

Allocation of training aims and exercises (Table 1)

Description	Exercises																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Direct actuation of a single-acting cylinder	•	•	•	(•)																
Indirect actuation of single-acting cylinders									•				•							•
Direct actuation of double acting cylinders				•																
Indirect actuation of double acting cylinders					•	•	•	•		•	•	•	•	•	•	•	•	•	•	•
Creating an OR function						•		•	•	•		•		•					•	•
Creating an AND function					•	•	•	•			•	•		•	•	•	•	•	•	•
Time dependent control systems							•	•		•	•	•				•	•	•	•	(•)
Pressure dependent control systems																				
a) Pressure sequence valve									a						a					a
b) Pressure regulator									b		b	b			b				b	b
Use of limit valves (roller lever valves)					•	•	•		•	•	•	•	•	•	•	•	•	•	•	•
Signal switch-off through																				
a) Roller lever valve with idle return											(a)				a					
b) Reversing valve															(b)	b	b	b	b	b
Control systems with continuous cycle							•	•			•		•							•
Oscillating cylinder movements										•						•				
Self-latching loop									•		•									(•)
Black-box problem solution																				•

() Training aims for later evaluation

Allocation of components and exercises (Table 2)

Description	Exercises																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3/2-way valve with push button, normally closed	1	1			2	3		1	1	1	1	2		1	2	1	1	1	1	1
3/2-way valve with push button, normally open			1						1											
5/2-way valve with selector switch				1			1	1			1		1					1	1	
Pressure gauge		2	2	2	2			1				2				2	2	2	2	
3/2-way roller lever valve, normally closed						1	2	2		3	2	4	2	3	2	3	3	2	4	4
3/2-way roller lever valve with idle return, norm. closed															2					
5/2-way single pilot valve					1				2		1						1	1	1	1
5/2-way double pilot valve						1	1	1		2	1	3	3	2	2	3	3	3	3	2
Shuttle valve (OR)						1		1	1	1	1	1		1				1	1	2
Dual pressure valve (AND)					1	1	1	1			1	1			1			3	1	4
Time delay valve, normally closed							1	1		1	1	1				1	1	1	1	
Quick exhaust valve			1		1											1				1
One-way flow control valve		1	1	2	1	1	2	1	2		1	2			2	2	2	2	2	1
Pressure sequence valve								1						1						1
Single-acting cylinder	1	1	1						1				1					1		1
Double-acting cylinder				1	1	1	1	1		1	2	2	2	2	2	2	1	1	2	2
Service unit with on-off valve	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pressure regulator with pressure gauge								1		1		1	1		1				1	1
Manifold	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Number of components	4	7	8	8	11	11	11	15	10	12	14	21	12	12	16	17	17	21	25	19
Number of components used for the first time	4	2	2	2	2	3	1	2	0	0	0	0	0	0	1	0	0	0	0	0

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Training aim	Exercises																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Direct actuation of single acting cylinders	•				•		•		•											
Direct actuation of double acting cylinders		•			•		•		•		•		•							
Indirect actuation of single acting cylinders			•			•		•		•					•	•				
Indirect actuation of double acting cylinders				•		•		•		•		•		•	•	•	•	•	•	•
AND-funktion of the input signals					•	•														
OR-funktion of the input signals							•	•												
Actuation from two different positions									•	•										
Reversal by means of an electric limit switch											•	•								
Oscillating motion of the piston rod												•	•							
Electric latching circuit with dominating switch-of signal															•					
Electric latching circuit with dominating switch-on signal																•				
Reversal by means of magnetic proximity switches																	•		•	
Reversal by means of pressure switches																		•	•	
Co-ordinated motion control with auxiliary conditions																				•

Allocation of components and exercises (Table 2)

Description	Exercises																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Relay, 3-off			1	1		1		1		1		1		1	1	1	1	1	1	1
Signal input plate, electrical	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Indicator and distributor plate, electrical	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
Single-acting cylinder	1		1		1	1	1	1	1	1					1	1				
Double-acting cylinder		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Service unit with on-off valve	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Manifold	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Proximity sensor with cylinder mounting																	2		2	2
Limit switch, electrical, actuated from the left											1	1	1	1						1
Limit-switch, electrical, actuated from the right													1	1						1
Pneumatic-electrical converter																		1	1	
3/2-way single solenoid valve, normally closed	1		1		1	1									1	1				
5/2-way single solenoid valve	1	1	1	1	1	1	1	1							1	1				1
5/2-way double solenoid valve									1	1	1	1	1	1			1	1	1	1
Number of components	4	7	8	8	11	11	11	15	10	12	14	21	12	12	16	17	17	21	25	19