



BFD*

SIX-PORTS FLOW DIVERTER

SERIES 10

p max 320 bar
Q max 90 l/min

OPERATING PRINCIPLE

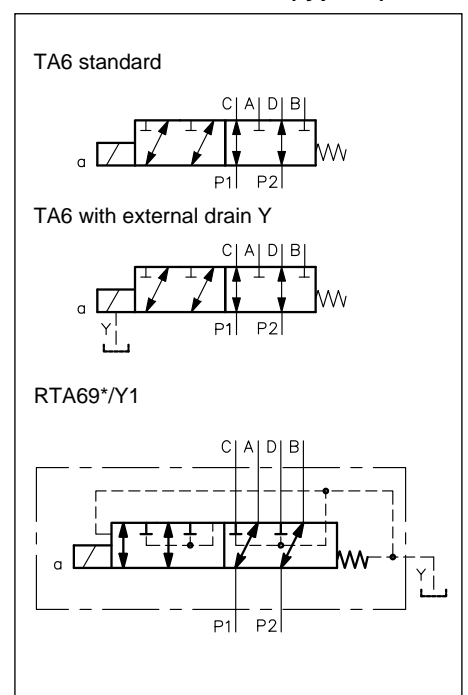
- The BFD* modular solenoid valve is a six-port flow diverter that allows the simultaneous connection of two of the four working lines, switching between them by solenoid actuation.
- They are available in two sizes, depending on the flow rate, and they are used mainly for compact applications in mobile 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. A corrosion resistance version is available as well (600 hours). See point 16.
- 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:		250	250
	- standard version	320	320
	- with drain Y option	320	-
	bar		
Maximum flow	l/min	60	90
Pressure drops $\Delta p - Q$	see point 4		
Electrical features	see point 7		
Operating limits	see point 5		
Electrical connections	see point 12		
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 (typical)





1 - IDENTIFICATION CODE

1.1 - BFD06

	BFD	06	-		-		/	10	-		/	
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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 (see **NOTE 1**)

NOTE 1: Coils locking ring and related OR are supplied together with valves.

NOTE 2: The standard valve is supplied with zinc-nickel finishing.
 The zinc-nickel finishing on the valve body makes the valve suitable to ensure a salt spray resistance up to **240** hours.
 For a salt spray resistance up to **600** hours refer to **point 16**.
 (test operated according to UNI EN ISO 9227 standards and test evaluation operated according to UNI EN ISO 10289 standards).

Option:
Y = drain port in mounting surface (see point 14.1)

Exclusive and mandatory for spool RT*69:
Y1 = BSP side port for external drain (see point 14.2)

Manual override: (see point 15)
 Omit for override integrated in the tube (**standard**)
CM = boot protected
CK1 = knob

Coil electrical connection (see **NOTE 2**)
 K7 connection is available on D12 and D24 coils only (see point 7 and 12).
K1 = plug for EN 175301-803 connector (ex DIN 43650) (**standard**)
K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S

1.2 - BFD10

	BFD	10	-		-	TA6	/	10	-		K1	/	
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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)

