VS6M

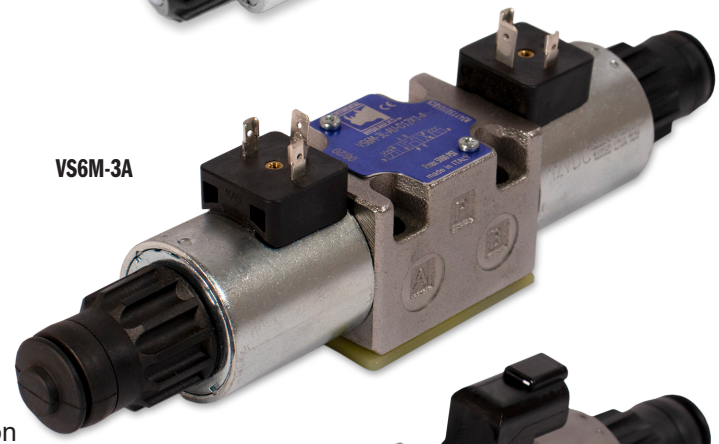
Solenoid Operated Directional Valve

SUBPLATE MOUNTING
ISO 4401-03

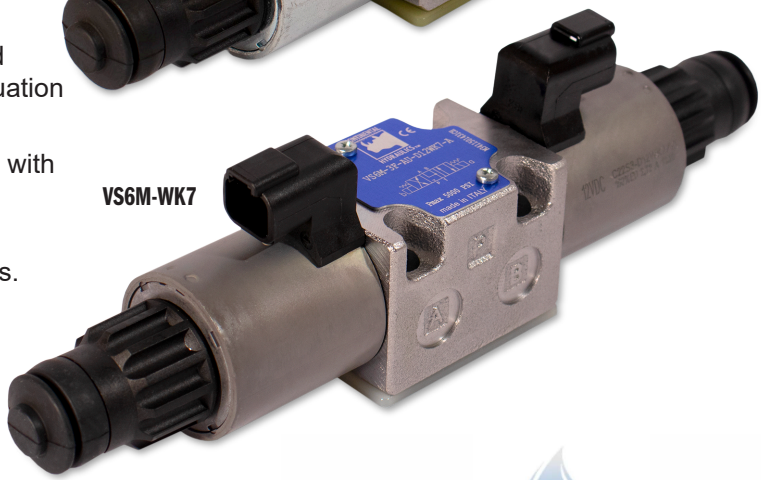
P max **5000 PSI 350 bar**
Q max **26 GPM 100 l/min**

VS6M-1A

VS6M-3A



VS6M-WK7



DESCRIPTION

The VS6M series valves are ideal for application in washdown and outdoor mobile environments, and are supplied with a zinc-nickel surface treatment suitable to ensure a salt spray resistance up to 600h (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

The valve body is made with high strength iron castings with internal passages designed to minimize pressure drop.

The valve can be supplied for valve functions requiring 2 or 3 positions, as well as 3 way or 4 way flow functions.

Key Features:

- Coil connections include DIN 43650, AMP junior, DEUTSCH DT04-2P
- Flows to 26 GPM and multiple spool options
- With 5000 PSI rated work ports and the tank port is rated to 3000 PSI

PERFORMANCE

(Obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

Max operating pressure: P - A - B ports **T port DC** **T port AC**	PSI (bar)	5000 (350) 3000 (210) DC 2300 (160) AC
Maximum flowrate	GPM (l/mi)	26 (100)
Pressure drops Δp-Q	see page 4	
Operating limits	see page 5 - 6	
Electrical features	see page 10 - 11	
Electrical connections	see page 9	
Ambient temperature range	°F (°C)	-4 / 140 (-20 / +50)
Fluid temperature range	°F (°C)	-4 / 176 (-20 / +80)
Fluid viscosity range	cSt	10 - 400
Fluid contamination degree	according to ISO 4406:1999 class 20/18/15	
Recommended viscosity	cSt	25
Mass: single solenoid valve **double solenoid valve**	lbs (kg)	3.1 (1,5) 4.4 (2)

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VS6M

IDENTIFICATION CODE:

VS6M - □ □ - □ □ - □ □ - □ ——— DESIGN LETTER

BASIC VALVE FUNTIONS / SPOOL CODES
see page 3

SEAL TYPE	
CODE	**DESCRIPTION**
A	BUNA (STD)
G	VITON

MECHANICAL	
CODE	**DESCRIPTION**
OMIT	No options
R	Single Solenoid - B port end
U	Manual Override Boot
S	Override with Screw
H	Lever Override
LL	Long Lever Override
CP	Push Knob Override
CK1	Turn Knob Override
CPK	Mechanical Detent Override
CK2	Push and Twist Override

VOLTAGE	
CODE	**DESCRIPTION**
DC Power Supply	
D12	12 VDC
D14	14 VDC
D24	28 VDC
D28	28 VDC
D48	48 VDC
D110	110 VDC
D125	125 VDC
D220	220 VDC
D00	Valves without coils
AC Power Supply	
A24	24 V - 50 Hz
A48	48 V - 50 Hz
A110	110 V - 50 Hz / 120 V 0 60 Hz
A230	230 V - 50 Hz / 240 V 0 60 Hz
A00	Valves without coils

CONNECTION TYPE	
CODE	**DESCRIPTION**
Omit	Only for D00 Coil Code
K1	DIN 43650 (Form A)
K2	AMP Junior (DC Voltage)
K7	Deutsch DT04-2P (12 or 24 Volt DC)

Please see Connectors Catalog Form #1027453

TYPICAL ORDERING CODE:
VS6M-3A-A-D24K1-A

IDENTIFICATION CODE: High IP and Corrosion Resistance

VS6M - □ □ - □ □ U - □ □ - □ ——— DESIGN LETTER

BASIC VALVE FUNTIONS / SPOOL CODES
see page 3

SEAL TYPE	
CODE	**DESCRIPTION**
A	BUNA (STD)
G	VITON

MECHANICAL	
CODE	**DESCRIPTION**
OMIT	No options
R	Single Solenoid - B port end
H	Lever Override
LL	Long Lever Override
CP	Push Knob Override
CK1	Turn Knob Override
CPK	Mechanical Detent Override
CK2	Push and Twist Override

