Introduction

Please note:
Drawing or functional symbols are often used to describe braking schemes and device functions. The drawings and functional symbols used for this are in accordance with standard DIN 74 253, May 1979 edition, or standard DIN ISO 1219, August 1978 edition.

Drawing symbols

Drawing symbols (DIN 74 253) can be used for schematic representation of braking systems (installation plans) in motor vehicles.

Symbol connections are marked in conformity with standard DIN ISO 6786, December 1981 edition. These markings are not part of the symbols, but can be added to make the symbols easier to understand.

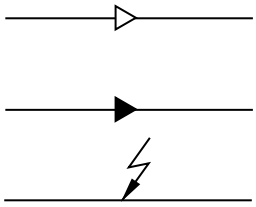
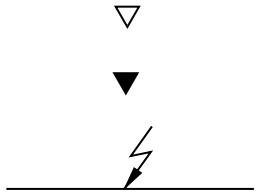
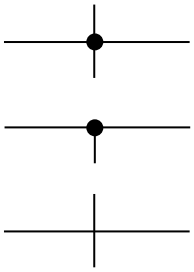
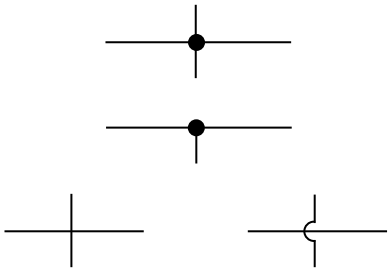
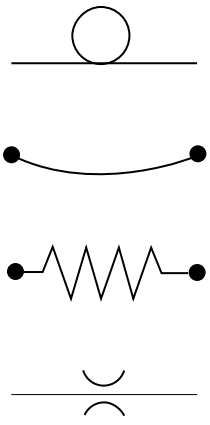
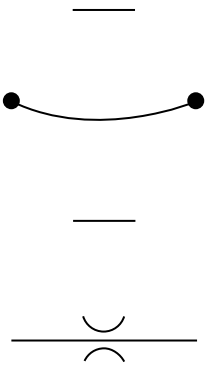
Functional symbols

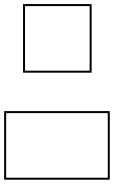
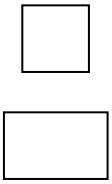
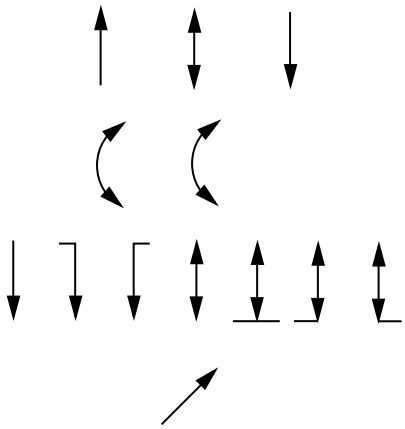
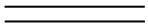
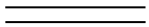
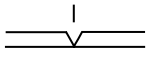
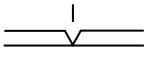
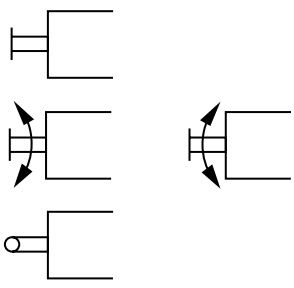
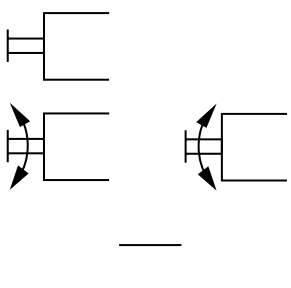
Functional symbols (DIN ISO 1219) are used to represent the internal switching of devices or device parts. They consist of one or more basic signs and, in general, of one or more functional characters.

In circuit diagrams, the devices are represented in the off-position, and then if the latter is not available, in the original control position. In case of deviation from this, an instruction, for instance operating position, will be required.

Please note

The drawing and functional symbols presented in the next page are only an extract from the corresponding standard.

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		General Line
		Marking the Line (current direction and type of lever) Pneumatic (also outlet to atmoshere) Hydraulic Electric
		Line limits: with connection without connection
		Line Design: Line Loop Flexible line for connecting moving parts (Brake tube) Drilled Line (Wendelflex®) Throttle inside the line (Throttle Valve)
		Circuit as symbol for compressor, pump, motor, measure instrument, joint, rolls etc.

