



# LOGIC ELEMENTS

SERIES 20

**LC\* CARTRIDGE VALVES**  
ISO 7368 - DIN 24342

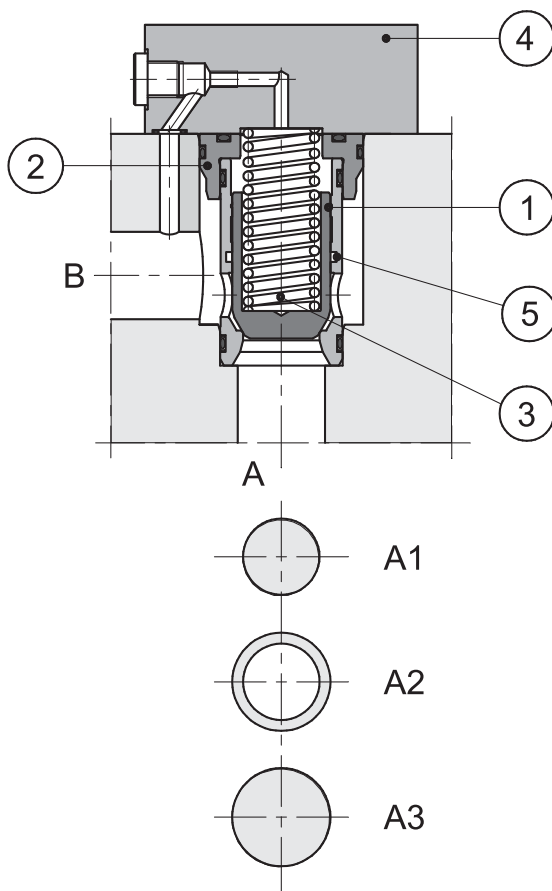
**LP\* COVERS**

**ND 16 - 25 - 32 - 40 - 50 - 63**

**p max 420 bar**

**Q max (see table of performances)**

## OPERATING PRINCIPLE



- Logic elements are cartridge valves suitable for installation in blocks or manifolds. They are available in five different sizes: ND 16 - 25 - 32 - 40 - 50 - 63.
- They are designed to perform complex hydraulic circuits, using functional compact blocks, with high flow rates and low pressure drops.
- They are made of a cartridge valve with ISO7368 / DIN 24342 cavity bore and a control cover (4). The cover includes the cartridge valves pilot lines; some versions are designed for the installation of ISO 4401-03 (CETOP 03) valves, to realise different control functions (see paragraph 8 for diagrams and function descriptions). A low leakage version, obtained inserting a seal into the seat no. 5, is also available.
- The cartridge valves are composed of a jacket (2), a poppet (1), and a closing spring (3). The poppet can either be standard (S) or with a damping nose (D), suitable for a smooth flow control during the valve opening and closing phases.
- There are two different types of cartridge valves available:
  - **Q type:** this valve is used for flow and directional control and as a check valve.  
The areas involved are:
    - $A_1$  - corresponding to the seat diameter area, considered as reference area = 1
    - $A_3$  - corresponding to the jacket internal diameter area.
    - $A_2$  - corresponding to the difference between  $A_3 - A_1$
 The area ratio  $A_1/A_3$  is 1/1,66.  
The valve opens when the pressure acting either on area  $A_1$  (flow from A to B) or on area  $A_2$  (flow from B to A) is higher than the pressure acting on area  $A_3$  (added to the spring load value).
  - **P type:** this valve is used for pressure control.  
In this case the areas  $A_1$  and  $A_3$  are equivalent (area ratio 1:1) and the valve enables the flow direction from A to B only.

## 1 - IDENTIFICATION CODE FOR CARTRIDGE VALVES

|          |          |   |  |   |          |   |  |
|----------|----------|---|--|---|----------|---|--|
| <b>L</b> | <b>C</b> | - |  | / | <b>N</b> | / |  |
|----------|----------|---|--|---|----------|---|--|

Cartridge valve

Shutter type:  
(area ratio  $A_1 / A_3$ ):  
**QS** = flow rate control (1:1,66)  
**QD** = flow rate control with damping nose (1:1,66)  
**PS** = pressure control (1:1)

**LL** = Low leakage version, with seal between C and B. Omit if not required.

Seals:  
NBR seals for mineral oil

**20** - for ND 16, 25, 32, 40 and 50  
**21** - for ND 63  
 (the overall and mounting dimensions remain unchanged from 20 to 29)

Nominal cracking pressure on section A1:  
**0.5** = 0,5 bar  
**1** = 1 bar (for ND 63 only)  
**2** = 2 bar (not available for ND 63)  
**4** = 4 bar  
 (other cracking pressure values available on request)

| AVAILABLE NOMINAL SIZES |            |            |            |            |            | VERSIONS                     | SYMBOL |
|-------------------------|------------|------------|------------|------------|------------|------------------------------|--------|
| 16<br>ND16              | 25<br>ND25 | 32<br>ND32 | 40<br>ND40 | 50<br>ND50 | 63<br>ND63 |                              |        |
| x                       | x          | x          | x          | x          |            | <b>QS0.5</b>                 |        |
| x                       | x          | x          | x          | x          | x          | <b>QS2</b>                   |        |
| x                       | x          | x          | x          | x          |            | <b>QD4</b>                   |        |
| x                       | x          | x          | x          | x          | x          | <b>PS1</b><br><br><b>PS2</b> |        |

## 2 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4. For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). 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 - TECHNICAL CHARACTERISTICS (cartridge valve with control cover)**

|   |  |           |
|---|--|-----------|
| Max operating pressure LC cartridge valve                           | bar  | 420       |
| Max operating pressure limit of cover type DP*, DPE*, DF1, DF2, LCM | bar  | 350       |
| Max operating pressure with distributor installed on cover          | See technical characteristics of the distributor |           |
| 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        |

**3.1 - Cartridge valves type Q performances (flow control function)**

|                   |                      |                 | NOMINAL SIZE |      |      |       |       |       |     |
|-------------------|----------------------|-----------------|--------------|------|------|-------|-------|-------|-----|
|                   |                      |                 | 16           | 25   | 32   | 40    | 50    | 63    |     |
| Area A1           | cm <sup>2</sup>      |                 | 1,54         | 3    | 6    | 8,76  | 14,8  | 24,6  |     |
| Area A2           | cm <sup>2</sup>      |                 | 1            | 2    | 4    | 5,76  | 9,7   | 16,1  |     |
| Area A3           | cm <sup>2</sup>      |                 | 2,54         | 4,9  | 10   | 14,3  | 24,3  | 40,7  |     |
| Version S:        | opening stroke h     | cm              | 0,8          | 1    | 1,25 | 1,6   | 1,8   | 2,3   |     |
|                   | opening volume       | cm <sup>3</sup> | 2,03         | 4,9  | 12,5 | 22,88 | 43,74 | 96,26 |     |
|                   | max recommended flow | l/min           | 250          | 500  | 900  | 1300  | 2000  | 3000  |     |
| Version D:        | opening stroke h     | cm              | 0,8          | 1,15 | 1,5  | 1,8   | 2,2   | 2,7   |     |
|                   | opening volume       | cm <sup>3</sup> | 2,03         | 5,63 | 15   | 25,74 | 53,46 | 110   |     |
|                   | max recommended flow | l/min           | 200          | 450  | 800  | 1100  | 1700  | 2700  |     |
| Cracking pressure | A→B                  | spring 0,5      | bar          | 0,5  | 0,5  | 0,5   | 0,5   | 0,5   | -   |
|                   |                      | spring 2        |              | 2    | 2    | 2     | 2     | 2     | 2   |
|                   |                      | spring 4        |              | 4    | 4    | 4     | 4     | 4     | -   |
|                   | B→A                  | spring 0,5      |              | 0,9  | 1,1  | 0,7   | 0,76  | 0,8   | -   |
|                   |                      | spring 2        |              | 3,1  | 3    | 3,1   | 3     | 3,2   | 3,2 |
|                   |                      | spring 4        |              | 6,15 | 5,9  | 5,4   | 5,9   | 5,9   | -   |
| Mass              | Kg                   |                 | 0,25         | 0,5  | 1,1  | 1,9   | 3,9   | 7,8   |     |

