

ServoOne iPlc

Quick Start Guide

Single-Axis System
Multi-Axis System
Junior

ServoOne Single-axis system

ServoOne Multi-axis system

ServoOne junior

valid from ServoOne Firmware 2.20-01, ServoOne junior Firmware 1.10-01 ,
basic motion library Version V1.1.4.2 and standard library 1.0.0.0
valid from CoDeSys 3.3 Patch 1 (released version)

Quick Start Guide for ServoOne

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We reserve the right to make technical changes.

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The content of this Application Manual was compiled with the greatest care and attention, and based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated in line with ongoing technical developments in our products.

Information and specifications may be subject to change at any time. For information on the latest version please refer to www.lt-i.com.

How to use the document

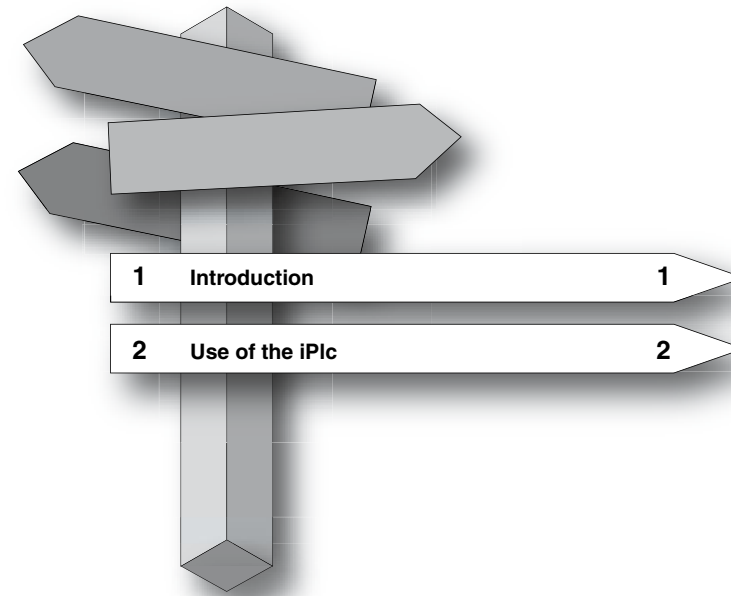
Dear User,

This manual is intended for project engineers, commissioning engineers or programmers of drive and automation solutions on the CANopen and EtherCAT field bus.

It is assumed that you are already familiar with these field bus systems through appropriate training and from reading the relevant literature. We assume that your drive is already in operation – if not, you should first consult the Operation Manual.



NOTE: This manual applies to the ServoOne position controller system, so you will see only the abbreviation SO used below.



Pictograms





	<p>Important! Misoperation may result in damage to the drive or malfunctions.</p>
	<p>Danger from electrical voltage! Improper behaviour may endanger human life.</p>
	<p>Danger from rotating parts! Drive may start up automatically.</p>
	<p>Note: Useful information.</p>

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1 Introduction

This manual gives a short introduction how to use the iPlc programming interface.

With this manual the user can start creating own programs which assist and add the functions of the ServoOne and ServoOne junior.

1.1 iPlc Overview

A **programmable logic controller** (PLC) or **programmable controller** is a digital computer used for automation of electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or lighting fixtures. PLCs are used in many industries and machines. Unlike general-purpose computers, the PLC is designed for multiple inputs and output arrangements, extended temperature ranges, immunity to electrical noise, and resistance to vibration and impact. Programs to control machine operations are typically stored in battery-backed or non-volatile memory. A PLC is an example of a real time system since output results must be produced in response to input conditions within a bounded time, otherwise unintended operation will result [Wikipedia].

1.1.1 iPlc Characteristics

- No additional "PLC hardware" is needed – the iPlc uses free CPU power of the ServoOne.
- No special firmware is needed. The iPlc is already included in the ServoOne firmware (2.20-01 or higher) and in the ServoOne junior firmware (1.10-01 or higher).
- The PLC needs to be activated by a unique licence code. This licence code needs to be entered into the ServoOne by using the LTi DriveManager5. A licence code is assigned to one drive.

1.1.2 Programming Environment

The iPlc uses the CoDeSys 3.x programming environment (based on IEC 61131). This programming environment is available in the Downloadarea at <http://drives.lt-i.com/>, the Homepage of LTi DRIVES.