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Rectangle and Square as Symbols for valves, Cylinders and Actuators
		Square on top for conditioning (filter, lubricant devices, sedimentator, heat
		Framing of devices which are fitted together
   		Arrow, display of: flow direction Turning facility, direction of revolution Ways and flow direction inside of the valve Inclined arrow: shows adjustment facility
Operating media		
		Lever, shaft, linkage and mechanical connection
		locking mechanism: Tool to hold a switch position
		Mechanical operated: general via turning via linkage

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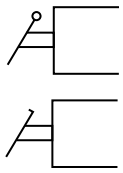
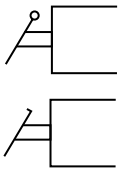
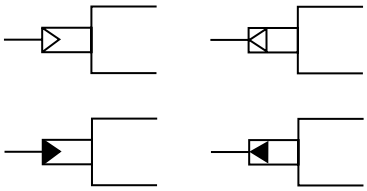
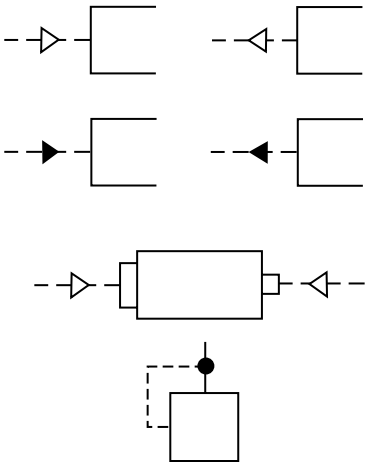
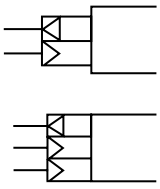
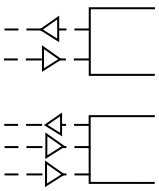
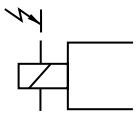
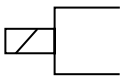
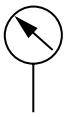
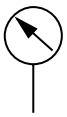
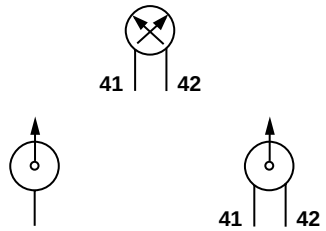
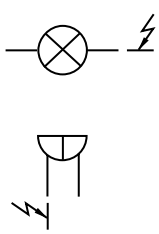
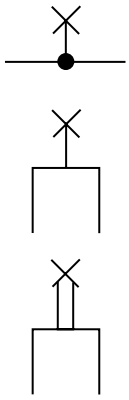
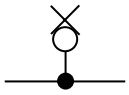
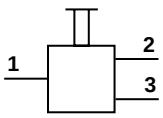
