rexroth
A Bosch Company

Application Manual

ctrlX WORKS

Basic System

R911403761, Edition 10

Liability

The specified data is intended for product description purposes only and shall not be deemed to be a guaranteed characteristic unless expressly stipulated in the contract. All rights are reserved with respect to the content of this documentation and the availability of the product.

DOK-XWORKS-**********-AP10-EN-P DC-AE/EPI5 (MiSc/PiaSt)

2b16adcc7e432d850a347e88187a85d5, 10, en_US

Table of contents

1 About this documentation

The PC-based engineering tool ctrlX WORKS allows to centrally access the automation environment of ctrlX AUTOMATION.

- The purpose of this document is to get familiar with the PC-based engineering tool ctrlX WORKS
- The content is intended for users configuring, commissioning and operating functionally secure products

Editions of this documentation

Edition	Release date	Note
01	2020-06	First edition ctrlX WORKS Version WRK-V-0102
02	2020-09	Revision ctrlX WORKS Version WRK-V-0104
03	2021-01	Revision ctrlX WORKS Version WRK-V-0106
04	2021-05	Revision ctrlX WORKS Version WRK-V-0108
05	2021-08	Revision ctrlX WORKS Version WRK-V-0110
06	2021-12	Revision ctrlX WORKS Version WRK-V-0112
07	2022-04	Revision ctrlX WORKS Version WRK-V-0114 New: • ➦Window – “App Build Environments” • ➦Dialog – “Add ctrlX CORE App Build Environment” • ➦Sidebar – “App Build Environments <Build environment name>”
08	2022-08	Revision ctrlX WORKS Version WRK-V-0116 Revised: • ➦Window – “Settings”
09	2023-01	Revision ctrlX WORKS Version WRK-V-0118 Revised: • ➦ctrlX WORKS – Licensing information – Chapter "Licensing notes" added • ➦Creating the system report in ctrlX WORKS • ➦Window – Overview • ➦Window – “About”

Edition	Release date	Note
10	2023-03	Revision ctrlX WORKS Version WRK-V-0120 New: • ➦ Window – “API reference” Revised: • ➦ Window – Overview • ➦ Window – “Devices” • ➦ Window – “Settings” • ➦ Dialog – “Add a ctrlX CORE”

1.1 ctrlX WORKS – Licensing information

Open Source Components

A list of open source components used is available in ctrlX WORKS and in the ctrlX CORE interface in the side navigation in the menu item “About” below the button “Open Source Components”, see ➦ Chapter 6.2.6 Window – “About” on page 26 or ➦ Chapter 6.2.7 Window – “Open Source Components” on page 26.

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 its 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:

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

4 Introduction and overview

4.1 ctrlX WORKS

4.1.1 ctrlX WORKS - Basics

Functional scope

The PC-based engineering tool ctrlX WORKS allows to centrally access the automation environment of ctrlX AUTOMATION.

Device overview

- Managing ctrlX CORE and ctrlX CORE Virtual controls
  → Pin your ctrlX CORE to the device table. A control is provided in the overview even if it cannot be reached at the moment, as it is disabled for example
  → Add a new ctrlX CORE Virtual control

Engineering Tools

- **ctrlX PLC Engineering**
  Tool to create the PLC application
- **ctrlX I/O Engineering**
  Tool to configure a field bus connection and I/O components
- **ctrlX DRIVE Engineering**
  Tool to parameterize the ctrlX DRIVE

App Build Environments

- Provides the option to automatically create Linux build environments on a Windows PC to develop ctrlX CORE apps in the ctrlX AUTOMATION environment.

After the installation, double-click on the desktop symbol to open the ctrlX WORKS start page. Already configured ctrlX CORE Virtual controls and ctrlX CORE controls reachable in the network are displayed, refer to ➦ Chapter 5.1.1 Devices on page 15. The ctrlX CORE and the ctrlX CORE Virtual control are configured in the browser.

Use the DE ▾/EN ▾ interfaces to change the language.

Use the ⓘ interface to open the menu with more information, see ➦ Table on page 19.

Open the ctrlX WORKS help with the “Show documentation”.

Further information

- ➦ Chapter 5.1.1 Devices on page 15
- ➦ Chapter 4.2.1 ctrlX WORKS – Installation on page 12
- ➦ Chapter 4.3.1 ctrlX WORKS – Licenses on page 13
- ➦ Chapter 5.1.2 ctrlX CORE Virtual on page 15
- ➦ Chapter 5.1.3 ctrlX CORE on page 16
- ➦ Chapter 6.2.2 Window – “Devices” on page 20
- ➦ Chapter 6.2.3 Window – “Engineering Tools” on page 21
- ➦ Chapter 6.2.4 Window – “App Build Environments” on page 21
- ➦ Chapter 6.2.5 Window – “Settings” on page 23
- ➦ Chapter 6.2.6 Window – “About” on page 26

4.2 Installation

4.2.1 ctrlX WORKS – Installation

General notes on the software installation

Installing the software ctrlX WORKS and the respective software options requires knowledge of PCs, the operating system and admin rights on the respective PC.

A Windows 10 64 bit operating system is required to operate ctrlX WORKS.

An internet access is required for the installation using the “ctrlx-works-xxxx.exe” file. Software packages of the Rexroth provision platform can only be downloaded online. Optionally, the respective setup files can be downloaded first and then installed via a local network.

Multiple ctrlX WORKS installations can be operated simultaneously on one computer.