1.1.3 iPlc Implemented Functions

- CoDeSys 3.x standard functions (e.g. timers, trigger-functions, flip-flops, counter)
- Functions for single-axis positioning (absolute, relative and endless positioning)
- motor control (Start, Stop, Quickstop, Halt)
- status and diagnosis
- Read and write access to all parameters
- Access to in-/outputs

1.1.4 Performance

The speed is limited by the free CPU power (typically cycle times down to 1 ms are possible, 5ms are recommended).

The iPlc performance depends on the activated functions (e.g. motor control type, profile-generation, field-bus-communication) in the ServoOne.

Cyclic access to predefined parameters: analog and digital I/O and PLC-Parameters (10 x real, 20 x integer, 20 x double-integer).

1.2 Additional Documentation

Please notice that our additional Documentation is available in the Downloadarea at <http://drives.lt-i.com/>.

- ServoOne operation manual
- ServoOne application manual

3S-Smart Software Solutions GmbH also provides an online help for the CoDeSys programming system.

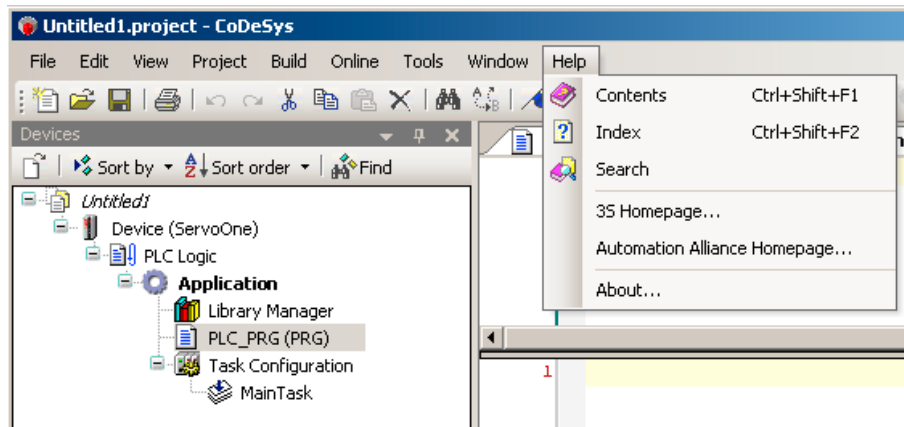


Figure 1.1 CoDeSys Help

2 Use of the iPlc

2.1 Requirements for using the iPlc

- LTI ServoOne with **iPlc licence**
- ServoOne software "**DriveManager5**" (**V5.3.9 or above**)
- **CoDeSys 3.x programming system**
- **ServoOne drive description 1.1.1.0 or higher**
- **ServoOne basic motion library 1.1.4.2 or higher**
- **ServoOne standard library 1.0.0.0 or higher**

The DriveManager Software, the CoDeSys programming system, the device description and the libraries are available on our homepage <http://drives.lt-i.com/> (Downloadarea).

The ServoOne can be ordered together with an iPlc licence. These ServoOne contains a "1" within the model number.

ServoOne : SO8X.xxx.xxxx.x1xx.x

ServoOne junior : SO2X.xxx.xxxx.x1xx.x

The licence code can also be ordered separately and the iPlc functionality can be added later on together with the serial number. The ordering number for a single PLC-licence is 1100.0000.0100.0.

2.2 Installation of CoDeSys 3.x

- Unzip the CoDeSys 3.x files and store these in a local directory on your computer.
- Double click onto the installation file.
- Follow the instructions during the installation process.

2.3 Entering the licence code

If the iPlc licence is ordered separately it will be required to enter the licence code manually.

- Open the DriveManager5
- Enter the four digit iPlc licence code in parameter P693 (Drive settings -> Administration -> Licence).
- Store value in the non volatile memory
- Reboot the device

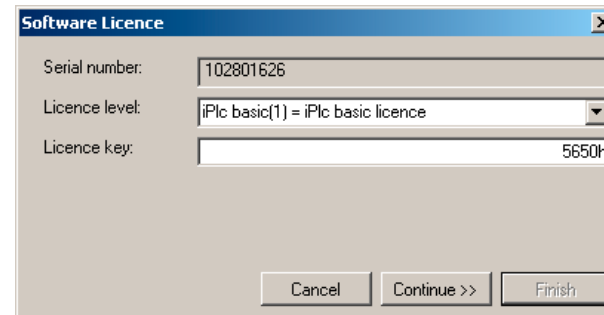


Figure 2.1 Software Licence

2.4 Parameter settings in the ServoOne

There are several possibilities to use the iPlc:

- Start the motor control via iPlc
- Reference value command via iPlc
- Calculations
- Additional monitoring
- And much more

When the iPlc is not used for motor control or reference value command, no additional settings in the DriveManager are necessary.

