Contents

Preface	5
1 Modern information technology	9
1.1 Fundamentals of electrical engineering	. 10
1.1.1 Sensors	10
1.1.2 Actuators	11
1.2 Open-loop and closed-loop control	12
1.2.1 Classification of open-loop control systems	
1.2.2 Classification of closed-loop control systems	14
1.3 Programmable logic circuits and programmable relays	15
2 Introduction to working with Siemens LOGO! Soft Comfort	17
2.1 The program interface	17
2.1.1 Developing a program	18
2.2 Settings	20
2.2.1 Block properties	
2.2.2 Basic program settings	21
2.3 The help function	21
2.4 The simulation mode	21
3 Connection of LOGO! and transfer of a program	
3.1 Preassembled practice boards for simulation	23
3.1 Preassembled practice boards for simulation	23 23
3.1 Preassembled practice boards for simulation	23 23
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network	23 23 24 25
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply	23 23 24 25
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network	23 23 24 25
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function	23 24 25 25 29
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media	23 24 25 25 29
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function	23 24 25 25 29 30
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO!	23 24 25 25 29 30 33
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO! 3.7 Expansion components for LOGO! 3.8 Trial project for circuit wiring 3.8.1 Circuit for hardware simulation	23 24 25 25 29 30 33 34
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO! 3.7 Expansion components for LOGO! 3.8 Trial project for circuit wiring	23 24 25 25 29 30 33 34
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO! 3.7 Expansion components for LOGO! 3.8 Trial project for circuit wiring 3.8.1 Circuit for hardware simulation	23 24 25 29 30 33 34 34
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO! 3.7 Expansion components for LOGO! 3.8 Trial project for circuit wiring 3.8.1 Circuit for hardware simulation 3.8.2 A simple program: the twilight switch 3.9 Integration of the LOGO! into 5 V systems 3.10 Transfer of programs	23 24 25 25 30 33 34 37 37
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO! 3.7 Expansion components for LOGO! 3.8 Trial project for circuit wiring 3.8.1 Circuit for hardware simulation 3.8.2 A simple program: the twilight switch 3.9 Integration of the LOGO! into 5 V systems 3.10 Transfer of programs 3.10.1 Sending programs to the LOGO!	23 24 25 25 30 33 34 37 39 39
3.1 Preassembled practice boards for simulation 3.2 The connection of sensors and actuators 3.3 Power supply 3.4 LOGO! in the network 3.4.1 The capabilities of a web server 3.5 External storage media 3.6 SMS function 3.6.1 Data exchange between CMR2020 and LOGO! 3.7 Expansion components for LOGO! 3.8 Trial project for circuit wiring 3.8.1 Circuit for hardware simulation 3.8.2 A simple program: the twilight switch 3.9 Integration of the LOGO! into 5 V systems 3.10 Transfer of programs	23 24 25 25 29 30 33 34 37 39 39

4 Simple exercises with the LOGO!	41
4.1 Switching by means of digital signals	41
4.2 Switching by means of analog signals	42
4.3 Time delays	43
4.4 Comparator circuit	44
4.5 Pulse or frequency measurement	46
4.6 Information output on one display	
4.6.1 Ticker function and colored background lighting	
4.7 Simplifying complex circuits	
4.7.1 Splitting and merging connections	
4.7.2 Creating UDF blocks	49
5 Planning and carrying out a project in information technology	
5.1 Project planning using an example of a fan circuit	
5.2 Safety notes	
5.3 A simple soldering course	
5.3.1 Manufacturing a board for the simulation of the LOGO! inputs	58
6 Using the LOGO! in day-to-day operations	60
6.1 A weather station	
6.1.1 Anemometer subprogram	
6.1.2 Temperature measurement subprogram	
6.1.3 Precipitation measurement subprogram	
6.1.4 Overall program for weather station	
6.2 An illumination system	
6.3 A plant station for the window sill	
6.4 A tea brewer	
6.4.1 Water boiler subproject	
6.4.2 Tea cup subproject	
6.4.3 Control system subproject	
6.5 An electronic lock	
6.5.1 Shift register function of the LOGO!	
6.5.2 Brief description of the function block diagram	
6.6 Object monitoring	
6.6.1 Integration of a camera	
6.7 An intelligent garden watering system with process water control	92
6.7.1 Soil humidity measurement subproject	
6.7.2 Watering process subproject	
6.7.3 Overall circuit for garden watering	93
6.8 Speed measurement with the LOGO!	
6.9 Controlling a photovoltaic system	
6.10 Generating hot water using a wood stove	
6.11 An (automobile) alarm system	
6.12 Automated feeding machine for an aquarium or terrarium	
6.13 Telemetry for a vacation home	
6.13.1 Subproject: Access point protection	

6.13.2 Subproject: Frost and humidity monitoring	124
6.13.3 Additional capabilities of the remote display and remote control	125
6.14 A service for seniors	128
6.14.1 Motion detector subproject	129
6.14.2 Water consumption subproject	132
6.14.3 Medication taking subproject	
6.15 The automatic lawn mower	137
6.15.1 Controlling the two motors subproject	140
6.15.2 Putting the lawn mower into parking position subproject	142
6.15.3 Lawn mower with low battery power subproject	144
6.15.4 Lawn mower in the parking position subproject	144
6.15.5 Tip-over protection subproject	147
6.15.6 UDF blocks in the project	148
7 Appendix	153
7.1 Signal designations	153
7.2 Time delays	154
References	155
Index	100