>
<td>R0375 410 02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 4</td>
<td>77 8.5 20</td>
<td>11.5 4.8</td>
<td>R0375 410 26</td>
</tr>
<tr>
<td></td>
<td>M6</td>
<td>1 1</td>
<td>25 – –</td>
<td>5.3</td>
<td>R0375 510 00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 4</td>
<td>142 11 40</td>
<td>5.3</td>
<td>R0375 510 02</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 2</td>
<td>72 11 50</td>
<td>3.2</td>
<td>R0375 510 09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 2</td>
<td>62 11 40</td>
<td>3.2</td>
<td>R0375 510 11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 2</td>
<td>47 8.5 30</td>
<td>5.3</td>
<td>R0375 510 23</td>
</tr>
</tbody>
</table>

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3.3
4. Start-up

⚠️ Remove all the fixtures used to secure the system during shipment. When lifting the CMS, hold it by the main body (1) only and not the motor cover (2) or the end blocks (3). Use the lifting straps provided with the shipment. Carefully consider the unit's center of gravity prior to hoisting.

⚠️ CMS linear motion systems are to be used only for their intended purpose. Follow all guidelines for accident prevention, machine guarding and high-voltage electrical safety. Additional customer-supplied guarding is to be installed. Assembly, start-up and maintenance is to be performed only by fully trained personnel.

4.1 Checking the operating conditions

- Check the ambient temperature, loading, speed of the ball screw drive (BS), travel speed and stroke.

⚠️ For special operating conditions, please consult us. This applies in particular to the presence of glass fibers, sawdust, solvents, and to short stroke applications.

4.2 Connecting up the CMS electrically

🔥 Observe all safety regulations for working with high-voltage equipment!

- Keep the "Controllers, Motors, Electrical Accessories" catalogs handy for reference.
- Keep the documentation of the respective controller handy for reference.
- Always connect up the controllers using the correct cables, i.e., controller A1 with cables marked A1.

⚠️ Lay the motor cable at the greatest possible distance from the encoder cables!
4.3 Trial run, run-in

⚠️ Check the E-STOP switch before initial start-up!
⚠️ Check customer-supplied guarding!
⚠️ Do not exceed the load capacities, moments, maximum speeds, velocities and motor data etc! See catalog.

• Move the system at reduced speed over the entire travel distance.
• While doing this, verify the functionality of the software limit switches.

5. Maintenance

Basic lubrication is applied in-factory. The fixed and floating bearings of the ball screw drive (BS) are greased for life and will not need to be relubricated under normal operating conditions.

5.1 Lube nipples in the carriage

The main body of the CMS has holes drilled on each side through which the lube nipples in the carriage can be accessed. It is sufficient to lubricate the system from one side.

• Move the carriages to the position “L/2” to gain access to all lube nipples.
• Lubricate both carriages.
• When using a manual lube gun, weigh the required quantity of grease per stroke.

⚠️ After applying the lubricant, reclose the holes in the main body.
⚠️ Tubes with appropriate nozzles (1) can be ordered under part number R3455 030 44.
5.2 Lube ports for carriage attachments

The lube ports are closed with a set screw for shipment.

⚠️ When using the lube ports, make sure the connection dimensions are correct and use O-rings (4) to DIN 3771:
- O-ring 3 x 1 mm
- Part number R3411 118 01

🔍 It is sufficient to lubricate each carriage through one lube port only.

<table>
<thead>
<tr>
<th>Size</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>M</th>
<th>Lm</th>
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</thead>
<tbody>
<tr>
<td>12-80</td>
<td>54</td>
<td>6</td>
<td>6</td>
<td>Ø3</td>
<td>Ø5+0.02</td>
<td>0.6-0.1</td>
<td>M3</td>
<td>65</td>
</tr>
<tr>
<td>15-110</td>
<td>66</td>
<td>6.5</td>
<td>6.5</td>
<td>Ø3</td>
<td>Ø5+0.02</td>
<td>0.6-0.1</td>
<td>M3</td>
<td>85</td>
</tr>
<tr>
<td>20-145</td>
<td>88</td>
<td>7</td>
<td>7</td>
<td>Ø3</td>
<td>Ø5+0.02</td>
<td>0.6-0.1</td>
<td>M3</td>
<td>100</td>
</tr>
</tbody>
</table>

5.3 Lubrication through connection brackets

- The two carriages per axis can be lubricated using one funnel-type lube nipple DIN 3405-AM6.

