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Общество с ограниченной ответственностью
«Кама-Флекс Гидравлика»

# Monoblock

# Directional Control Valves

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Monoblock Directional Control Valves

Contents


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# 1 Hydraulic system

## 1.1 General directions for circuit installation of system

### 1.1.1 Cleanliness

Before cabling pipelines, make sure that pipelines hollows are thoroughly clean (metal and flexible pipes), likewise fitting tings and seals.
The same care should be exercised during assembling and servicing operations, adapting clean procedures and working in an environment free of chips, swarf, dust and other possible sources.

### 1.1.2 Tank

The recommended tank capacity must be 2 ч 3 times the pump flow rate Q (unit volume per minute) for intermittent duties, or 6 ч 7 x Q for continuous duties, and up to 10 ч 12 x Q for heavy duties with demanding continuity, pressure and temperature conditions.
The suggested temperature of the oil in the tank should not exceed 60° C (140° F); if this limit cannot be guaranteed by the dimensions of the tank alone, a heat exchanger must be installed.

### 1.1.3 Pipeline diameters

The oil speed must be kept within safe limits, beyond which the operation of the system could be adversely affected. As a general guide, recommendable limits are:

0.5 ч1.5 m/s (1.7 ч 5 ft./s) suction
0.8 ч 2 m/s (2.2 ч 6.6 ft./s) return
2 ч 5 m/s (6.6 ч17 ft./s ) pressure

Lower speeds are adapted for applications typified by low pressure or continuous duty.
Remember that flow speed in m/s is determined by the formula $[(Q/d^2) \times 21.2]$
where
Q" is the flow rate in liters/min.
d" is the internal diameter of the pipe in mm.

### 1.1.4 Filters

Filtration 10 micron must be assured where solenoid or pilot operated valves are in use, and p30 micron in other cases. Except in certain special applications, the filter is usually assembled on the return line, that the size of element must be compatible with the maximum unloading flow rate.

### 1.1.5 Oil

The system should be operated only with hydraulic oil containing anti-foaming and antioxidant additives.
Selection of the right viscosity range will depend principally on the temperature and filtration parameters, the oil should be changed following the first 3000 hours operation and every 5000 hours thereafter.

### 1.1.6 Fittings

The threaded ports of the directional control valve housing are machined to DIN 3852 form x.
Accordingly, fittings with STRAIGHT THREADED ENDS only should be used (e.g. DIN 3852 form A or B).
In the interest of safety, fittings with TAPER THREADED ENDS (e.g. DIN 3852 form C) should never be used, as these can cause deformation and cracks in the valve housing.
Our warranty conditions will be not valid in the case of tapered fittings utilisation.

## 1.2 Directional control valves Operating and maintenance guide-lines

Always exercise the utmost care when carrying out any operation on the valves (assembling, stripping, tests) and pay scrupulous attention to cleanliness: this will prevent the valves from the risk of being seriously damaged attributable to chips, dust and other foreign matter.
When washing a machine to which valves are mounted, never expose the valves themselves to liquids containing detergents or corrosive agents, or to high pressure jets, which may damage them or cause rust and corrosion.

### 1.2.1 Spools assembling

The location of spools in the valve housing does not present any particular difficulty.
First, make sure the O-ring seals are faultlessly clean, then proceed to insert the spool into its socket, checking for smooth and unhindered sliding movement. Finally, fit the seals with the relative alignment rings, then fix on the position control and the handle assembly.

### 1.2.2 Assembling of valve sections

Before proceeding with the assembling of sectional valves, make sure that the mounting surface is strictly flat. Start by locating all the O-rings in their respective seats, applying a light layer of grease.
The bolts must be gradually by small increments up to the prescribed torque (see table).
Under no circumstances attempt doing this operation without the aid of a torque wrench; the bolts must be torqued up gradually and in alternation, as excessive or unevenly applied force can cause the spools to jam.
Conversely, an insufficient tightening torque can result in oil leaks and extrusion of the seals.
The operation of bolts tightening should be effected with oil components at ambient temperature (20 ч 30 C).
After completing the assembling and tightening operations, verify that the spools continue to slide freely and proceed with final testing.

## 1.3 Generals

Recommended conditions for best performance of the system. We recommend to strictly follow the conditions advised here above, failing which warranty shall be void.

