

Exercise No. :	7
Exercise title :	Control systems implementing the work cycle as well as logical and safety in pneumatics
Class:	Hydraulics and hydraulic drives
Field of study:	Erasmus+ - mechanical engineering

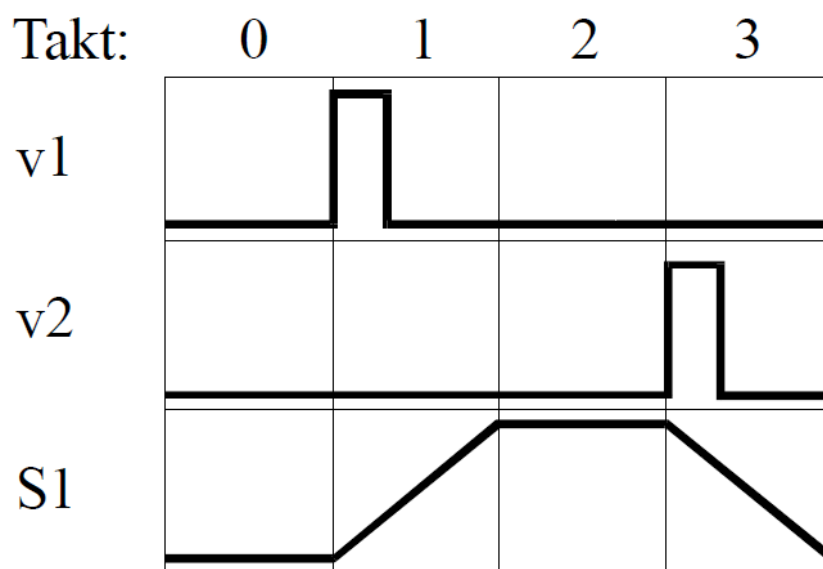
The aims of the exercise are:

- learning the construction of control systems and pneumatic drive based on cyclograms,
- learning the use of valves performing logical functions, and building safety systems of the "two hands" type.

1. The course of the exercise

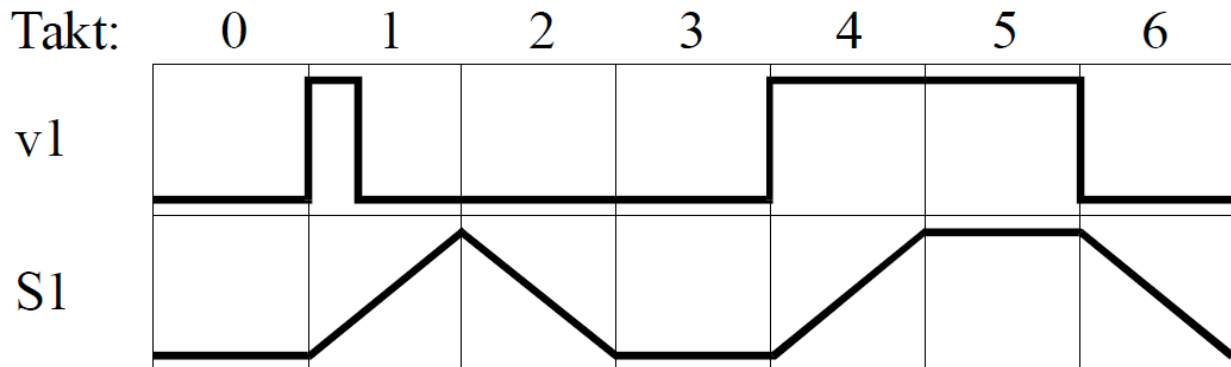
1.1 The actuator control system without road connectors

Build a double-acting actuator control system working in accordance with the work cycle shown in the drawing. The valves v1 and v2 controlled by the button cause the S1 pneumatic actuator to move to the right or left.



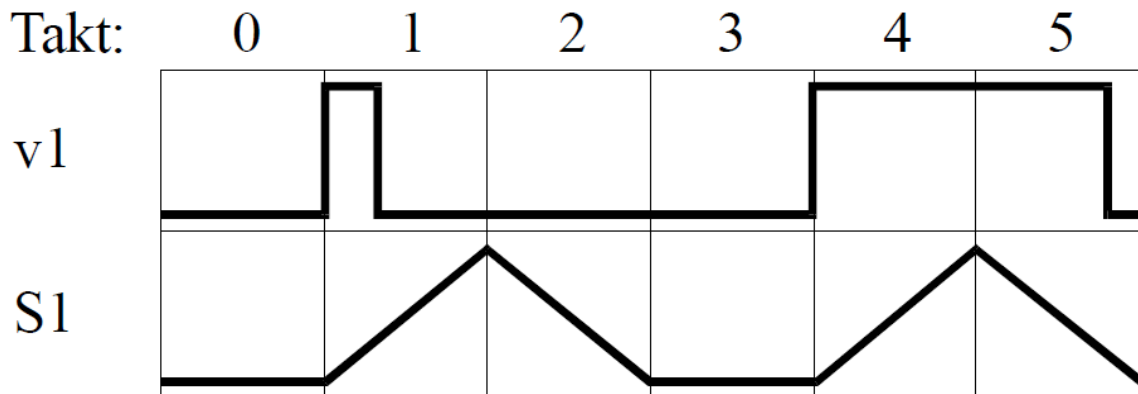
1.2 Actuator control system with one road switch

Build a double-acting actuator control system working in accordance with the work cycle shown in the drawing. The valve v1 is controlled by a button and causes the extension of the S1 pneumatic actuator. The actuator returns automatically thanks to the limit switch after reaching the end position, provided that the valve button v1 is released. Use one limit switch to build the system.



1.3 An actuator control system with two road switches

Build a double-acting actuator control system working in accordance with the work cycle shown in the drawing. The v1 valve controlled by the button causes the extension of the S1 pneumatic actuator. The actuator returns automatically after reaching the end position, regardless of the state of the valve button v1 (if the buttons V1 are pressed for a long time, the actuator will continuously extend and retract). Use two limit switches to build the circuit.



After the systems are built and tested, diagrams of all systems should be drawn based on the standardized symbols of pneumatic elements.

1.4 Logical valves

Build a simple system of direct control of a single-acting pneumatic actuator with two buttons with the use of:

- "double signal" valve
- "circuit switch" valve

After building and testing the systems, determine what logical functions are performed by individual valves. Then, draw diagrams of both systems based on the standardized symbols of pneumatic systems and write the state tables for these functions.

Attention: *In each system, two buttons and a properly selected valve should be used. Use the symbol on the valve to identify the correct valve.*

1.5 Two-hand safety systems

The safety requirements of many devices, such as e.g. hydraulic presses, dictate that their activation should be possible only by pressing two different buttons with two hands. Therefore, to build a system that allows you to run any double-acting actuator with two buttons based on a pneumatically operated 3/2 monostable valve,

After the system is built and tested, a system diagram should be drawn based on the standardized symbols of pneumatic systems.

2. Conclusions

The conclusions should describe the construction and principle of operation of pneumatic road connectors and pneumatic logic valves used during the exercise.

3. Report

The report is to contain diagrams of all the circuits built in point 3 with truth tables and a short description of operation, as well as conclusions according to point 4.