Application Note

FESTO

CPX-IO Setup Computer Environment for Integration with Python

A step by step guide to set up computer environment for Python and Festo cpx-io python library to communicate with and control a CPX-E or CPX-AP system by Modbus TCP.
CPX-IO stands for **“CPX I**nput/**O**utput**”**

CPX-AP-A
CPX-AP-I
CPX-E
CPX-IO

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Table of contents

1 Software used

Name	Compatible Software Version
Python	v3.10 and above
Visual Studio Code	Any version
pip	Follow instruction in command prompt
festo-cpx-io	Latest version on GitLab

Table 1.1: Software used

Information

Visual Studio Code is a common programming environment for python. However, it is not the only one. User can choose any programming environment they prefer. In this tutorial, we use Visual Studio Code as an example.

2 Introduction

This is an application note to guide the first setup of Windows computer environment for Festo cpx-io python library. It can be used to communicate with and control Festo CPX-E and CPX-AP-*-EP remote IO modules.

CPX-IO stands for **“CPX I**nput/**O**utput**”**. It is written by Festo and reposited in the online repository of public python packages, Python Package Index (PyPI) and can be downloaded via package manager, pip. The project is uploaded and maintained in GitHub and mirrored in GitLab. There you can find explanations and examples of the library.

3 Useful links

Subject	URL
GitLab repository	https://gitlab.com/festo-research/electric-automation/festo-cpx-io/
Documentation	https://festo-research.gitlab.io/electric-automation/festo-cpx-io/
PyPI project	https://www.pepy.tech/projects/festo-cpx-io
Feedback and bug report	https://gitlab.com/festo-research/electric-automation/festo-cpx-io/-/issues

Table 3-1: Useful links

4 Setup Computer Environment

Most of the time, setting up of computer environment for the library is most time consuming. Although it only needs to be done once. Thus, this step by step guide intends to help the users who are not familiar with Python programming to prepare the environment for the library.

➔ **Note**
Internet connection is necessary to download all the packages!

Follow the steps below to set up the computer.

4.1 Install Visual Studio Code

Download and install Visual Studio Code from the official website. There is also a portable version, for users who do not want to install the software.
Link: https://code.visualstudio.com/#alt-downloads

4.2 Install Python

Download and install Python from the official website.
Link: https://www.python.org/downloads/

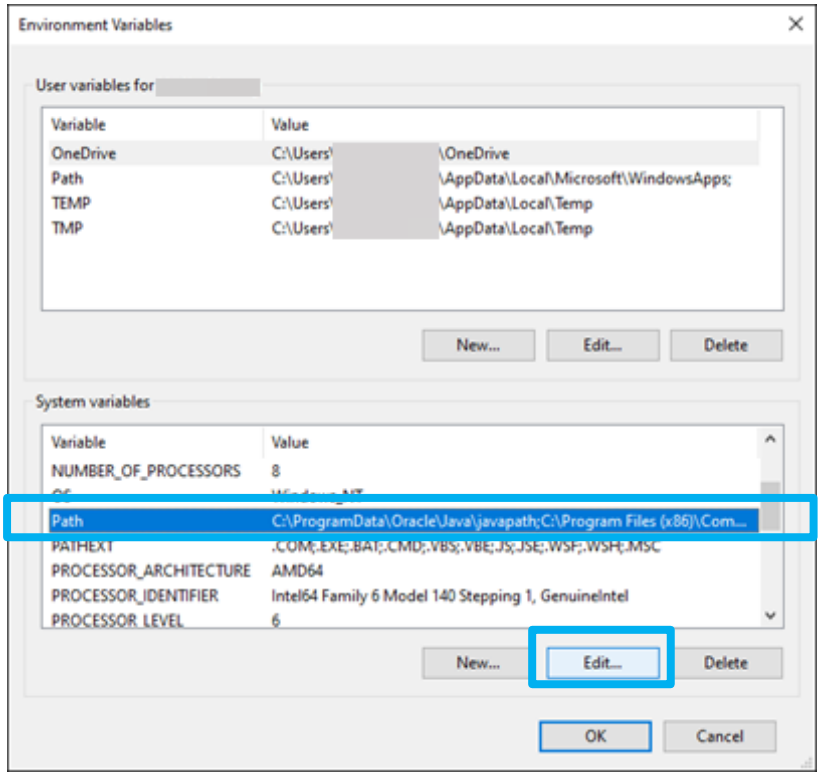
If python is installed, check whether the path to python is recognized by the system.