2-axis units
1. Lube nipple for the X-axis
   (lubricant can also be applied through the opposite side of the bracket)
2. Lube nipple for the Z-axis
   (lubricant can also be applied through the opposite side of the bracket)

3-axis units
3. Lube nipple for the X-axis
4. Lube nipple for the Y-axis
   (lubricant can also be applied through the opposite side of the bracket)
5. Lube nipple for the Z-axis
5.4 Lubricant

⚠️ CMS systems are designed for grease lubricants only!

⚠️ Do not use greases containing solid particles (e.g., graphite or MoS₂)!

See table at right for recommended lithium soap greases.

<table>
<thead>
<tr>
<th>For ALL modules</th>
<th>Lithium base grease AK (DIN51825)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Consistency class NLGI 2 (DIN51818)</td>
</tr>
</tbody>
</table>

5.5 Lubricant quantities

⚠️ For special operating conditions, please consult us. This applies in particular to the presence of glass fibers, sawdust, solvents, and to short stroke applications.

5.6 Lubrication intervals

• Every 500 operating hours or after the specified travel, whichever is reached first.

<table>
<thead>
<tr>
<th>Profile width</th>
<th>BS</th>
<th>Lubricant quantity</th>
<th>Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>**</td>
<td>***</td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>12 x 16</td>
<td>0.6 g</td>
<td>0.3 g</td>
</tr>
<tr>
<td>110</td>
<td>16 x 16</td>
<td>1.7 g</td>
<td>0.8 g</td>
</tr>
<tr>
<td>145</td>
<td>20 x 20</td>
<td>3.6 g</td>
<td>1.3 g</td>
</tr>
</tbody>
</table>

* Driven carriage  ** Second carriage  *** Connection bracket

5.7 Cable routing for power supply lines

The power supply lines are shipped with the illustrated cable routing. The open cross-sections are available for customer wiring. Divider walls can be shifted. Unused divider walls can be removed.

5.3 *400 g cartridge
6. **Back-up battery for absolute encoder**

Location of the back-up battery
The battery is included in the shipment.
Pre-installed and refreshed prior to shipment.

⚠️ Unlike the usual ECODRIVE Cs designs, the battery is located in the motor casing and not in the controller.

In CMS axes, the battery is located directly below the metal cover of the motor housing.

⚠️ **Do not install an additional back-up battery in the battery compartment of the controller!**
The back-up battery for absolute encoder data is already connected to the encoder plugged and sealed.

🔗 Changing the back-up battery ➔ please see section 9.

7. **Replacing assemblies**

7.1 **CMS repairs**

For replacement of individual components, see the CKK Mounting Instructions R310D4 2671. In all other cases, please consult Bosch Rexroth.
8. Project planning
   (additions / changes)
   For all general purposes, the project planning manual for the
   ECODRIVE Cs applies here also. The instructions given below
   relate to the differences or additional features for CMS multi-
   axis systems versus the ECODRIVE Cs project planning manual.

8.1 Assignment of CMS axes to ECODRIVE Cs
   drives
   The ECODRIVE Cs controllers used for CMS axes are:
   - DKC **.3-012 (400 W) with
   - MSM030C-0300-NN-M0-CG1
     for CMS axes with profile width 90 mm or 110 mm
   - DKC **.3-018 (750 W) with
   - MSM040B-0300-NN-M0-CG1
     for CMS axes with profile width 145 mm

8.2 Input voltage
   Single-phase or three-phase 230 VAC is required for travel
   profiles and permissible payloads as specified in the CMS catalog
   (R310A 2625).