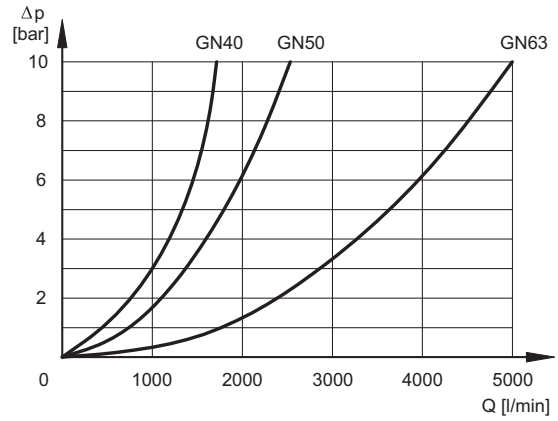
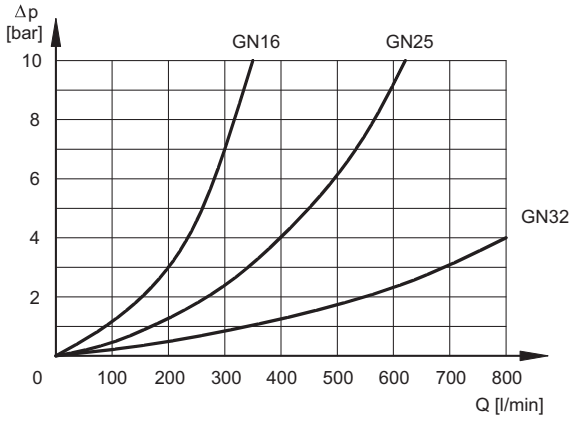
**3.2 - Cartridge valves type P performances (pressure control function)**

|                   |                      |       | NOMINAL SIZE |     |     |      |      |      |
|-------------------|----------------------|-------|--------------|-----|-----|------|------|------|
|                   |                      |       | 16           | 25  | 32  | 40   | 50   | 63   |
| Area A1 = Area A3 | cm <sup>2</sup>      |       | 2,54         | 4,9 | 10  | 14,4 | 24,3 | 40,7 |
| Version S:        | max recommended flow | l/min | 200          | 400 | 900 | 1000 | 1500 | 2500 |
| Cracking pressure | spring 1             | bar   | -            | -   | -   | -    | -    | 1    |
|                   | spring 2             |       | 2            | 2   | 2   | 2    | 2    | -    |
| Mass              | Kg                   |       | 0,25         | 0,5 | 1,1 | 1,9  | 3,9  | 7,8  |

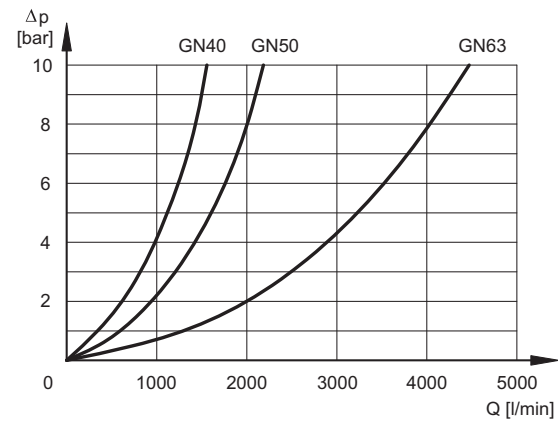
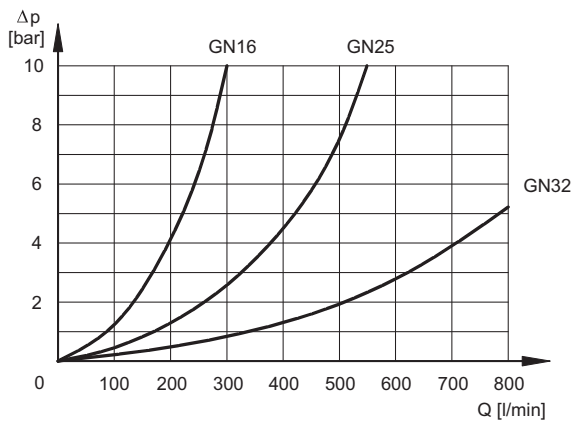


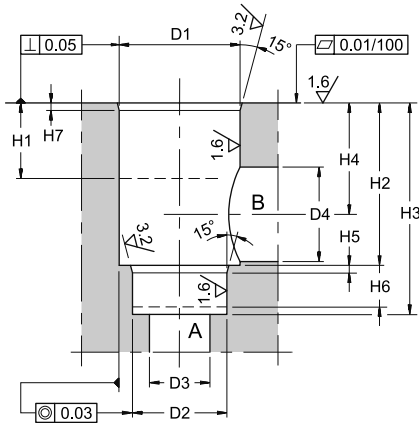
**4 - CHARACTERISTIC CURVES** (values obtained with viscosity 36 cSt at 50°C)

**4.1 - LC\*-QS flow control function and LC\*-PS pressure control function**

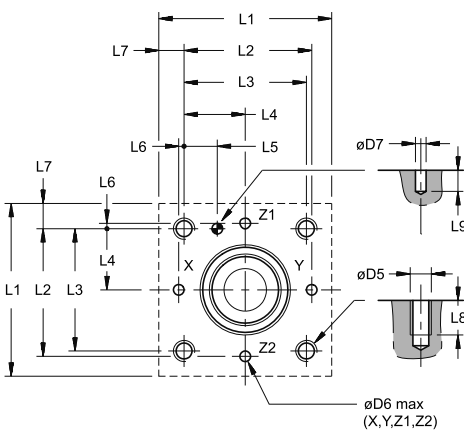


**4.2 - Flow control function with damping nose LC\*-QD**



**5 - LC CARTRIDGE VALVES SEAT DIMENSIONS ACCORDING TO ISO 7368 / DIN 24342**


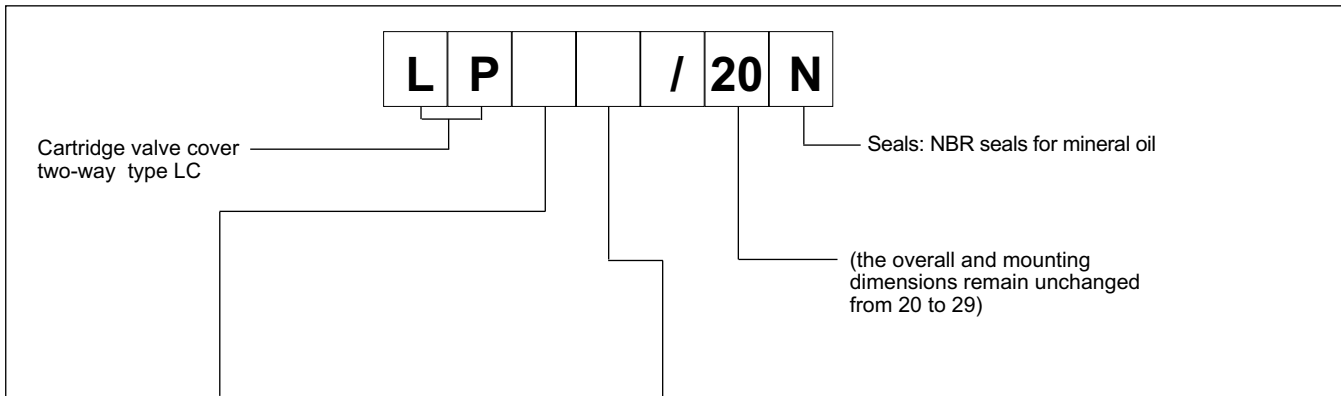
|   | LC CARTRIDGE VALVES NOMINAL SIZE |      |     |     |      |      |
|---|----------------------------------|------|-----|-----|------|------|
|   | 16                               | 25   | 32  | 40  | 50   | 63   |
| $\text{ØD1}^{\text{H7}}$                          | 32                               | 45   | 60  | 75  | 90   | 120  |
| $\text{ØD2}^{\text{H7}}$                          | 25                               | 34   | 45  | 55  | 68   | 90   |
| $\text{ØD3 max}$                                  | 16                               | 25   | 32  | 40  | 50   | 63   |
| $\text{ØD4}$                                      | 16                               | 25   | 32  | 40  | 50   | 63   |
| $\text{ØD4 max}$                                  | 25                               | 32   | 40  | 50  | 63   | 80   |
| H1 min  | 20                               | 30   | 30  | 30  | 35   | 40   |
| $\text{H2} \pm 0,1$                               | 43                               | 58   | 70  | 87  | 100  | 130  |
| $\text{H3} \begin{matrix} +0,1 \\ 0 \end{matrix}$ | 56                               | 72   | 85  | 105 | 122  | 155  |
| H4 referred to diameter $\text{ØD4}$              | 34                               | 44   | 52  | 64  | 72   | 95   |
| H4 referred to diameter $\text{ØD4 max}$          | 29,5                             | 40,5 | 48  | 59  | 65,5 | 86,5 |
| H5  | 2                                | 2,5  | 2,5 | 3   | 3    | 4    |
| H6 min  | 11                               | 12   | 13  | 15  | 17   | 20   |
| H7  | 2                                | 2,5  | 2,5 | 3   | 4    | 4    |

