rexroth
A Bosch Company

Application Manual

EtherNet/IP Adapter App

EtherNet/IP Adapter for ctrlX OS Version 3

R911428581 Edition 01

Disclaimer

The data specified above only serve to describe the product. As our products are constantly being further developed, no statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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1 About this documentation

Editions of this documentation

Edition	Release date	Note
01	2025 − 05	First edition for EtherNet/IP Adapter App − Version 3.6.0

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

The EtherNet/IP Adapter App activates the device interface for real time EtherNet/IP communication and enables the ctrlX device to act as an EtherNet/IP Adapter in an EtherNet/IP network.

EtherNet/IP™ is a trademark of ODVA, Inc.

The EtherNet/IP protocol is part of the CIP family of protocols managed by ODVA. With regard to CIP, the application acts as a Communications Adapter. The data exchanged in the EtherNet/IP network is provided to all apps on the ctrlX device via the ctrlX Data Layer. The EtherNet/IP Adapter is configured via the ctrlX OS web interface. The "Automation Core" system app and the MultiEthernet master/slave hardware extension (COM20) on the ctrlX device are required to operate the EtherNet/IP

Adapter App. To integrate the EtherNet/IP communication adapter (managed by the ctrlX device) into the engineering software of the EtherNet/IP Scanner, such as IndraWorks, EDS files (Electronic Data Sheets) are provided.

The EtherNet/IP Adapter App is not supported by virtual ctrlX device instances!

Requirements for operating the EtherNet/IP Adapter App

- ctrlX CORE hardware with MultiEthernet master/slave hardware extension.
- EtherNet/IP Adapter app license, see: ➦ Licensing
- System app "Automation Core" (installed on the ctrlX device by default).

4.1 Installation on the ctrlX device

The installation of apps on a crtlX device is usually carried out online via the ➦ ctrlX OS STORE or optionally locally via an installation file.

You can find more information on the installation on the ctrlX device in the ctrlX OS application manual, see web documentation:

➦ Apps − Basic information

➦ Installing the app from the ctrlX OS Store on the ctrlX device

4.2 Licensing

The operation of the EtherNet/IP Adapter App is subject to licensing and requires the following license:

License type key	Material number
SWL-XC*-EIA-ETHERNETIPA**-NNNN	R911420593

Purchasing a license

Further information on purchasing and handling ctrlX licenses can be found in the application manual for ctrlX OS Runtime, see: ➦ Documentation on the web

Behavior in case of a missing license

The EtherNet/IP Adapter app can be installed on the ctrlX device without a license, but if an EtherNet/IP Adapter instance is to be added to the ctrlX device, a message is displayed stating that the required license is not available.

4.3 EtherNet/IP Adapter app – Configuration

The EtherNet/IP Adapter is configured via the web interface of the ctrlX device.

Start the web interface of the ctrlX device and navigate to the window: “EtherNet/IP Adapter”, see:

➦ Window − EtherNet/IP Adapter

The EtherNet/IP Adapter on the ctrlX device can be enabled and the device configuration can be selected in the window, see:

➦ EtherNet/IP Adapter - Configuration

4.4 EtherNet/IP Adapter app – Features

The EtherNet/IP Adapter app supports the following functions:

- Communication within an EtherNet/IP network.
- Configuration of an EtherNet/IP Adapter device.
- Access to cyclical I/O data via the ctrlX Data Layer.
- Field bus mapping (vendor-specific objects)

Technical data

CIP product type	12 (0xC) - Communications Adapter
Manufacturer ID	287 (0x11F) - Bosch Rexroth
Product code	121 (0x79)
Cycle time	2 ms
RPI (min/max)	10 – 500
Maximum message size (incoming/out-going)	496 / 496 bytes
Electronic keying	Not supported
IO connection types (implicit)	Exclusive owner/listen only/input only
QoS	DSCP
Supported reset services	0 (power cycle)
Interface speed	10 and 100 Mb/s
Interface duplex modes	Half/Full/Auto-negotiation
IP configuration	DHCP / BOOTP
ACD	Supports: (IETF RFC 5227)
Vendor-specific objects	1 (0xC7)

5 Creating and deleting an EtherNet/IP Adapter instance

Creating an adapter instance

To be able to operate the ctrlX device as an EtherNet/IP Adapter, an EtherNet/IP Adapter instance has to be created on the ctrlX device.

Only one EtherNet/IP instance can be created on a ctrlX device at a time.

