

Equipment set TP 701 – Basic level

Basic proportional hydraulics training



Proportional hydraulics, Basic Level

Proportional valves are continuous valves that, thanks to proportional magnets, not only permit simple switching positions, but also enable a continuous transition in the valve opening.

These valves are specifically used in hydraulics where variable volumetric flows (proportional directional control valve or proportional throttle) are needed together with load compensation (proportional flow control valve) or variable pressures (proportional pressure-relief valve). The equipment set provides information about proportional valves, how they function, and how they are activated using proportional amplifiers and a setpoint value card. The set can be used to design, set, and commission simple proportional control systems.

Training content

Components:

- Design and function of different proportional valves
- Characteristic curves and characteristics of proportional valves
- Design and function of amplifiers and setpoint specification
- Getting to know the characteristics of the 1 and 2-channel amplifier
- Completely setting the 1-channel amplifier
- Setting the basic current, step current, and maximum current
- Getting to know the characteristics of the 4/3-way proportional valve and the proportional pressure-relief valve
- Deriving the settings for the 2 channel amplifier
- Setting ramps
- Deriving the ramp settings from the function diagram

Measurements and calculations:

- Determining characteristic curves and characteristics of valves and equipment
- Measuring parameters such as pressure, volumetric flow, and time
- Calculating the flow for proportional directional control valves
- Calculating speeds for double-acting cylinders with varying load
- Calculating the natural frequency of a cylinder drive
- Calculating times for acceleration and braking

Hydraulic circuits:

- Controlling pressure and speed
- Reading and creating hydraulic and electric circuit diagrams
- Creating a function diagram
- Designing and commissioning control systems, including fault finding
- Basic circuits for proportional hydraulics, such as pressure stage circuit, rapid traverse feed circuit, pump bypass, approaching positions, controlled acceleration and braking, logically connecting setpoint values, load-independent speeds
- Getting to know the pressure stage control system
- Braking a cylinder feed
- Reversing a hydraulic motor
- Setting process-dependent pressure stages
- Externally and logically interconnecting setpoint values
- Approaching a position with braking
- Creating a load-independent feed speed

Complete equipment set TP 701

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The most important components at a glance:

| | | |
|----|---|--------|
| 1 | 1x Relay, three-fold | 162241 |
| 2 | 1x Proportional amplifier | 162255 |
| 3 | 1x Setpoint value card | 162256 |
| 4 | 1x Signal input, electrical | 162242 |
| 5 | 2x Proximity sensor, inductive, M12 | 548643 |
| 6 | 1x 4/3-way proportional valve | 544350 |
| 7 | 1x 4/2-way solenoid valve, spring return | 544346 |
| 8 | 1x Proportional pressure relief valve | 544351 |
| 9 | 1x Pressure filter | 548609 |
| 10 | 1x Pressure balance (proportional flow control valve) | 159351 |
| 11 | 1x Pressure relief valve | 544335 |
| 12 | 1x Differential cylinder 16/10/200 with cover | 572746 |
| 13 | 1x Hydraulic motor | 152858 |
| 14 | 1x Flow control valve | 152842 |
| 15 | 1x One-way flow control valve | 152843 |
| 16 | 2x Pressure gauge | 152841 |
| 17 | 2x T-distributor | 152847 |
| 18 | 1x Weight, 9 kg, for cylinder | 152972 |

Necessary accessories, also order:

| | | |
|----|---|--------|
| 5x | Hose line with quick release couplings, 600 mm | 152960 |
| 2x | Hose line with quick release couplings, 1500 mm | 159386 |
| | Measuring case | 177468 |
| | Pressure relief unit | 152971 |
| | 4 mm Safety laboratory cables → Page 155 | |
| | Aluminum profile plate → Page 39 | |
| | Hydraulic power pack → Pages 148 – 149 | |
| | Protective cover for weight, 9 kg → Page 143 | |
| | Tabletop power supply unit → www.festo-didactic.com | |
| | Power supply unit for mounting frame → Page 155 | |

Also order:

Workbook



Ten exercises provide an introduction to the equipment and circuits for proportional hydraulics. Individual items of equipment are presented and their settings are tested. The progressively complex exercises then provide a complete solution.

The workbook contains:

- Sample solutions
- Training notes
- Multimedia CD-ROM with graphics, photos of industrial applications, animations, and FluidSIM® circuit diagrams
- Worksheets for students

Campus license (→ Page 19):

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| de | 94457 |
| en | 94472 |
| es | 94404 |
| fr | 94352 |

Supplementary media

- Designing and simulating with FluidSIM®
- Measuring and controlling with FluidLab®
- WBT Hydraulics
- WBT Electrohydraulics
- WBT Open- and closed-loop control
- Textbook: Proportional hydraulics, Basic level
- Hydraulics poster set

