

Process Valves

Symbols / Icons for
Planners, Designers
and Piping Engineers



Table of contents



<i>Contents</i>		<i>Page</i>
Explanation and important notes	Copyright / right of use	3 - 4
Sample schematic	Example	5
Symbols for process valves	Valve types/bodies	6
Symbols for valve actuators	Actuator types	7
Symbols for accessories		8
Symbols for position and process controllers	for process valves	10
Globe valves, straight through	Straight seat 2/2 way	11
Globe valves, straight through	Angle seat 2/2 way	12
Globe valves, multi-port	Double seat 3/2 way	13
Globe valves, angled design	Straight seat 2/2 way	14
Diaphragm valves, straight through	2/2 way	15
Diaphragm valves for tank mounting	2/2 way	16
Diaphragm valves, angled design	2/2 way	17
Diaphragm valves, T design	3/2 way	18
Diaphragm valves, full bore	2/2 way	19
Ball valves, straight through	2/2 way	20
Ball valves, multi-port	3/2 way with "T -passage"	21
Ball valves, multi-port	3/2 way with "L- passage"	22
Butterfly valves	2/2 way	23
Swing check valve	2/2 way	24
Gate valves	2/2 way	25
Pinch valves	2/2 way	26
Plug valves, straight through	2/2 way	27
Plug valves, multi-port	3/2 way with "T-passage"	28
Plug valves, multi-port	3/2 way with "L-passage"	29
Measurement devices	Process control	30
Examples		31 - 34

New logical symbols for process valves

Following many requests by plant designers and engineers to obtain a list of symbols for process valves we have looked into the host of available norms and printed data concerning this topic and established this document. We found out that although a large number of symbols exist in the various norms they are only particularly suited to the relevant area of application of the norm (e.g. norm for fire safety installations DIN 19 227 part 2, norm for thermal electric stations DIN 2481 and EN ISO 10 628 flow chart for process plant). In some cases different icons are used for one and the same valve type and actuator. For this reason this system of symbols has been developed to particularly meet the requirements of plant engineering and process valve systems and to suit their relevant applications.

Versions

The symbols will also be made available in electronic form in future to support CAD systems . For workshops and sites they will also be available on a shrink-wrapped memo card. The electronic version is expected to be available in summer 2004.

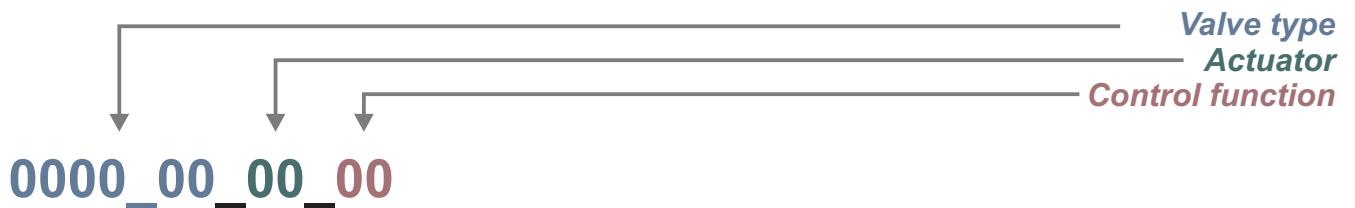
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Legend / File names / GB



Valve type

Globe valve - straight seat
 Globe valve - angle seat
 Globe valve - multi-port
 Globe valve - angled design

Diaphragm valve - straight through
 Diaphragm valve - tank mounting
 Diaphragm valve - angled design
 Diaphragm valve - T-design
 Diaphragm valve - full bore

Ball valve - straight through
 Ball valve - multi-port / T-passage
 Ball valve - multi-port/ L-passage

Butterfly valve - straight through
Swing check valve

Gate valve - straight through
Pinch valve - straight through
Plug valve - straight through
 Plug valve - multi-port / "T-passage"
 Plug valve - multi-port / "L-passage"

VGS
VGA
VGM
VGC

VDS
VDB
VDC
VDT
VDFS

VBS
VBM_T
VBM_L

VBFS
VBFS_PO

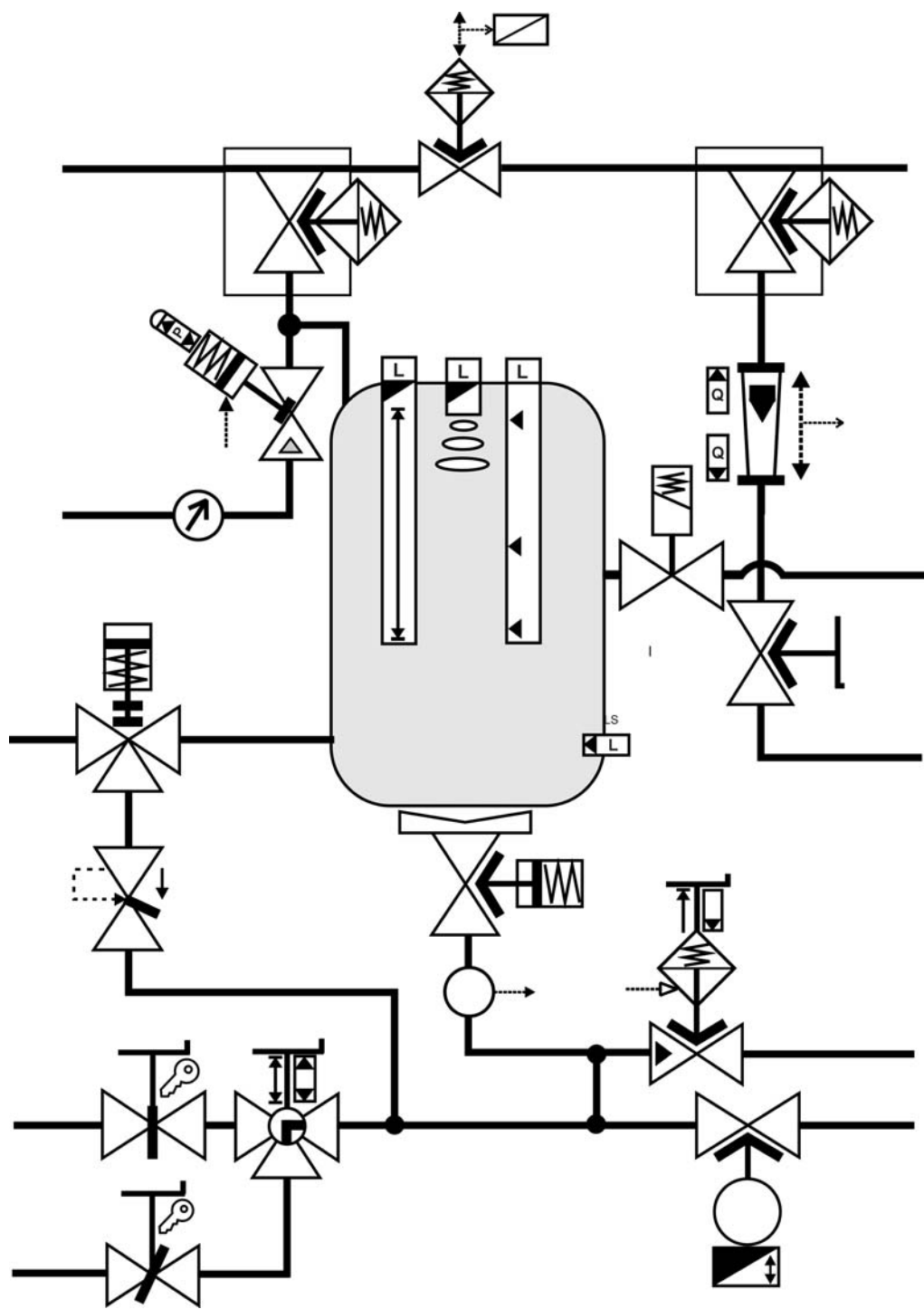
VGAS
VHS
VPS
VPM_T
VPM_L

Actuator

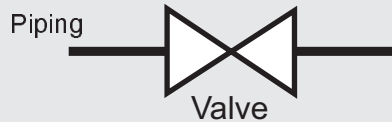
manual, hand operated **MH**
 manual, gear operated **MG**
 electro-solenoid **SE**
 pneumatic, piston controlled **PP**
 pneumatic, membrane controlled **PD**
 hydraulic, piston controlled **HP**
 hydraulic, membrane controlled **HD**
 operated by electric motor **ME**

Control function

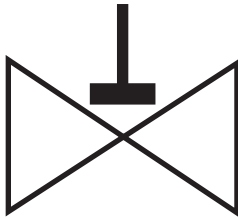
00 Manual operation
10 Normally closed
20 Normally open
30 Double acting
61 Motorized
62 Motorized with position sensor
63 Motorized with position controller
64 Motorized with process controller
65 Motorized with process controller and field bus connection



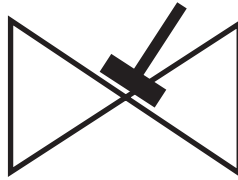
Symbols for process valves



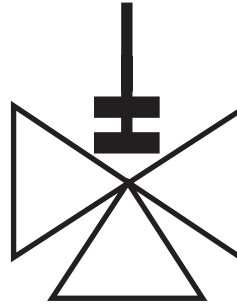
General symbol for straight through valves independent of the valve type and type of operation



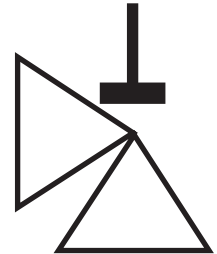
Sitzventil_Geradesitz_2_2_D
Globe_valve_straight seat_2_2_D



Sitzventil_Schrägsitz_2_2_D
Globe_valve_angle seat_2_2_D



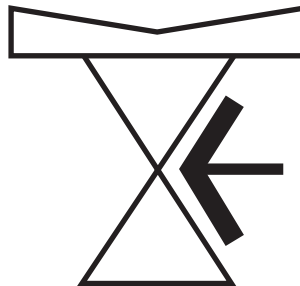
Sitzventil_Mehrwege_3_2_M
Globe_valve_multi-port_3_2_M



Sitzventil_Eckausführung_2_2_E
Globe_valve_angled design_2_2_E



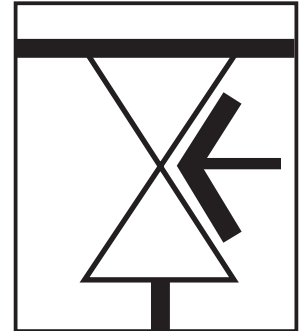
Membranventil_2_2_D
Diaphragm_valve_2_2_D



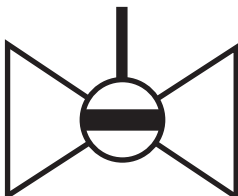
Membranventil_Behältereinbau_2_2_B
Diaphragm_valve_tank_2_2_B



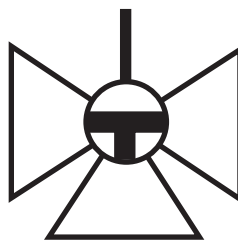
Membranventil_Eckausführung_2_2_E
Diaphragm_valve_angled design_2_2_E



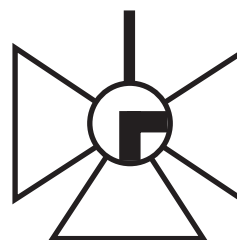
Membranventil_Mehrwege_3_2_T
Diaphragm_valve_multi-port_3_2_T



Kugelventil_2_2_D
Ball_valve_2_2_D



Kugelventil_Mehrwege_3_2_T
Ball_valve_multi-port_3_2_T



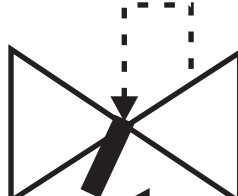
Kugelventil_Mehrwege_3_2_L
Ball_valve_multi-port_3_2_L



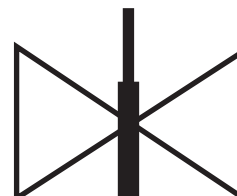
Membranventil_Tiefsitz_2_2_D
Diaphragm_valve_full bore_2_2_D



Klappenventil_2_2_D
Butterfly_valve_2_2_D



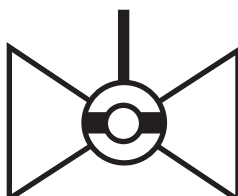
Rückschlagklappe_2_2_D
Swing_check_valve_2_2_D



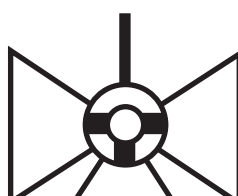
Schieberventil_2_2_D
Gate_valve_2_2_D



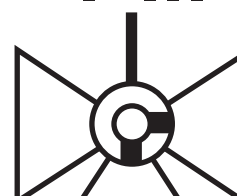
Schlauchquetschventil_2_2_D
Pinch_valve_2_2_D



Kükenventil_2_2_D
plug_valve_2_2_D



Kükenventil_Mehrwege_3_2_T
plug_valve_multiport_3_2_T

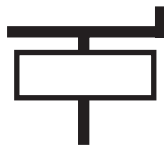


Kükenventil_Mehrwege_3_2_L
plug_valve_multiport_3_2_L

Symbols for valve actuators



Actuator_MH_00



Actuator_MG_00

Manual actuator

"Manually operated"

"Manually operated by gear/servo"



Actuator_PP_10



Actuator_PP_20



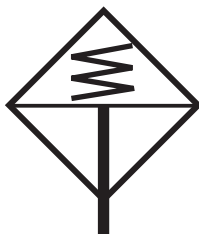
Actuator_PP_30

Pneumatic/Hydraulic actuator, piston controlled

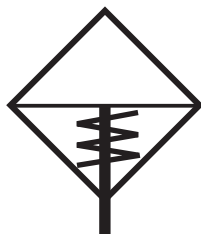
"Normally closed"

"Normally open"

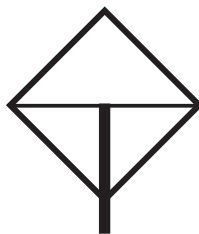
"Double acting"



Actuator_PD_10



Actuator_PD_20



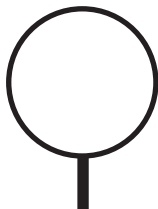
Actuator_PD_30

Pneumatic/Hydraulic actuator, membrane controlled

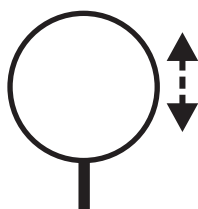
"Normally closed"

"Normally open"

"Double acting"



Actuator_ME_61



Actuator_ME_62

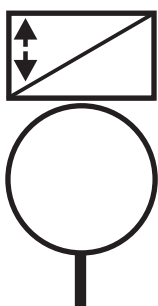
Motorized actuator

electric

"AC/DC"

"AC/DC with position feedback"

Type of voltage and level must be noted in the motorized actuator symbol (e.g. DC / 24 V)



Actuator_ME_63



Actuator_ME_64



Actuator_ME_65

Motorized actuator

electric with integrated controller

"AC/DC with position controller"

"AC/ DC with position and process controller"

"AC/DC with position and process controller and field bus"

Type of voltage and level must be noted in the motorized actuator symbol (e.g. DC / 24 V)