1. Open the web interface of the ctrlX device and navigate to the window: “EtherNet/IP Adapter”, see:

   ➦ Window − EtherNet/IP Adapter

2. Click on the [+] button in the window.
   ➡ The Add EtherNet/IP Adapter dialog opens.
3. Enter an instance name in the dialog and select a port.
4. Confirm the dialog.
   ➡ The EtherNet/IP Adapter instance is created on the ctrlX device and displayed in the “EtherNet/IP Adapter” window.

Deleting an adapter instance

The pre-OP communication status is required to delete an EtherNet/IP Adapter instance, see: ➦ State machine

1. Open the web interface of the ctrlX device and navigate to the window: “EtherNet/IP Adapter”, see:

   ➦ Window − EtherNet/IP Adapter

2. Click on the [🗑] button in the table column of the EtherNet/IP Adapter instance.
3. Acknowledge the confirmation prompt.
   ➡ The EtherNet/IP Adapter instance is removed from the ctrlX device.

6 EtherNet/IP Adapter - Configuration

Prerequisite

A DHCP server has to be running in the network in which the EtherNet/IP Adapter is used.

Network configuration

The EtherNet/IP Adapter automatically receives an IP address as soon as it is connected.

Protocol-specific configuration

The communication parameters of the EtherNet/IP Adapter can be configured using an EtherNet/IP Scanner.

Configuring the cyclic I/O load

After creating an EtherNet/IP Adapter instance on the ctrlX device, the format of the exchanged cyclic I/O content can be configured. This is also known as Adapter Configuration.

A selection of preconfigured templates is available that cover common data types and input/output assignments.

Included configuration templates:

Template	Input	Output	Data type (structure in the Data Layer)
in_32_out_32	8	8	ARRAY OF UDINT
in_64_out_64	16	16	ARRAY OF UDINT
in_128_out_128	32	32	ARRAY OF UDINT
in_256_out_256	64	64	ARRAY OF UDINT
in_384_out_384	96	96	ARRAY OF UDINT
in_496_out_496	128	128	ARRAY OF UDINT

If no adapter configuration is specified, the template in_496_out_496 is used by default.

Backing up and restoring the configuration

The configuration settings for acyclic messaging and the adapter configuration are backed up and restored centrally via the app data management of the ctrlX device. More information on backing up and restoring can be found in the ctrlX OS user documentation, see: ➦ Back up and restore (backup)

7 State machine

The EtherNet/IP Adapter manages an internal state machine to control the communication of the EtherNet/IP protocol in the network and is coupled with the communication connection of the ctrlX device.

The operating state can be changed in the “EtherNet/IP Adapter” window, see:

➦ Window − EtherNet/IP Adapter

EtherNet/IP - Operating states

When the ctrlX device is switched on, the EtherNet/IP Adapter automatically switches to an operating state that is either Safe-OP or Op, depending on whether an EtherNet/IP Scanner is connected.

The following operating states are supported:

State	Name	Description
Initialized	Init	• No communication with the application layer. • Switches to the "Pre-Operational" state as soon as initialization is complete.
Pre-Operational	Pre-OP	• No process data communication, neither with ctrlX Data Layer nor with the EtherNet/IP network. • Switches to safe operating state.
Safe-Operational	Safe-OP	• Process data communication with the ctrlX Data Layer. • The connection to the EtherNet/IP Scanner is disconnected. • No communication with the EtherNet/IP network. • Switches to "Operational" if an EtherNet/IP Scanner is connected.
Operational	Op	• EtherNet/IP Scanner is connected. • Process data communication with the ctrlX Data Layer and with the EtherNet/IP network. • Switches to the "Safe-Operational" state when the connection to the EtherNet/IP Scanner is disconnected.

In the event of a fatal error, the device switches to Pre-OP state. It is no longer possible to switch to the Safe-OP state. In this case, please follow the recommended remedies in the diagnostic message, see: ➦ Diagnostics

8 Diagnostics

The diagnostic messages of the EtherNet/IP Adapter are transferred to the diagnostic logbook of the ctrlX device and contain the following categories:

- Status messages
- Warnings
- Errors

More information on the diagnostic logbook of the ctrlX device can be found in the application manual for the ctrlX OS operating system, see: ➦ Documentation on the web

9 User interface

9.1 Window − EtherNet/IP Adapter

The window is used to manage the EtherNet/IP Adapter instance on the ctrlX device.

The window can be used to add, configure or delete an EtherNet/IP Adapter instance on the ctrlX device, see also:

➦ Creating and deleting an EtherNet/IP Adapter instance

➦ EtherNet/IP Adapter - Configuration

Invocation

The window is displayed in the page navigation of the ctrlX OS web interface after installing the EtherNet/IP Adapter app.