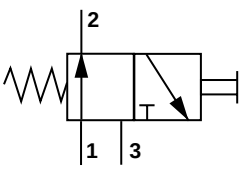
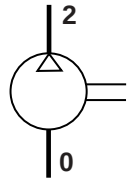
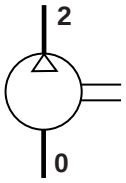
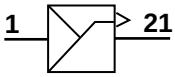
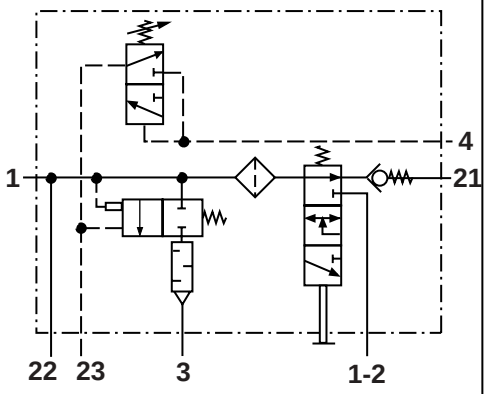
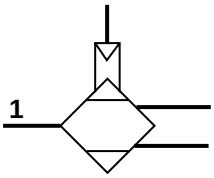
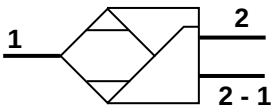
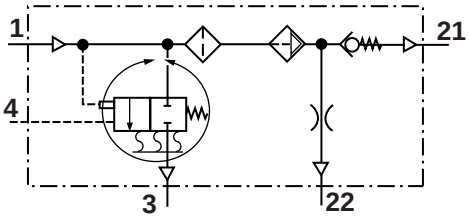
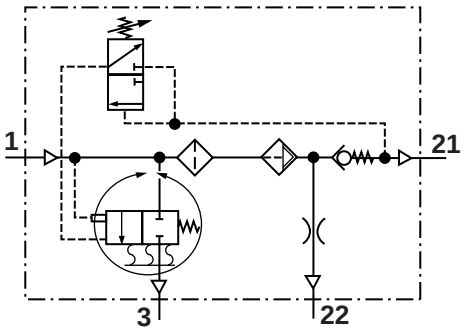
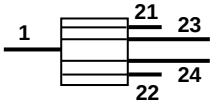
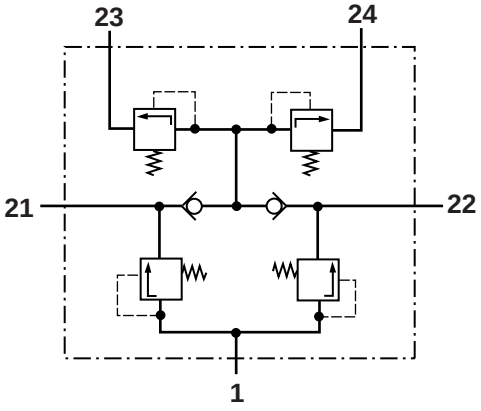
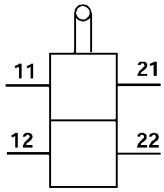
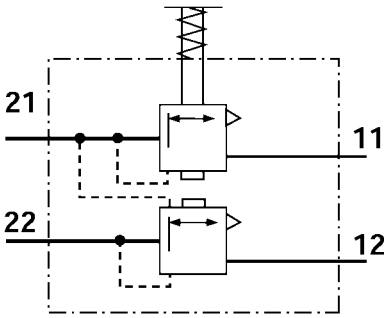
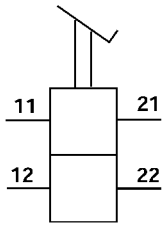
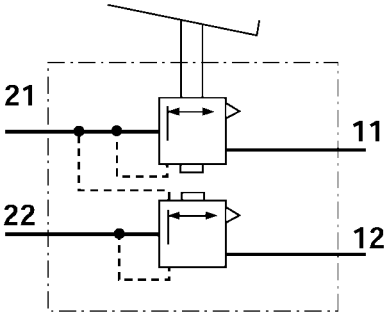
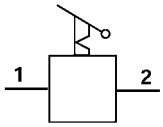
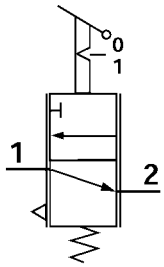
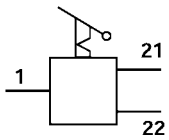
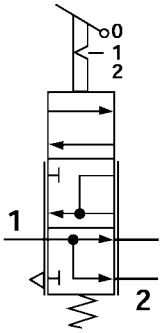
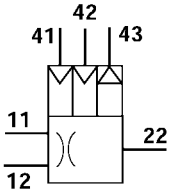
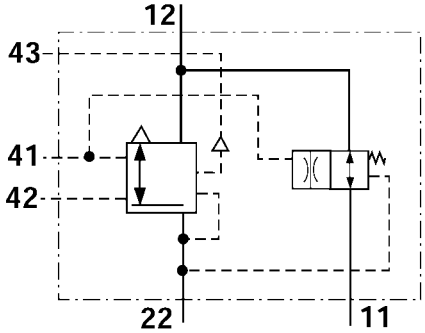
		Mechanical operated: via hand lever via pedal
		Activation pneumatic hydraulic via different control areas control channels are in the unit
		examples for multi-control dual control via pressure increase triple control
 2)		activation electrical, via solenoid
		Slack Adjuster: manually automatically
warning devices		
		pressure measuring devices: Single pressure gauge