1. Open command prompt window.
2. Prompt `python -V` .
3. If the system reply with Python with version number. The system recognize its path and its ready to use.

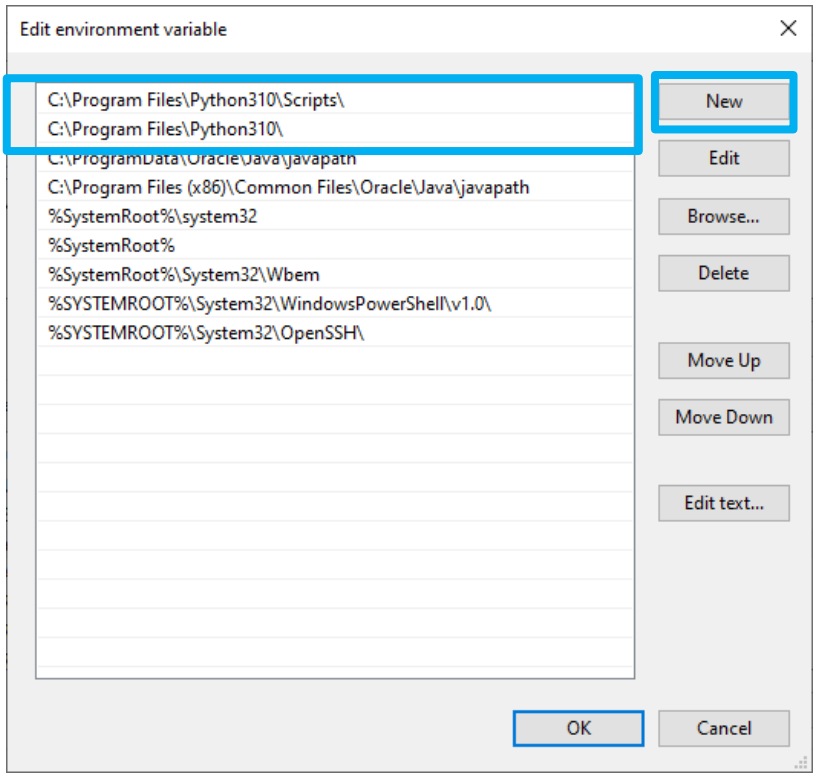
```
C:\Users\      >python -V
Python 3.11.5
```

If the system does not reply with Python and version number, its path needs to be added to the system variable.

1. Open ‘Environment Variables’ window.
2. Edit System variables’ path.



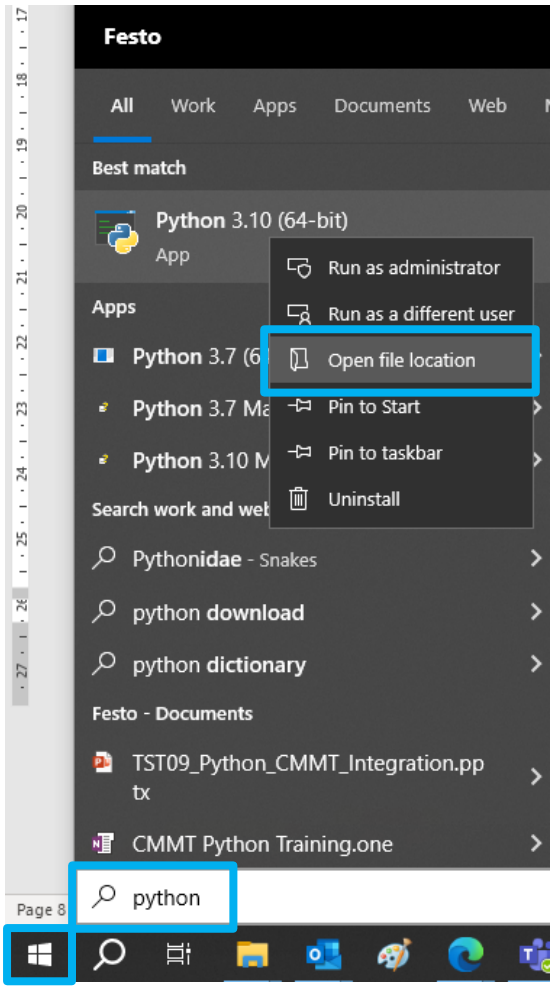
3. Click ‘New’ to add following two paths:
   a. ‹ PATH TO PYTHON ›
      Example: C:\Program Files\Python310
   b. ‹ PATH TO PYTHON ›\Scripts
      Example: C:\Progam Files\Python310\Scripts