**6 - LP CONTROL COVERS INTERFACE DIMENSIONS ACCORDING TO ISO 7368 / DIN 24342**


|                           | LP CONTROL COVERS NOMINAL SIZE |      |     |      |     |       |
|---------------------------|--------------------------------|------|-----|------|-----|-------|
|                           | 16                             | 25   | 32  | 40   | 50  | 63    |
| $\text{ØD5}$              | M8                             | M12  | M16 | M20  | M20 | M30   |
| $\text{ØD6 max}$          | 4                              | 6    | 8   | 10   | 10  | 12    |
| $\text{ØD7}^{\text{H13}}$ | 4                              | 6    | 6   | 6    | 8   | 8     |
| L1                        | *                              | 85   | 100 | 125  | 140 | 180   |
| $\text{L2} \pm 0,1$       | 48                             | 62   | 76  | 92,5 | 108 | 137,5 |
| $\text{L3} \pm 0,1$       | 46                             | 58   | 70  | 85   | 100 | 125   |
| $\text{L4} \pm 0,1$       | 23                             | 29   | 35  | 42,5 | 50  | 62,5  |
| $\text{L5} \pm 0,1$       | 12,5                           | 13   | 18  | 19,5 | 20  | 24,5  |
| $\text{L6} \pm 0,1$       | 2                              | 4    | 6   | 7,5  | 8   | 12,5  |
| L7                        | *                              | 13,5 | 15  | 20   | 20  | 27,5  |
| L8 min                    | 15                             | 20   | 28  | 35   | 35  | 52    |
| L9 min                    | 8                              | 8    | 8   | 8    | 8   | 8     |

\* = cover with special dimensions (see par. 9.2 + 9.7)

**7 - COVERS IDENTIFICATION CODE**



| AVAILABLE NOMINAL SIZES |            |            |            |            |            | COVER NAME  | SYMBOL | DIAGRAM PARAGRAPH | OVERALL DIMENSIONS PARAGRAPH |
|-------------------------|------------|------------|------------|------------|------------|-------------|--------|-------------------|------------------------------|
| 16<br>ND16              | 25<br>ND25 | 32<br>ND32 | 40<br>ND40 | 50<br>ND50 | 63<br>ND63 |             |        |                   |                              |
| X                       | X          | X          |            |            | X          | <b>R</b>    |        | 8.1               | 9.1                          |
| X                       | X          | X          | X          | X          | X          | <b>D</b>    |        | 8.2               | 9.2                          |
| X                       | X          | X          | X          |            |            | <b>DZ</b>   |        | 8.3               | 9.3                          |
| X                       | X          | X          | X          | X          |            | <b>DF1</b>  |        | 8.4               | 9.4                          |
| X                       | X          | X          | X          |            |            | <b>DF2</b>  |        | 8.5               | 9.5                          |
| X                       | X          | X          | X          | X          | X          | <b>Q</b>    |        | 8.6               | 9.6                          |
| X                       | X          | X          | X          | X          | X          | <b>DP*</b>  |        | 8.7               | 9.7                          |
| X                       | X          | X          | X          | X          |            | <b>DPE*</b> |        | 8.8               | 9.7                          |

## 8 - FUNCTIONAL DIAGRAMS

### 8.1 - R cover for directional control and check valve function with external pilot X

| Functional diagrams | Description  |
|---------------------|--|
|                     | <p>Piloting of the cartridge valve through the X port, available on the mounting surface or with pipe connection 1/4" BSP.</p> <p>For ND 40 and ND 50 sizes, the external piloting function can be realised by using control cover type D, with blanking plate code <b>1950751</b> (to be ordered separately).</p> |

### 8.2 - D cover for directional control and check valve function

| Functional diagrams | Description   |
|---------------------|---|
|                     | <p>Piloting of the cartridge valve by means of solenoid valve type <b>DS3-TA</b> (to be ordered separately - see catalogue 41 150)</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = A ↔ B intercepted flow</li> <li>- solenoid valve ON = A ↔ B free flow</li> </ul> |

### 8.3 - DZ cover for directional control with possibility to pilot other cartridges in line

| Functional diagrams | Description  |
|---------------------|--|
|                     | <p>The DZ cover enables the piloting of its cartridge valves and also of other valves connected to Z1 and Z2 pilot lines.</p> <p>The solenoid valve type <b>DS3-S10</b> must be ordered separately (see catalogue 41 150).</p> |

### 8.4 - DF1 cover for directional control and check function with double pilot line

| Functional diagrams | Description   |
|---------------------|---|
|                     | <p>The DF1 cover gives the possibility of a double pilot line through X and Z1 ports.</p> <p>The solenoid valve type <b>DS3-TA</b> must be ordered separately (see catalogue 41 150).</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = A ↔ B intercepted flow</li> <li>- solenoid valve ON = A → B free flow , B → A intercepted (if pilot line X is connected with B and if Z1 is connected with A).</li> </ul> |

**8.5 - DF2 cover for directional control and check function with priority piloting from two external lines**

| Functional diagrams | Description  |
|---------------------|--|
|                     | <p>The cartridge valve can be simultaneously piloted from X and Z1 lines.</p> <p>The shuttle valve, integrated in the cover, enables the automatic selection of the pilot line which has the higher pressure (priority line).</p> <p>The solenoid valve type <b>DS3-TA</b> must be ordered separately (see catalogue 41 150).</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = A ↔ B intercepted flow</li> <li>- solenoid valve ON = A ↔ B free flow</li> </ul> |

**8.6 - Q cover for flow control function**

| Functional diagrams | Description  |
|---------------------|--|
|                     | <p>Flow control function by means of cover with stroke limiter.</p> <p>For a better flow control and to avoid the wear of the valve seat, this cover is normally used with a QD4 cartridge type.</p> |

**8.7 - DP\* cover for pressure control function**

| Functional diagrams | Description   |
|---------------------|---|
|                     | <p>Pressure control function with a built-in relief valve.</p> <ul style="list-style-type: none"> <li>- max. adjustment pressure <b>DP4</b> = 140 bar - <b>DP6</b> = 350 bar</li> </ul> <p>The top blanking plate code 1950591 must be ordered separately.</p>  |
|                     | <p>Pressure control function with electrical unloading by means of <b>DS3-SA2</b> solenoid valve (to be ordered separately - see catalogue 41 150).</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = unloading at minimum pressure</li> <li>- solenoid valve ON = pressure controlled by the built-in relief valve.</li> </ul>   |
|                     | <p>Pressure control function with electrical unloading and two step pressure by means of the solenoid valves <b>DS3-S2</b> (to be ordered separately - see catalogue 41 150), <b>MCI*-SAT/10</b> (for 16, 25 and 32 sizes - to be ordered separately) and <b>MCD*-SAT</b> (for 40, 50 and 63 sizes to be ordered separately - see catalogue 61 200)</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = unloading at minimum pressure</li> <li>- solenoid valve ON side a = pressure controlled by the relief valve integrated in the cover</li> <li>- solenoid valve ON side b = pressure controlled by the relief valve (<b>MCI*</b> or <b>MCD*</b>)</li> </ul> |



|  |  |
|--|--|
|  | <p>Pressure control function with electrical control and three steps pressure by means of the solenoid valves <b>DS3-S3</b> (to be ordered separately - see catalogue 41 150), <b>MCI*-DT/10</b> (for 16 - 25 and 32 sizes - to be ordered separately) and <b>MCD*-DT/51</b> (for 40 and 50 sizes - to be ordered separately - see catalogue 61 200)</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = pressure controlled by the cover relief valve.</li> <li>- solenoid valve ON side a = pressure controlled by the relief valve on side b.</li> <li>- solenoid valve ON side b = pressure controlled by the relief valve on side a.</li> </ul> |
|--|--|

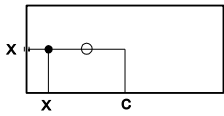
8.8 - DPE\* cover for pressure control function

| Functional diagram | Description  |
|--------------------|--|
|                    | <p>Pressure control function by means of <b>PRED3</b> proportional valve (to be ordered separately see catalogue 81 210).</p> <ul style="list-style-type: none"> <li>- max. adjustment pressure <b>DPE4</b> = 140 bar - <b>DPE6</b> = 350 bar</li> <li>- proportional valve OFF = unloading at minimum pressure</li> <li>- proportional valve ON = proportional control of pressure</li> </ul> |

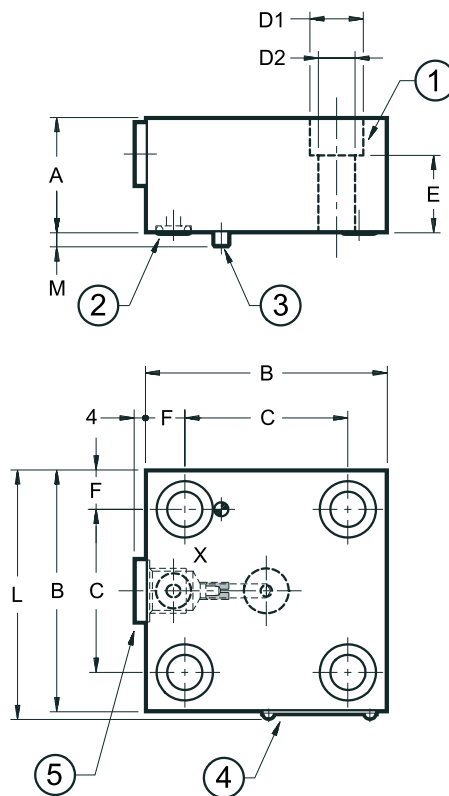
**9 - OVERALL AND MOUNTING DIMENSIONS FOR CONTROL COVERS**

**9.1 - R type covers**

dimensions in mm



LP16R  
LP25R  
LP32R  
LP63R



|    | NOMINAL SIZE |      |       |       |
|----|--------------|------|-------|-------|
|    | 16           | 25   | 32    | 63    |
| A  | 30           | 30   | 40    | 70    |
| B  | 65           | 85   | 100   | 180   |
| C  | 46           | 58   | 70    | 125   |
| D1 | 13,5         | 19   | 25    | 46    |
| D2 | 8,5          | 13   | 17    | 31    |
| E  | 19           | 17   | 22    | 35    |
| F  | 9,5          | 13,5 | 15    | 27,5  |
| L  | 67,5         | 87,5 | 102,5 | 182,5 |
| M  | 4            | 5    | 5     | 5     |