After the initial installation, the [⊕] button is displayed in the window, which can be used to add an EtherNet/IP Adapter instance.

As soon as an instance has been created, a line with the following instance information is displayed in the window:

Element	Function
“Name”	The name of the active EtherNet/IP Adapter instance.
“State”	For the current communication status, see: ➦ State machine
“Status”	App license status display, which may contain the following text: ● **"OK"** The required license is available on the ctrlX device. ● **"License not available"** The license required to operate the instance is missing, see chapter "Licensing" in: ➦ Introduction and overview
“Port”	The name of the port (device connection) to which the EtherNet/IP Adapter instance is linked.
“Actions”	Buttons for controlling communication and the instance: ● [▷] Switches the EtherNet/IP Adapter instance to the "Operational" state and starts real time data communication. Please note that when connecting and disconnecting an EtherNet/IP Scanner with the instance, the status changes between "Safe-Operational" and "Operational". The symbol does not change, but the status element is updated. ● [□] Switches the EtherNet/IP Adapter instance to the "Pre-Operational" state and stops real time data communication. ● [🗑] Removes the EtherNet/IP Adapter instance. The function is disabled if the instance is in the "Operational" or "Safe-Operational" operating states.

10 Related documentation

10.1 Overview

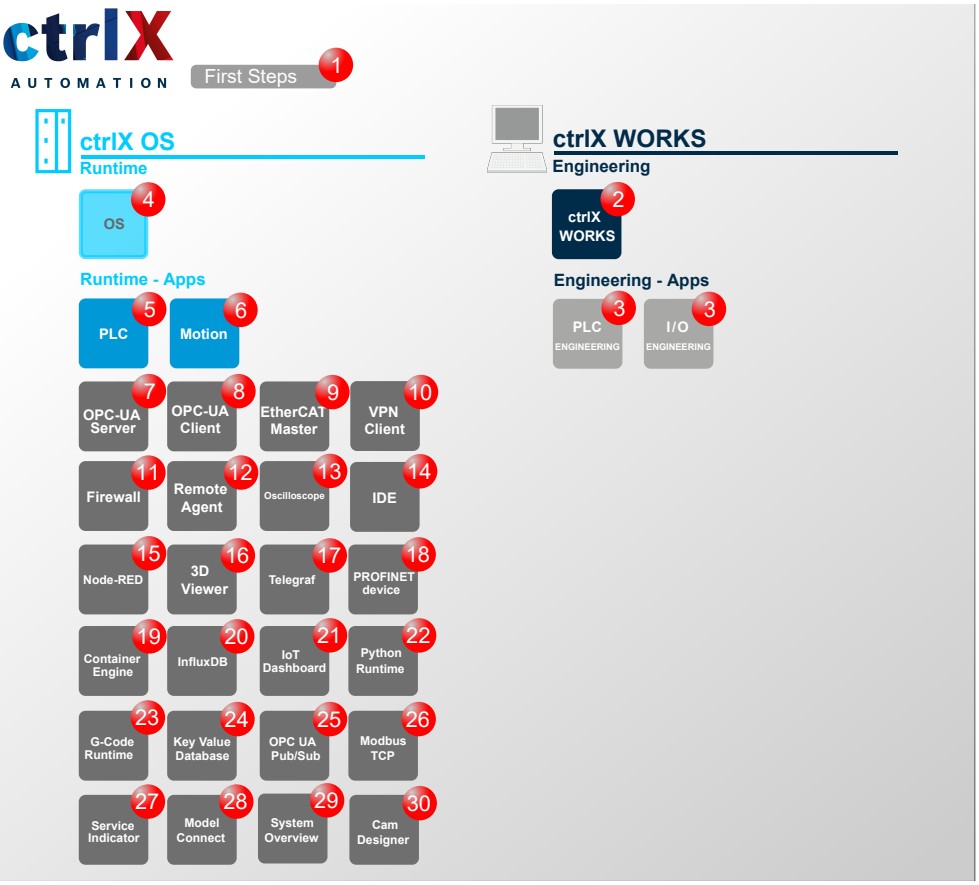

Fig. 1: Overview on further documentations

10.2 ctrlX AUTOMATION

No.	Documentation
1	**ctrlX WORKS First Steps** Quick Start Guide ➦ Web documentation link Ordering information: • DOK-XWORKS-F*STEP*****-QU01-EN-P • R911403760

