






## Course description

# Basics of Sensors and Actuators

	Level of difficulty	Beginner
	Learning time	15 h
	Additionally recommended learning media	Basics of Sensors (Evaluation)
	Course type	eLab
	Theme category	Factory Automation

After completing the training, the learners know the function and structure of an overall mechatronic system. They know the sensors and actuators of an automated system. The learners can independently carry out the commissioning of the components using the technical documentation. The material flow of the system as well as the representation of a flow chart in GRAFCET complete this training.

No.	Task	Method	Competency level	Content	Competencies	Learning time	HW/ SW depend
<b>Learning unit 1: Stacking Magazine Module</b>							
1	Structure and function of the stacking magazine module	Guidance text supported Method	Knowledge	<ul style="list-style-type: none"> <li>▪ Module stacking magazine</li> <li>▪ Mini I/O terminal</li> <li>▪ Through-beam photoelectric sensor</li> <li>▪ Cylinder</li> <li>▪ 5/2-way solenoid valve</li> <li>▪ Throttle check valve</li> <li>▪ Magnetic proximity switch</li> </ul>	<ul style="list-style-type: none"> <li>▪ Know the structure and function of the stacking magazine.</li> <li>▪ Can allocate the individual components of the stacking magazine.</li> <li>▪ Can identify the components with the help of the technical documentation.</li> </ul>	30 min.	No
2	Workpiece output in the stacking magazine	Guidance text supported Method	Understand	<ul style="list-style-type: none"> <li>▪ Module stacking magazine</li> <li>▪ Mini I/O terminal</li> <li>▪ Through-beam photoelectric sensor</li> <li>▪ Cylinder</li> <li>▪ 5/2-way solenoid valve</li> <li>▪ Throttle check valve</li> <li>▪ Magnetic proximity switch</li> </ul>	<ul style="list-style-type: none"> <li>▪ Know the structure and function of a throughbeam photoelectric sensor.</li> <li>▪ Can adjust a through-beam photoelectric sensor.</li> <li>▪ Know the construction and function of a 5/2-way solenoid valve.</li> <li>▪ Are able to independently learn about the structure and function of a double-acting cylinder.</li> <li>▪ Can perform a functional test of the components.</li> <li>▪ Can identify the individual components with the help of the circuit diagram.</li> <li>▪ Know the structure and function of the magnetic proximity switch.</li> <li>▪ Can interpret the signals of a magnetic proximity switch.</li> </ul>	75 min.	Yes

No.	Task	Method	Competency level	Content	Competencies	Learning time	HW/ SW dependent
3	Commissioning of the stacking magazine module	Guidance text-supported Method	Apply	<ul style="list-style-type: none"> <li>▪ Commissioning</li> <li>▪ Visual inspection</li> <li>▪ Functional test</li> <li>▪ Troubleshooting</li> </ul>	<ul style="list-style-type: none"> <li>▪ Could put a mechatronic subsystem into operation.</li> <li>▪ Can perform a visual inspection on a subsystem.</li> <li>▪ Can perform a functional test on a subsystem.</li> <li>▪ Can identify errors and correct them.</li> <li>▪ Can reproduce the knowledge gained about the individual components.</li> </ul>	90 min.	Yes

No.	Task	Method	Competency level	Content	Competencies	Learning time	HW/ SW depend
<b>Learning unit 2: Module Conveyor</b>							
4	Structure and function of the Tape module	Guidance text supported Method	Understand	<ul style="list-style-type: none"> <li>Module conveyor</li> <li>DC motor controller</li> <li>Mini I/O terminal</li> <li>DC motor</li> <li>Through-beam photoelectric sensor</li> <li>Diffuse reflection light scanner</li> <li>Light guide device</li> </ul>	<ul style="list-style-type: none"> <li>Know the structure and function of the belt.</li> <li>Can match the individual components of the magazine.</li> <li>Can identify the components with the help of the technical documentation.</li> </ul>	30 min.	No
5	Workpiece detection at the intermediate position	Guidance text supported Method	Apply	<ul style="list-style-type: none"> <li>Module conveyor</li> <li>DC motor controller</li> <li>Mini I/O terminal</li> <li>DC motor</li> <li>Through-beam photoelectric sensor</li> <li>Diffuse reflection light scanner</li> <li>Light guide device</li> <li>Adjustment</li> </ul>	<ul style="list-style-type: none"> <li>Know the structure and function of a diffuse reflection light scanner with fibre optics.</li> <li>Know the principles of object detection using a diffuse sensor with fiber optics.</li> <li>Can carry out the adjustment of a diffuse sensor with fibre optics.</li> <li>Can reproduce the knowledge gained about the individual components.</li> </ul>	90 min.	Yes

