BLS6
BANKABLE LOAD SENSING PROPORTIONAL CONTROL VALVE
SERIES 11

p max **300** bar
**Q** max **120** l/min

OPERATING PRINCIPLE
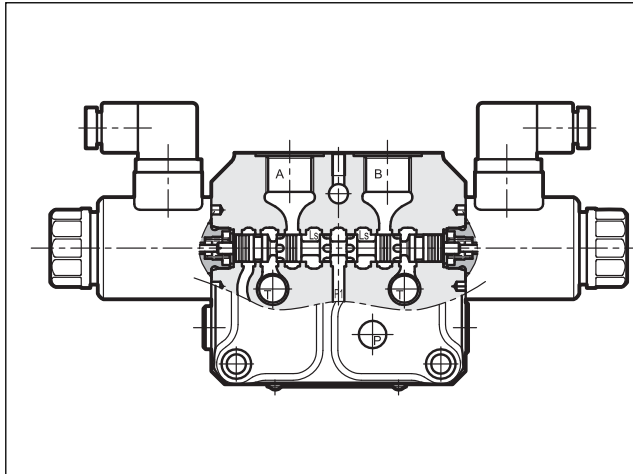
— The BLS6 directional control valve is stackable and can be assembled up to 8 different modules.

— Each module is equipped with a meter-in compensator that keep costant the flow, independently from load changes.

— Sections with pressure compensators are not influenced in any way by other operated functions, provided that sufficient pump capacity is available. To correctly work, the sum of the flows contemporarily used must not overcome the 90% of the inlet flow.

— The user ports A and B are threaded 1/2" BSP. On the inlet module the ports P1, P2 and T1 are threaded 3/4" BSP.

— Available also with lever manual override.

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

Maximum operating pressure: - A and B ports - P1 and P2 ports - T1 port	bar	300 250 20
Maximum flowrate: - A and B ports - P1 and P2 ports - T1 port	l/min	45 100 120
Pressure drops Δp - Q	see paragraph 3	
Electrical characteristics	see paragraph 5	
Electrical connections	see paragraph 8	
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 18/16/13	
Recommended viscosity	cSt	25
Single body mass	kg	4,5

HYDRAULIC SYMBOLS
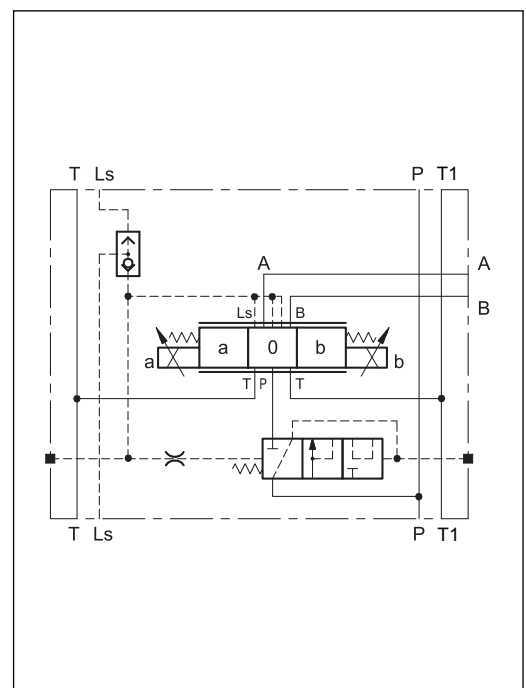
1 - IDENTIFICATION CODES FOR LOOSE MODULES

Here below all the loose components identification codes of the bankable valve are shown. To order a whole assembled valve, please use the codes at paragraphes 9 and 10.
The inlet section is available in different version for fixed pump and for system with Load Sensing pump.

1.1 - Proportional module


```
BLS 6 - [ ][ ][ ] / 11 V - [ ][ ] / [ ]
```

Compensated direct operated directional valve with proportional control

Size

Spool type:
PC = closed centers
PA = open centers

Solenoid position:
(omit for configuration with two solenoids)
A = 1 solenoid on side A
B = 1 solenoid on side B

Spool nominal flow (see below)

Series no. (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
V = FPM seals (**standard**)

Coil type:
D12 = Nominal solenoid voltage 12V DC
D24 = Nominal solenoid voltage 24V DC

Coil electrical connection:
(see paragraph)
K1 = plug for connector type DIN 43650 (**standard**)
K7 = plug for connector type DEUTSCH DT04-2P male

Manual override
(see par. 11)

SPOOLS

Valve configuration depends on the combination of the following elements:
number of proportional solenoids, spool type, nominal flow rate.

