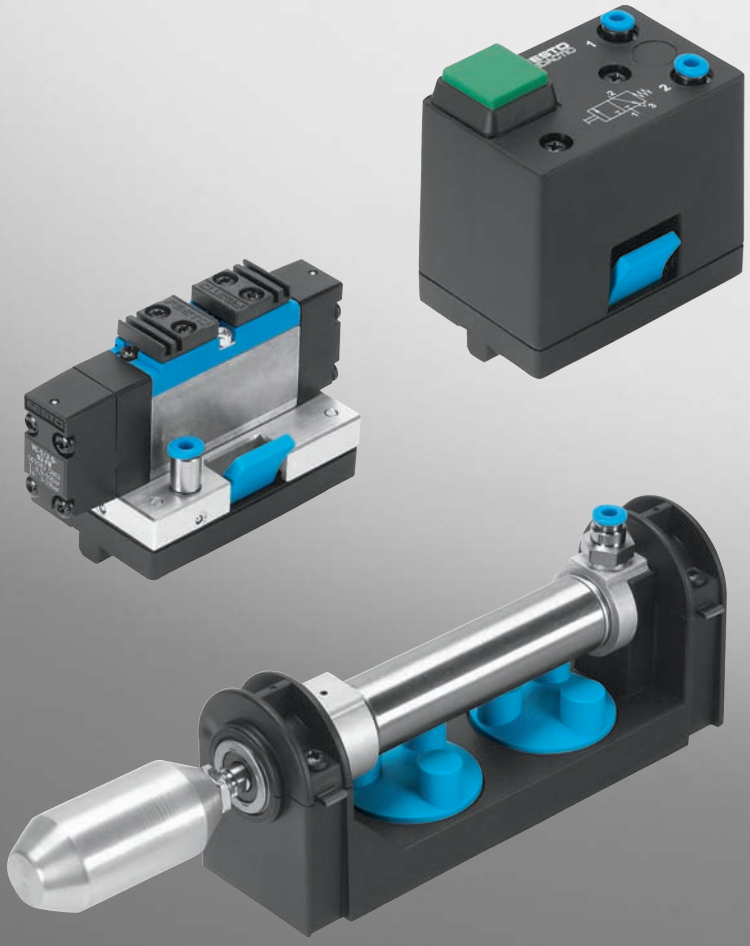
Pneumatics
Basic Level

FESTO

Set of Overhead Transparencies
TP 101



Festo Didactic
095001 en

Order No.: 095001
Description: PNEUM.FOLIEN.
Designation: D:OT-TP101-GB
Edition: 02/2000
Author: Frank Ebel
Graphics: Doris Schwarzenberger
Layout: 04.12.2000, Beatrice Huber

Internet: www.festo.com/didactic
e-mail: did@festo.com

Foreword

The Collection of Transparencies is conceived for the basic material of the TP100 Pneumatic Technology Package. The transparency collection and technology package form part of the Learning System for Automation from Festo Didactic GmbH & Co.

The transparencies are designed from a didactical and methodological point of view. For each transparency, there is a short accompanying text that provides the speaker with a quick overview of the contents. More information you will find in the textbook Pneumatics.

Syllabus

- Physical fundamentals of pneumatics
- Function and application of pneumatic components
- Designation and drawing of pneumatic symbols
- Drawing of pneumatic circuit diagrams in accordance with standards
- Representation of motion sequences and operating statuses
- Direct and indirect stroke-dependent controls
- AND/OR logic functions of the input signals
- Time-dependent control system with time-delay valve
- Pressure-dependent control system with pressure sequence valve
- Troubleshooting with simple pneumatic control systems

The text pages contain a complete picture of the transparency with additional explanations and designations which the speaker can enter on the transparency during instruction.

The advantages of this concept are:

- The speaker can add to the transparencies step by step during the presentation
- Instruction is livelier
- The text pages supplied reduce preparation time

New!
Electronic presentation

The enclosed CD-ROM contains all the overhead transparencies and accompanying text of this edition in an electronically presentable form in the files „Pneumatics_transparencies.pdf“ and „Pneumatics_text.pdf“. In addition to the screen presentation, which can be made in any order, the contents can be printed out and text and graphics can be used for your own training preparations, insofar as the functionality of the required Adobe® Acrobat® Reader permits this. This freely distributable software is available on the CD-ROM in the currently valid English version for Windows 95/98/NT for installation in the directory „Acrobat_Reader“. Please start the file „rs405eng.exe“ and follow the subsequent dialogue.

