

# GETTING STARTED

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# CHAPTER 1

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# Introduction

## Purpose of this Manual

Thank you for purchasing the AutomationDirect ProductivityCODESYS CPU. The user manual provides information that will help you install, set up, troubleshoot, and maintain your ProductivityCODESYS project.

The manual includes information that is critical to the safety of the personnel, who will install and use the controller, and to the machinery, processes, and equipment controlled by the P2CDS-622 CPU.

The manual also includes important information about power and signal wiring, mounting the CPU and I/O modules, and configuring the system.

## Intended Use of This Product

The P2CDS-622 is a Productivity® 2000 format CPU allowing implementation of the IEC-61131-3 programming languages through the use of CODESYS software. The CODESYS system is the basis of a comprehensive suite that covers the entire software side of automation including Industrial Internet of Things (IIoT), communication, Soft PLC, drives, and visualization. It offers users practice-oriented, integrated solutions for the convenient configuration of automation applications and provides practical support for accomplishing daily tasks.

Users can develop a human machine interface (HMI) and a PLC application in one IEC 61131-3 development system. The CODESYS Visualization tool has proven itself in thousands of industrial machine and plant applications around the world.

Any use other than described in this manual is not permitted, as it may expose the user to possible harm and/or damage to the device or connected equipment.

The P2CDS-622 CPU must not be altered or modified. The safety instructions as well as the maximum permissible ambient conditions and operating parameters are given in Chapter 2 "Specifications".

This instruction manual is meant to be read thoroughly while being mindful of safe and proper operation. It contains important information on mounting, operating and handling the P2CDS-622.

## Benefits of P2CDS-622 with CODESYS Software

Choose your functionality

- Visualization and communication with other systems
- Testing, debugging, analysis, version control
- Fieldbus and I/O connection

Choose between extensive Industry 4.0 possibilities

- Administration platform for your controllers and projects
- Remote maintenance and remote access
- Data logging and display
- Connection to external systems for Big Data/Machine Learning/AI
- Static code analysis for early detection of potential programming errors
- Profiling/test automation tools for facilitated acceptance according to EN13849 PL<sub>d</sub>
- Creation of graphical user interfaces
- Remote access for maintenance, diagnostics, monitoring, and debugging via the associated Industry 4.0 platform
- Cloud-supported analysis of operating data
- Connection to public cloud systems via MQTT for predictive maintenance by means of AI algorithm

For Building Control Systems (Local and Global)

- Expandable panel controls, thanks to being manufacturer independent and widely used open systems
- Industry standard protocols such as Modbus
- Engineering software for the creation of logical links and sequences
- Convenient graphical configuration of aggregates/units for trade-specific application
- Worldwide available visualizations for monitoring and operation
- Connection of external APIs and cloud providers through IoT clients for efficient energy management, e.g. at the energy exchange
- Analysis of incoming measurement data in the cloud and presentation of the results on configurable dashboards

## Conventions Used



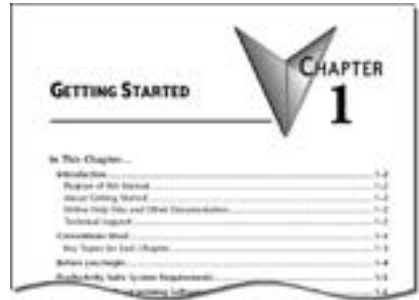
**NOTE:** When you see the “note pad” icon in the left-hand margin, the paragraph to its immediate right will be a special note. Notes represent information that may make your work quicker or more efficient. The word **NOTE** in boldface will mark the beginning of the text.



**WARNING:** When you see the “exclamation point” icon in the left-hand margin, the paragraph to its immediate right will be a warning. This information could prevent injury, loss of property, or even death in extreme cases. Any warning in this manual should be regarded as critical information that should be read in its entirety. The word **WARNING** in boldface will mark the beginning of the text.

### Key Topics for Each Chapter

The beginning of each chapter will list the key topics that can be found in that chapter.



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## Important Online Resources

Download the latest version of the CODESYS Software from the CODESYS website:

<https://us.store.codesys.com/codesys.html>



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**NOTE:** *USB or Ethernet cable is also required for communications between PC and CPU.*

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Follow steps on site to log-in and download the CODESYS software system.



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**NOTE:** *CODESYS supports the software from their website. Once you establish a user account you will be able to receive support from CODESYS.*

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Access to ADC Community based help for your ProductivityCODESYS projects is available from our website: [P2CDS-622](#). Here you will find access to our RTD site.

A variety of other useful information about the ProductivityCodesys I/O modules, as well as code for example tasks and more is available.

In addition, all supported Productivity2000 series power supplies and I/O modules include a convenient installation insert.

# P2CDS-622 System

## Preparation

The installation steps are as follows:

1. Install the CODESYS IDE on your PC.
2. Install the latest P2CDS-622 Firmware image file.
3. Install the P2CDS-622 Device Package (.package) file.
4. Configure the Ethernet ports
5. Install the IIoT Library file (optional) if needed.

## 1. CODESYS IDE Install

- The first task is to load and install the CODESYS software. This can be found at the following CODESYS Store location:  
<https://us.store.codesys.com/codesys.html>
- The remaining steps can be found at this RTD site:  
**The RTD link:** <https://docs.codesys-p2cds622.com/en/latest/Getting%20Started/preparation.html>

There you will find all the information for getting your P2CDS-622 system up and running.

## P2CDS-622 System, cont'd

### IEC 61131-3 Supported Editor Types:

- Functional Block Diagram (FBD)
- Structured Text (ST)
- Sequential Function Charts (SFC)
- Ladder Diagram (LD)

CODESYS (and P2CDS-622) also supports Continuous Function Charts (CFC) programming, in addition to the aforementioned IEC61131-3 programming types.