# 2 Monoblock directional control valve DE 40

Contents


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| 2.7 | Cable remote control | 7.2 |
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## 2.1 General specifications

| Technical specification | Metering unit system | |
|---|---|---|
| Max flow rate | l/min<br>U.S.G.P.M. | 45<br>12 |
| Max operating pressure | bar<br>PSI | 300<br>4350 |
| Max back pressure | bar<br>PSI | 50<br>700 |
| Oil temperature | ° C<br>° F | -10 to 80<br>14 to 180 |
| Oil viscosity | ° E<br>cSt | 2.4 to 10<br>16 to 75 |
| Oil filtration | m | p30 |

| Spool leakage at 100 bar (1450 PSI), Temp. 50° C (120° F), viscosity 27 cSt: | | |
|---|---|---|
| Maximum | $cm^3$/min<br>Cu. In./min | 12<br>0.732 |
| Middle | $cm^3$/min<br>Cu. In./min | 8<br>0.487 |
| Lower values on demand (to be agreed with our Sales Dpt.) | | |

| | |
|---|---|
| Number of spools | 1 to 7 |
| Adjustable direct operated relief valve (tamper-proof seal available on request) | VP |
| Single load hold check valve | C |

### 2.1.1 Weight

| Version | Metering unit systems | Weight |
|---|---|---|
| DE 40.1 | kg<br>LBS | 3<br>6.61 |
| DE 40.2 | kg<br>LBS | 4<br>8.82 |
| DE 40.3 | kg<br>LBS | 5<br>11.03 |
| DE 40.4 | kg<br>LBS | 6<br>13.21 |
| DE 40.5 | kg<br>LBS | 7<br>15.41 |
| DE 40.6 | kg<br>LBS | 8<br>17.61 |
| DE 40.7 | kg<br>LBS | 9<br>19.83 |

### 2.1.2 Material specification:

Body: High strength cast-iron.
Spool: Hardened steel and chrome plated
Seals: Buna N".

### 2.1.3 Standard features:

1) Parallel - Tandem circuit
2) interchangeable spools (provides minimum leakage, smooth operation)
3) Wide selections inlets, work ports, and outlets threaded ports.
4) Negative overlapping of the spool.

### 2.1.4 Optional features available:

1) Open or closed centre positions, 3 or 4 way operations, 3 or 4 position (float position), full open centre (motoring spool) and other spool options.
2) Carry over.
3) Complete lever assembly
4) Wide range of positioners

### 2.1.5 Symbols:

P: inlet port
T: outlet port
A / B: work ports
H.P.C.O.: carry-over
VP: relief valve
$P_2T_2$: top inlet and outlet ports
$P_1$: side inlet
$T_1$: side outlet

P: pressure line
T : exhaust line
N : centre line (by pass).

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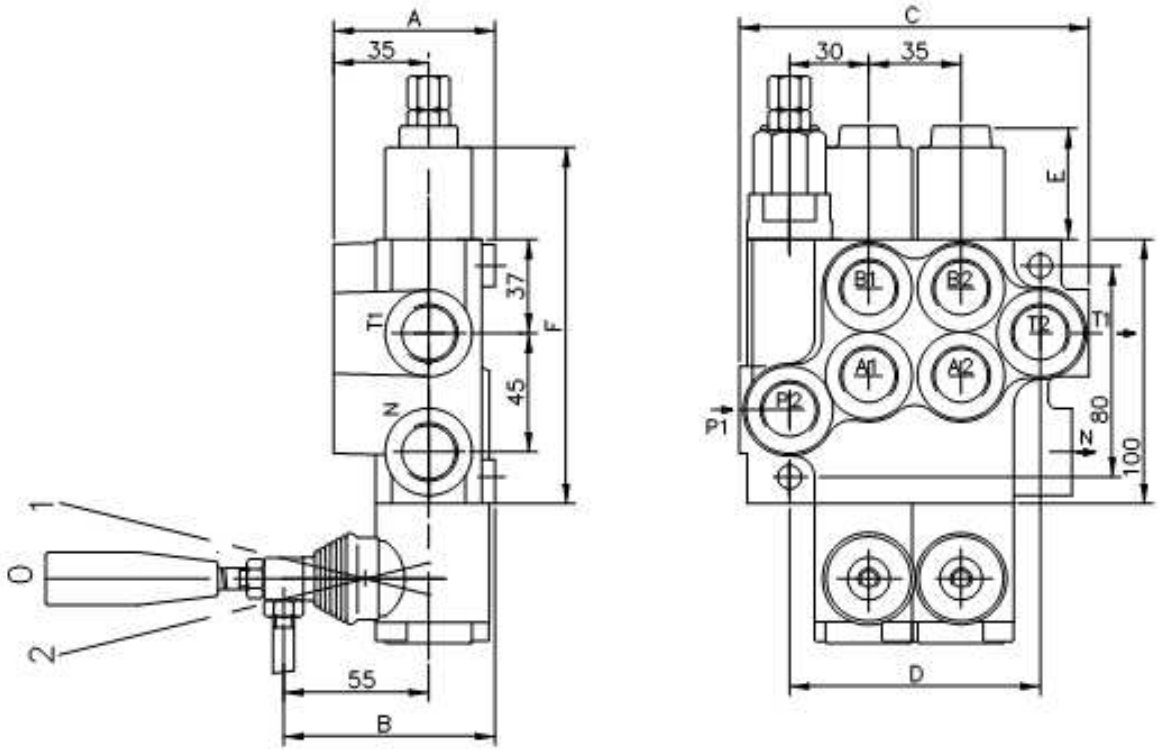
2.2 Dimensional data