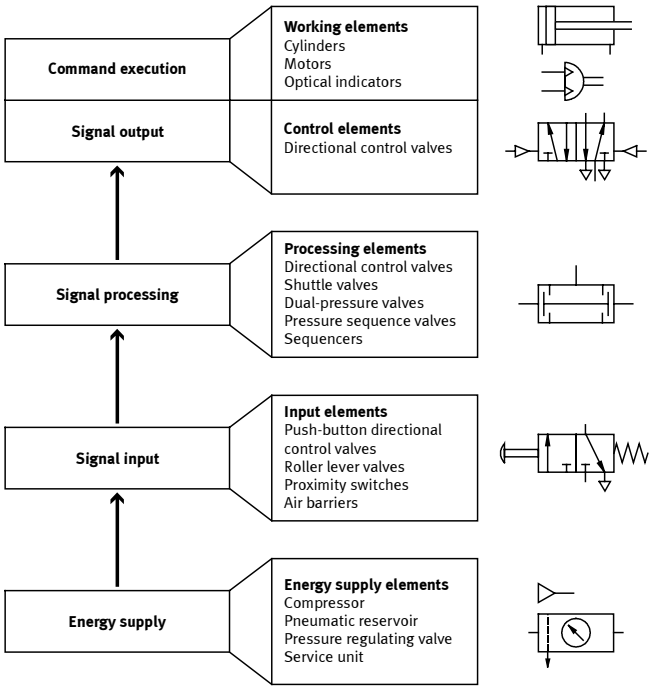
Contents

The Structure of Pneumatic Systems

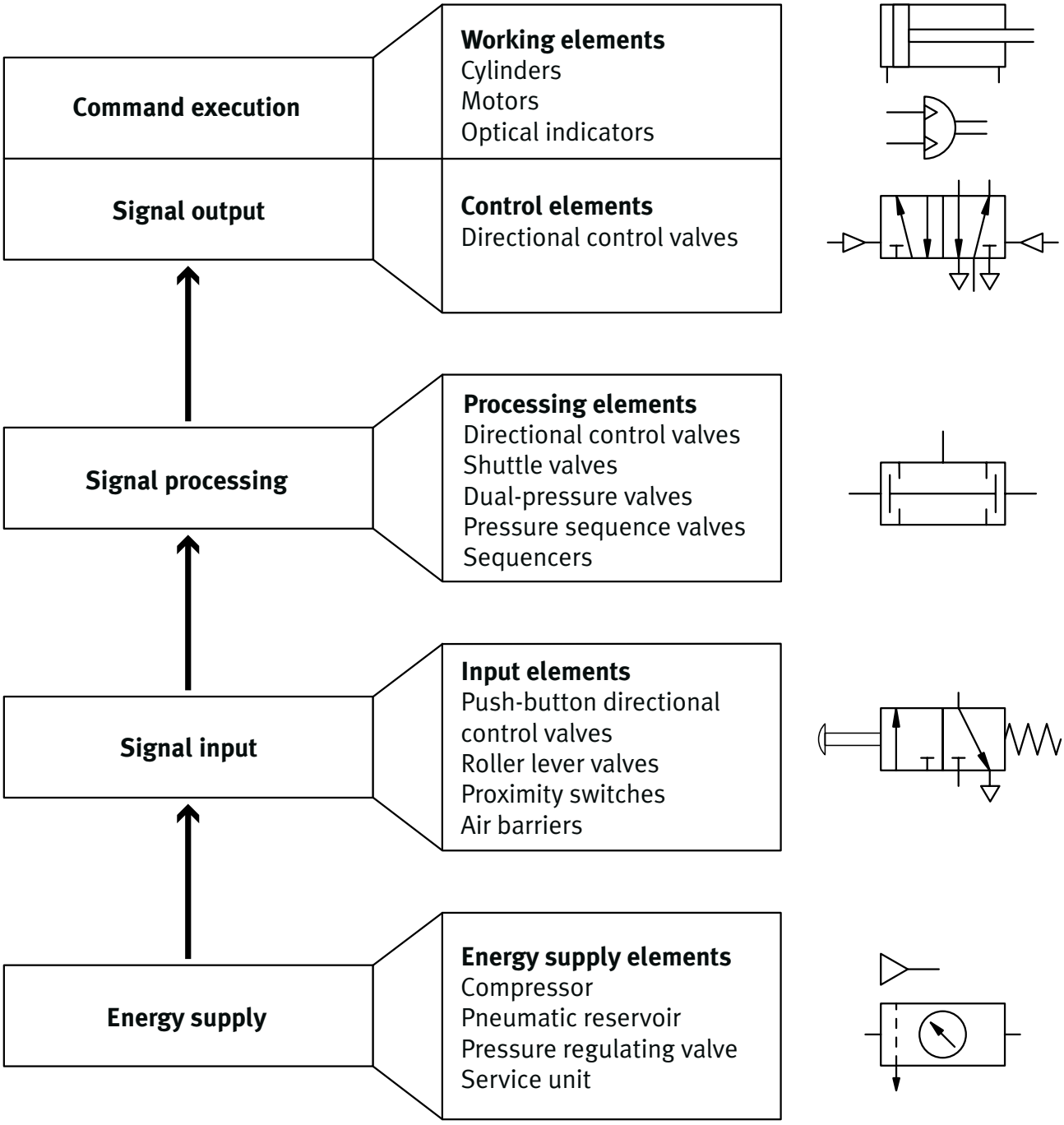
Signal flow
- From bottom to top

Control chain
- S P A principle: Sensor, processor, actuator
- I P A principle: Input, processing, output

Energy supply
- Through tubing or piping



The Structure of Pneumatic Systems



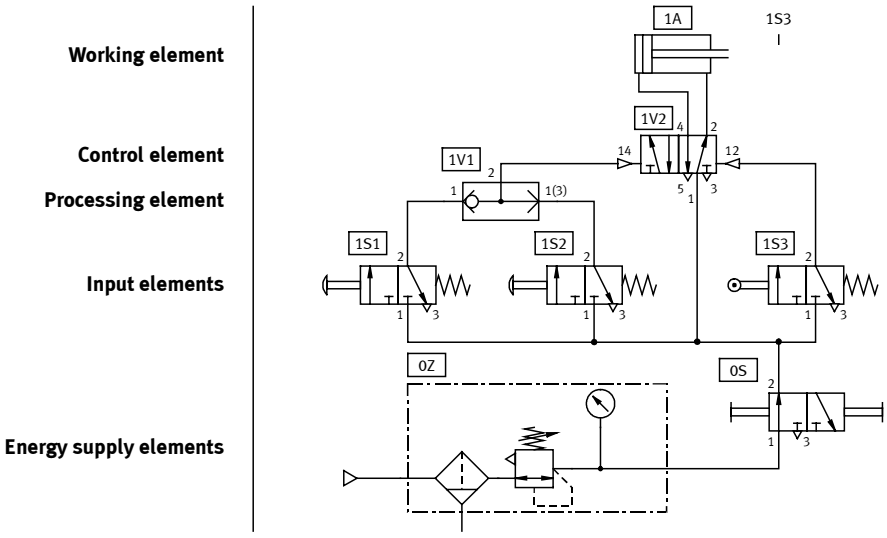
System Circuit Diagram

Identification code for components

- System number
  beginning with 1; used only when the entire circuit consists of more than one system
- Circuit number
  beginning with 1; all accessories with 0
- Component identification
  by letter
- Component number
  beginning with 1

Circuit Diagram

- From top to bottom
- Working element 1A
  on working element marking line of input element 1S3
- Control element 1V2
- Processing element 1V1
- Input elements 1S1, 1S2, 1S3
- Energy supply elements 0Z, 0S



