Chirpstack-balenaContainer

Open Source LoRaWAN Server for x86 based controllers.
To control this docker package, you need to connect to the console of the controller and type "chirpstack-control" to get more info.

Please note, that You first need to install the balena engine!

Please visit https://www.chirpstack.io/ to learn more how to use the software.

This package includes

- chirpstack-gateway-bridge v3.10.0
  License information:
  https://github.com/brocaar/chirpstack-gateway-bridge/blob/master/LICENSE
- chirpstack-network-server v3.12.2
  License information:
  https://github.com/brocaar/chirpstack-network-server/blob/master/LICENSE
- chirpstack-application-server v3.14.0
  License information:
  https://github.com/brocaar/chirpstack-application-server/blob/master/LICENSE

This user manual is valid for:

Designation	**Version**
Chirpstack-balenaContainer-x86	• 1.0.1 • 1.0.2

Table of contents

1 Identification of warning notes

DANGER

Indicates a hazard with a high risk level. If this hazardous situation is not avoided, it will result in death or serious injury.

WARNING

Indicates a hazard with a medium risk level. If this hazardous situation is not avoided, it could result in death or serious injury.

CAUTION

Indicates a hazard with a low risk level. If this hazardous situation is not avoided, it could result in minor or moderate injury.

NOTE

This symbol together with the NOTE signal word warns the reader of actions that might cause property damage or a malfunction.

Here you will find additional information or detailed sources of information.

2 Qualification of users

The use of products described in this manual is oriented exclusively to:

- Electrically skilled persons or persons instructed by them. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.
- Qualified application programmers and software engineers. The users must be familiar with the relevant safety concepts of automation technology as well as applicable standards and other regulations.

3 Hardware configuration

WARNING

Before working on the station or module, disconnect the station from power!

NOTE

Observe the necessary safety precautions when handling components that are vulnerable to electrostatic discharge (EN 61340-5-1 and IEC 61340-5-1)!

Observe the information in the corresponding documentation of all components listed in chapterRequired hardware!

The package slips, data sheets and user manuals are available under ww.phoenixcontact.net/products.

Pay particular attention to all **safety and warning notices** in the corresponding documentation!

3.1 Required hardware

Required hardware:

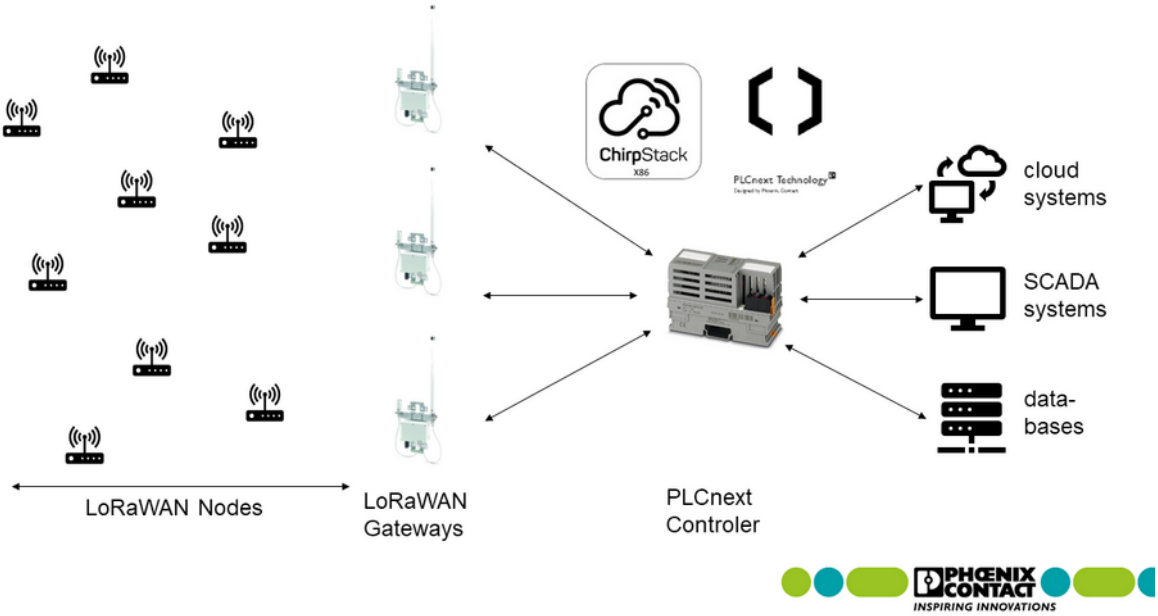
Description	Type	Order No.	Pcs./Pkt.
PLCnext Controller*	AXC F 3152	1069208	1
Box-PC*	EPC 1502	2688035	1