Actuator_SE_10



Actuator_SE_20



Actuator_SE_30

Solenoid actuator

electric

"AC/DC - normally closed"

"AC/DC - normally open"

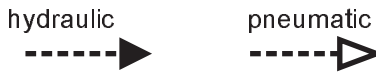
"AC/DC - double acting"

Type of voltage and level must be noted right of the solenoid actuator symbol (e.g. DC / 24 V)

Additional symbols



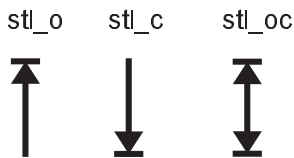
Symbols for flow direction and type of working medium
Left: gas, middle: steam, right: liquid



Symbols for valve actuator control lines and type of control medium.
Left: hydraulic, right: pneumatic



Symbol for locking device



Symbols for mechanical stroke limiters for valve actuators
Left: opening stroke, middle: closing stroke, right: opening and closing stroke)



Symbols for electrical position indicators

Top line from left to right:

Both end positions, end position open, end position closed



Bottom line:

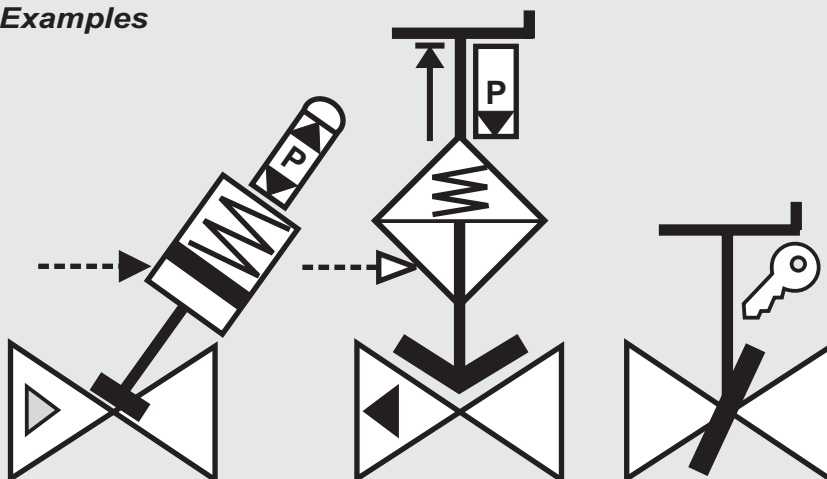
Switches as above, but with integrated optical position indicator (mechanical or LED/light)



Field bus connections for pneumatic process valves.

Left: Electronic field bus connection, right: Electronic field bus connection with integrated pilot valve

Examples



From left to right:

Globe valve, flow against the seat, working medium steam, hydraulically operated piston actuator "normally closed" and electrical position indicator for both end positions, with optical indicator

Diaphragm valve with specified flow direction for liquid working media, pneumatic membrane controlled actuator "normally closed", manual override and stroke limiter for valve position "open" and electrical position indicator for end position "closed".

Butterfly valve with lockable manual operator

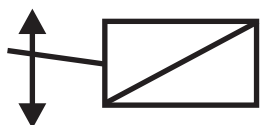
P:	position controller
PC:	process controller
M:	mechanical travel transmission
E:	electronic travel transmission
D:	direct mounting to valve actuator
S:	separate mounting
I:	integrated in the actuator or direct mounting



P_E_IS

Position controller, electric

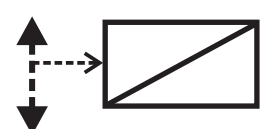
Integrated in the motorized actuator or for separate mounting



P_M_D

Position controller, electro-pneumatic

With mechanical travel transmission for direct mounting to the valve actuator



P_E_DS

Position controller, electro-pneumatic

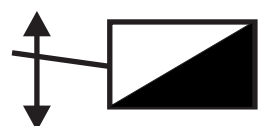
With electronic travel transmission for direct mounting to the valve actuator or separate mounting



PC_IS

Process controller, electric

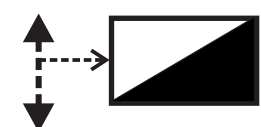
Integrated in the motorized actuator or for separate mounting



P_PC_M_D

Process controller, electro-pneumatic

With mechanical travel transmission for direct mounting to the valve actuator

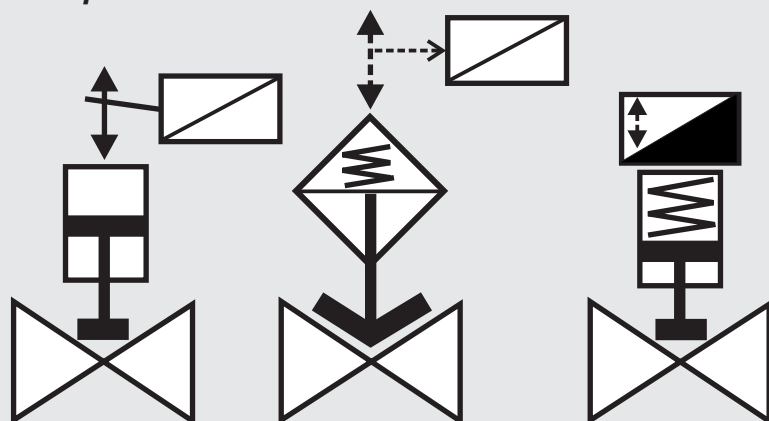


P_PC_E_DS

Process controller, electro-pneumatic

With electronic travel transmission for direct mounting to the valve actuator or separate mounting

Examples



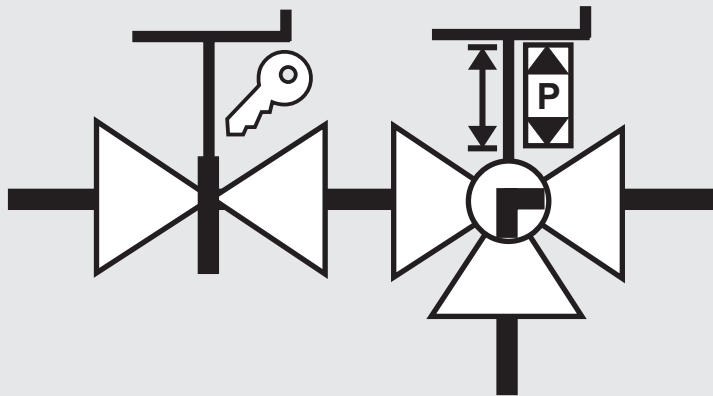
From left to right:

Globe valve "double acting" with piston controlled actuator and directly mounted electro-pneumatic position controller with mechanical travel transmission (actual value/ valve position)

Diaphragm valve "normally closed" with membrane controlled actuator and directly mounted or separate electro-pneumatic position controller with electronic travel transmission.

Globe valve "normally closed" with directly mounted position/process controller with integrated travel transmission.

Examples

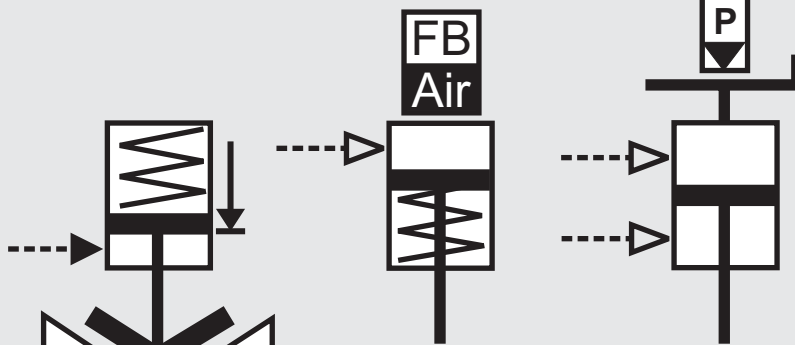


Manual actuators

From left to right:

Gate valve, straight through, with lockable handwheel

Ball valve, 3 way design with "L-ball" and travel limitation on both sides (closing limiter) and an electrical position indicator for both end positions.



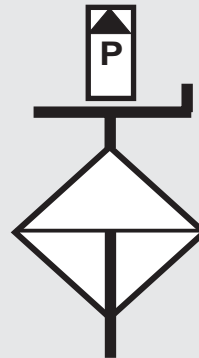
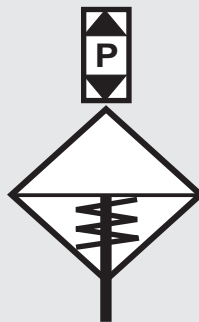
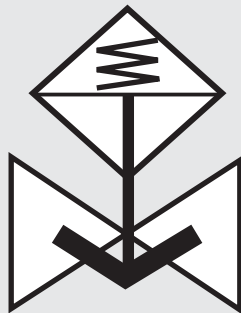
Piston controlled pneumatic/hydraulic actuators

From left to right:

Hydraulically operated pinch valve "normally closed" with stroke limiter in "closed" position".

Pneumatic piston actuator "normally open" with integrated field bus connection.

Pneumatically operated piston actuator, "double acting" with manual override and electrical position indicator for "closed" end position



Membrane controlled pneumatic/hydraulic actuators

From left to right:

Diaphragm valve, full bore design "normally closed"

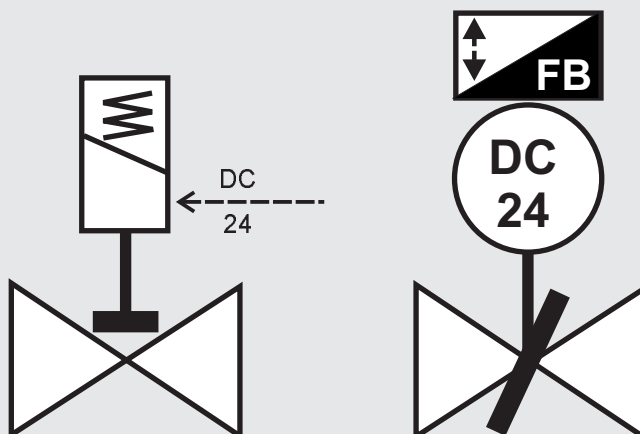
"Normally open" with electrical position indicator for both end positions

"Double acting" with manual override and electrical position indicator for "open" end position

From left to right:

Electric solenoid actuator

Globe valve, straight through design. The solenoid is operated with 24 Volt DC. Normally closed actuator.



Electric motorized actuator

Butterfly valve, straight through design. The motorized actuator is operated with 24 Volt DC and has an integrated process controller with correcting variable output. The actuator/valve can be connected to a field bus system.

Globe valves, straight seat 2/2 way straight through design



File name

Globe valve, straight
manually operated

VGS_MH_00

control function

MG

manual, gearbox / servo

SE

solenoid

PP

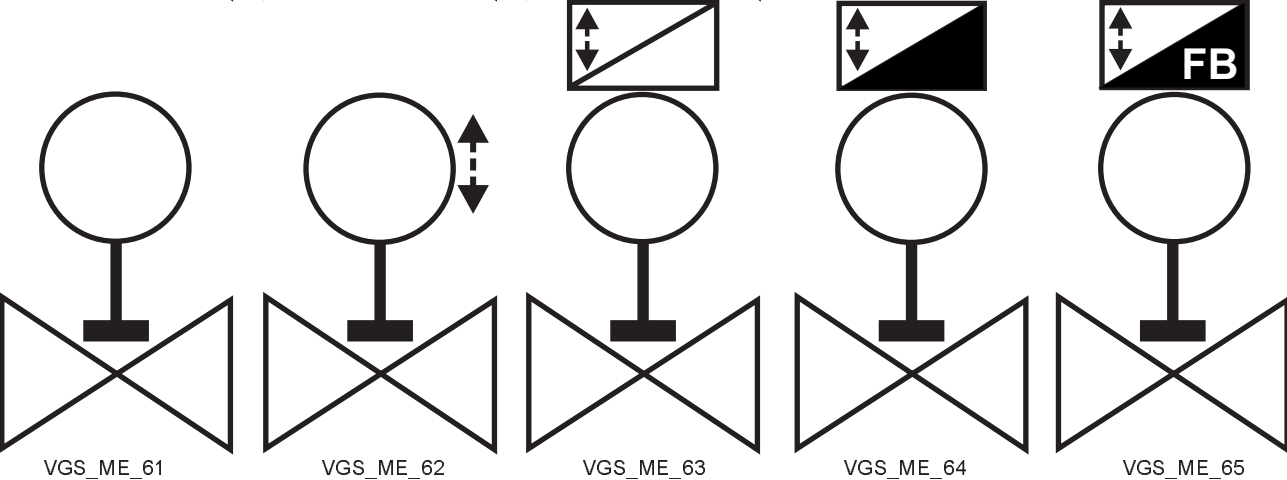
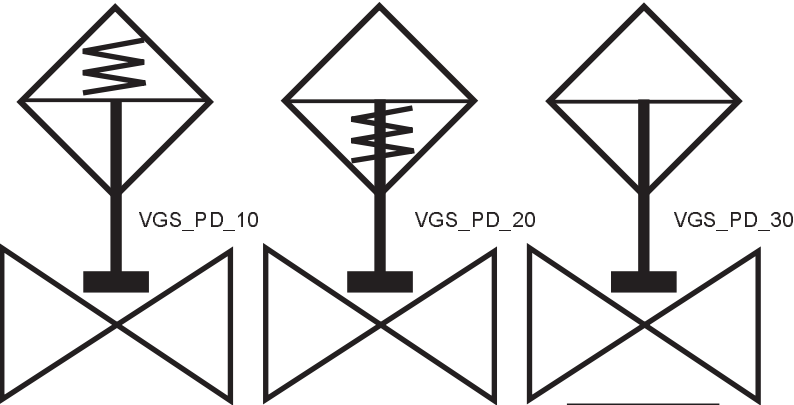
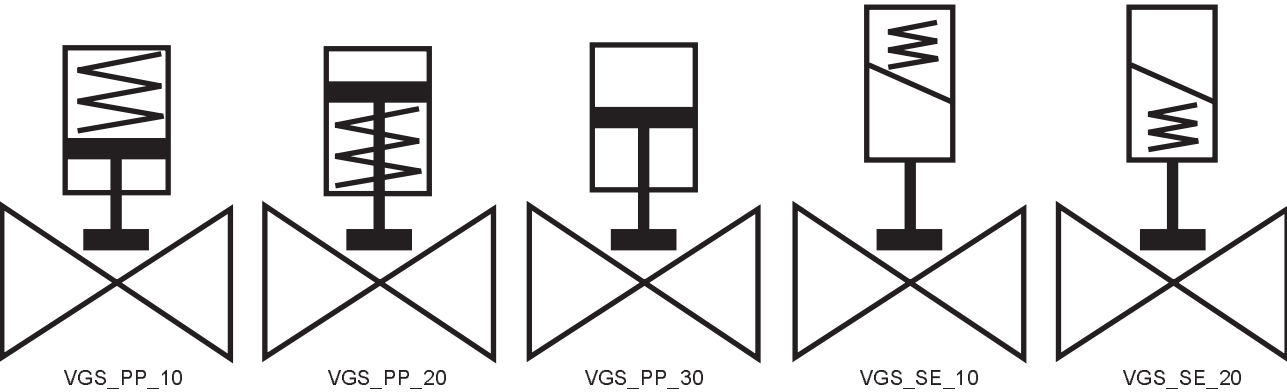
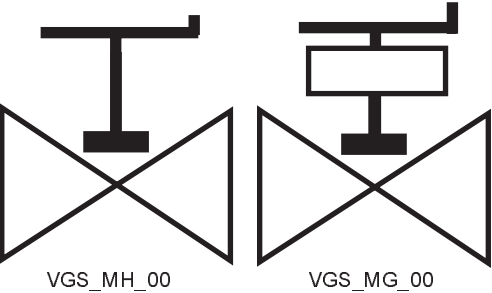
pneumatically operated by piston

