

TABLE OF CONTENTS

List of symbols.....	7
1. BASIC COMPONENTS OF HYDRAULIC SYSTEMS (<i>Paweł Ciężkowski, Sebastian Bąk</i>)...	9
1.1. Introduction.....	9
1.2. Design and operation of basic hydraulic components.....	9
1.3. Laboratory stand.....	13
1.4. Method and measurements.....	16
1.5. Laboratory task.....	17
References.....	18
2. CONTROL IN HYDRAULIC SYSTEMS WITH THE USE OF PROPORTIONAL TECHNOLOGY (<i>Dariusz Dąbrowski</i>).....	19
2.1. Introduction.....	19
2.2. The principle of operation of devices in proportional technology.....	20
2.2.1. Proportional directional control valve 4WRE.....	20
2.2.2. Proportional directional control valve PVG 32.....	21
2.2.3. A10V0 Pump.....	22
2.3. Laboratory stand.....	23
2.4. Course of measurements.....	27
2.5. Developing the results of measurements.....	28
References.....	29
3. HYDRAULIC CYLINDER ROD POSITION CONTROL (<i>Jarosław Kuśmierczyk</i>).....	31
3.1. Introduction.....	31
3.2. Structure and operation principle of electro-hydraulic servo system for position control....	32
3.3. Test stand.....	33
3.4. Control system.....	34
3.5. Hydraulic system and proportional valve.....	35
3.6. Performing the experiment.....	38
References.....	39
4. BASIC COMPONENTS OF PNEUMATIC SYSTEMS (<i>Paweł Gomoliński</i>).....	40
4.1. Aim of the exercise.....	40
4.2. Definitions.....	40
4.3. Introduction to pneumatic drive systems architecture.....	41
4.3.1. Pre-treatment of working medium.....	41
4.3.2. Basic actuators.....	42
4.3.3. Basic control devices.....	42
4.3.4. Direct and indirect control.....	46

4.4. Symbols of pneumatic components	47
4.5. Description of the laboratory test stand	49
4.5.1. Handling the test stand fastening systems	50
4.6. Sample pneumatic drive system	51
4.7. Procedure for the laboratory exercise	54
4.8. Sample tasks performed within the laboratory exercise	54
4.9. Safety rules	55
References	55
5. CHARACTERISTICS OF A POSITIVE-DISPLACEMENT PUMP (<i>Michał Makowski</i>)	56
5.1. Introduction	56
5.2. Basic concepts and dependencies	56
5.3. Object of the study	58
5.4. Test stand	58
5.5. Conducting measurements	59
5.6. Control panel	60
5.7. Developing results	61
References	62
6. DIMENSIONLESS CHARACTERISTICS OF A TORQUE CONVERTER (<i>Michał Makowski</i>)	63
6.1. Introduction	63
6.2. Basic dependencies and construction of the torque converter	63
6.3. Object of the study	68
6.4. Test bench	69
6.5. Course of measurements	71
6.6. Developing the results of measurements	72
6.7. Issues related to the topic of the activity	73
References	73
7. DIMENSIONLESS CHARACTERISTIC OF HYDROSTATIC DRIVE (<i>Lech Knap</i>)	74
7.1. Introduction	74
7.2. Construction and operation of a hydrostatic transmission, main terms and dependencies	74
7.3. Object of the studies	77
7.4. Test stand	78
7.5. Method of measurements	81
7.6. Elaboration of results of measurements	82
7.7. Issues related to the topic of the activity	83
References	83