COIL VOLTAGE	
CODE	**DESCRIPTION**
DC Power Supply	
D12	12 VDC
D24	24 VDC

CONNECTION TYPE	
CODE	**DESCRIPTION**
WK1	DIN 43650 (Form A)
WK7	Deutsch DT04-2P (12 or 24 Volt DC)
WK7D	Deutsch DT04-2P with Diode (12 or 24 Volt DC)

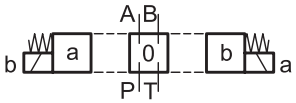
Please see Connectors Catalog Form #1027453

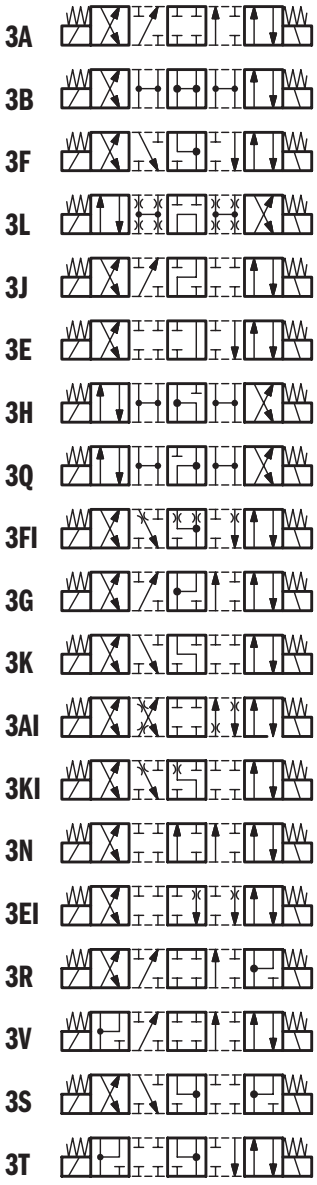
TYPICAL ORDERING CODE:
VS6M-3A-AU-D24WK7-A

VS6M

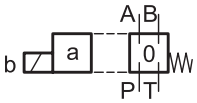
SPOOL TYPE

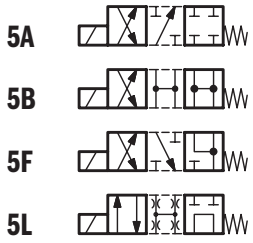
2 solenoids
3 positions with spring centering



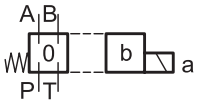


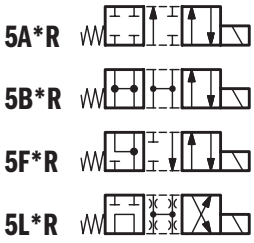
1 solenoid side A
2 positions (central + external)
with spring centering



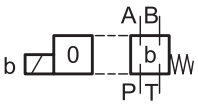


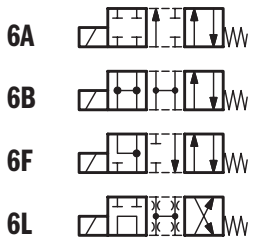
1 solenoid side B
2 positions (central + external)
with spring centering



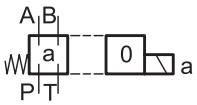


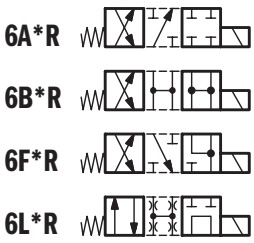
1 solenoid side A
2 positions (external + central)
with return spring



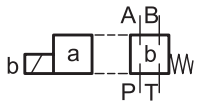


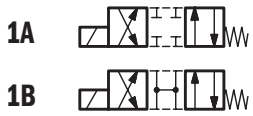
1 solenoid side B
2 positions (external + central)
with return spring



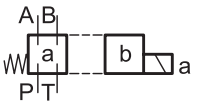


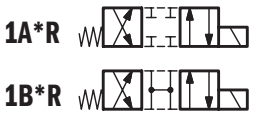
1 solenoid side A
2 external positions with
return spring



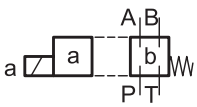


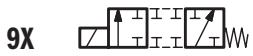
1 solenoid side B
2 external positions with
return spring



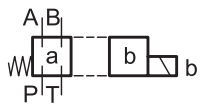


1 solenoid side A
2 positions with return spring



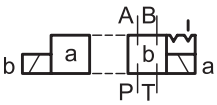


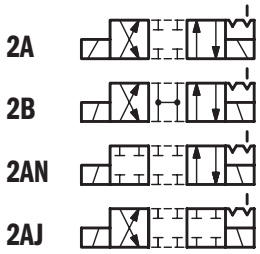
1 solenoid side B
2 positions with return spring



Besides the diagrams shown, which are the most frequently used, other special versions are available: consult our technical department for their identification, feasibility and operating limits.

2 solenoids
2 positions with mechanical retention





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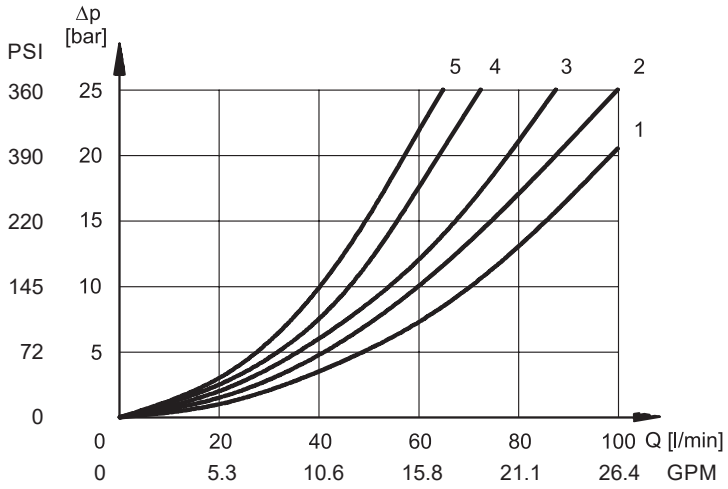
PRESSURE DROPS Δp-Q

(obtained with viscosity 36 cSt at 50 °C)



Refer to curve 5 for the pressure drops between working lines A and B of the spools 3G, 3R, 3V, 3S and 3T used in regenerative schemes.

ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION			
	P → A	P → B	A → T	B → T
	CURVES ON GRAPH			
3A, 5A	2	2	3	3
3B, 5B	1	1	3	3
3F, 5F, 6F	3	3	1	1
3L, 5L, 6L	5	5	5	5
3J	2	1	3	3
3E	2	2	3	1
3H, 3Q	4	5	5	5
3FI	2	2	3	3
3G	1	3	1	3
3K	2	2	1	3
3AI, 3KI, 3EI	2	2	3	3
3N	1	2	3	3
3R, 3S	1	5	2	
3V, 3S	5	1		2
1A	3	3	3	3
1B	2	2	2	2
9X	3	3		
2A, 2B, 2AW, 2AJ	2	2	2	2

DE-ENERGIZED POSITION

SPOOL TYPE	FLOW DIRECTION				
	P → A	P → B	A → T	B → T	P → T
	CURVES ON GRAPH				
3B, 5B					2
3F, 5F, 6F			3	3	
3L, 5L, 6L, S4					5
3J		4			
3E				3	
3H, 3Q			6	6	3
3G	3	3			
3K			3		
3N	4				
3S, 3T			3	3	

SWITCHING TIMES

The values indicated are obtained according to ISO 6403 standard, with mineral oil viscosity 36 cSt at 50°C.

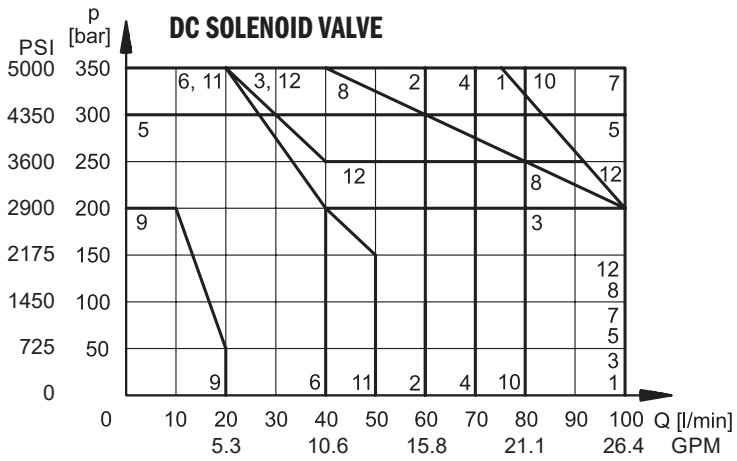
SPOOL TYPE	TIMES [MS]	
	ENERGIZING	DE-ENERGIZING
DC	25 - 75	15 - 15
AC	10 - 25	15 - 40

OPERATING LIMITS

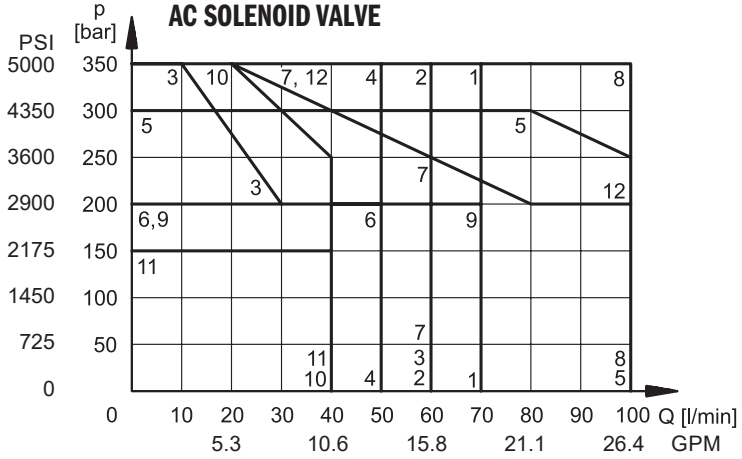
The curves define the flow rate operating fields according to the valve pressure of the different versions. The values have been obtained according to ISO 6403 norm with solenoids at rated temperature and supplied with voltage equal to 90% of the nominal voltage. The value have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.

The limits for 1B and 1A spools refer to the 4-way operation. The operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow are shown in the chart on the next page. The performance of the DC solenoid powered by AC with rectifier connectors are on page 6.

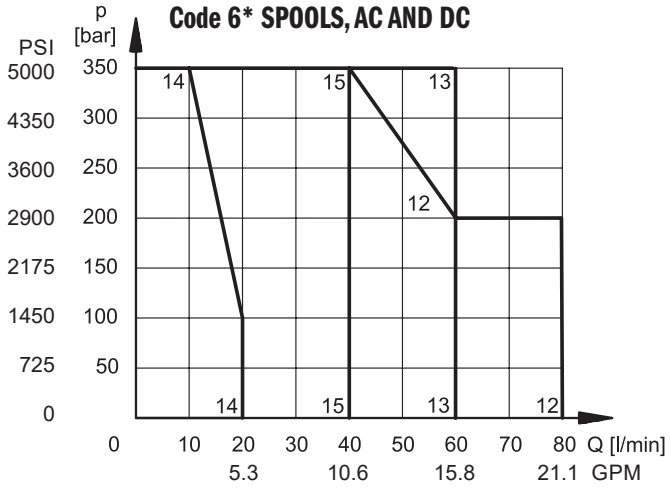
DC SOLENOID VALVE



AC SOLENOID VALVE



Code 6* SPOOLS, AC AND DC



DC SOLENOID VALVE

SPOOL	CURVE	
	P → A	P → B
3A, 5A	1	1
3B, 5B	2	2
3F, 5F	3	3
3L, 5L	4	4
3J	5	5
3E	4	6
3H	4	4
3Q	4	4
3FI	7	7
3G	7	7
3K	4	6
3AI	1	1
3KI	4	4
3N	5	5
3EI	4	4
3R	6*	6
3V	6	6*
3S	6	6
3T	6	6
1A	7	7
1B	8	8
2A	7	7
2B	8	8
2AN, 2AJ	7	7