2) The lighting arrow ( ) does not belong to the symbol

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
	—— ——	Dual pressure gauge Pressure warning monitor
 2)	—— ——	lamp Buzzer
Test and charging ports		
	—— —— ——	Test and charging ports: in a line in a device in a device with mechanical sequencing actuation
	——	Charging port: delivery of energy is not available
Overview valves		
		For valves in general, a single square is used
		3/2 control valve, hand operated

2) The lighting arrow ( ) does not belong to the symbol

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		compressor
		Unloader
 	 	Air dryer: without Integrated unloader valve with integrated unloader
		Four Circuit Protection Valve

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Brake Valve: with tapped actuation
		with running plate actuator.
		Hand brake valve: for lorries
		for tractor-trailer combination
		Trailer Control Valve

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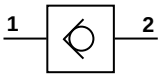
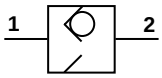
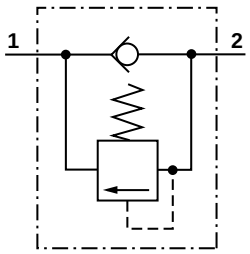
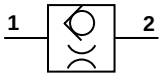
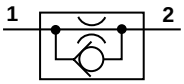
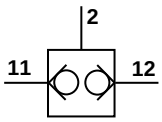
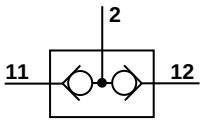
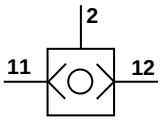
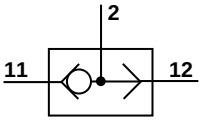
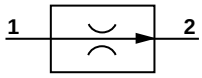
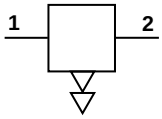
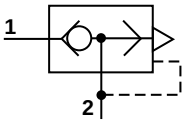
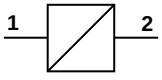
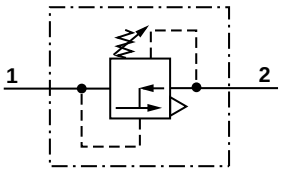
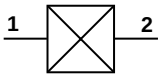
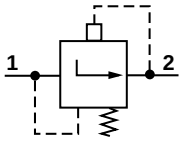
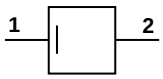
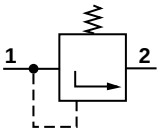
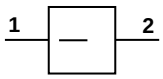
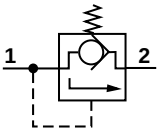
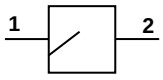
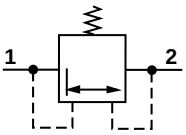
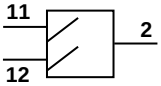
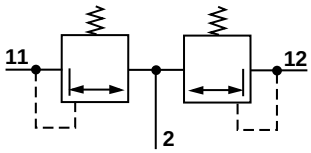
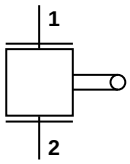
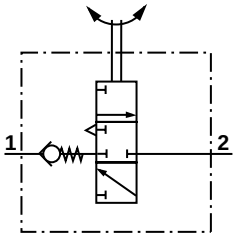
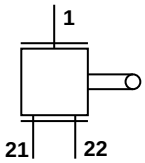
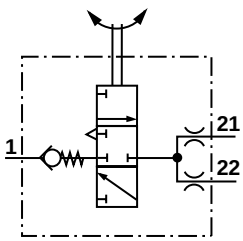
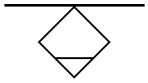
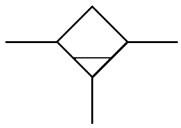
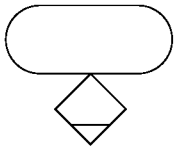
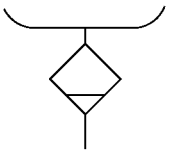
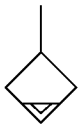
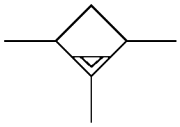
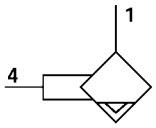
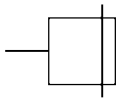
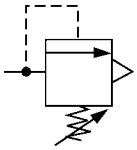
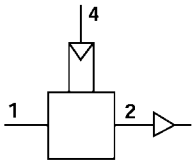
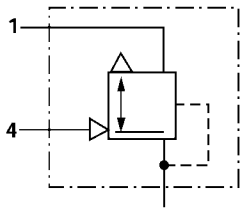
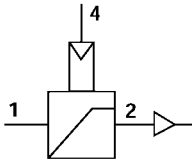
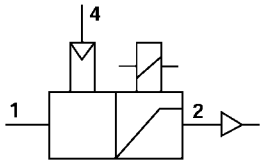
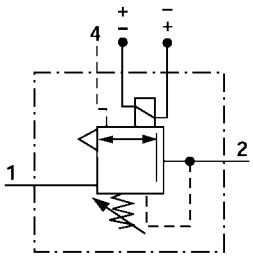
1) 		Check valve
1) 		Check valve with limited back-flow
1) 		Check valve with throttled back flow
		Shuttle valve without backflow (double check valve)
		Shuttle valve with back-flow (Two-way valve)
		Throttle valve
		Quick-release valve
1) 		Proportioning Pressure Regulator, not linear (control valve)

