

# Node-RED App

Graphic Programming for ctrlX OS 03VRS

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DOK-XCORE\*-RED\*\*\*V03\*\*-AP01-EN-P

DC-AE/PAG-SW (MiNi)/(PiaSt)

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# 1 About this documentation

## Editions of this documentation

Edition	Date	Notes
01	2024 – 11	Edition for the Node-RED App (Version RED-V-0302)

# 2 Important directions on use

## 2.1 Intended use

### 2.1.1 Introduction

Rexroth products are developed and manufactured to the state-of-the-art.

The products are tested prior to delivery to ensure operational safety and reliability.

#### ▲ WARNING

#### Personal injury and damage to property due to incorrect use of products!

The products may only be used as intended.

Failure to use the products as intended may cause situations resulting in property damage and personal injury.

#### NOTICE

#### Damages resulting from unintended use

Rexroth As the manufacturer does not assume any warranty, liability or compensatory claims for damages resulting from unintended use of the products. The user alone shall bear the risks of an unintended use of the products.

Before using Rexroth products, make sure that all the prerequisites for an intended use of the products are met:

- Personnel that in any way, shape or form uses Rexroth products must first read and understand the relevant safety instructions and be familiar with their intended use
- Leave hardware products in their original state, i.e., do not make any structural modifications. It is not permitted to decompile software products or alter source codes
- Do not install damaged or defective products or commission them
- It has to be ensured that the products have been installed as described in the relevant documentation

### 2.1.2 Areas of use and application

Products of the ctrlX series are suitable for Motion/Logic applications.

#### NOTICE

Products of the ctrlX series may only be used with the accessories, mounting parts, and other components specified in this documentation. Components that are not expressly mentioned must neither be attached nor connected. The same applies to cables and lines.

Only to be operated with the hardware component configurations and combinations expressly specified and with the software and firmware specified in the corresponding documentations and functional descriptions.

Products of the ctrlX series are suitable for single-axis as well as for multi-axis drive and control tasks. Device types with different equipment and interfaces are available for using the system in specific applications.

Typical areas of application:

- Building automation
- IoT and Security Gateway or Device
- Handling & Robotic

Controls of the ctrlX CORE series may only be operated under the mounting and installation conditions, in the position of normal use and under the ambient conditions (temperature, degree of protection, humidity, EMC, etc.) specified in the related documentations.

## 2.2 Unintended use

"Unintended use" refers to using the ctrlX products outside of the above-mentioned areas of application or under operating conditions and technical data other than described and specified in the documentation.

ctrlX products must not be used if they are exposed to following conditions:

- Operating conditions that do not meet the specified ambient conditions. Operation under water, under extreme temperature fluctuations or under extreme maximum temperatures is prohibited
- Applications that have not been expressly authorized by Rexroth




## 3 Safety instructions

The Safety instructions contained in the available application documentation feature specific signal words (DANGER, WARNING, CAUTION or NOTICE) and, where required, a safety alert symbol (in accordance with ANSI Z535.6-2006).

The signal word is meant to draw the reader's attention to the safety instruction and identifies the hazard severity.

The safety alert symbol (a triangle with an exclamation point), which precedes the signal words DANGER, WARNING and CAUTION, is used to alert the reader to personal injury hazards.

The Safety instructions in this documentation are designed as follows:

 <b>DANGER</b>	In case of non-compliance with this safety instruction, death or serious injury <b>will</b> occur.
 <b>WARNING</b>	In case of non-compliance with this safety instruction, death or serious injury <b>could</b> occur.
 <b>CAUTION</b>	In case of non-compliance with this safety instruction, minor or moderate injury could occur.
<b>NOTICE</b>	In case of non-compliance with this safety instruction, property damage could occur.

## 4 Introduction and overview

### 4.1 Node-RED app – Basics

Node-RED app for ctrlX CORE

Use the graphic open source tool "Node-RED" to connect functions such as input, output and processing of nodes in a so-called "flow". The flow facilitates data processing as well as monitoring and controlling of different processes or devices.

The Node-RED app provides the node RED framework in a validated variant customized for the ctrlX CORE control. Rexroth has undertaken statutory obligations (such as open source clearing) for app distribution. The app contains several extensions for integration in the functional scope and the ctrlX CORE safety system.