## DE 40 1 / 2 / 3 / 4 / 5 / 6 / 7




| | A | B | C | D |
|---|---|---|---|---|
| DE 40.1 | 60 | 80 | 85 | 60 |
| DE 40.2 | 60 | 80 | 129 | 97 |
| DE 40.3 | 60 | 80 | 164 | 132 |
| DE 40.4 | 60 | 80 | 199 | 167 |
| DE40.5 | 60 | 80 | 234 | 202 |
| DE 40.6 | 60 | 80 | 269 | 237 |
| DE 40.7 | 60 | 80 | 304 | 272 |

Table 4

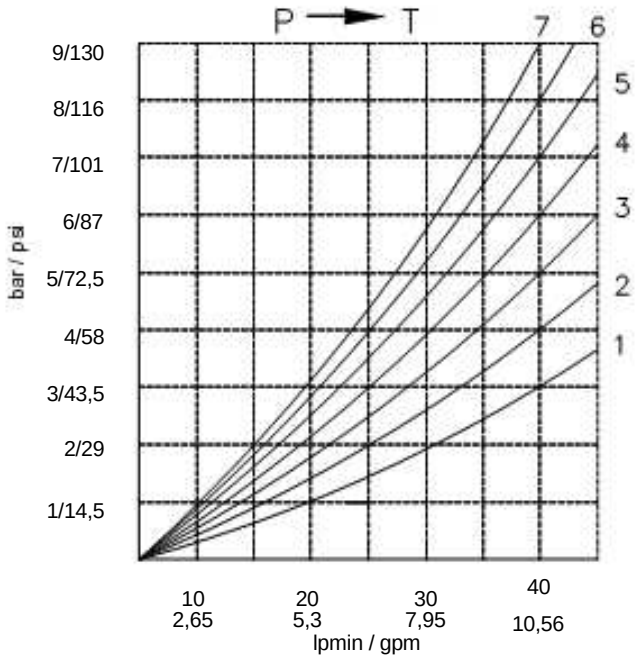
| code | working ports |
|---|---|
| 11 | P1 - T1 |
| 12 | P1 - T2 |
| 21 | P2 - T1 |
| 22 | P2 - T2 |

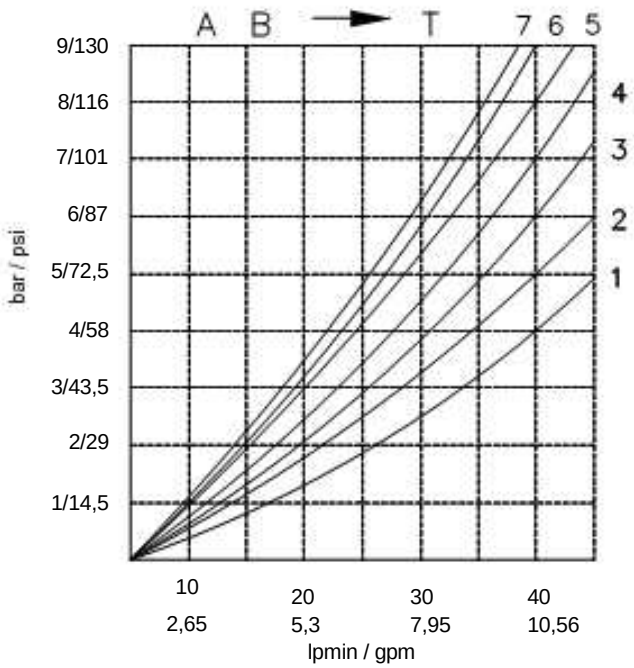
| Spool Positioners | E | F |
|---|---|---|
| 1 - 4 - 5 - 6 - 7 - 8 - 9 - 10 - 11 | 40 | 183 |
| 2 - 3 | 72 | 225 |
| 16 | + | + |