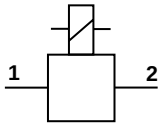
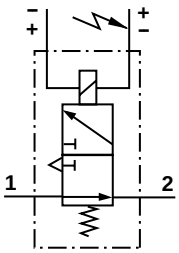
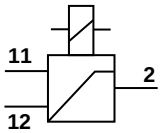
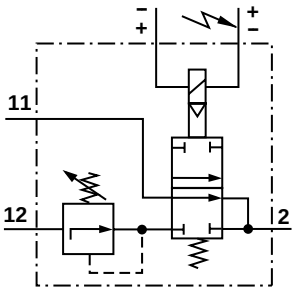
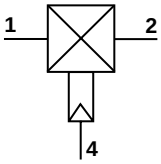
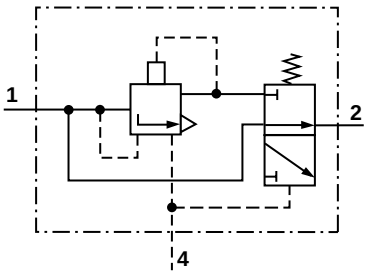
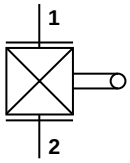
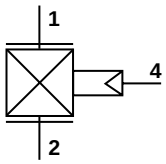
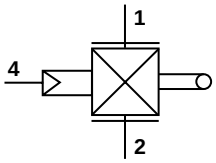
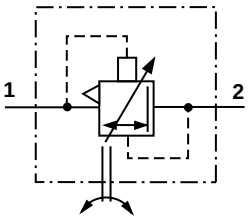
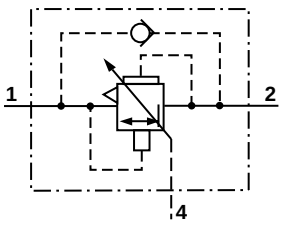
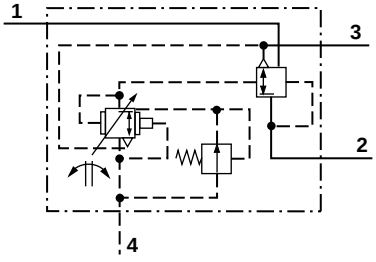
1) Flow direction in operation is here shown from left to right

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
1) 		Pressure divider in linear ratio (pressure reducer)
1) 		Charging Valve: without backflow
		with back-flow
		with limited back-flow
		Dual Charging Valve with limited return flow
		Levelling Valve: with one port to bellows
		with two different evaluated ports to bellows

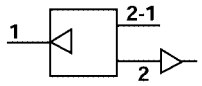
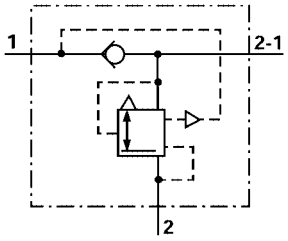
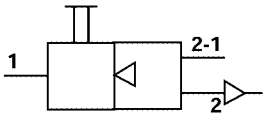
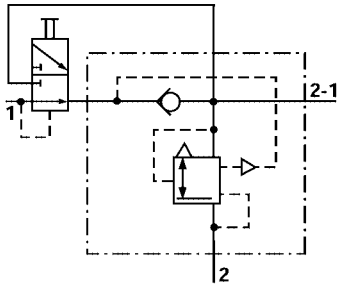
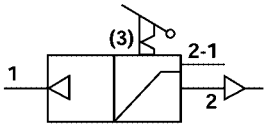
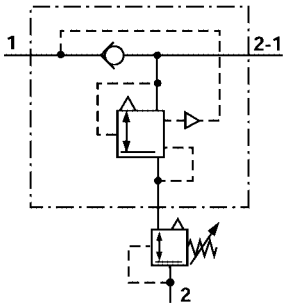
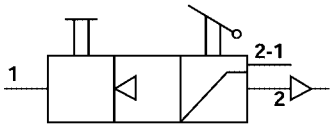
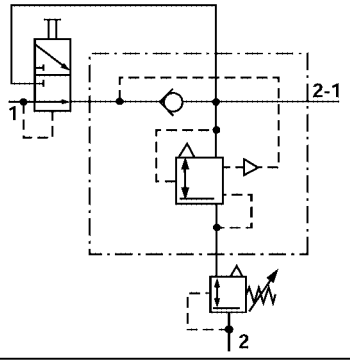
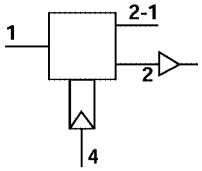
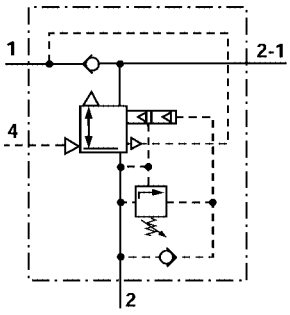
1) Flow direction in operation is here shown from left to right

