



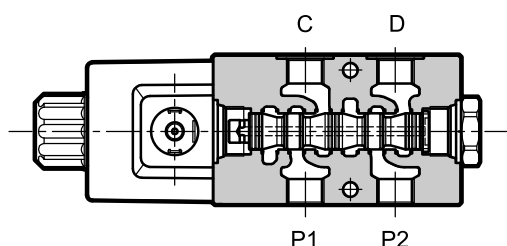
BFD*

SIX-PORT 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 high-corrosion-resistance version (600 hours) and a version with UL Recognized coils for the North American markets are also available.
- The standard valve BFD10 is suitable to ensure a salt spray resistance up to 240 hours. A high-corrosion-resistance version (600 hours) is also available.

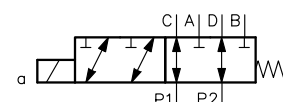
PERFORMANCES

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

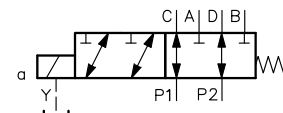
		BFD06	BFD10
Maximum operating pressure: - standard version - with drain Y option - with drain Y1 option	bar	250 320 320	250 320 -
Maximum flow	l/min	60	90
Pressure drops Δp - Q	see point 4		
Electrical features	see point 7		
Operating limits	see point 5		
Electrical connections	see point 13		
Ambient 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)

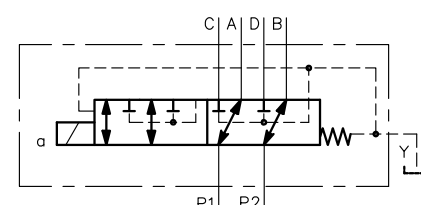
TA6 standard



TA6 with external drain Y



RTA69*/Y1





1 - IDENTIFICATION CODE

1.1 - BFD06

BFD 06 - - / 10 - - - /												
Six-port 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		
DC power supply: D12 = 12 V D24 = 24 V D26 = 26.4 V D00 = alve without coils, with locking rings and O-rings		Option: Y = drain port in mounting surface (see point 15.1) Exclusive and mandatory for spool RT*69: Y1 = BSP side port for external drain (see point 15.2)		Manual override (see point 16): Omit for override integrated in the tube (standard) CM = boot protected CK1 = knob		Coil electrical connection (see point 13): K1 = plug for connector type EN 175301-803 (ex DIN 43650) K2 = plug for connector type AMP JUNIOR K7 = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S K7D = plug DEUTSCH DT04-2P for male connector type DEUTSCH DT06-2S, with diode		Coil version (see availability table): Omit for standard zinc-plated version W = corrosion-protected (point 8) ULW = UL Recognized, corrosion-protected (points 7.2 and 8)		NOTE: The valve protection level against atmospheric agents depends on the combination of the fitted components (configuration). See point 8 for further details.		
AVAILABILITY												
voltage	electr. conn.	std	coil version									
D12, D24	K1	■	■	■								
	K2	-	-	-								
	K7	-	-	-								
	K7D	-	■	-								
D26	K1	-	■	■								
	K7	-	-	■								

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

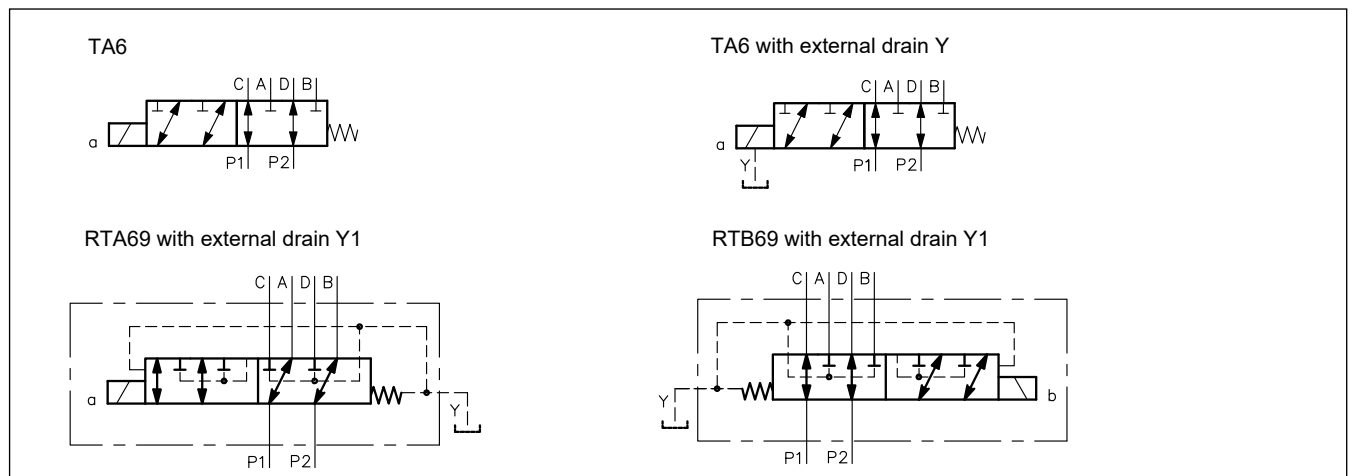
Option:
Y = drain port in mounting surface (see point 15.1)

