



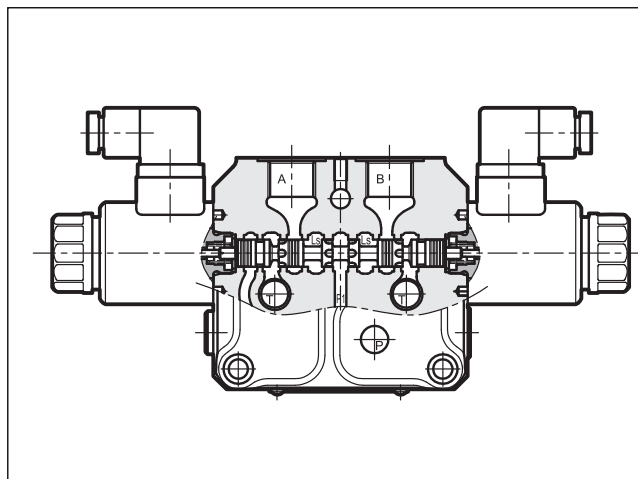
# BLS6

## BANKABLE LOAD SENSING PROPORTIONAL CONTROL VALVE

### SERIES 11

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

#### OPERATING PRINCIPLE

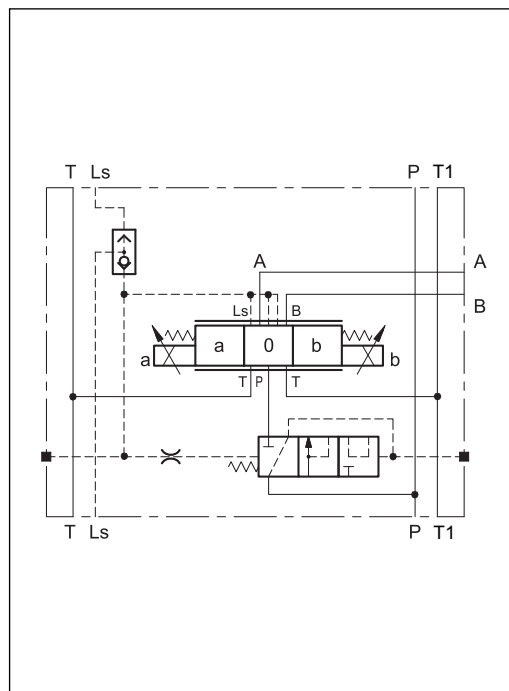


- The BLS6 directional control valve is stackable and can be assembled up to 8 different modules.
- Each module is equipped with a meter-in compensator that keep constant the flow, independently from load changes.
- Sections with pressure compensators are not influenced in any way by other operated functions, 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.
- 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.
- The manual lever override is available as option.

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

|                                                                                  |                                              |                  |
|----------------------------------------------------------------------------------|----------------------------------------------|------------------|
| Maximum operating pressure:<br>- A and B ports<br>- P1 and P2 ports<br>- T1 port | bar                                          | 300<br>250<br>20 |
| Maximum flowrate:<br>- A and B ports<br>- P1 and P2 ports<br>- T1 port           | l/min                                        | 45<br>100<br>120 |
| Pressure drops $\Delta p$ - 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<br>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 paragraphs 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) \_\_\_\_\_

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

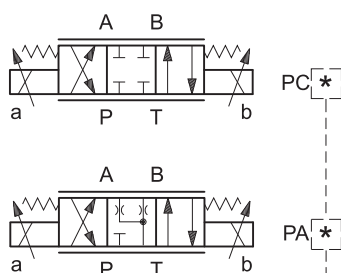
Seals:  
**V** = FPM seals (**standard**)

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

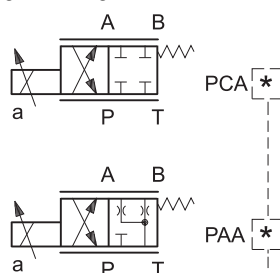
#### SPOOLS

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

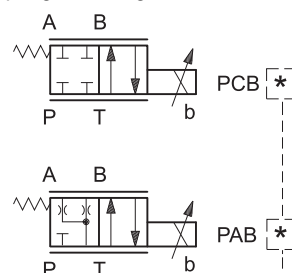
2 solenoids configuration:  
 3 positions with spring centering



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

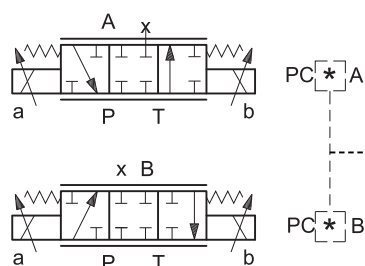


1 solenoid on side B.  
 2 positions (central + external) with spring centering



| SYMMETRICAL  |            |
|--------------|------------|
| max flow     | $\Delta p$ |
| <b>15/15</b> | 4          |
| <b>25/25</b> | 8          |
| <b>30/30</b> | 4          |
| <b>45/45</b> | 8          |

| ASYMMETRICAL |            |
|--------------|------------|
| max flow     | $\Delta p$ |
| <b>15/10</b> | 4          |
| <b>25/15</b> | 8          |
| <b>30/20</b> | 4          |
| <b>45/30</b> | 8          |



| SINGLE FLOW |            |
|-------------|------------|
| max flow    | $\Delta p$ |
| <b>30</b>   | 4          |
| <b>45</b>   | 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:

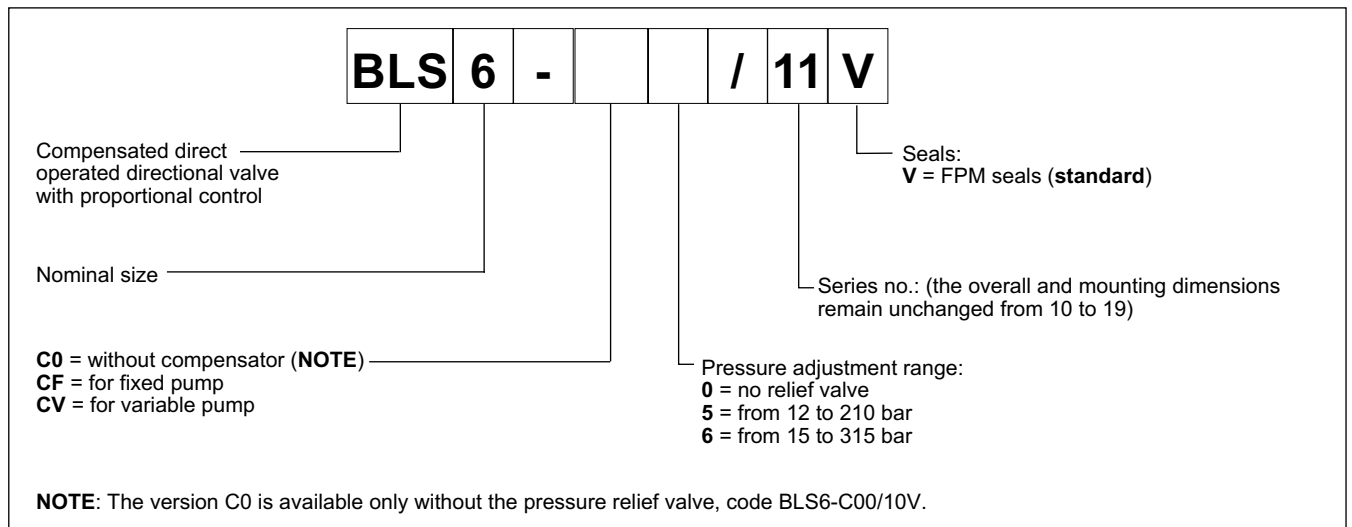
**SC** = closed center with on-off solenoid

**SA** = open center with on-off solenoid

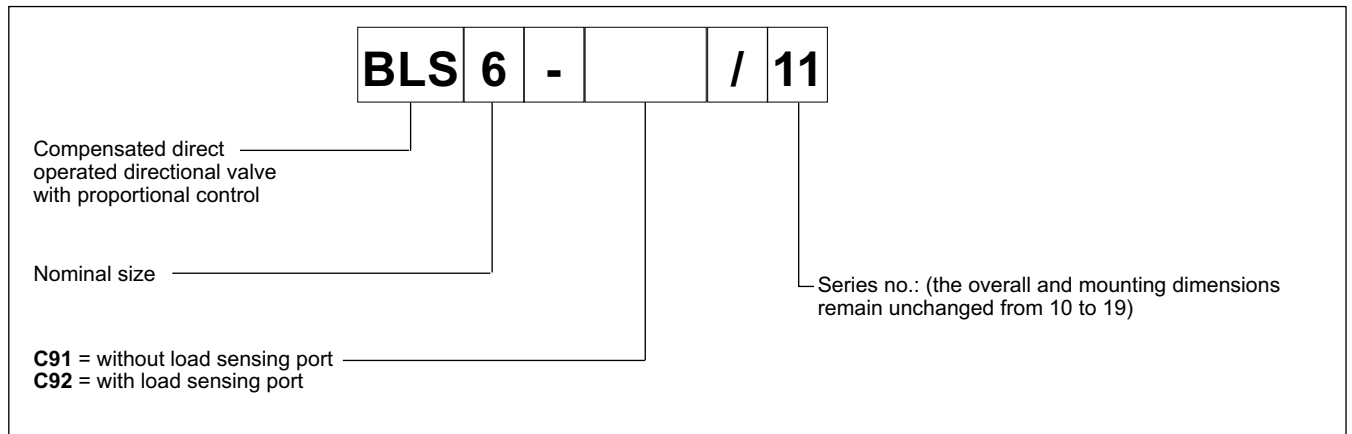
In this version is also available a spool for high flow named SC60/60 and SA60/60.

### 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.



### 1.4 - End plate modules



## 2 - HYDRAULIC FLUIDS

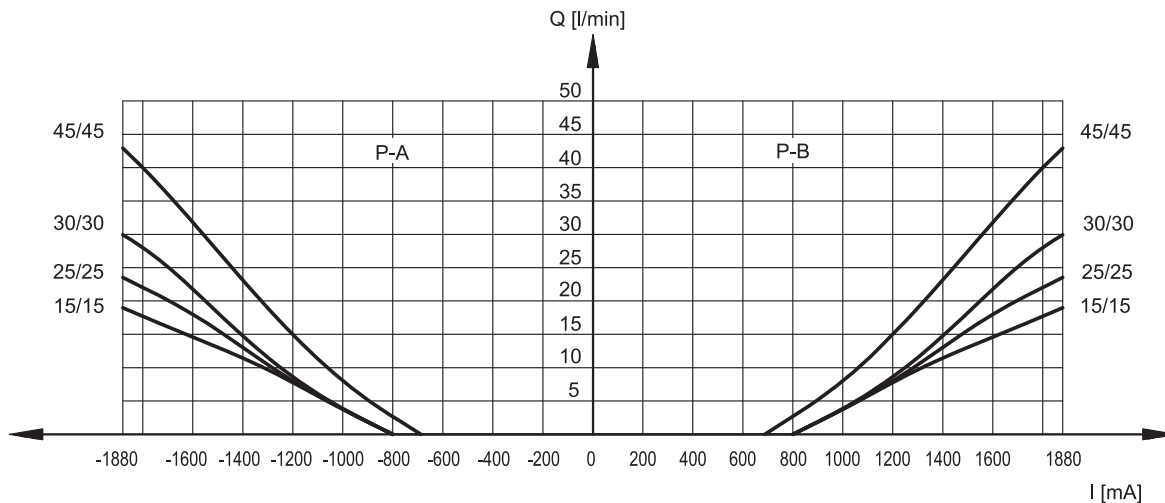
Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4 or fluids HFDR type. For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department. Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics.