Otherwise the following settings must be done:

Parameter Name	Parameter No.	Setting
MPRO_CTRL_SEL	P159 sub 0	PLC(4) = via IEC61131 program
MPRO_REF_SEL	P165 sub 0	PLCbasic(4) = via PLC basic library
CON_CfgCon	P300 sub0	PCON(3) = Position control mode
CON_REF_Mode	P301 sub 0	PG(0) = setpoint effects to profile generator
MPRO_DRVCOM_AUTO_START	P144 sub 0	ON(1) = Start/restart drive automatically in case of power or fault

Table 2.1 Parameter

Set control and reference

Control via

Reference via

Motor control start condition

Profile

Profile mode

Profile type

Interpolation

Interpolation type

Limit

Speed override %

Direction barrier

Figure 2.2 Set control, reference and profile mode

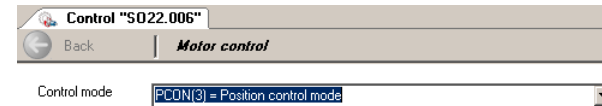


Figure 2.3 Control mode

2.5 Using the CoDeSys programming system

2.5.1 Start CoDeSys 3.x



CoDeSys V3.3 Patch 1

To start CoDeSys 3.x click on the desktop symbol

2.5.2 Installation of the ServoOne device description

The device description contains information for CoDeSys which are necessary to get access to the device.

The device description needs to be installed only once.

- Download the device description from our Homepage <http://drives.lt-i.com/Downloadarea>.
- Open Device Repository window (Tools -> Device Repository)
- Click on "Install..."
- Choose and install the device description from folder.
- Make sure that "Device description files" is chosen as file type.
- Close window