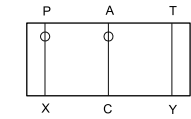
|                             |        |      |        |      |
|-----------------------------|--------|------|--------|------|
| ports ready for restrictors | port X |      |        |      |
| restrictors                 | M6x8   |      | M10x10 |      |
| Mass [Kg]                   | 1,20   | 2,30 | 4,00   | 17,5 |

|   |  |
|---|--|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br><b>16</b> = M8x30<br><b>25</b> = M12x35<br><b>32</b> = M16x45<br><b>63</b> = M30x80   |
| 2 | N. 1 sealing ring 90 Shore:<br><b>16</b> = OR type 2025 (6.07x1.78)<br><b>25</b> = OR type 2037 (9.25x1.78)<br><b>32</b> = OR type 2037 (9.25x1.78)<br><b>63</b> = OR type 2056 (14.00x1.78) |
| 3 | Locating pin:<br><b>16</b> = Ø3x10 <b>25</b> = Ø5x14<br><b>32</b> = Ø5x14 <b>63</b> = Ø6x14  |
| 4 | Identification label   |
| 5 | Plug X: 1/4" BSP   |

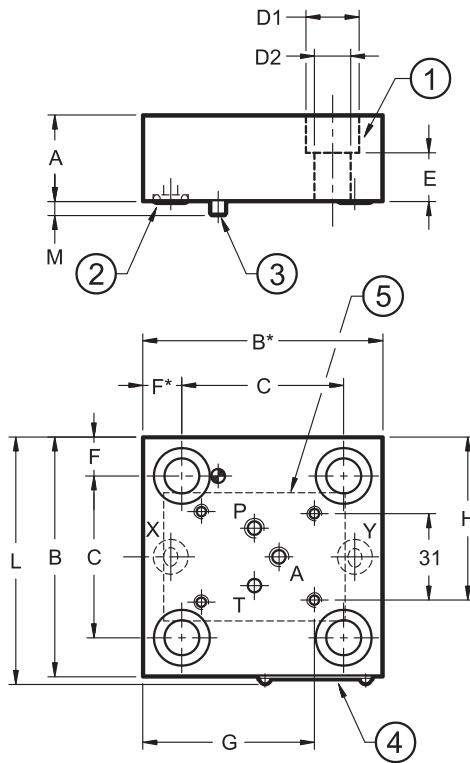
**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

**9.2 - Covers type D**

dimensions in mm



LP16D  
LP25D  
LP32D  
LP40D  
LP50D  
LP63D



|    | NOMINAL SIZE |      |       |       |       |       |
|----|--------------|------|-------|-------|-------|-------|
|    | 16           | 25   | 32    | 40    | 50    | 63    |
| A  | 30           | 30   | 40    | 40    | 50    | 70    |
| B  | 65           | 85   | 100   | 125   | 140   | 180   |
| B* | 75           | 85   | 100   | 125   | 140   | 180   |
| C  | 46           | 58   | 70    | 85    | 100   | 125   |
| D1 | 13,5         | 19   | 25    | 31    | 31    | 46    |
| D2 | 8,9          | 13   | 17    | 21    | 21    | 31    |
| E  | 19           | 17   | 22    | 30    | 30    | 35    |
| F  | 9,5          | 13,5 | 15    | 20    | 20    | 27,5  |
| F* | 19,5         | 13,5 | 15    | 20    | 20    | 27,5  |
| G  | 52           | 60,2 | 65,2  | 73,2  | 82,7  | 111,5 |
| H  | 48           | 58   | 65,5  | 78    | 85,5  | 105,5 |
| L  | 67,5         | 87,5 | 102,5 | 127,5 | 142,5 | 182,5 |
| M  | 4            | 5    | 5     | 5     | 5     | 7     |

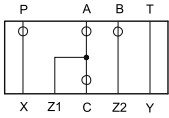
|                             |      |      |      |      |     |      |
|-----------------------------|------|------|------|------|-----|------|
| ports ready for restrictors | P, A |      |      |      |     |      |
| restrictors                 | M6x8 |      |      |      |     | M8x8 |
| Mass [Kg]                   | 1,20 | 2,30 | 4,00 | 4,80 | 7,6 | 17,5 |

|   |   |
|---|---|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br><b>16</b> = M8x30 <b>25</b> = M12x35<br><b>32</b> = M16x45 <b>40</b> = M20x50<br><b>50</b> = M20x60 <b>63</b> = M30x80   |
| 2 | n° 2 sealing rings 90 Shore :<br><b>16</b> = OR type 2025 (6.07x1.78)<br><b>25</b> = OR type 2037 (9.25x1.78)<br><b>32</b> = OR type 2037 (9.25x1.78)<br><b>40</b> = OR type 2050 (12.42x1.78)<br><b>50</b> = OR type 2050 (12.42x1.78)<br><b>63</b> = OR type 2056 (14x1.78) |
| 3 | Locating pin:<br><b>16</b> = Ø3x10 <b>25</b> = Ø5x14<br><b>32</b> = Ø5x14 <b>40</b> = Ø5x14<br><b>50</b> = Ø6x14 <b>63</b> = Ø6x14  |
| 4 | Identification label  |
| 5 | Mounting surface ISO 4401-03<br>(CETOP 4.2-4-03-350)  |

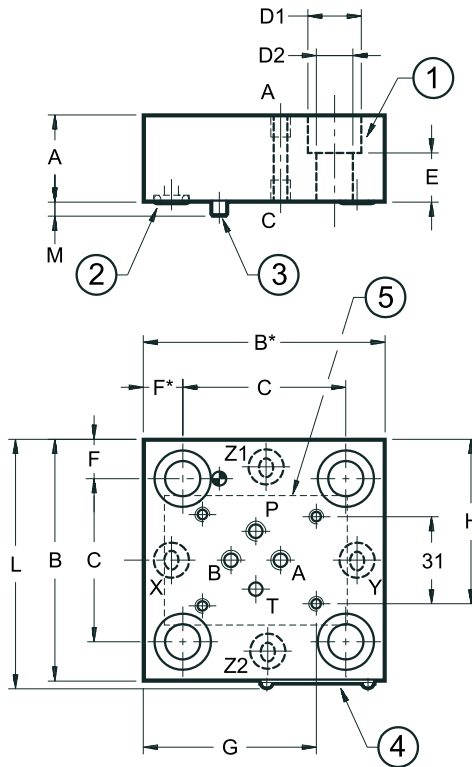
**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

### 9.3 - Covers type DZ

dimensions in mm



LP16DZ  
LP25DZ  
LP32DZ  
LP40DZ



|    | NOMINAL SIZE |      |       |       |
|----|--------------|------|-------|-------|
|    | 16           | 25   | 32    | 40    |
| A  | 30           | 30   | 40    | 50    |
| B  | 65           | 85   | 100   | 125   |
| B* | 75           | 85   | 100   | 125   |
| C  | 46           | 58   | 70    | 85    |
| D1 | 13,5         | 19   | 25    | 31    |
| D2 | 8,9          | 13   | 17    | 21    |
| E  | 19           | 17   | 22    | 30    |
| F  | 9,5          | 13,5 | 15    | 20    |
| F* | 19,5         | 13,5 | 15    | 20    |
| G  | 52           | 60,2 | 65,2  | 84    |
| H  | 48           | 58   | 65,5  | 78    |
| L  | 67,5         | 87,5 | 102,5 | 127,5 |
| M  | 4            | 5    | 5     | 5     |