AC SOLENOID VALVE

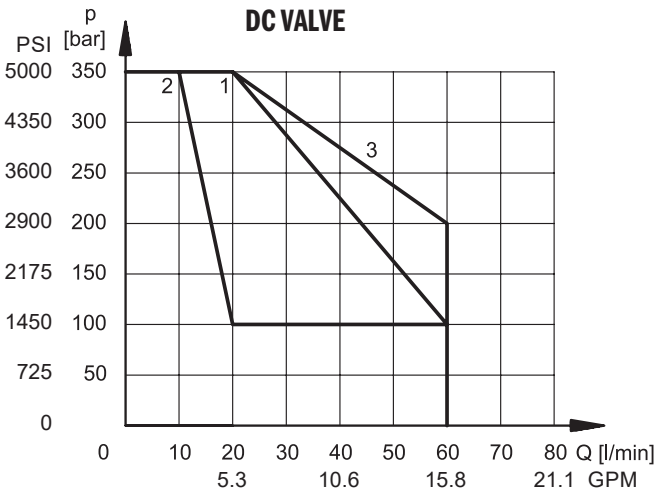
SPOOL	CURVE	
	P → A	P → B
3A, 5A	1	1
3B, 5B	2	2
3F, 5F	3	3
3L, 5L	2	2
3J	5	5
3E	6	6
3H	4	4
3Q	4	4
3FI	7	7
3G	8	8
3K	6	6
3AI	2	2
3KI	7	7
3N	5	5
3EI	7	7
3R	10*	10
3V	10	10*
3S	10*	10
3T	10	11*
1A	1	1
1B	1	1
2A	8	8
2B	9	9
2AN, 2AJ	8	8

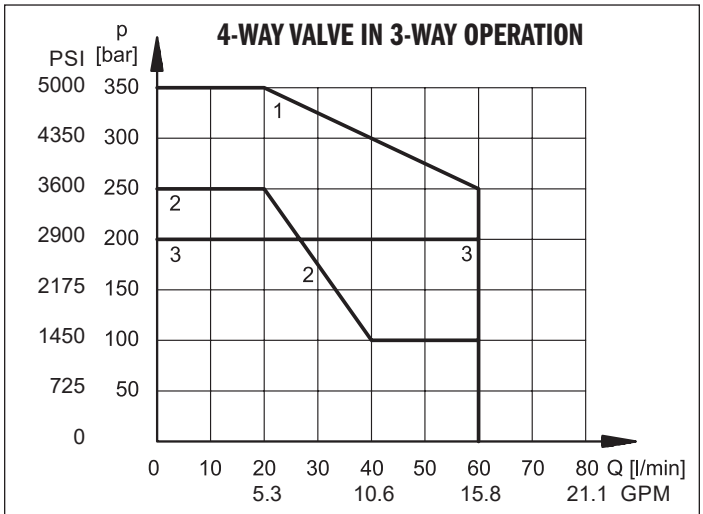
* Performance obtained for a valve with A and B lines connected the one to the piston-side chamber and the other to the rod-side chamber of a double-acting cylinder with area ratio 2:1.

SPOOL	CURVE
6A	12
6B	13
6F	14
6L	15

4-way valve in 3-way operation

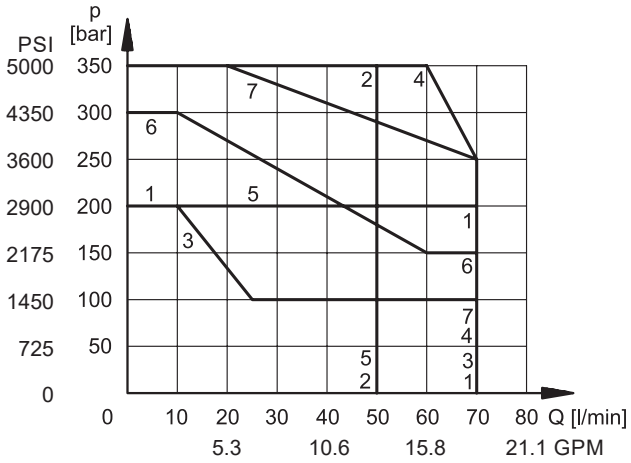
Operating limits of a 4-way valve in 3-way operation or with port A or B plugged or without flow.





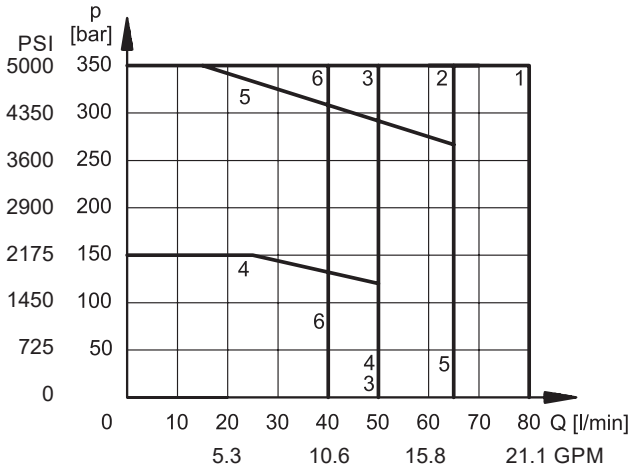
SPOOL	CURVE	
	DC	AC
1A backpr. A; 1A-*R backpr. B	1	1
1B backpr. A; 1B-*R backpr. B	1	1
1A backpr. B; 1A-*R backpr. A	2	1
1B backpr. B; 1B-*R backpr. A	3	3