Before each installation, it is checked whether a ctrlX WORKS installation is already available on the PC. In this case, a query is displayed, asking whether the existing installation should be changed or if a parallel installation should be executed.

ctrlX WORKS Initial installation

Proceed as follows when installing the ctrlX WORKS software for the first time:

1. To start the installation, execute the ctrlX WORKS setup file“ ctrlx-works-xxxx.exe” (admin rights required).
2. In die User account control window, use “Yes” to confirm that the PackageManager can implement changes on your device.
   ➧ The ctrlX WORKS setup wizard is started.
3. Select the installation language before continuing the installation with “Next”. Use the “Settings” to change the product URL, if required.
4. Select between “Reinstall” (installs ctrlX WORKS on the computer. Existing installations are not changed) or “Change installation” (changes an existing installation. Select the installation to be changed).
5. After selecting “Reinstall”, confirm “Next” and check the terms of use of the Bosch Rexroth AG before continuing the installation with “Accept”.
   ➧ The dialog to select the installation directory is shown.
6. Enter the directory for the ctrlX WORKS installation and confirm the dialog with “Next”.
   ➧ The dialog to select the functions.
7. Select the functions to be installed on the PC with ctrlX WORKS from the list.
   For more information about the function, refer to → ➦ Chapter 4.2.2 ctrlX WORKS – Installation options on page 13.
   Confirm your selection with “Next”.
8. Start the installation with “Install”.
   ➧ The installation can take some minutes and is shown visually.
   The installation result is shown at the end.
9. To close the installation, select “Done”.

Further information

- ➦ Chapter 4.1.1 ctrlX WORKS - Basics on page 11

4.2.2 ctrlX WORKS – Installation options

Customized installation

In the ctrlX WORKS installation setup, select the functions and tools to be installed. Functions can be added to the installation at a later point.

The installation options available in the setup can be added or removed to/from the existing installation at a later point.

Further information

- Chapter 4.2.1 ctrlX WORKS – Installation on page 12
- Chapter 4.3.1 ctrlX WORKS – Licenses on page 13

4.3 Licenses

4.3.1 ctrlX WORKS – Licenses

Currently, no special licenses are required.

Further information

- Chapter 4.1.1 ctrlX WORKS - Basics on page 11

5 Working with ctrlX WORKS

5.1 Device overview

5.1.1 Devices

The table “Devices” lists all ctrlX CORE and configured ctrlX CORE Virtual controls that are available and pinned in the network.

The automatic device detection in the network detects devices from the same subnet. This includes an automatic configuration of the network interface of the device. Common standards such as DHCP, UPNP or mDNS allow the device detection in the network without user configuration.

Status, device type, IP address and the available actions are displayed for each listed device. To open the start page of the control, click on the name of the device or its IP address.

To change the status of the ctrlX CORE Virtual controls (online/offline) or to delete the control if it is in online state, go to the action panel. Select the stylus button to open the configuration window of the ctrlX CORE Virtual control.

The ctrlX CORE controls can be pinned using the needle. They remain visible also when they are switched off.

Further information

- Chapter 6.2.2 Window – “Devices” on page 20
- Chapter 6.4.1 Sidebar – “Devices <Control name>” on page 30
- Chapter 4.1.1 ctrlX WORKS - Basics on page 11

5.1.2 ctrlX CORE Virtual

Provision of virtual controls on the desktop PC as option for the ctrlX WORKS installation of the offline project planning.

General information

To test functions and configurations without control hardware on a PC, ctrlX WORKS provides the ctrlX CORE Virtual. It emulates the ctrlX CORE control in a Linux environment on a Windows PC.

Note the following when using the ctrlX CORE Virtual:

- System requirements:
  - Windows 10 64 Bit
  - 8 GB RAM
  - Processor with support of the virtualization technology (Intel®VT or AMD-V)
- Up to 5 ctrlX CORE Virtual can be managed
- No field bus connection available
- If a ctrlX CORE Virtual is started, the configuration and operation are analog to the configuration and operation of a ctrlX CORE

The ctrlX CORE Virtual is operated in a virtualization environment. When installing ctrlX WORKS on a virtual machine (e.g. Oracle VM VirtualBox) and when executing ctrlX CORE Virtual, considerable performance restrictions can occur. Check the settings regarding the supported of nested virtualization for the virtual machine.

Due to licensing reasons, operation of the ctrlX CORE Virtual is terminated after a runtime of four hours. Subsequently, restart the control.

Prerequisites

The ctrlX WORKS installation always includes a current base image for the ctrlX CORE Virtual. To create a ctrlX CORE Virtual on the engineering PC, install ctrlX WORKS with the respective installation option “Virtual Controls”, see ➦ Chapter 4.2.1 ctrlX WORKS – Installation on page 12.

Description

Virtual controls can be created and managed in the ctrlX WORKS engineering interface. The control is also started and stopped in the engineering interface and the ctrlX CORE web browser is accessed to further configure, program and to use project planning.

For the ctrlX CORE Virtual control, the complete Linux operating system is emulated on the engineering PC. Thus, starting the ctrlX CORE Virtual takes a bit longer. The “Booting” display in the status field shows the start.

The “Online” status shows a successful ctrlX CORE Virtual startup. To access the control via the web browser, enter the name or IP address. To open the website of the control in the default browser, click on the respective link.

In “Online” state, a ctrlX CORE Virtual control is also shown as device in the Windows network environment if this service is active in Windows.

Note that the active ctrlX CORE Virtual controls continue running when ending ctrlX WORKS. To shut down a ctrlX CORE Virtual, select the ☐ in the device overview of ctrlX WORKS.

Settings

In the ctrlX WORKS settings, select whether or not to display the emulation process window. This setting is only evaluated when starting a control.

Further information

- ➦ Chapter 5.1.1 Devices on page 15
- ➦ Chapter 5.1.3 ctrlX CORE on page 16
- ➦ Chapter 6.2.2 Window – “Devices” on page 20
- ➦ Chapter 6.2.5 Window – “Settings” on page 23
- ➦ Chapter 6.4.1 Sidebar – “Devices <Control name>” on page 30

5.1.3 ctrlX CORE

Project planning of the ctrlX CORE via ctrlX WORKS.