10.3 ctrlX WORKS

No.	Documentation
2	**ctrlX WORKS Basic System 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XWORKS-WRK***V02**-APRS-EN-P ● R911421576
3	**ctrlX PLC Engineering - PLC Programming System 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XPLC**-ENG*****V02-APRS-EN-P ● R911421578
3	**ctrlX PLC Engineering - PLC Libraries 02VRS** Reference Book ➦ Web documentation link Ordering information: ● DOK-XPLC**-LIB***V02**-RERS-EN-P ● R911421580

10.4 ctrlX OS

No.	Documentation
4	**ctrlX OS - Operating System for ctrlX CORE Control Devices 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-XCR***V02**-APRS-EN-P ● R911421590
	ctrlX OS - Data Layer nodes 02VRS Reference Book ➦ Web documentation link Ordering information: ● DOK-XCORE*-DL****V02**-RERS-EN-P ● R911421592
	ctrlX OS - Diagnostics 02VRS Reference Book ➦ Web documentation link Ordering information: ● DOK-XCORE*-DIAG**V02**-RERS-EN-P ● R911421594

10.5 ctrlX OS apps

No.	Documentation
5	**PLC App - PLC Runtime Environment for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-PLC***V02**-APRS-EN-P ● R911421584
6	**Motion App - Motion Runtime Environment for ctrlX CORE 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-MOT***V02**-APRS-EN-P ● R911421610
7	**OPC UA Server App - OPC UA Server for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-UAS***V02**-APRS-EN-P ● R911421598
8	**OPC UA Client App - OPC UA Client for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-UAC***V02**-APRS-EN-P ● R911421600
9	**EtherCAT Master App - EtherCAT master for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-ECM***V02**-APRS-EN-P ● R911421604
10	**VPN Client App - Remote Support Software for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-VPN***V02**-APRS-EN-P ● R911421596
11	**Firewall App - Security Functions for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-FRW***V02**-APRS-EN-P ● R911421606

No.	Documentation
12	**Remote Agent App - ctrlX Device Portal Connection for ctrlX OS Devices 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-RMA***V02**-APRS-EN-P ● R911421608
13	**Oscilloscope App - Oscilloscope Function for ctrlX OS Devices 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-OSC***V02**-APRS-EN-P ● R911421587
14	**IDE App - Integrated Development Environment 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-IEN***V02**-APRS-EN-P ● R911421612
15	**Node RED App - Graphic Programming for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-NOENRED*V02-APRS-EN-P ● R911421582
16	**3D Viewer App - Browser-based 3D Kinematic Simulation for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-3DV***V02**-APRS-EN-P ● R911421615
17	**Telegraf App - Server Agent for Collecting Data in the Data Layer 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-TSA***V02**-APRS-EN-P ● R911421623
18	**PROFINET Device App - PROFINET Device for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-PROFINETV02-APRS-EN-P ● R911421617

No.	Documentation
19	**Container Engine App - Using Docker® Images on the ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-DOE***V02**-APRS-EN-P ● R911421619
20	**InfluxDB App - Influx Database Connection for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-IDB***V02**-APRS-EN-P ● R911421625
21	**IoT Dashboard App - Data Visualization in Dynamic, Interactive Dashboards 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-GDB***V02**-APRS-EN-P ● R911421633
22	**Python Runtime App - Python Runtime App Environment for ctrlX CORE 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-PYR***V02**-APRS-EN-P ● R911421629
23	**G-Code Runtime App - G-Code Interpreter for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-GCO***V02**-APRS-EN-P ● R911421631
24	**Key Value Database App - Data Layer Management 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-KVD*****V02-APRS-EN-P ● R911418735
25	**OPC UA Pub/Sub App - OPC UA Pub/Sub for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-UAP***V02**-APRS-EN-P ● R911421602

No.	Documentation
26	**Modbus TCP App - Modbus TCP Communication over ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-MOD*TCP*V02-APRS-EN-P ● R911421621
27	**Service Indicator App Service Indicator for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-SIN*****V02-APRS-EN-P ● R911421627
28	**Model Connect App Target for Model-based Development and Simulation for ctrlX OS 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-MOC***V02**-APRS-EN-P ● R911421631
29	**System Overview App - System Topology and System Information 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XCORE*-SOV***V02**-APRS-EN-P ● R911424409
30	**Cam Designer - Configuring ctrlX Motion Cams 02VRS** Application Manual ➦ Web documentation link Ordering information: ● DOK-XWORKS-CAM***V02**-APRS-EN-P ● R911424390

11 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)

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