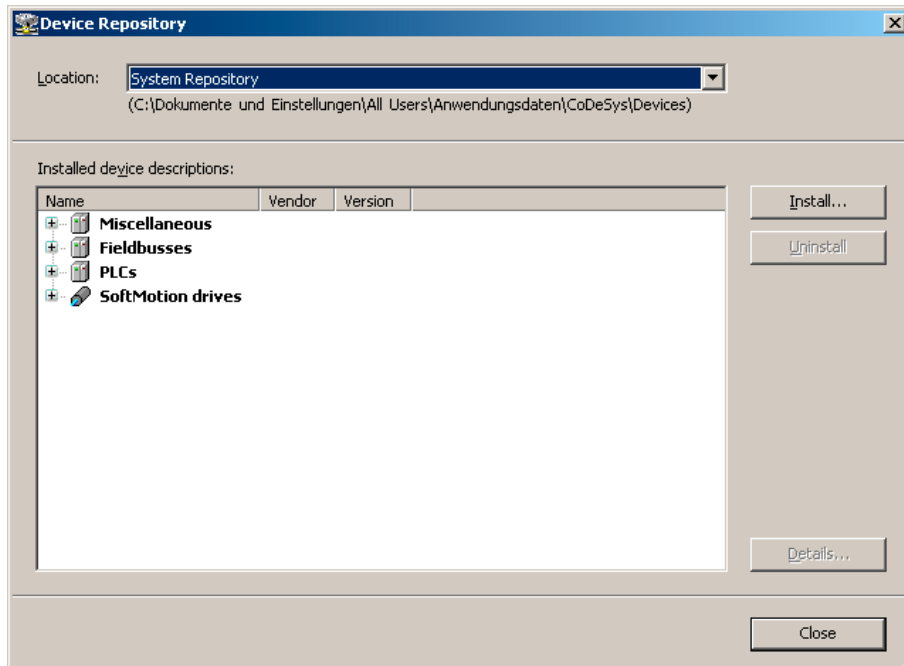


Figure 2.4 Device Repository

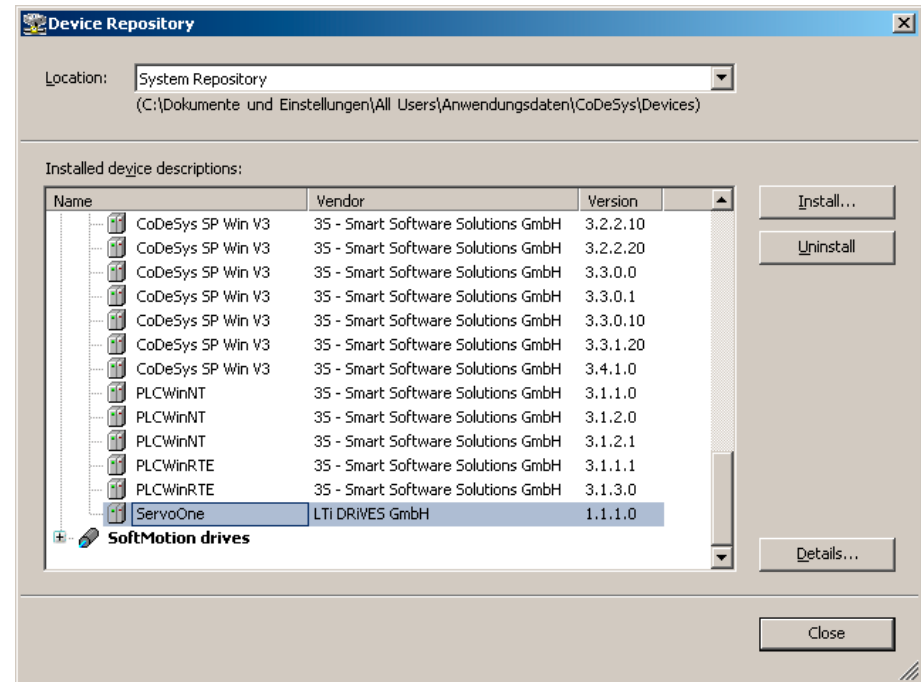


Figure 2.5 Device description

2.5.3 Installation of the basic motion library

The ServoOne basic motion library contains drive specific functions like enable / disable-functions and also motion control functions.

The basic motion library needs to be installed only once.

- Open the library repository window (Tools -> Library repository).
- Click on "Install..."
- Choose and install ServoOne basic motion library from folder.
- Close window

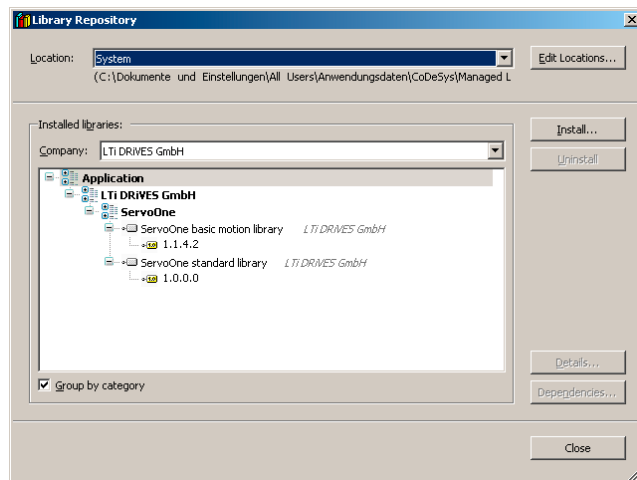


Figure 2.6 Library Repository

The ServoOne standard library contains adjusted functions and must also be installed.

- Open the library repository window (Tools -> Library repository).
- Click on "Install..."
- Choose and install ServoOne standard library from folder.
- Close window

2.5.4 Creation and basic configuration of a new project

A project contains all the information CoDeSys needs to produce the software, which finally will be downloaded to the ServoOne. The project contains program code, used libraries and task configurations.

- Start CoDeSys 3.x CoDeSys V3.3 Patch 1
- Open a new project (File-> New Project...)
- Click on "Standard project"
- Confirm with "OK"