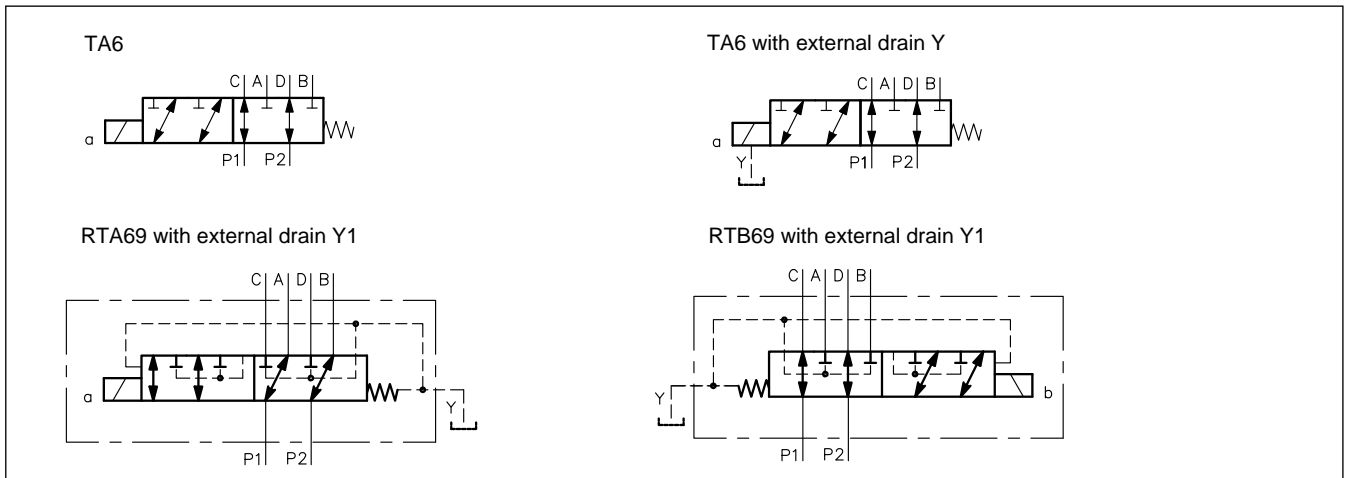
Seals: _____
N = NBR seals for mineral oil (**standard**)
V = FPM seals for special fluids

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.

Option:
Y = drain port in mounting surface (see point 14.1)

Manual override: (see point 15)
 Omit for override integrated in the tube (**standard**)
CM = boot protected

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

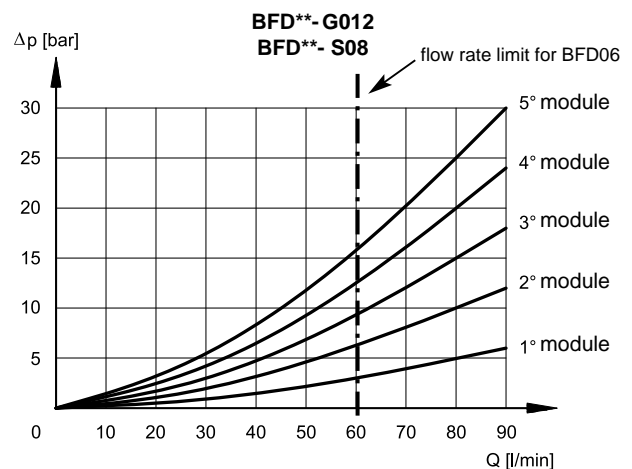
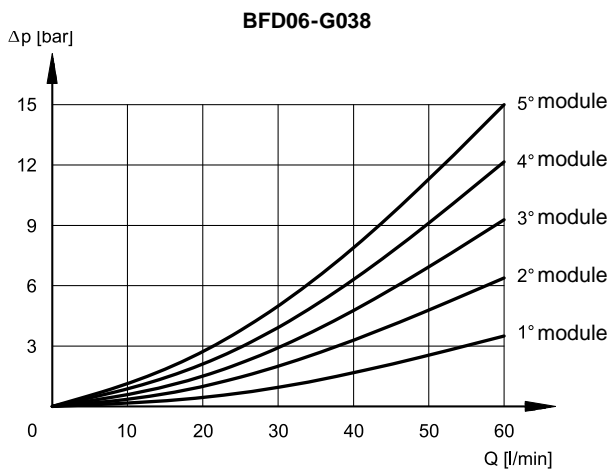
2 - SPOOL TYPE

3 - 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.