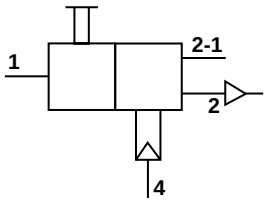
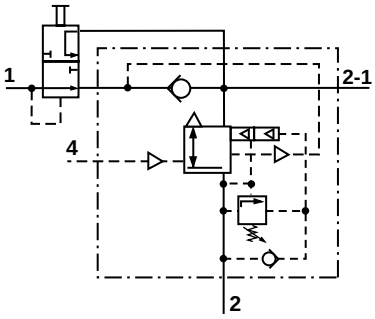
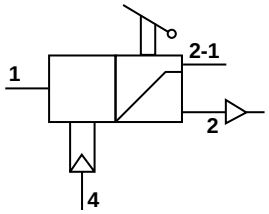
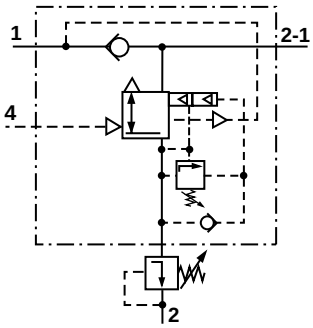
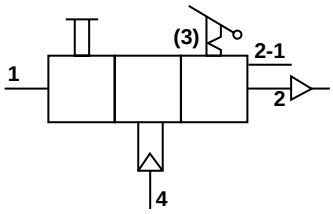
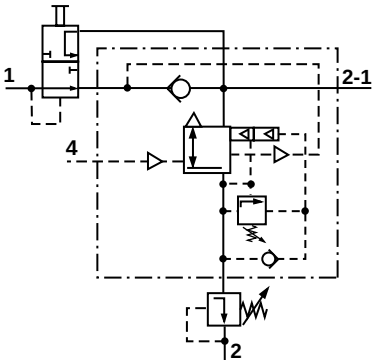
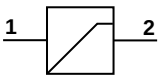
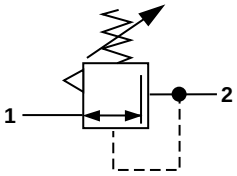
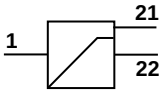
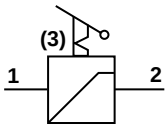
Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Drain Valve (water separator) manually activated, in passing line
		manually activated, at the reservoir
		with automatic draining
	—	automatic draining with pulse control
1) 		Safety valve
1) 		Relay Valve
	—	with pressure reduction
		with solenoid activated brake valve and pressure limitation (solenoid relay valve)

1) Flow direction in operation is here shown from left to right

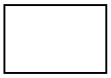
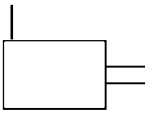
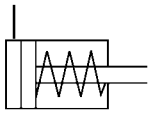
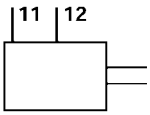
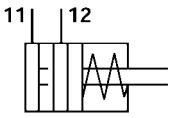
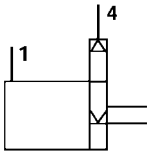
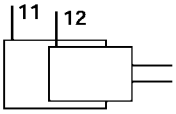
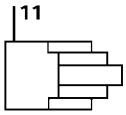
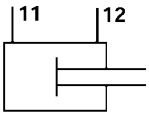
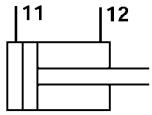
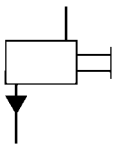
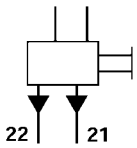
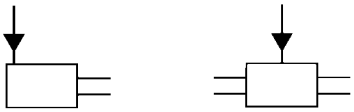
Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Solenoid valve
1) 		Brake valve solenoid actuated, with pressure limitation
		Empty load valve
  	  	Load Sensing Valve: mechanically controlled pneum. or hydr. controlled, e.g. single circuit pneumatically controlled mechanically controlled with integrated relay valve

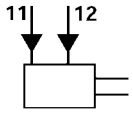
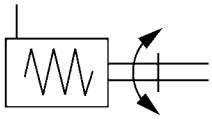
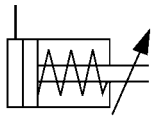
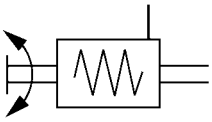
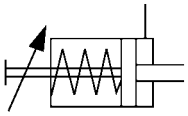
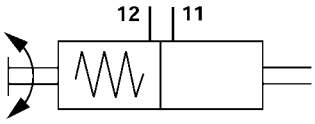
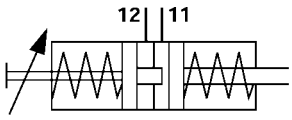
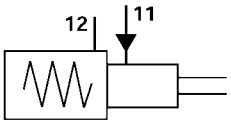
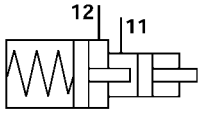
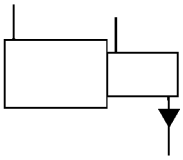
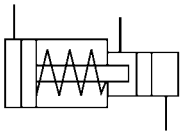
1) Flow direction in operation is here shown from left to right

