

# BFD\*

## SIX-PORTS FLOW DIVERTER

SERIES 10

**p** max 320 bar  
**Q** max 90 l/min

### OPERATING PRINCIPLE

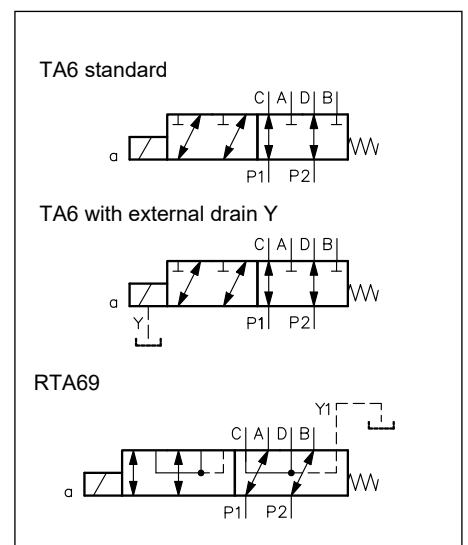
- The BFD\* modular solenoid valve is a six-port flow diverter that allows the simultaneous connection of two of the four working lines, switching between them by solenoid actuation.
- They are available in two sizes, depending on the flowrate, and they are used mainly for compact applications in mobile sector.
- Up to 5 diverters can be fastened together in stacked assemblies, working in series.
- The external drain is available as option on both sizes.
- The standard valve BFD06 is suitable to ensure a salt spray resistance up to 240 hours. To reach 600 hours of resistance WK\* type coils with zinc-nickel treatment are needed.
- The standard valve BFD10 is suitable to ensure a salt spray resistance up to 600 hours.

### PERFORMANCES

(obtained with mineral oil with viscosity of 36 cSt at 50°C)

		BFD06	BFD10	
Maximum operating pressure:	bar	250	250	
		- with drain Y	320	320
		- with drain Y1	80	-
Maximum flow	l/min	60	90	
Pressure drops $\Delta p - Q$		see point 3		
Electrical features		see point 6		
Operating limits		see point 4		
Electrical connections		see point 11		
Ambient temperature range	°C	-20 / +50		
Fluid temperature range	°C	-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	kg	3	3.5	
Surface treatment		zinc-nickel		

### HYDRAULIC SYMBOL





**1 - IDENTIFICATION CODE**

**1.1 - BFD06**

	<b>BFD</b>	<b>06</b>	-		-		/	<b>10</b>	-		/		
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Six-ports flow diverter, stackable

Nominal size 60 l/min

Ports:  
**G038** = 3/8" BSP  
**G012** = 1/2" BSP  
**S08** = 3/4" 16 UNF

Spool type (see point 2):

**TA6**  
only for BFD06-G038. Mandatory Y1 option :  
**RTA69**  
**RTB69**

Series: (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:  
**N** = NBR seals for mineral oil (**standard**)  
**V** = FPM seals for special fluids

Coil type:  
**D12** = 12 V  
**D24** = 24 V  
**D28** = 28 V  
**D00** = valve without coils. The locking rings of the coils and the relevant O-Rings are supplied together with valves.

Option:  
**Y** = drain port in mounting surface (see point 13.1)  
For spool RT\*69 only:  
**Y1** = BSP port for internal leakages drain (mandatory, see point 13.2)

Manual override: (see point 14)  
Omit for override integrated in the tube (**standard**)  
**CM** = boot protected  
**CK1** = knob

Coil electrical connection  
**WK1**, **WK7** and **WK7D** connections are available on D12 and D24 coils only (see point 6 and 11).  
**K1** = plug for EN 175301-803 connector (ex DIN 43650) (**standard**)  
**K7** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S

To obtain a salt spray resistance up to 600 hours, choose coil type:  
**WK1** = plug for EN 175301-803 connector (ex DIN 43650)  
**WK7** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S.  
**WK7D** = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S, with diode.  
With **WK \*** type coils, the **CM** manual override is standard, to protect the solenoid tube.