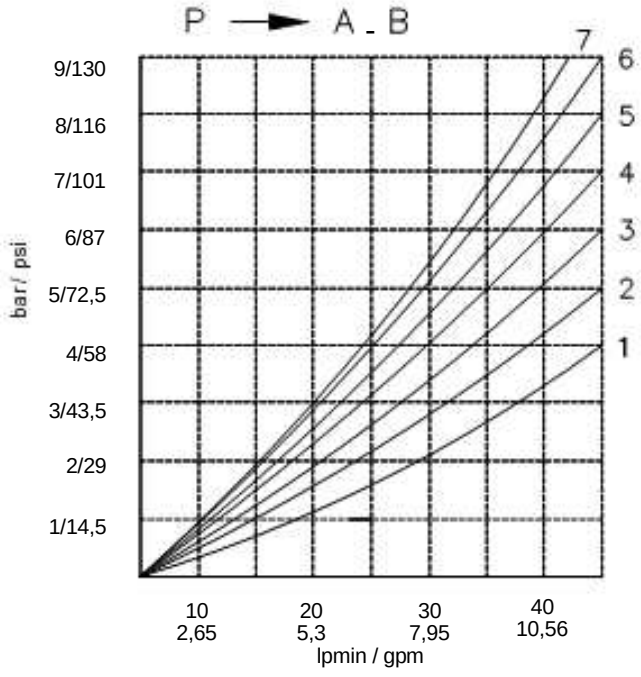
Table 5

| code | Port thread | | | |
|---|---|---|---|---|
| | P | A B | T | N |
| M | M22x1.5 | M18x1.5 | M22x1.5 | M22x1.5 |
| G | 1/2" BSPP | 3/8" BSPP | 1/2" BSPP | 1/2" BSPP |
| S | 7/8" - 14 UNF | 3/4" - 16 UNF | 7/8" - 14 UNF | 7/8" - 14 UNF |

## 2.3 Performance curves



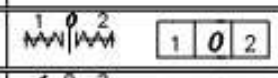
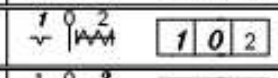
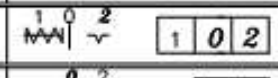
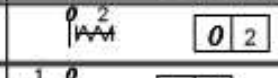
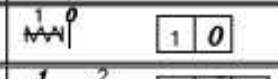
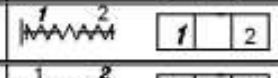
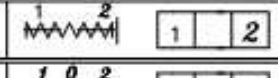
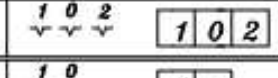
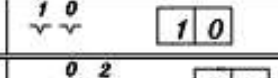
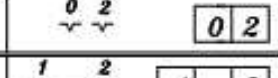
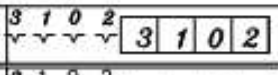
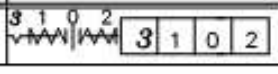



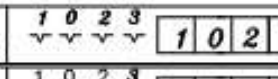
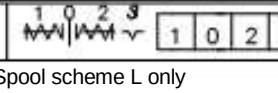

Oil Shell Tellus T37
Temperature 50℃ (120℉)
Viscosity 27 cSt

## 2.4 Spool charts

Table 11

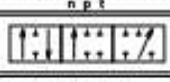
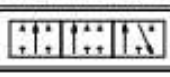
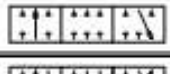
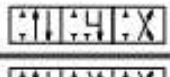
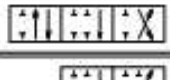
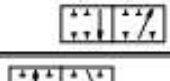
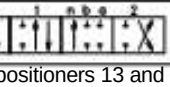
| Type | Spool positioners |
|---|---|
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 9 |  |
| 10 |  |
| 11 |  |
| * 13 |  |
| * 16 |  |

* for Spool scheme K only

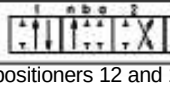
| | | |
|---|---|---|
| ** | 13R |  |
| ** | 12 |  |

** for Spool scheme L only

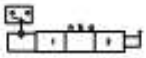
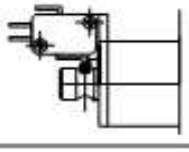
Table 10

| Type | Spool scheme |
|---|---|
| A |  |
| B |  |
| C |  |
| D |  |
| E |  |
| F |  |
| G |  |
| H |  |
| M |  |
| N |  |
| O |  |
| P |  |
| Q |  |
| R |  |
| S |  |
| T |  |
| * K |  |