System Circuit Diagram

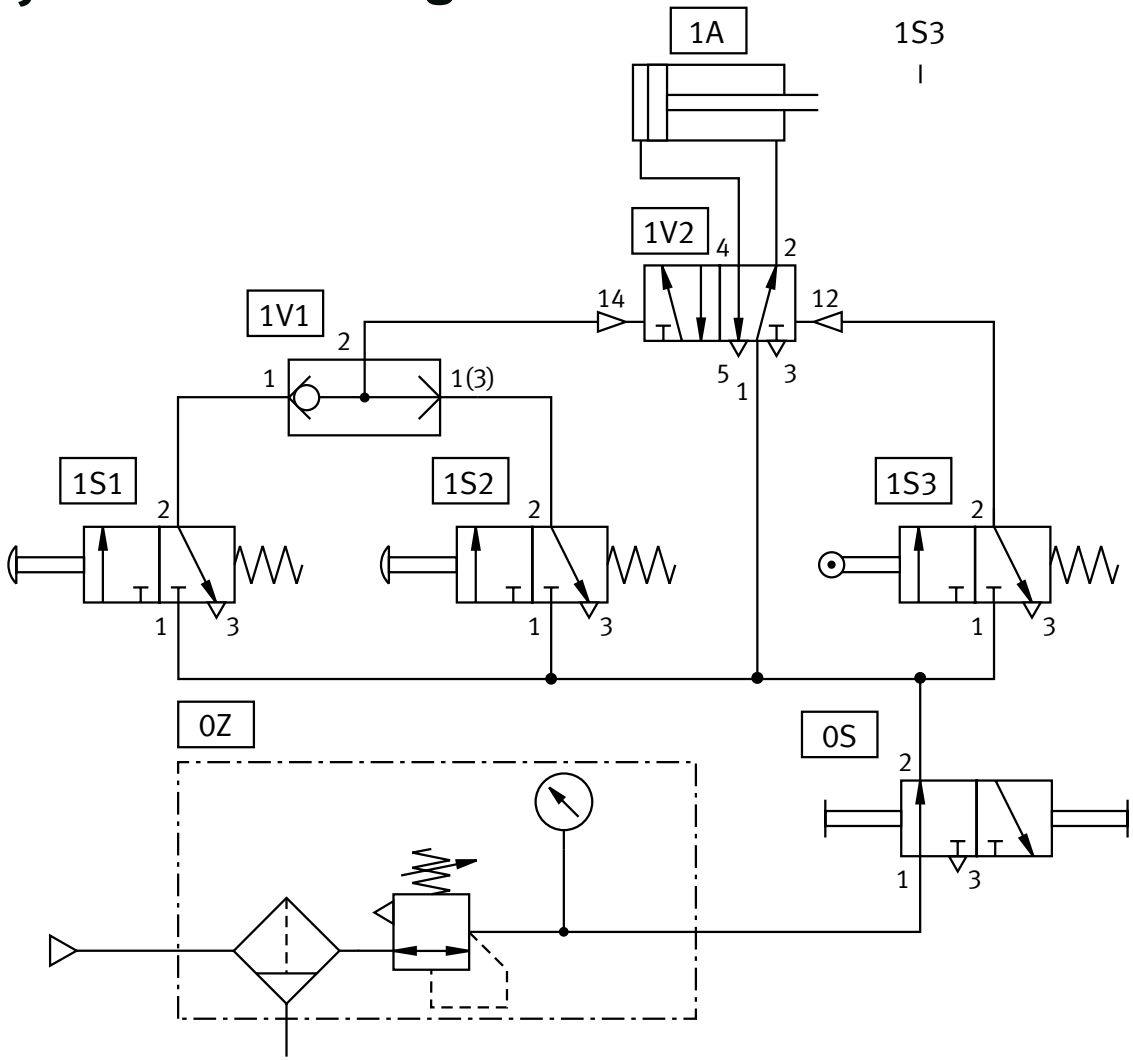
Working element

Control element

Processing element

Input elements

Energy supply elements



Direct Actuation of Cylinders

Single-acting cylinders

- Perform work in only one direction
- Return position via spring
- Air supply port, vent hole

3/2-Way valve

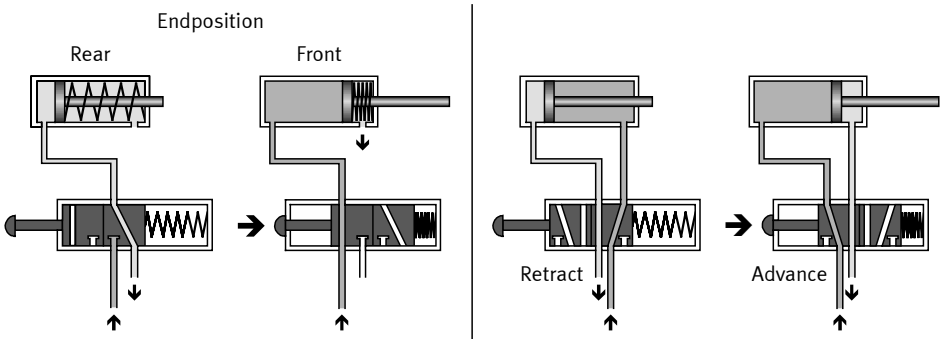
- 3 Working ports, 2 switching positions
- Manually actuated, spring return