### Node-RED in the Rexroth App Zone

For more information about the Node-RED app, refer to [↗ Rexroth App Zone](#):

- Current articles on ctrlX apps
- “How to” area including tips and tricks
- "Developer forum", if you have any questions or need support

### Node-RED Installation and integration in the ctrlX CORE web interface

The app installation is described in the documentation of the ctrlX CORE Runtime, refer to the [↗ Web documentation](#).

By installing the app, the ctrlX CORE web interface is extended by the following elements:

- “Node-RED” node in the ctrlX CORE web interface with the following child nodes:
  - [↗ Flow Editor](#)
  - [↗ Dashboard](#)

### Licensing

Required license to operate the Node-RED app on a ctrlX CORE control:

Type code	Part number
SWL-XC*-RED-NODE*RED*****-NNNN	R911399092

### Users and authorizations

The Node-RED user authentication is connected to the ctrlX user management. An authentication (login) at the ctrlX CORE control is required to access the Node-RED Flow Editor and the Dashboard. In the ctrlX user and ctrlX authorizations section, Node RED-specific authorizations can be specified, controlling the data access to the data layer of the control, refer to the [↗ web documentation](#).



Insufficient authorizations can result in the Dashboard not being granted access to the data layer. Thus, no data can be displayed in the Dashboard or interfaces are inactive.

### Reverse proxy integration

The Flow Editor as well as the Dashboard are integrated in the ctrlX Reverse Proxy. Thus, it is ensured that the Node-RED supports the ctrlX safety mechanisms and does not require any additional ports.


### Safety aspects

Node-RED is running as safe app on the ctrlX CORE control and thus only has limited access to external software and interfaces.

The following use cases are not supported:

- **Online installation of additional nodes**, requiring natively compiled code.

The offline import is possible via a library package (\*.tgz). In this case, please contact our service department.

- **Project mode** requiring access to the command line of the "Git"  **git** software.
- **Access to external commands**, e.g. calling the external command in the flow using Exec nodes.

### Node-RED Flow Editor

The "Flow Editor" is the web-based user interface in which the user can create flows, refer to [Chapter 5.1.1 Window – “Flow Editor” on page 7](#)

## 5 ctrlX UI – Elements

### 5.1 Windows

#### 5.1.1 Window – “Flow Editor”

##### Function:

Use the Node-REDFlow Editor to connect functions such as input, output and processing of nodes in a so-called “flow” (e.g. inputs/outputs). The flow facilitates data processing as well as monitoring and controlling of different processes or devices.



A complete description of the node RED functions and the links to the node RED communication can be found under <https://nodered.org/>

##### Related topics:

[information about Node-RED and about the Node-RED app](#)

##### Call:

ctrlX CORE side navigation “*Node-RED → Flow Editor*”



Call the Flow Editor to open the web browser with the login window for the ctrlX CORE control.

Login to the control with your user name and password.

### Node-RED Flow Editor

The Flow Editor is the Node-RED user interface in which the user can create and configure flows.

The Flow Editor consists of three main areas:

- Node panel
- Sheets panel
- Info panel / Debug panel (tabs)

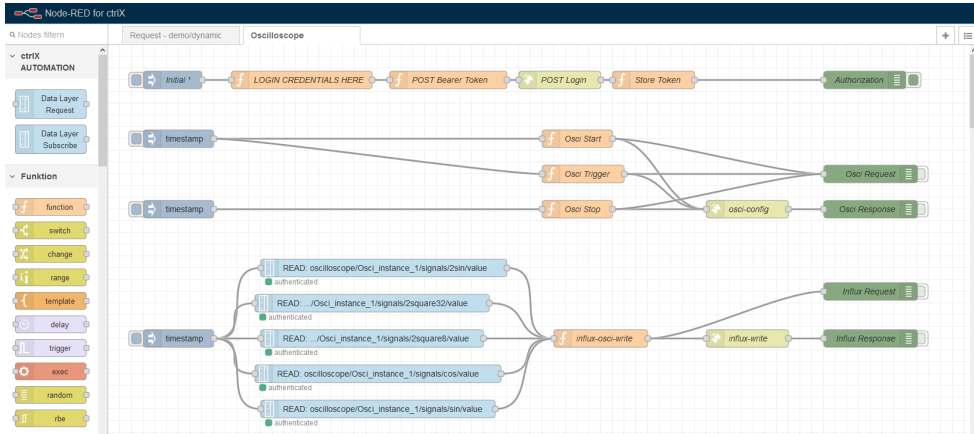


Fig. 1: Node RED flow editor


The node panel can be found to the left margin of the flow editor. The panel lists all installed or available nodes. The nodes are divided into functional categories such as input and output and can be extended using the package manager.