AC solenoid valve with coil A110 fed with 110V - 60 Hz



SPOOL	CURVE	
	P → A	P → B
3A, 5A	1	1
3B, 5B	2	2
3F, 5F	3	3
3L, 5L	4	4
3FI	5	5
1A	2	2
2A	6	6

Operating limits for DC solenoid valves fed with AC with rectifier connectors



SPOOL	CURVE	
	P → A	P → B
3A, 5A	2	2
3B, 5B	3	3
3F, 5F	4	4
3L, 5L	2	2
3FI	5	5
1A	6	6
2A	1	1

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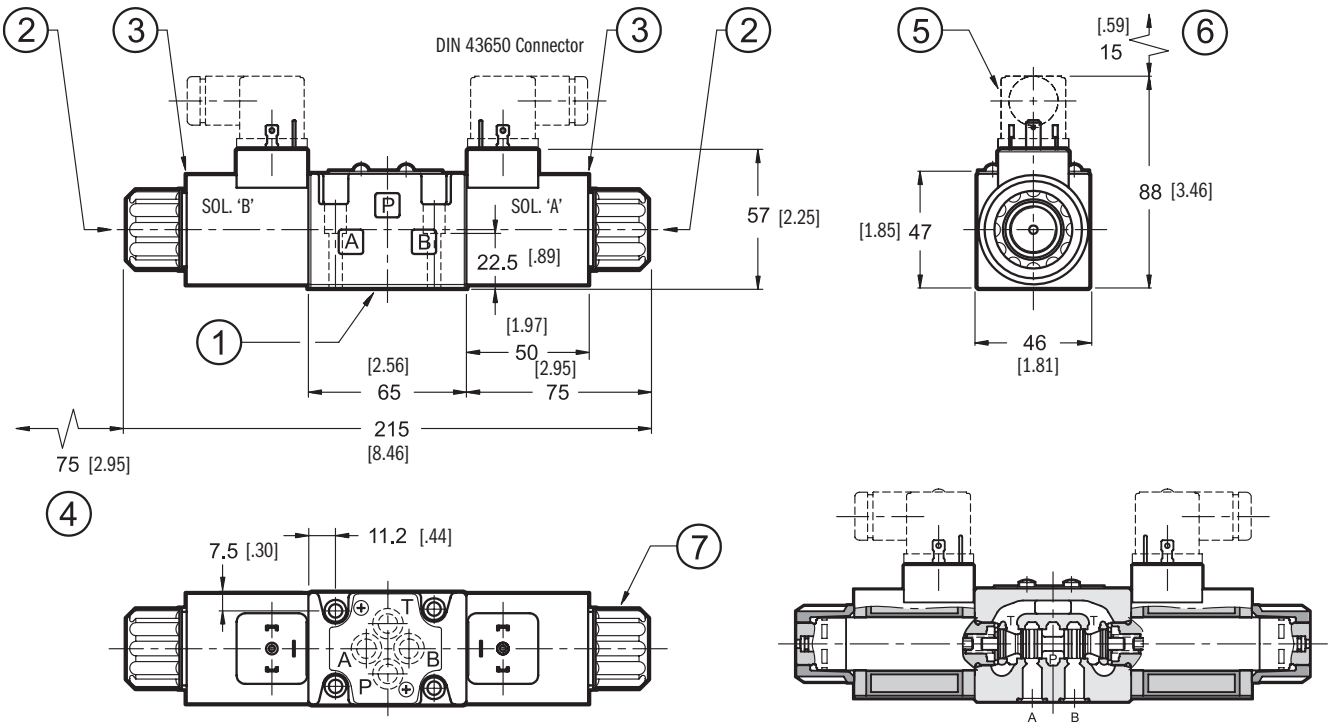
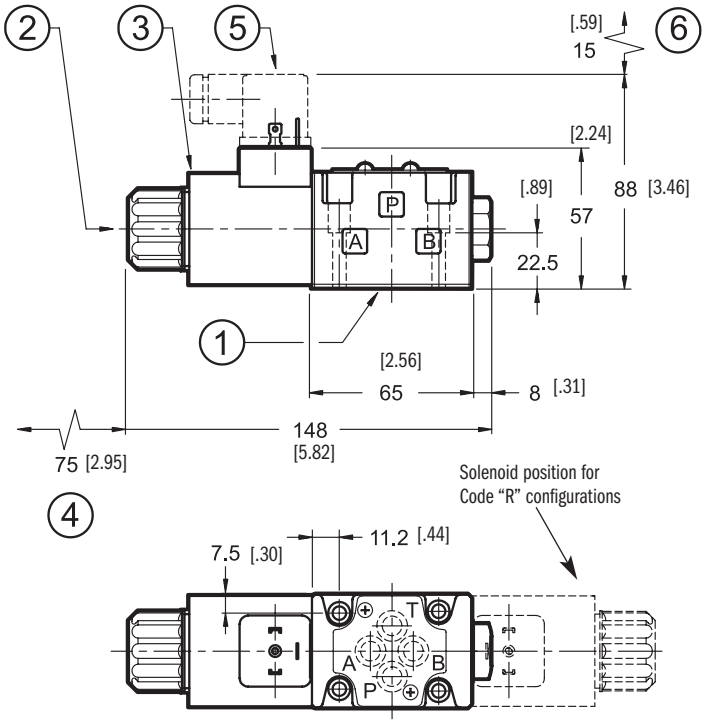
OVERALL AND MOUNTING DIMENSIONS FOR DC SOLENOID VALVES

Dimensions mm [in]

VS6M-2*, 3*



VS6M-1*, 5*, 6*, 9*



Valve fastening: BD03-125
Tightening torque: 4-6 lb-ft (5.4 - 8 Nm)

1	Mounting surface with sealing rings: 4pcs of AS568-012 90 Shore A
2	Standard manual override included in the solenoid tube
3	Coil (360° revolving)
4	Coil removal space
5	EN 175301-803 (ex DIN 43650) connector to be ordered separately.
6	Connector removal space
7	Locking ring: tightening torque 4 lb-ft (5 Nm)