* With firmware version 2021.0 or higher

Recommended hardware:

Description	Type	Order No.	Pcs./Pkt.
LoRaWAN-Gateway	LPWAN GATEWAY ETH/4G EU KIT	1173484	1+

3.2 System overview



4 Installing the app

Please note, that You first need to install the balena engine! Only in V1.0.0 the controller needs an internet connection for the first startup of the chirpstack application.

You find the **balenaEngine-DockerForIOT-x86** here:
https://www.plcnextstore.com/permalinks/apps/latest/60002172000334
After that You can install **Chirpstack-balenaContainer-x86:**
https://www.plcnextstore.com/permalinks/apps/latest/60002172000339

Find detailed information how to install PLCnext apps on your device in the next chapters!

After installation and start of the Chiprstack-balenaContainer-x86 You need to use the console app “chirpstack-control” to startup the chirpstack Docker container. See chapter 5 App configuration for detailed information!

4.1 Connecting the PLCnext Controller with the PLCnext Store

A solution is downloaded directly from the PLCnext Store to your PLCnext Controller. To download the solution directly onto your PLCnext Controller, the PLCnext Controller needs to be connected to the PLCnext Store via the Internet.

For this, you have to prepare your PLCnext Controller and then assign it to your profile in the PLCnext Store. To do this, proceed as follows:

4.1.1 Preparing the PLCnext Controller

- Install the firmware version required by the app on your PLCnext Controller.
- For information on which firmware version is required by the app, refer to the detail page of the app in the PLCnext Store.
- The firmware can be found on the product page for the corresponding device at phoenixcontact.com/products.
- Phoenix Contact recommends carrying out a firmware update via the web-based management (WBM). Alternatively, you can update the firmware via the shell. Information on this can be found in the PLCnext Community.
- For additional information, please refer to the user manual of the respective device. The user manual can be found on the product page for the corresponding device at phoenixcontact.com/products.

- Assign an IP address to your PLCnext Controller that is accessible via the Internet, a subnet mask, and the corresponding Gateway (IP address of your Internet router).
- For information on how to assign the necessary parameters to your PLCnext Controller, refer to the user manual of the corresponding device. The user manual can be found on the product page for the corresponding device at phoenixcontact.com/products.
- Permit your PLCnext Controller to connect to the PLCnext Store. To do this, proceed as follows:
  - Open the WBM of the PLCnext Controller in the web browser via the following URL: “http://IP address of the controllers/wbm”.
  - In the WBM, open the “Configuration” area and click on “Proficloud”.
  - Enable the check boxes for “Enable Proficloud Service” and “Enable PLCnext Store Service”.
  - Use the displayed status table to ensure that the connection has been established.
  - Close the WBM.
  - Restart the PLCnext Controller.

4.1.2 Assigning the prepared PLCnext Controller to your profile in the PLCnext Store

Once you have completed the steps for preparing the PLCnext Controller, you can assign this controller to your profile in the PLCnext Store. To do this, proceed as follows:

- Use the “Login” button to log in to the PLCnext Store.
- Open your profile by clicking on your user name and then on “Profile”.
- Open the “My Licenses & Devices” tab.
- Click on “Add device”.
- Enter the UUID of the PLCnext Controller.

The UUID is printed on the side of the controller and also available in the WBM.

- Add a nayme and any further information as necessary.
- Click on “Add”.

The PLCnext Controller is now assigned to your profile.

Every PLCnext Controller can be assigned to only one profile.

4.2 Downloading a solution onto a PLCnext Controller

A solution is downloaded directly from the PLCnext Store to your PLCnext Controller. Using various parameterization options, you can individually adapt a solution to your application.

Registering in the PLCnext Store as well as downloading and using the offered applications is intended only for persons who act on behalf of a company.