Prerequisites

ctrlX WORKS installation available on the engineering PC, see ➦ Chapter 4.2.1 ctrlX WORKS – Installation on page 12.

Description

A ctrlX CORE is shown in the table “Devices” after is was identified in the connected network using the integrated search mechanism.

If the connection to the control is disconnected, the control is removed from the overview. The list entry remains in the overview even when the control is offline using the “Pinning” action.

If a ctrlX CORE is not displayed automatically from the network due to firewall and router settings, insert a link to this control via the button +.

Further information

- Chapter 5.1.1 Devices on page 15
- Chapter 5.1.2 ctrlX CORE Virtual on page 15
- Chapter 6.2.2 Window – “Devices” on page 20
- Chapter 6.2.5 Window – “Settings” on page 23
- Chapter 6.4.1 Sidebar – “Devices <Control name>” on page 30

5.2 Diagnostics

5.2.1 Creating the system report in ctrlX WORKS

Function:

Creating a system report to supplement an error description.

If an error occurs in ctrlX WORKS or a software package such as ctrlX PLC or ctrlX IO Engineering, staff of the service and development department requires the version of the individual software packages to debug the error. The ctrlX WORKS user can easily obtain and download this information as system report (.zip file).

Call:

ctrlX WORKS ⓘ *“ctrlX WORKS system report”*

Procedure to create a system report in ctrlX WORKS:

- Click on the ⓘ button to open a menu with more information
- Click on the “ctrlX WORKS system report” button
- Downloading .zip file

Content of a system report in ctrlX WORKS:

The system report (i.e. the zip file) contains the following control information:

- ctrlX WORKS product version
- List of all installed software packages including their versions
- Log files of the %LOCALAPPDATA%\Rexroth\ctrlX WORKS\<ID> directory
- If available, more entries of installed software packages

This information is contained in the archive, in file "VersionInfo.json" as well as in the subdirectory "Logs”.

Automated evaluation

To read out and evaluate the system report contents, e.g. the ZIP file, automatically, the names and contents of the contained files contained are predefined. Log files and entries of installed software packages can be an exception to this.

Further information

- Chapter 6.2.1 Window – Overview on page 19

6 ctrlX UI – Elements

6.1 Navigation

6.1.1 Side navigation – Overview

Function:

For the available functions, go to side navigation. Select in the right upper corner of the side navigation to minimize it and select to maximize it.

Further information

- Chapter 4.1.1 ctrlX WORKS - Basics on page 11

6.2 Windows

6.2.1 Window – Overview

Call:

Select the window via ctrlX WORKSside navigation.

Settings:

In the selected window, the window name is displayed on the left page.

Use the buttons DE /EN to change the language.

Use the button to open the menu with more information:

GUI element	Description
Application manual	Open the help about the ctrlX WORKS basic system in the browser
Current page help	Open the help to the currently shown window in the browser
How-tos	Open app zone and how to in the browser. Find information about ctrlX AUTOMATION FAQs, examples, tech notes and how tos here
Forum	Open ctrlX AUTOMATION Forum in the browser
API reference	Opens the interface descriptions, see Chapter 6.2.8 Window – “API reference” on page 28
GitHub	Open the GitHub platform in the browser
ctrlX WORKS system report	Creating a ctrlX WORKS system report, see Chapter 5.2.1 Creating the system report in ctrlX WORKS on page 17

Further information

- Chapter 4.1.1 ctrlX WORKS - Basics on page 11
- Chapter 6.2.5 Window – “Settings” on page 23
- Chapter 5.2.1 Creating the system report in ctrlX WORKS on page 17

6.2.2 Window – “Devices”

Function:

The window “Devices” is the ctrlX WORKS start page. The upper screen half shows the product banner “ctrlX WORKS”. It references to the basic information on the ctrlX WORKS. Below the product banners in the table, the ctrlX CORE Virtual controls are provided as option of the ctrlX WORKS installation for the offline project planning and the ctrlX CORE controls.

Call:

ctrlX WORKS side navigation *“Devices”*

Elements of the “Devices” window

GUI element	Description
Product banner “ctrlX WORKS”	The tile “ctrlX WORKS” provides an overview on the ctrlX WORKS concept and a start into further detailed product documentations. Select icon tile to show and hide the
Command bar “Devices”	“[x] item(s)” Number of listed ctrlX CORE and ctrlX CORE Virtual controls
	 Adding a ctrlX CORE Virtual or a link to the existing ctrlX CORE control in the table of the available ctrlX CORE devices. The dialog “Add a ctrlX CORE” opens, see Chapter 6.3.1 Dialog – “Add a ctrlX CORE” on page 29
	 Refresh current page
	 Open device settings page
Table “Devices”	“Name”: Control name
	“State” Operating state of the control. A ctrlX CORE Virtual can assume four operating states: • “Offline”: The control is not running • “Booting”: The control was started and the control web server does not yet respond • “Online”: The control was started successfully and the control web server responds • “Shutdown”: The control was stopped and the system shuts down
	“Type” Control type (ctrlX CORE or ctrlX CORE Virtual)
	“IP adresses” IP address of the control. In the operating state “Online”, the name and the IP addresses become hyperlinks. Click on the links to open the website of the control in the standard browser

GUI element	Description
	"Actions" Includes buttons to edit or delete a control. This is only possible in stopped state. ▷ or □ Starting or ending the ctrlX CORE Virtual on the device ✎ Editing a ctrlX CORE Virtual. This is only possible in the stopped state, refer to ➦ Chapter 6.4.1 Sidebar – "Devices <Control name>" on page 30 🗑 Deleting a ctrlX CORE Virtual 📌 Pin the table entry of the ctrlX CORE. It also remains when the control is "Offline"

Further information

- ➦ Chapter 5.1.1 Devices on page 15
- ➦ Chapter 6.4.1 Sidebar – "Devices <Control name>" on page 30
- ➦ Chapter 4.1.1 ctrlX WORKS - Basics on page 11

6.2.3 Window – "Engineering Tools"

Function

The window"Engineering Tools" provides an overview of all stand-alone Windows applications in the ctrlX AUTOMATION environment. The tool is managed via the ctrlX WORKS installation. A Windows application is represented by a tile. This tile contains information about the function of the respective application as well as a link to install the installation at a later point or to start the application.