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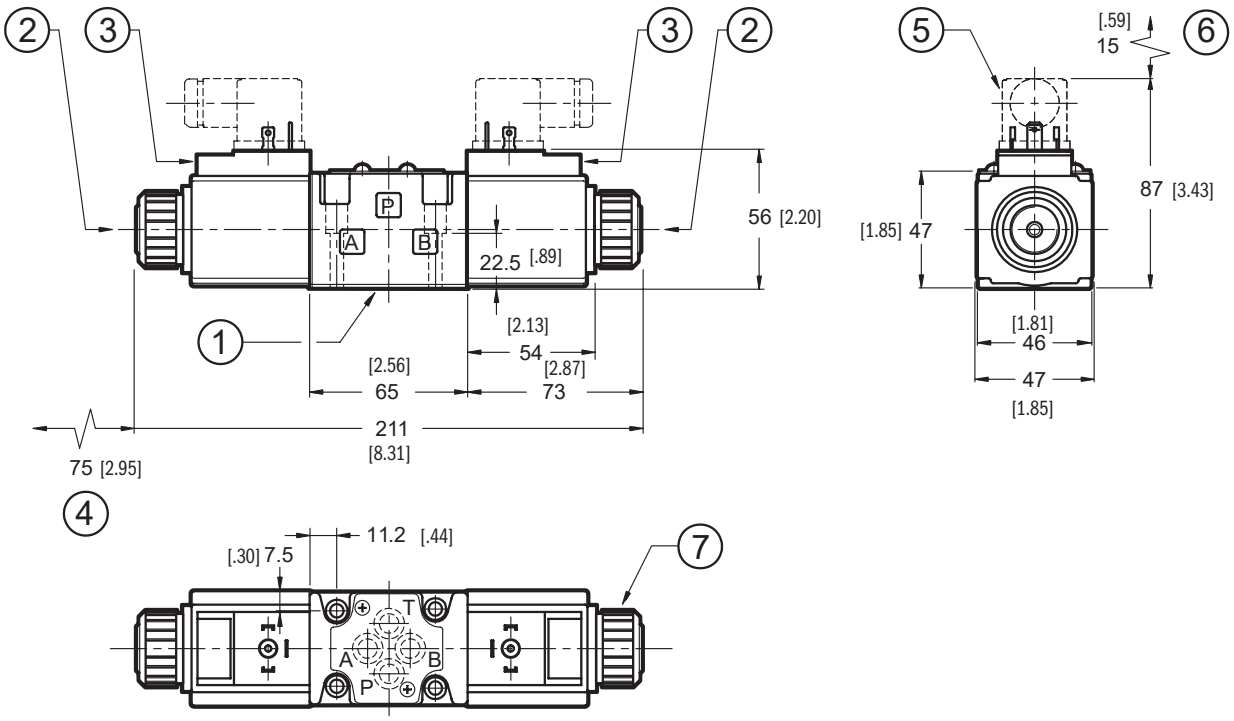
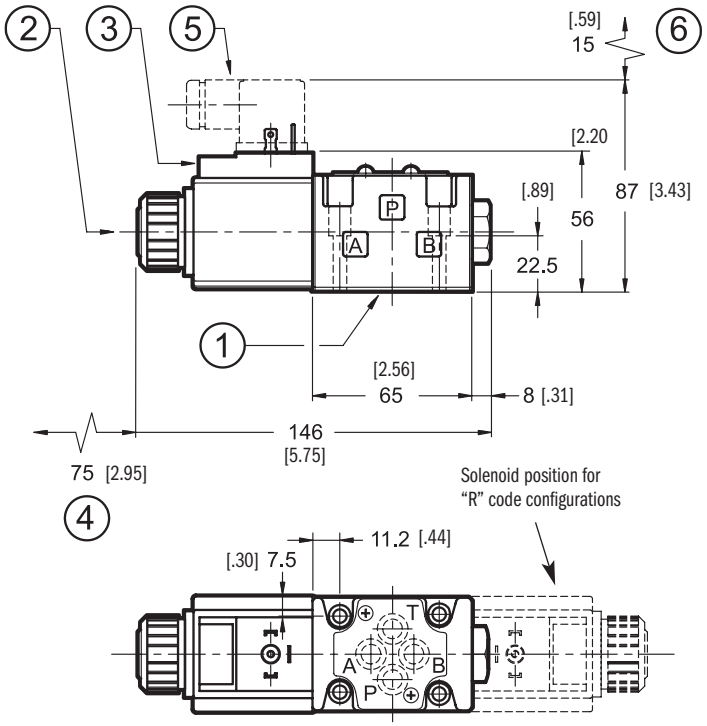
OVERALL AND MOUNTING DIMENSIONS FOR AC SOLENOID VALVES

Dimensions mm [in]

VS6M-2*, 3*



VS6M-1*, 5*, 6*, 9*



Valve fastening: BD03-125
Tightening torque: 4-6 lb-ft (5.4 - 8 Nm)

1	Mounting surface with sealing rings: 4pcs of AS568-012 90 Shore A
2	Standard manual override included in the solenoid tube
3	Coil (360° revolving)
4	Coil removal space
5	EN 175301-803 (ex DIN 43650) connector to be ordered separately.
6	Connector removal space
7	Locking ring: tightening torque 4 lb-ft (5 Nm)

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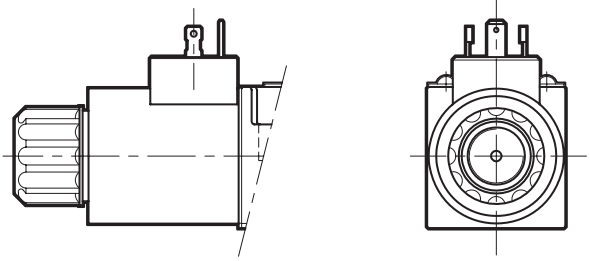
ELECTRICAL CONNECTIONS

See Connectors and Cable Sets Catalog (1027453) for all available connection styles.

