# Workstation LC2030

The LC2030 workstation was designed for training in open and closed-loop control technology. It offers a wide selection of practice options, from simple open-loop control tasks to complex controlled systems.

All signals (0/2...10V DC or 24V DC) are available via 4 mm laboratory sockets on the system control panel. The filling level is recorded via a float switch or a pressure sensor. The filling level is changed by controlling the three pumps and/or the valves. Switches and buttons on the control panel can be used flexibly for operation. Signal lights enable errors and process states to be displayed.



## Technical Data

- Dimensions (W x D x H): 520 x 450 x 720 mm
- Container contents: 2 x ca. 8 l
- Weight: approx. 26 kg

## Control Loops

- Level control with controllable pump,
- Level control with controllable valve (optional),
- Flow control with controllable pump (optional),
- Flow control with controllable valve (optional),
- Pressure control with controllable pump (optional),
- Temperature control with heating element and cooler (optional).

## Open-Loop Control Technology

- Four pumps can be switched on/off,
- Three float switches show three different filling levels,
- Three switches and two buttons can be switched by hand,
- Three LEDs (red, yellow, green) in the control panel can be controlled.

With the help of the switches and buttons, tasks such as emergency stop, process start and stop, and interruption can be implemented. The lamps enable malfunctions, errors and process states to be identified.

## Scope of Delivery

Frame with control panel, two containers made of acrylic glass, pressure transmitter (fill level), adjustable pump, two centrifugal pumps, three level float switches, drain hose, power cable, instructions

## Optional Extensions for the LC2030

Controllable valve, flow sensors (inlet and outlet), heating element, temperature sensor, circulation pump, cooler, pressure sensor, LC2030 training (software)

# LC2030 Training

Use the LC2030 Training for training in control engineering.

Investigate the behaviour of 6 different control loops with standard controllers.

Create your own controls using GRAFCET and logic plans and test them on the integrated simulated of the real system.

Integrated MQTT protocol for connection to brokers, WEB visualization (Industry 4.0).

Possible uses of LC2030 Training:

- Connection to the real workstation LC2030 (automation, control)
- Working with the integrated simulated system (automation, control)
- Connection of the simulated system to PLC or controls via OPC UA
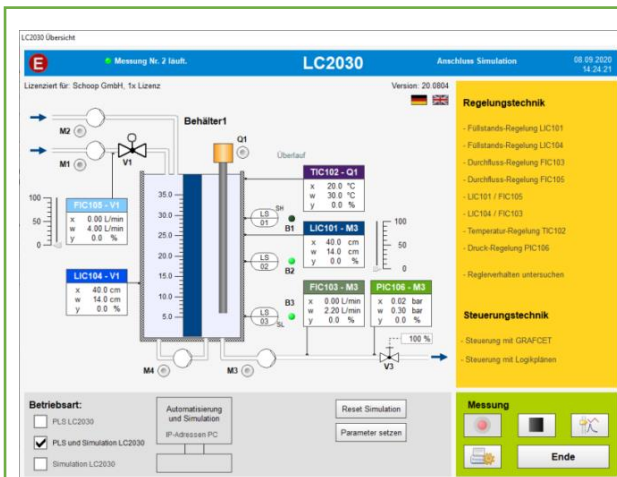


## Closed-Loop Control

- Level control with controllable pump
- Level control with controllable valve
- Flow control with controllable pumpe
- Flow control with controllable valve
- Temperature control
- Pressure control
- Combined control
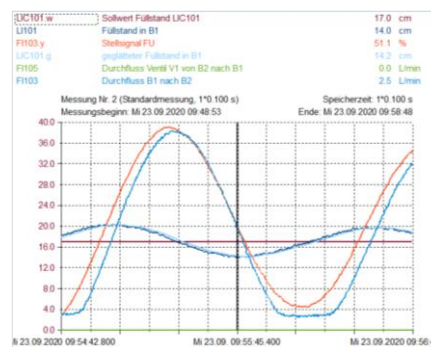


All control variables, controller parameters and state variables are recorded and can be graphically evaluated later.
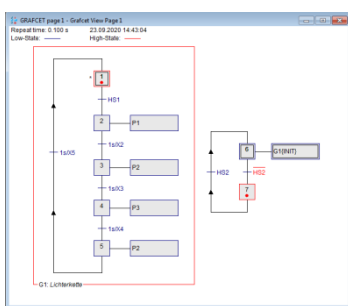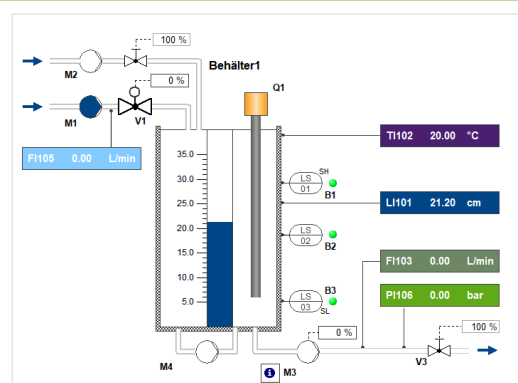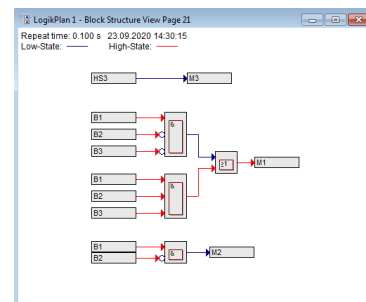