**1.2 - BFD10**

	<b>BFD</b>	<b>10</b>	-		-		TA6	/	<b>10</b>	-		<b>K1</b>	/		
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Six-ports flow diverter, stackable

Nominal size 90 l/min

Ports:  
**G012** = 1/2" BSP  
**S08** = 3/4" 16 UNF

Spool type (see point 2)

Series:  
(the overall and mounting dimensions remain unchanged from 10 to 19)

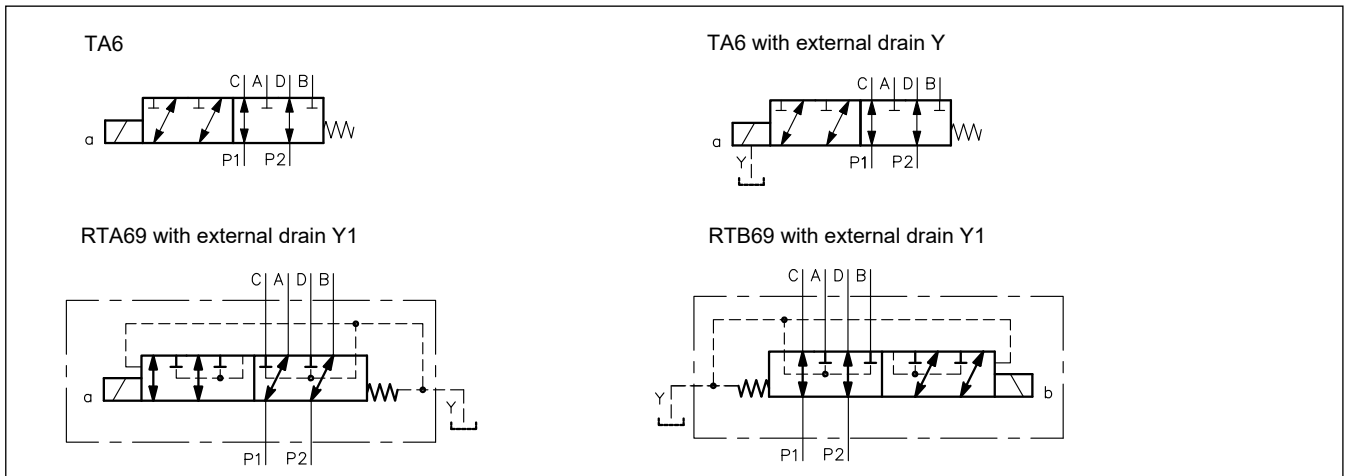
Seals:  
**N** = NBR seals for mineral oil (**standard**)  
**V** = FPM seals for special fluids

Option:  
**Y** = drain port in mounting surface (see point 13.1)

Manual override: (see point 14)  
Omit for override integrated in the tube (**standard**)  
**CM** = boot protected

Coil connection with plug for EN 175301-803 connector (ex DIN 43650)

Coil type:  
**D12** = 12 V  
**D24** = 24 V  
**D00** = valve without coils. The locking rings of the coils and the relevant O-Rings are supplied together with valves.

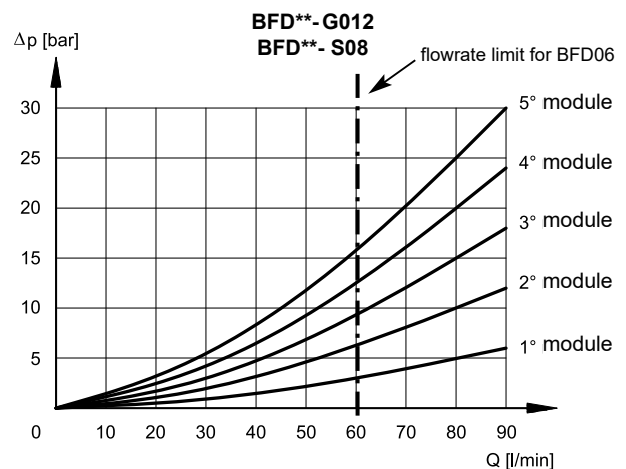
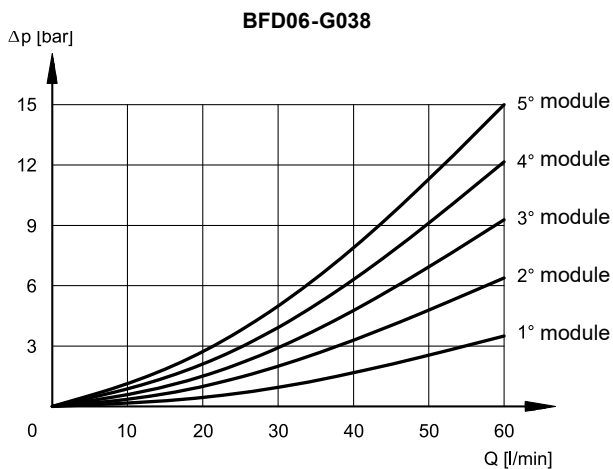
**2 - SPOOL TYPE**