⚠️ When assigning the drive controllers to the correspond-
   ing axes, please follow the instructions given in the section on
   labeling/identification of drive controllers and mechanical axes
   in the project planning manual. If these instructions are not
   followed, pre-set soft limit switches may not function properly,
   which may cause damage to the mechanical components.

8.3 Braking resistor
   For most applications, the built-in braking resistor will be
   sufficient.
   For the travel profiles specified in the CMS catalog, it may be
   necessary to install an external braking resistor, especially for
   vertical axes with very short pauses between movements.
   If an overload threatens, the warning:
   "E252 Braking resistor warning"
   will appear, and if an overload occurs, the error:
   "F220 Braking resistor overload" will be displayed.

Remedy: Use an external braking resistor.

☞ See ECODRIVE Cs troubleshooting notes for installation
   of an external braking resistor.

☞ See ECODRIVE Cs project planning manual.
9. Replacing batteries in CMS axes

Back-up batteries for CMS axes can be ordered from Bosch Rexroth.
For battery replacement intervals, see ECODRIVE Cs project planning manual.

9.1 Scope of shipment
- Shrink sealed battery
- Heat-shrinkable tubing 12/4 with hotmelt adhesive (color: gray)
- Paper and cable binders

⚠ Disconnect the system from the mains power supply (e.g. mains switch or similar).

9.2 Open the housing
Remove the screws from the motor housing and lift off the cover.

9.3 Remove the encoder connector and battery from the housing
Disconnect encoder plug from the encoder extension.
Remove the cable ties from the encoder plug and the battery.

9.4 Remove the old battery
Using a knife, carefully cut open the gray sheath at the point shown (see illustration at left). To avoid damaging the cable, do not make the cut too deep.

⚠ Important !!!
If the motor is left too long without a battery, the stored referencing data will be lost. For the maximum time that the motor can be left without a battery, see additional documentation.
(To restore the referencing data, see the enclosed CD)

When the connector has been exposed, disconnect the old battery.
9.5 Insert the new battery
To re-establish the motor unit’s enclosure protection class, the battery connector must be shrink sealed again. Push the prepared piece of heat-shrink tubing over the cable leading to the connector and connect up the new battery. Wrap 6-7 layers of paper around the plug connection to protect it from the adhesive. The paper also provides protection the next time the battery has to be replaced.

9.6 Application of shrink tubing
Carefully slide the shrink tubing until it is centered over the plug connection, taking care not to displace the paper as you do so. Use a heat gun to shrink seal the tubing from one end to the other.

9.7 Fasten the encoder connector and the battery inside the housing
Now reconnect the encoder plug and use cable ties to fasten it to the housing at the specified points. Then fasten the battery to the metal motor housing, also using cable ties. If the battery has been properly replaced, the arrangement should be as shown in the illustration. Replace the cover and screw it in place.
10. Notes on firmware fault clearance
   (additions / changes)

   Fault description
   - F248 Low Battery voltage

11. Default settings / pre-parameterization

Contrary to the default setting, the following settings have been made by Bosch Rexroth prior to shipment.