Information

If the path to python is unknown, do following steps to find out.

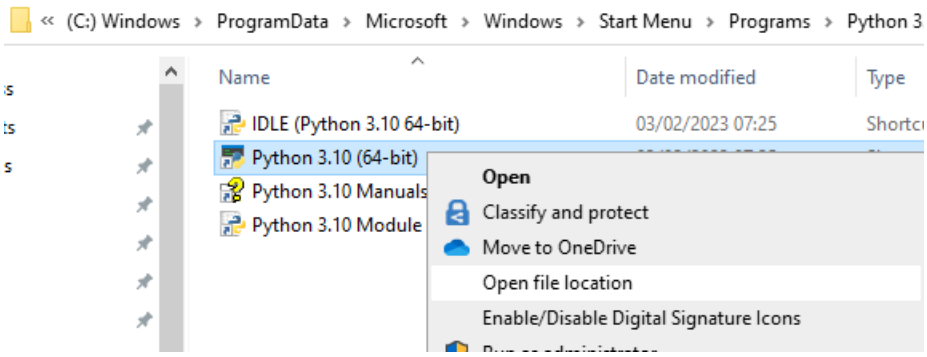
1. Go to menu, enter ‘python’.
2. Right click on the application, select ‘Open file location’.



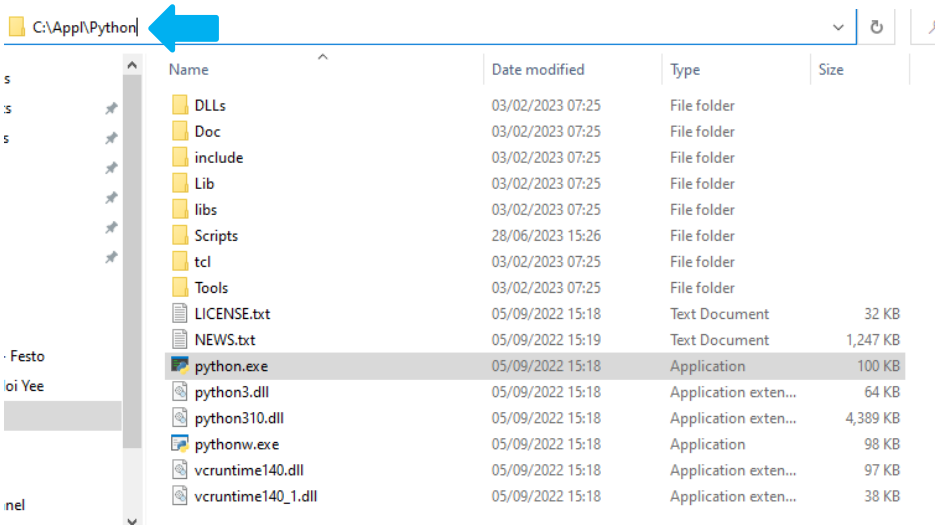
3. If the file is not a shortcut, it’s the path.

If the file is a shortcut, do following:

1. Right click on the shortcut, select ‘Open file location’.



2. The path is shown.



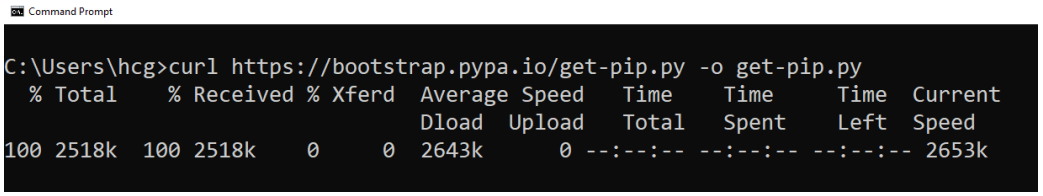
4.3 Install Python Package Manager pip

Check if pip is installed.

