

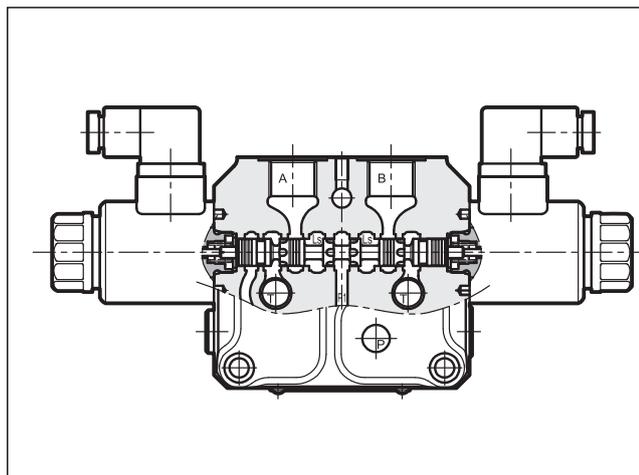
BLS6

BANKABLE LOAD SENSING PROPORTIONAL CONTROL VALVE

SERIES 12

p max 300 bar
Q max 120 l/min

OPERATING PRINCIPLE



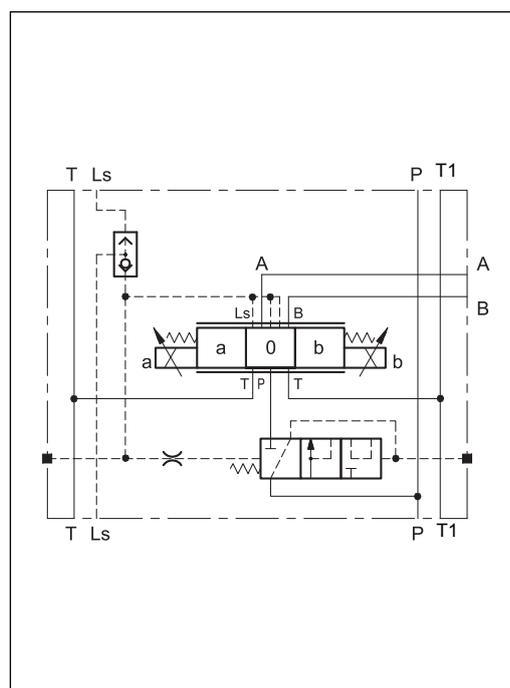
- The BLS6 directional control valve is stackable and can be assembled up to 8 different proportional and on/off modules .
- Each module is equipped with a meter-in compensator that keep constant the flow, independently from load changes.
- Sections with pressure compensators are not influenced in any 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.
- Working ports A and B are threaded 1/2" BSP. On the inlet module the ports P1, P2 and T1 are threaded 3/4" BSP.
- The manual lever override is available as option.

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
Electrical characteristics	see paragraph 4	
Ambient temperature range	°C	-20 / +60
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
Surface treatment of body and plates	galvanic, zinc-nickel	

HYDRAULIC SYMBOL



1 - IDENTIFICATION CODES FOR LOOSE MODULES

Here below are shown the identification codes of all the loose components of the bankable valve. To order a whole assembled valve, please use the codes at paragraphs 9 and 10.

The inlet section is available in different versions for fixed pumps and for systems with Load Sensing pump.

1.1 - Proportional module

BLS 6 - / 12 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) _____

Manual override (see par. 11)

Coil electrical connection: (see paragraph)
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)

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
05/05	4
09/09	8
15/15	4
25/25	8
30/30	4
45/45	8

ASYMMETRICAL	
max flow	Δp
09/06	8
15/10	4
25/15	8
30/20	4
45/30	8

SINGLE FLOW	
max flow	Δp
30	4
45	8

44 150/116 ED

2/14

1.2 - On-off modules

Proportional and on-off modules can be used together. In this case, the description for the spool type in the identification code has to be as follow:

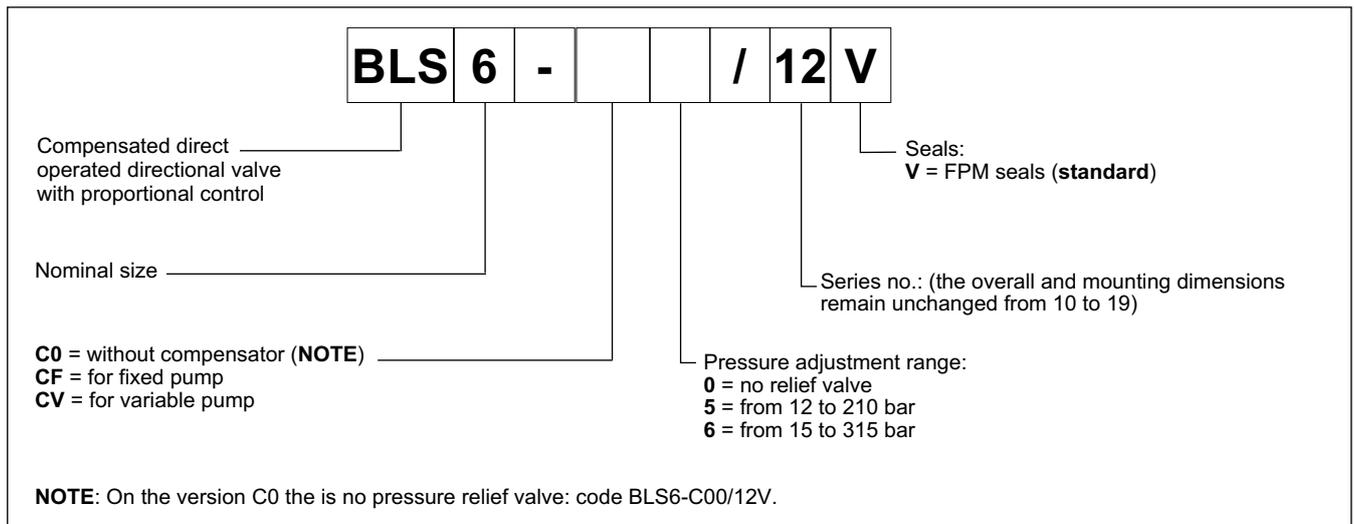
SC = closed center with on-off solenoid

SA = open center with on-off solenoid

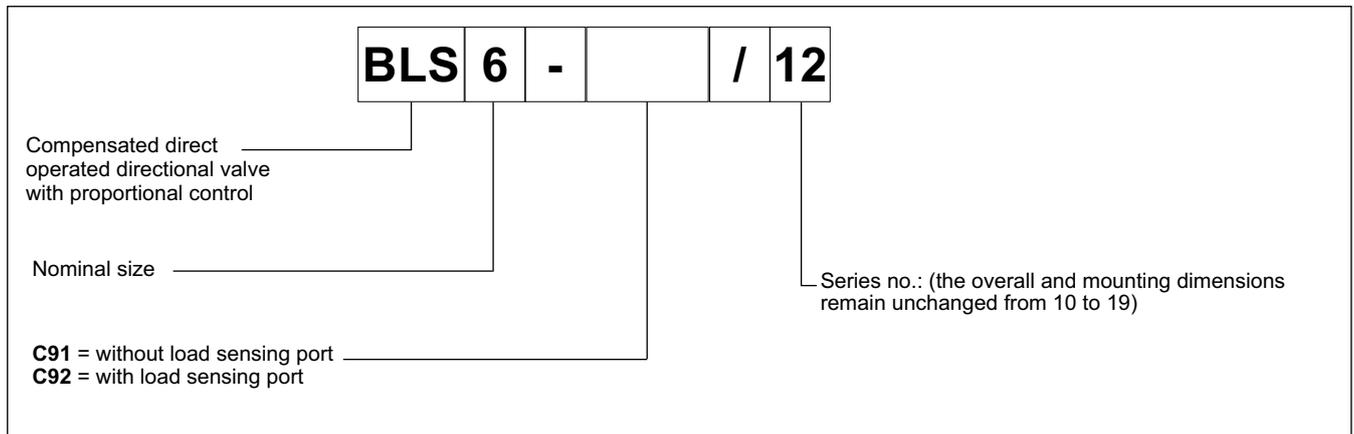
Two spools for high flow rates are available: SC60/60 and SA60/60.

1.3 - Inlet plates

The inlet section is available in different versions, 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.



1.4 - End plates



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.