Manual override: (see point 16)
 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



3 - HYDRAULIC FLUIDS

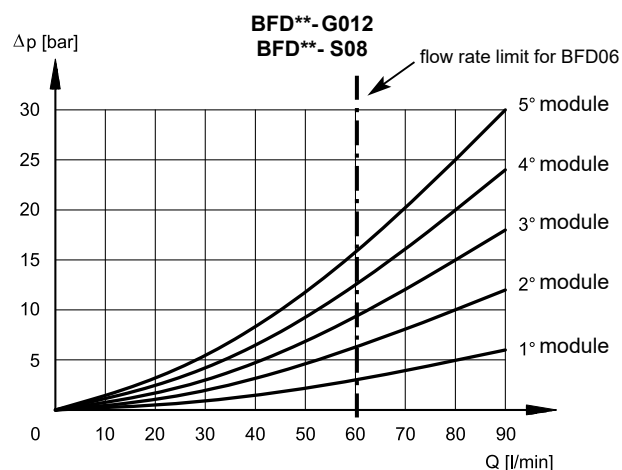
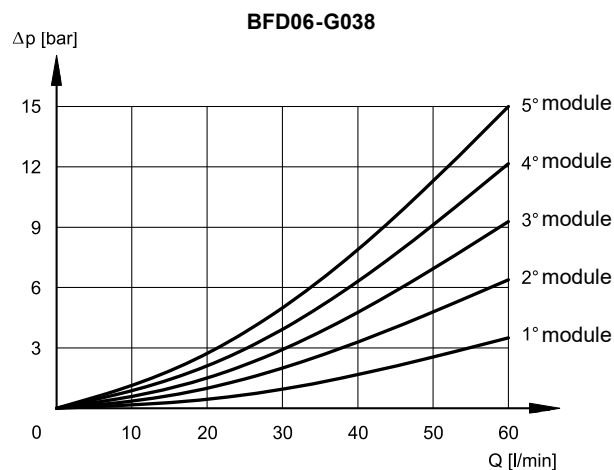
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals (code N). For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other fluid types such as HFA, HFB, HFC, please consult our technical department.

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)

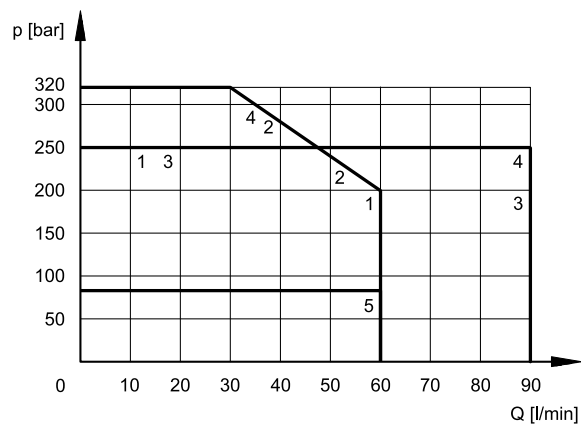
Pressure drops Δp -Q at initial position



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 FEATURES

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. The coil is fastened to the tube by a threaded ring, and can be rotated 360°, to suit the available space.

7.2 - UL Recognized coils

ULW type coils are UL Recognized Components (cUR@us marking) intended for installation within end-use equipment that is subject to evaluation in accordance with the applicable UL and CSA standards.