* for Spool positioners 13 and 16 only

| | | |
|---|---|---|
| ** | L |  |

** for Spool positioners 12 and 13R only

| code | Microswitch option | |
|---|---|---|
| 17 |  | Microswitch type Omron v 165 I C5<br>Spool positioner 1  |

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2.5 Schemes

Table 6

| Code | Circuit type |
|---|---|
| P | Parallel |
| T | Tandem |

Table 7

| Code | Relief valve VP |
|---|---|
| W | Without relief valve |
| D180 | With relief valve ( factory setting 180 bar ) |

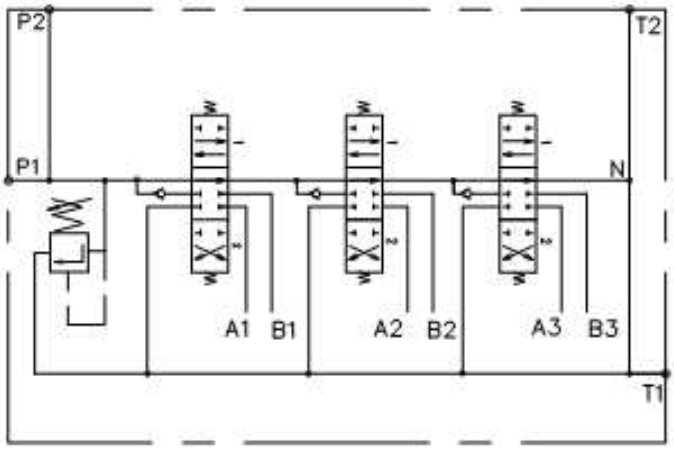
Table 3

| Code | Check valve option |
|---|---|
| S | Single check valve on inlet port |
| C | Check valve on each section |

Table 8

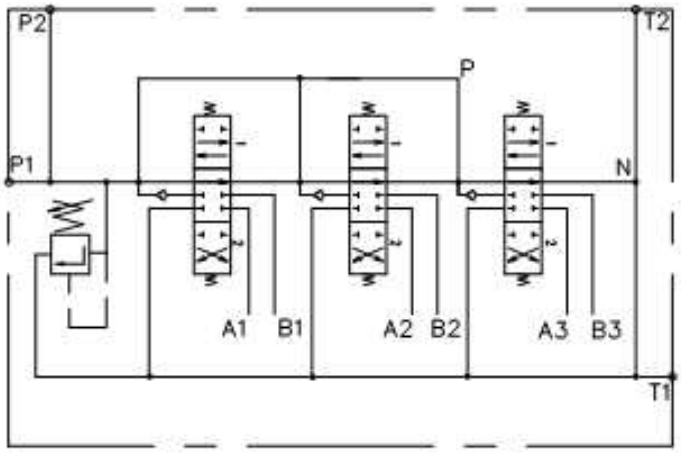
| Code | Outlet port |
|---|---|
| X | Without power beyond ( H.P.C.O. ) |
| C2 | Power Beyond ( H.P.C.O. ) 1/2" BSPP female thread |
| N | Prearrangement for power beyond ( H.P.C.O. ) |
| C4 | Closed center |