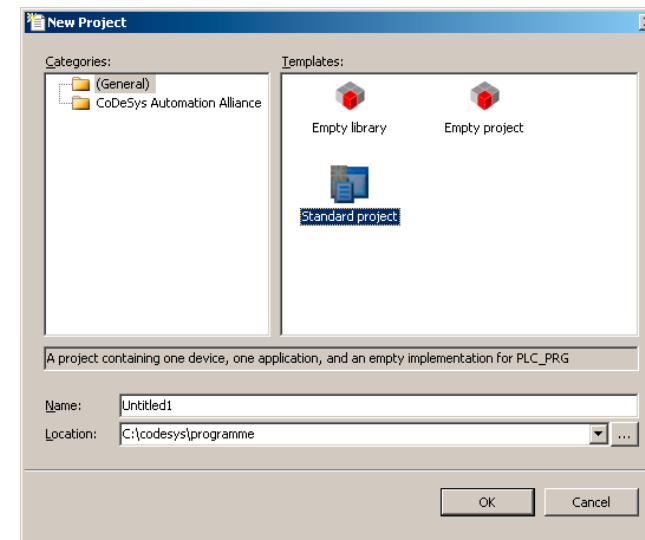


Figure 2.7 New Project

The device description for the ServoOne is already installed. As a result it is possible to choose the ServoOne as the Device. Below you can choose your IEC language. In this case please choose Structured Text (ST).

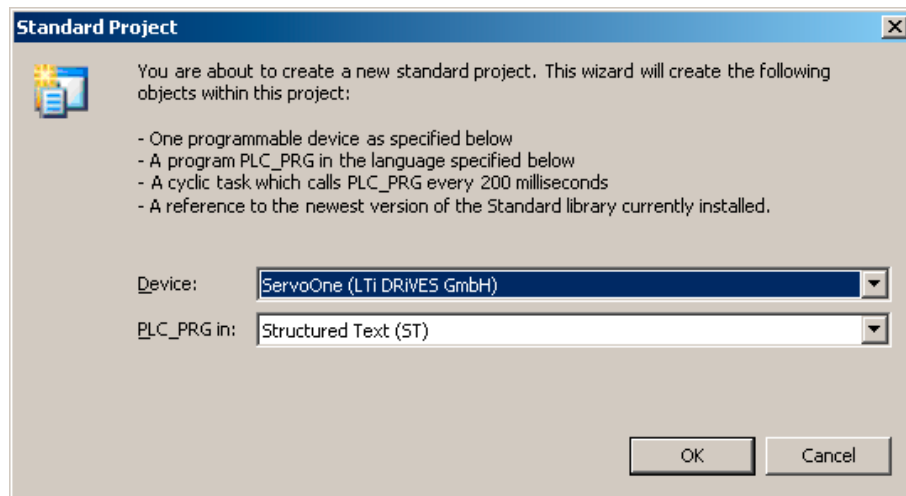


Figure 2.8 Standard Project

After confirming with “OK” you can see the User Interface Components:

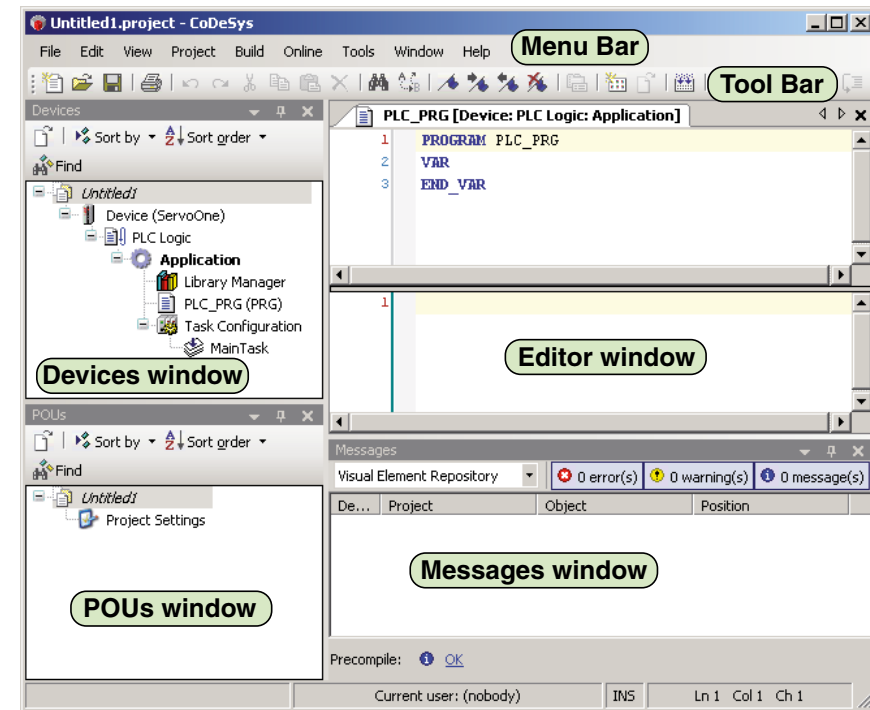


Figure 2.9 User Interface Components

- Menu Bar: Provides menus which contain all currently available commands
- Tool Bar: Contains tool buttons for all currently available tools
- ToolBox window: Provides editor-specific tools (open from View menu)
- POUs window (view): For organizing the programming units (POUs, DUTs etc)
- Devices window (view): For organizing the device resource objects
- Editor window (view): Used for creating the particular object in the respective editor.
- Messages Window: Precompile, Compile, Build, Download messages etc. are displayed in this window (message view).

In the Devices window you find the three main parts of a CoDeSys application:

- POU (PLC_PRG)
- Library Manager
- Task Configuration

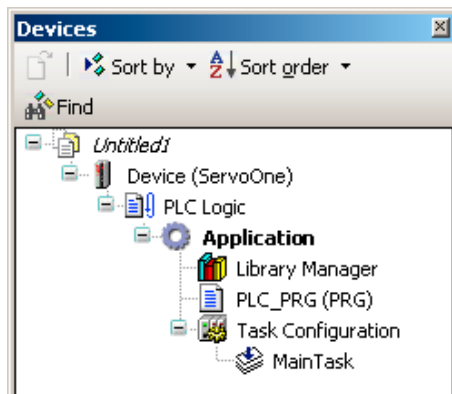


Figure 2.10 Project tree

POUs (Program Organisation Units) contain mostly the program code of the project.

The **Task configuration** contains the task of a project. A task calls one or more POU's within the project frequently. The **Library manager** contains all libraries which are needed in the project.

Now you must add the ServoOne basic motion library to the library manager.

The ServoOne standard library will be automatically included.

- Choose "Add Library..." out of the "Libraries" menu
- Select „ServoOne basic motion library“
- Click on "OK"

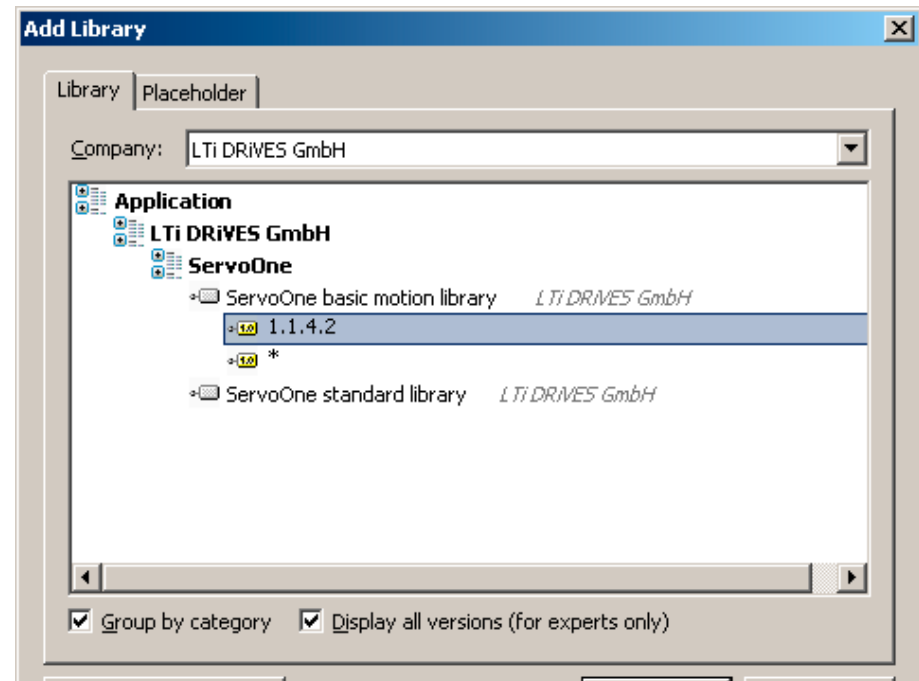


Figure 2.11 Adding a library to the Library Manager

After that, you can start to write your iPlc program in the editor window by opening the POU (PLC_PRG).