SUPPLY VOLTAGE FLUCTUATION	± 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: To further reduce emissions, when using a DC power supply, type H connectors are recommended. These prevent overvoltage peaks when the coil supply circuit is opened (see catalogue 49 000).

7.3. - DC solenoid valve - current and power consumption

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

Using connectors type 'D' or 'D1'(see cat. 49 000) with embedded bridge rectifier it is possible to feed DC coils with alternating current (50 or 60 Hz), considering a reduction of the operating limits (see diagram at point 6.4).

7.3.1 - DC coils with diode (BFD06 only)

K7D coils incorporate a suppression diode providing protection against voltage peaks. During switching, the diode limits the voltage generated by the coil winding to 33 V for the D12 coil and 62 V for the D24 coil.

(values ± 10%)

valve	coil	nominal voltage [V]	resistance at 20°C [Ω]	current consumpt [A]	power consumpt [W]
BFD06	D12	12	4.5	2.68	32.2
	D24 (std, W)	24	18.6	1.29	31
	D24 (ULW)	24	16.6	1.45	34.7
	D26	26.4	20.6	1.28	33.9
BFD10	D12	12	2.9	4.14	50
	D24	24	12.3	1.95	47

8 - PROTECTION AGAINST ENVIRONMENTAL CONDITIONS

The valve protection against environmental conditions depends on the combination of its individual components (valve body, coils, electrical connection and manual override). This determines both the corrosion resistance level and the IP degree of protection.

8.1 - IP degree of protection

The IP degree of protection is defined according to IEC 60529 and indicates the level of protection against the ingress of solid objects and liquids.

The actual IP degree of protection of the valve depends on the type of electrical connection, the solenoid tube protection and the design solutions adopted. The stated IP degree of protection is guaranteed only when a connector with an equivalent degree of protection is correctly wired and installed.

coil version	electrical connection type	IP rating	
		electrical conn.	valve
standard	K1	IP65	IP65
W, ULW	K1	IP66	IP65
	K2	IP65/IP67	
	K7	IP66/IP68/IP69 IP69K*	
	K7D	IP66/IP68/IP69 IP69K*	
W, ULW + manual override type C*	K1	IP66	IP66
	K2	IP65/IP67	IP65/IP67
	K7	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*
	K7D	IP66/IP68/IP69 IP69K*	IP66/IP68/IP69 IP69K*

(*) The IP69K degree of protection is not covered by IEC 60529 but is defined in ISO 20653.

IP Ratings: Selection Guide

The IP rating indicates protection against solid objects (first digit) and liquids (second digit). For solid objects, rating 6 is the highest level and provides complete dust protection. Our solenoid valves fall into this category.

For liquids, three types are distinguished:

- degree 1 to 6: protection against water jets;
- degree 7 and 8: protection against immersion;
- degree 9: protection against high-pressure, high-temperature water jets.

IP ratings are neither equivalent nor cumulative: IP66 covers lower ratings; IP68 covers IP67 only, not IP66, IP65 or lower ratings; IP69 does not cover any other rating.

Where a component complies with more than one type of protection, all applicable IP ratings shall be stated.

Example: equipment protected against powerful water jets and continuous immersion is marked IP66/IP68.

8.2 - Corrosion resistance

The BFD06 and BFD10 valve bodies are treated with a zinc-nickel finish and, when combined with standard coils, provide corrosion resistance of up to 240 h in salt spray testing.

For the BFD06 valve, complete valve configurations featuring a zinc-nickel finish on the valve body, type W or ULW coils, and a type C* manual override providing solenoid tube protection ensure corrosion resistance of up to 600 h in salt spray testing.

For the BFD10 valve, complete valve configurations featuring a zinc-nickel finish on the valve body, standard plastic coils, and a type C* manual override providing solenoid tube protection ensure corrosion resistance of up to 600 h in salt spray testing.

Salt spray tests are carried out in accordance with UNI EN ISO 9227, with results evaluated according to UNI EN ISO 10289.