Double-acting cylinder

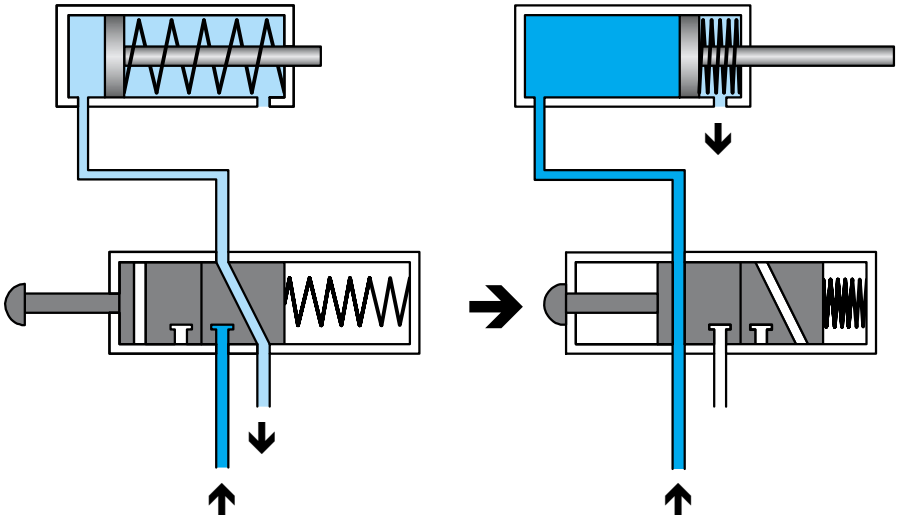
- Performs work in both directions
- 2 air supply ports

5/2-Way valve

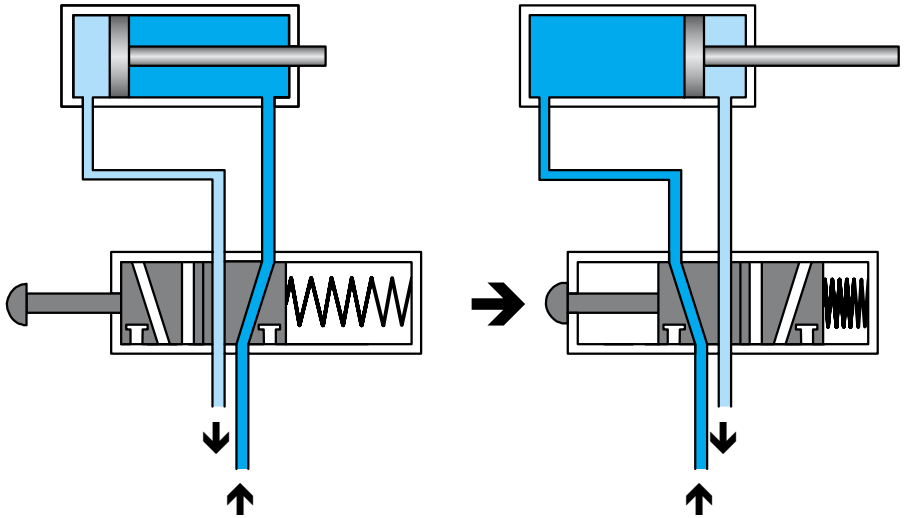
- 5 Working ports, 2 switching positions
- Manually actuated, spring return



Direct Actuation of Cylinders



Single-acting cylinder



Double-acting cylinder

Symbols for the Power Supply Section

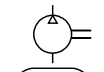
Symbols in accordance with DIN ISO 1219 "Fluid Technique – Graphical Symbols and Circuit Diagrams”

The triangle indicates the flow direction.

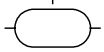
In general, the symbols for pneumatics and hydraulics are the same.

Energy Supply

– Compressor with constant displacement volume



– Pneumatic reservoir



– Pressure source

Maintenance

– Filter

– Water separator with manual actuation

– Water separator with automatic condensate drain

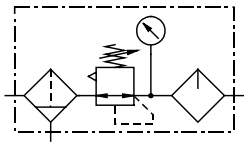
– Lubricator

– Pressure regulating valve with relief port, adjustable

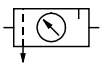
Combined Symbols

– Air service unit

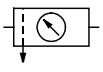
Consisting of
Compressed air filter,
Pressure regulating valve,
Pressure gauge and
compressed air lubricator



Simplified representation
of a service unit



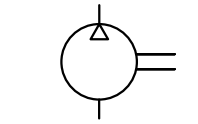
Simplified representation
of a service unit without
compressed air lubricator