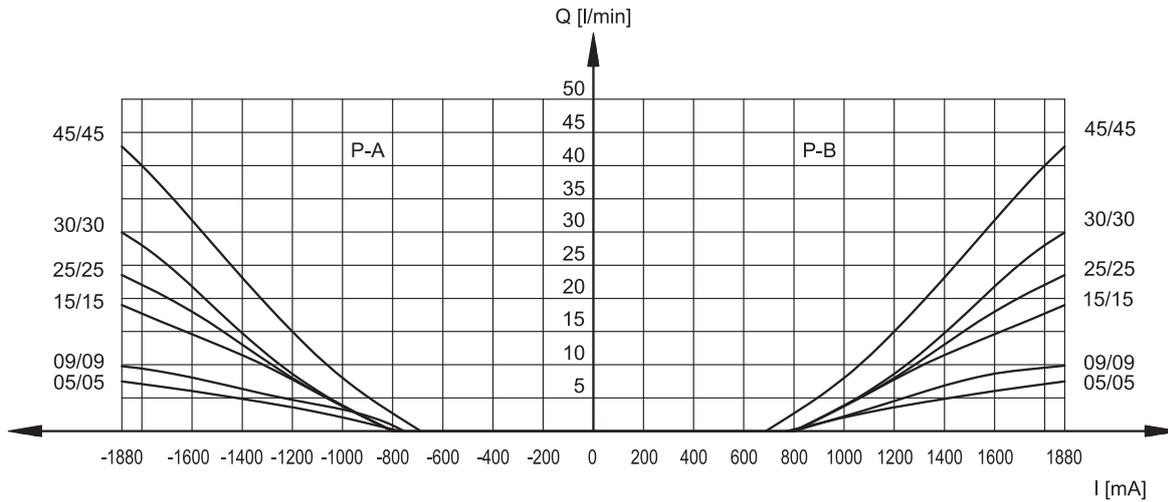


3 - CHARACTERISTIC CURVES

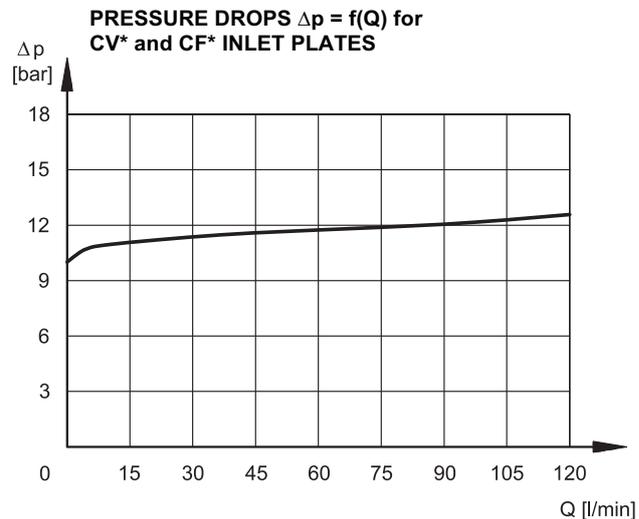
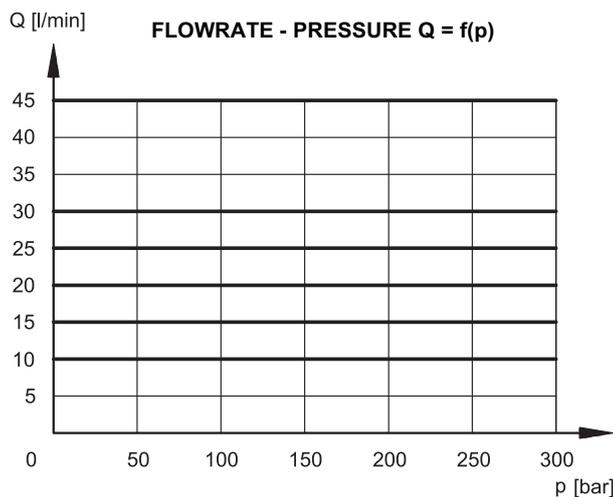
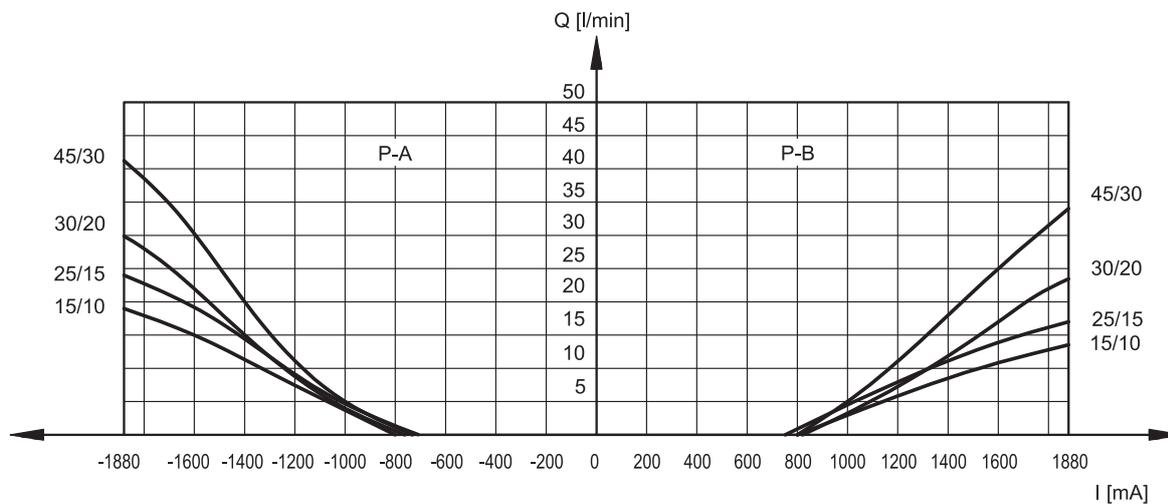
(values obtained with viscosity 36 cSt at 50 °C)

Typical constant flow rate obtained through the embedded 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 Δp -Q SYMMETRICAL FLOWS - PC AND PA SPOOLS



ASYMMETRICAL FLOWS - PC and PA SPOOLS



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)	K1 coil K7 coil	Ω	3.66 4 17.6 19
NOMINAL CURRENT	A	1.88	0.86
DUTY CYCLE		100%	
PWM FREQUENCY	Hz	200	100
ELECTROMAGNETIC COMPATIBILITY (EMC)		According to 2004/108/EC	
CLASS OF PROTECTION : Coil insulation (VDE 0580) Impregnation:		class H class F	

Protection from atmospheric agents IEC EN 60529

Plug-in type	IP 65	IP 69 K
K1 DIN 43650	x (*)	
K7 DEUTSCH DT04 male	x	x (*)

(*) The protection degree is guaranteed only with the connector correctly connected and installed

5 - STEP RESPONSE

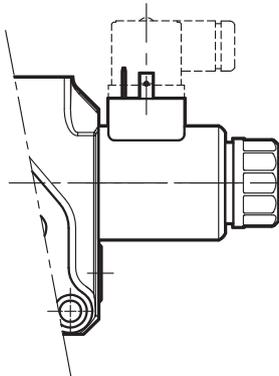
(measured with mineral oil with viscosity of 36 cSt at 50°C with electronic control units)

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.