Call:

ctrlX WORKS side navigation *"Engineering Tools"*

Further information

- ➦ Chapter 4.1.1 ctrlX WORKS - Basics on page 11

6.2.4 Window – "App Build Environments"

Function

The window "App Build Environments" provides the option to automatically create Linux build environments on a Windows PC to develop ctrlX CORE apps in the ctrlX AUTOMATION environment.

By adding an *app build environment*, a directory with the different batch files is created.

Upon the first start of a build environment, a current Linux system image is downloaded and all software packages required for app development are automatically installed on this operating system. This operation can take up to 15 minutes, depending on the internet connection.

If the initialization of the build environment is successful, the build environment can be started as emulation. The build environment can be contacted via the set SSH port.

Visual Studio Code → https://code.visualstudio.com/ is recommended as source code editor.

Install a remote SSH extension in Visual Studio Code to connect to the build environment and to develop and build apps.

Further information to create apps with the ctrlX Automation SDK can be found on GitHub: https://boschrexroth.github.io/ctrlx-automation-sdk/

If no ctrlX CORE app build environment was created on the control, the button ⊕ “Add a ctrlX CORE App Build Environment” is displayed in the window. After adding a configuration, command bars and the table including the entry of the connection are displayed on the page.

Call:

ctrlX WORKS side navigation *“App Build Environments”*

Elements of the “App Build Environments” **window**

GUI element	Description
Command bar	“[x] item(s)” Number of listed ctrlX CORE app build environments
	 Refresh current page
	 Add a ctrlX CORE App Build Environment is added to the table. The dialog “Add app build environment” opens, see ➦ Chapter 6.3.2 Dialog – “Add ctrlX CORE App Build Environment” on page 30
Table	“Name”: Build environment name
	“State” Operating state of the build environment. A build environment can assume four operating states: ● “Offline”: The build environment is not running ● “Initializing”: Build environment was downloaded and is installed ● “Booting”: Build environment was started but could it was not possible to establish a connection via SSH ● “Online”: Build environment was started successfully and a connection can be established via SSH ● “Shutdown”: The build environment was stopped and the system shuts down ● “Shutdown”: The build environment was stopped and the system shuts down
	“Type” Process architecture of the build environment
	“SSH” SSH address of the control. In the operating state “Online”, the name and the SSH address become hyperlinks. Click on the links to open the Windows SSH Client.

GUI element	Description
	"Actions" Includes buttons to start/stop, edit and delete the build environment. Deleting and editing is only possible in stopped state. ▷ or □ Starting and stopping the ctrlX CORE app build environment ✎ Editing a ctrlX CORE app build environment. This is only possible in the stopped state, refer to ➦ Chapter 6.4.2 Sidebar – "App Build Environments <Build environment name>" on page 33 🗑 Deleting a ctrlX CORE app build environment

Further information

- ➦ Chapter 6.3.2 Dialog – "Add ctrlX CORE App Build Environment" on page 30
- ➦ Chapter 6.4.2 Sidebar – "App Build Environments <Build environment name>" on page 33
- ➦ Chapter 4.1.1 ctrlX WORKS - Basics on page 11

6.2.5 Window – "Settings"

Function:

In the window "Settings" find the settings for ctrlX WORKS.

Call:

ctrlX WORKS side navigation *"Settings"*

Tile "General"

Start page

Via the "Start page", it is specified which page is displayed upon the start of ctrlX WORKS. The initialization value is "Devices".

Help

To change the jump target to the Content Delivery Portal, go to the address field "Help url". Select the help to be opened using the button ⓘ. Via the "Reset" interface, the help jump target is reset to the default value. The "Use offline help" interface is active if the ctrlX offline help is installed on the PC. Via this interface, this jump target is set to the installed offline help.

Tile "Setup"

"Installed version"

The currently installed ctrlX WORKS version is shown.

Click on the button "Add or remove features" to determine the functions and tools to be installed in the opening ctrlX WORKS window "Custom Setup", see ➦ Chapter 4.2.2 ctrlX WORKS – Installation options on page 13.

"Available updates(s)"

The available ctrlX WORKS updates are shown here.

Click on the button of the new version to update in the opening ctrlX WORKS window “Custom Setup”, see ➦ Chapter 4.2.2 ctrlX WORKS – Installation options on page 13.

Tile “Licenses”

The “ Licenses” window is used to manage licenses for software requiring a license on the Engineering PC.

If a ctrlX CORE license dongle is plugged into the PC when starting ctrlX WORKS, licenses for a ctrlX CORE control can be transferred to this dongle. To manage licenses for the PC, the dongle has to be removed and ctrlX WORKS restarted.

Windows-based ctrlX WORKS tools do not yet support licensing via dongle.

Related topics

➦ Licenses - Overview
➦ Licenses in the ctrlX Store

Functions in the window

- **License overview**
  The license overview lists all licenses that are on the PC or on a dongle.
  Additionally, license information and information about the expiry date is contained.

Licenses that have expired, are automatically deleted from the table.