4 - CHARACTERISTIC CURVES

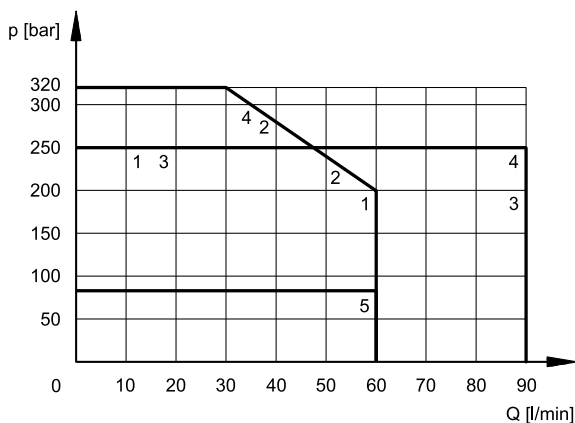
(obtained with viscosity 36 cSt at 50 °C)

Pressure drops Δp -Q at initial position


5 - 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

**6 - 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
BFD06	25 ÷ 75	20 ÷ 50
BFD10	50 ÷ 100	20 ÷ 40

7 - ELECTRICAL CHARACTERISTICS**7.1 - 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.

Interchangeability of coils of different voltages is possible without tube replacement.

The coil is fastened to the tube by a threaded ring, and can be rotated to suit the available space.

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.

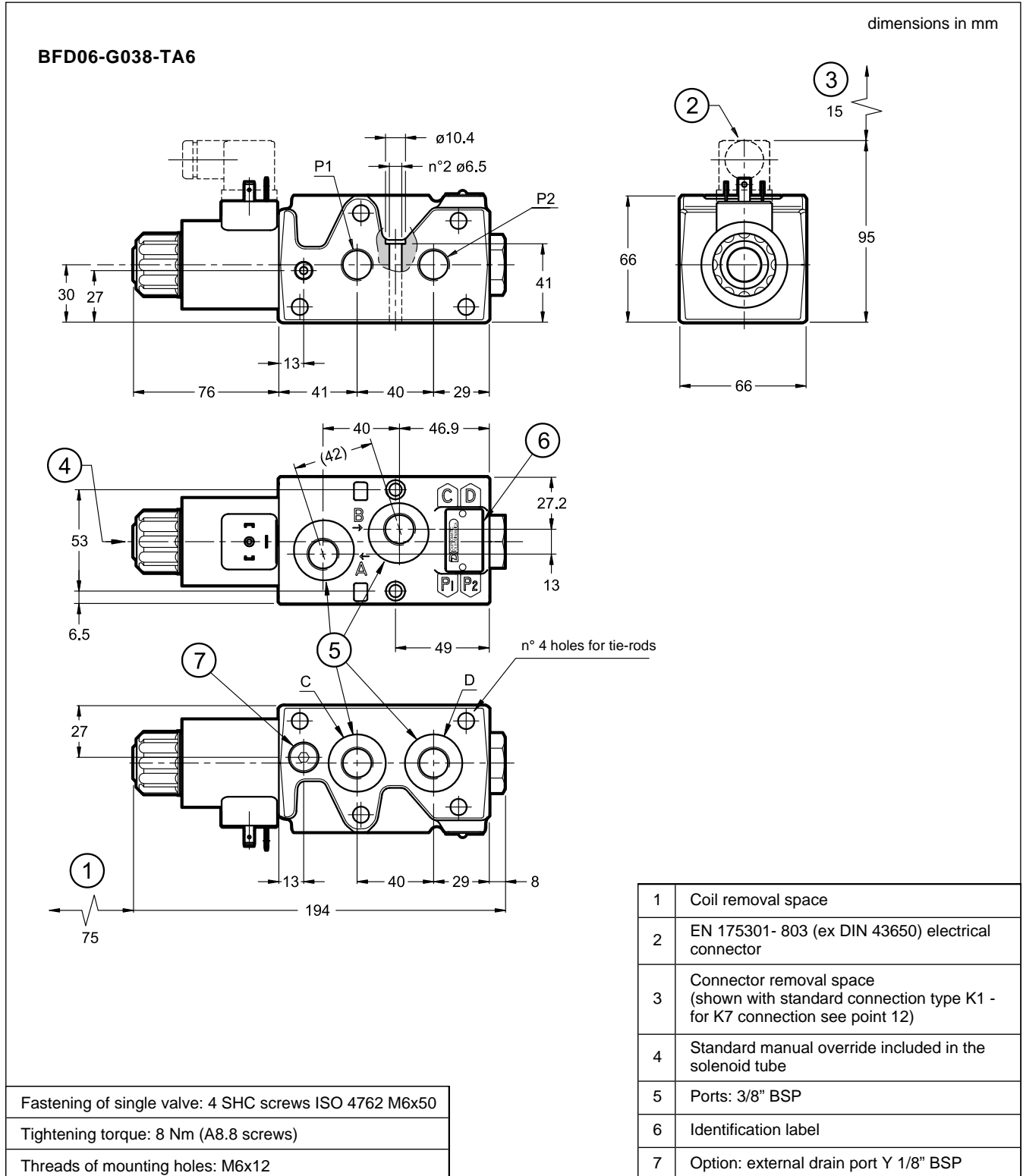
electric connection	electric connection protection	whole valve protection
K1	IP65	IP65
K7	IP65/67	