The fluid must be preserved in its physical and chemical characteristics.

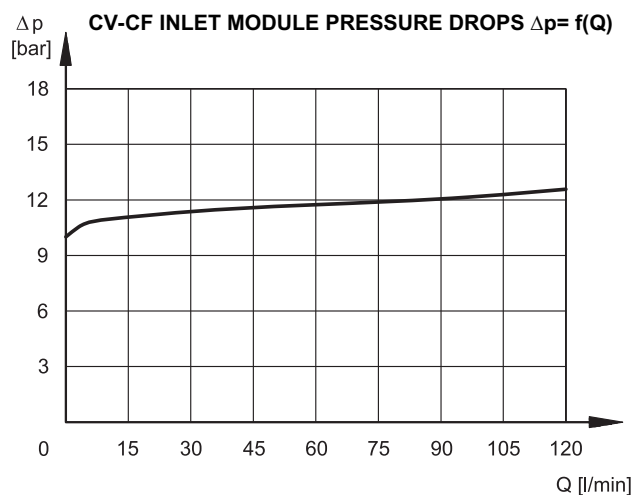
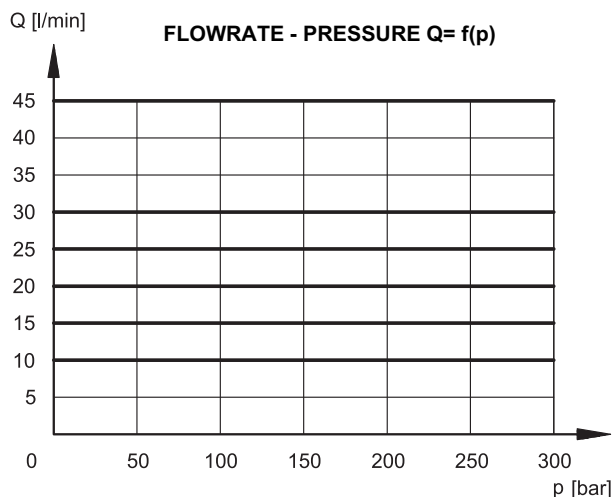
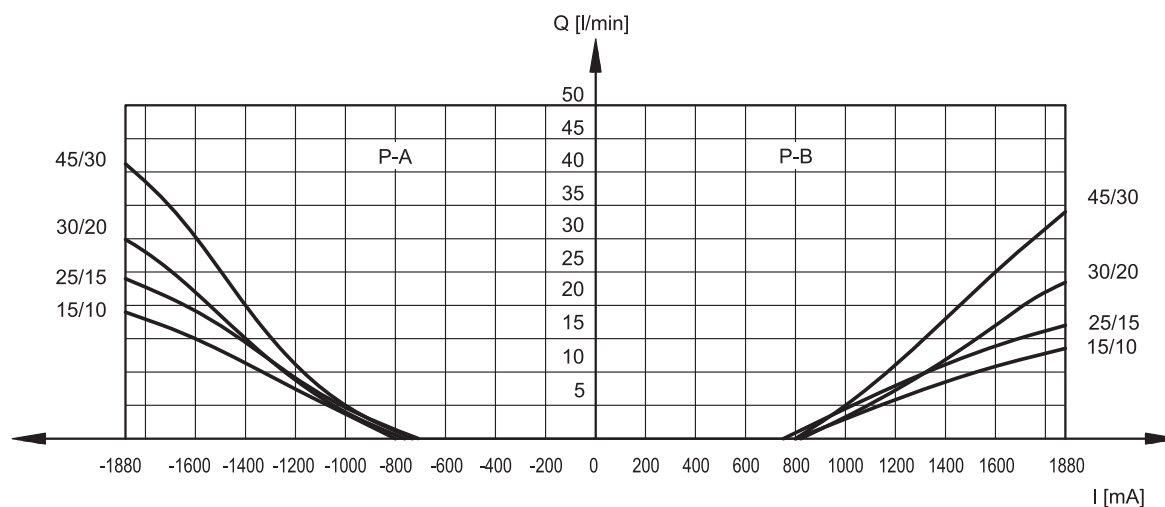
### 3 - CHARACTERISTIC CURVES (values obtained with viscosity 36 cSt at 50 °C)

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 $\Delta p$ -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.

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

### 5 - STEP RESPONSE

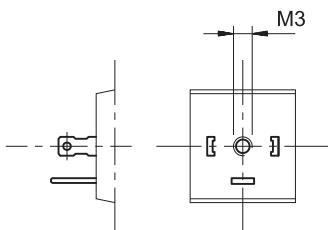
(measured with mineral oil with viscosity of 36 cSt at 50°C with the relative electronic control units)

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.