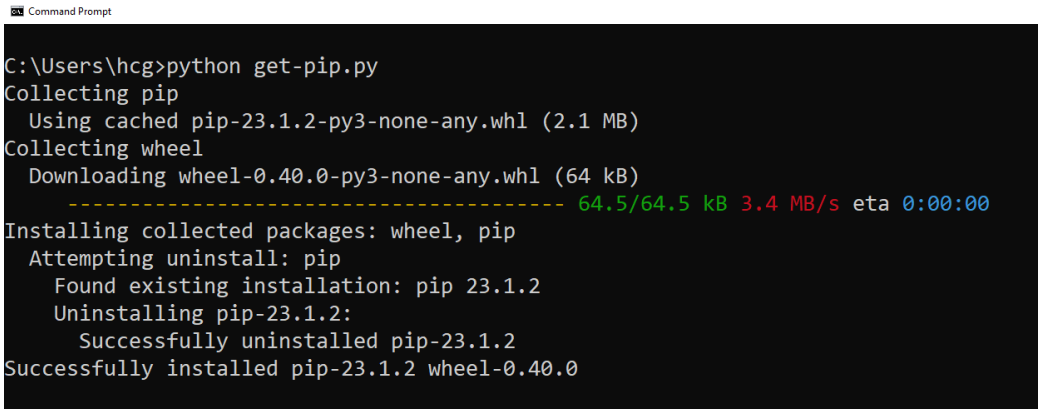
1. Open command prompt window.
2. Prompt `pip -V` .
3. If the system replied with pip and its version number. Its installed.

If the system does not reply with pip and version number, install pip.

1. Download pip with following prompt `curl https://bootstrap.pypa.io/get-pip.py -o get-pip.py` .



2. Install pip with following prompt, `python get-pip.py` .



3. Keyword “Successfully installed pip ‹ version › wheel ‹ version ›” indicates successful installation.

4.4 Install festo-cpx-io

After pip is installed, we are ready to install festo-cpx-io library.

1. Open command terminal, prompt `pip install festo-cpx-io` .

```
C:\Users\    >pip install festo-cpx-io
Looking in indexes: https://pypi.org/simple, https://adeartifactory1.de.festo.net/artifactory/api/pypi/electricdrives-python-dev-local/simple
Collecting festo-cpx-io
  Using cached festo_cpx_io-0.5.1-py3-none-any.whl.metadata (5.4 kB)
Requirement already satisfied: pymodbus<4.0.0,>=3.0.0 in c:\appl\python\lib\site-packages (from festo-cpx-io) (3.6.6)
Requirement already satisfied: rich in c:\appl\python\lib\site-packages (from festo-cpx-io) (13.7.1)
Requirement already satisfied: platformdirs<5.0.0,>=4.1.0 in c:\appl\python\lib\site-packages (from festo-cpx-io) (4.2.2)
Requirement already satisfied: requests<3.0.0,>=2.31.0 in c:\appl\python\lib\site-packages (from festo-cpx-io) (2.32.3)
Requirement already satisfied: charset-normalizer<4,>=2 in c:\appl\python\lib\site-packages (from requests<3.0.0,>=2.31.0->festo-cpx-io) (3.3.2)
Requirement already satisfied: idna<4,>=2.5 in c:\appl\python\lib\site-packages (from requests<3.0.0,>=2.31.0->festo-cpx-io) (3.7)
Requirement already satisfied: urllib3<3,>=1.21.1 in c:\appl\python\lib\site-packages (from requests<3.0.0,>=2.31.0->festo-cpx-io) (2.2.2)
Requirement already satisfied: certifi>=2017.4.17 in c:\appl\python\lib\site-packages (from requests<3.0.0,>=2.31.0->festo-cpx-io) (2024.6.2)
Requirement already satisfied: markdown-it-py>=2.2.0 in c:\appl\python\lib\site-packages (from rich->festo-cpx-io) (3.0.0)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in c:\appl\python\lib\site-packages (from rich->festo-cpx-io) (2.17.2)
Requirement already satisfied: mdurl~=0.1 in c:\appl\python\lib\site-packages (from markdown-it-py>=2.2.0->rich->festo-cpx-io) (0.1.2)
Using cached festo_cpx_io-0.5.1-py3-none-any.whl (57 kB)
Installing collected packages: festo-cpx-io
Successfully installed festo-cpx-io-0.5.1
```