2 solenoids configuration:
3 positions with spring centering

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

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

SYMMETRICAL	
max flow	Δp
15/15	4
25/25	8
30/30	4
45/45	8

ASYMMETRICAL	
max flow	Δp
15/10	4
25/15	8
30/20	4
45/30	8

SINGLE FLOW	
max flow	Δp
30	4
45	8

1.2 - On-off modules

If necessary the proportional spool can be used together with on-off solenoids. In this case the description for the spool type as to be as follow:
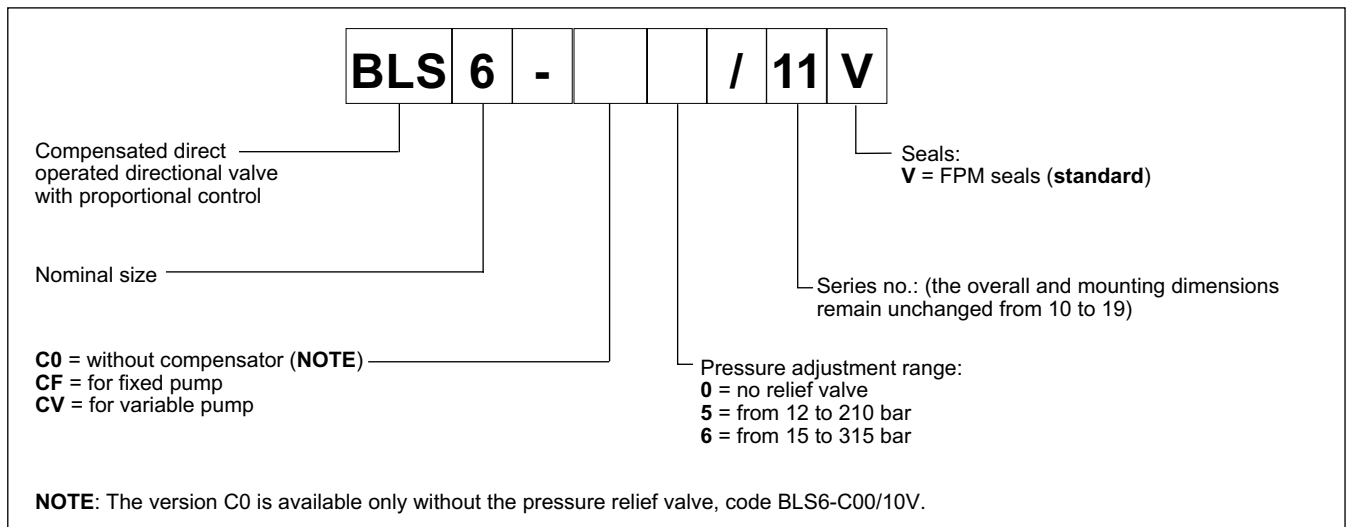
SC = closed center with on-off solenoid
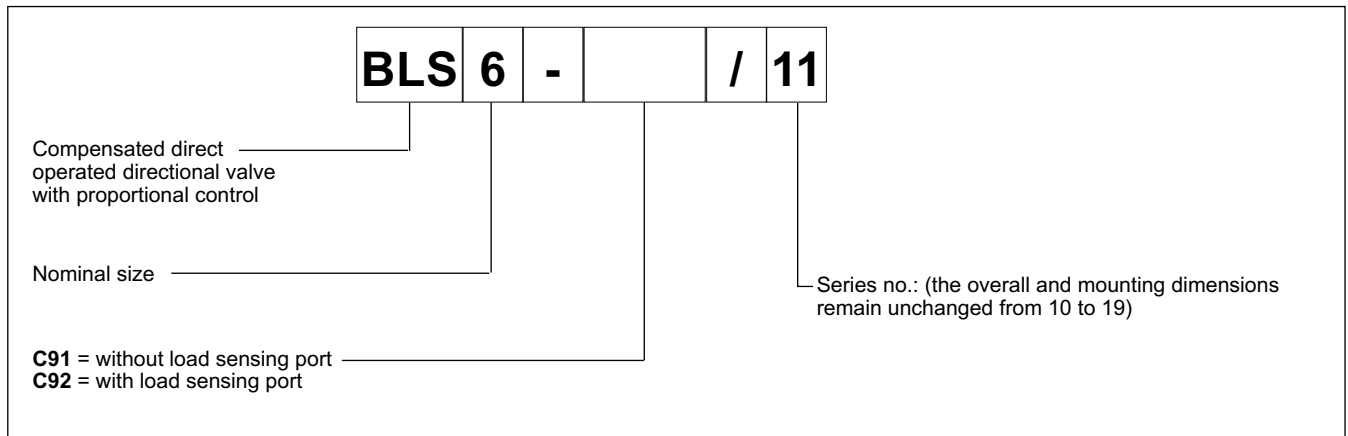**SA** = open center with on-off solenoid
In this version is also available a spool for high flow named SC60/60 and SA60/60.