PD

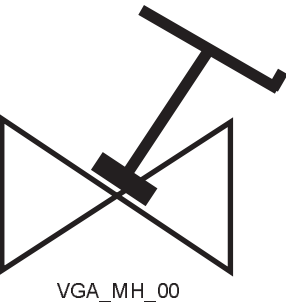
pneumatically operated by membrane

ME

motorized



Globe valves, angle seat 2/2 way straight through design



File name

globe valve, angle seat

manually operated

VGA_MH_00

control function

SE

solenoid

PP

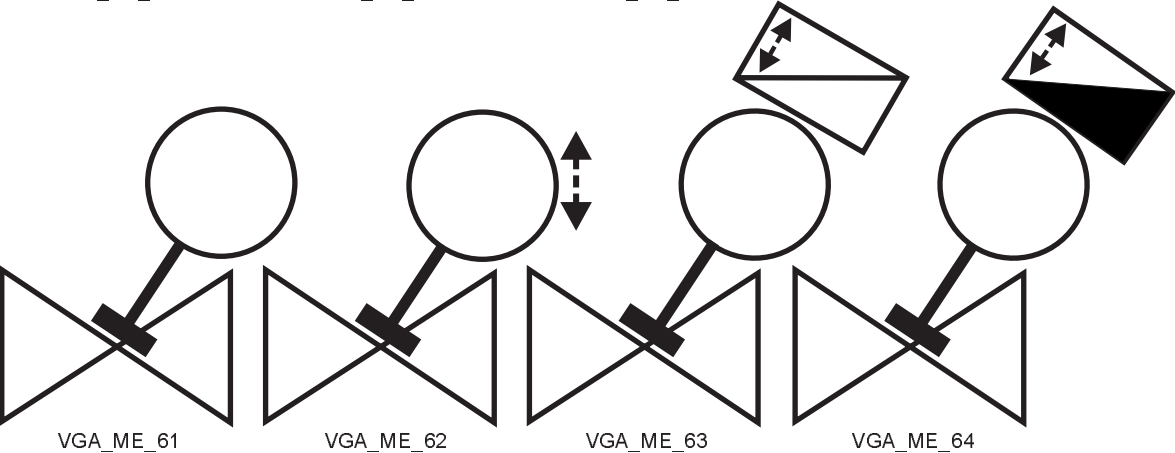
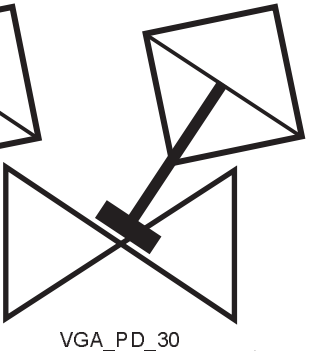
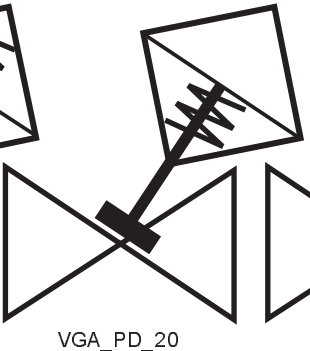
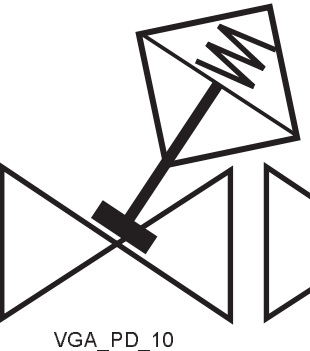
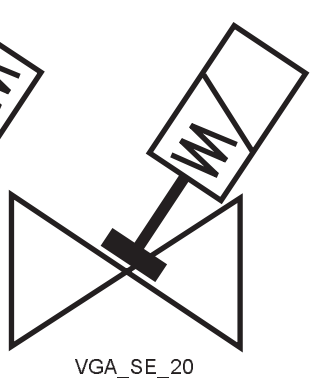
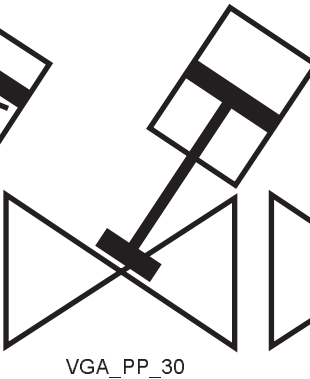
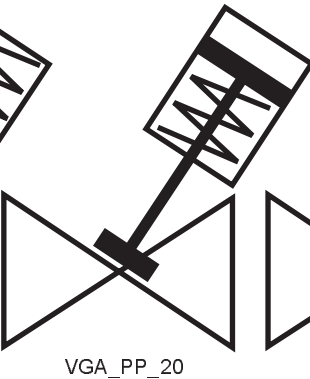
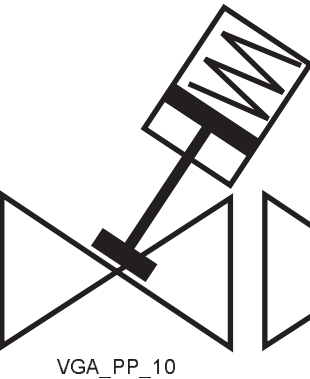
pneumatically operated by piston

PD

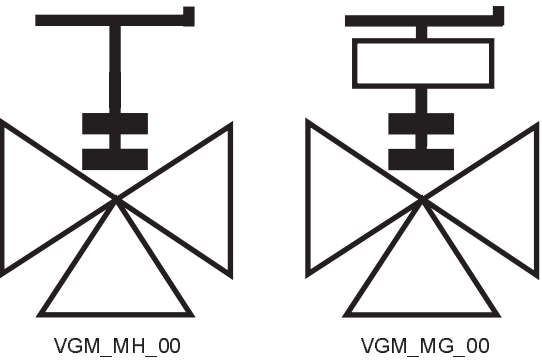
pneumatically operated by membrane

ME

motorized



Globe valves / double seat 3/2 way multi-port design



File name

globe valve, multi-port

manually operated

VGM_MH_00 ← control function

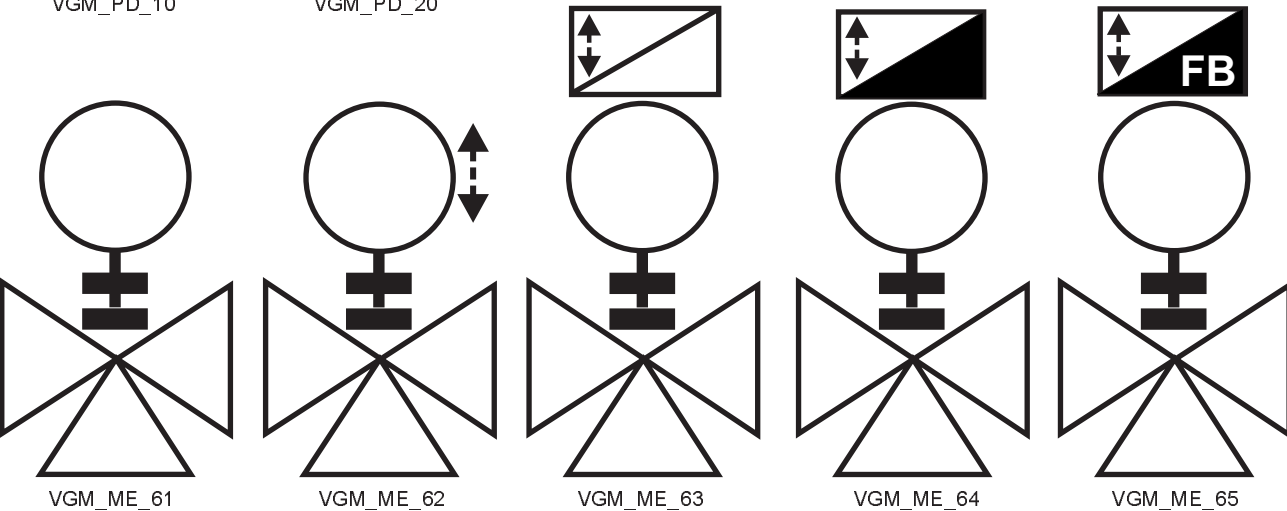
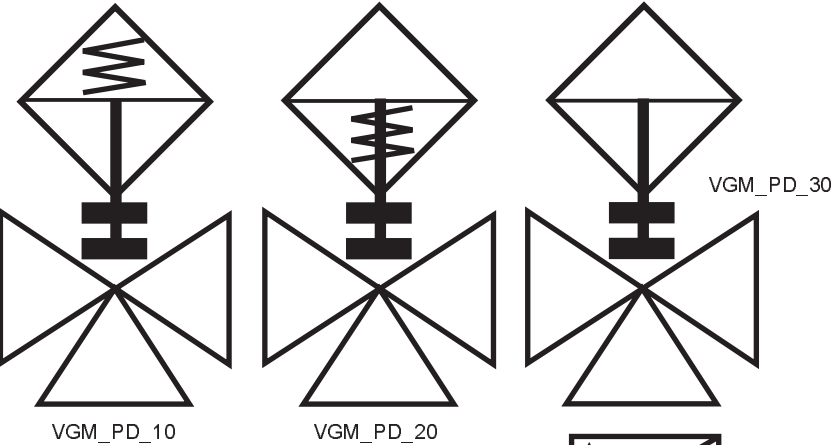
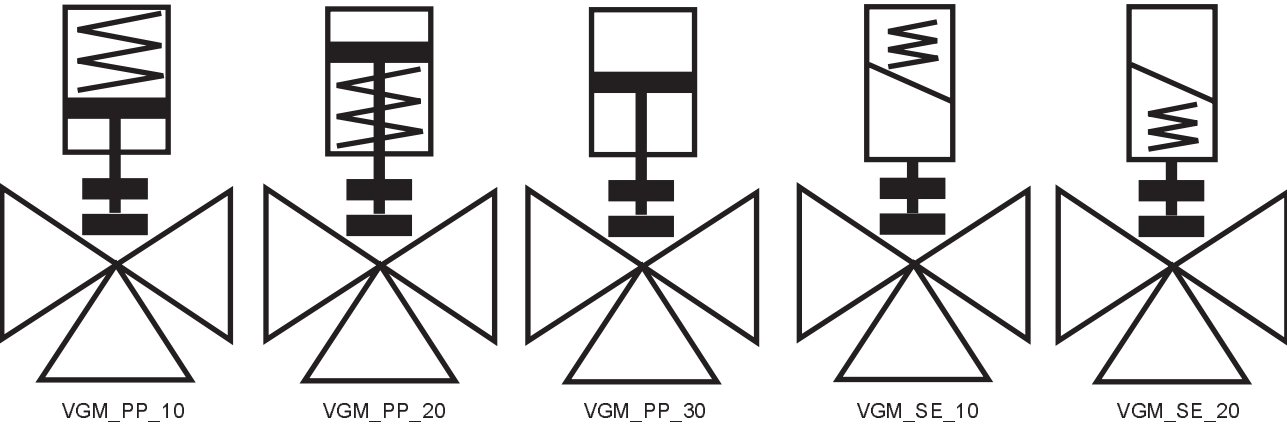
MG manual, gearbox / servo

SE solenoid

PP pneumatically operated by piston

PD pneumatically operated by membrane

ME motorized



Globe valves 2/2 way angled design



File name

globe valve, angled design

manually operated

VGC_MH_00 ← control function

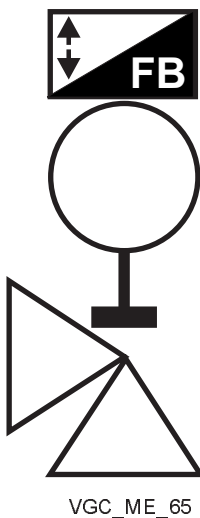
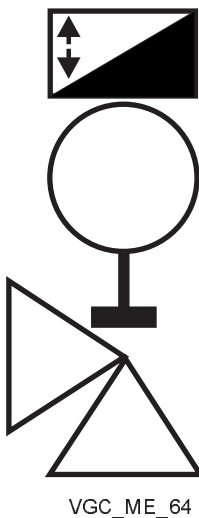
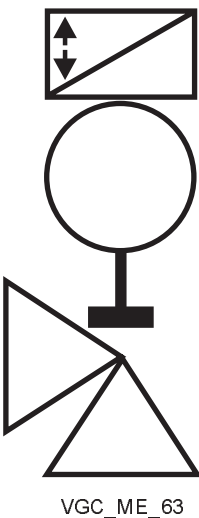
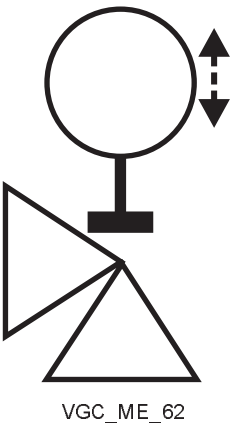
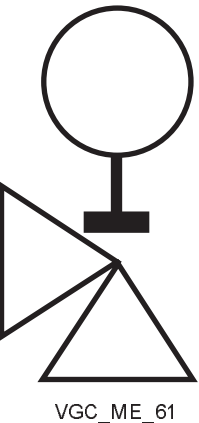
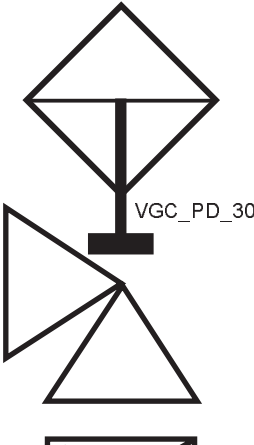
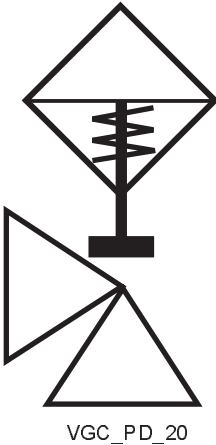
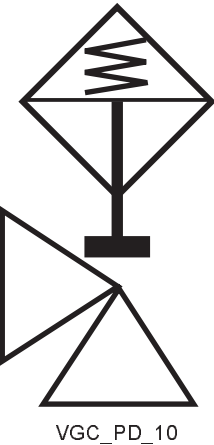
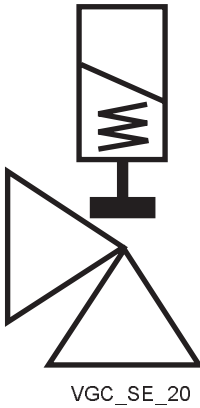
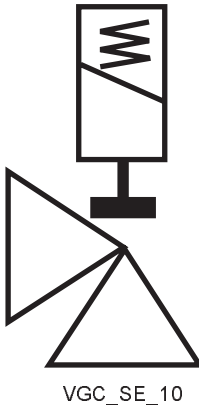
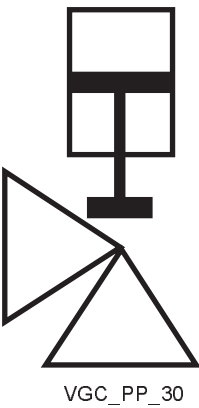
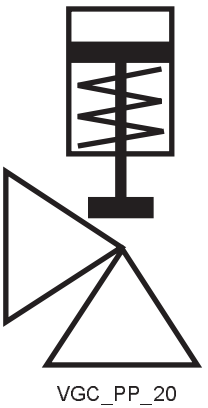
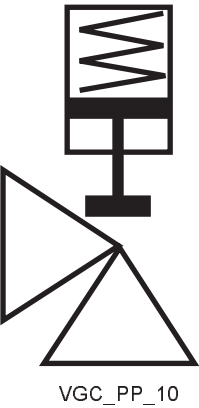
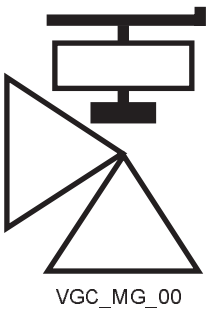
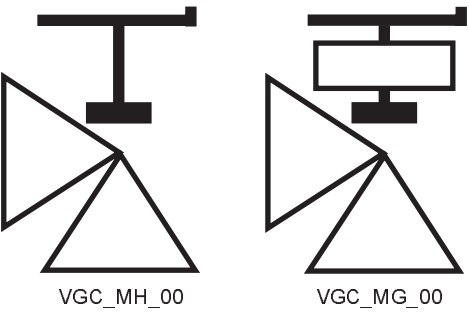
MG manual, gearbox / servo