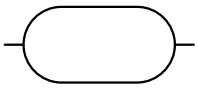
Symbols for the Power Supply Section

Energy Supply

– Compressor with constant displacement volume



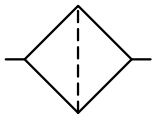
– Pneumatic reservoir



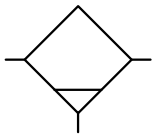
– Pressure source

Maintenance

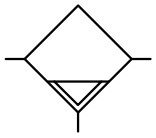
– Filter



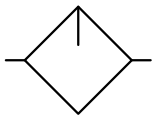
– Water separator with manual actuation



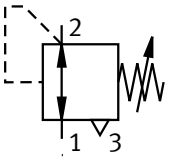
– Water separator with automatic condensate drain



– Lubricator



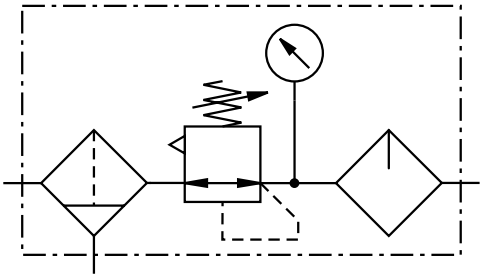
– Pressure regulating valve with relief port, adjustable



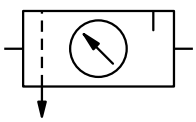
Combined Symbols

– Air service unit

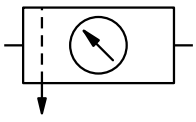
Consisting of
Compressed air filter,
Pressure regulating valve,
Pressure gauge and
compressed air lubricator



Simplified representation
of a service unit



Simplified representation
of a service unit without
compressed air lubricator



Directional Control Valves: Ports and Switching Positions

Directional control valves are used as

- Control elements
- Processing elements or
- Input elements

Written title:	2/2-Way valve
Spoken title:	Two-slash-two way valve
Port identification:	By numbers

Open position/Normally open position
Closed position/Normally closed position

Number of ports
Number of switching positions

2/2-way valve, normally open position

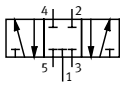
3/2-way valve, normally closed position

3/2-way valve, normally open position

4/2-way valve
flow from 1 → 2 and from 4 → 3

5/2-way valve
flow from 1 → 2 and from 4 → 5

5/3-way valve, mid-position closed

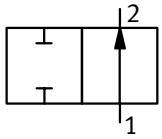


Directional Control Valves: Ports and Switching Positions

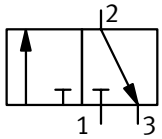
Number of ports

Number of switching positions

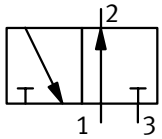
2/2-way valve, normally open position



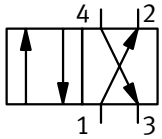
3/2-way valve, normally closed position



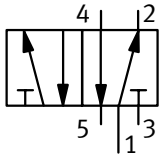
3/2-way valve, normally open position



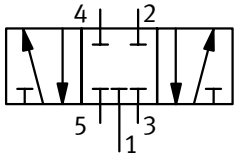
4/2-way valve
flow from 1 → 2 and from 4 → 3



5/2-way valve
flow from 1 → 2 and from 4 → 5



5/3-way valve, mid-position closed



Port designations

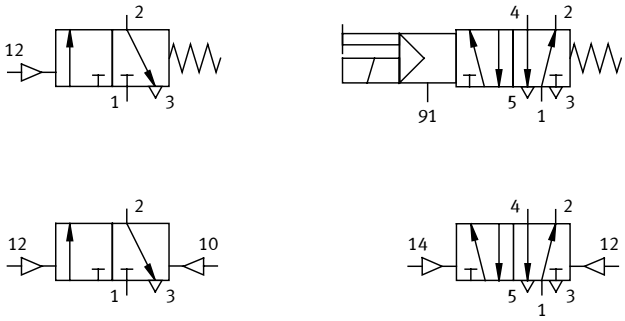
Port designation in accordance with DIN ISO 5599-3 "Fluid Technology – Pneumatics, 5-Way Valves"

Working ports

- 1 Supply port
- 2, 4 Working ports
- 3,5 Exhaust ports

Pilot ports

- 10 Signal applied blocks flow from 1 to 2
- 12 Signal applied opens flow from 1 to 2
- 14 Signal applied opens flow from 1 to 4
- 81, 91 Auxiliary pilot air



Port designations