**2 - HYDRAULIC FLUIDS**

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.

**3 - CHARACTERISTIC CURVES**

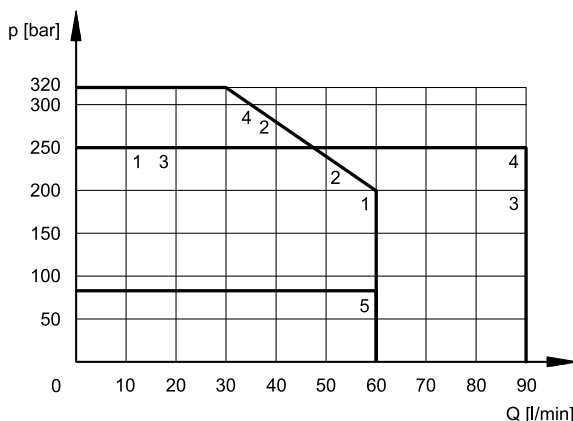
(obtained with viscosity 36 cSt at 50 °C)

Pressure drops  $\Delta p$ -Q at initial position


**4 - 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 values have been obtained with mineral oil, viscosity 36 cSt, temperature 50 °C and filtration according to ISO 4406:1999 class 18/16/13.



VALVE	CURVE
BFD06*	1
BFD06*/Y	2
BFD06- RT*69/Y1	5
BFD10*	3
BFD10*/Y	4

**5 - SWITCHING TIMES**

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

TIMES ms ( $\pm 10\%$ )	ENERGIZING	DE-ENERGIZING
<b>BFD06</b>	25 ÷ 75	20 ÷ 50
<b>BFD10</b>	50 ÷ 100	20 ÷ 40

**6 - ELECTRICAL CHARACTERISTICS****6.1 - 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.

**Protection from atmospheric agents IEC 60529**

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

electric connection	electric connection protection	whole valve protection
K1	IP65	IP65
WK1	IP66	IP66
K7	IP65/67	IP65
WK7, WK7D	IP66/IP68/IP69, IP69K*	

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

<b>SUPPLY VOLTAGE FLUCTUATION</b>	$\pm 10\%$ Vnom
<b>MAX SWITCH ON FREQUENCY</b>	10.000 ins/hr
<b>DUTY CYCLE</b>	100%
<b>ELECTROMAGNETIC COMPATIBILITY (EMC) (NOTE)</b>	In compliance with 2014/30/EU
<b>LOW VOLTAGE</b>	In compliance with 2014/35/EU
<b>CLASS OF PROTECTION</b> Coil insulation (VDE 0580) Impregnation	class H class F (BFD06) class H (BFD10)