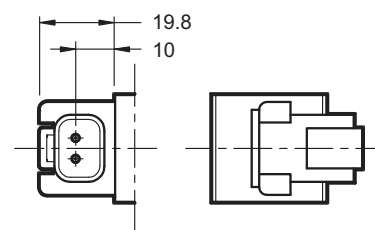
|                              |          |          |
|------------------------------|----------|----------|
| <b>Reference signal step</b> | 0 → 100% | 100 → 0% |
| Step response [ms]           |          |          |
| <b>BLS6</b>                  | 50       | 40       |

### 6 - ELECTRIC CONNECTIONS

connection for DIN 43650 connector code **K1**



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

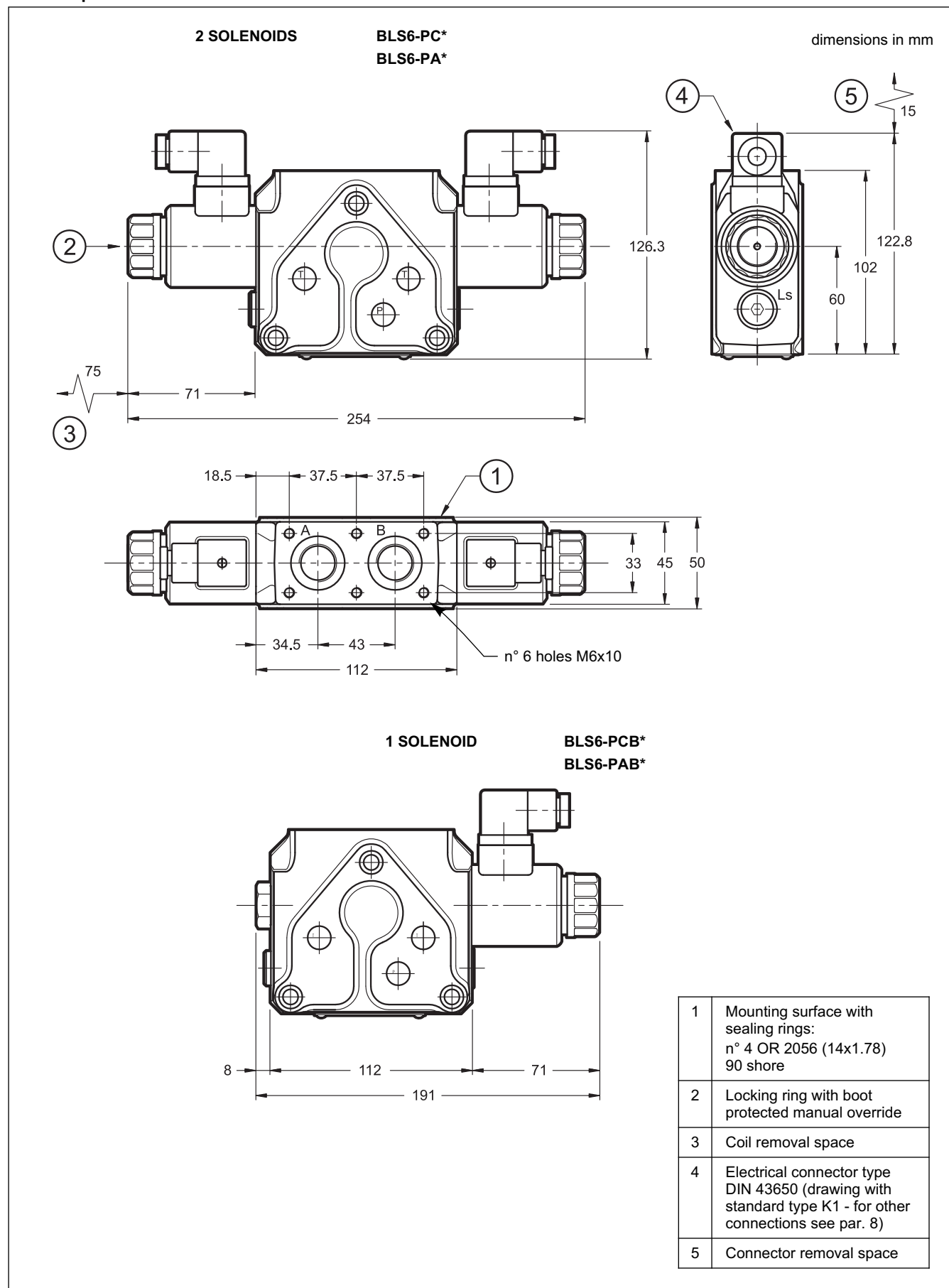


### 7 - ELECTRIC CONNECTORS

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

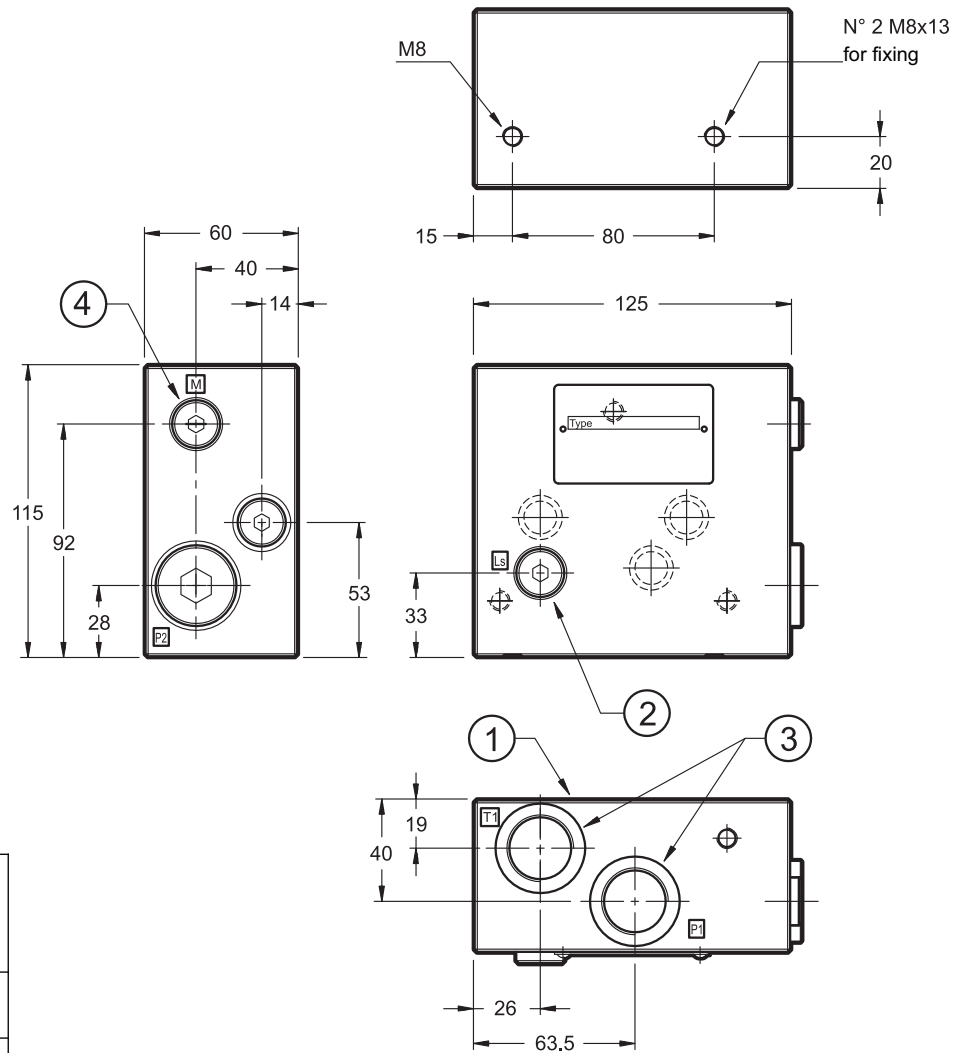
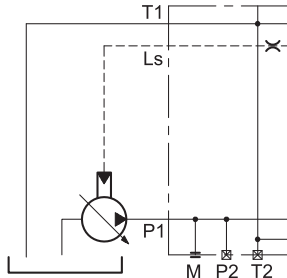
### 8.1 - Proportional module