Dimensions mm [in]

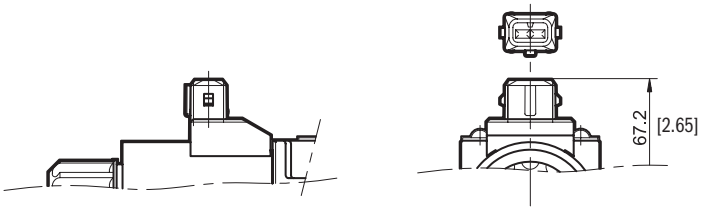
Connection for EN 175301-803
(ex DIN 43650) connector

code K1 (standard)
code WK1 (W7 version only)



Connection for
AMP JUNIOR connector

code K2



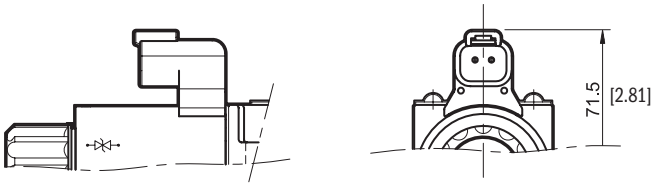
Connection for
DEUTSCH DT06-2S male connector

code K7

Connection for
DEUTSCH DT06-2S male connector

code WK7 (W7 version only)

code WK7D (with diode)



ELECTRICAL FEATURES

Solenoids

These are essentially made up of two parts: tube and coil. The tube is threaded into the valve body and includes the armature that moves immersed in oil, without wear. The inner part, in contact with the oil in the return line, ensures heat dissipation. The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

NOTE: In order to further reduce the emissions, with DC supply, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit.

SUPPLY VOLTAGE FLUCTUATION	± 10% Vnom
MAX SWITCH ON FREQUENCY	18.000 ins/hr
DUTY CYCLE	100%
ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)	In compliance with 2014/30/EU
LOW VOLTAGE	In compliance with 2014/35/EU
CLASS OF PROTECTION: **Coil insulation (VDE 0580)** **Impregnation: DC valve** **AC valve**	 class H class F class H

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ELECTRICAL FEATURES

Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both valve and connectors of an equivalent IP degree, correctly connected and installed.

Electric connection	Electric connection protection	Whole valve protection
K1	IP65	IP65
K2	IP65/67	
K7	IP65/67	

Current and absorbed power for DC solenoid valve

The table shows current and power consumption values of the DC coils.

Using connectors type “D” (VEA-6FR) with embedded bridge rectifier it is possible to feed DC coils (starting from 48V voltage) with alternating current (50 or 60 Hz), considering a reduction of the operating limits (see page 6).

	Nominal voltage [V]	Resistance at 20 °C [Ω]	Current consumption [A]	Power consumption [W]	Coil code K1	K2	K7
D12	12	4,4	2,72	32,7	M1903080	M1903100	M1902940
D14	14	7,2	1.93	27	M1903086		
D24	24	18,6	1,29	31	M1903081	M1903101	M1902941
D28	28	26	1,11	31	M1903082		
D48	48	78,6	0,61	29,5	M1903083		
D110	110	423	0,26	28,2	M1903464		
D125	125	550	0,23	28,6	M1903467		
D220	220	1692	0,13	28,2	M1903465		

Current and absorbed power for AC solenoid valve

The table shows current and power consumption values at inrush and at holding, for AC coils.
Coils for alternating current (values ± 5%).

Suffix	Nominal voltage [V]	Freq. [Hz]	Resistance at 20 °C [Ω]	Current consumption at inrush [A]	Current consumption at holding [A]	Power consumption at inrush [VA]	Power consumption at holding [VA]	Coil code [K1]
A24	24	50	1,69	5,81	1,32	139	32	M1902830
A48	48		6,02	3,78	0,86	182	41	M1902831
A110	110V-50Hz 120V-60Hz	50/60	33	1,76	0,40	194	44	M1902832
				1,54	0,35	185	42	
A230	230V-50Hz 240V-60Hz		135	0,92	0,21	213	48	M1902833
				0,79	0,18	190	43	

DC Coils - High IP Rated

The coils feature a zinc-nickel surface treatment.

The WK7d coil includes a suppressor diode of pulse for protection from voltage peaks during switching. During the switching the diode significantly reduces the energy released by the winding, but limiting the voltage to 31.4 V in the D12 coil and to 58.9 V in the D24 coil.

	Nominal voltage [V]	Resistance at 20 °C [Ω]	Current consumption [A]	Power consumption [W]	Coil code WK1	WK7	WK7D
D12	12	4,4	2,72	32,7	M1903590	M1903580	M1903600
D24	24	18,6	1,29	31	M1903591	M1903581	M1903601
D26	26	21,8	1,21	32	M1903599	M1903589	

Protection from atmospheric agents IEC 60529

The IP protection degree is guaranteed only with both value and connectors of an equivalent IP degree, correctly connected and installed.

Electric connection	Electric connection protection	Whole valve protection
WK1	IP66	IP66
WK7	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*
WK7D	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

(*) The IP69K protection degree is not taken in account in IEC 60529 but is included in ISO 20653.

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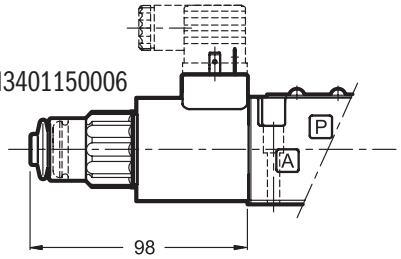
MANUAL OVERRIDES

Dimensions mm [in]

Manual override, boot protected

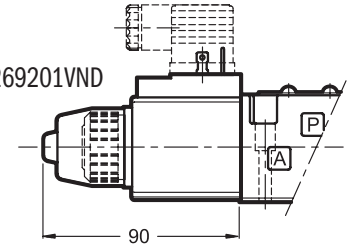
U - Version for DC solenoid valve

Code: M3401150006



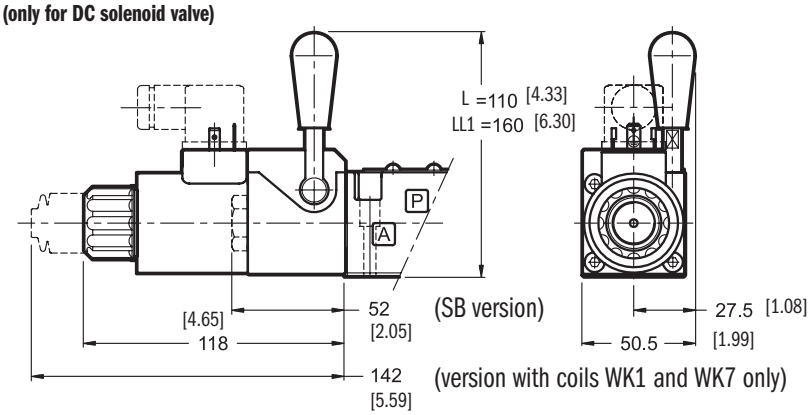
U - Version for AC solenoid valve

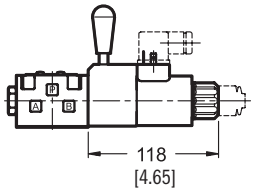
Code: M0269201VND



H Lever manual override

(only for DC solenoid valve)





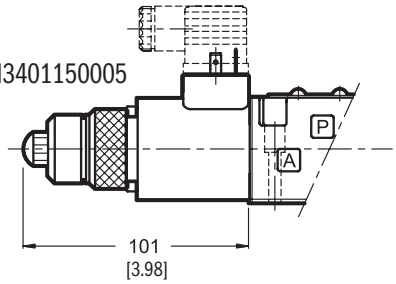
NOTES: the CH device is located on the A side of the valve, with the exception of the valves type VS6M-5*.

