

Networked Systems in Automation Engineering



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Complete Solutions for Automation Systems

Open-Loop Control with AS-Interface, PROFIBUS and PROFINET

Present day trends in automation engineering are heading towards modular systems with distributed systems. PROFINET, PROFIBUS and AS-Interface offer all of the networking possibilities for various intelligent components – from the lowest field level up to and including process control and instrumentation. Any components needed to operate and monitor machines (HMI) are integrated into this bus environment and permit a high degree of process transparency.



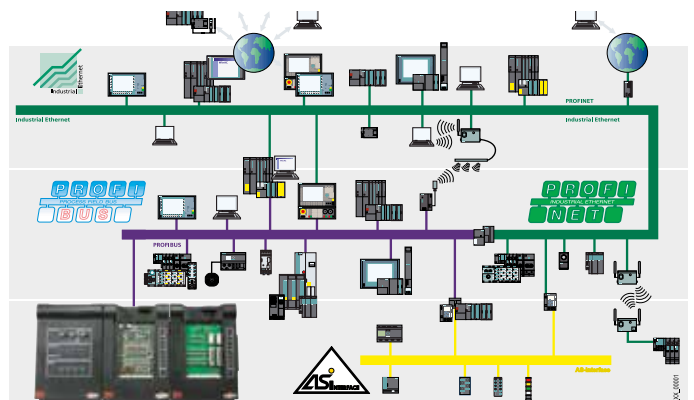
Wiring and maintenance

In order to dramatically reduce wiring and maintenance work on production lines, standardised field bus systems are increasingly being used to couple components together. This enables decentralised organisation of automation equipment, i.e. in close proximity to the actual sensors and actuators in the field. This eliminates the need for complex and error-prone parallel wiring of such actuators and sensors.



Field bus level

Thanks to standardised and open field bus protocols, systems stemming from different manufacturers are able to communicate. All automation components, including PLC systems, PCs, operating and monitoring equipment, as well as sensors and actuators themselves can all exchange data via the field bus. In order to meet demands for real-time process automation, field bus systems operate with very high data rates.



Training systems

The training systems cover all areas of control systems from simple bus structures to complex networks. One key benefit is common to all the systems and that is their rapid set-up times. By using typical industrial components, bus structures can be modified and expanded with a high degree of flexibility. Human Machine Interface (HMI) technology is naturally included as well.

The following network systems can be integrated:

- AS-Interface
- PROFIBUS
- PROFINET
- Industrial Ethernet



Industrial Bus Systems

Understanding and Using Bus Systems

It is essential nowadays to know about the most important industrial bus systems. With this compact equipment set you can learn about project planning for three different bus systems and how to use them. You will become familiar with these bus systems not merely from the extensive background theory but also from the detailed experiment instructions. The first assignment covers direct communication using the I/O of the PLC system. As an introduction to bus systems themselves, a conveyor belt will then be connected via an AS-i bus. The system most commonly used in industry, PROFIBUS, is covered second. Then finally, a conveyor belt will be controlled via PROFINET. One system can therefore be controlled by four different communications interfaces.



Sample experiment "Industrial bus systems CBS 1"

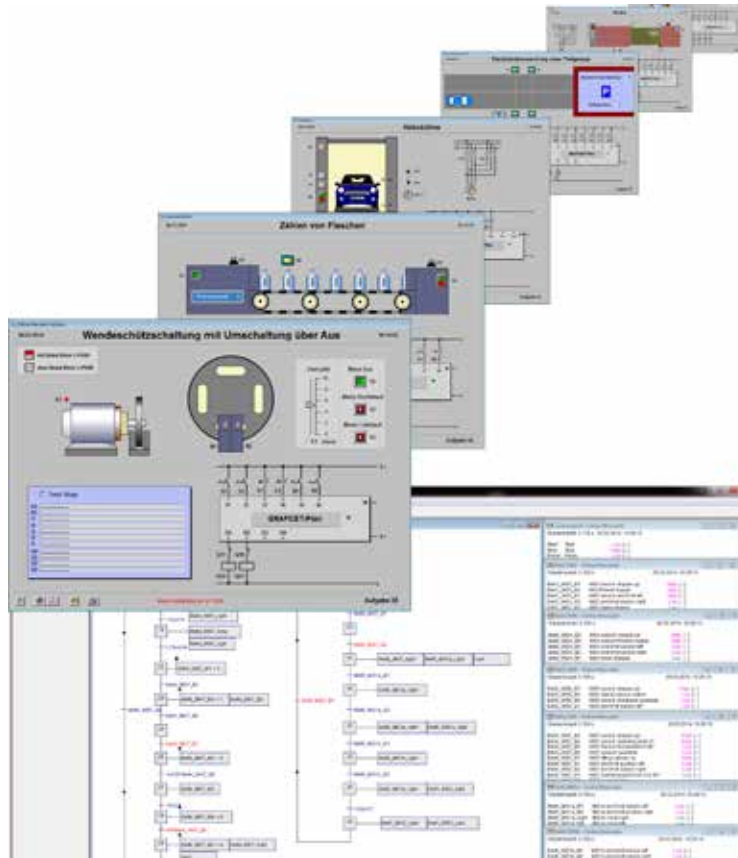
Training contents

- Fundamentals of TIA Portal
- Programming of a conveyor belt via I/O
- Fundamentals and project planning for AS-i bus
- Control of a conveyor belt via AS-i
- Fundamentals and project planning for PROFIBUS
- Control of a conveyor belt via PROFIBUS
- Fundamentals and project planning for PROFINET
- Control of a conveyor belt via PROFINET