1.3 - Inlet modules

The inlet section is available in different version, for fixed and for variable pumps with load sensing. The version for fixed pump can be easily converted to work with variable pumps and vice versa.

| BLS | 6 | - | | | / | 11 | V |

Compensated direct operated directional valve with proportional control

Nominal size

C0 = without compensator (**NOTE**)
CF = for fixed pump
CV = for variable pump

Pressure adjustment range:
0 = no relief valve
5 = from 12 to 210 bar
6 = from 15 to 315 bar

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

Seals:
V = FPM seals (**standard**)

NOTE: The version C0 is available only without the pressure relief valve, code BLS6-C00/10V.

1.4 - End plate modules

| BLS | 6 | - | | / | 11 |

Compensated direct operated directional valve with proportional control

Nominal size

C91 = without load sensing port
C92 = with load sensing port

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

2 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4 or fluids HFDR type. For the use of other kinds of fluid 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 (values obtained with viscosity 36 cSt at 50 °C)

Typical constant flow rate obtained with internal 2-way compensator, and current with 12V solenoid type (for D24 version the maximum current is 860 mA), measured for the various spool types available.

PROPORTIONAL MODULES PRESSURE DROPS ∆p-Q

SYMMETRICAL FLOWS - PC AND PA SPOOLS

ASYMMETRICAL FLOWS - PC AND PA SPOOLS

FLOWRATE - PRESSURE Q= f(p)