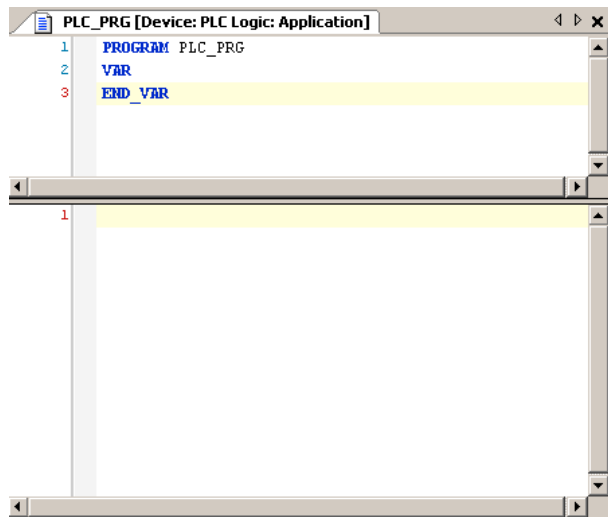


Figure 2.12 Editor window

In the following step the Gateway has to be configured. Select the Gateway and click on “Scan network”. After that select your ServoOne and click on “Set active path”.

This command sets the currently selected communication channel as the active one, which means that all actions concerning communication will exactly refer to this channel.

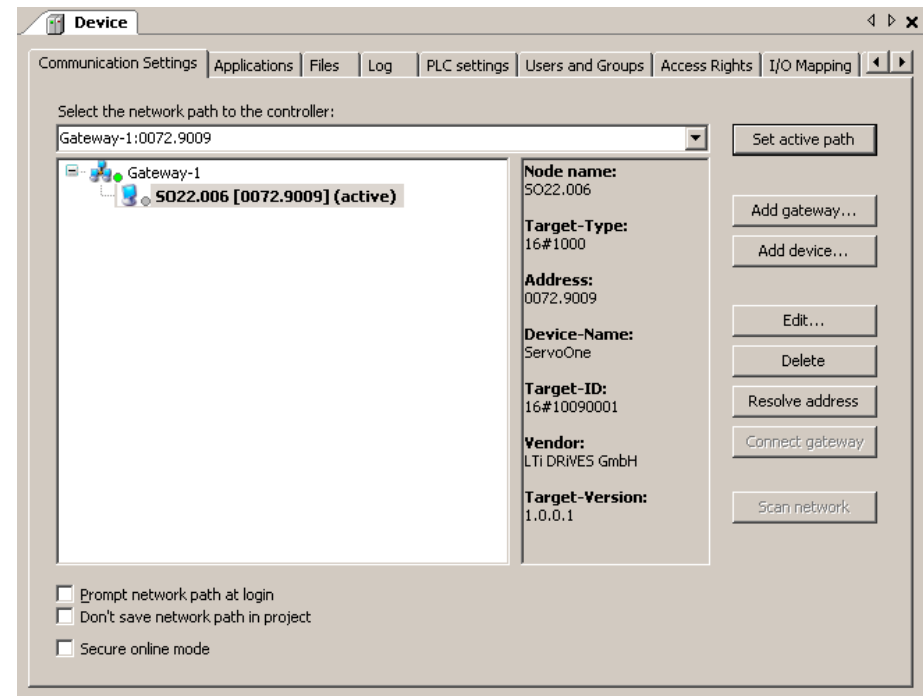



Figure 2.13 Configuration of the gateway



Figure 2.14 Toolbar Login

Then click on Login to  or Alt+F5.

After that the “Device User Logon” window appears. The User Name and the Password is “root”.

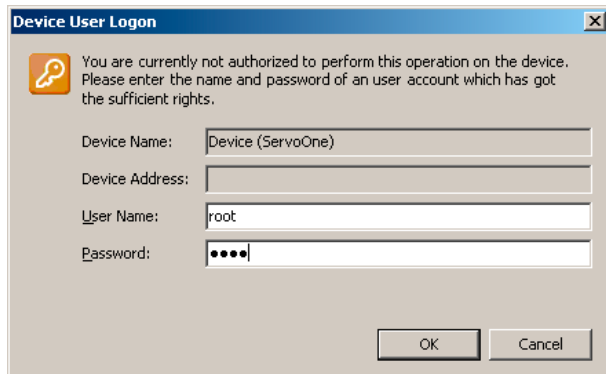


Figure 2.15 Device User Logon window

Now you can start the application by clicking the blue start arrow or F5.



Figure 2.16 Toolbar Start

The iPlc program is now running.

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