SUPPLY VOLTAGE FLUCTUATION	$\pm 10\%$ Vnom
MAX SWITCH ON FREQUENCY	10.000 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 (BFD06) Impregnation (BFD10)	class H class F class H

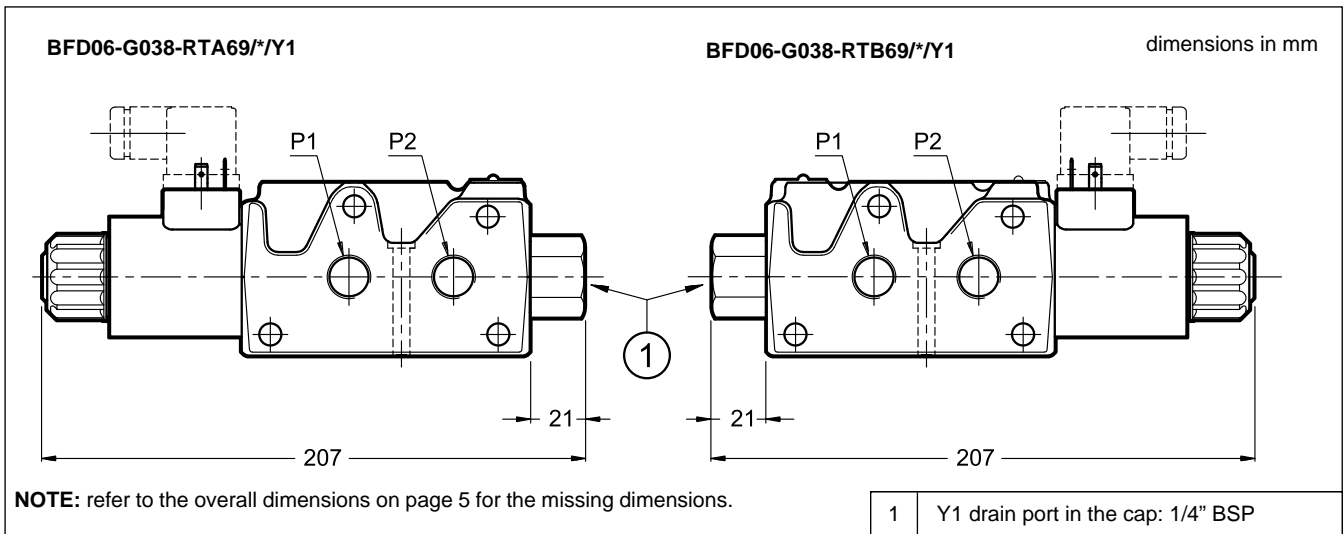
NOTE: In order to further reduce the emissions, use of type H connectors is recommended. These prevent voltage peaks on opening of the coil supply electrical circuit (see cat. 49 000).