SE solenoid

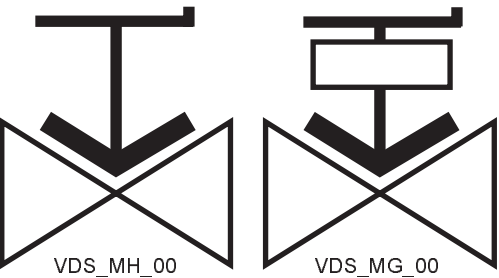
PP pneumatically operated by piston

PD pneumatically operated by membrane

ME motorized



Diaphragm valves 2/2 way straight through design



File name

diaphragm valve, straight

manually operated

VDS_MH_00 ← control function

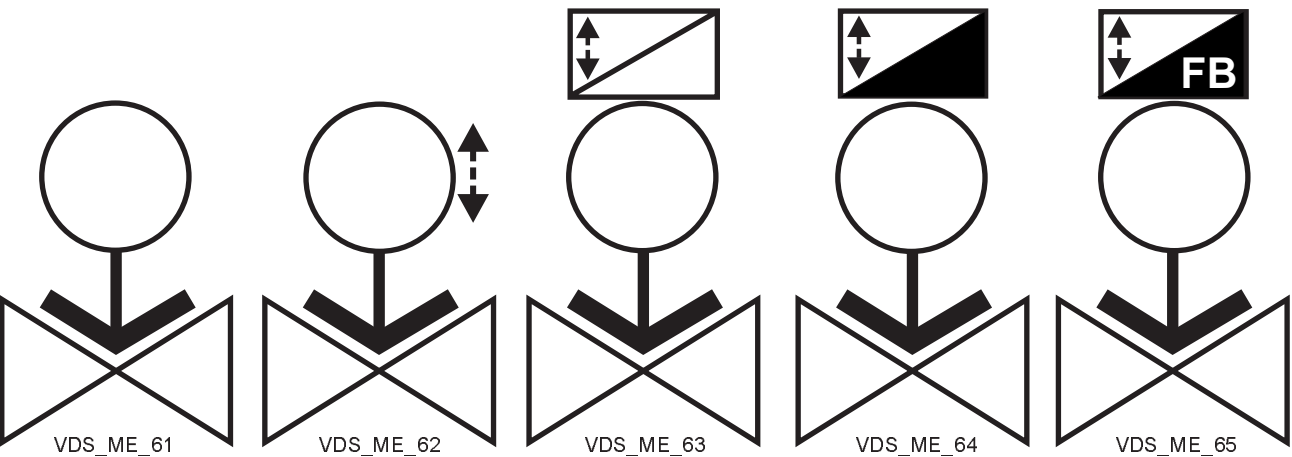
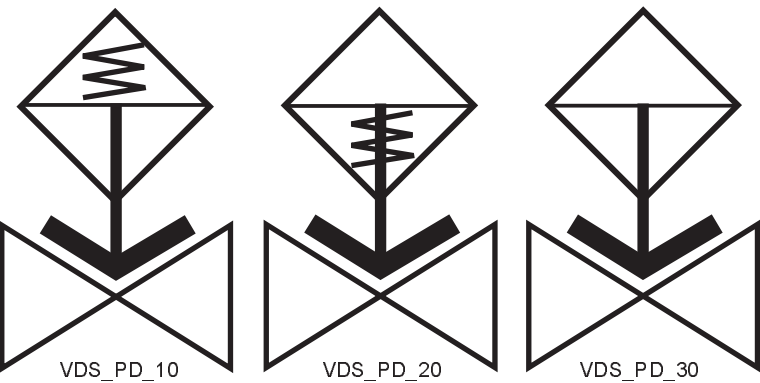
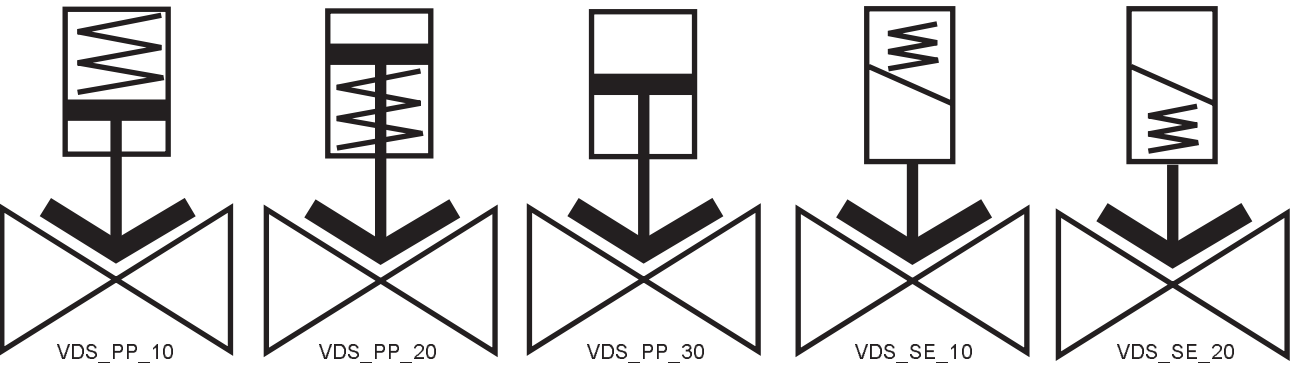
MG manual, gearbox / servo

SE solenoid

PP pneumatically operated by piston

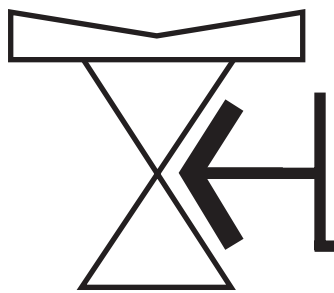
PD pneumatically operated by membrane

ME motorized

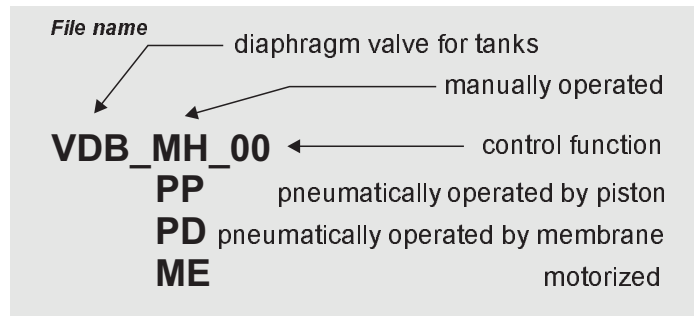


Diaphragm valves 2/2 way for tank mounting

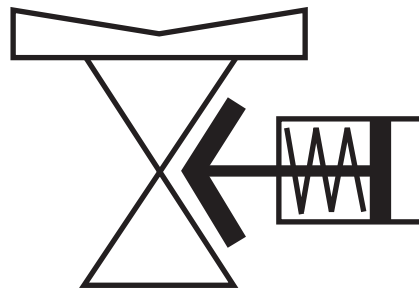
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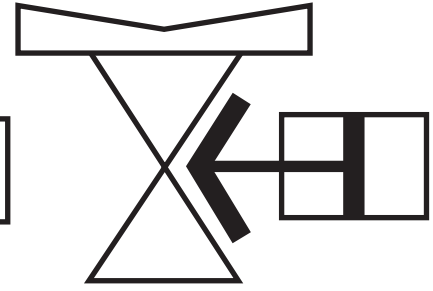
VDB_MH_00



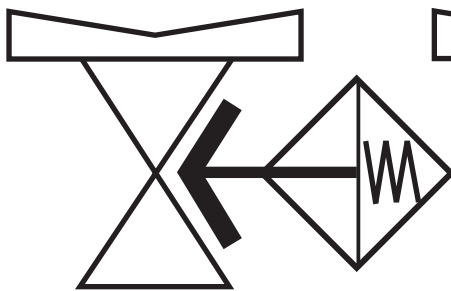
VDB_PP_10



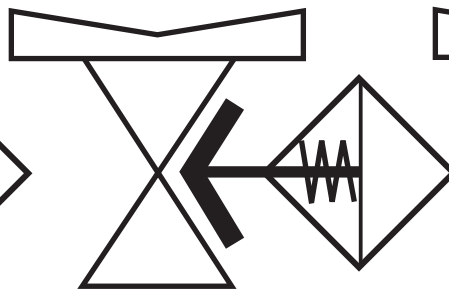
VDB_PP_20



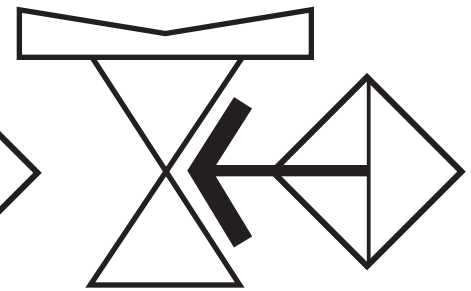
VDB_PP_30



VDB_PD_10



VDB_PD_20



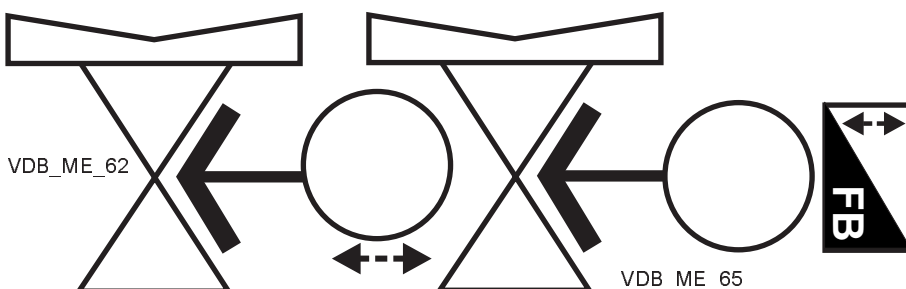
VDB_PD_30



VDB_ME_61



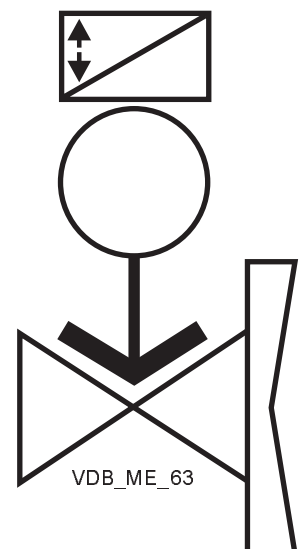
VDB_ME_64



VDB_ME_62



VDB_ME_65



VDB_ME_63

Diaphragm valves 2/2 way angled design



File name

Diaphragm valve, angled design

manually operated

VDC_MH_00

control function

PP

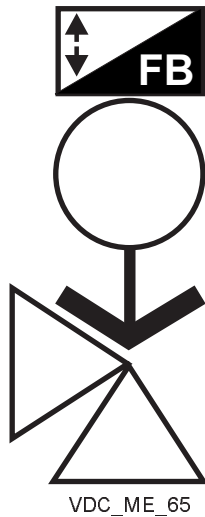
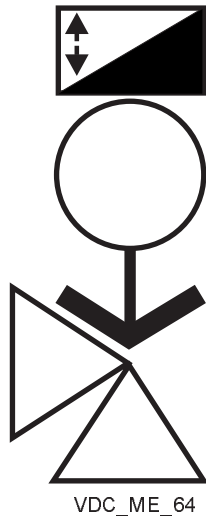
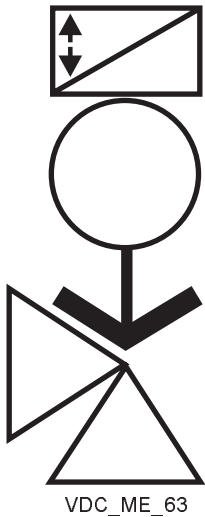
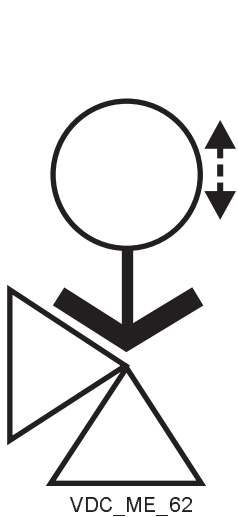
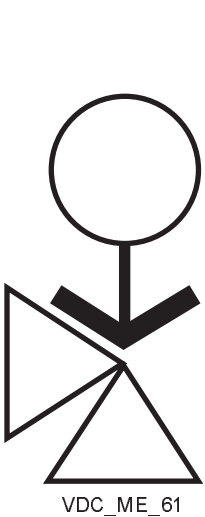
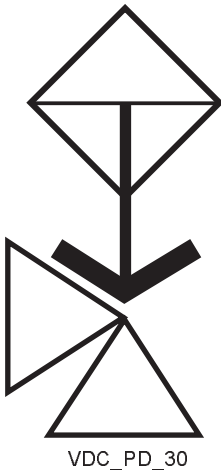
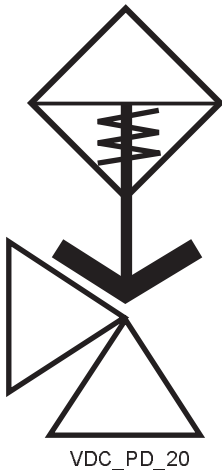
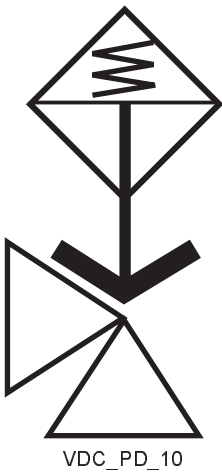
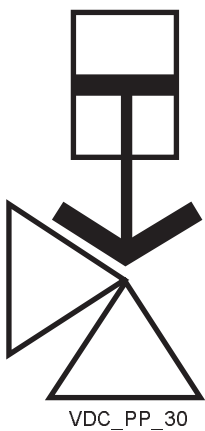
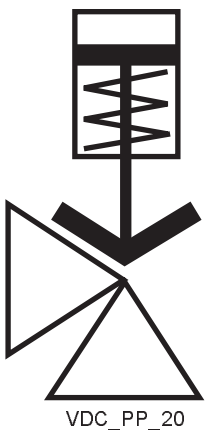
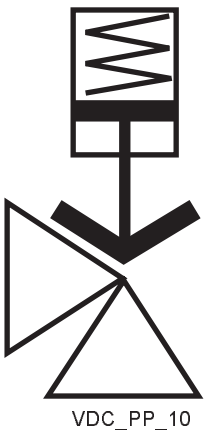
pneumatically operated by piston