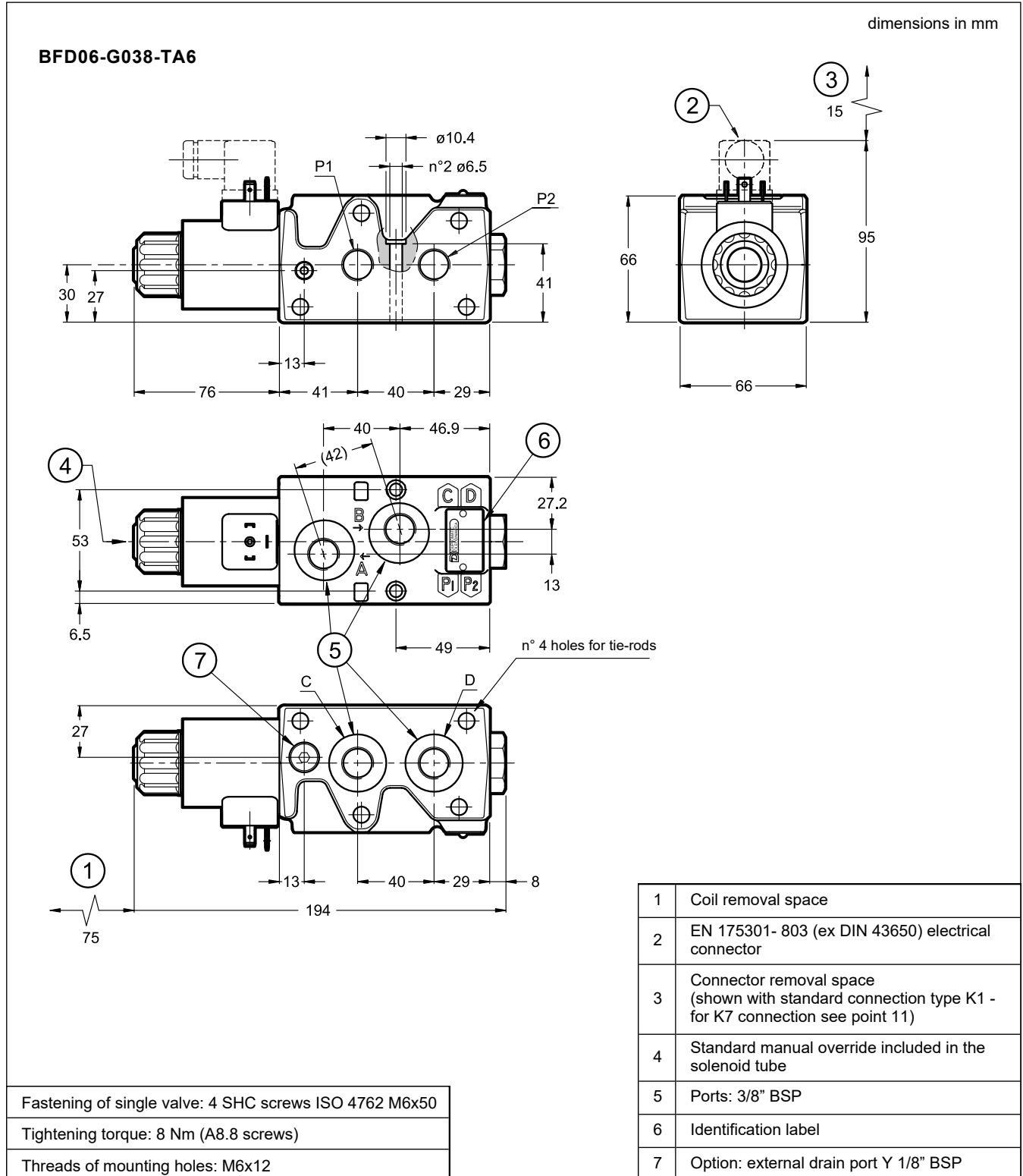
**NOTE:** In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