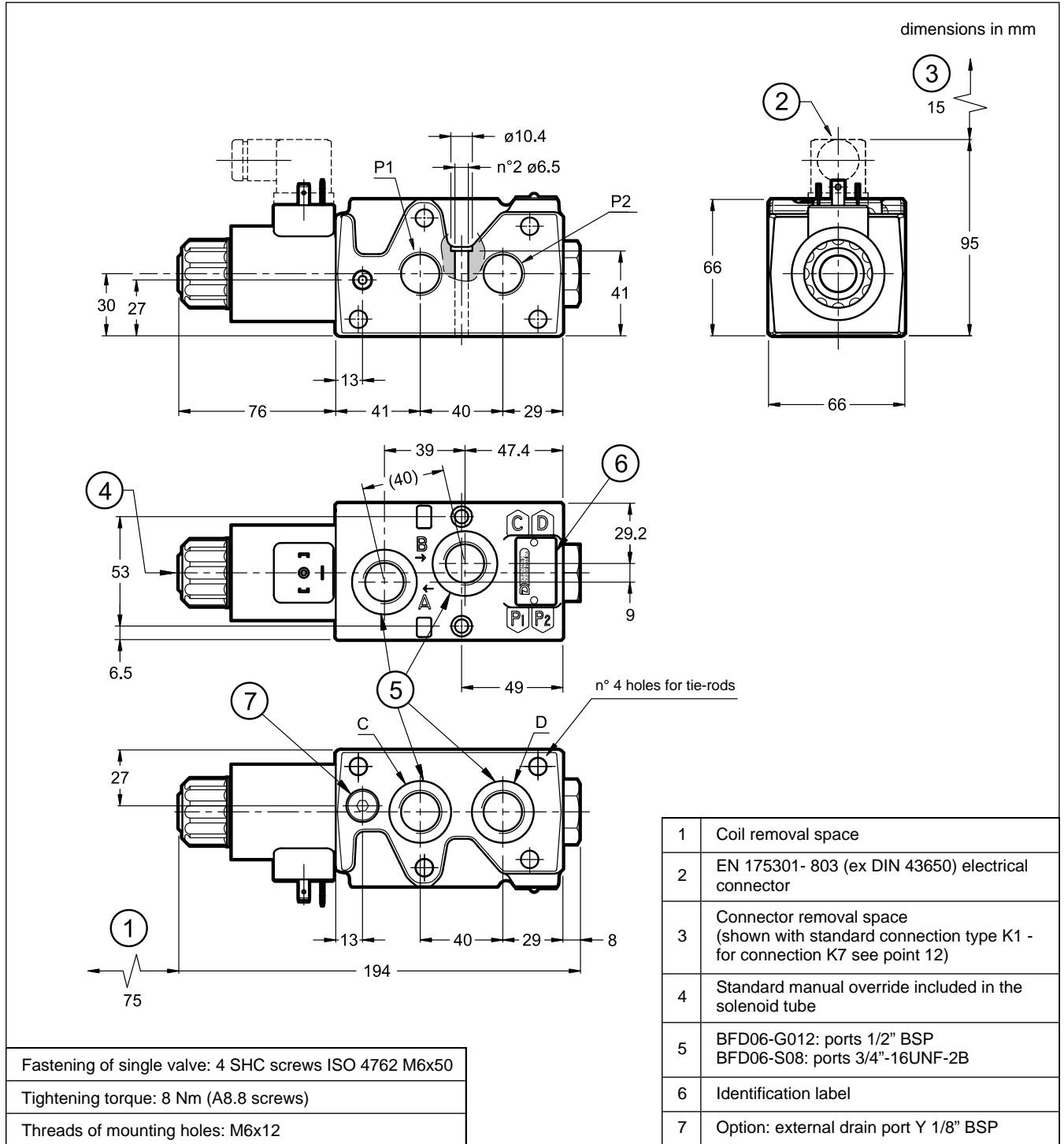
7.2 - Current and absorbed power

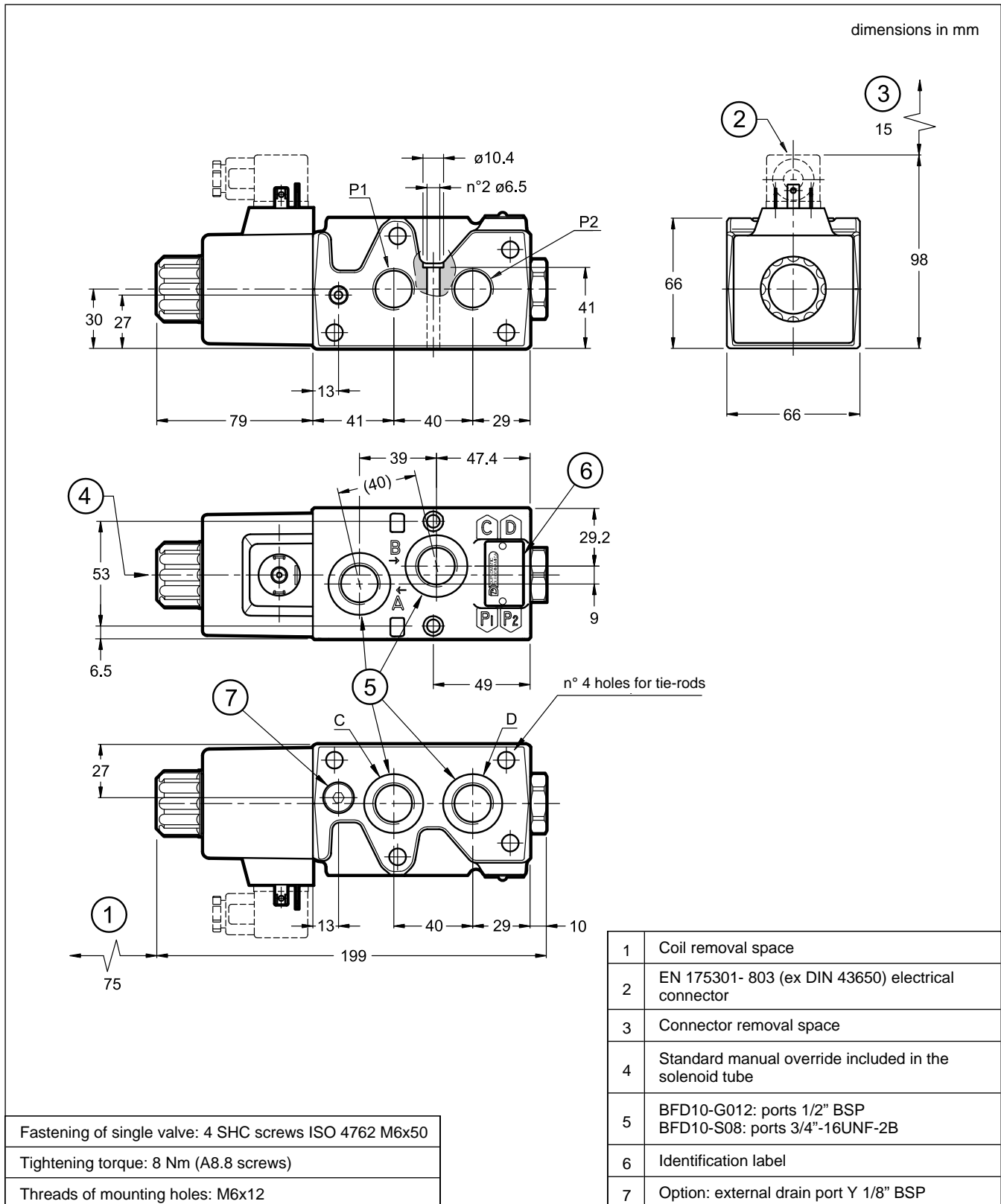
Valve	Coil	Resistance at 20°C [Ω] ($\pm 5\%$)	Current consumption [A] ($\pm 10\%$)	Absorbed power [W] ($\pm 10\%$)	Coil code	
					K1	K7
BFD06	D12	4,4	2,72	32,7	1903080	1902940
	D24	18,6	1,29	31	1903081	1902941
	D28	26	1,11	31	1903082	
BFD10	D12	2,9	4,14	50	1903150	
	D24	12,3	1,95	47	1903151	