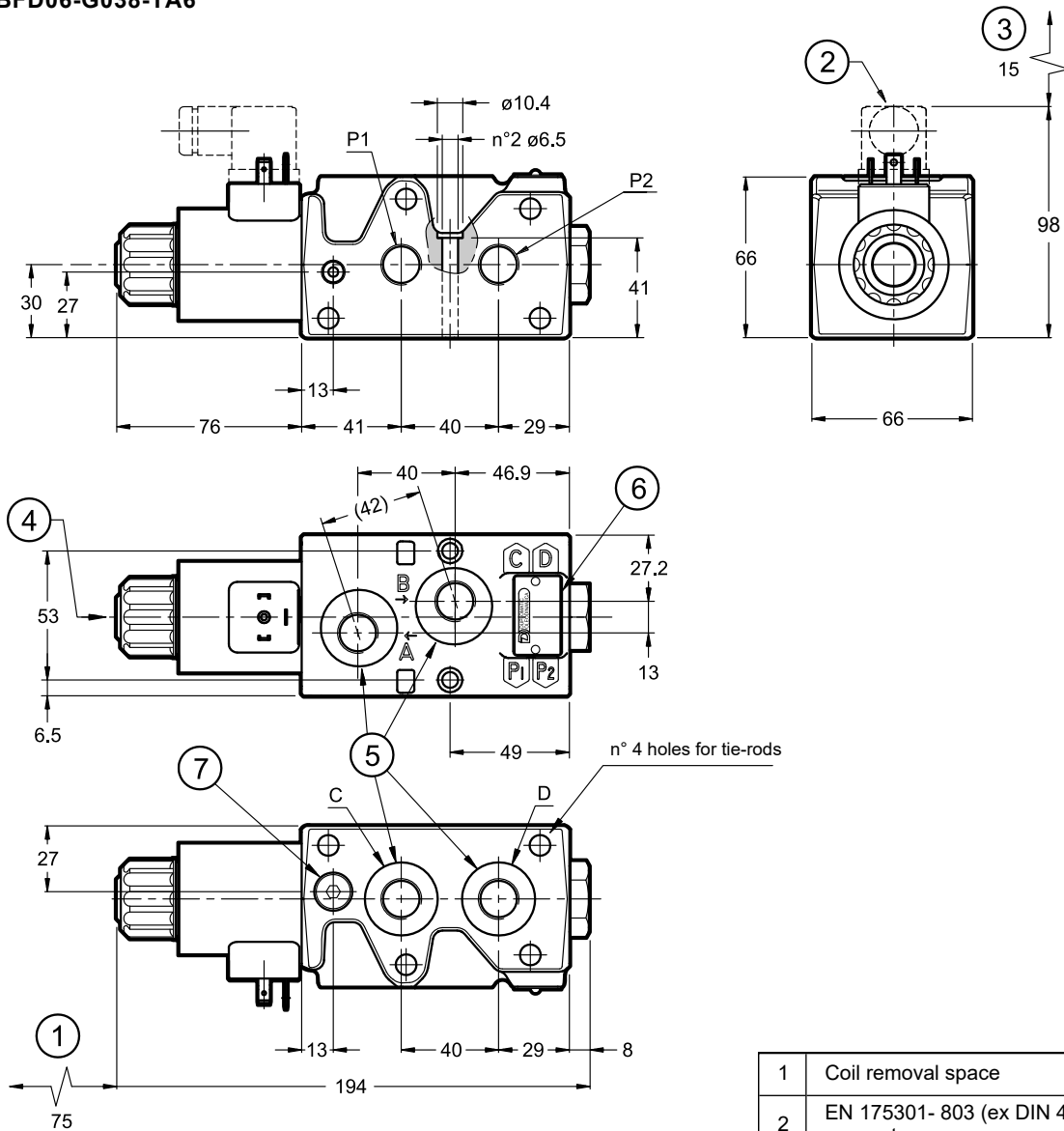
The availability of the various protection levels depends on the combination of design options selected and may vary according to supply voltage, electrical connection type and manual override selected (see availability table, point 1).

type	configurations	resistance
BFD06	+ standard coil (zinc-plated)	240 h
	+ W or ULW coil	240 h
	+ W or ULW coil + type C* manual override	600 h
BFD10	+ standard coil (plastic)	240 h
	+ standard coil (plastic) + type C* manual override	600 h