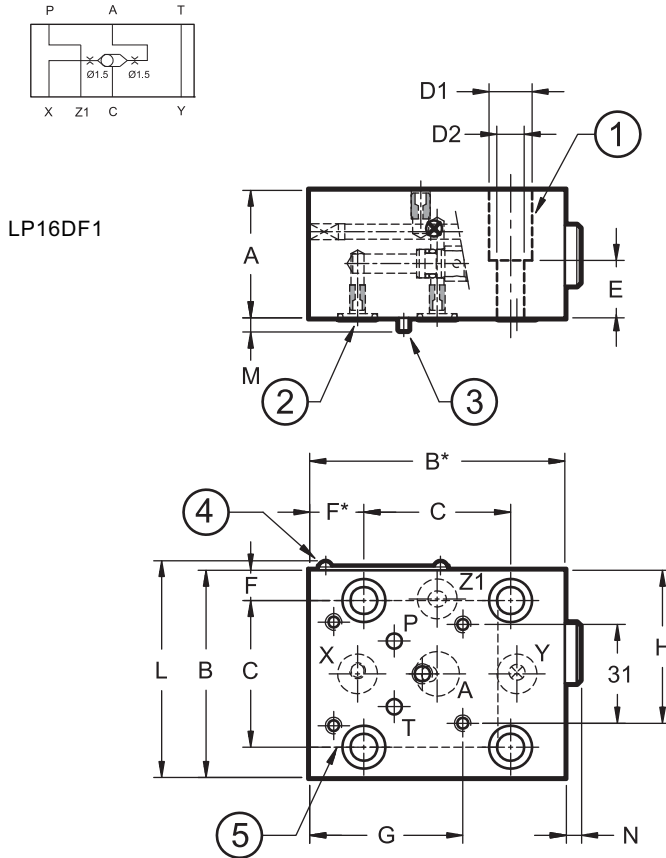
|                                  |            |      |      |     |
|----------------------------------|------------|------|------|-----|
| ports ready for restrictors M6x8 | P, A, B, C |      |      |     |
| Mass [Kg]                        | 1,20       | 2,30 | 4,00 | 4,3 |

|   |  |
|---|--|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br><b>16</b> = M8x30 <b>25</b> = M12x35<br><b>32</b> = M16x45 <b>40</b> = M20x50   |
| 2 | n° 4 sealing rings 90 Shore :<br><b>16</b> = OR type 2025 (6.07x1.78)<br><b>25</b> = OR type 2037 (9.25x1.78)<br><b>32</b> = OR type 2037 (9.25x1.78)<br><b>40</b> = OR type 2050 (12.42x1.78) |
| 3 | Locating pin:<br><b>16</b> = Ø3x10 <b>25</b> = Ø5x14<br><b>32</b> = Ø5x14 <b>40</b> = Ø5x14  |
| 4 | Identification label   |
| 5 | Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)  |

**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

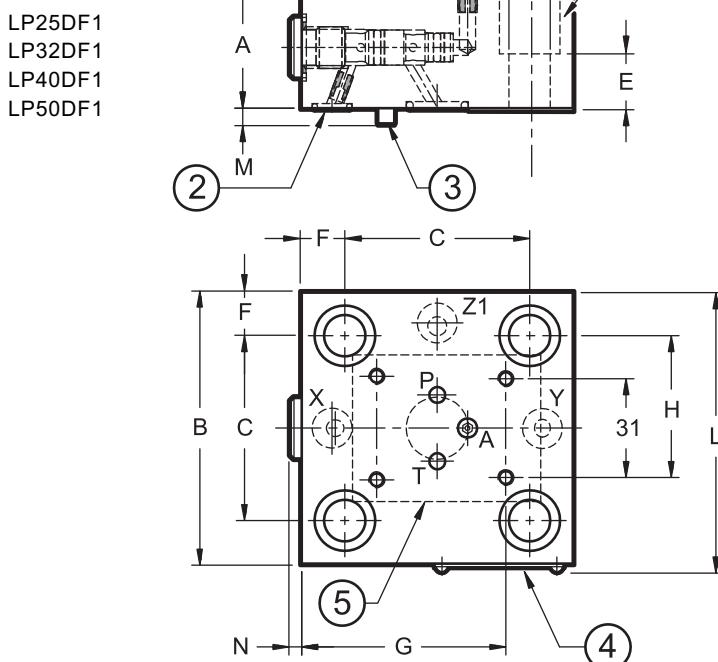
**9.4 - Covers type DF1**

dimensions in mm



|    | NOMINAL SIZE |      |       |       |       |
|----|--------------|------|-------|-------|-------|
|    | 16           | 25   | 32    | 40    | 50    |
| A  | 40           | 40   | 40    | 50    | 50    |
| B* | 80           | 85   | 102   | 125   | 140   |
| B  | 65           | 85   | 102   | 125   | 140   |
| C  | 46           | 58   | 70    | 85    | 100   |
| D1 | 13,5         | 19   | 25    | 31    | 31    |
| D2 | 8,5          | 13   | 17    | 21    | 21    |
| E  | 18           | 17   | 22    | 30    | 30    |
| F* | 17           | 13,5 | 16    | 20    | 20    |
| F  | 9,5          | 13,5 | 16    | 20    | 20    |
| G  | 47,5         | 64   | 72,5  | 84    | 91,5  |
| H  | 48           | 58   | 66,5  | 78    | 85,5  |
| L  | 67,5         | 87,5 | 104,5 | 127,5 | 142,5 |
| M  | 4            | 5    | 5     | 5     | 5     |
| N  | 4,5          | 3,5  | 3,5   | -     | -     |

|           |     |     |   |     |     |
|-----------|-----|-----|---|-----|-----|
| Mass [Kg] | 1,8 | 2,3 | 4 | 6,7 | 7,6 |
|-----------|-----|-----|---|-----|-----|

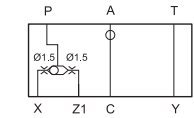


|   |   |
|---|---|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br><b>16</b> = M8x30 <b>25</b> = M12x35<br><b>32</b> = M16x45 <b>40</b> = M20x60<br><b>50</b> = M20x60  |
| 2 | N° 3 sealing rings 90 Shore :<br><b>16</b> = OR type 2037 (9.25x1.78)<br><b>25</b> = OR type 2037 (9.25x1.78)<br><b>32</b> = OR type 2037 (9.25x1.78)<br><b>40</b> = OR type 2050 (12.42x1.78)<br><b>50</b> = OR type 2050 (12.42x1.78) |
| 3 | Locating pin<br><b>16</b> = Ø3x10 <b>40</b> = Ø5x14<br><b>25</b> = Ø5x14 <b>50</b> = Ø6x14<br><b>32</b> = Ø5x14   |
| 4 | Identification label  |
| 5 | Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)   |

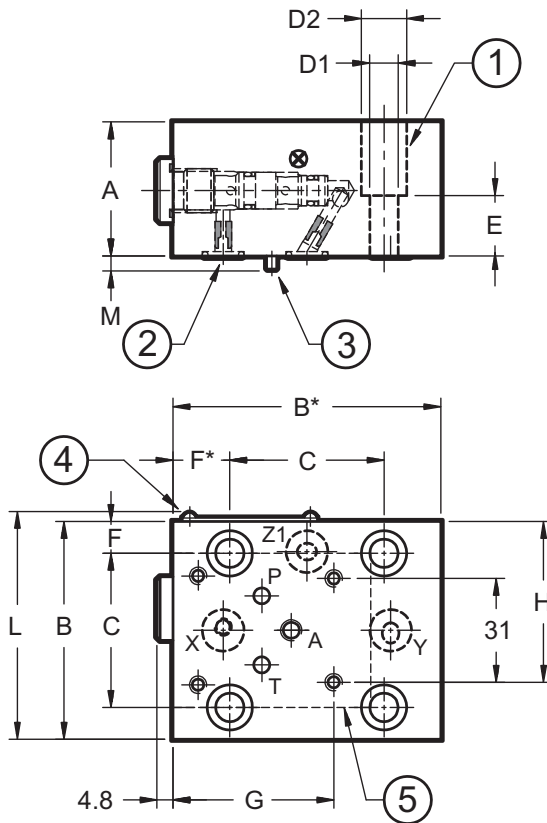
**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

### 9.5 - Covers type DF2

dimensions in mm



LP16DF2  
LP25DF2  
LP32DF2  
LP40DF2



|    | NOMINAL SIZE |      |       |       |
|----|--------------|------|-------|-------|
|    | 16           | 25   | 32    | 40    |
| A  | 40           | 40   | 40    | 50    |
| B  | 65           | 85   | 102   | 125   |
| B* | 80           | 85   | 102   | 125   |
| C  | 46           | 58   | 70    | 85    |
| D1 | 13,5         | 19   | 25    | 31    |
| D2 | 8,5          | 13   | 17    | 21    |
| E  | 18           | 17   | 22    | 30    |
| F  | 9,5          | 13,5 | 16    | 20    |
| F* | 17           | 13,5 | 16    | 20    |
| G  | 48           | 61   | 68,7  | 81    |
| H  | 48           | 58   | 65,5  | 71,2  |
| L  | 67,5         | 87,5 | 102,5 | 104,5 |
| M  | 4            | 5    | 5     | 5     |