**6.2 - Current and absorbed power**

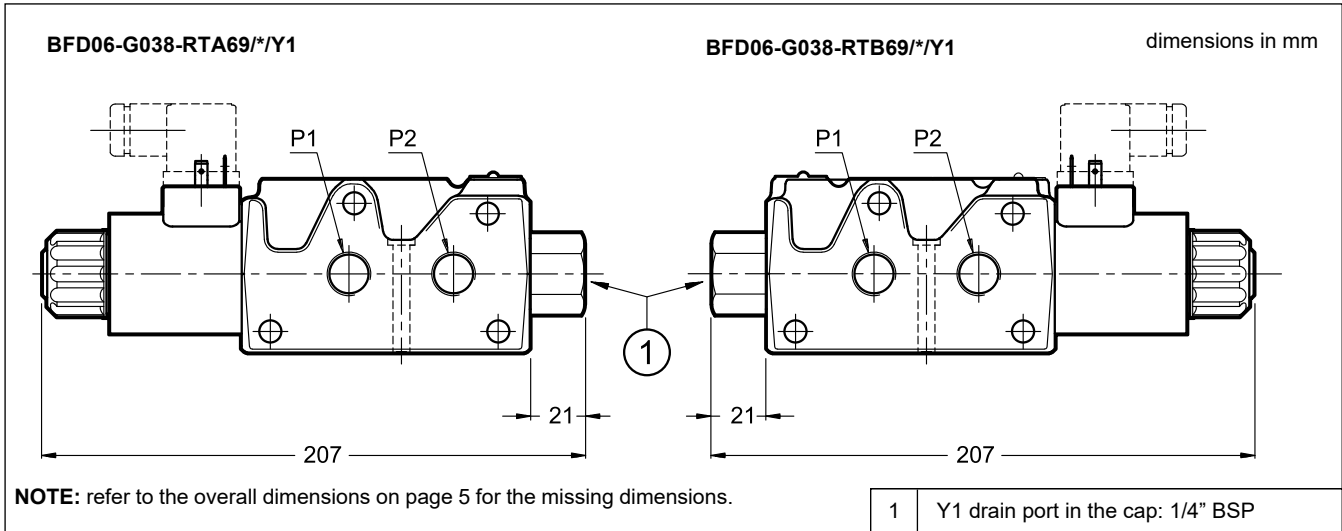
WK1, WK7 and WK7D coils have a zinc-nickel surface treatment and are specific for the high resistant version to salt spray.

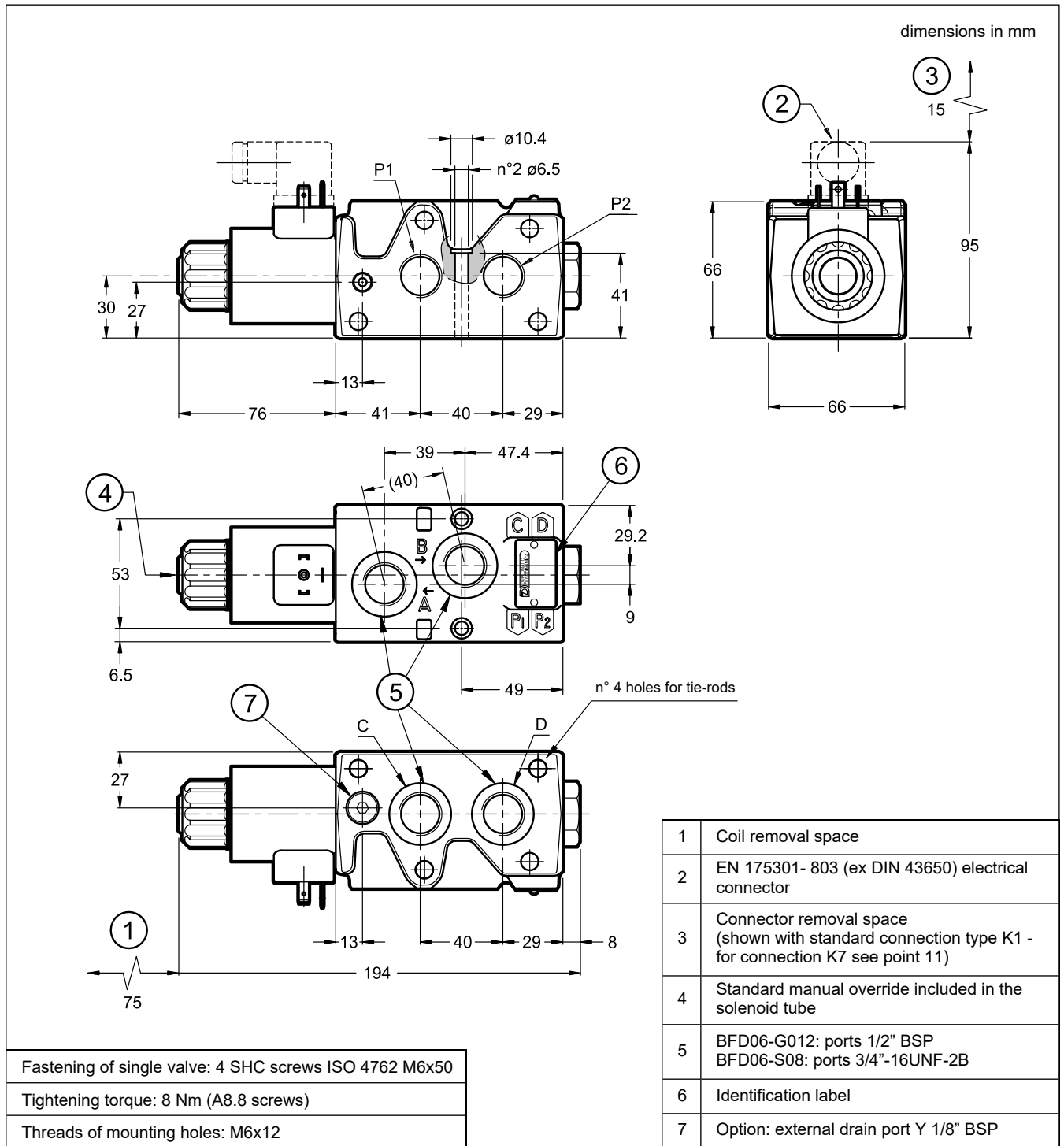
The WK7D coil includes a suppressor diode of pulses for protection from voltage peaks during switching. During the switching the diode significantly reduces the energy released by the winding, by limiting the voltage to 31.4V in the D12 coil and to 58.9 V in the D24 coil.