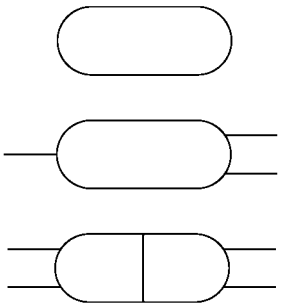
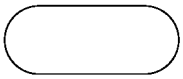
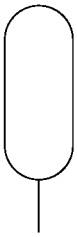
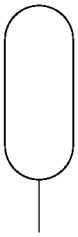
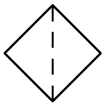
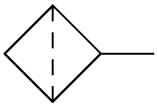
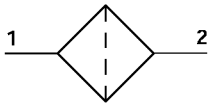
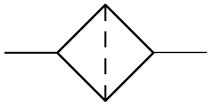
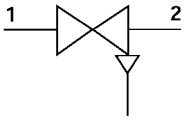
Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Trailer control valve for single line brake system: without release valve
		with release valve
		with hand controlled pressure limiter valve, e.g. with (3) fixed pressures
		with release valve and hand controlled pressure limiter valve without instruction of quantity of fixed pressures
		Relay emergency valve for two-line brake system without release valve, with adjustable predominance

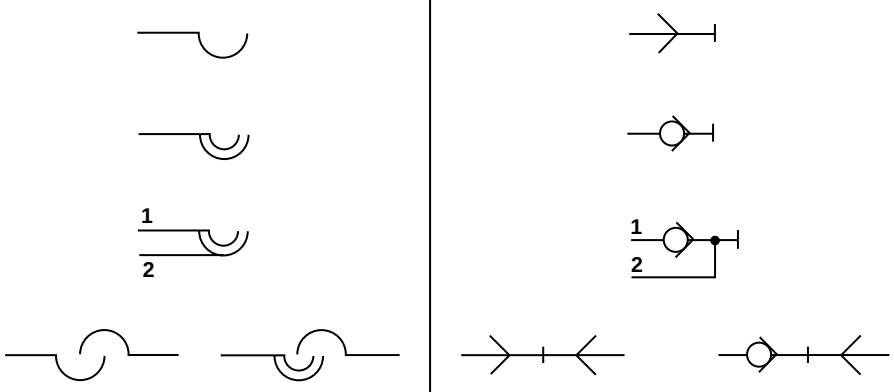
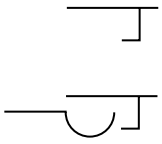
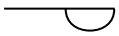
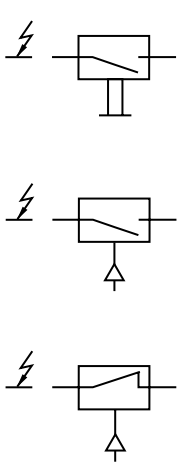
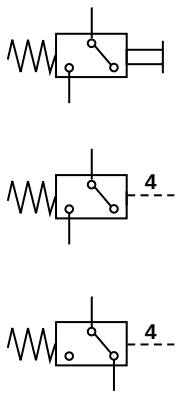
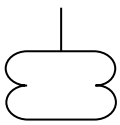
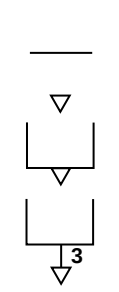
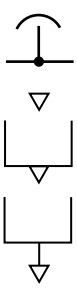
Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
1) 		Relay emergency valve for two-line brake system: with release valve and adjustable predominance
		with hand controlled pressure limiter valve without instruction of fixed pressures
		with release valve and hand controlled pressure limiter valve, e.g. with (3) fixed pressures
1) 		Pressure limiting valve:
	—	with one unlimited delivery (21) and one limited delivery (22)
	—	hand controlled, e.g. with (3) fixed pressures

1) Flow direction in operation is here shown from left to right

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Compressed air cylinder, in general: (also diaphragm cylinder)
		single circuit
		dual circuit
		with locking
		Telescope Cylinder
		Double Acting Cylinder
		Hydraulic Cylinder, in general:
		single circuit master cylinder, mechanically controlled
		dual circuit master cylinder, mechanically controlled
		Slave cylinder, single circuit

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Hydraulic slave cylinder: dual circuit
		Spring brake actuator, in general
		pull type with release device at front
		push type with release device at rear
		Combinated brake cylinder push type, pneumatically actuated with release device at rear
		push type, pneumatically and hydraulically actuated
		Air/hydraulic cylinder with hydraulical master

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Reservoir, in general, as energy storage (pressure reservoir)
		Single chamber air reservoir
		Multi chamber air reservoir
		hydraulic accumulator
		Fluid reservoir for balancing, anti-freeze agent or hydraulic fluid
		Filter, in general
		Air intake filter
		Line filter
		Cut-Off Cock: without exhaust
		with exhaust