PD

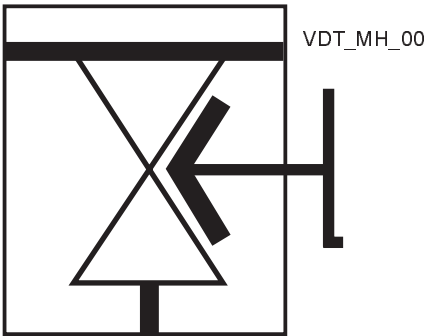
pneumatically operated by membrane

ME

motorized

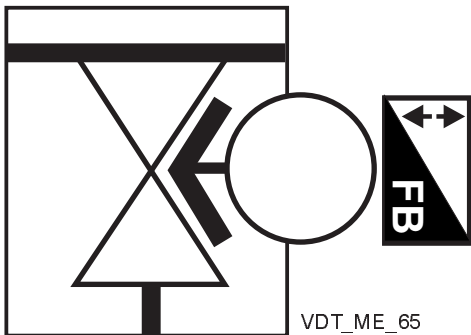
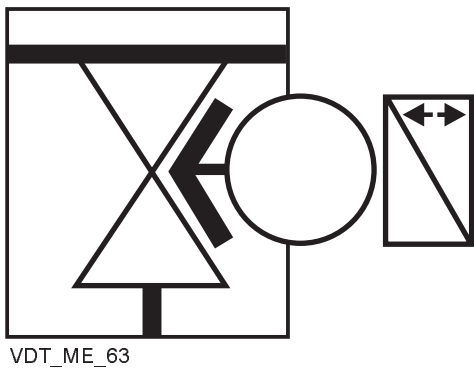
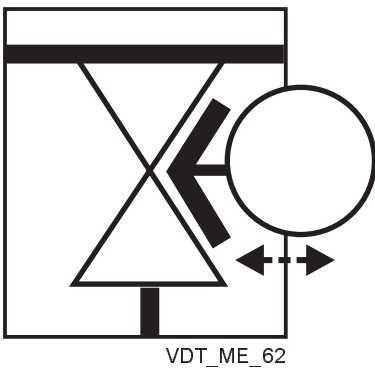
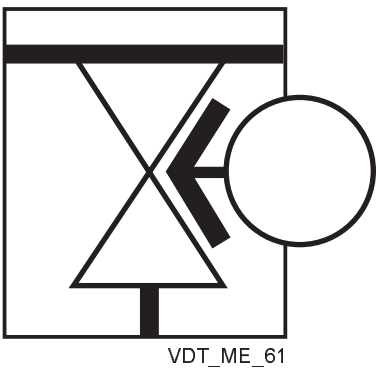
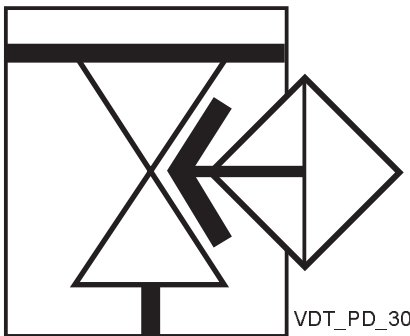
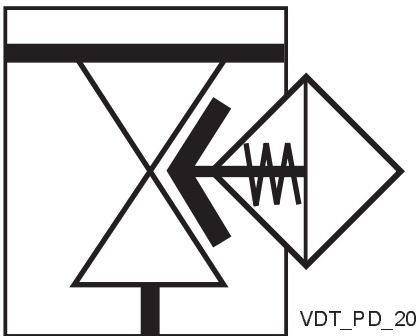
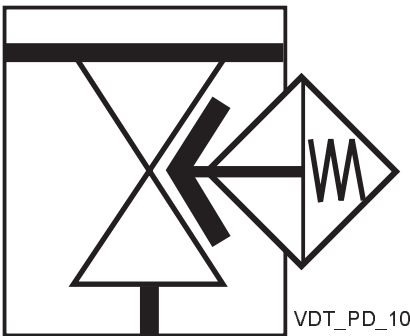
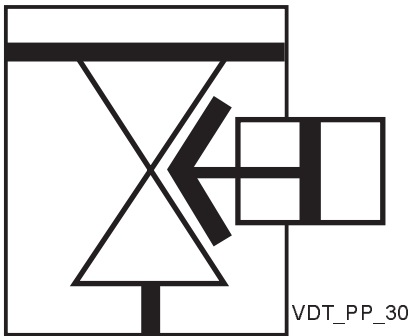
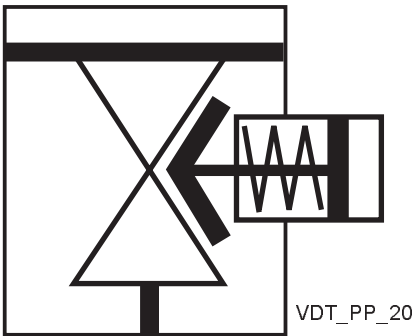
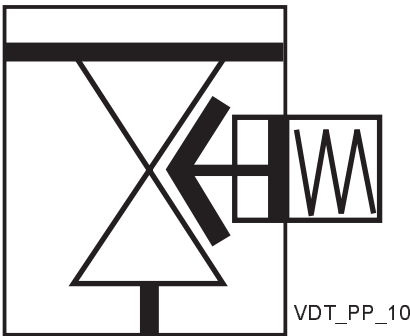


Diaphragm valves 3/2 way T design for feeding and outlet



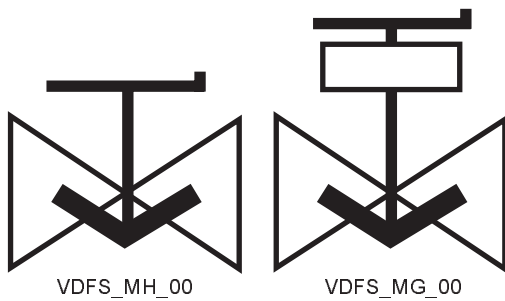
File name

- diaphragm valve, T design
- manually operated
- VDT_MH_00** control function
- PP** pneumatically operated by piston
- PD** pneumatically operated by membrane
- ME** motorized

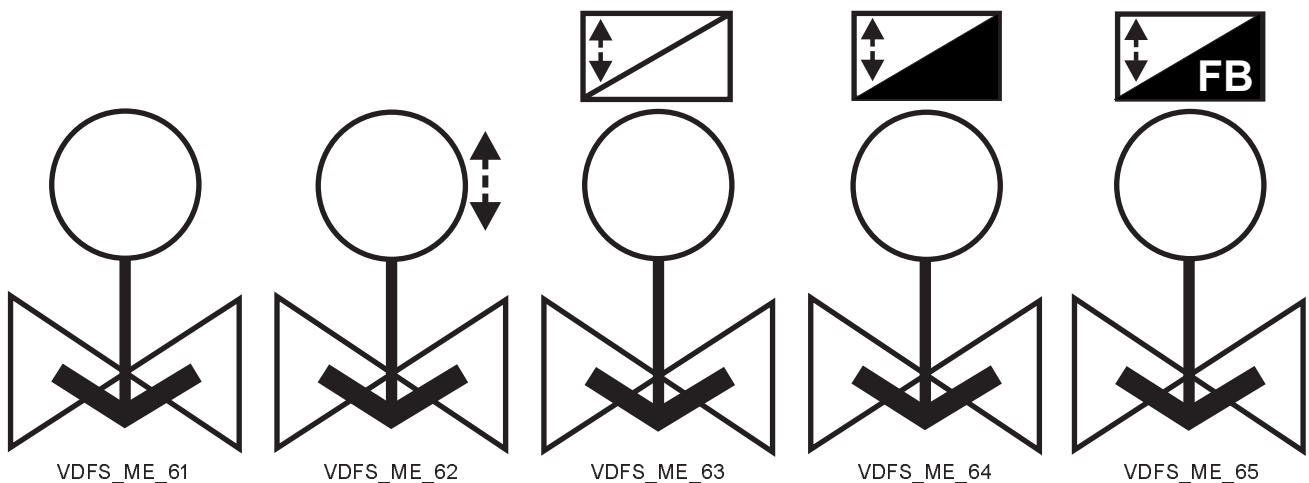
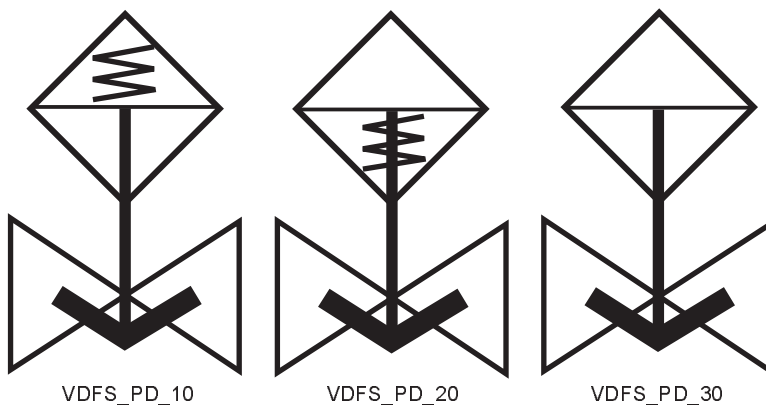
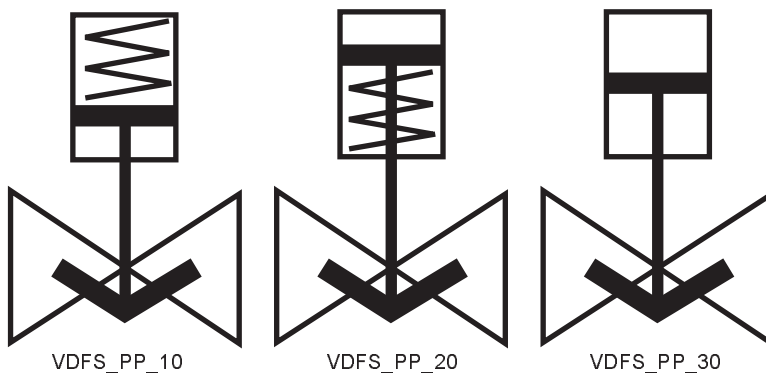


Diaphragm valves 2/2 way full bore, straight through design

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<i>File name</i>	diaphragm valve, full bore, straight
	manually operated
VDFS_MH_00	control function
MG	manual, gearbox / servo
PP	pneumatically operated by piston
PD	pneumatically operated by membrane
ME	motorized



Ball valves 2/2 way straight through design



File name

ball valve, straight

manually operated

control function

manual, gearbox / servo

pneumatically operated by piston

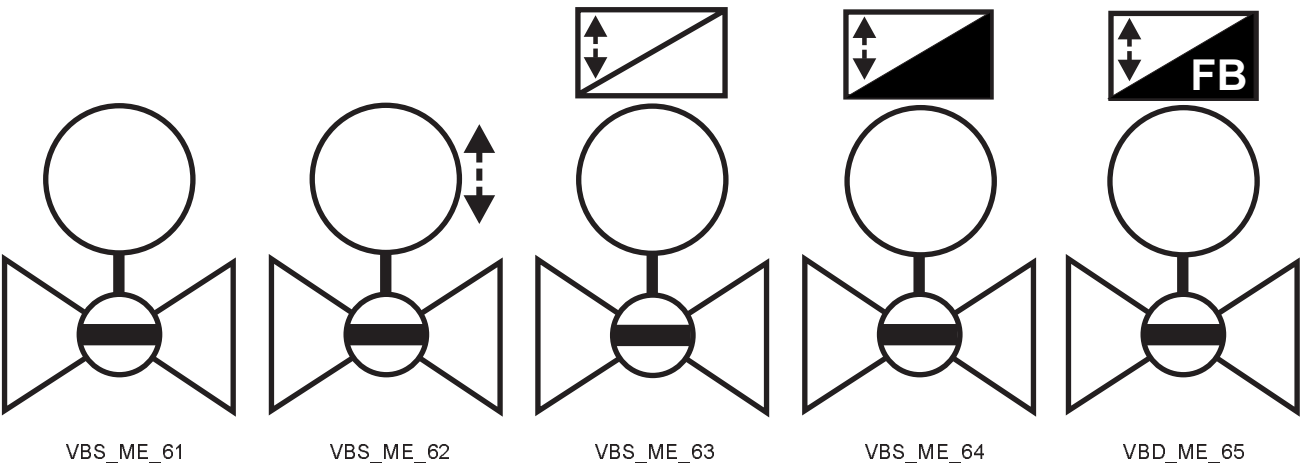
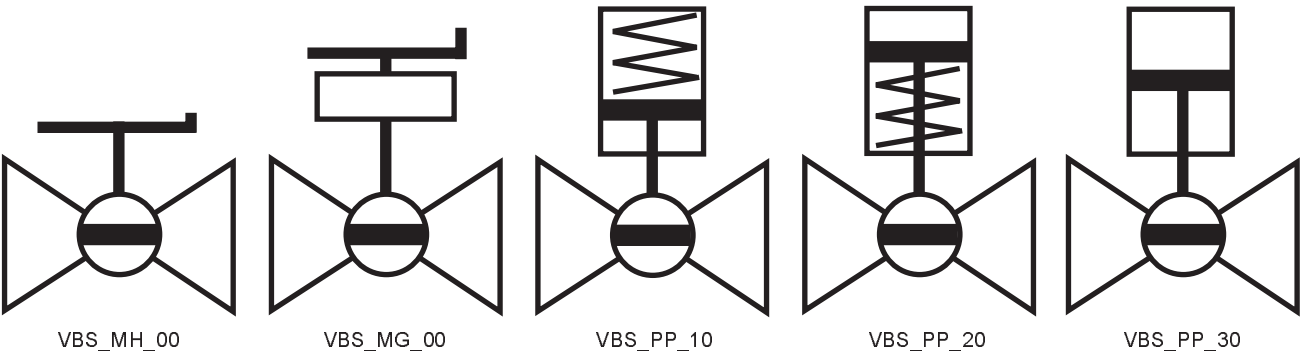
motorized