The sheet panel in the middle of the flow editor defines the workspace with the so-called flows. In the workspace, the nodes are added to the workspace from the node panel using Drag&Drop, then they are interconnected and configured.

The info box and the debug box to the right side are divided into tabs. The information area shows the description of a selected node. The debug area lists the debug node output or internal errors.

### Nodes for access to the ctrIX CORE data layer

The Node-RED app has nodes for access to the data layer. The nodes are used to read, write or subscribe to data from/to the data layer. The node provides navigation which facilitates access to data layer variables and data.

Help about the nodes and its use is available in the Flow Editor. Select the relevant data layer node in the sheets panel and click on the help tab  in the info and debug window.



The node can also be downloaded to the GitHub in the Bosch Rexroth section: <https://github.com/boschrexroth/node-red-contrib-ctrlx-automation>

### Saving and backup the Node-RED flows

Node-RED flows are saved in the active configuration of the ctrIX COREcontrol, together with the app data. They are part of the ctrIX CORE functions for backup and restoring, see [Web documentation](#).



Uninstalling of ctrIX Node-RED app does not result in deleting the existing and saved flows in the active configuration.

If you re-install the Node-RED app and enable a configuration with existing flows, the flows start up automatically.

## 5.1.2 Window – “Dashboard”

### Function:

The Dashboard is a configurable interface to display and control objects and live data (buttons, controllers, trend displays, etc.).

The Dashboard objects are configured in the Node-RED Flow Editor. The Node panel provides objects for visualization.

**Related topics:**

- ➔ information about Node-RED and about the Node-RED app
- ➔ Node-RED Flow Editor

**Call:**

ctrlX CORE side navigation “Node-RED → Dashboard”



A complete description of the Node-RED functions can be found under:

➔ <https://nodered.org/docs/>



Got to the ctrlX developer community for more information about the Node-RED app and its applications:

➔ <https://developer.community.boschrexroth.com>

## 6 Related documentation

### 6.1 Overview

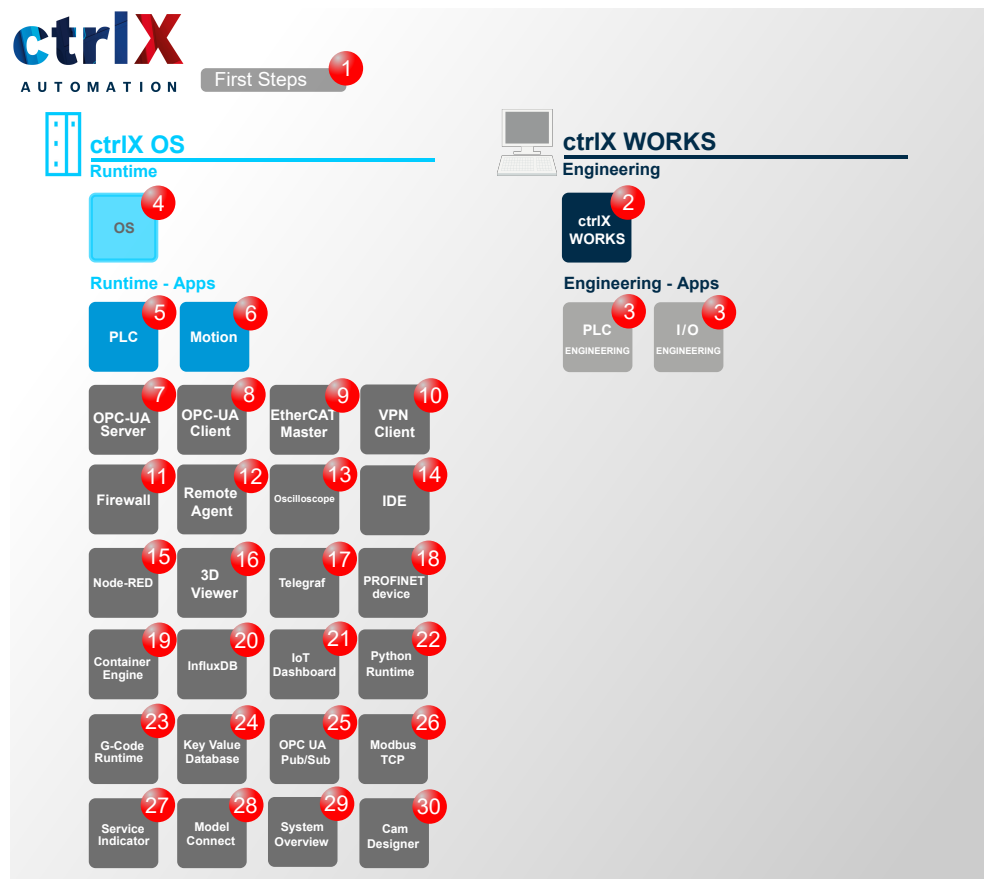


Fig. 2: Overview on further documentations

## 6.2 ctrIX AUTOMATION

No.	Documentation
1	<p><b>ctrIX WORKS First Steps</b> Quick Start Guide  <a href="#">↪ Web documentation link</a>                      Ordering information:</p> <ul style="list-style-type: none"> <li>• DOK-XWORKS-F*STEP*****-QU01-EN-P</li> <li>• R911403760</li> </ul>

## 6.3 ctrIX WORKS

No.	Documentation
2	<p><b>ctrIX WORKS - Basic System 03VRS</b> Application Manual  <a href="#">↪ Web documentation link</a>                      Ordering information:</p> <ul style="list-style-type: none"> <li>• DOK-XWORKS-WRK***V03**-APRS-EN-P</li> <li>• R911423376</li> </ul>
3	<p><b>ctrIX PLC Engineering - PLC Programming System 03VRS</b> Application Manual  <a href="#">↪ Web documentation link</a>                      Ordering information:</p> <ul style="list-style-type: none"> <li>• DOK-XPLC**-PLE***V03**-APRS-EN-P</li> <li>• R911423378</li> </ul>
3	<p><b>ctrIX PLC Engineering - PLC Libraries 03VRS</b> Reference Book  <a href="#">↪ Web documentation link</a>                      Ordering information:</p> <ul style="list-style-type: none"> <li>• DOK-XPLC**-LIB***V03**-RERS-EN-P</li> <li>• R911423456</li> </ul>

## 6.4 ctrlX OS

No.	Documentation
4	<b>ctrlX OS - Operating System for ctrlX CORE Control Devices 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-XCR***V03**-APRS-EN-P</li><li>● R911423382</li></ul>
	<b>ctrlX OS - Data Layer Nodes 03VRS</b> Reference Book <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-DL****V03**-RERS-EN-P</li><li>● R911423384</li></ul>
	<b>ctrlX OS - Diagnostics 03VRS</b> Reference Book <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-DIAG**V03**-RERS-EN-P</li><li>● R911423386</li></ul>

## 6.5 ctrlX OS apps

No.	Documentation
5	<b>PLC App - PLC Runtime Environment for ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-PLC***V03**-APRS-EN-P</li><li>● R911423401</li></ul>
6	<b>Motion App - Motion Runtime Environment for ctrlX CORE 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-MOT***V03**-APRS-EN-P</li><li>● R911423405</li></ul>
7	<b>OPC UA Server App - OPC UA Server for ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-UAS***V03**-APRS-EN-P</li><li>● R911423392</li></ul>