CV-CF INLET MODULE PRESSURE DROPS ∆p= f(Q)
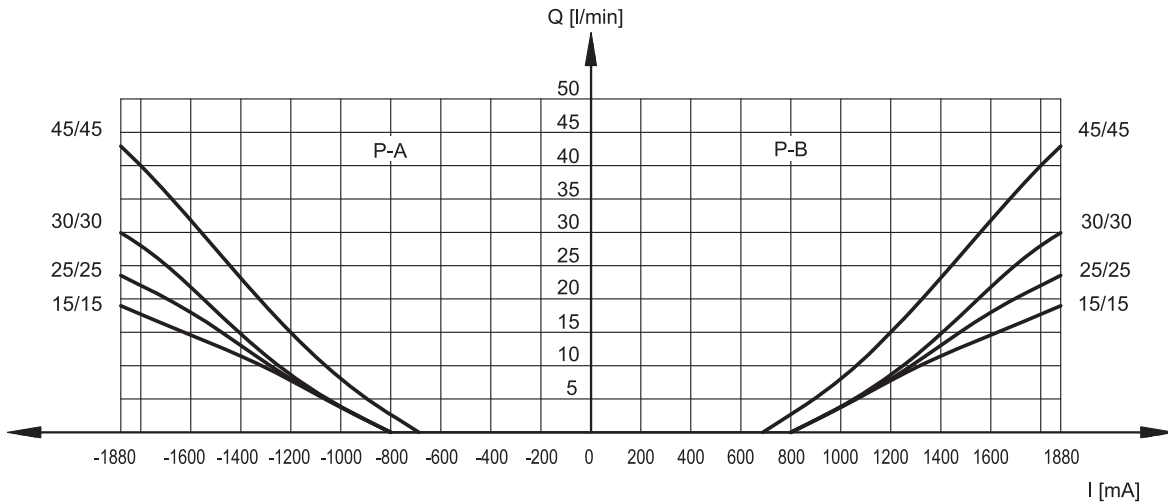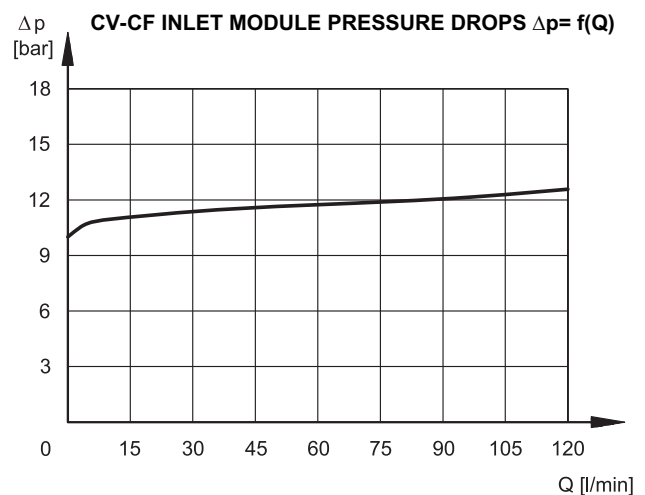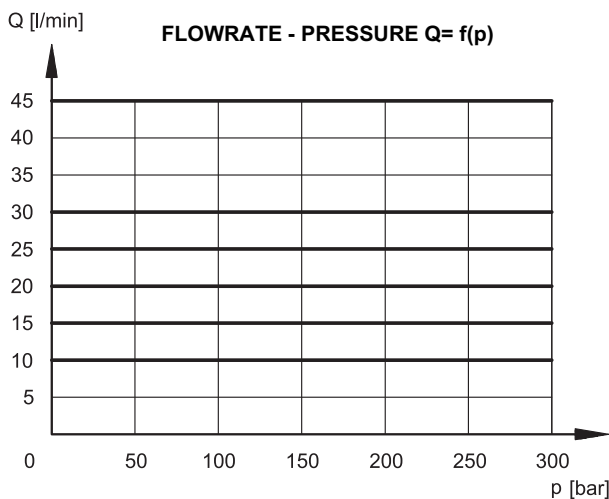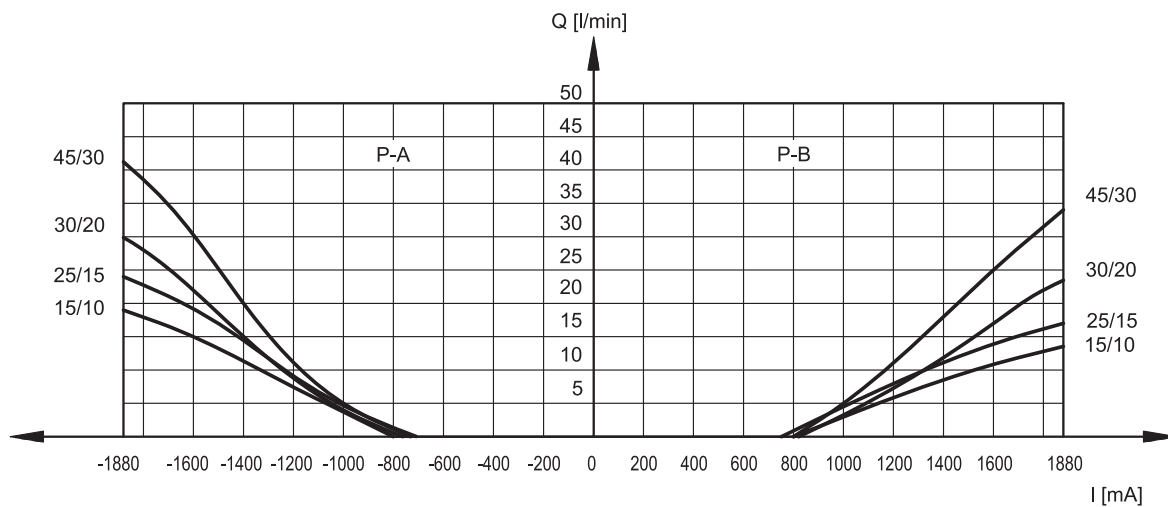
4 - ELECTRICAL CHARACTERISTICS

Proportional solenoid

The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to maintain friction to a minimum thereby reducing hysteresis.

The coil is mounted on the tube secured by means of a lock nut.
It can be rotated through 360° depending on installation clearances.

| NOMINAL VOLTAGE	V DC	12	24
RESISTANCE (at 20°C)	Ω	3,66	17,6
MAXIMUM CURRENT	A	1,88	0,86
DUTY CYCLE	100%		
ELECTROMAGNETIC COMPATIBILITY (EMC)	according to 2004/108/CE		
PROTECTION AGAINST ATMOSPHERIC AGENTS (CEI EN 60529 standards)	IP 65		

5 - STEP RESPONSE
(measured with mineral oil with viscosity of 36 cSt at 50°C with the relative electronic control units)

Step response is the time (delay) taken for the valve to reach 90% of the set position value following a step change of the reference signal.