11.1 Drive addresses

A1 axis  ->  Address 03 (S3 at 0, S2 at 3)
A2 axis  ->  Address 04 (S3 at 0, S2 at 4)
A3 axis  ->  Address 05 (S3 at 0, S2 at 5)
1-axis systems -> Address 03 (S3 at 0, S2 at 3)
### 11.2 Drive parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-0-4034</td>
<td>Profile type (only for Pro-bus, DeviceNet or CanOpen)</td>
<td>FF 80h (I/O mode with dataset acknowledgement)</td>
</tr>
<tr>
<td>R-0-4079</td>
<td>Baud rate (only for Pro-bus, DeviceNet or CanOpen)</td>
<td>500 kbps for Pro-bus, 125 kbps for DeviceNet, 10 kbps for CanOpen</td>
</tr>
<tr>
<td>S-0-0142</td>
<td>Application type</td>
<td>e.g. Mf 20-143</td>
</tr>
<tr>
<td>S-0-0044 and S-0-0078 and S-0-0160</td>
<td>Weighting type</td>
<td>&quot;Translatory&quot;</td>
</tr>
<tr>
<td>S-0-0101</td>
<td>Velocity, controller response time</td>
<td>20 [ms]</td>
</tr>
<tr>
<td>S-0-0104</td>
<td>Position controller Kv factor</td>
<td>5 [1000/min]</td>
</tr>
<tr>
<td>S-0-0123</td>
<td>Feed constant</td>
<td>Depending on module Frame size 90 -&gt; 10 mm/rev Frame size 110 -&gt; 16 mm/rev Frame size 145 -&gt; 20 mm/rev</td>
</tr>
<tr>
<td>S-0-0121</td>
<td>Load gear input</td>
<td>10 rev</td>
</tr>
<tr>
<td>S-0-0122</td>
<td>Load gear output</td>
<td>Depending on module Frame size 90 -&gt; always 10 mm Frame size 145 -&gt; always 10 mm Frame size 110 -&gt; 10 mm w/o timing belt side drive Frame size 110 -&gt; 15 mm w/ timing belt side drive</td>
</tr>
<tr>
<td>P-0-0360</td>
<td>Jogging velocity</td>
<td>600 mm/min</td>
</tr>
<tr>
<td>S-0-0260</td>
<td>Positioning acceleration</td>
<td>1000 mm/s^2</td>
</tr>
<tr>
<td>S-0-0050</td>
<td>Positioning limit value monitoring</td>
<td>Active</td>
</tr>
<tr>
<td>S-0-0049</td>
<td>Positioning limit value positive</td>
<td>Maximum stroke = 5 mm (customer-specific axis length)</td>
</tr>
<tr>
<td>S-0-0055</td>
<td>Positioning limit value negative</td>
<td>Zero point = 5 mm</td>
</tr>
<tr>
<td>P-0-0590</td>
<td>Monitoring of travel range switch</td>
<td>Not active</td>
</tr>
<tr>
<td>P-0-0590</td>
<td>Reaction to travel range overshoot</td>
<td>Warning</td>
</tr>
<tr>
<td>S-0-0091</td>
<td>Velocity bipolar limit value</td>
<td>Depending on module Frame size 90 -&gt; 32000 mm/min Frame size 145 -&gt; 66000 mm/min Frame size 110 -&gt; 53000 mm/min w/o timing belt side drive Frame size 110 -&gt; 35000 mm/min with timing belt side drive</td>
</tr>
<tr>
<td>S-0-0259</td>
<td>Positioning velocity</td>
<td>Depending on module Frame size 90 -&gt; 32000 mm/min Frame size 145 -&gt; 66000 mm/min Frame size 110 -&gt; 53000 mm/min w/o timing belt side drive Frame size 110 -&gt; 35000 mm/min with timing belt side drive</td>
</tr>
<tr>
<td>S-0-0138</td>
<td>Acceleration limit value</td>
<td>10 m/s^2 or 15 m/s^2 (depending on axis combination)</td>
</tr>
<tr>
<td>S-0-199</td>
<td>Monitoring window</td>
<td>20 mm</td>
</tr>
<tr>
<td>P-0-1119</td>
<td>Safe standstill</td>
<td>2 (velocity setpoint set to zero via ramp and - ker)</td>
</tr>
<tr>
<td>S-0-0052</td>
<td>Reference o. set dimension</td>
<td>Set individually during axis assembly prior to shipment</td>
</tr>
<tr>
<td>P-0-4073</td>
<td>Event mask</td>
<td>0xFFFF (for DeviceNet or CanOpen)</td>
</tr>
<tr>
<td>P-0-1203</td>
<td>Slope of ramp Z</td>
<td>Depending on module Frame size 90 -&gt; 30000 mm/s^2 Frame size 110 -&gt; 30000 mm/s^2 Frame size 145 -&gt; 20000 mm/s^2</td>
</tr>
</tbody>
</table>

### 11.3 Setting the mechanical zero point

The default setting for the mechanical zero point can be found in the CMS catalog.

The mechanical zero point has been pre-set with a tolerance of 0.5 mm.

When an axis system is replaced by an identical model, the positioning targets may have to be taught in again (because of this tolerance).