No.	Task	Method	Competency level	Content	Competencies	Learning time	HW/ SW dependent
6	Controlling a DC motor with a motor controller	Guided text Method	Apply	<ul style="list-style-type: none"> <li>▪ Module conveyor</li> <li>▪ Commissioning</li> <li>▪ DC motor</li> <li>▪ Motor controller</li> <li>▪ Tape control</li> </ul>	<ul style="list-style-type: none"> <li>▪ Can independently learn about the structure and function of the DC motor.</li> <li>▪ Know the operating principle of a DC motor.</li> <li>▪ Can work with technical documentation and interpret information.</li> <li>▪ Know the structure and function of a motor controller.</li> <li>▪ Can control a DC motor with a motor controller.</li> <li>▪ Can control a tape.</li> <li>▪ Can reflect on the knowledge gained.</li> </ul>	60 min.	Yes
7	Commissioning of the conveyor module	Guided text Method	Apply	<ul style="list-style-type: none"> <li>▪ Module conveyor</li> <li>▪ Function test</li> <li>▪ Commissioning</li> <li>▪ Mechatronic subsystem</li> </ul>	<ul style="list-style-type: none"> <li>▪ Can carry out a visual inspection on the module belt.</li> <li>▪ Can perform a functional test of the electrical components.</li> <li>▪ Can put a tape into operation.</li> <li>▪ Can reproduce the operation of a mechatronic subsystem.</li> <li>▪ Know the structure and components of a mechatronic subsystem.</li> </ul>	45 min.	Yes

No.	Task	Method	Competency level	Content	Competencies	Learning time	HW/ SW de-pend
<b>Learning unit 3: Station Distribute Pro</b>							
8	Material flow and production storage of the MPS Station Distribute Pro	Guided text Method	Apply	<ul style="list-style-type: none"> <li>Module stacking magazine</li> <li>Station Distribute Pro</li> <li>Material flow</li> <li>Production memory</li> <li>Handling technology</li> <li>Total/partial functions</li> </ul>	<ul style="list-style-type: none"> <li>Know the different types of production memories.</li> <li>Know the storage types of the stacking magazine module.</li> <li>Know the symbols of the material flow.</li> <li>Can allocate the handling technology symbols to the material flow of the station.</li> <li>Can assign the entire material flow to the station.</li> <li>Know the overall and partial functions of the station.</li> </ul>	150 min.	Yes
9	Creating a GRAFCET for the MPS Station Distribute Pro sequence	Guided text Method	Apply	<ul style="list-style-type: none"> <li>Station Distribute Pro</li> <li>Sequence control</li> <li>GRAFCET</li> <li>Simulation</li> </ul>	<ul style="list-style-type: none"> <li>Know the basic features of a sequence control.</li> <li>Can describe the main features of a sequence control system.</li> <li>Can describe a sequence control for the station.</li> <li>Know the functions and possibilities of GRAFCET.</li> <li>Can create a process description in GRAFCET for a mechatronic subsystem.</li> <li>Can simulate a sequence control for the station.</li> </ul>	120 min.	Yes
10	Commissioning of the MPS Station Distribute Pro	Guidance text based method	Apply	<ul style="list-style-type: none"> <li>Commissioning</li> <li>Visual inspection</li> <li>Functional test</li> <li>Technical documentation</li> <li>Signal Check</li> </ul>	<ul style="list-style-type: none"> <li>Know the procedure of a systematic commissioning of a mechatronic system.</li> <li>Can check a mechanical test of the components.</li> <li>Can perform electrical and pneumatic testing of components.</li> <li>Can check connection situations using technical documentation.</li> <li>Can check signals from sensors using the simulation box.</li> <li>Can commission a complete mechatronic system.</li> </ul>	60 min.	Yes