Grafcet

GRAF CET Practical Set

In the GRAFCET practical set for the S7-1200 there are 15 process simulations available with practice-oriented exercises and representative solutions. The S7-1200 is connected to the PC via a standard Ethernet interface. GRAFCET plans are drafted on the PC and tested using the inputs and outputs of the PLC system.



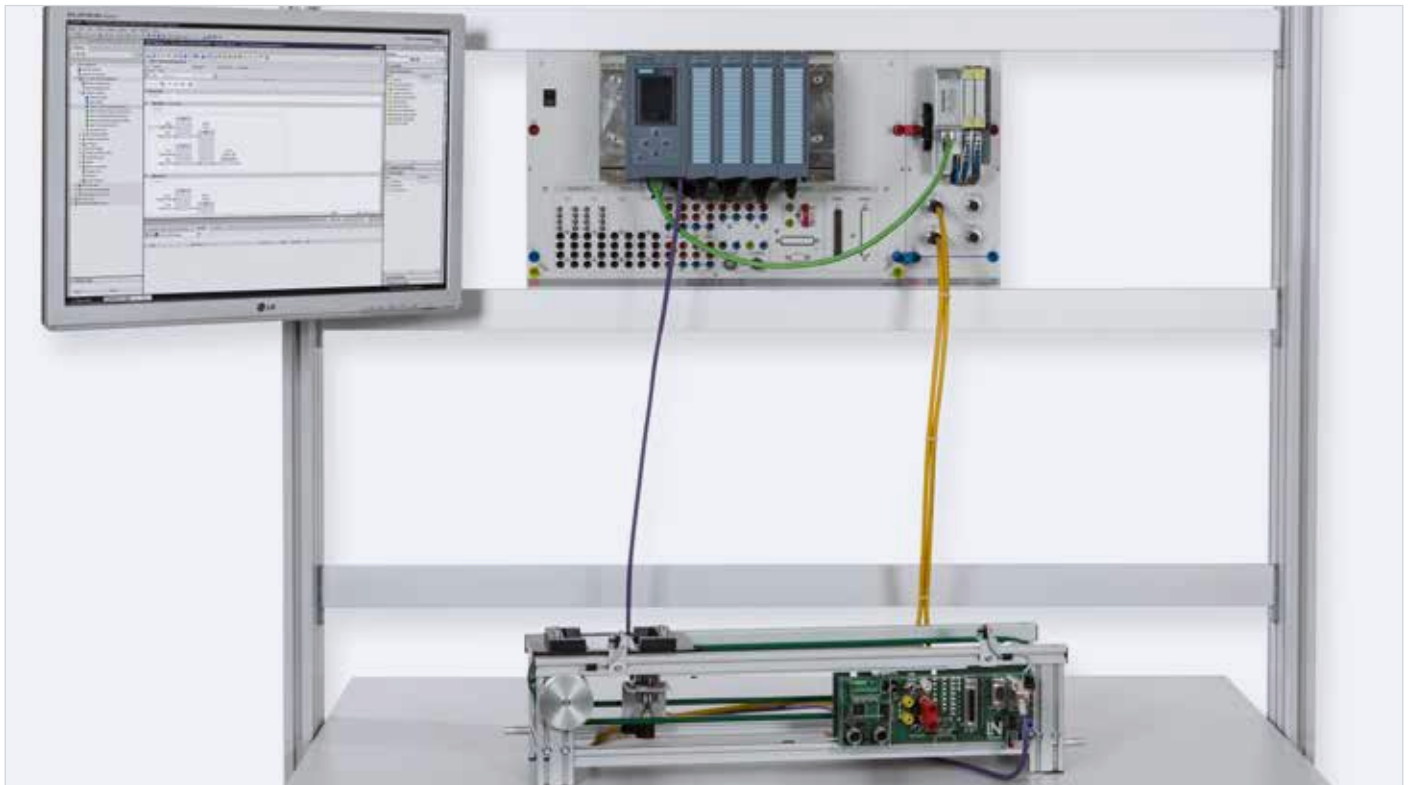
Equipment

- Temperature monitoring with indicator lights
- Heating up a furnace with a solar collector
- Temperature monitoring of a boiler
- Detection of rotation direction of a slowly rotating shaft
- Reversing contactor circuits with change-over via an off switch
- Reversing contactor circuits with direct switch-over
- Open-loop control of a reversible drive
- Continuous inching mode for a motor
- Parking space monitoring
- Bottle counting
- Gear lubrication
- Traffic light system
- Lifting platform
- Running lights
- Rolling shutters

RFID

RFID Chips as Product IDs

Standing for Radio Frequency Identification, RFID involves contactless identification and localization of objects and permits automatic registration, storage and networking of digital data. The "RFID" training system is a practical environment for learning how pallets at an automation facility are identified by means of system function modules (SFC). The system can also be used to provide instruction in network configuration by means of PROFINET.