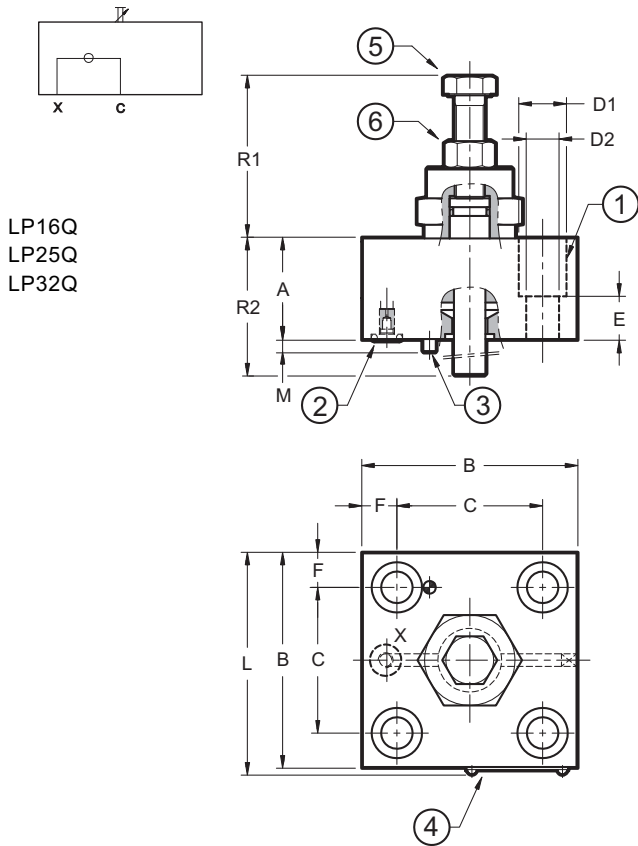
|                                  |     |     |   |     |
|----------------------------------|-----|-----|---|-----|
| ports ready for restrictors M6x8 | A   |     |   |     |
| Mass [Kg]                        | 1,8 | 2,3 | 4 | 6,7 |

|   |  |
|---|--|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br>16 = M8x30    25 = M12x35<br>32 = M16x45    40 = M20x60 |
| 2 | N° 3 sealing rings 90 Shore:<br>OR type 2037 (9.25x1.78)   |
| 3 | Locating pin<br>16 = Ø3x10    32 = Ø5x14<br>25 = Ø5x14    40 = Ø5x14                             |
| 4 | Identification label   |
| 5 | Mounting surface ISO 4401-03<br>(CETOP 4.2-4-03-350)   |

**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

**9.6 - Covers type Q**

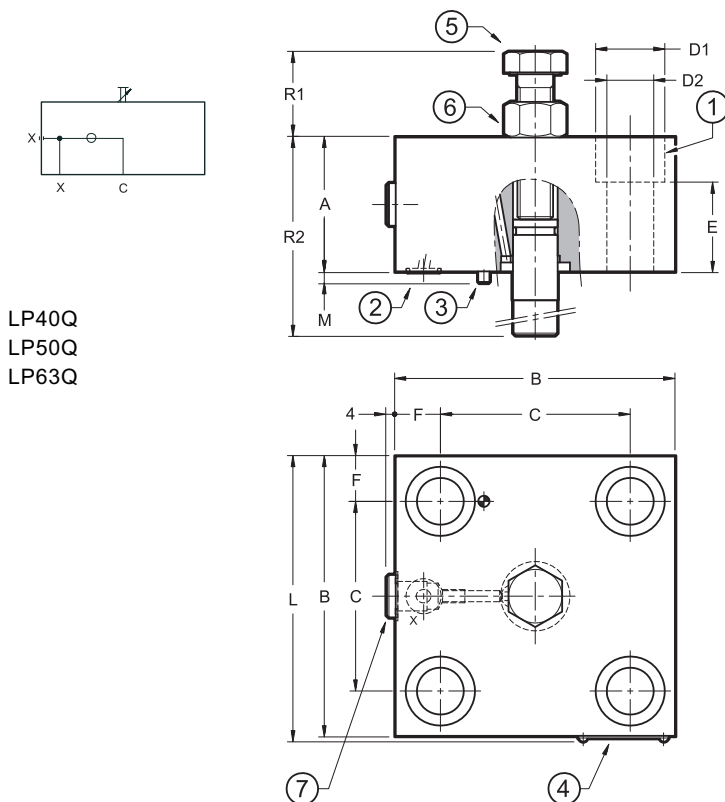
dimensions in mm



LP16Q  
LP25Q  
LP32Q

|    | NOMINAL SIZE |           |             |           |             |           |
|----|--------------|-----------|-------------|-----------|-------------|-----------|
|    | 16           | 25        | 32          | 40        | 50          | 63        |
| A  | 35           | 40        | 40          | 60        | 60          | 80        |
| B  | 65           | 85        | 100         | 125       | 140         | 180       |
| C  | 46           | 58        | 70          | 85        | 100         | 125       |
| D1 | 13,5         | 19        | 25          | 31        | 31          | 46        |
| D2 | 8,5          | 13        | 17          | 21        | 21          | 31        |
| E  | 18           | 17        | 22          | 30        | 30          | 45        |
| F  | 9,5          | 13,5      | 15          | 20        | 20          | 27,5      |
| L  | 67,5         | 87,5      | 102,5       | 127,5     | 142,5       | 182,5     |
| M  | 4            | 5         | 5           | 5         | 5           | 5         |
| R1 | 55,5 + 63,5  | 62,5 + 74 | 58,5 + 73,5 | 38,5 + 57 | 44,5 + 66,5 | 52 + 81   |
| R2 | 45 + 51,5    | 45 + 51,5 | 45 + 51,5   | 44 + 52   | 44 + 52     | 165 + 194 |

| ports ready for restrictors | port X |      |   |     |        |    |
|-----------------------------|--------|------|---|-----|--------|----|
|                             | M5x8   | M6x8 |   |     | M10x10 |    |
| Mass [Kg]                   | 1,6    | 3    | 5 | 8,9 | 11,7   | 18 |



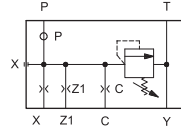
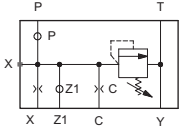
LP40Q  
LP50Q  
LP63Q

|   |   |
|---|---|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br><b>16</b> = M8x30 <b>25</b> = M12x35<br><b>32</b> = M16x35 <b>40</b> = M20x70<br><b>50</b> = M20x70 <b>63</b> = M30x90   |
| 2 | n° 1 sealing ring 90 Shore:<br><b>16</b> = OR type 2025 (6.07x1.78)<br><b>25</b> = OR type 2037 (9.25x1.78)<br><b>32</b> = OR type 2037 (9.25x1.78)<br><b>40</b> = OR type 2050 (12.42x1.78)<br><b>50</b> = OR type 2050 (12.42x1.78)<br><b>63</b> = OR type 2056 (14x1.78)   |
| 3 | Locating pin:<br><b>16</b> = Ø3x10 <b>25</b> = Ø5x14<br><b>32</b> = Ø5x14 <b>40</b> = Ø5x14<br><b>50</b> = Ø6x14 <b>63</b> = Ø6x14  |
| 4 | Identification label  |
| 5 | Stroke limiter<br>clockwise rotation to reduce stroke<br><b>16</b> = 1 turn: 1,25 mm - spanner 18<br><b>25</b> = 1 turn: 1,25 mm - spanner 18<br><b>32</b> = 1 turn: 1,25 mm - spanner 18<br><b>40</b> = 1 turn: 2,00 mm - spanner 24<br><b>50</b> = 1 turn: 2,50 mm - spanner 30<br><b>63</b> = 1 turn: 2,00 mm - spanner 36 |
| 6 | Locking nut:<br><b>16</b> = spanner 18 <b>25</b> = spanner 18<br><b>32</b> = spanner 18 <b>40</b> = spanner 24<br><b>50</b> = spanner 30 <b>63</b> = spanner 36   |
| 7 | Plug X:<br><b>40</b> = 1/4" BSP<br><b>50</b> = 1/4" BSP<br><b>63</b> = 1/4" BSP   |

**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)

## 9.7 - Covers type DP\* and DPE\*

dimensions in mm



LP16DP\*  
LP25DP\*  
LP32DP\*  
LP40DP\*  
LP50DP\*  
LP63DP\*

LP16DPE\*  
LP25DPE\*  
LP32DPE\*  
LP40DPE\*  
LP50DPE\*

|    | NOMINAL SIZE |          |          |         |         |         |
|----|--------------|----------|----------|---------|---------|---------|
|    | 16           | 25       | 32       | 40      | 50      | 63      |
| A  | 40           | 40       | 40       | 50      | 50      | 70      |
| B  | 65           | 85       | 100      | 125     | 140     | 180     |
| B* | 75           | 85       | 100      | 125     | 140     | 180     |
| C  | 46           | 58       | 70       | 85      | 100     | 125     |
| D1 | 13,5         | 19       | 25       | 31      | 31      | 46      |
| D2 | 8,5          | 13       | 17       | 21      | 21      | 31      |
| E  | 18           | 17       | 22       | 30      | 30      | 35      |
| F  | 9,5          | 13,5     | 15       | 20      | 20      | 27,5    |
| F* | 19,5         | 13,5     | 15       | 20      | 20      | 27,5    |
| G  | 52           | 64       | 71,5     | 84      | 91,5    | 102,7   |
| H  | 48           | 58       | 65,5     | 78      | 85,5    | 105,5   |
| L  | 67,5         | 87,5     | 102,5    | 127,5   | 142,5   | 182,5   |
| M  | 4            | 5        | 5        | 5       | 5       | 5       |
| N  | 24           | 25       | 25       | 25      | 25      | 35      |
| R  | 45÷ 51,5     | 45÷ 51,5 | 45÷ 51,5 | 44 ÷ 52 | 44 ÷ 52 | 44 ÷ 52 |