DE40.3.C.T.A1.A1.A1



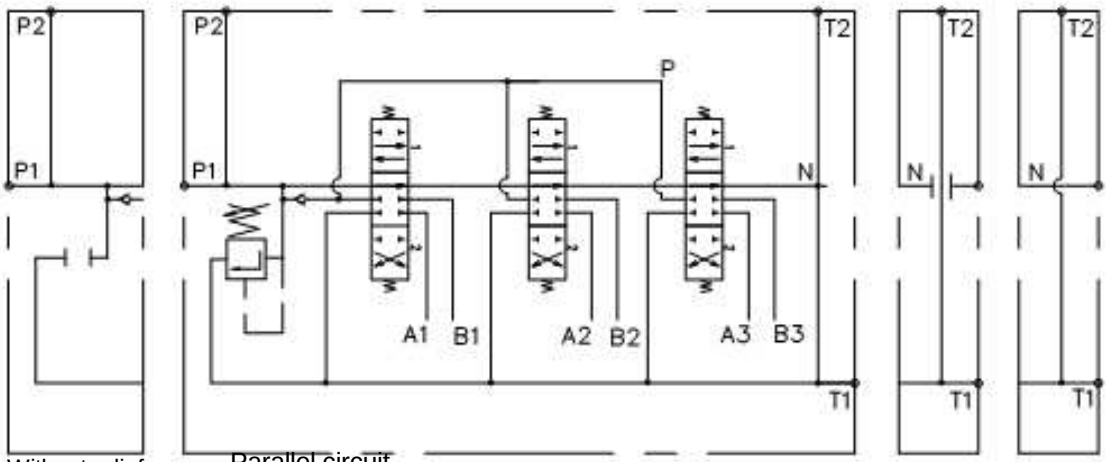

Tandem circuit
with check valve on each section

DE40.3.C.P.A1.A1.A1




Parallel circuit
with check valve on each section

DE40.3.S.P.A1.A1.A1




Without relief
Valve

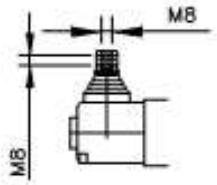
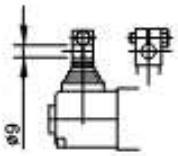
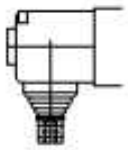
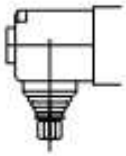
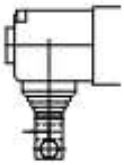
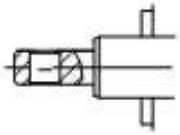
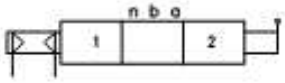
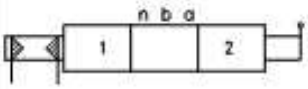
Parallel circuit
with single check
valve on inlet port

Closed
center

Power
beyond - H.P.C.O

## 2.6 Spool control

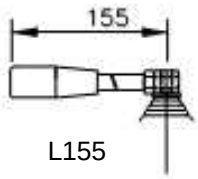
Table 12

| code | feature | code | feature | code | feature |
|---|---|---|---|---|---|
| L10 |  Lever control | L11 |  Lever control | L12 |  Lever control |
| L20 |  Lever control | L21 |  Lever control | L22 |  Lever control |
| SL |  Without lever control | P |  Pneumatic control on-off ( 5-10 bar ) pilot port 1/4" BSPP | H |  Hydraulic control on-off ( 5-20 bar ) pilot port 1/4" BSPP |
| TC<br>TP | Cable remote control ( see paragraph 2.7 ) | TM | Joystick control ( see paragraph 2.8 ) | | |

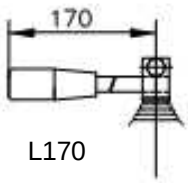
Shaft type for lever control L10, L11, L12, L20, L21 and L22 (to be ordered separately):

L155 (M8 x 155mm)

L170 (dia.9 x 170mm)