8 - BFD06-G038 OVERALL AND MOUNTING DIMENSIONS


8.1 - Versions with external drain Y1



9 - BFD06-G012 AND BFD06-S08 OVERALL AND MOUNTING DIMENSIONS


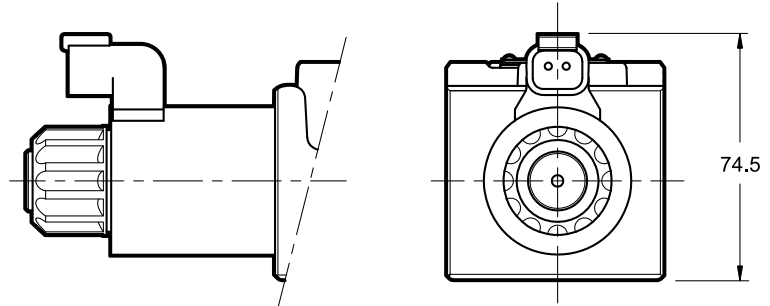
10 - BFD10 OVERALL AND MOUNTING DIMENSIONS

11 - INSTALLATION

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

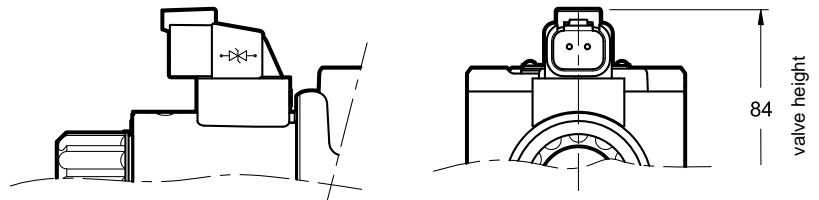
12 - ELECTRICAL CONNECTIONS

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
 DEUTSCH DT06-2S male connector
 code **K7**



connection for
 DEUTSCH DT06-2S male connector
 code **WK7** (W7 version only)
 code **WK7D** (W7 version only - coil
 with diode)



13 - 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.

14 - OPTIONS

14.1 - Subplate external drain port (option Y)

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

It allows the operation with a pressure up to 320 bar on the ports.

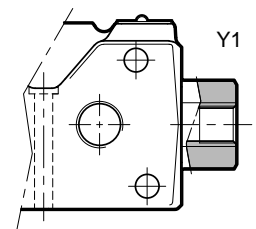
Connect Y port to an appropriate drain line with p max 250 bar.

14.2 - External drain through BSP side port (Y1)

This version is exclusive and mandatory for RS*69 spools and is used with interchange function in the control circuits of the pilot lines: it drains the inactive lines and the solenoid tubes through the 1/4 "BSP Y1 side drain port.

