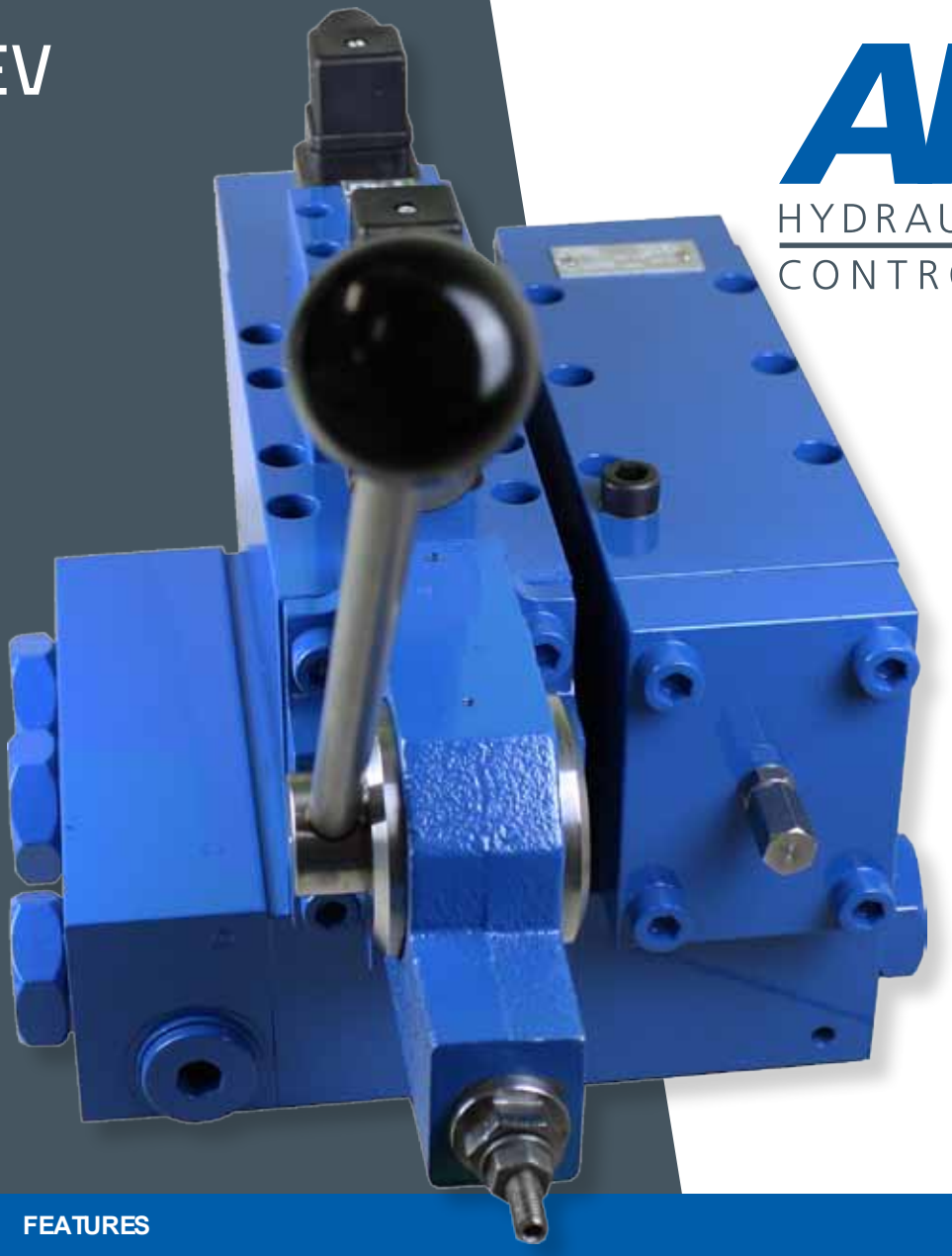
# MEV

AMCA HYDRAULIC CONTROLS



## FEATURES

* Load independent flow control corresponds to the spool-position proportional to the electrical input signal.