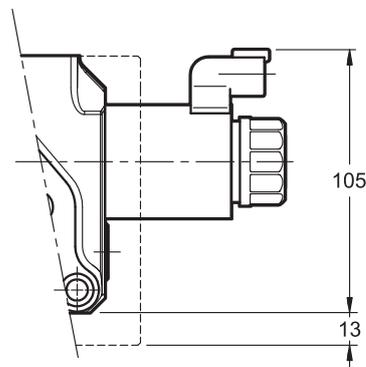
Reference signal step	0 →100%	100 →0%
STEP RESPONSE [ms]		
BLS6	50	40

6 - ELECTRIC CONNECTIONS

connection for DIN 43650 connector code **K1 (standard)**



connection for DEUTSCH DT04-2P connector type code **K7**

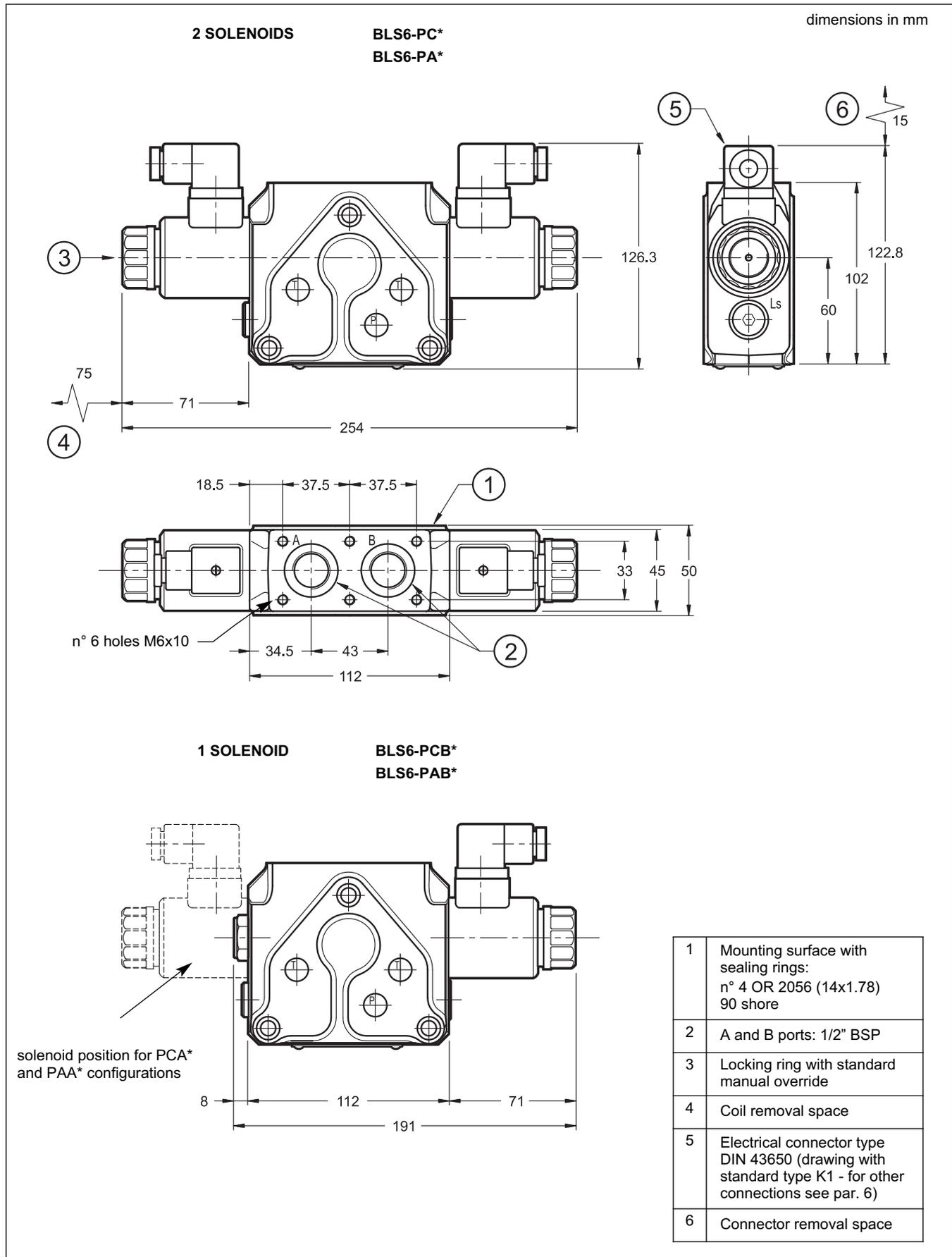


7 - ELECTRIC CONNECTORS

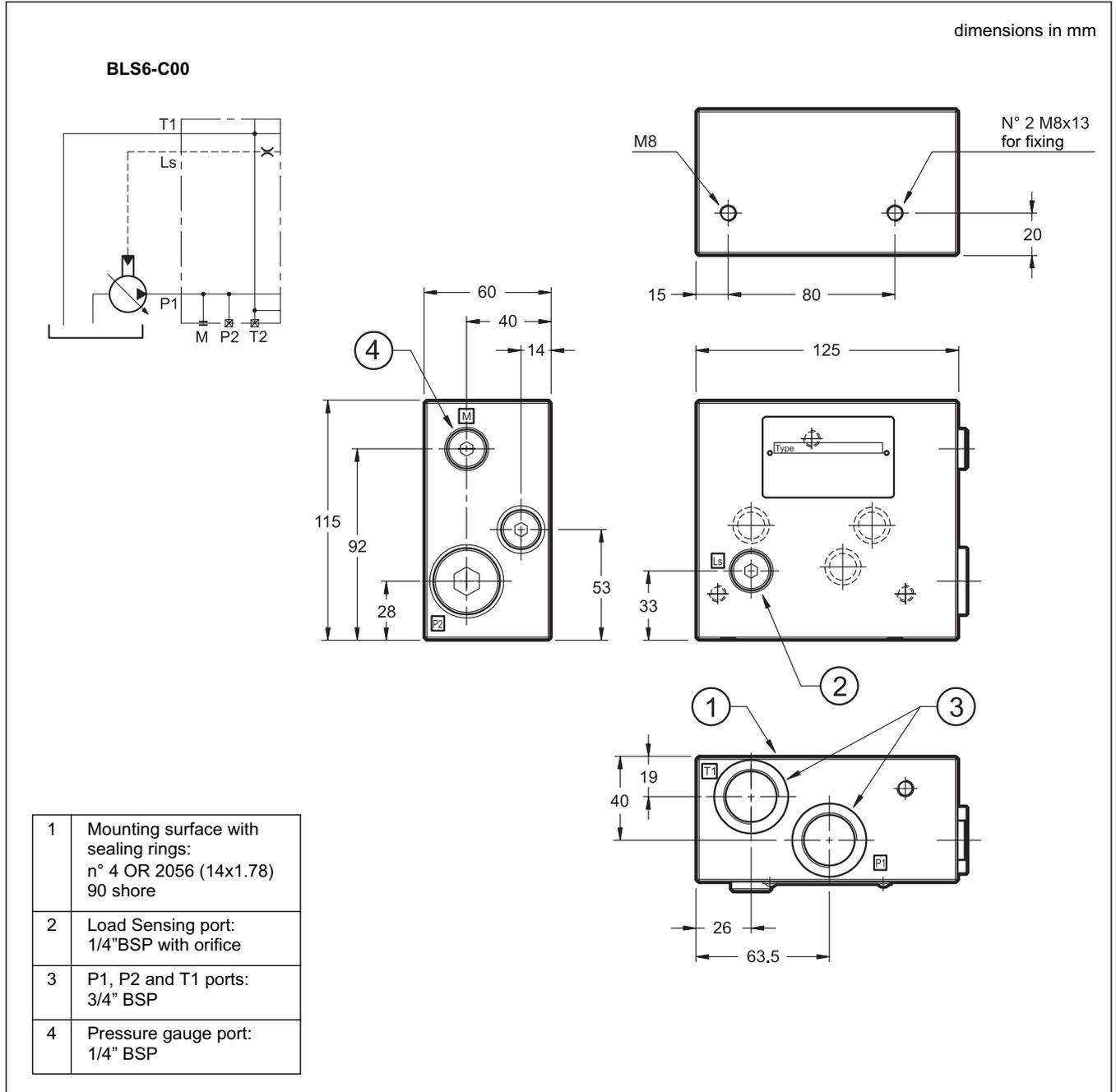
The on-off modules are supplied without connectors. For on-off coils with standard electrical connection K1 type (DIN 43650) the connectors can be ordered separately: see catalogue 49 000.