Table 1: Elements of the “Licenses” window

GUI element	Description
Tab “Licenses”	“[x] items”: Shows the number of listed licenses
	"Info: License dongle is plugged in" is displayed when a license dongle is detected on the PC
	 Button “Register this PC (device)” Link to the license portal. Register the Engineering PC in the licensing center
	 Button “Assign licenses (entitlement)” Link to the license portal. In the licensing center, previously purchased licenses can be assigned to the target device and the license file can be downloaded to the engineering PC
	 Button “Upload license file (capability response)” Opens the File Explorer to load the assigned license file from the Engineering PC to the target device

GUI element	Description
License overview table	Column entries • **Product** License type designation • **App** Name of the licensed application. • **Description** License description • **Expires (UTC)** Expiry of the license validity. Contains only a value (if it is not a permanent license) as mm-dd-yyyy hh:mm:ss
Tab “Sources”	“[x] items”: Shows the number of listed license sources
License overview table	Column entries • **Type** Source type: Device or dongle • **Serial number** Serial number of the license source • **Available** Shows if the source is currently available

Tile “Devices”

“ctrlX CORE Virtual”

Virtual control emulation

Select whether to show the window of the emulation process for a running ctrlX CORE Virtual instance via a switch.

Storage location for virtual controls

Directory: In this directory, all data concerning the virtual controls of the device are stored. When switching between different directories, the data is retained.

Via the “Reset”button, the directory is reset to the default path.

Images for virtual controls

Images are used to emulate virtual controls. Each control is based on a common base image with pre-installed system apps. A user image is used for the changes within a virtual control. The table lists all base images, the associated user images and their file sizes.

GUI element	Description
Command bar “Images”	“[x] item(s)” Number of listed “images”
	 Adding a new **image**. An "Open dialog" opens to select an image package file. The following formats are supported: *.xiwp and *.zip. After adding a new image, the version can be selected when creating a new virtual control
Table “Images”	“Image version” The version of the base image
	“Image size” The size of the base image file in kilobytes

GUI element	Description
	“User Images size” The sum of the user image files in kilobytes
	“Actions” Contains buttons to delete an image, this is only possible if this base image is no longer used.  Deleting an“image”

Further information

- Chapter 4.1.1 ctrlX WORKS - Basics on page 11
- Chapter 4.2.2 ctrlX WORKS – Installation options on page 13

6.2.6 Window – “About”

Function:

The window “About” provides product information on the present ctrlX WORKS software instance:

- Software and version
- Software publisher (copyright)
- Open source components, see
  Chapter 6.2.7 Window – “Open Source Components” on page 26
- General conditions of use

Call:

ctrlX WORKS side navigation *“About”*

Further information

- Chapter 4.1.1 ctrlX WORKS - Basics on page 11
- Chapter 6.2.7 Window – “Open Source Components” on page 26
- Chapter 6.2.5 Window – “Settings” on page 23

6.2.7 Window – “Open Source Components”

Function:

The window “Open Source Components” provides information on open source components implemented into the ctrlX WORKS software instance. The components are shown in a table.

Following the table, the “Written offer for source code” is displayed.

Call:

ctrlX WORKS side navigation *“About”* → *“Open Source Components”*

Elements of the “Open Source Components” window

GUI element	Description
Table	“Name” Name of the open source component
	“Version” Version of the open source component
	“License(s)” License type

GUI element	Description
“Written offer for source code”	Information on the reference of the implemented source code

Button“Written offer for source code”

License information

This product contains software components that are licensed as "Free software" or “Open source software“ under one or several of the below-mentioned licenses and which thus require that the source code is made available. The source code of these software components is not provided together with this product. Instead, Bosch Rexroth provides the licenses upon request. To obtain the source code, email a request to ➦ open.source@boschrexroth.de or post it to the following address:

Bosch Rexroth AG
Open Source Office
Zum Eisengießer 1
97816 Lohr am Main
Germany

a.

For software components licensed under the GNU General Public License Version 2 and/or 3, the GNU Library General Public License Version 2 and/or the GNU Lesser General Public License Version 2.1 and/or 3.0, the Affero General Public License Version 1,2 and/or 3, the 7-Zip license or the eCos License 2.0, the following applies:

- Everybody has the right to obtain the source code of the software components from Bosch Rexroth.
- This offer is valid until three years after the last distribution of the object code by Bosch Rexroth; notwithstanding the foregoing, in the case of licensing under the GNU General Public License Version 3, the Affero General Public License Version 3 or the GNU Lesser General Public License Version 3.0, this offer shall stand as long as Bosch Rexroth provides spare parts or support services for the product.
- The corresponding source code also comprises the source code required to generate, install, execute and modify the object code if required by the relevant license.
- For the circulation of the source code, Bosch Rexroth reserves the right to charge incidental costs for preparing the data carrier (CD ROM, DVD or USB flash drive) as well as for postage.
- Please let us know where to send the corresponding source code to. If possible, please provide additional information about the affected product (e.g. product ID, serial number). This will help in finding the corresponding source code.

b.

For software components or corresponding source code licensed either under Mozilla Public License (MPL) version 1.0, 1.1 or 2.0, der Common Development and Distribution License (CDDL) version 1.0, of the Nokia Open Source License (Nokia or NOKOS) version 1.0a, Common Public Attribution License v.1.0 or which are part of the exception of Modified GPLv2 FreeRTOS License (Exception), the following applies:

- If you received such software components by Bosch Rexroth, upon request, Bosch Rexroth provides you with the source code of the software components, complying with the applicable previously mentioned license. Depending on the data volume, the code is attached to an email or is provided via a file hosting service.
- If Bosch Rexroth has modified pre-existing source code, you may obtain the corresponding source code for that modification (licensed under the terms of the applicable license above) for at least 12 months after it is first provided to a third party, but at least 6 months after a subsequent version of the modification is provided to a third party.
- Please provide the product information (e.g. product ID, serial number) containing the software components to help us find the correct corresponding source code.

Further information

- ➦ Chapter 4.1.1 ctrlX WORKS - Basics on page 11
- ➦ Chapter 6.2.5 Window – “Settings” on page 23

6.2.8 Window – “API reference”

Function:

The API for ctrlX WORKS enables creating and editing of devices and licenses in ctrlX WORKS based on REST (**RE**presentational **S**tate **T**ransfer).