9 - BFD06-G038 OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

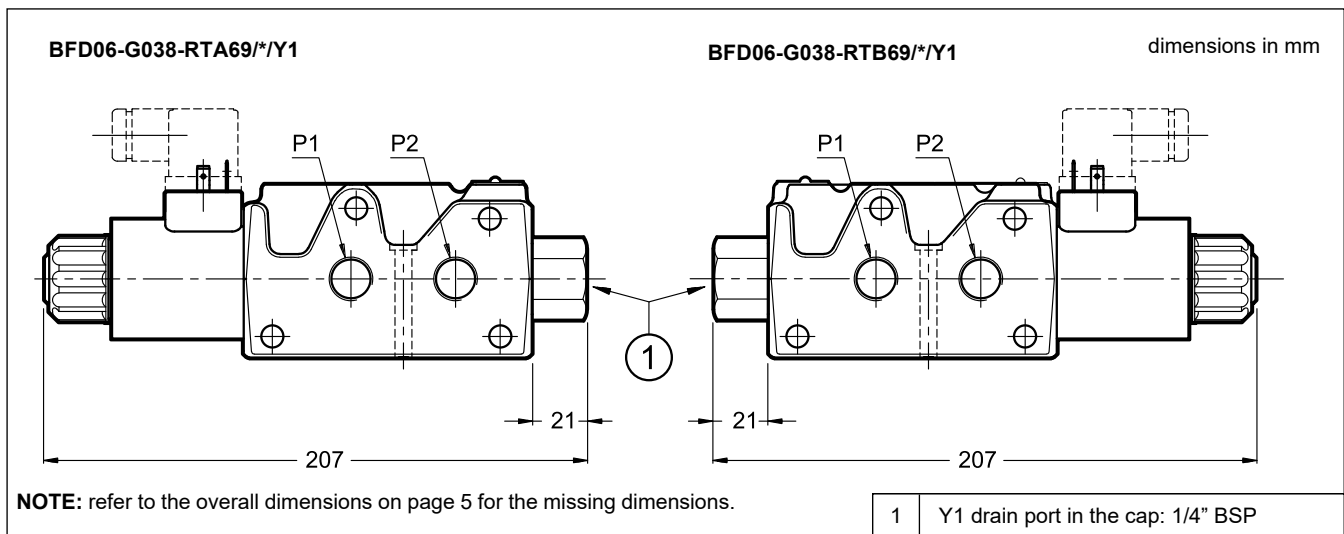
BFD06-G038-TA6



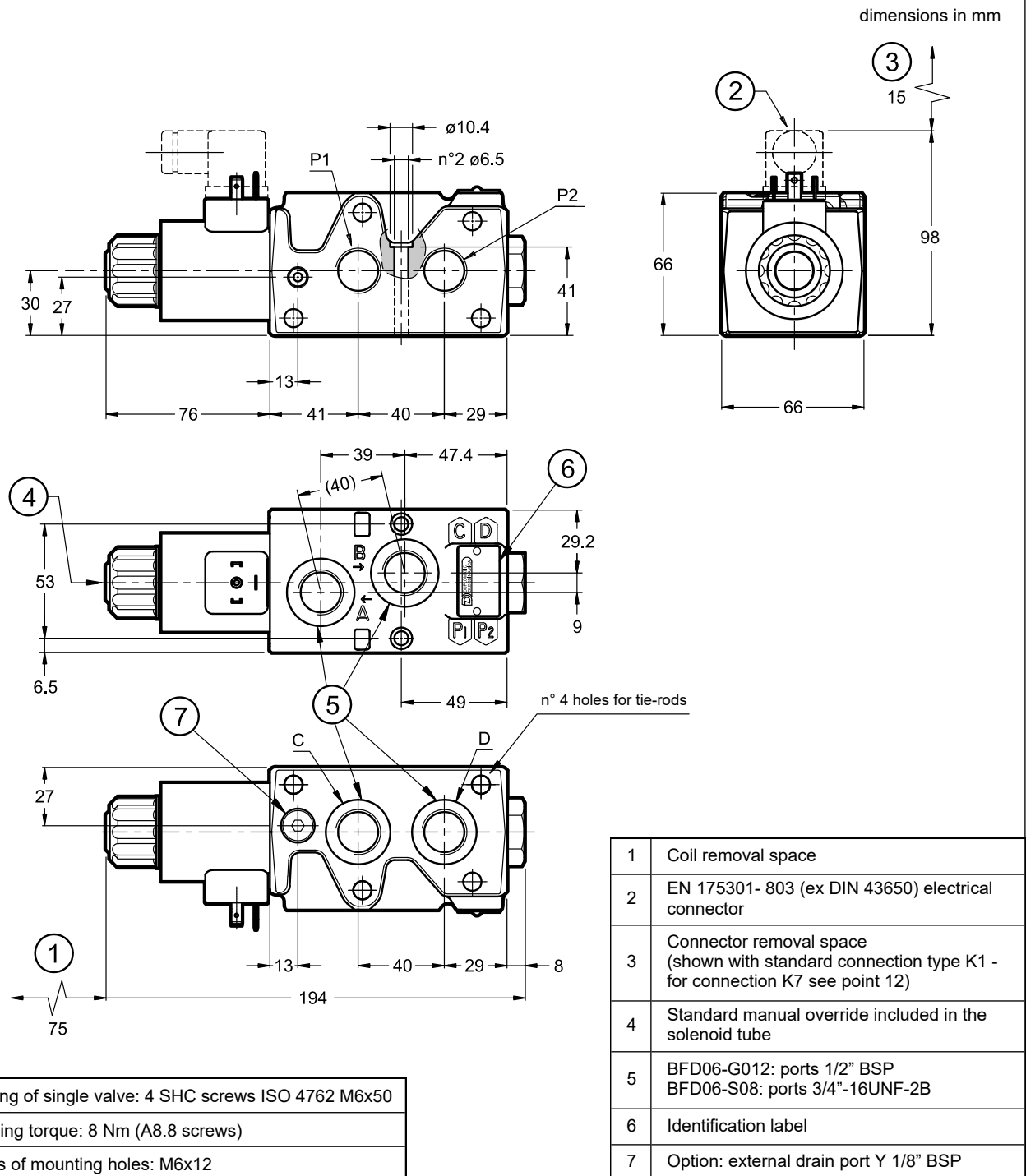
1	Coil removal space
2	EN 175301- 803 (ex DIN 43650) electrical connector
3	Connector removal space (shown with standard connection type K1 - for K7 connection see point 12)
4	Standard manual override included in the solenoid tube
5	Ports: 3/8" BSP
6	Identification label
7	Option: external drain port Y 1/8" BSP