Reference signal step	0 →100%	100 →0%
Step response [ms]		
BLS6	50	40

6 - ELECTRIC CONNECTIONS

connection for DIN 43650 connector code **K1**
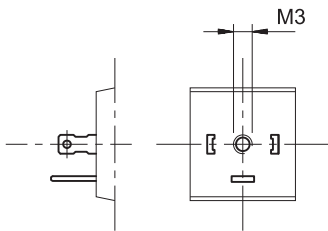
connection for DEUTSCH DT04-2P connector type code **K7**
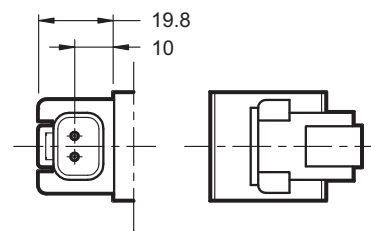
7 - ELECTRIC CONNECTORS
The solenoid valves are supplied without connectors. For coils with standard electrical connections K1 type (DIN 43650) the connectors can be ordered separately. For the identification of the connector type to be ordered please see cat. 49 000. Connectors for K7 connections are not available.

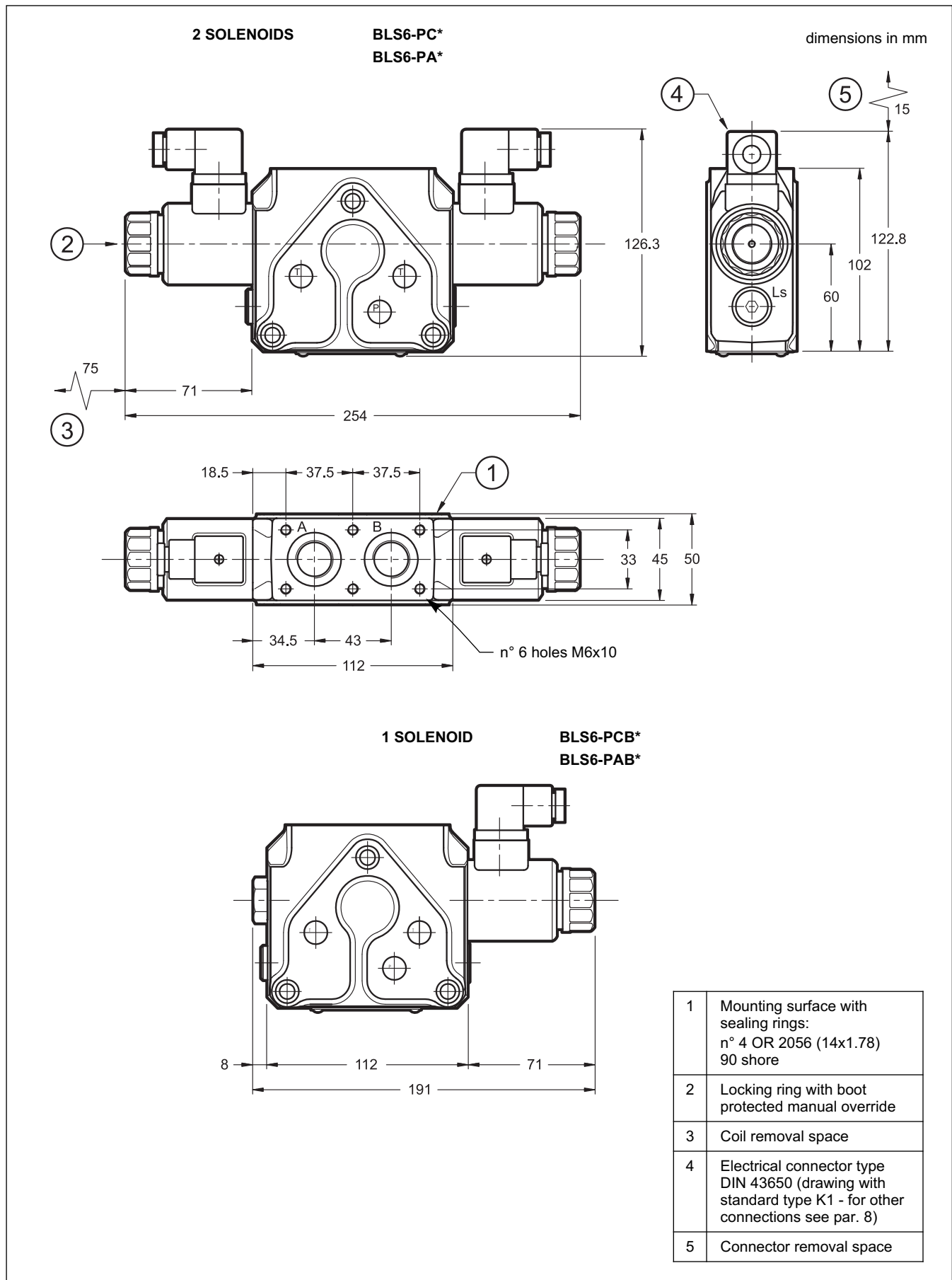## 8 - OVERALL AND MOUNTING DIMENSIONS
8.1 - Proportional module