Alternatively, a client API can be generated for the OpenAPI specification in various programming languages. This enables automated creation of virtual controls for testing purposes.

Call:

ctrlX WORKS button ⓘ → API reference

Start parameter for use of interface:

By default, the software tool "ctrlX WORKS" opens in an integrated browser. In this mode,ctrlX WORKS is not automatable. To use functions of the interface, you have to assign a fixed port to the API.

For this purpose, please start the software with an additional parameter --port=<port number>

- **Via the Windows input panel** <storage location>\ctrlx-works.exe --port=4242
- **Via a link** <storage location>\ctrlx-works.exe --port=4242
- **Via the "Run" application** rexrothstudio://wrk/?hostname=localhost&--port=4242

Please note that a blank space is entered between the storage location path and the parameter.

The selected port number is required for starting a web server and therefore must not be occupied by another application.

API use:

If the software tool "ctrlX WORKS" is started with a 'port parameter', subsequently, it opens in "server mode" and an icon appears in the SysTray (notification panel) of Windows. The icon can be used to open the interactive OpenAPI documentation, as well as ctrlX WORKS in the standard browser.

In this mode, the interface is ready to accept REST requests and execute various ctrlX WORKS functions.

Alternatively, a client API can be generated for the OpenAPI specification in various programming languages. This enables automated creation of virtual controls for testing purposes.

Further information

- ➦Chapter 6.2.1 Window – Overview on page 19

6.3 Dialogs

6.3.1 Dialog – “Add a ctrlX CORE”

Function:

Use the dialog “Add a ctrlX CORE” to add a ctrlX CORE Virtual or a link to an existing ctrlX CORE control in the table of the available ctrlX CORE. Use the button ⓘ to open the help for the currently displayed dialog. The dialog can be closed via the button ✕.

Call:

ctrlX WORKS side navigation *“Devices”* → button +

Dialog elements

	Function
“Create a new ctrlX CORE Virtual”	Creating a new ctrlX CORE Virtual. The default name of a new ctrlX CORE is **VirtualControl-x** and can be changed in the input field “Name”. In the “image version” drop-down list, the highest available version is selected as the default version. Depending on the selection of the image version, other system app versions are preinstalled in the new virtual control. Available image versions can be managed on the device settings page ➦Tile “Devices” on page 25
“Insert a link to the available ctrlX CORE ”	Adding a link to an existing ctrlX CORE. An existing ctrlX CORE is created by entering an IP address into the input field. If a ctrlX CORE is detected below the IP address, the control name is shown
“OK”	Command to confirm the dialog and to create the ctrlX CORE Virtual or ctrlX CORE
Cancel	Command to cancel the dialog

Further information

- ➦Chapter 6.2.2 Window – “Devices” on page 20
- ➦Chapter 5.1.1 Devices on page 15

6.3.2 Dialog – “Add ctrlX CORE App Build Environment”

Function:

To add a build environment app to the table via the dialog “Add ctrlX CORE App Build Environment”.

Call:

ctrlX WORKS side navigation *“App Build Environments”* → button +

“Add ctrlX CORE App Build Environment”

The following input is required to add a build environment:

Dialog elements

GUI element	Function
“Name”	The name of a build environment is created as sub-folder for the files in the storage location
“Storage location”	Directory in which the build environment is to be saved
Port Forwarding	Port forwarding of the build environment to the local PC can be defined here. Forwarding for port 22 (SSH) of the build environment is required
: Disabled : Enabled “Use HTTP and HTTPS proxy on localhost:3128”	If an HTTP proxy is running on port 3128 on a PC, the proxy can be referenced in the build environment for internet access.

Further information

- Chapter 6.2.4 Window – “App Build Environments” on page 21
- Chapter 6.4.2 Sidebar – “App Build Environments <Build environment name>” on page 33
- Chapter 4.1.1 ctrlX WORKS - Basics on page 11

6.4 Sidebars

6.4.1 Sidebar – “Devices <Control name>”

Function:

The properties of a ctrlX CORE Virtual can be edited in stopped state via the sidebar “Devices <Control name>”. If the control is running, the control properties are opened as read-only.

Call:

ctrlX WORKS side navigation *“Devices”* → button

Elements of the sidebar “Devices <Control name>”

GUI element	Description
Tab bar “Devices <Control name>”	“Basics”: Changing the control name. The valid characters are displayed

GUI element	Description
	“Extended”: The following is shown in this tab: “Network Adapter” The selection allows to access the control using a TAP Windows network adapter. The control can be reached via the respectively configured IP addresses. The IP addresses are set analogously to the ctrlX CORE using the settings of the control. • CPU Cores Set the number of processor kernels to be emulated for the control here • “Hardware acceleration” The ctrlX CORE Virtual is operated in a Linux emulation. For an optimized operation, an additional hardware acceleration is required. This selection specifies which hardware acceleration is used to operate ctrlX CORE Virtual: – **None**: Using the standard Tiny Code Generator (TCG) without hardware support – **Intel® Hardware Accelerated Execution Manager (HAXM)**: Using Intel® Hardware Accelerated Execution Manager (Hypervisor) as accelerator. This option is the default value. The installation takes place during the ctrlX WORKS setup – **Windows Hypervisor platform**: Feature is compatible with AMD processors and computers with enabled Windows Hypervisor platform feature Use the info symbol next to the drop-down box for detailed information about the status of the hardware acceleration **HAXM** on the system. For an error-free operation, the following requirements have to be met: – Intel64 supported * Yes – VMX supported * Yes – VMX enabled * Yes – EPT supported * Yes – NX supported * Yes – NX enabled * Yes – Hyper-V disabled * Yes If required, the HAXM setup can also be executed manually. The setup is contained in the ctrlX WORKS installation directory in the subfolder **haxm-windows-v...** • “Base Image Version” Version display of the current base image (cannot be edited) • “User Image” File name of the user image file used (cannot be edited)