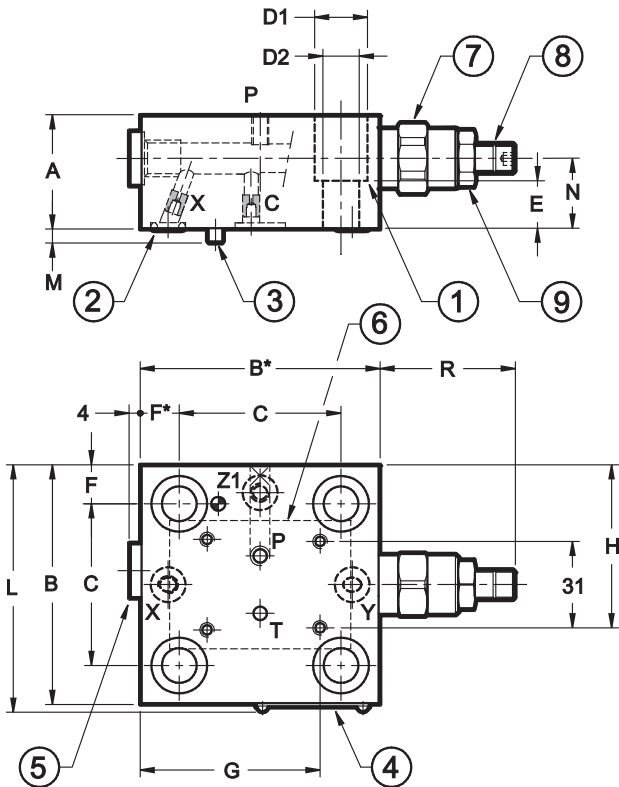
| Mass [Kg] | 1,36 | 2,46 | 4,16 | 7,40 | 10,50 | 17,5 |
|-----------|------|------|------|------|-------|------|
|           |      |      |      |      |       |      |

### DP\* restrictors

|   | M5x6 | M6x8 |      |      | M8x8 |
|---|------|------|------|------|------|
| X | Ø1,2 | Ø1,2 | Ø1,2 | Ø2,0 | Ø2,0 |
| C | Ø0,7 | Ø0,7 | Ø1,5 | Ø1,2 | Ø1,5 |

### DPE\* restrictors

|    | M5x6 | M6x8 | M6x8 | M6x8 | M6x8 |
|----|------|------|------|------|------|
| X  | Ø0,8 | Ø0,7 | Ø1   | Ø1   | Ø1   |
| C  | Ø0,6 | Ø0,6 | Ø0,8 | Ø0,8 | Ø0,8 |
| Z1 | Ø6   | Ø6   | Ø6   | Ø6   | Ø6   |



|   |  |
|---|--|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br>16 = M8x30    25 = M12x35<br>32 = M16x45    40 = M20x50<br>40 = M20x60    63 = M30x80   |
| 2 | 90 Shore sealing rings :<br>16 = n° 3 OR type 2025 (6.07x1.78)<br>25 and 32 = n° 3 OR type 2037 (9.25x1.78)<br>40 and 50 = n° 3 OR type 2050 (12.42x1.78)<br>63 = n° 3 OR type 2056 (14.00x1.78) |
| 3 | Locating pin:    16 = Ø3x10<br>25, 32 and 40 = Ø5x14<br>50 and 63 = Ø6x14  |
| 4 | Identification label   |

|   |  |
|---|--|
| 5 | Plug X: 1/4" BSP   |
| 6 | Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)  |
| 7 | Pressure control valve   |
| 8 | Countersunk hex adjustment screw.<br>Clockwise rotation to increase pressure<br>16, 25 and 32 = spanner 5<br>40, 50 and 63 = spanner 6 |
| 9 | Locking nut:<br>16, 25 and 32 = spanner 17<br>40, 50 and 63 = spanner 19   |

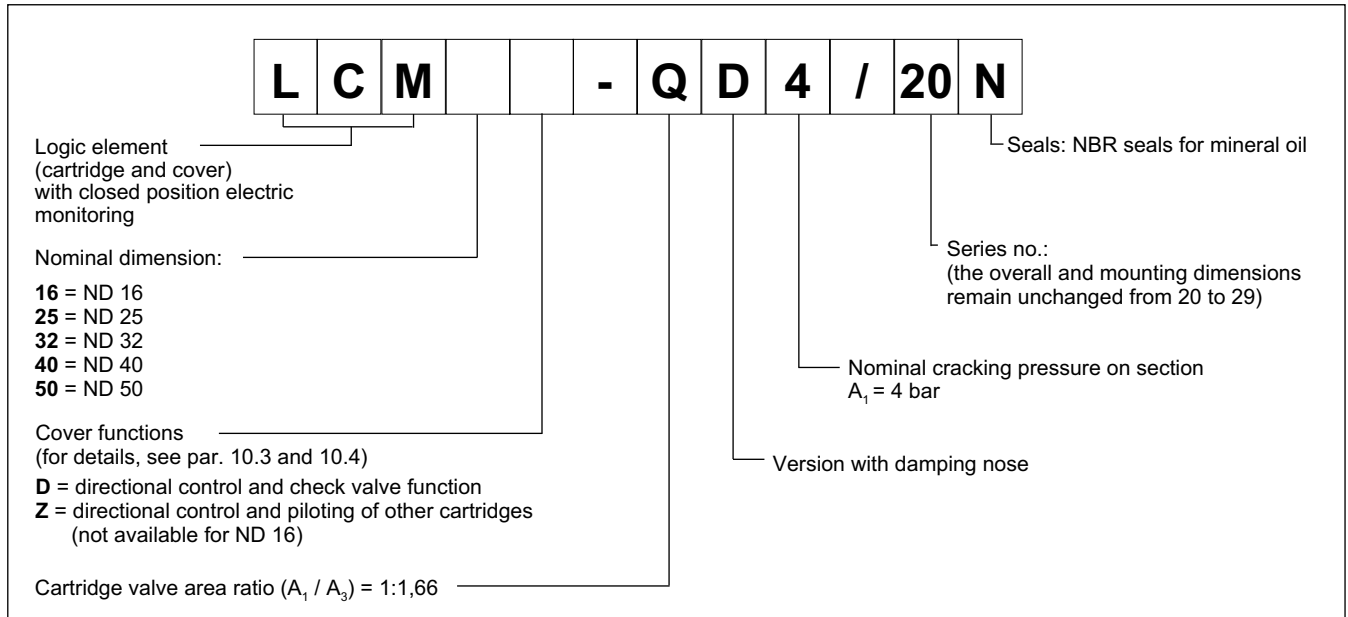
**NOTE:** Fastening bolts class 12.9 ISO 4762 are recommended for the installation of the cover (to be ordered separately)



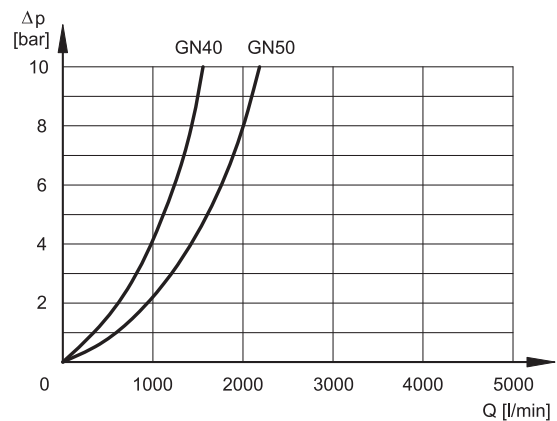
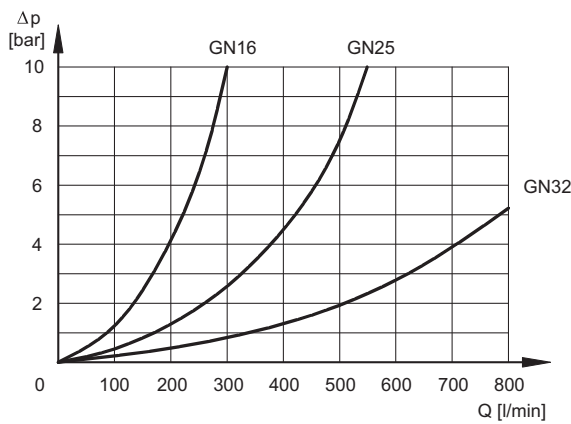
## 10 - MONITORED LOGIC ELEMENTS

Monitored logic elements are made of a directional function cartridge valve and a cover with built-in inductive proximity sensor. The PNP type sensor with closed contact states the condition of A↔B intercepted flow.