## 8.2 - Inlet modules

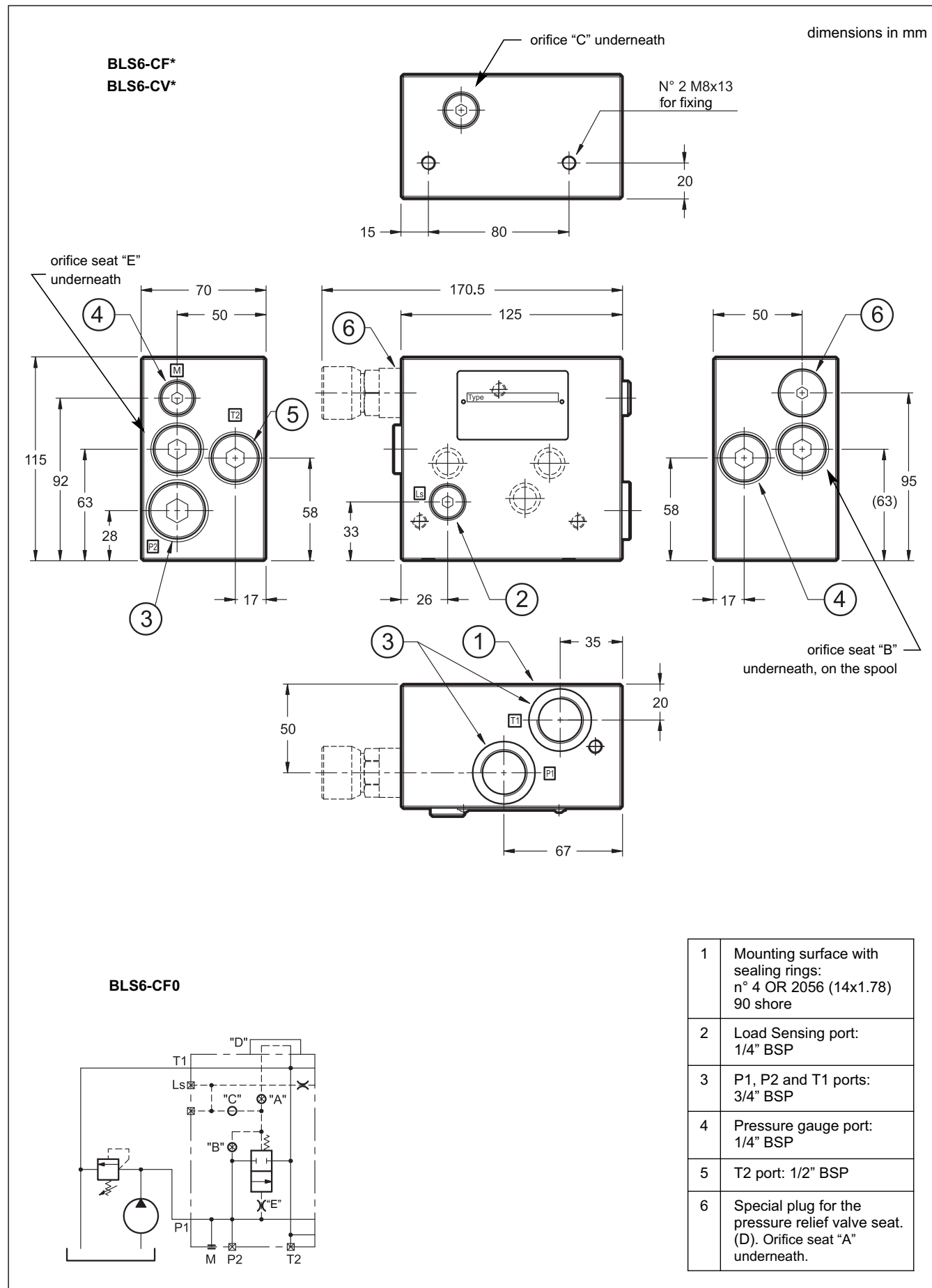
dimensions in mm

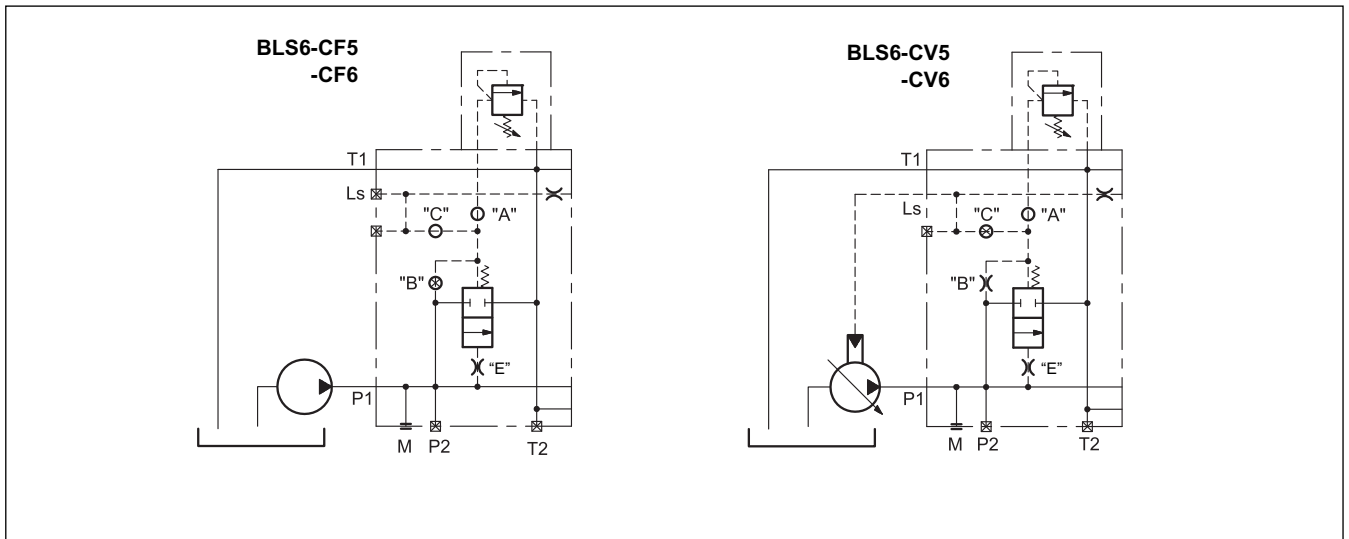
BLS6-C00



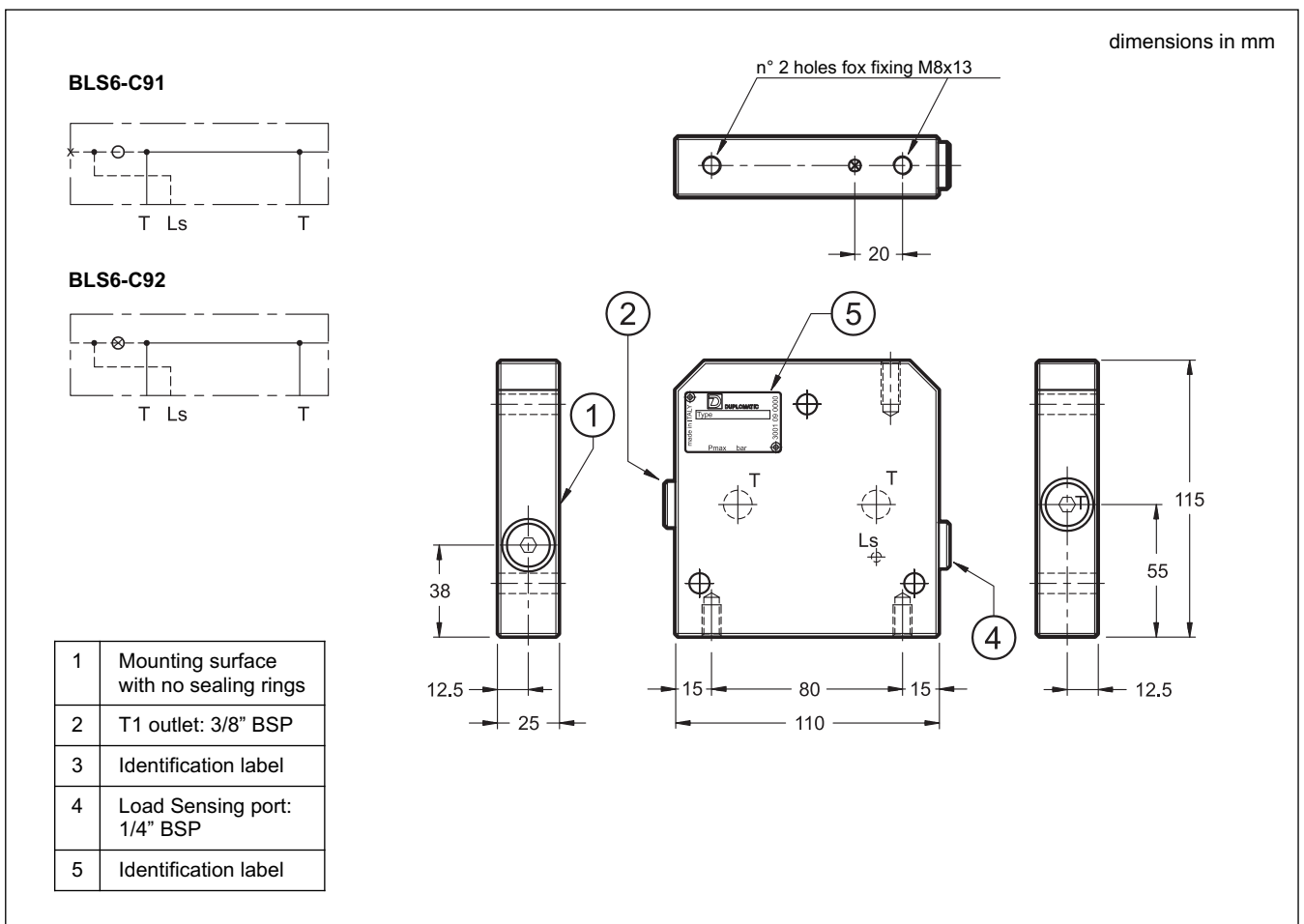
|   |                                                                            |
|---|----------------------------------------------------------------------------|
| 1 | Mounting surface with sealing rings:<br>n° 4 OR 2056 (14x1.78)<br>90 shore |