GUI element	Description
	All changes in the file system of the ctrlX CORE Virtual control are saved in the respective user image file. A user image file can only be used with its respective base image file. “Port Forwarding” • “Port Forwarding” If port forwarding is required (e.g. in a VPN environment), some communication ports of the ctrlX CORE Virtual control (e.g.: SSH 22, HTTPS 443, PLC 11740, OPC UA 4840) have to be redirected. To make these settings, go to the field “Port Forwarding”. The numerical placeholders to be entered for the respective ports can be feely selected (wwww:22,xxxx:443,yyyy:11740,zzzz:4840). Open the control website via https://localhost:xxxx. The PLC communication can be set up in the ctrlX PLC Engineering via the address 127.0.0.1:yyyy. The address localhost:wwww is used for an SFTP access to the control • External access This option is available if the “Port Forwarding” option is active. By selecting a network adapter, it is specified which network interface is used to publish the virtual control. The ports defined in the “Port Forwarding” are forwarded via the host IP. External devices can establish a connection to the control via the following address: ***https://<Host-IP>:<Port>***. **Note:** To allow external access, a rule has to be created for the affected ports in the firewall of the PC • CPU Cores Set the number of processor kernels to be emulated for the control here • “Hardware acceleration” The ctrlX CORE Virtual is operated in a Linux emulation. For an optimized operation, an additional hardware acceleration is required. This selection specifies which hardware acceleration is used to operate ctrlX CORE Virtual: – **None**: Using the standard Tiny Code Generator (TCG) without hardware support – **Intel® Hardware Accelerated Execution Manager (HAXM)**: Using Intel® Hardware Accelerated Execution Manager (Hypervisor) as accelerator. This option is the default value. The installation takes place during the ctrlX WORKS setup – **Windows Hypervisor platform**: Feature is compatible with AMD processors and computers with enabled Windows Hypervisor platform feature

GUI element	Description
	Use the info symbol next to the drop-down box for detailed information about the status of the hardware acceleration **HAXM** on the system. For an error-free operation, the following requirements have to be met: – Intel64 supported * Yes – VMX supported * Yes – VMX enabled * Yes – EPT supported * Yes – NX supported * Yes – NX enabled * Yes – Hyper-V disabled * Yes If required, the HAXM setup can also be executed manually. The setup is contained in the ctrlX WORKS installation directory in the subfolder **haxm-windows-v...** • “Base Image Version” Version display of the current base image (cannot be edited) • “User Image” File name of the user image file used (cannot be edited). All changes in the file system of the ctrlX CORE Virtual control are saved in the respective user image file. A user image file can only be used with its respective base image file.

To save the change, select Save. Select Cancel to return to the window “Devices”.

The operation of a ctrlX CORE Virtual in a virtual machine is currently very restricted as an emulation is executed in a virtual machine. The performance mainly depends on whether nested virtualizations are possible at all and if the hardware acceleration **HAXM** can run in this environment.

Further information

- Chapter 5.1.1 Devices on page 15
- Chapter 6.2.2 Window – “Devices” on page 20

6.4.2 Sidebar – “App Build Environments <Build environment name>”

Function:

The properties of a build environment can be edited in stopped state via the sidebar “App Build Environments <Build environment name> ” If the build environment is running, the properties are opened as read-only.

Call:

ctrlX WORKS side navigation *“App Build Environments”* → button

“Edit build environment app”

The following input is required to add a build environment:

Elements of the dialog “App Build Environments <Build environment name>”

GUI element	Function
“Name”	The name of a build environment can be changed. The storage location, however, does not change
Port Forwarding	Port forwarding of the build environment to the local PC can be defined here. Forwarding for port 22 (SSH) of the build environment is required
“Storage location (read-only)”	Directory in which the build environment is saved
“Hardware acceleration (read-only)”	The hardware acceleration used for the emulation is displayed. A dialog opens via the ⓘ dialog containing detailed information
: Disabled : Enabled “Use HTTP and HTTPS proxy on localhost:3128 (read-only) ”	Shows if the local HTTP Proxy is referenced in the build environment for internet access

Further information

- Chapter 6.2.4 Window – “App Build Environments” on page 21
- Chapter 6.3.2 Dialog – “Add ctrlX CORE App Build Environment” on page 30
- Chapter 4.1.1 ctrlX WORKS - Basics on page 11