4.2.1 Downloading a free solution

- Use the “Login” button to log in to the PLCnext Store.
- Make sure that your PLCnext Controller is connected to the PLCnext Store as described in Section 4.1.
- Click on the name of the solution that is of interest to you.

The detail page of the solution is displayed.

- Make sure that the technical conditions (PLCnext Controller, firmware, I/O modules) for the solution are met.

The technical conditions can be found on the detail page for the corresponding solution.

- For further information, refer to the documentation for the solution.
- On the detail page, click the “Install” button.

This will take you to the overview page of the available devices.

- Add your PLCnext Controller by clicking the “Add device” button.
- Mark the added PLCnext Controller.
- Read and accept the General Terms and Conditions of the PLCnext Store as well as the license agreements of the app provider (“Terms & Conditions”) and click on “Continue”.

This will take you to a summary of your order.

- Click the “Install” button.

The solution will be installed on the PLCnext Controller.

The overview page of your devices in the PLCnext Store appears.

- Check whether the device status switches to “Installed”. If necessary, refresh your web browser.
- For parameterization, read the documentation for the solution.
- Evaluate the solution in the PLCnext Store after using it.

4.2.2 Downloading a fee-based solution

- Use the “Login” button to log in to the PLCnext Store.
- Make sure that your PLCnext Controller is connected to the PLCnext Store as described in Section 4.1.
- Click on the name of the solution that is of interest to you.

The detail page of the solution is displayed.

- Make sure that the technical conditions (PLCnext Controller, firmware, I/O modules) for the solution are met.

The technical conditions can be found on the detail page for the corresponding solution.

- For further information, refer to the documentation for the solution.
- Click the “Buy” button.

Now, you have the following options:

- Save the solution to your license pool.
  After completing the purchase process, the license is available as “Uninstalled” in your license pool.
- Install the solution directly on one of your devices.
  After completing the purchase process, the solution is installed on the device you selected. The license is available as “Installed” in your license pool.
- Choose whether you want to save your solution in the license pool or install the solution directly on one of your devices.
- Read and accept the license agreements by the app provider and click on “Continue”.

You will be taken to a page with a purchase overview.

- Click the “Go to payment” button.

An external website of the payment service provider, Novalnet, opens.

- Enter the data necessary for the payment transaction and complete the payment transaction by clicking the “Pay” button.
- In the PLCnext Store, you will find your purchased license (as “Installed” or “Uninstalled”) in the license pool.
- Evaluate the solution in the PLCnext Store after using it.

5 App configuration

After installation of *balenaEngine-DockerForIOT-x86* and *Chirpstack-balenaContainer-x86* You have to connect to the console of the controller.

Type `chirpstack-control` to show the help of the application.

```
Usage:        chirpstack-control COMMAND

Handles the chirpstack docker installation on the PLCnext Controller

  Commands:
  install     Prepares the balena engine for the chirpstack container
              and prepares a default setup (optional).
              After installation You can change configurations in "/opt/plcnext/appshome/data/60002172000339/configuration/".
  start       Starts the chirpstack on balena as a daemon (without console output).
              Please remember, that the chirpstack will not restart after a reboot!
  autostart   Starts the chirpstack on balena as a daemon in autostart mode.
              (the application restarts automatically after a reboot of the controler.
  stop        Stops the chirpstack daemon (independent, if start or autostart was used).
  remove      Removes the chirpstack from balena including the images (optional).
```

5.1 chirpstack-control install

To install the chirpstack docker environment use `chirpstack-control install`.

An installation process will start to install the docker images. The docker images are packed in a file, which was installed with the App.

After downloading the images, the installation process will ask You to do some default settings. If You agree by typing y/Y or just press enter to accept the default (Yes), the installation process will go further with following steps:

1. Starting the chirpstack container
2. Connecting the network-server to the application-server
3. Creating a service profile for the european band (EU868)
4. Adding a device profile for the Adeunis Field Test Device
5. Stopping the container

You can skip this process by pressing n/N and enter.

Then the installation process is finished.

5.2 chirpstack-control start

If the chirpstack container preparation is done, you can start the chirpstack environment with `chirpstack-control start`. Then the balena-engine starts up the chirpstack environment in daemon mode. When the starting process is done, the chirpstack environment is reachable over http://<ip-address-of-the-controller>:8080. Read chapter *5.6 Connect to the Chirpstack UI* to get more information how to work with the Chirpstack Environment.