2 SOLENOIDS   **BLS6-PC***
BLS6-PA*

dimensions in mm

1 SOLENOID   **BLS6-PCB***
BLS6-PAB*

1	Mounting surface with sealing rings: n° 4 OR 2056 (14x1.78) 90 shore
2	Locking ring with boot protected manual override
3	Coil removal space
4	Electrical connector type DIN 43650 (drawing with standard type K1 - for other connections see par. 8)
5	Connector removal space

8.2 - Inlet modules

dimensions in mm

BLS6-C00

1	Mounting surface with sealing rings: n° 4 OR 2056 (14x1.78) 90 shore
2	Load Sensing port: 1/4"BSP with orifice
3	P1, P2 and T1 ports: 3/4" BSP
4	Pressure gauge port: 1/4" BSP

8.2 - Inlet modules

BLS6-CF*
BLS6-CV*

dimensions in mm

orifice "C" underneath

N° 2 M8x13
for fixing

20

15   80

orifice seat "E"
underneath

70

50

115

92

63

28

M

T2

P2

4

5

3

170.5

125

6

Type

Ls

33

26

2

50

58

6

4

95

(63)

17

orifice seat "B"
underneath, on the spool

3   1   35

T1

20

50

P1

67

BLS6-CF0

"D"

T1

Ls

"C" "A"

"B"

"E"

P1

M P2 T2

1	Mounting surface with sealing rings: n° 4 OR 2056 (14x1.78) 90 shore
2	Load Sensing port: 1/4" BSP
3	P1, P2 and T1 ports: 3/4" BSP
4	Pressure gauge port: 1/4" BSP
5	T2 port: 1/2" BSP
6	Special plug for the pressure relief valve seat. (D). Orifice seat "A" underneath.

BLS6-CF5 -CF6

BLS6-CV5 -CV6

8.3 - End modules

dimensions in mm

n° 2 holes fox fixing M8x13

20

BLS6-C91

T Ls T

BLS6-C92

T Ls T

38

12.5

25

15   80   15

110

115

55

12.5

1	Mounting surface with no sealing rings
2	T1 outlet: 3/8" BSP
3	Identification label
4	Load Sensing port: 1/4" BSP
5	Identification label

9 - IDENTIFICATION CODE OF ASSEMBLED VALVE

| BLS6 | - | | - | | - | | - | | /11V | - | | | / | |

Compensated direct operated directional valve with proportional control

Inlet module:
C0 = without compensator (**NOTE**)
CF = for fixed pump
CV = for variable pump

Pressure adjustment range:
0 = no relief valve
5 = from 12 to 210 bar
6 = from 15 to 315 bar

Proportional module:
Choose open or closed center, and then the spool type, like code in par. 1.1
Repeat for each proportional module required, max 8 modules.

End plate:
C91 = without load sensing port
C92 = with load sensing port

Manual override on all proportional modules (see par. 11)

Coil electrical connection: (see paragraph 9)
K1 = plug for connector type DIN 43650 (standard)
K7 = plug for connector type DEUTSCH DT04-2P male

Coil type:
D12 = Nominal solenoid voltage 12V DC
D24 = Nominal solenoid voltage 24V DC

Seals:
V = FPM seals (**standard**)

Series no.: (the overall and mounting dimensions remain unchanged from 10 to 19)

NOTE: The version C0 is available only without the pressure relief valve, wiith code BLS6-C00/10V.

Coding example:
BLS6-C00-PC30/30-PC30/30-C92/11V-D24K1: assembled valve includes: inlet module without 3 way compensator; 2 prop. modules with closed center flow 30/30; end plate without load sensing port; FPM seals, 24V DC coils and K1 connection.

BLS6-CF5-PA45/30-PA45/30-PC30/30-PAB15/15-C91/11V-D12K1: assembled valve includes: inlet module for fixed pump, with pressure max 210 bar; 2 prop. modules with open center flow 45/30, 1 prop. module with close center, flow 30/30 and 1 prop. module with open center and solenoid only on side B, flow 15/15; end plate with load sensing port; FPM seals, 12V DC coils and K1 connection.

NOTE: To obtain the best performances, we suggest to mount the spool with the max flow first, and then the others decreasing.