2. Keyword “Successfully installed festo-cpx-io ‹ version › indicates successful installation.

To check the installed version, prompt `pip show festo-cpx-io` .

```
C:\Users\    >pip show festo-cpx-io
Name: festo-cpx-io
Version: 0.5.1
Summary: Library to control and access festo CPX modules
Home-page:
Author:
Author-email: Martin Wiesner <martin.wiesner@festo.com>, Elias Rosch <elias.rosch@festo.com>
```

Information

If following occurred:

1. Python or pip is blocked by computer's administrator.
2. Path to python cannot be added to environment variables because of user right.

...use following prompt ‹ PATH TO PYTHON ›\python.exe -m pip install festo-cpx-io .

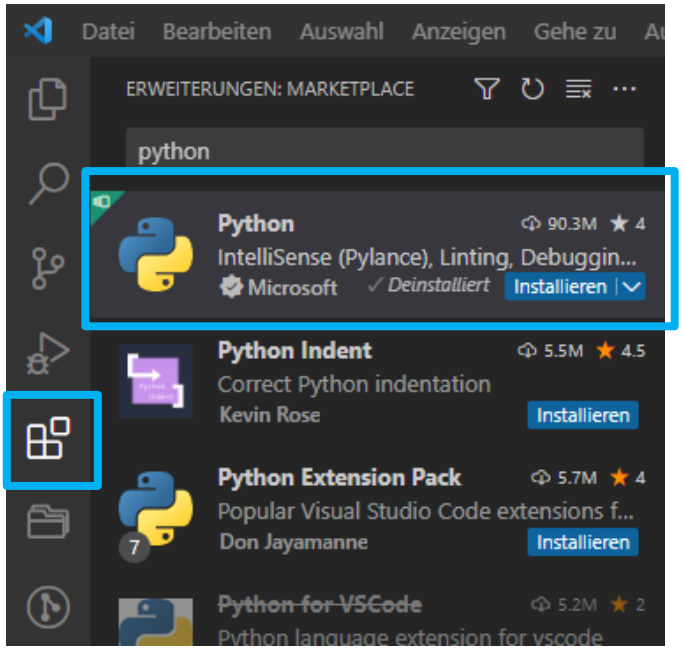
Example: C:\Appl\Python\python.exe -m pip install festo-cpx-io.

```
$ .venv/bin/python3 -m pip install festo-cpx-io
Looking in indexes: https://pypi.org/simple, https://adeartifactory1.de.festo.net/artifactory/api/pypi/electricdrives-python-dev-local/simple
Requirement already satisfied: festo-cpx-io in ./.venv/lib/python3.10/site-packages (0.2.0)
Requirement already satisfied: rich in ./.venv/lib/python3.10/site-packages (from festo-cpx-io) (13.7.0)
Requirement already satisfied: pymodbus<4.0.0,>=3.0.0 in ./.venv/lib/python3.10/site-packages (from festo-cpx-io) (3.6.4)
Requirement already satisfied: pygments<3.0.0,>=2.13.0 in ./.venv/lib/python3.10/site-packages (from rich->festo-cpx-io) (2.17.2)
Requirement already satisfied: markdown-it-py>=2.2.0 in ./.venv/lib/python3.10/site-packages (from rich->festo-cpx-io) (3.0.0)
Requirement already satisfied: mdurl~=0.1 in ./.venv/lib/python3.10/site-packages (from markdown-it-py>=2.2.0->rich->festo-cpx-io) (0.1.2)
```

4.5 Install Python Extension in VS Code

Install python extension for support of the language in VS Code.

1. Open VS Code.
2. Go to extension page.
3. Search for keyword 'python'.
4. Install Python extension from Microsoft.



5 Update Festo-cpx-io

The package is updated regularly to PyPI. It can be updated via pip in command terminal with prompt `pip install festo-cpx-io --upgrade` .