FUNCTION DIAGRAM - Description
A Practical Example

- The work cycle of a device must be divided into individual phases and elementary functions.
- These elementary functions can be easily implemented using control elements and relevant cylinders.
- Distributed functions also allow greater clarity and better orientation in the entire mechanism.

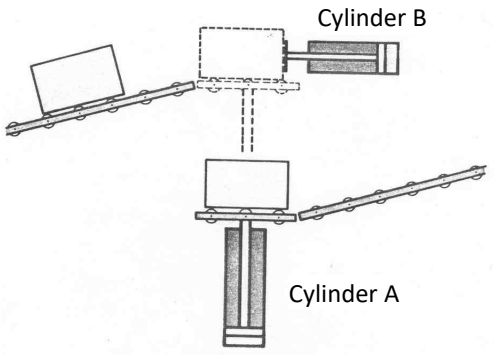

Figure 1 Example

1. *Description according to time sequence*

The piston of cylinder A extends and lifts the package
The piston of cylinder B (extends) moves the package
The piston of cylinder A (retracts) moves down
The piston of cylinder B (retracts) moves to the starting position

2. *Description using a table*

Work cycle phase (step)	Movement of cylinder A	Movement of cylinder B
1	forward	—
2	—	forward
3	back	—
4	—	back

3. *Diagram with signposts*

Simplified representation: Piston extension →
Piston retraction ←

A →
B →
A ←
B ←

4. *Simplified description*

Marking for forward (extending) movement: **+**
Designation for reverse (retracting) movement: **-**
A+, B+, A-, B-

Or otherwise:

A+
B+
A-
B-

5. Graphical representation (using a diagram)

Function diagram:

Diagram of motion functions – describes the operation of cylinders and work units
Control diagram (control functions) – shows the states of the control elements

DIAGRAM OF MOTION FUNCTIONS

DIAGRAM OF THE MOVEMENTS OF THE INDIVIDUAL PHASES OF THE WORK CYCLE

The sub-sections of the diagram, showing motion functions, are related to individual steps of the work cycle. A one-time change expresses the phase of the work cycle in the status of a work element.

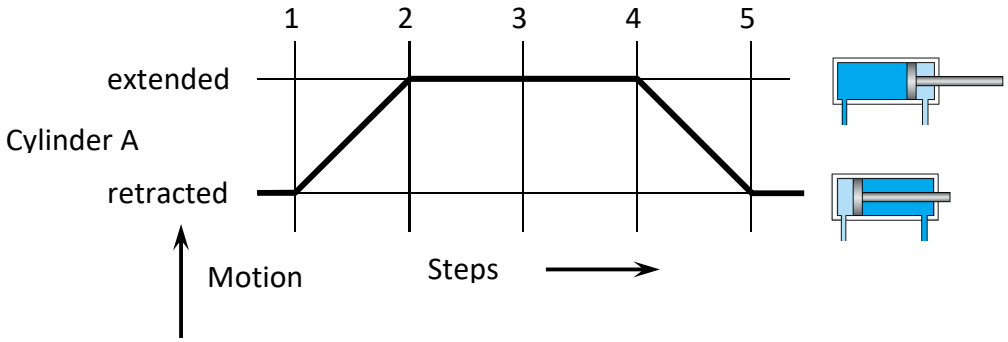

Figure 2 Operation diagram of a pneumatic cylinder (linear actuator)

From step 1 to step 2, the cylinder moves from the retracting to the extending position, reaching the end of step 2. From phase 4, the cylinder moves back and reaches the starting position at phase 5.

Example from Figure 1:

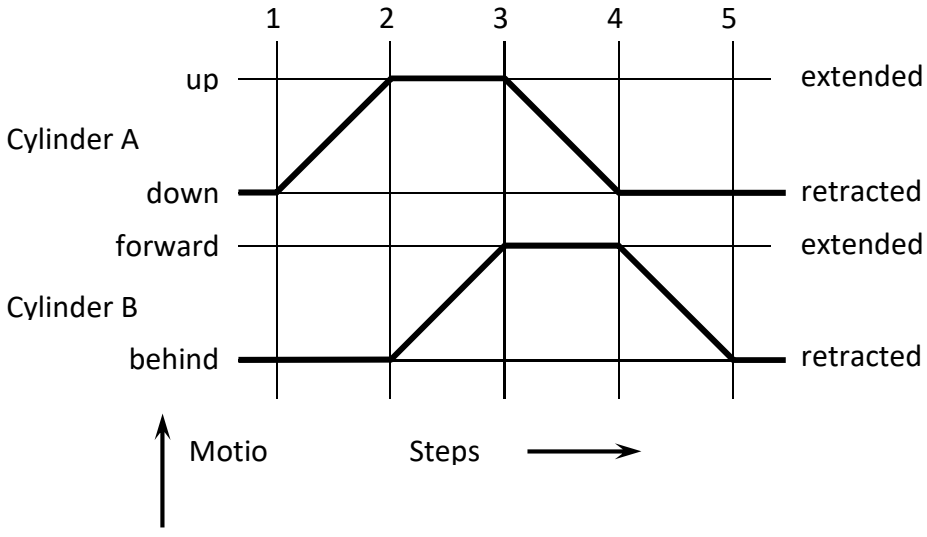

Figure 3 Diagram corresponding to the example

Notes on drawing the diagram:

- Paths (strokes) of cylinder motion are drawn to scale but at a uniform size (regardless of actual size)
- If there is a functional change during the phase, then a partial division into fractions of the phase or interphase is introduced
- The status designation is arbitrary. The designation is either verbal (e.g. behind – forward, top – bottom), or symbolic (0 – 1)
- The numerical designation of the phases is arbitrary

TIME DIAGRAM OF MOTIONS

The path or strokes of the work unit are recorded as a function of time.

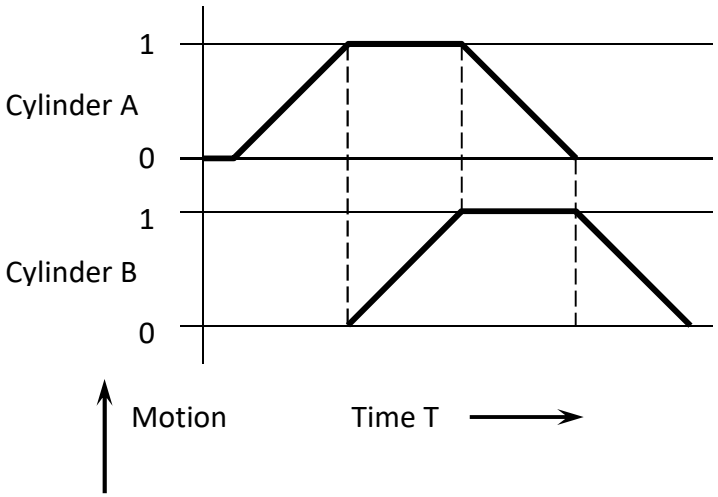

Figure 4 Diagram corresponding to the example

Dashed lines express the dependence between both types of diagrams. In the diagram of the dependence on the individual phases (steps) of the work cycle, the dependence of the individual functions is clearer; in the timing diagram, the course of speeds and their differences stand out.

CONTROL DIAGRAM (CONTROL FUNCTIONS)

The states of the control elements are also shown in diagrams divided by phases of the duty cycle or time. The elements' switching times (time constants) are not drawn in the diagrams.

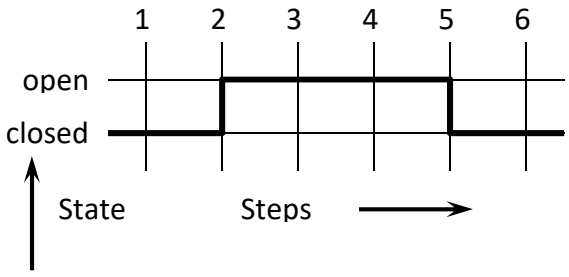

Figure 5 Activity flow diagram

When displaying a control diagram, drawing it together with a motion diagram is recommended.

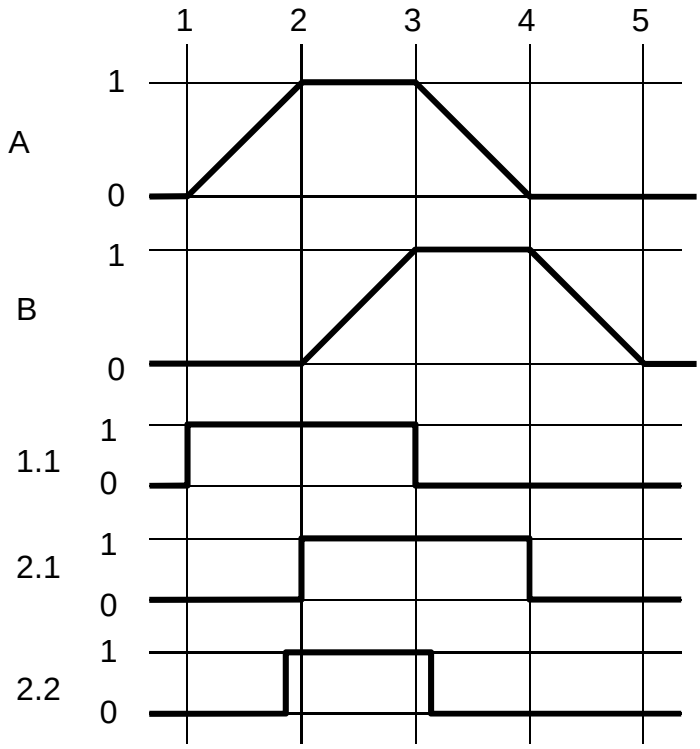

Figure 6 Function diagram (motion and control diagram) corresponding to the example