| 2 | Load Sensing port:<br>1/4" BSP with orifice  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

## 8.2 - Inlet modules





### 8.3 - End modules



## 9 - IDENTIFICATION CODE OF ASSEMBLED VALVE

|      |   |  |   |  |   |  |   |  |   |    |   |   |  |   |  |
|------|---|--|---|--|---|--|---|--|---|----|---|---|--|---|--|
| BLS6 | - |  | - |  | - |  | - |  | / | 11 | 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. 13)

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, with code BLS6-C00/10V.

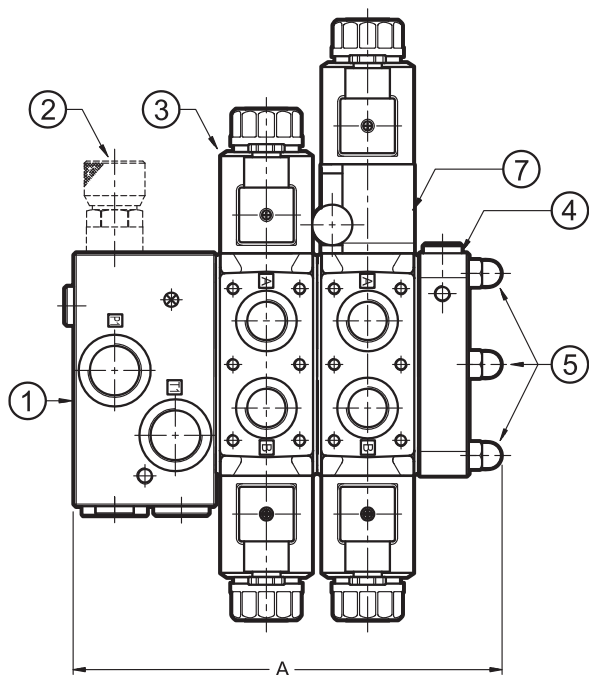
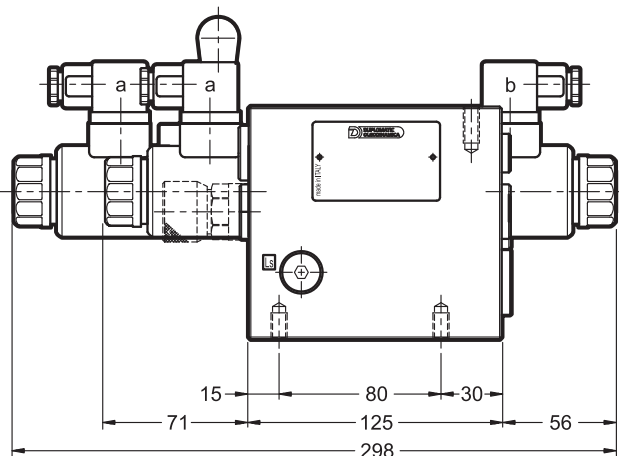
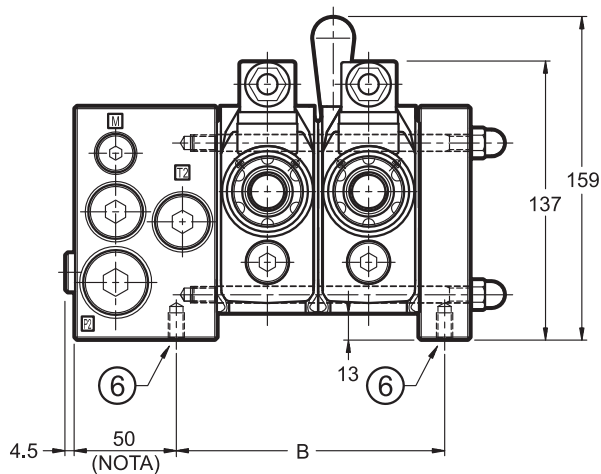
**Coding example:**  
**BLS6-C00-PC30/30-PC30/30-C92/11V-D24K1:** assembled valve includes: inlet module without 3 way compensator; 2 prop. modules with closed center flow 30/30; end plate without load sensing port; FPM seals, 24V DC coils and K1 connection.