Fastening of single valve: 4 SHC screws ISO 4762 M6x50
Tightening torque: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x12

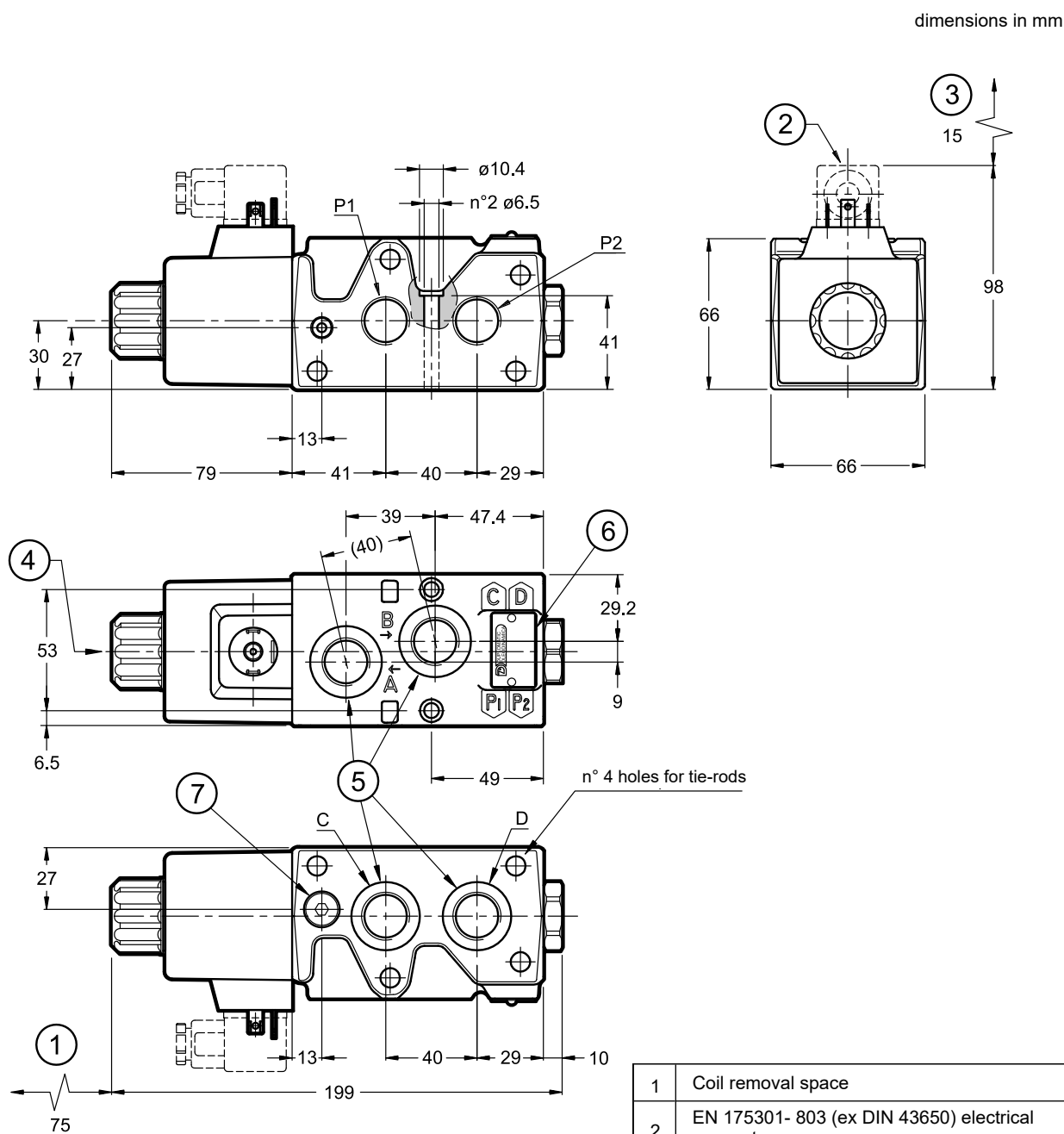
9.1 - Versions with external drain Y1



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



11 - BFD10 OVERALL AND MOUNTING DIMENSIONS



1	Coil removal space
2	EN 175301- 803 (ex DIN 43650) electrical connector
3	Connector removal space
4	Standard manual override included in the solenoid tube
5	BFD10-G012: ports 1/2" BSP BFD10-S08: ports 3/4"-16UNF-2B
6	Identification label
7	Option: external drain port Y 1/8" BSP

Fastening of single valve: 4 SHC screws ISO 4762 M6x50
Tightening torque: 8 Nm (A8.8 screws)
Threads of mounting holes: M6x12

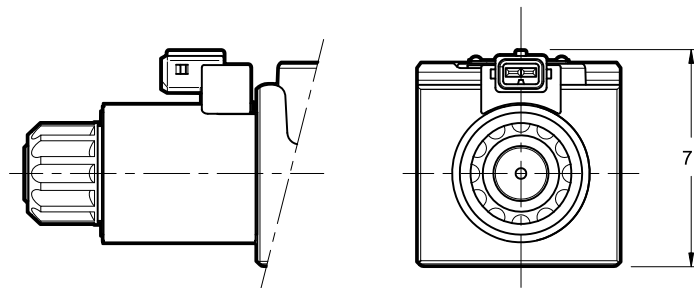
12 - INSTALLATION

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

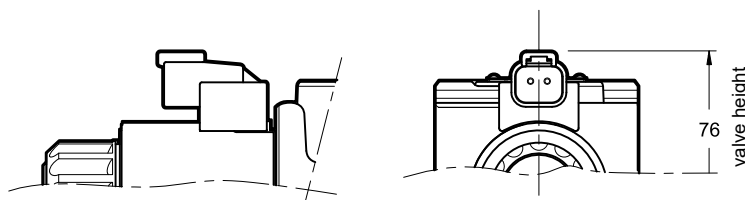
13 - ELECTRICAL CONNECTIONS

K1, WK1 and ULWK1 connections (for EN 175301- 803 connector) are described in the dimension drawings. ULWK7 and WK7D connections are available for BFD06* valves only.

connection for AMP JUNIOR
connector
code **ULWK2**



connection for
DEUTSCH DT06-2S male connector
code **ULWK7**
code **WK7D** (with diode)



14 - 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.

15 - OPTIONS

15.1 - 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.

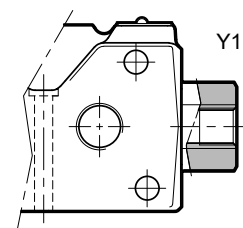
Connect Y port to an appropriate drain line with p max 250 bar.

15.2 - 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.