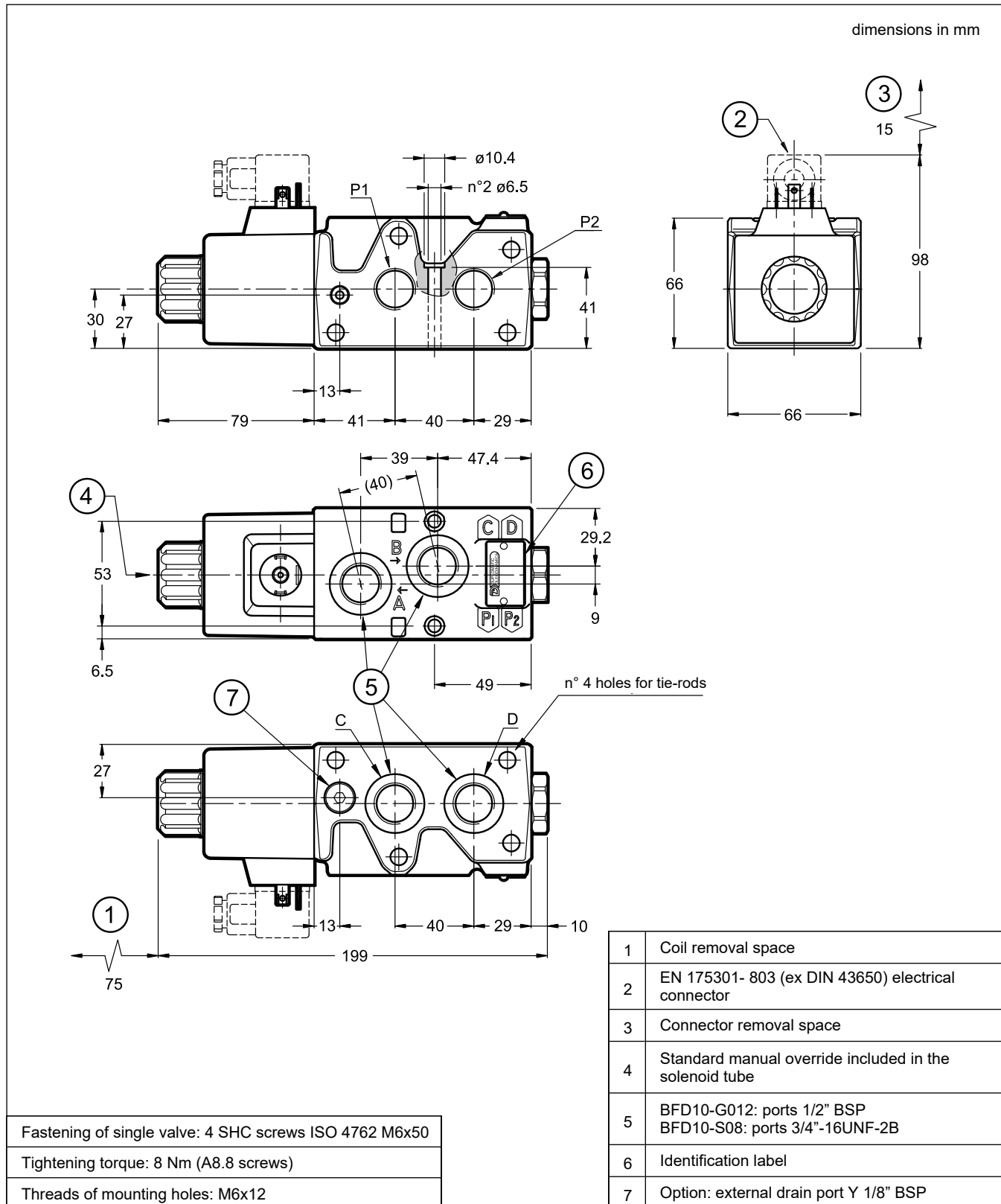
Valve	Coil	Resistance at 20°C [Ω] ( $\pm 5\%$ )	Current consumption [A] ( $\pm 10\%$ )	Absorbed power [W] ( $\pm 10\%$ )	Coil code				
					K1	WK1	K7	WK7	WK7D
<b>BFD06</b>	<b>D12</b>	4 ÷ 5	2,72	32,7	1903080	1903590	1902940	1903580	1903600
	<b>D24</b>	18 ÷ 19,5	1,29	31	1903081	1903591	1902941	1903581	1903601
	<b>D28</b>	24,5 ÷ 27	1,11	31	1903082				
<b>BFD10</b>	<b>D12</b>	2,9	4,14	50	1903150				
	<b>D24</b>	12,3	1,95	47	1903151				

