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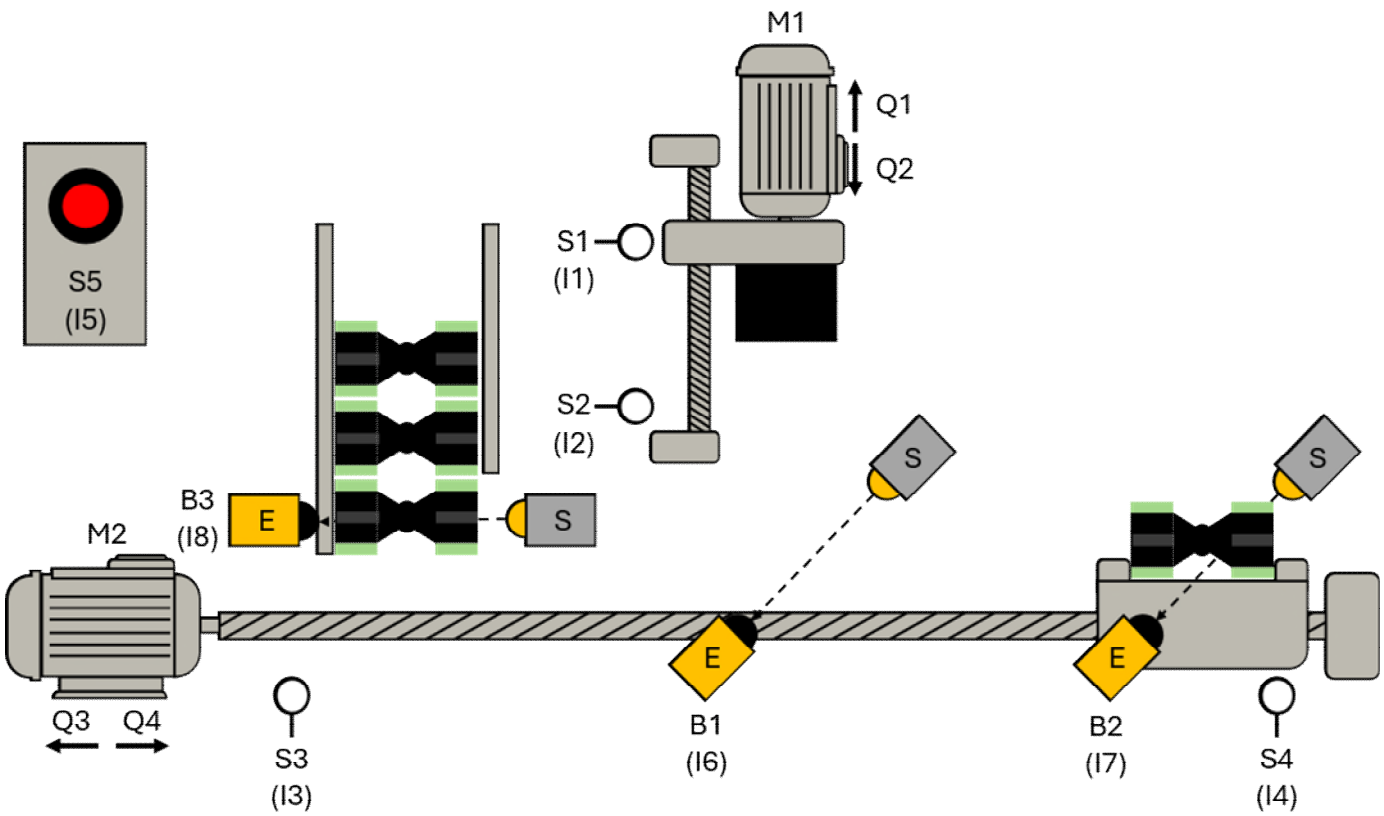
GROLLMUS
KNOWLEDGE | SOFTWARE | AUTOMATION

# Bending machine 24V

Introduction



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# 0 Foreword

## 0.1 Introduction

This accompanying material serves as a comprehensive guide to commissioning and programming programmable logic controllers (PLCs), specifically using the example of a Siemens S7-1200 in the TIA Portal. It combines a theoretical introduction with practical exercises to guide the reader step by step through the setup, configuration and commissioning of a PLC system. The concepts and techniques taught are not limited exclusively to the Siemens S7-1200, but can also be transferred to other PLC systems.

Particular attention is paid to practical application. The exercises are designed to simulate real scenarios and give the user a concrete idea of how an industrial plant can be programmed and put into operation. The exercises cover both graphical programming in function block diagrams (FBD) and textual programming in Structured Text (ST) or SCL (Siemens), so that the user can choose according to preference or necessity. In many cases, exercises are provided for both programming methods, but only one of them needs to be completed. This dual exercise selection offers flexibility and allows customization to individual learning preferences.

The content is divided into several chapters that systematically build on each other. First, a model of an industrial plant is presented to create a practical context. This is followed by a detailed description of the hardware configuration, which deals with the components of a PLC and their configuration. The various modules such as power supply, central module and input and output modules are covered, as well as symbolic addressing and project planning in the TIA Portal.

The commissioning of the hardware is then explained step by step, including connecting the PLC to the programming device, loading the project data and using diagnostic functions. Exercises on visual inspection and commissioning the hardware project planning round off this section.

Another important part of the document is dedicated to GRAFCET, a method for planning and visualizing flow chains that are essential for controlling complex processes. Rules for the creation of GRAFCET process chains are presented here.

The chapters on structured programming and data blocks provide an in-depth introduction to programming methods and the use of memory structures in a PLC.

Specific program instructions such as flip-flops, edges, time functions and counters are covered in detail and applied in practical exercises. If textual programming [ST / SCL] is chosen, the following sub-chapters IF instruction and CASE structure must also be observed.

In addition to hardware commissioning, software commissioning is also covered. It describes how the program status is monitored in various programming languages and how cross-references can be used to maintain an overview of complex programs.

The penultimate chapter focuses on the conversion of GRAFCET flowcharts into program code in the selected programming language.

At the end, the accompanying material is rounded off by the planning and programmatic implementation of the automatic sequence of the system. This is where all the knowledge from the previous chapters is put to practical use.

This accompanying material is intended to serve as a practical guide for the reader to successfully plan, implement and optimize their own PLC projects.

## 0.2 Exercise description

All exercises in this accompanying material are structured according to the following scheme:

Target:
The objective describes what added value the exercise offers, what knowledge is to be tested and consolidated.

Task:
The task contains a brief, general description of the task. This can optionally be specified in more detail by the function.

Function (optional):
The function description is optional. The behavior of the task to be implemented is specified in more detail here. For example, a detailed functional description of the process sequence of the system can be found here.

Procedure (optional):
The procedure is optional. It shows the detailed procedure for achieving the solution, step by step, usually with the aid of an S7 1200 CPU in the TIA Portal.

Solution(optional):
The solution is optional. If solutions are given, these are to be understood as suggested solutions and not as the only correct sample solution. As long as the result you produce fulfills the objective, task and functional description as specified, it is also to be regarded as correct.

Read the objective, task and function (if available) carefully before you start carrying out the task.
If the procedure is clear to you at this point, if necessary with the help of the previously taught theory, you can start with the implementation.
If you do not understand how to achieve the target and task description, you can use the procedure as a guide.
After completing the exercise, you can compare the solution you have developed with the existing solution and work out the differences, advantages and disadvantages of the implementation.