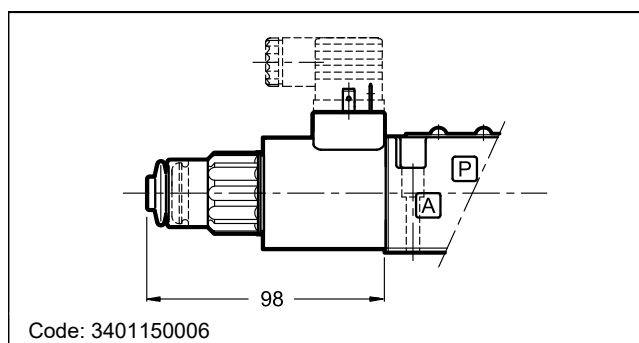
Connect Y1 port to an appropriate drain line with p max 250 bar.



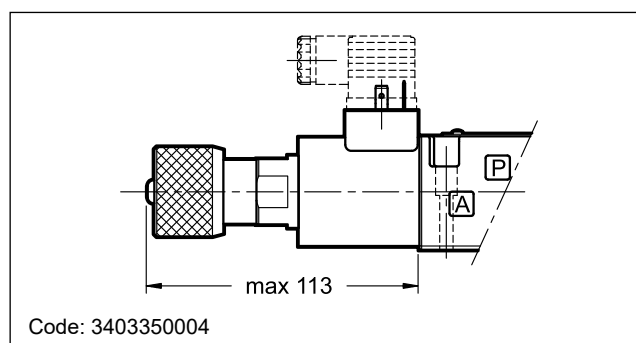
16 - MANUAL OVERRIDES

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.

16.1 - CM manual override boot protected.



16.2 - CK1 turning knob override (available for BFD06 only)

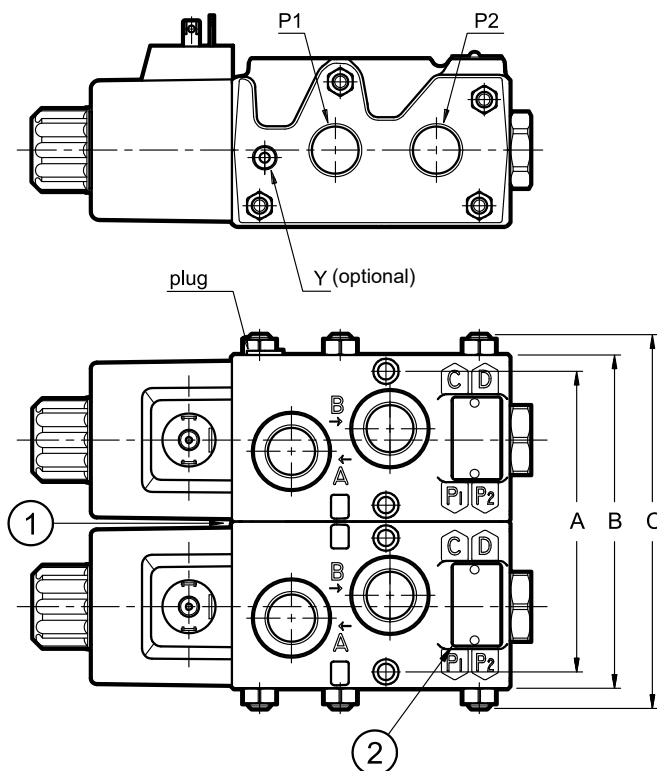
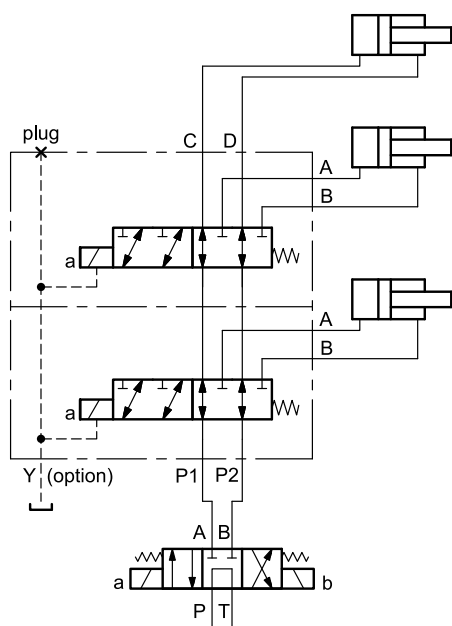


17 - SERIES CONFIGURATION

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