VBS_MH_00

MG

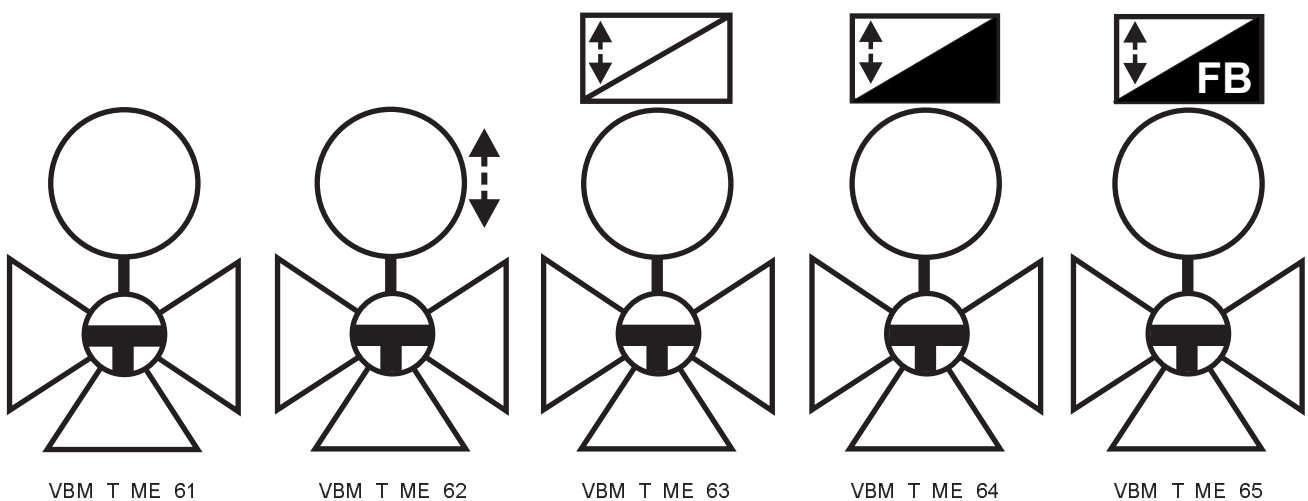
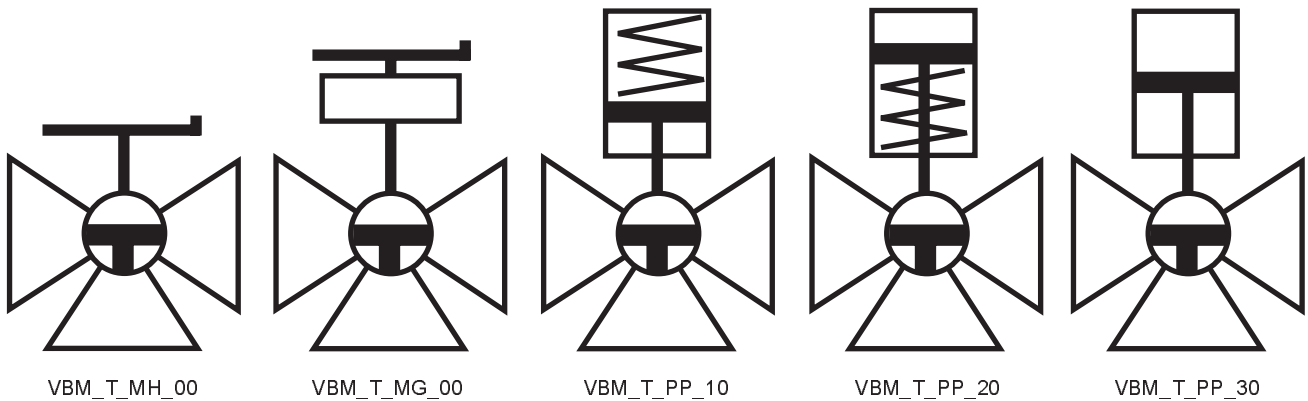
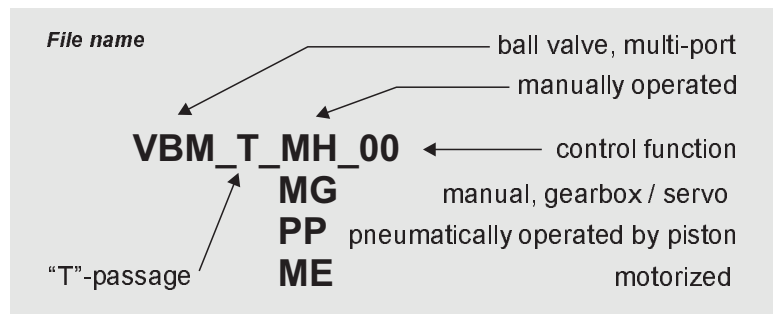
PP

ME



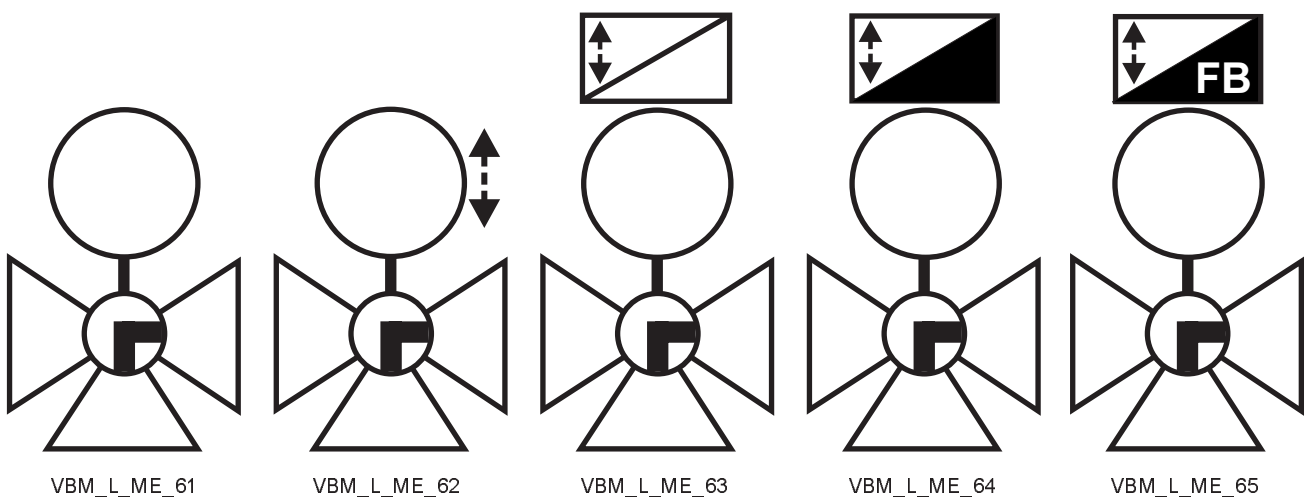
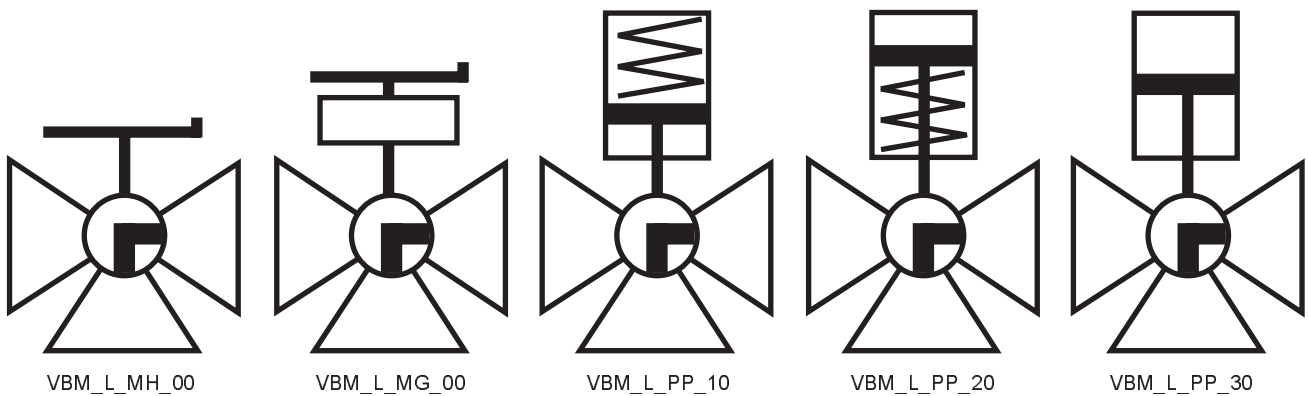
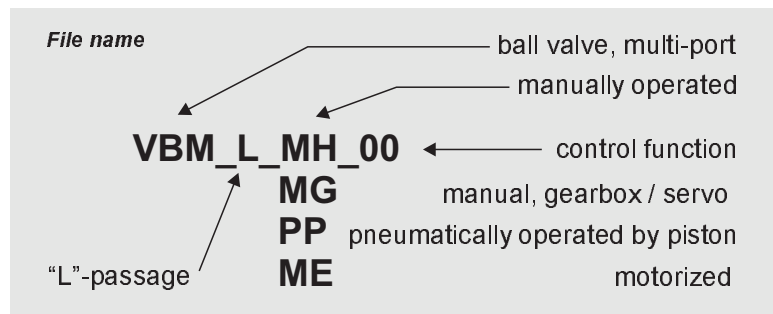
Ball valves 3/2 way with T-passage, multi-port design

GEMÜ®

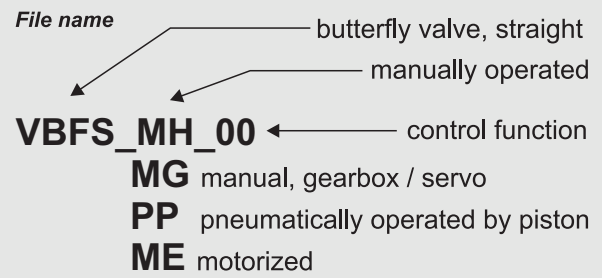


Ball valves 3/2 way with L-passage, multi-port design

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Subject to alteration / 09-03 / Ralph Kroupa



Swing check valve 2/2 way straight through design

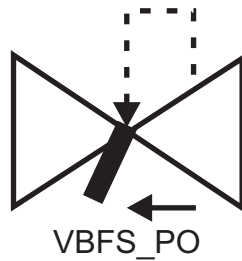


File name

Swing check valve, straight

VBFS_PO

control function
pressure operated



Gate valves 2/2 way straight through design



File name

Gate valve, straight

manually operated

control function

manual, gearbox / servo

pneumatically operated by piston

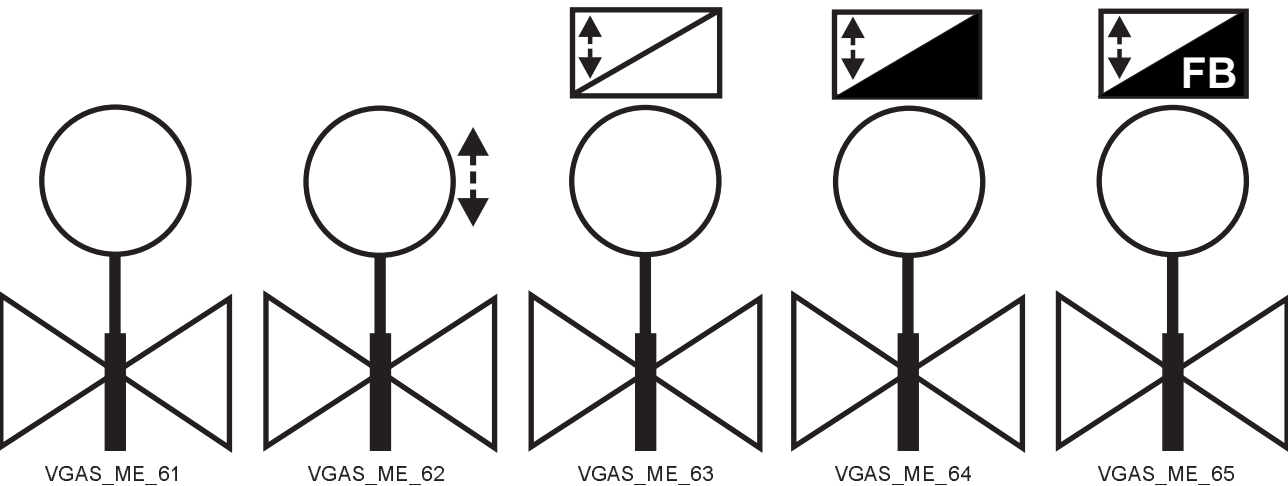
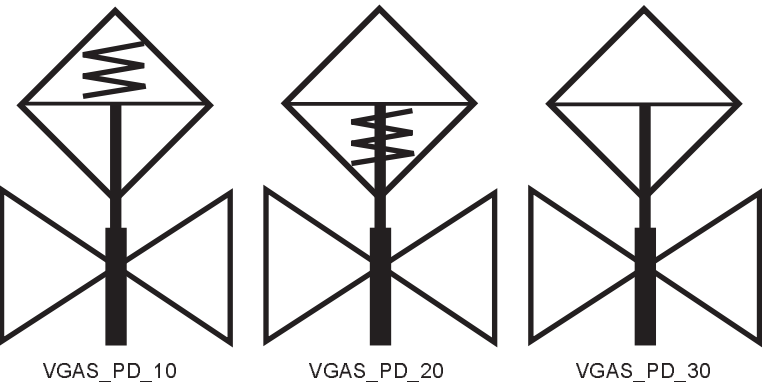
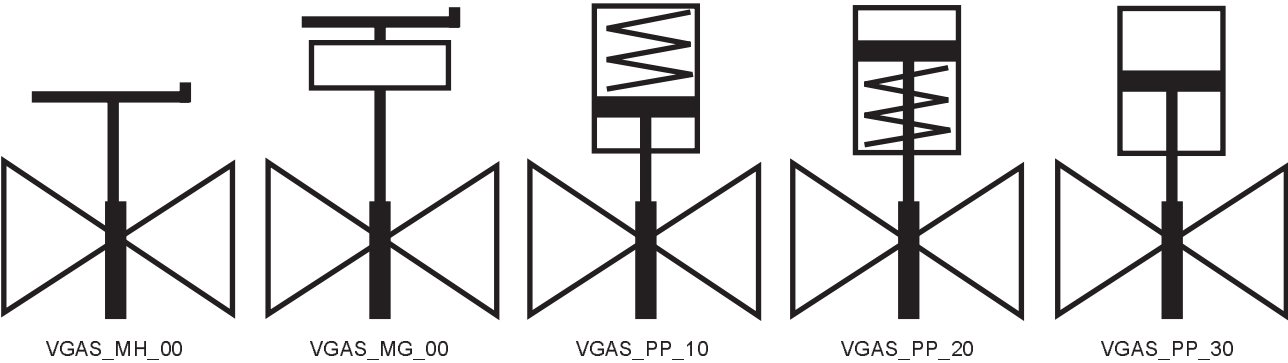
motorized