No.	Documentation
8	<p><b>OPC UA Client App - OPC UA Client for ctrlX OS 03VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-UAC***V03**-APRS-EN-P</li> <li>● R911423390</li> </ul>
9	<p><b>EtherCAT Master App - EtherCAT Master for ctrlX OS 03VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-ECM***V03**-APRS-EN-P</li> <li>● R911423394</li> </ul>
10	<p><b>VPN Client App - Remote Support Software for ctrlX OS 03VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-VPN***V03**-APRS-EN-P</li> <li>● R911423388</li> </ul>
11	<p><b>Firewall App - Security Functions for ctrlX OS 03VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-FRW***V03**-APRS-EN-P</li> <li>● R911423397</li> </ul>
12	<p><b>Remote Agent App - ctrlX Device Portal Connection for ctrlX OS Devices 03VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-RMA***V03**-APRS-EN-P</li> <li>● R911423399</li> </ul>
13	<p><b>Oscilloscope App - Oscilloscope Function for ctrlX OS Devices 03VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-OSC***V03**-APRS-EN-P</li> <li>● R911423407</li> </ul>
14	<p><b>IDE App - Integrated Development Environment 02VRS</b></p> <p>Application Manual</p> <p><a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-IEN***V02**-APRS-EN-P</li> <li>● R911421612</li> </ul>

No.	Documentation
15	<b>Node RED App - Graphic Programming for ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-RED***V03**-APRS-EN-P</li><li>● R911423403</li></ul>
16	<b>3D Viewer App - Browser-based 3D Kinematic Simulation for ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-3DV***V03**-APRS-EN-P</li><li>● R911423411</li></ul>
17	<b>Telegraf App - Server Agent for Collecting Data in the Data Layer 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-TSA***V03**-APRS-EN-P</li><li>● R911425238</li></ul>
18	<b>PROFINET Device App - PROFINET Device for ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-PND***V03**-APRS-EN-P</li><li>● R911425232</li></ul>
19	<b>Container Engine App - Using Docker® Images on the ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-DOE***V03**-APRS-EN-P</li><li>● R911425234</li></ul>
20	<b>InfluxDB App - Influx Database Connection for ctrlX OS 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-IDB***V03**-APRS-EN-P</li><li>● R911425240</li></ul>
21	<b>IoT Dashboard App - Data Visualization in Dynamic, Interactive Dashboards 03VRS</b> Application Manual <a href="#">↗ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-GDB***V03**-APRS-EN-P</li><li>● R911425248</li></ul>

No.	Documentation
22	<p><b>Python Runtime App - Python Runtime Environment for ctrlX CORE 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-PYR***V03**-APRS-EN-P</li> <li>● R911425244</li> </ul>
23	<p><b>G-Code Runtime App - G-Code Interpreter for ctrlX OS 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-GCO***V03**-APRS-EN-P</li> <li>● R911425246</li> </ul>
24	<p><b>Key Value Database App - Data Layer Management 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-KVD***V03**-APRS-EN-P</li> <li>● R911425250</li> </ul>
25	<p><b>OPC UA Pub/Sub App - OPC UA Pub/Sub for ctrlX OS 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-UAP***V03**-APRS-EN-P</li> <li>● R911423409</li> </ul>
26	<p><b>Modbus TCP App - Modbus TCP Communication over ctrlX OS 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-MBT***V03**-APRS-EN-P</li> <li>● R911425236</li> </ul>
27	<p><b>Service Indicator - App Service Indicator for ctrlX OS 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-SIN***V03**-APRS-EN-P</li> <li>● R911425242</li> </ul>
28	<p><b>Model Connect App - Target for Model-based Development and Simulation for ctrlX OS 03VRS</b></p> <p>Application Manual  <a href="#">↪ Web documentation link</a></p> <p>Ordering information:</p> <ul style="list-style-type: none"> <li>● DOK-XCORE*-MOC***V03**-APRS-EN-P</li> <li>● R911425252</li> </ul>

No.	Documentation
29	<b>System Overview App - System Topology and System Information 03VRS</b> Application Manual <a href="#">↪ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XCORE*-SOV***V03**-APRS-EN-P</li><li>● R911425254</li></ul>
30	<b>Cam Designer - Configuring ctrlX MOTION Cams 03VRS</b> Application Manual <a href="#">↪ Web documentation link</a> Ordering information: <ul style="list-style-type: none"><li>● DOK-XWORKS-CAM***V03**-APRS-EN-P</li><li>● R911427217</li></ul>

## 7 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts provide you with advice and assistance. You can contact us **24/7**.

### Service Germany

Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone: **+49 9352 40 5060**

Fax: **+49 9352 18 4941**

Email: [↗ service.svc@boschrexroth.de](mailto:service.svc@boschrexroth.de)

Internet: [↗ http://www.boschrexroth.com](http://www.boschrexroth.com)

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

### Service worldwide

Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

### Preparing information

To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

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