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

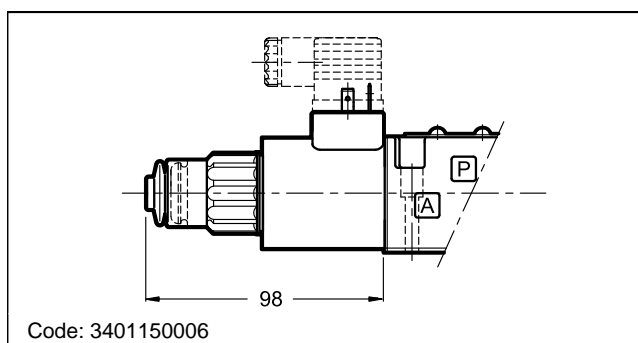
Connect Y1 port to an appropriate drain line with p max 250 bar.



15 - MANUAL OVERRIDES

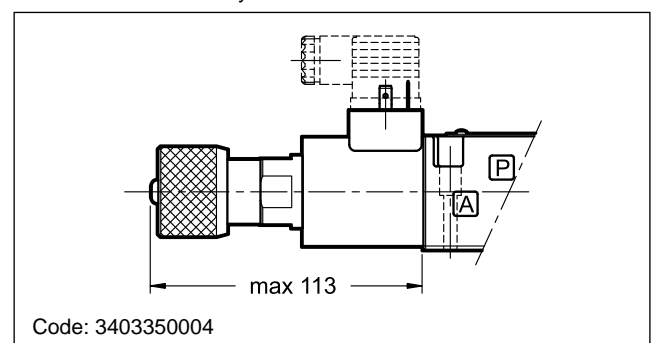
These valves have solenoids whose pin for manual operation is integrated in the tube. Actuate this override by pushing it with a suitable tool, minding not to damage the sliding surface.

15.1 - CM manual override boot protected.



15.2 - CK1 turning knob override.

Available for BFD06 only





16 - HIGH IP DEGREE AND CORROSION RESISTANCE VERSION

16.1 - Identification code

<div style="border: 1px solid black; padding: 5px; display: inline-block;"> BFD06... </div>	-		/			
<p>Choices as in standard identification code</p> <p>Coil type: D12 = 12 V D24 = 24 V</p> <p>Coil electrical connection (see NOTE) 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.</p>					<p>Option: Y = drain port in mounting surface (see point 14.1)</p> <p>Exclusive and mandatory for spool RT*69: Y1 = BSP side port for external drain (see point 14.2)</p>	
<p>NOTE: The CM manual override is fitted as standard to protect the solenoid tube.</p>						<p>Manual override (see point 15): Omit for boot protected manual override (standard) CK1 = knob</p>

17.2 - Corrosion resistance

This version features the zinc-nickel coating on all exposed metal parts of the valve, making it resistant to exposure to the salt spray for **600** hours (test performed according to UNI EN ISO 9227 and assessment test performed according to UNI EN ISO 10289).

17.3 - DC coils

The coils feature a zinc-nickel surface treatment.

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.

(values ±10%)

	Nominal voltage [V]	Resistance at 20°C [Ω]	Current consumpt. [A]	Power consumpt. [W]	Coil code		
					WK1	WK7	WK7D
D12	12	4.4	2.72	32.7	3984000001	3984000101	3984000111
D24	24	18.6	1.29	31	3984000002	3984000102	3984000112

17.4 - 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
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 into account in IEC 60529 but it is included in ISO 20653.

NOTE: As regards the liquid ingress protection (second digit), there are three means of protection.

Codes from 1 to 6 are related to water jets.

Rates 7 and 8 are related to immersion.

Rate 9 is reserved for high pressure and temperature water jets.

This means that IPX6 covers all the lower steps, rate IPX8 covers IPX7 but not IPX6 and lower, instead IPX9 does not cover any of them.

Whether a device meets two types of protection requirements it must be indicated by listing both the tests separated by a slash.

(E.g. a marking of an equipment covered both by temporary immersion and water jets is IP66/IP68).

17 - 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.

17.1 - 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



BFD*
SERIES 10

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MOTION SOLUTIONS
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