7 Related documentation

7.1 Overview

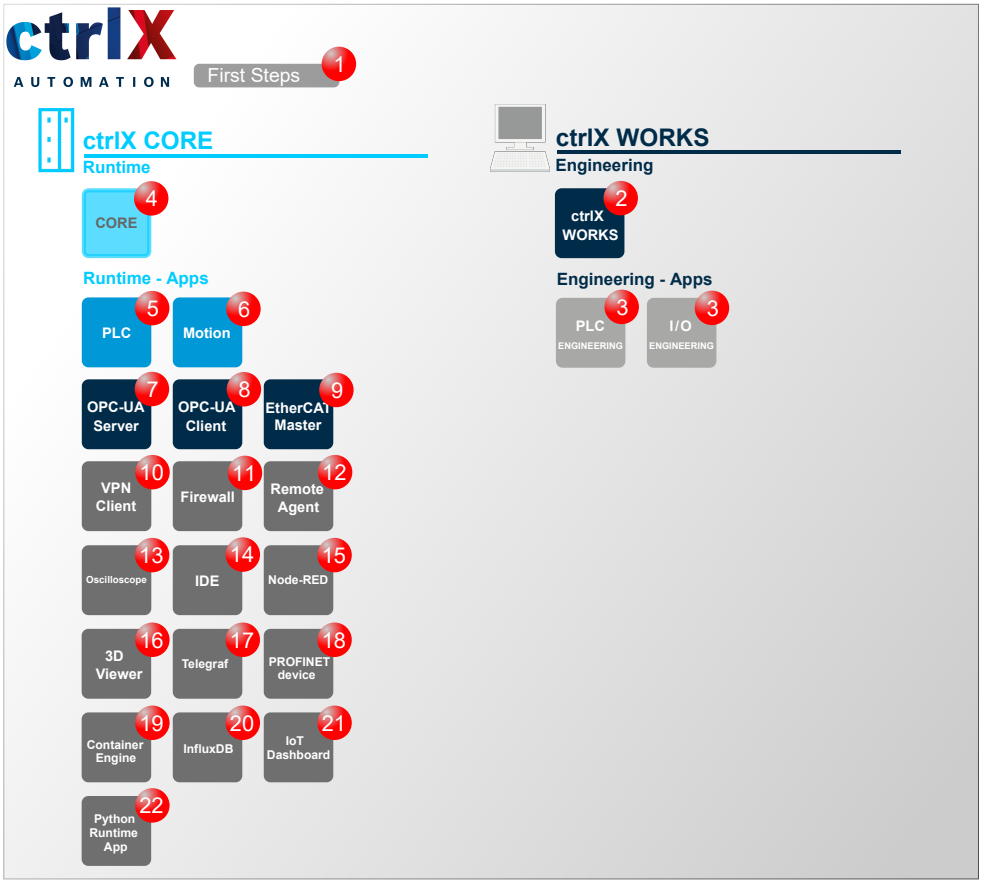

Fig. 1: Overview on further documentations

7.2 ctrlX AUTOMATION

No.	Documentation
1	**ctrlX WORKS First Steps** Quick Start Guide ➦ Web documentation link Ordering information: • DOK-XWORKS-F*STEP*****-QURS-EN-P • R911403760

7.3 ctrlX WORKS

No.	Documentation
2	**ctrlX WORKS Basic System** Application Manual ➦Web documentation link Ordering information: • DOK-XWORKS-**********-APRS-EN-P • R911403761
3	**ctrlX PLC Engineering - PLC Programming System** Application Manual ➦Web documentation link Ordering information: • DOK-XPLC**-ENGINEERING-APRS-EN-P • R911403764
3	**ctrlX PLC Engineering - PLC Libraries** Reference ➦Web documentation link Ordering information: • DOK-XPLC**-LIBRARY****-RERS-EN-P • R911403766

7.4 ctrlX CORE

No.	Documentation
4	**ctrlX CORE - Runtime** Application Manual ➦Web documentation link Ordering information: • DOK-XCORE*-BASE*******-APRS-EN-P • R911403768
	ctrlX CORE - Nodes of the Data Layer Reference ➦Link zur Web-Dokumentation Bestellinformationen: • DOK-XCORE*-BASE*DL****-RERS-EN-P • R911420072
	ctrlX CORE - Diagnostics Reference ➦Web documentation link Ordering information: • DOK-XCORE*-DIAG*******-RERS-EN-P • R911403770

7.5 ctrlX CORE apps

No.	Documentation
5	**PLC App - PLC Runtime Environment for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-PLC********-APRS-EN-P • R911403787
6	**Motion App - Motion Runtime Environment for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-MOTION*****-APRS-EN-P • R911403791
7	**OPC UA Server App - OPC UA Server for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-OPCUA*SERV*-APRS-EN-P • R911403778
8	**OPC UA Client App - OPC UA Client for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-OPCUA*CLIEN-APRS-EN-P • R911403781
9	**EtherCAT Master App - EtherCAT Master for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-ETHERCAT***-APRS-EN-P • R911403773
10	**VPN Client App - Remote Support Software for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-VPN********-APRS-EN-P • R911403775
11	**Firewall App - Security Functions for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-FIREWALL***-APRS-EN-P • R911403783

No.	Documentation
12	**Remote Agent App - ctrlX Device Portal Connection for ctrlX Devices** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-REMOTE*AG**-APRS-EN-P • R911403785
13	**Oscilloscope App - Oscilloscope Function for ctrlX Devices** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-OSCI*******-APRS-EN-P • R911409806
14	**IDE App - Integrated Development Environment** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-IDE********-APRS-EN-P • R911410625
15	**Node RED App - Graphic Programming for ctrlX CORE** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-NODE*RED***-APRS-EN-P • R911403789
16	**3D Viewer App - Browser-based 3D Kinematic Simulation for ctrlX CORE** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-3D*VIEWER**-APRS-EN-P • R911416124
17	**Telegraf App - Server Agent for Collecting Data in the Data Layer** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-TELEGRAF***-APRS-EN-P • R911416836
18	**PROFINET Device App - PROFINET Device for ctrlX CORE** Application Manual ➥ Web documentation link Ordering information: • DOK-XCORE*-PROFINET***-APRS-EN-P • R911417857

No.	Documentation
19	**Container Engine App - Use of Docker® Images on ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-DOCKER*****-APRS-EN-P • R911417855
20	**InfluxDB App - Influx Database Connection for ctrlX CORE** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-INFLUXDB***-APRS-EN-P • R911418738
21	**IoT Dashboard App - Data Visualization in Dynamic, Interactive Dashboards** Application Manual ➦ Web documentation link Ordering information: • DOK-XCORE*-GDB********-APRS-EN-P • R911420426
22	**Python Runtime App - Python Runtime Environment for ctrlX CORE** Application Manual ➦ Link zur Web-Dokumentation Ordering information: • DOK-XCORE*-PYR********-APRS-EN-P • R911420430

8 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
Internet:	➦ 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)

9 Index

rexroth
A Bosch Company

Bosch Rexroth AG
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr a.Main
Germany
Tel. +49 9352 18 0
Fax +49 9352 18 8400
www.boschrexroth.com/electrics

R911403761