### 10.1 - Identification code of monitored logic elements



### 10.2 - Characteristic Curves (values obtained with viscosity 36 cSt at 50°C)



**10.3 - Functional diagram of cover D for directional control and check valve function**

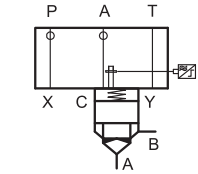
| Functional diagram | Description  |
|--------------------|--|
|                    | <p>Piloting of cartridge valve by means of solenoid valve type DS3-TA (to be ordered separately - see catalogue 41 150)</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = A → B intercepted flow</li> <li>- solenoid valve ON = A ↔ B free flow</li> </ul> |
|                    | <p>Piloting of cartridge valve by means of connection plate code 1950751 to be ordered separately.</p>   |

**10.4 - Functional diagrams for cover Z for directional control and piloting of other cartridges**

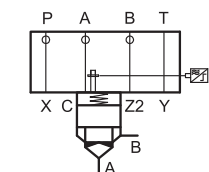
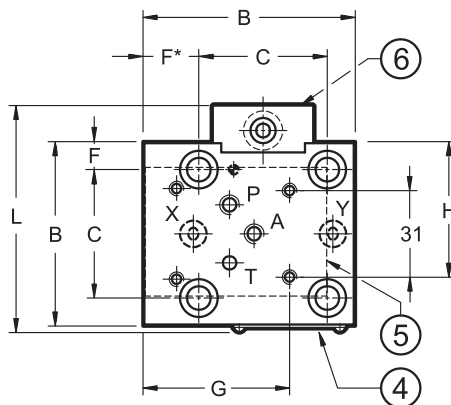
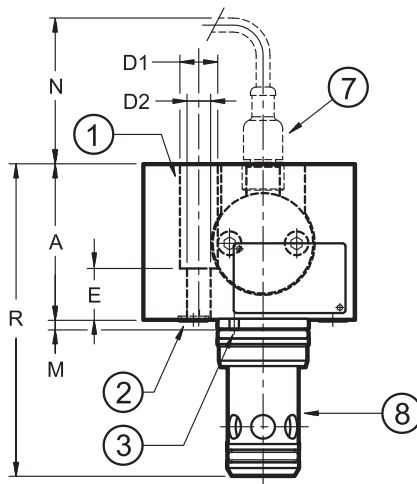
| Functional diagram | Description   |
|--------------------|---|
|                    | <p>Piloting of cartridge valve by means of solenoid poppet valve type <b>DT03-3A</b> (to be ordered separately - see catalogue 42 200). ISO 4401-03 manifold type <b>DN6</b> (cod.0294329) that allows to intercept the flow from two lines, obtaining a tight or the free flow.</p> <ul style="list-style-type: none"> <li>- solenoid valve OFF = sealing tight - A ↔ B locked flow</li> <li>- solenoid valve ON = flow A ↔ B free flow</li> </ul> |
|                    | <p>Piloting of cartridge valve by means of connection plate code 1950751 to be ordered separately.</p>  |

## 10.5 - OVERALL AND MOUNTING DIMENSIONS OF MONITORED LOGIC ELEMENTS

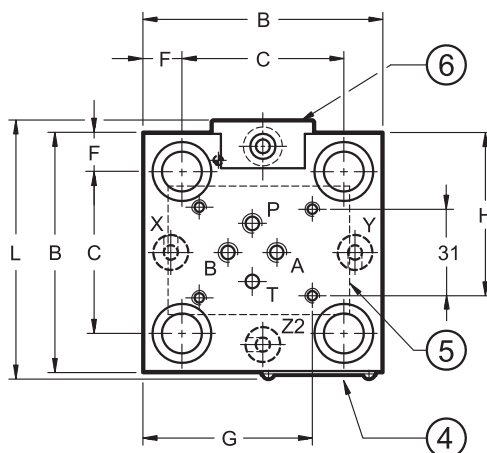
dimensions in mm



LCM16D-QD4  
LCM25D-QD4  
LCM32D-QD4  
LCM40D-QD4  
LCM50D-QD4



LCM25Z-QD4  
LCM32Z-QD4  
LCM40Z-QD4  
LCM50Z-QD4



|    | NOMINAL SIZE |      |       |       |       |
|----|--------------|------|-------|-------|-------|
|    | 16           | 25   | 32    | 40    | 50    |
| A  | 55           | 60   | 70    | 75    | 90    |
| B  | 78,5         | 85   | 100   | 125   | 140   |
| C  | 46           | 58   | 70    | 85    | 100   |
| D1 | 13,5         | 19   | 25    | 31    | 31    |
| D2 | 8,5          | 19   | 17    | 21    | 21    |
| E  | 18           | 17   | 22    | 30    | 30    |
| F* | 19,5         | 13,5 | 15    | 20    | 20    |
| F  | 9,5          | 13,5 | 15    | 20    | 20    |
| G  | 52           | 60,2 | 67,7  | 80,2  | 87,7  |
| H  | 48           | 58   | 65,5  | 105   | 85,5  |
| L  | 81           | 92   | 102,5 | 127,5 | 142,5 |
| M  | 4            | 5    | 5     | 5     | 5     |
| N  | 70           | 70   | 65    | 60    | 55    |
| R  | 111          | 132  | 155   | 180   | 212   |

|                                    |                             |     |     |     |      |
|------------------------------------|-----------------------------|-----|-----|-----|------|
| ports ready for restrictors M6x8.5 | P, A<br>B (on cover Z only) |     |     |     |      |
| Mass [Kg]                          | 2,1                         | 3,3 | 5,3 | 9,5 | 14,5 |

|   |  |
|---|--|
| 1 | N. 4 fastening bolts ( <b>NOTE</b> ):<br><b>16</b> = M8x30 <b>40</b> = M20x60<br><b>25</b> = M12x35 <b>50</b> = M20x60<br><b>32</b> = M16x45   |
| 2 | n° 3 sealing rings 90 Shore :<br><b>16</b> = OR type 2025 (6.07x1.78) (for ND 16 there are only 2 OR)<br><b>25</b> and <b>32</b> = OR type 2037 (9.25x1.78)<br><b>40</b> and <b>50</b> = OR type 2050 (12.42x1.78) |
| 3 | Locating pin:<br><b>16</b> = Ø3x10 <b>40</b> = Ø5x14<br><b>25</b> = Ø5x14 <b>50</b> = Ø6x14<br><b>32</b> = Ø5x14   |
| 4 | Identification label   |
| 5 | Mounting surface ISO 4401-03 (CETOP 4.2-4-03-350)  |
| 6 | Proximity sensor   |
| 7 | Connector for proximity sensor (to be ordered separately see par. 10.6)  |
| 8 | Cartridge valve always supplied with the cover   |

**NOTE1:** fastening bolts class 12.9 ISO 4762 are recommended for cover installation (to be ordered separately)

**NOTE2:** for cartridge valve seat dimensions see par. 5

## 10.6 - Technical characteristics of proximity sensor and relevant connector

### PROXIMITY SENSOR

#### PNP TYPE

|  |  |           |
|--|--|-----------|
| Rated voltage  | V DC   | 24        |
| Power supply voltage range   | V DC   | 10 ÷ 30   |
| Absorbed current   | mA   | 200       |
| Output   | normally open contact                              |           |
| Electric protection  | polarity inversion<br>short circuit<br>overvoltage |           |
| Electric connection  | with connector                                     |           |
| Max operating pressure   | bar  | 350       |
| Operating temperature range  | °C   | -25 / +80 |
| Class of protection according to CEI EN 60529 standards (atmospheric agents) |  | IP68      |
| Spool position LED ( <b>NOTE</b> )   |  | NO        |

**NOTE:** The led is placed in the connector and its light is YELLOW.

### ELECTRIC CONNECTOR (to be ordered separately)

code: ECM3S / M12L / 10

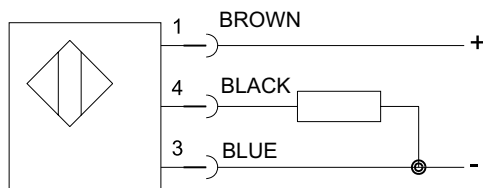
Connector: pre-wired connector M12 - IP68  
cable: with 3 conductors 0.34 mm<sup>2</sup> - length 5 mt - cable material: polyurethane resin (oil resistant)

#### LEDS:

GREEN LED: show the presence of power supply voltage to the connector. If the LED is off, the connector is not supplied.

YELLOW LED: show the valve condition:

- valve at rest      yellow LED on - green LED on
- switched valve    yellow LED off - green LED off



valve closed = closed contact (A↔B intercepted flow)  
valve open = open contact (A↔B free flow)