8 - OVERALL AND MOUNTING DIMENSIONS

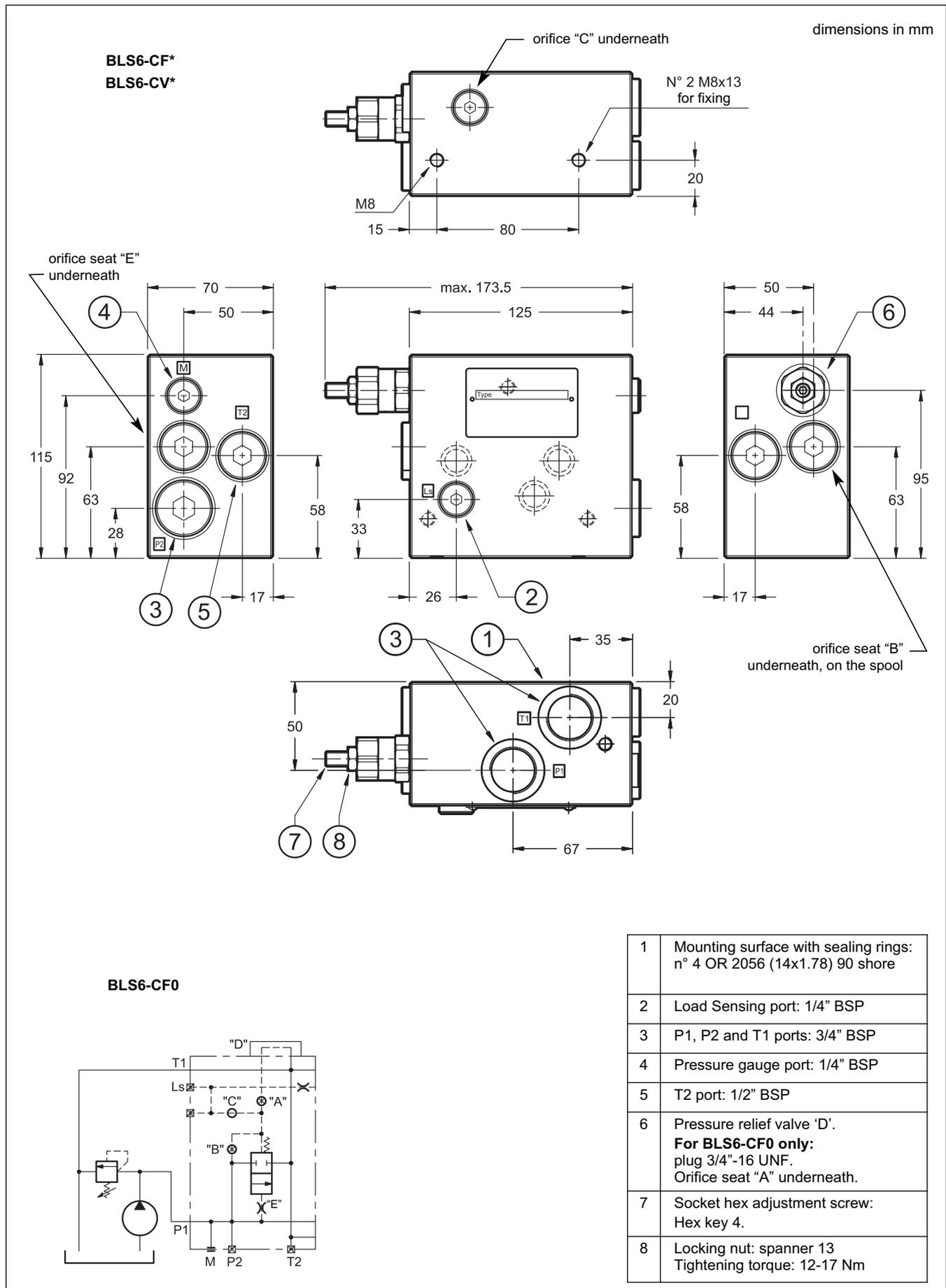
8.1 - Proportional module

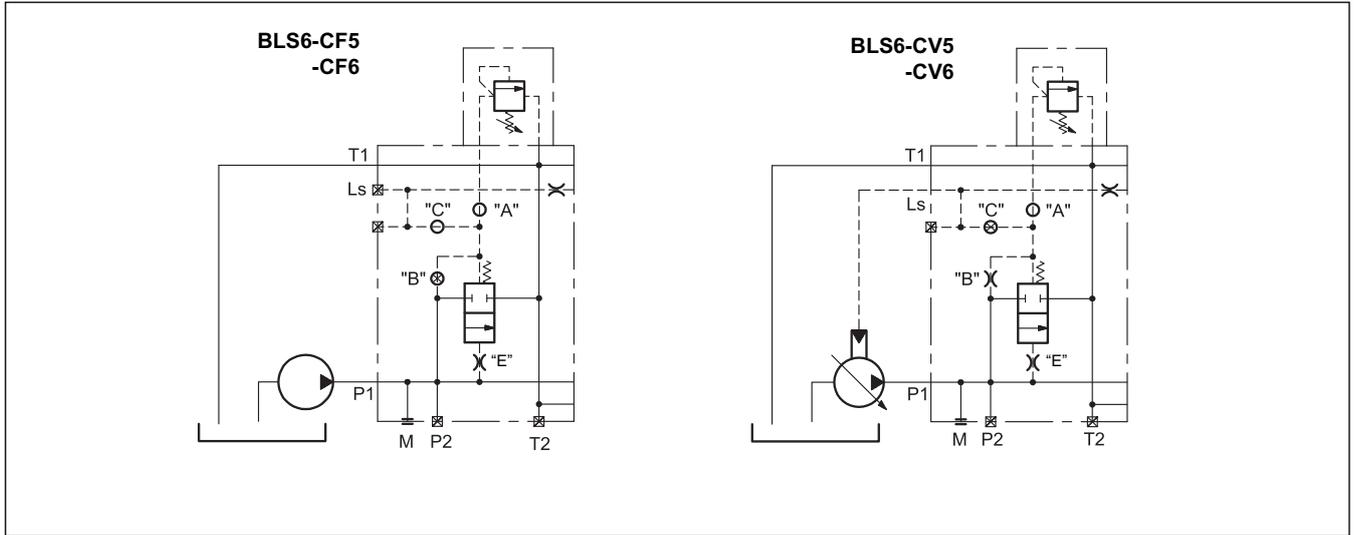


8.2 - Inlet plates

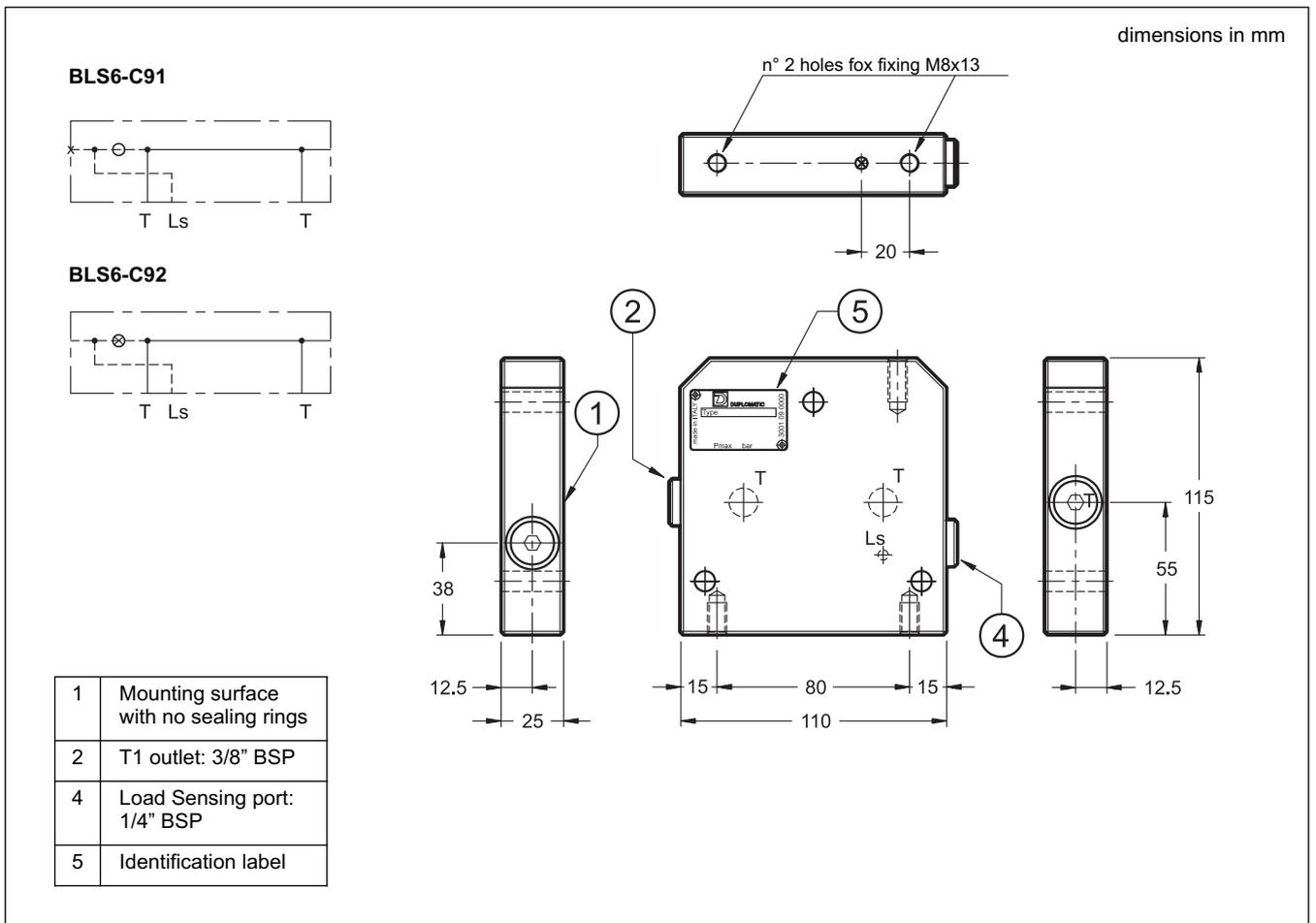


8.2 - Inlet plates





8.3 - End plates



9 - IDENTIFICATION CODE OF ASSEMBLED VALVE

BLS6	-		-		-		-		/	12	V	-		/	
-------------	---	--	---	--	---	--	---	--	---	----	---	---	--	---	--

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 6)
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, with code BLS6-C00/12V.

Coding example:

BLS6-C00-PC30/30-PC30/30-C92/12V-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-C91/12V-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 plate BLS6-C00 the dimension is 10 mm shorter.