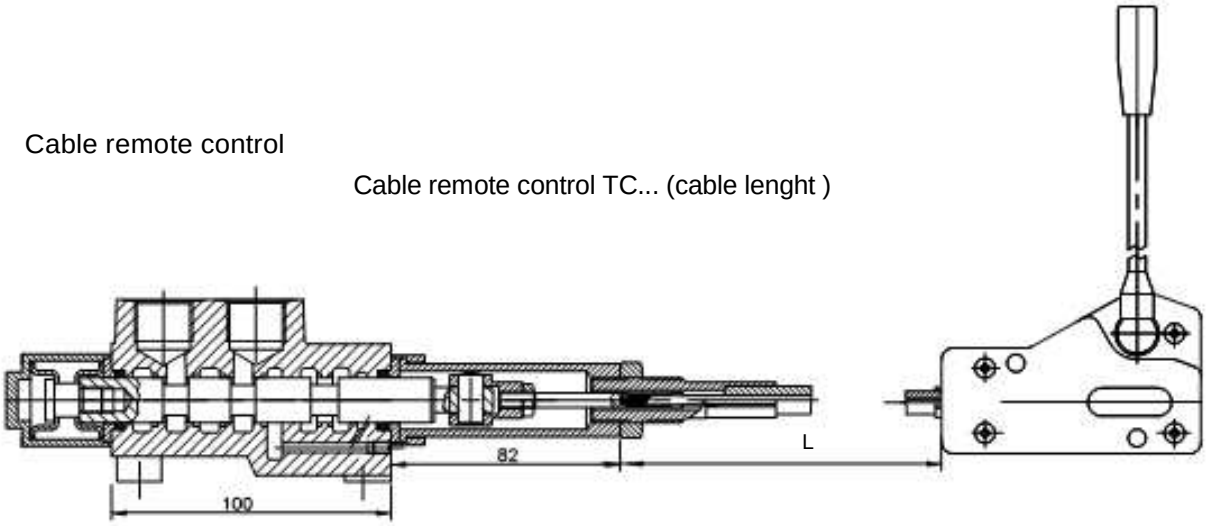
L155



L170

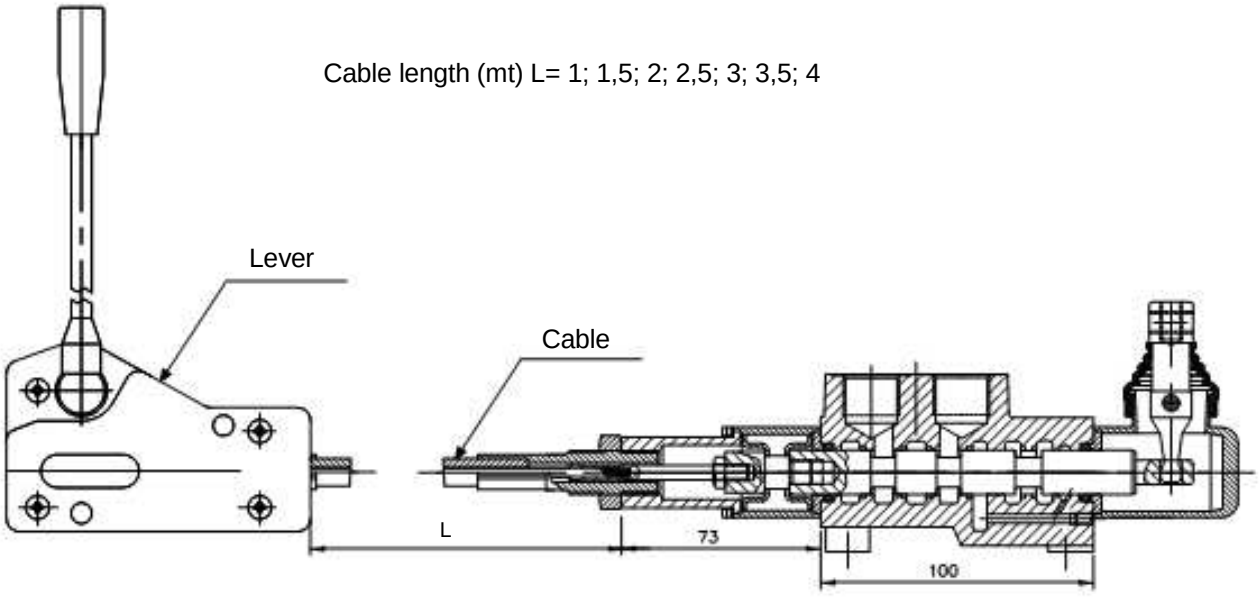
## 2.7 Cable remote control

Cable remote control TC... (cable lenght )



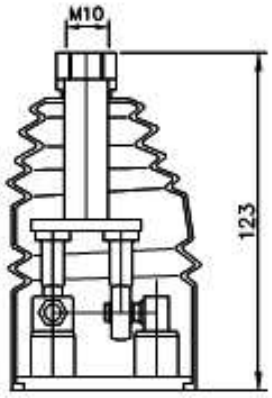

| Lever | | | |
|---|---|---|---|
| Code | 3047 | 3076 | 3077 |
| Stroke | 13+13 mm | 13+13 mm | 13+13 mm |
| Max. load | 45 kg | 45 kg | 45 kg |
| Level ratio | 10:1 | 10:1 | 10:1 |
| Lock in neutral | No | No | Yes |
| Antireverse lock | No | Yes | No |
| Body colour | Black | Black | Black |
| Cables type | Heavy Duty | Heavy Duty | Heavy Duty |
| Operating temperature | -40/+80C | -40/+80C | -40/+80C |

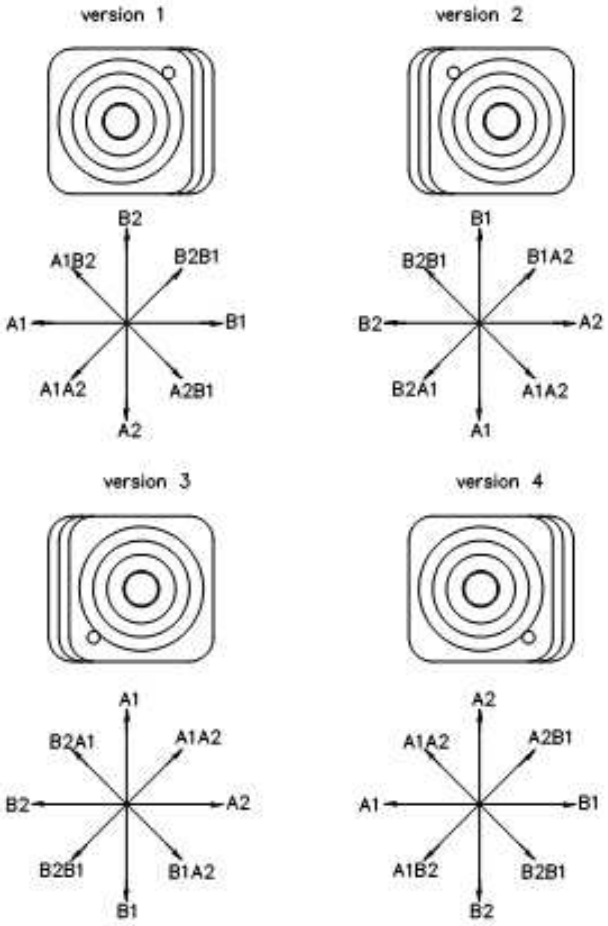
Cable length (mt) L= 1; 1,5; 2; 2,5; 3; 3,5; 4