VGAS_MH_00

MG

PP

ME



Pinch valves 2/2 way straight through design



File name

Pinch valve, straight

manually operated

control function

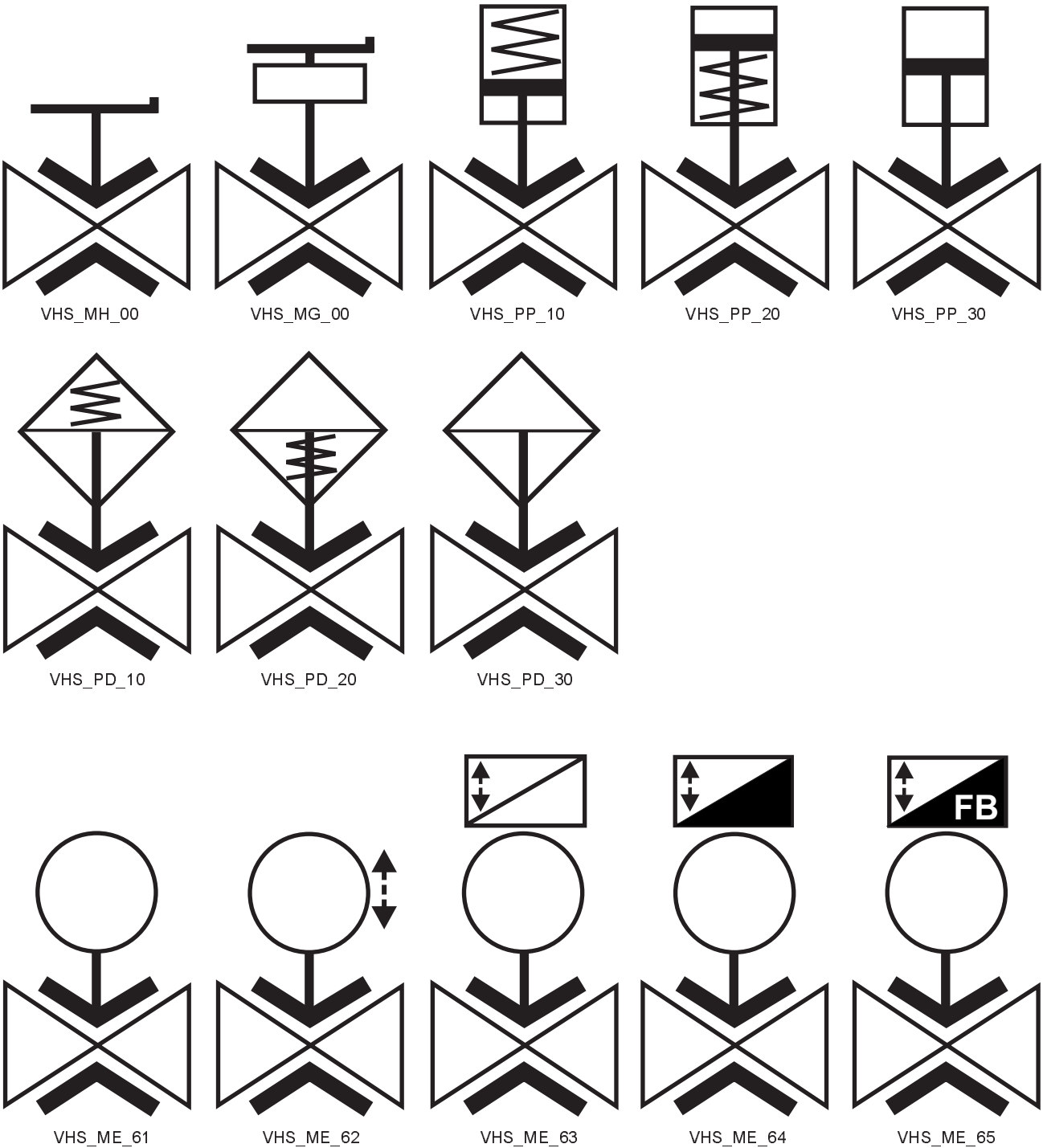
manual, gearbox / servo

pneumatically operated by piston

pneumatically operated by membrane

motorized

VHS_MH_00
MG
PP
PD
ME



Plug valves 2/2 way straight through design



File name

plug valve, straight

manually operated

control function

manual, gearbox / servo

pneumatically operated by piston

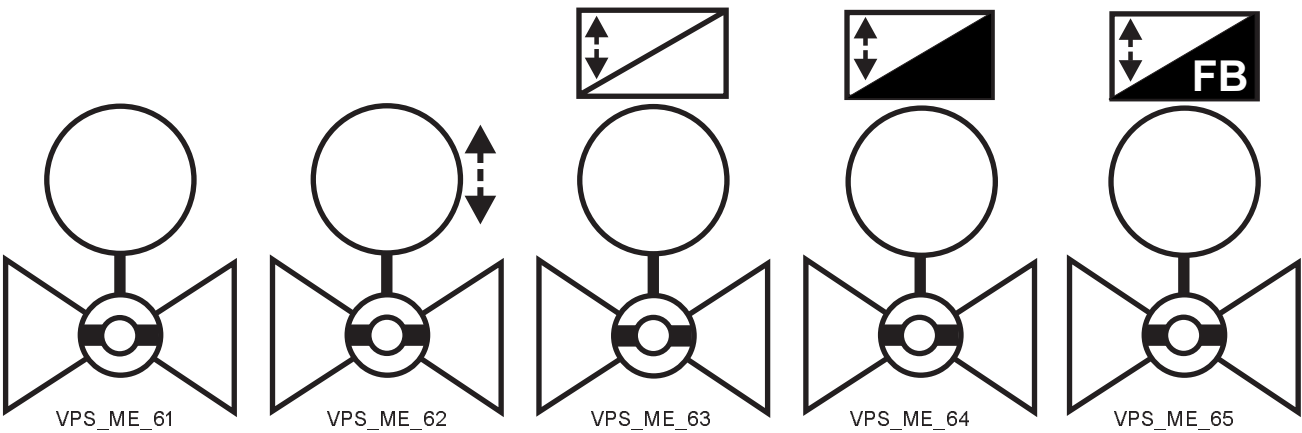
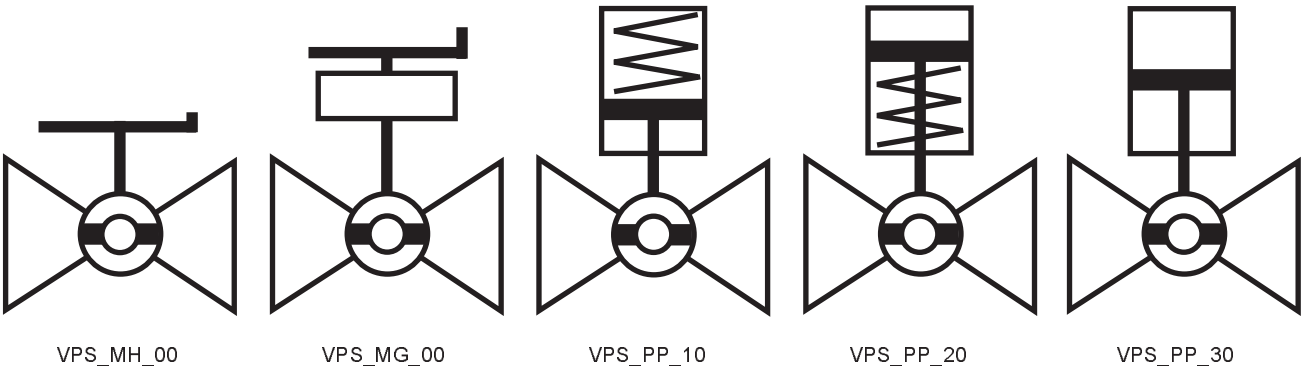
motorized

VPS_MH_00

MG

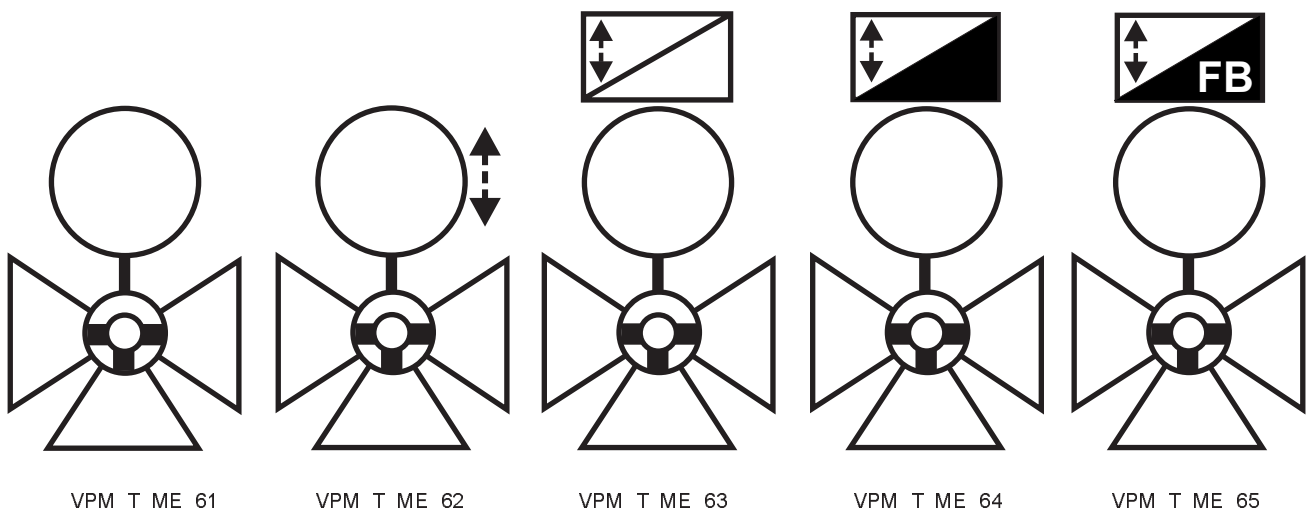
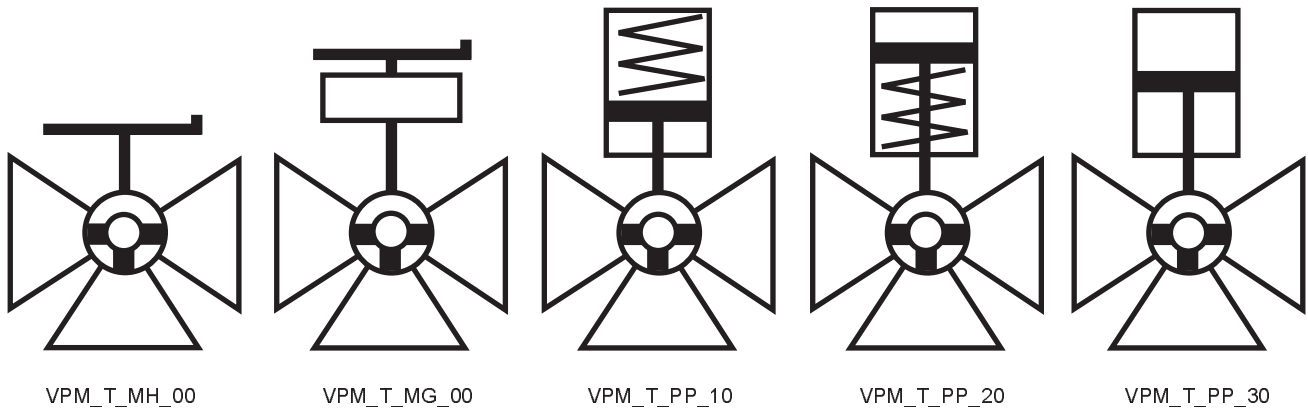
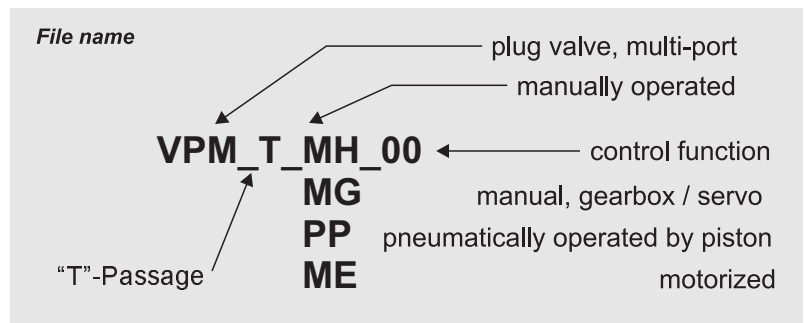
PP

ME

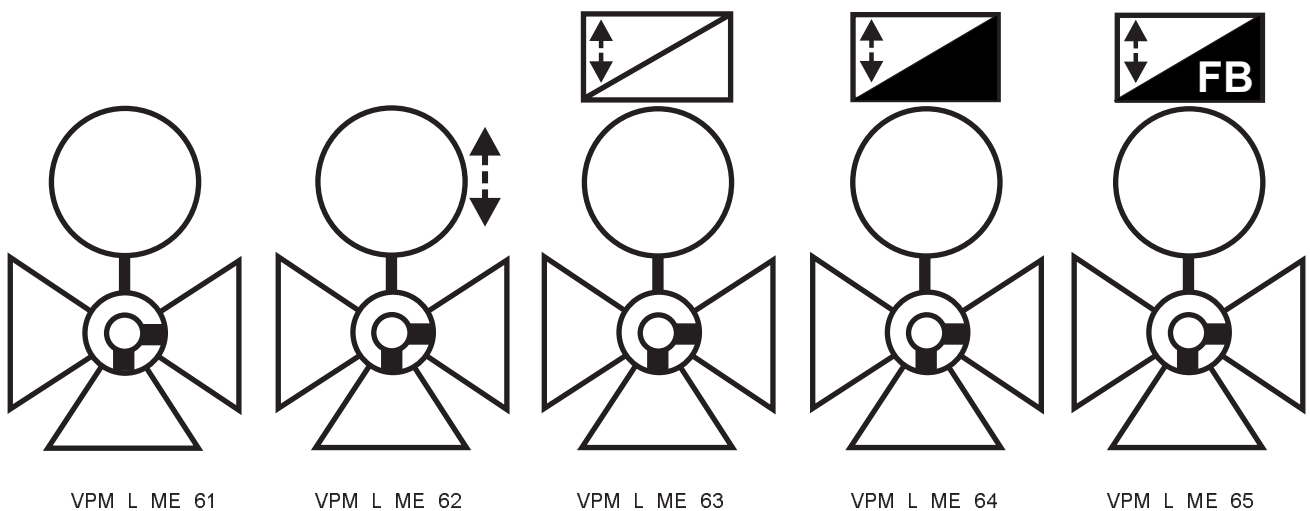
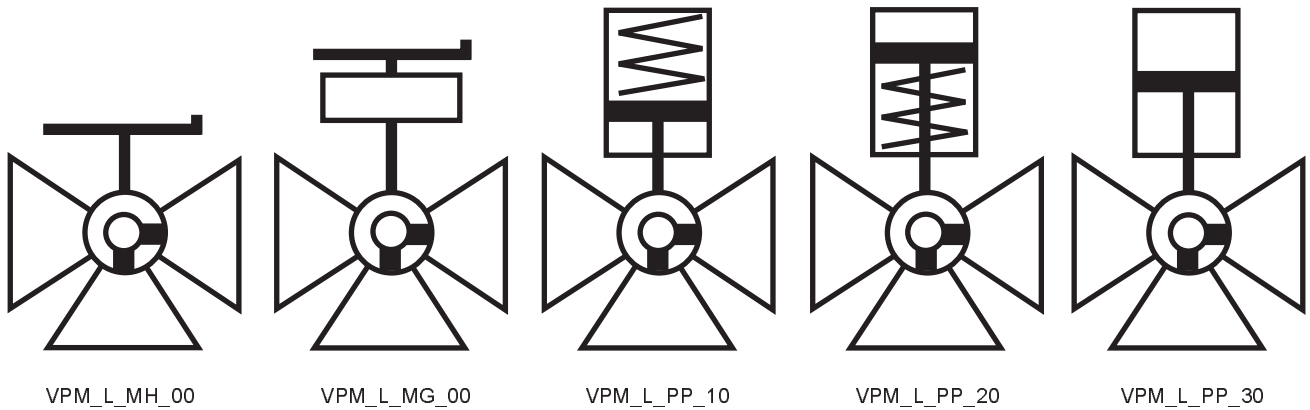
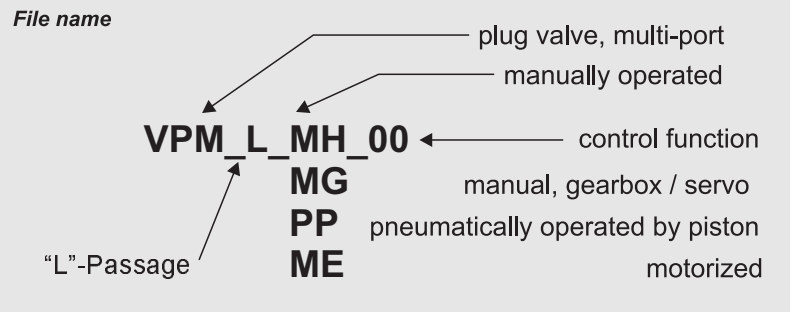