`chirpstack-control start` starts the environment just once. If the controller reboots or the balena-engine restarts, the Chirpstack will not start automatically. If You want, that the Chirpstack restarts automatically use `chirpstack-control autostart` (see next chapter).

5.3 chirpstack-control autostart

If the chirpstack container preparation is done, you can start the chirpstack environment with `chirpstack-control autostart`. Then the balena-engine starts up the chirpstack environment in daemon mode and the restart option “always”. When the starting process is done, the chirpstack environment is reachable at http://<ip-address-of-the-controller>:8080. Read chapter *5.6 Connect to the Chirpstack UI* to get more information how to work with the Chirpstack Environment.

`chirpstack-control autostart` starts the environment with the restart policy “always”. In this case the balena-engine will try to restart the chirpstack environment automatically, after breakdown or reboot.

5.4 chirpstack-control stop

If the chirpstack environment is running you can stop it with the `chirpstack-control stop` command.

If the environment was started in `autostart` mode. The balena-engine will not restart the Chirpstack automatically until you use autostart mode again.

5.5 chirpstack-control remove

Independent, if the Chirpstack is running or not, you can stop and remove the chirpstack containers and images with the `chirpstack-control remove` command.

Please use the remove command before You uninstall the App over the WBM or PLCnext Store!

- If You remove the App Container from the controller without removing it from balena-engine before the containers and images will stay on the controller.
- If You have started Chirpstack in autostart mode, the Chirpstack will also staying alive.
- Without the chirpstack-control app You only have access to the Chirpstack container over the balena-engine App.
- Another effect is a lost configuration. Then the chirpstack restarts with a default setup.

5.6 Connect to the Chirpstack UI

After starting the chirpstack environment is reachable in the web browser under:
http://<ip-address-of-the-controller>:8080

For default login use:

- Username: admin
- Password: admin

These credentials are also used during the chirpstack-control install process, if You want to create a default setup.

	Please change admin password as soon as possible!

You are also able to create new users and organization units in the chirpstack environment.

Please visit https://www.chirpstack.io/ to learn how to use the software.

5.7 Change the configuration of the Chirpstack (for experienced users)

After the chirpstack-control install process You can change the configuration settings of the chirpstack environment (for example enabling secure communication, binding to another login server etc.).

Find the configuration files here:

$ARP_APPS_DATA_DIR/60002172000339/configuration/

Please visit https://www.chirpstack.io/ to learn how to configure the software.

5.8 Connecting a gateway to the chirpstack

The Chirpstack networkserver is reachable for the gateways on Port 1700.

Change the local_conf.json of the packet forwarder like in the example below.

```
{
    "gateway_conf": {
        "gateway_ID": "<gateway-ID-set-by-manufacturer>",
        "serv_port_up": 1700,
        "serv_port_down": 1700,
        "server_address": "<ip-address-of-the-controller>"
    }
}
```

If You want to use the chirpstack gateway bridge on your gateway, please follow the instructions on https://www.chirpstack.io/.

6 FAQ

Where can I find more information about the PLCnext Store?

www.plcnext-community.net

I want to change the source code of the solution. What do I have to do?

Phoenix Contact does not provide for the source code of solutions to be modified arbitrarily.

If you have any change requests, please contact the developer of this solution.

Where can I find more information about the Chirpstack Applications?

https://www.chirpstack.io/

I installed the Chirpstack-balenaContainer on the Controller.

What do I have to do now?

Connect to the console and type `chirpstack-control` to get help or read chapter *5 App configuration* of this documentation.

I installed the Chirpstack-balenaContainer on the Controller. Who can I connect to the Chirpstack server?

Find the Chirpstack application here: http://<ip-address-of-the-controller>:8080

How can I connect a gateway to the chirpstack?

1. Register Your gateway with the EUI of the gateway in the Chirpstack.
   Topic “Gateways”, press “+ CREATE” and follow the instructions.
2. Change following parameters in the “local_conf.json” on the gateway.

```
{
    "gateway_conf": {
        "gateway_ID": "<gateway-ID-set-by-manufacturer>",
        "serv_port_up": 1700,
        "serv_port_down": 1700,
        "server_address": "<ip-address-of-the-controller>"
    }
}
```

3. Restart the gateway.