Experiment example "CID 1"

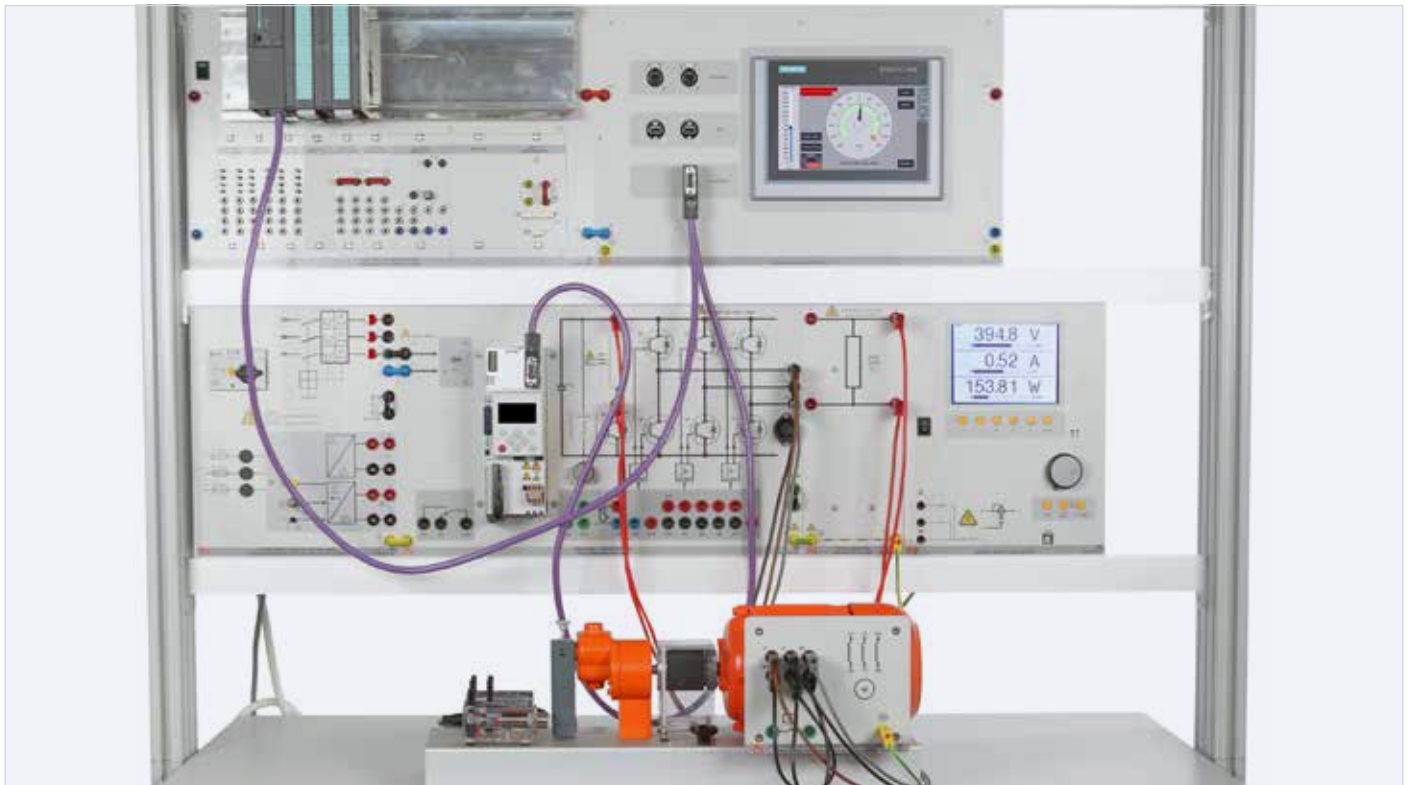
Training contents

- Writing and reading RFID tags
- Using various RFID modules
- Fundamentals of network technology and practical applications using experiment setups
- Data transmission with TCP/IP
- PROFINET
- Diagnostics

Open-Loop Control of Drive Systems

Close Relationship between Drive and Automation Engineering

The main focus of this training system lies in project planning and programming the PLC and operator panel as well as putting a frequency converter into operation and setting its parameters via PROFIBUS DP. The training system employs a servo brake to subject the frequency converter-controlled drive machine to a load. This enables various working machines such as a fan, winding drive, calendar, compressor and a flywheel to be simulated using variable parameters.



Experiment example "Open-loop control of drive systems CLP 20"

Training contents

- Setting parameters, programming and utilising a programmable logic control unit
- Project planning and operation of an operator panel
- Setting parameters and operation of a frequency converter
- Project planning and operation of a field bus system
- Parameter optimisation on various adjustable working machines