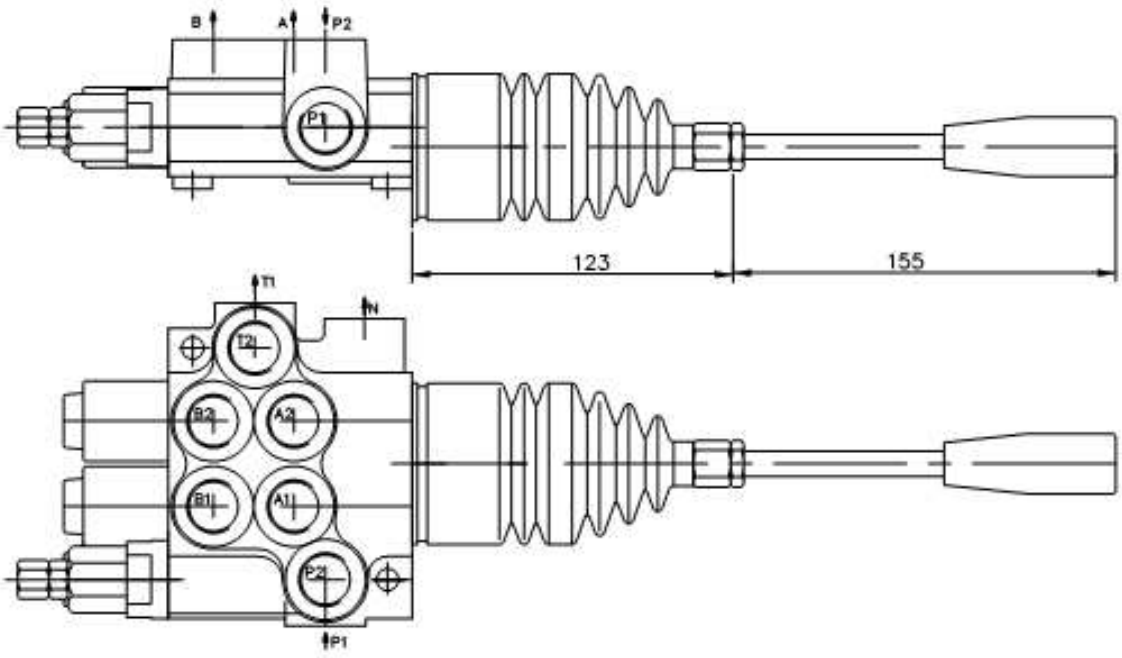



Cable remote control TP... (cable length )

2.8 Joystick control TM



## 2.9 Order Code

| Body features | | | | | | | | | Spool features | | | | Spool features | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DE 40 | 2 | S | 11 | G | P | D180 | X | - | A | 1 | L10 | - | A | 1 | P |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | 10 | 11 | 12 | | 10 | 11 | 12 |

| | | |
|---|---|---|
| 1 | Valve series | DE 40 |
| 2 | Number of Spool | 1 / 2 / 3 / 4 / 5 / 6 / 7 |
| 3 | check valve option | see table 3 |
| 4 | Working ports | see table 4 |
| 5 | Type of thread | see table 5 |
| 6 | Circuit type | see table 6 |
| 7 | Relief valve VP (setting) | see table 7 |
| 8 | Power Beyond ( H.P.C.O. ) | see table 8 |

| | | |
|---|---|---|
| 10 | Spool chart | see table 10 |
| 11 | Spool positioner | see table 11 |
| 12 | Spool control | see table 12 |

Example of order code:

DE 40.2.S.11.G.P.D180.X - A.1.L10 - A.1.P

Reminder: shaft for lever control to be ordered separately