10 - INSTALLATION AND OVERALL DIMENSIONS OF THE ASSEMBLED VALVE

dimensions in mm
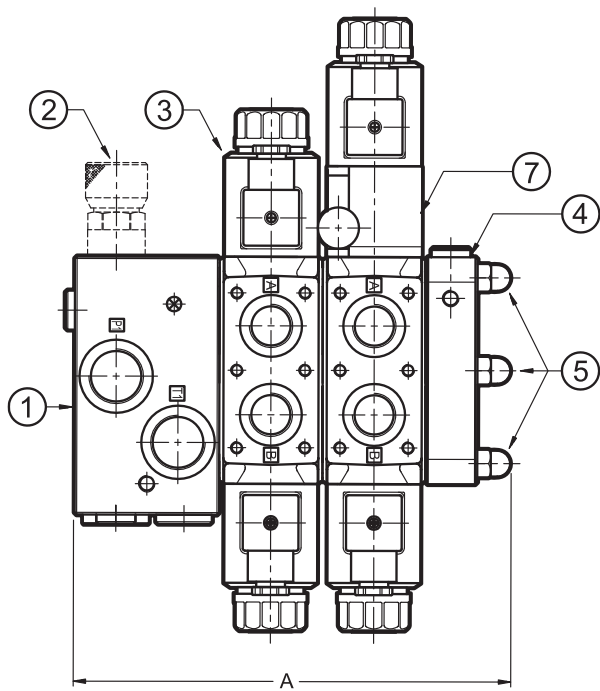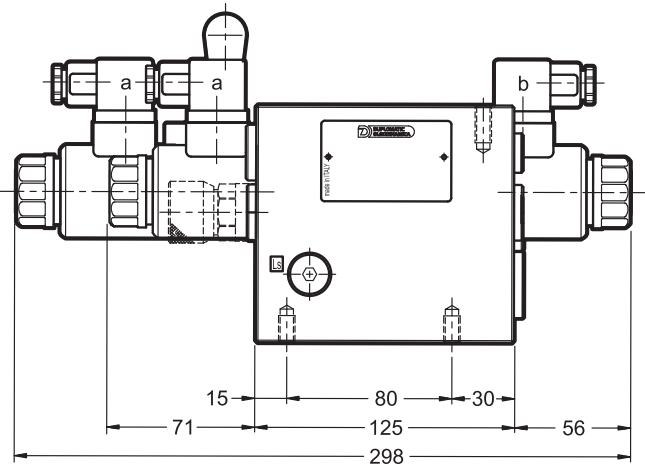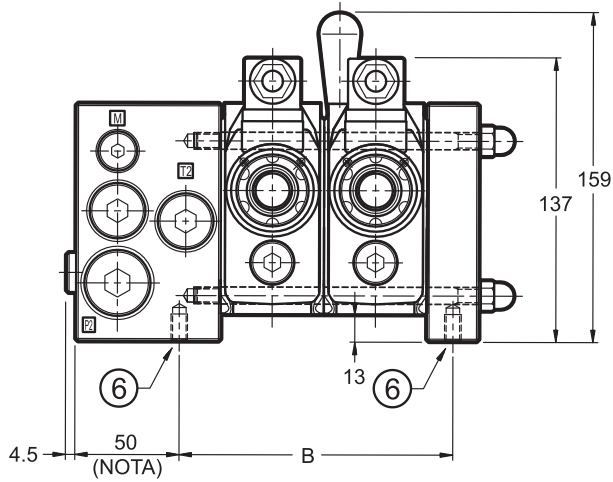
modules	A (**NOTE**)	B
2	212	132,5
3	262	182,5
4	312	232,5
5	362	282,5
6	412	332,5
7	462	382,5
8	512	432,5

NOTE: with the inlet module BLS6-C00 the dimension results 10 mm shorter.

1	Inlet module
2	Pressure relief valve
3	Proportional modules
4	End plate
5	Fixing studs
6	Fixing holes
7	Module with lever manual override

Fixing kit

The fixing kit includes n° 3 studs, 3 self locking nuts and 3 washers. To order it please use the following codes:

no. of body modules	code
2	3404150010
3	3404150011
4	3404150012
5	3404150013
6	3404150014
7	3404150015
8	3404150016

11 - MANUAL OVERRIDE

The standard valve has solenoids whose pin for the manual operation is integrated in the tube. The operation of this control must be executed with a suitable tool, minding not to damage the sliding surface.

Three different manual override version are available upon request:

- **CM** version, manual override belt protected.

- **CS** version, with metal ring nut provided with a M4 screw and a blocking locknut to allow the continuous mechanical operations.

- **CH**: lever manual override.