**7 - BFD06-G038 OVERALL AND MOUNTING DIMENSIONS**


7.1 - Versions with external drain Y1



**8 - BFD06-G012 AND BFD06-S08 OVERALL AND MOUNTING DIMENSIONS**


**9 - BFD10 OVERALL AND MOUNTING DIMENSIONS**

**10 - INSTALLATION**

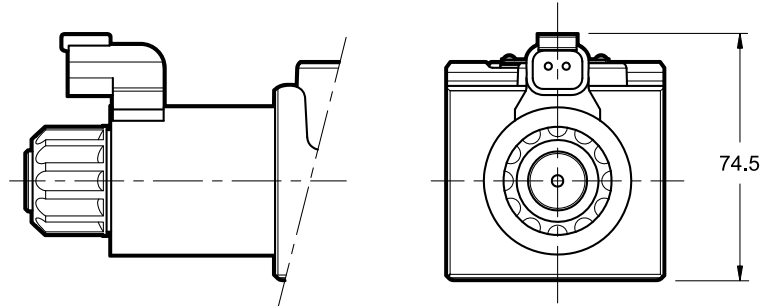
The solenoid valve can be installed in any position without affecting its operation.



**11 - ELECTRICAL CONNECTIONS**

K1 and WK1 connections (for EN 175301- 803 connector) are described in the dimension drawings. K7, WK7 and WK7D connections are available for BFD06\* valves only.

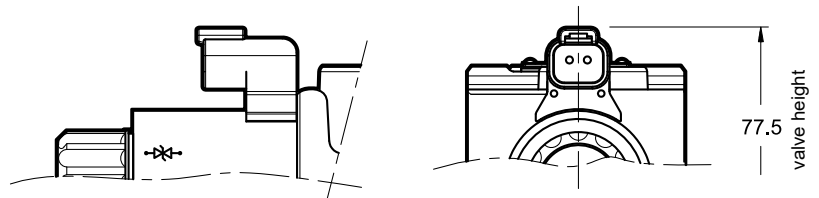
connection for plug DEUTSCH DT04-2P  
for connector type DEUTSCH DT06-2S,  
male  
code **K7**



**W7 versions:**

connection for plug DEUTSCH DT04-2P  
for connector type DEUTSCH DT06-2S,  
male

code **WK7**  
code **WK7D** coil with diode



**12 - ELECTRICAL CONNECTORS**

The solenoid valves are supplied without connectors. For coils with standard electrical connection K1 type EN 175301- 803 (ex DIN 43650) the connectors can be ordered separately: see catalogue 49 000.