Drawing symbols in accordance with standard DIN	Functional symbols in accordance with standard DIN	Explanation
		Coupling Head: without shut-off with shut-off with shut-off and two ports coupling heads, connected
		Dummy Coupling connected
		blind coupling
 2)		Electrical switch Shorting switch, mechanically operated Shorting switch, pneumatically operated Opening switch, pneumatically operated
		Air spring
		Exhausts: exhaust delivery exhaust directly at the device with exhaust line
		Elastic balancing device (knuckle joint)

2) The lighting arrow ( ) does not belong to the symbol

Features

For marking the ports of the components of compressed air braking systems, DIN ISO 6786 has applied since 1981.

The essential features of that standard are that the ports on the components

– are marked by numbers and not by letters. The intention is to prevent letters being misinterpreted, e. g. in foreign countries.

– Those should not be consecutively numbered but the numbers used for marking the port should provide some information on the function of that port on the component.

The markings consist of a number comprising a maximum of 2 digits. The first digit stands for the following:

0 intake connection
1 supply of energy
2 energy delivery (not for delivery to atmosphere; see no. 3)
3 exhaust port
4 control port (device inlet)
5 free
6 free
7 anti-freeze connection
8 oil connection
9 cooling water connection (compressor)

A second digit is then required when several similar connections, e.g. multi-circuit systems, are available. The relevance of the second digits is up to the manufacturers. They should begin at 1 and be used consecutively, e. g. 21, 22, 23, etc. If a modular system is used, deviations from this are permitted.

The following numbers are not available for free selection:

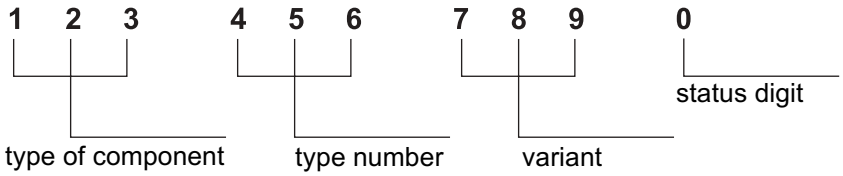
71 anti-freeze supply
72 anti-freeze discharge
81 oil supply
82 oil discharge
91 cooling water supply
92 cooling water discharge

Several similar ports leading out of one chamber have similar markings. Several similar ports leading out of one chamber have similar markings.

If a port can be used for different purposes in different applications, the markings must be agreed between the user and the manufacturer (e. g. in the case of directional control valves).

The markings should appear next to the ports on the components, and they can also be shown in the brake diagram next to the line connections drawn. They also apply to compressed air braking systems using, for example, a hydraulic transmission system.

Explanation of the 10-digit numbering system



The first group of three digits indicates the type of component. If the first digit is a 4 or a 9 this stands for a component from the automotive division. The second and third digits stand for the type of component (e. g. brake chamber).

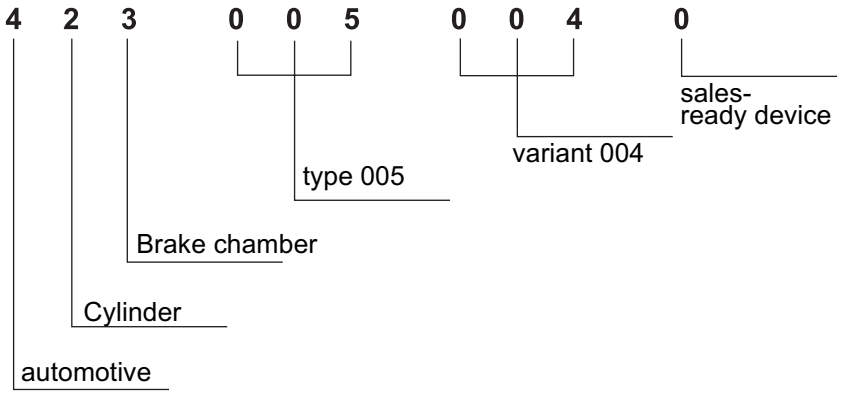
The second group of three digits contains the type number and is used for a family of components, i. e. components of a similar design or a similar type which may vary, however, in settings, characteristics or connection types.

The third group of three digits describes the component variant and thus stands for a certain component with its respective features. For this reason this number is very important, e. g. when replacing a component.

The final digit is the status digit. It shows whether this is a new component (0) or a reconditioned unit (7 plus red reference plate).

Other digits at the end are used for individual parts or modules.

The following example may serve to demonstrate the system:



Example for WABCO reference plate