**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<br>(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.

#### 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 |

Tightening torque: 25 Nm

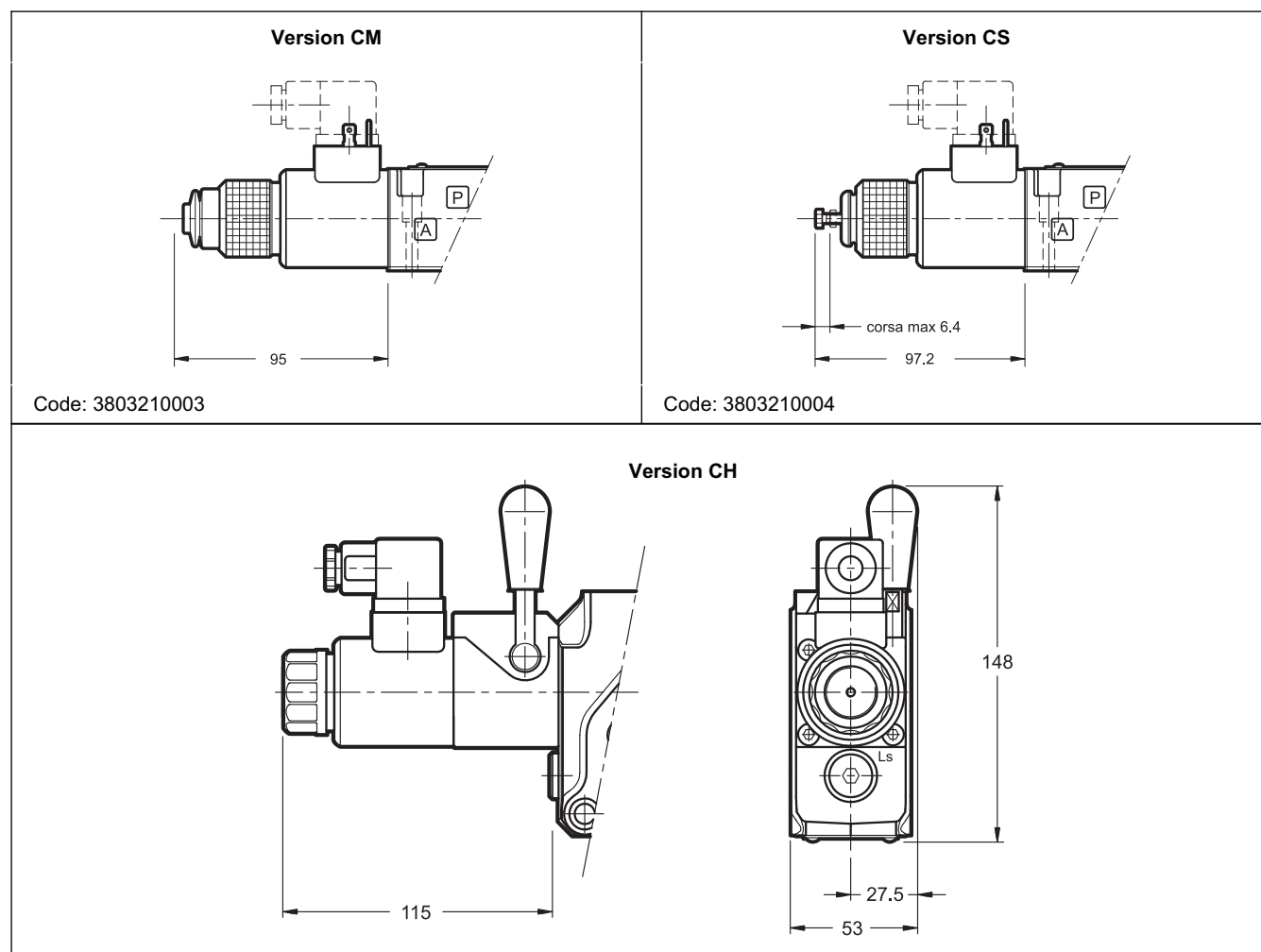
|   |                              |
|---|------------------------------|
| 1 | Inlet module                 |
| 2 | Pressure relief valve        |
| 3 | Proportional modules         |
| 4 | End plate                    |
| 5 | Fixing studs                 |
| 6 | Fixing holes                 |
| 7 | 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 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** version, lever manual override.



### 12 - ELECTRONIC CONTROL UNITS

#### Two solenoids

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

These cards drive only a module at once.

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

#### One solenoid

|                 |                  |                               |                 |
|-----------------|------------------|-------------------------------|-----------------|
| <b>EDM-M212</b> | 24V DC solenoids | rail mounting<br>DIN EN 50022 | see cat. 89 250 |
| <b>EDM-M242</b> | 12V DC solenoids |                               |                 |

### 13 - APPLICABLE SCHEMES