Fixing kit
 The fixing kit includes,
 all zinc-coated
 3 studs,
 3 self locking nuts
 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

Tightening torque: 25 Nm

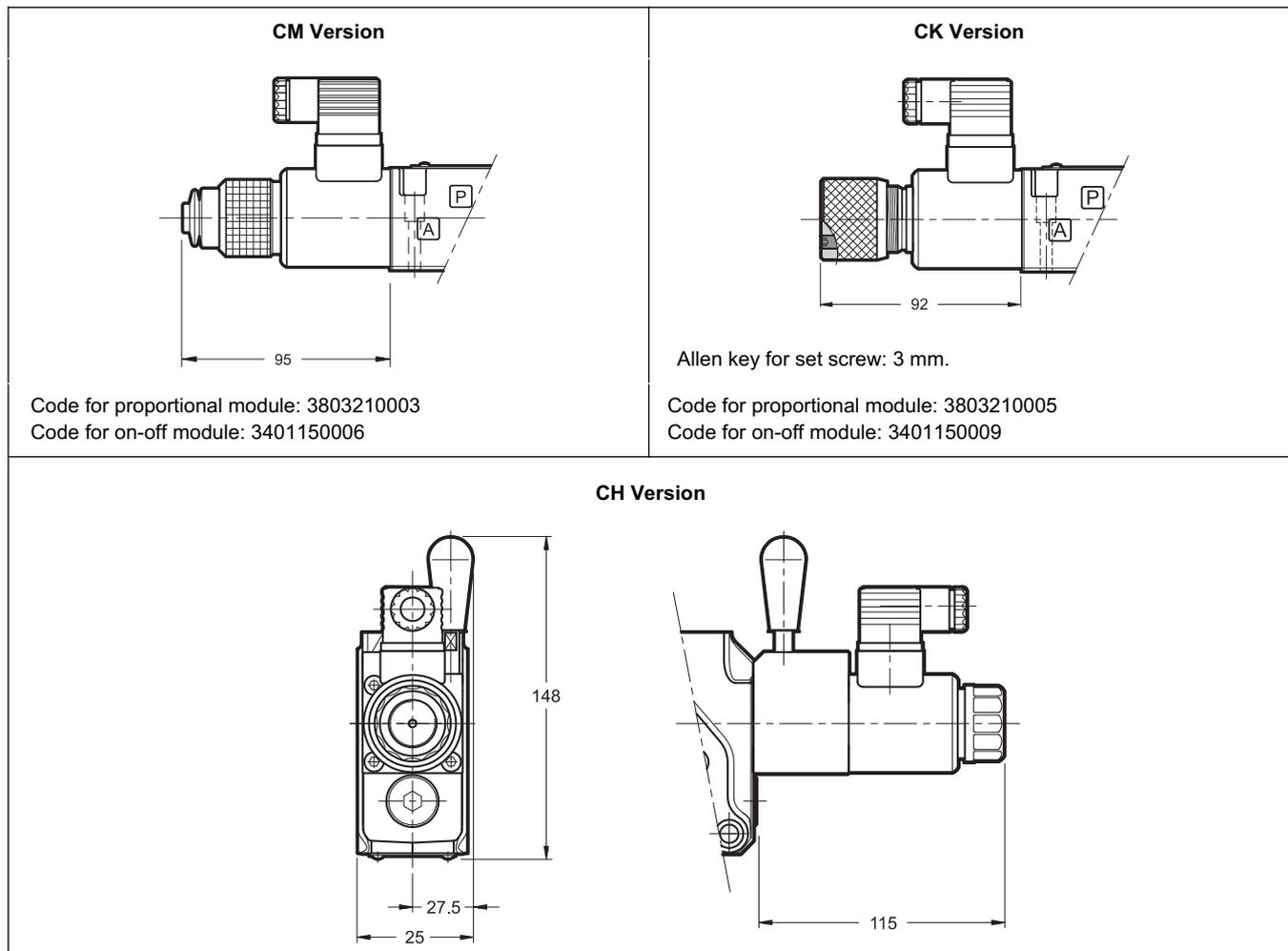
1	Inlet module
2	Pressure relief valve
3	Proportional modules
4	End plate
5	Fixing studs
6	Fixing holes
7	Manual lever override module

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 overrides are available upon request:

- **CM** manual override, boot protected.
- **CH** lever manual override.
- **CK** knob. When the set screw is screwed and its point is aligned with the edge of the knob, tighten the knob till it touches the spool: in this position the override is not engaged and the valve is de-energized. After adjusting the override, tighten the set screw in order to avoid the knob loosening.



NOTE: The overall dimension shown in the drawings is for the proportional modules; In ON-OFF modules consider an increase of 5 mm compared to the reported dimensions.

12 - ELECTRONIC CONTROL UNITS

One solenoid

EDC-111	for solenoid 24V DC	plug version	see cat. 89 120
EDC-141	for solenoid 12V DC		
EDM-M111	for solenoid 24V DC	DIN EN 50022 rail mounting	see cat. 89 250
EDM-M141	for solenoid 12V DC		

These cards drive only a module at once.
Every module to be driven with electronic card must have its one.

Two solenoids

EDM-M211	for solenoid 24V DC	rail mounting DIN EN 50022	see cat. 89 250
EDM-M241	for solenoid 12V DC		

13 - EXAMPLES OF APPLICATION