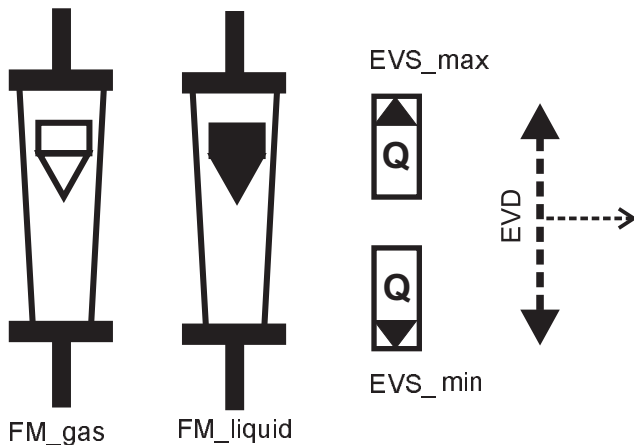
Plug valves 3/2 way with T- passage, multi-port design

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Plug valves 3/2 way with L- passage, multi-port design





FM_gas:

Flowmeter/variable area principle for gases (flow meter_gas)

FM_liquid:

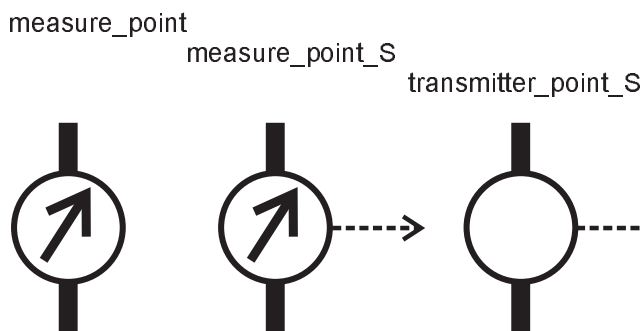
Flowmeter/variable area principle for liquids (flow meter_liquid)

EVS_max:

Limit switch max. for volumetric flow (Q) (electrical_value_switch_max)

EVS_min:

Limit switch min. for volumetric flow (Q) (electrical_value_switch_min)



measure_point:

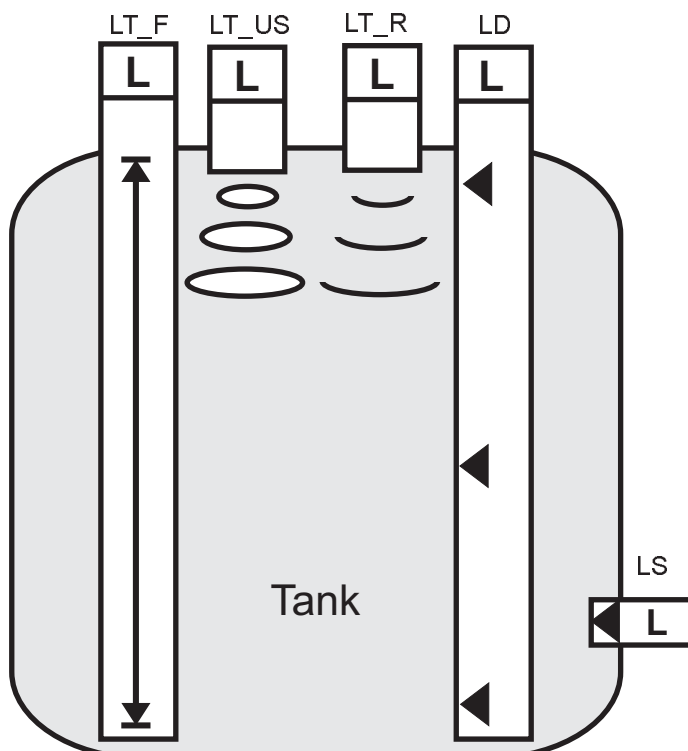
Measurement device without signal output for volumetric flow (Q), pressure (p), differential pressure (delta p), pH-value (pH), temperature (T) or other physical variables.

measure_point_S:

Measurement device with signal output for volumetric flow (Q), pressure (p), differential pressure (delta p), pH-value (pH), temperature (T) or other physical variables.

Transmitter_point_S:

Measuring transmitter with signal output for volumetric flow (Q), pressure (p), differential pressure (delta p), pH-value (pH), temperature (T) or other physical variables.



LT_F:

Level transmitter with float (Level Transmitter_float)

LT_US:

Level transmitter with ultrasonic sensor (Level Transmitter_Ultrasonic)

LT_R:

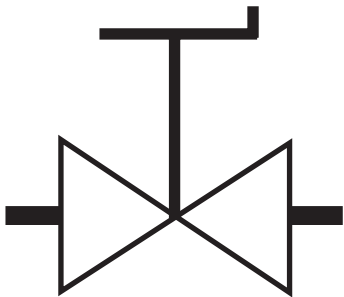
Level transmitter with radar sensor (Level Transmitter_Radar)

LD:

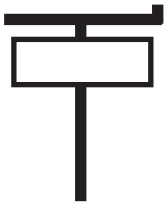
Level detector limit switches. The number of "arrows" corresponds to the number of limiting values to be switched. (Level Detection)

LS:

Level switch



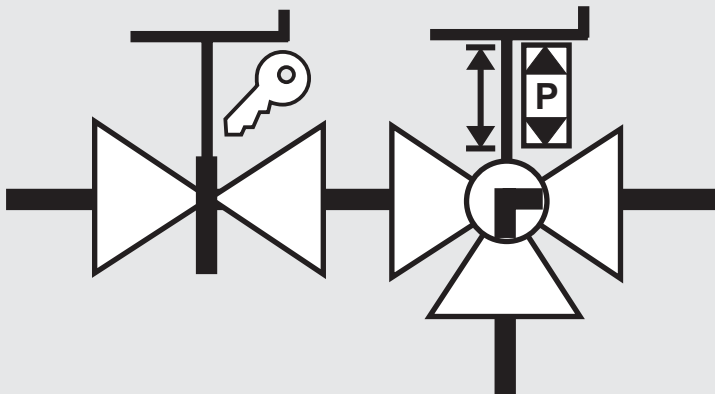
Valve with manual operator
“Directly manually operated”



Manual operator
“Manually operated by gear or servo operated”

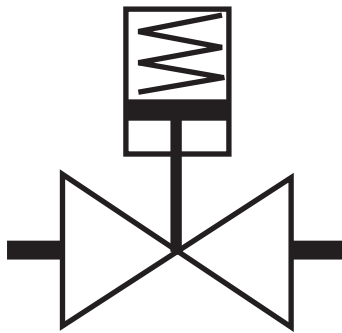
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Subject to alteration / 09-03 / Ralph Kroupa

Examples



From left to right:
Gate valve, straight through design with lockable manual operator
Ball valve, 3 way design with “L-ball” and travel stops on both sides (closing limit) and an electrical position indicator for both end positions.

Pneumatic/hydraulic piston controlled valve actuators



Process valve with pneumatic/hydraulic piston controlled actuator

“Normally closed”



Pneumatic/hydraulic valve actuator, piston controlled

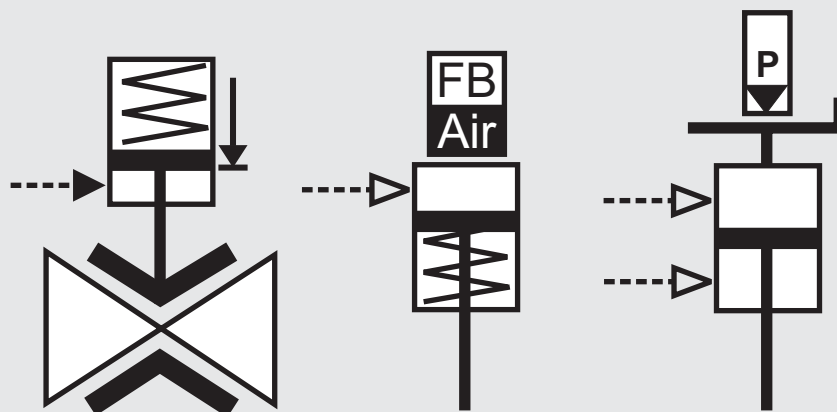
“Normally open”



Pneumatic/hydraulic valve actuator, piston controlled

“Double acting”

Examples



Piston controlled pneumatic/hydraulic actuators

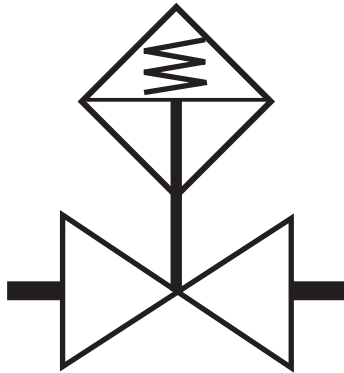
From left to right:

Hydraulically operated pinch valve “normally closed” with stroke limiter in “Closed” position.

Pneumatic piston actuator “normally open” with control air integrated field bus connection.

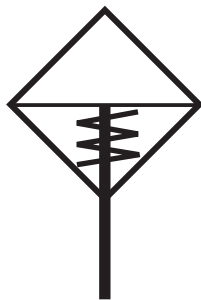
Pneumatically operated piston actuator “double acting” with manual override and electrical position indicator for “Closed” end position

Pneumatic/hydraulic membrane controlled valve actuators



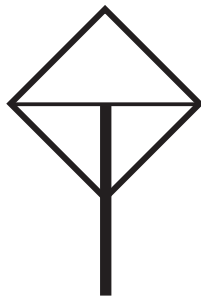
Process valve with pneumatic/hydraulic membrane controlled actuator

"Normally closed"



Pneumatic/hydraulic valve actuator, membrane controlled

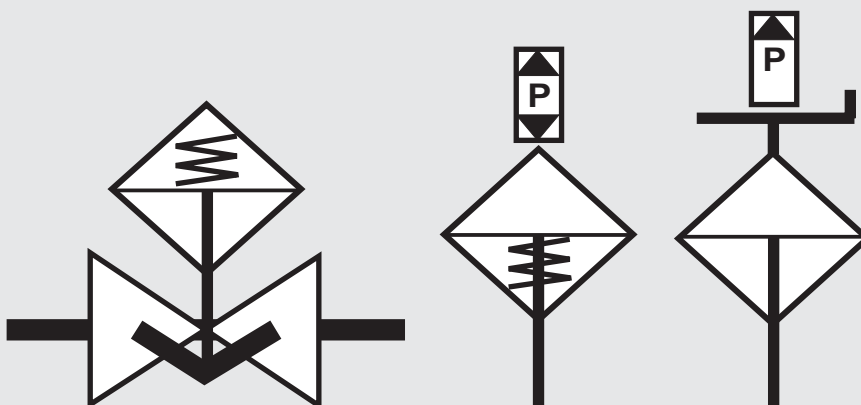
"Normally open"



Pneumatic/hydraulic valve actuator, membrane controlled

"Double acting"

Examples



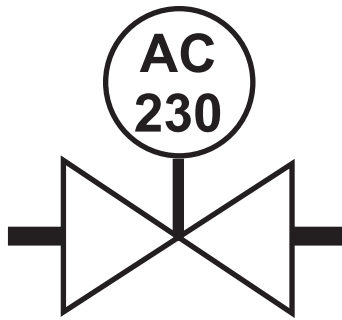
Membrane controlled pneumatic/hydraulic actuators

From left to right:

Diaphragm valve, full bore design, "normally closed".

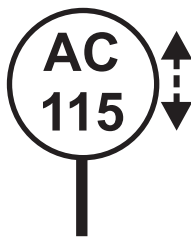
"Normally open" with electrical position indicator for both end positions.

"Double acting" with manual override and electrical position indicator for "Closed" position



AC = AC voltage
DC = DC voltage
Figure = volts

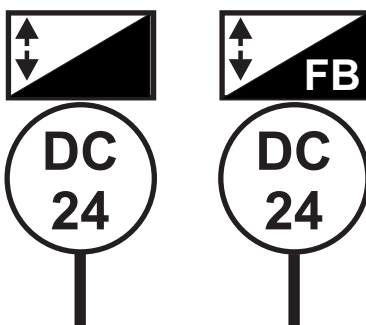
Process valve with motorized actuator, 230 V AC,
 for linear and quarter turn valves



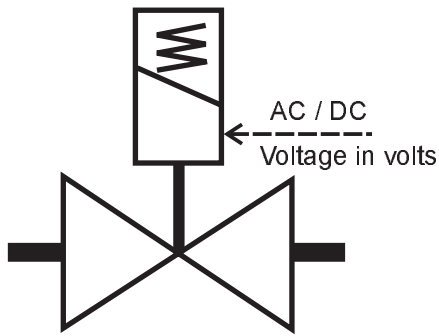
Motorized valve actuator with integrated continuous
 position feedback (e.g. for actual value detection of
 valve position in control systems).



Motorized valve actuator with integrated position
 controller.



Motorized valve actuator with integrated position
 and process controller
 (e.g. for controlling volumetric flow).
 Right illustration: With additional integrated field bus
 connection.



AC = AC voltage
DC = DC voltage
Figure = volts

Electro-solenoid valve actuator (solenoid actuator)

“Normally closed”.



Electro-solenoid valve actuator (solenoid actuator)

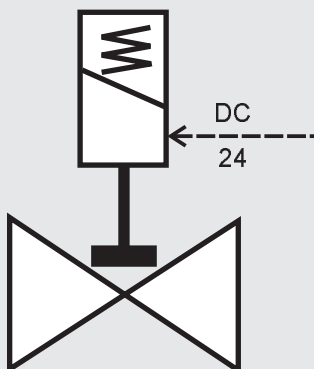
“Normally open”.



Electro-solenoid valve actuator (solenoid actuator)

“Double acting”.

Examples



Plastic or metal globe valve with electro-solenoid operation, “normally closed”, 24 V DC.