Version CM	**Version CS**
95	95
Code: 3803210003	Code: 3803210004

Version CH

115

148

27.5

53

BLS6
SERIES 11
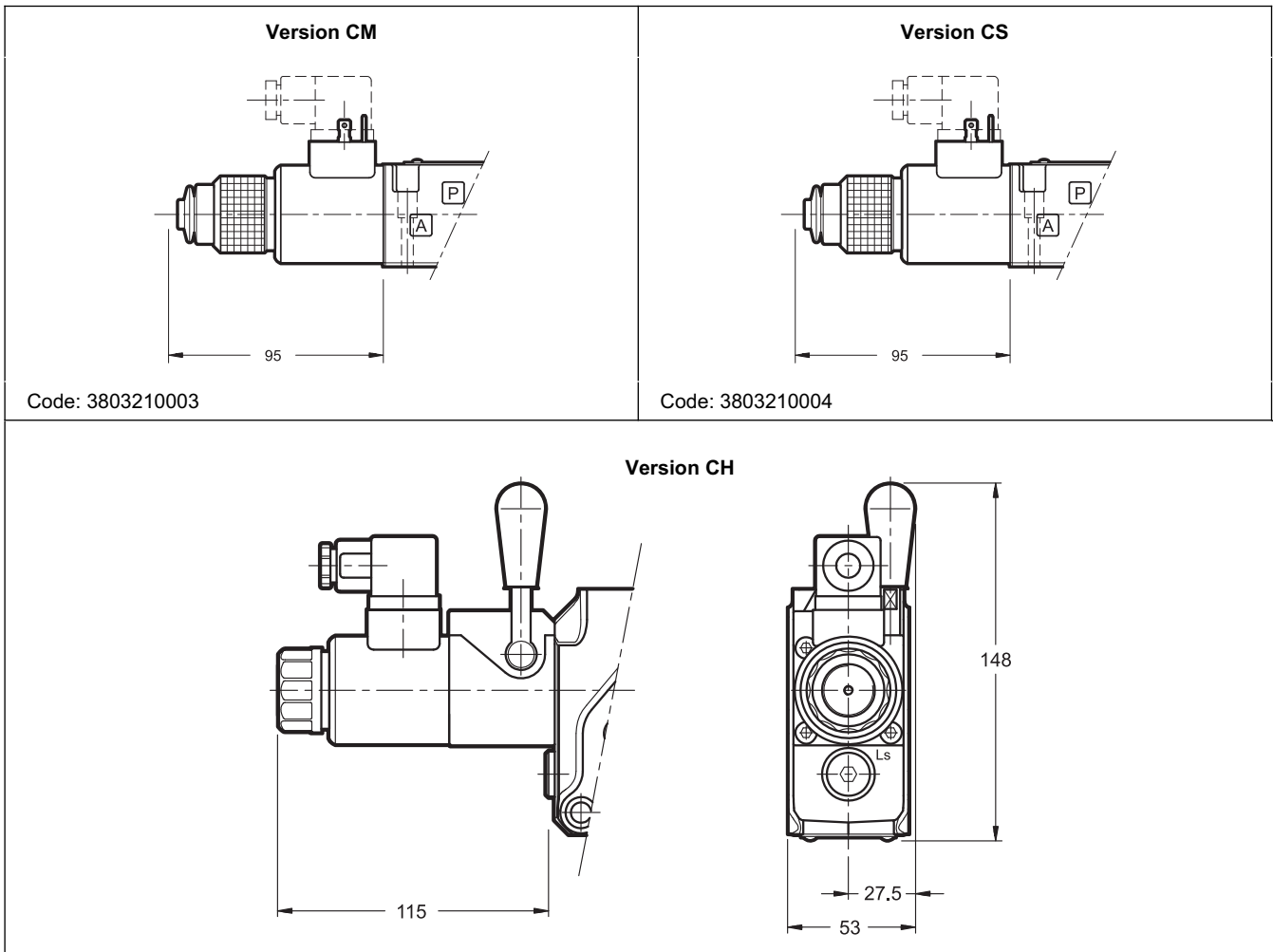
12 - ELECTRONIC CONTROL UNITS

Two solenoids

EDC-112	for solenoid 24V DC	plug version	see cat.89 120
EDM-M112	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 250
EDM-M142	for solenoid 12V DC		

One solenoid

EDM-M212	24V DC solenoids	rail mounting DIN EN 50022	see cat. 89 250
EDM-M242	12V DC solenoids		

These cards drive only a module at once.

Every module to be driven with electronic card must have its one.

13 - APPLICABLE SCHEMES

BLS6 valve for fixed diplacement pumps with pressure relief valve

BLS6 valve for systems with Ls pump. The system is equipped with a pilot-operated relief valve, protecting the pump.

44 150/110 ED

13/14

Example of two BLS6 valves linked with parallel connection for the pump and serial connection for LS port.