## Open-Loop Control

Creation of (sequence) controls using GRAFCET plans.

Creation of controls using logic plans.

Use of the controls on the real or simulated system.





## Simulated System for External Controls

Use the simulated system for training in the programming of external controls (PLS, Codesys, etc).

Connection is possible via OPC UA or directly for S7-300, S7-1200, S7-1500, LOGO.

Program controllers and test them on the simulatd system.

Program (sequence) controls and test them on the simulated system.

# LC2030 Training – Didactical Structure
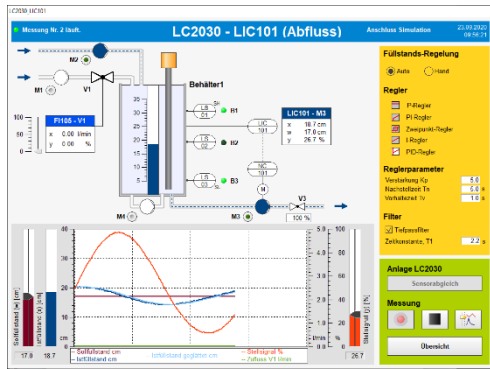


## Closed-Loop Control

- Selection of system
- Selection of controller
- Investigating the system, disturbance response and command action
- Grafic evaluation of the transient response
- Free setting of the controller parameters
- Optimizing the control

## Open-Loop Control with GRAFCET and Logic Plans

- Creating the control using GRAFCET plans or logic plans
- Execution of the GRAFCET plans or logic plans
- Grafically monitor and test the sequences of the GRAFCET plans and logic plans
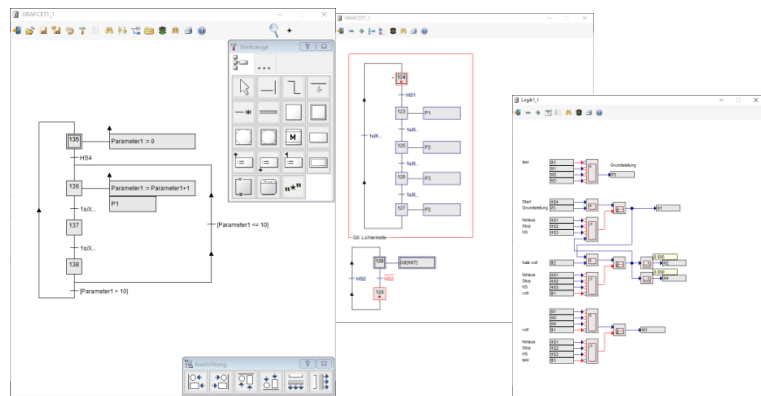


## Selection of Simulated or Real System

- Connection to the real workstation LC2030 via I/O board 8488 or directly via network (LC2030BK)
- Working with the simulated system

Carry out all control engineering experiments and all controls with GRAFCET or logic plans both with the real system and with the integrated simulated system



## PLC Connection to the Simulated System

Connection of external controls (PLC, Codesys, etc.) to the simulated system via OPC UA or directly for S7-300, S7-1200, S7-1500, LOGO.

Controls previously developed using GRAFCET or logic plans can be implemented externally and tested on the simulated system.
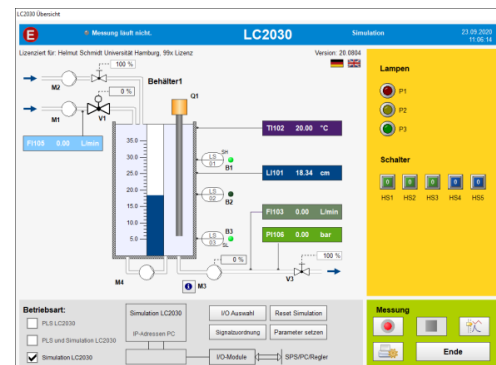


With the integrated MQTT protocol, connections to brokers in the Internet can be established. Thanks to the WEB visualization, the system can also be operated via mobile phones or tablets.

Teaching material with tasks for control engineering as well as an introduction to GRAFCET are included for activity-oriented teaching.