The high resistance to corrosion valves are equipped with a boot for solenoid tube protection.

CP Push manual override

(only for DC solenoid valve)

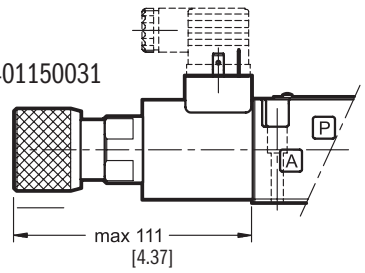
Code: M3401150005



CK1 knob manual override, turning

(only for DC solenoid valve)

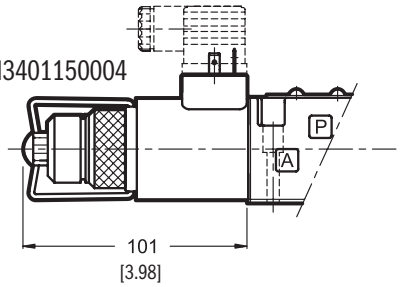
Code: M3401150031



CPK Push manual override with mechanical retention

(only for DC solenoid valve)

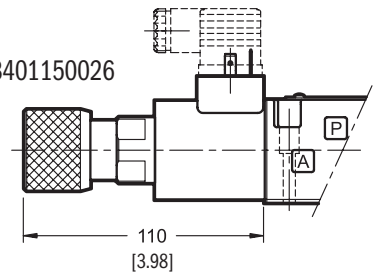
Code: M3401150004



CK2 and twist manual override

(only for DC solenoid valve)

Code: M3401150026



CONTINENTAL

DIRECTIONAL VALVES

VS6M

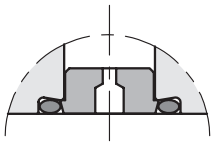
PORT RESTRICTIONS

Port restrictors are recommended if flow variations which exceed the valve performance limit during the switching processes occur, or for circuit dampening.

Port restrictor plugs can be ordered separately with the part numbers shown at right.

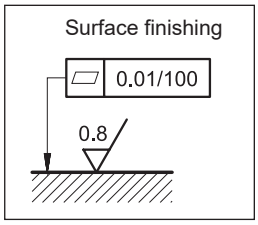
Ø(mm)	PART NUMBER
blank	M0144162
0.6	M0144163
0.8	M0144033
1	M0144034

Ø(mm)	PART NUMBER
1.2	M0144035
1.5	M0144036
1.8	M0144164
2	M0144165



INSTALLATION

Configurations with centering and return springs can be mounted in any position; type RK valves - without springs and with mechanical detent - must be mounted with the longitudinal axis horizontal.

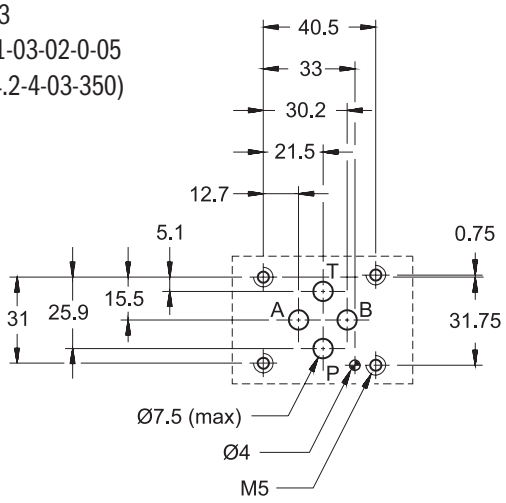


Valve fixing takes place by means of screws or tie rods, with the valve mounted on a lapped surface, with values of planarity and smoothness that are equal to or better than those indicated in the drawing. If the minimum values of planarity and/or smoothness are not met, fluid leakages between valve and mounting surface can easily occur.

MOUNTING SURFACE

Dimensions inch [mm]

NFPA D03
ISO 4401-03-02-0-05
(CETOP 4.2-4-03-350)



SEAL KIT

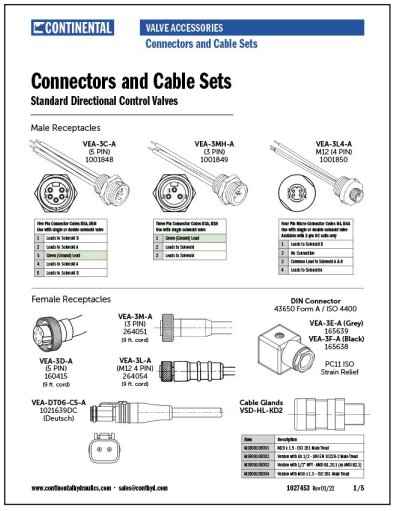
BUNA SEAL KIT	1013188
VITON SEAL KIT	1013096

BOLT KIT

BD03-125 (Valve Only)	1008406

NOTES:

1. Bolt kit consists of: Qty. 4 10-24NC x 1.25 inch screws / Qty. 4 #10 Lock washer
2. The recommended torque value for fasteners is: 4 lb.ft (5.4 Nm)


CONTINENTAL
VALVE ACCESSORIES
Connectors and Cable Sets

Connectors and Cable Sets
Standard Directional Control Valves

Male Receptacles

Female Receptacles

DIN Connector
43650 Form A / ISO 4400

Connectors and Cables Sets
Form #1027453

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