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**NOTE:** See Appendix A for an explanation of each Editor Type.

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For most systems such as EtherNet/IP™, portable CODESYS libraries implement the protocol stack for the fieldbus. Additionally, CODESYS offers libraries for Modbus communication (TCP or serial).

### Benefits:

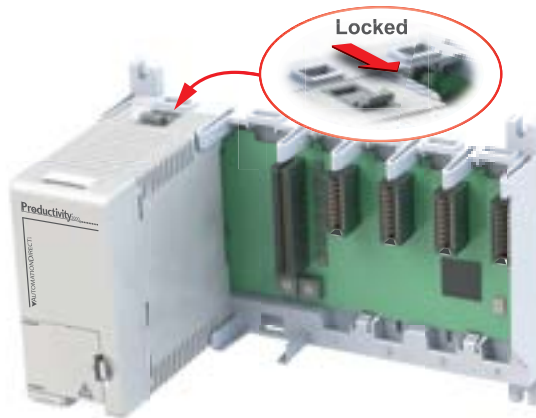
- Identical usage of the protocol stack for different fieldbus technologies
- Compiling / linking the stack dynamically to the application
- No external software tool required
- For Industrial Ethernet systems: No additional hardware required - a standard Ethernet port on the device for EtherNet/IP or Modbus TCP is sufficient
- Seamless integration of the configurator into the CODESYS Development System
- Comprehensive integrated diagnostic functions
- Integrated Commissioning and Diagnosis Functionality

Commissioning of the fieldbus system can be carried out with the Online Config Mode even without an available application. Numerous functions for communication diagnostics are available in the user interface and application, such as event loggers or diagnostic information in the device tree and in the application code.

# Install Hardware

The Productivity® 2000 CPU system components snap together to form a configured CPU in minutes. See Chapter 5, Installation and Wiring, for more detailed hardware installation information. What follows are the basic steps:

1. Install power supply in the base and engage locking tab.

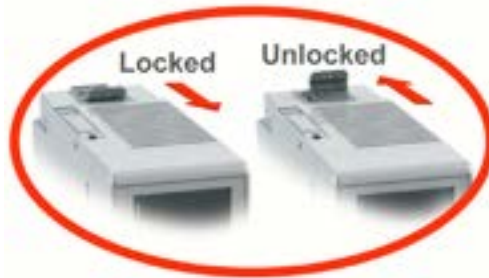


2. Install CPU in the base and engage locking tab.

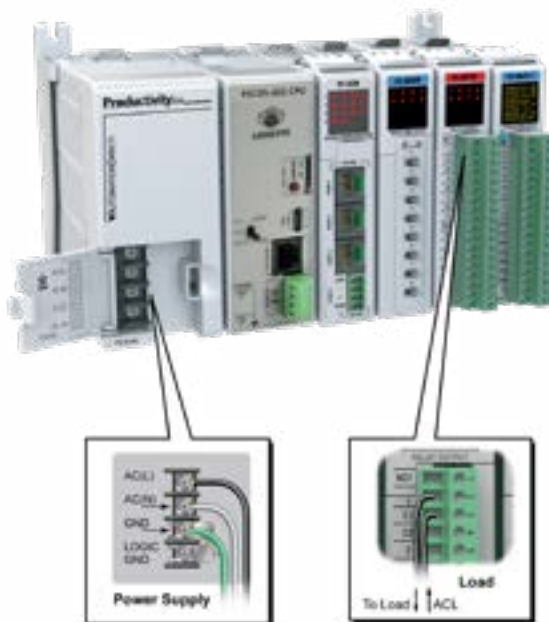




3. Install I/O Modules and engage locking tabs.



4. Connect appropriate wiring to the power supply (P2-01AC) and I/O (P2-08TRS) module in this example.



The power supply and load are connected through separate AC current sources.

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5. Connect USB cable. Programming connections may be via Ethernet cable or USB. P2CDS-622 CPUs have a USB type C programming port.



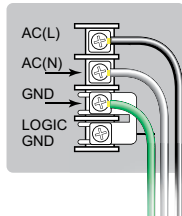
## Apply Power to CPU

Ensure proper wiring and the correct voltage is available before connecting wiring to the power supply. Once this is verified, connect power to the power supply. Once power is applied, the CPU will perform a self-evaluation and verification.

**P2-01AC**



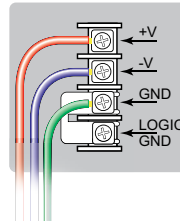
**100-240 VAC**



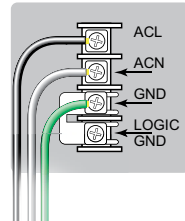
**P2-01DCAC**



**12-24 VDC**



**24VAC**

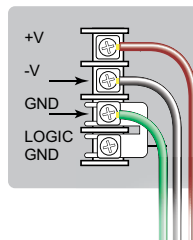


**P2-01DC**



**P2-01DC: 24-48 VDC**

**P2-02DC: 24VDC**



**P2-02DC**



# Develop HMI Screens directly in the CODESYS Development Environment

CODESYS Development System comes with an integrated visualization editor, allowing HMI development without the need for separate software interface.

Design visualization screens with direct access to all application variables thanks to the full integration in the IEC 61131-3 Development System, with no tag list comparison required.

Visualization screens can be for machine and plant operation, for testing and commissioning, and can be accessed simultaneously by any system with an internet browser (PCs, tablets, smartphones, etc.).



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**NOTE:** *The P2CDS-622 is an entry level CODESYS PLC that runs on a single 600MHz core. As such, adding complex Visualizations may affect performance.*

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