**13 - OPTIONS**

**13.1 - Subplate external drain port (option Y)**

This version allows the operation with pressures up to 320 bar on the ports.

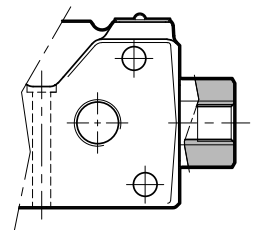
It consists in a Y drain hole realized on the valve interface, where the Y port is connected with the solenoid tubes: in this way the tubes are not stressed by the pressure operating on the valve ports.

**13.2 - External drain through plug (Y1)**

This version is used for interchange function in the control circuits of the pilot lines: it drains the inactive lines through the 1/4 "BSP side drain plug (Y1 connection)

This ensures that loads on idle lines are not subjected to unwanted movement.

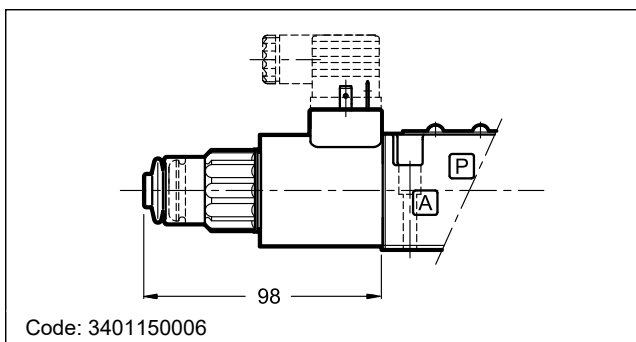
Connect Y1 port to an appropriate drain line.



**14 - MANUAL OVERRIDES**

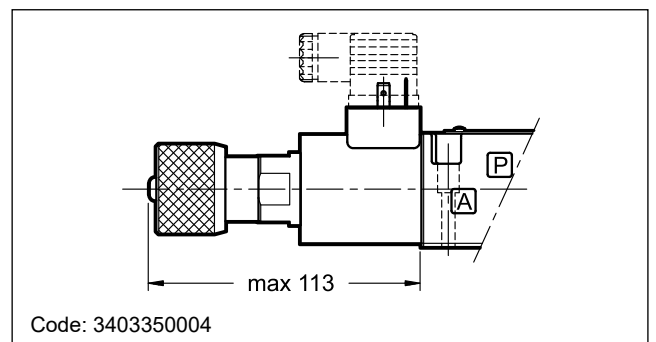
These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

**14.1 - CM manual override boot protected.**



**14.2 - CK1 turning knob override.**

Available for BFD06 only



**15 - SERIES CONFIGURATION**

The BFD\* valves can also be assembled in series, bundled up to 5 modules. The fixing kit must be ordered separately. It includes: rods and screws, nuts, security washers and OR, as indicated in the table below.

**15.1 - Hydraulic scheme, dimensions and installation**

**MOUNTING EXAMPLE**

1	Mounting surface with sealing rings: OR 2106 (26.7x1.78) 90 shore Additional for Y version only: OR 2050 (12.42x1.78) 90 shore
2	Identification label

Tightening torque: 17 Nm

modules no.	ways no.	A	B	C	bolts or tie-rods	nuts & washers	Qty. OR 2106	Qty. OR 2050	kit BFD*/10N	kit BFD*/10V
2	8	119	132	156	4 bolts M8x145	4+4	2	1	3404200002	3404200012
3	10	185	198	220	4 tie-rods M8x200	8+8	4	2	3404200003	3404200013
4	12	251	264	285	4 tie-rods M8x265	8+8	6	3	3404200004	3404200014
5	14	317	330	350	4 tie-rods M8x330	8+8	8	4	3404200005	3404200015