* The pump pressure always corresponds to the user pressure, +3,6,8 or 12 bar (43, 86, 114 or 172 psi) Δp compensator.

*The built-in pump-unloading valve results in:
- very low power turned into heat;
- minimum loading of the prime mover.

*User speed is precisely controlled under all load conditions.

*Progressive regulating curve; no pressure peaks when switching; sensitive control even for alternating pressures.

*Constant working speed of differential cylinders at the different regulating flow to the valve by grinding angle.

* Constant recirculation pressure independent of the number of units.

* Any limiting of flow for every user port.

* Load independent switching adjustment, constant acceleration and deceleration.

*Proportional solenoids with longer life for the armature in the oil (explosion proof solenoids "II 2 EEx mII T4 or T5", available).

*Proportional directional control valves also available as:
- Manual proportional series MHV and
- Hydraulic proportional series MOV.

Any combination of these control options is possible.

* The sub plate system allows a construction up to 8 control valves.

## TECHNICAL DATA

| | |
|---|---|
| Operating pressure (P,A,B) | ...350 bar (5000 psi) |
| Maximum return pressure (T): | |
| - aluminium springcaps | 15 bar (214 psi) |
| - cast iron springcaps | 30 bar (428 psi) |
| Δp compensator | 3; 6; 8 or 12 bar (43; 86; 114 or 172 psi) |
| Pressure setting range | 5...350 bar (72...5000 psi) |
| Flow range | ...800 l/min (...211 USgpm) - with 32 cSt at 40°C |
| Fluid | Mineral oil according to DIN 51524/51525 |
| Fluid temperature range | -35...+80°C (-31°...+176°F) |
| Viscosity range | 2,8...380 cSt, optimal 30 cSt |
| Contamination level max. | according to NAS 1638 Class 9 or ISO 18/15 |
| Nominal voltage | 12 V, 24 V |
| Nominal current | 12 V DC = 1.400 mA ; 24 V DC = 700 mA |
| Hysteresis | 3...8% (50...800 l/min (13...211 USgpm)) |
| Continuous operating | 100% |
| Type of protection | IP 65, optional IP67/II 2 EEx m II T4 |
| Recommended dither frequency | 100Hz |
| Mounting position | optional |

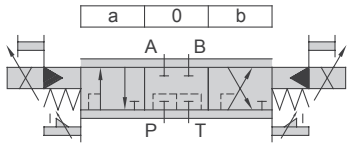
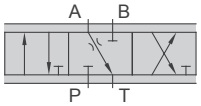
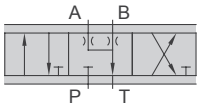
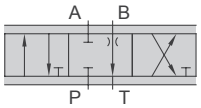
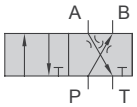
| | | | |
|---|---|---|---|
| Size working ports: | MEV12 : 1/2" | BSP | (SAE optional) |
| (in subplate) | MEV16 : 3/4" | BSP | (SAE optional) |
| | MEV20 : 1" | BSP | (SAE optional) |
| | MEV25 : 1 1/4" | BSP | (SAE optional) |
| | MEV32 : 1 1/2" | BSP | (SAE optional) |

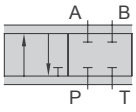
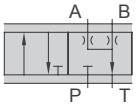
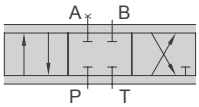
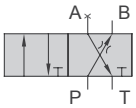
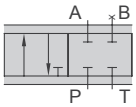
Max. flow in l/min. (USgpm) related to the Δp in bar (psi) over the compensator, per nominal bore:

| Size | Δp compensator | | | |
|---|---|---|---|---|
| | 3 (43) [1] | 6 (86) | 8 (114) | 12 (172) [2] |
| MEV12 | 50 (13) | 80 (21) | 90 (24) | 100 (26) |
| MEV16 | 100 (26) | 140 (37) | 155 (41) | 180 (47) |
| MEV20 | 160 (42) | 225 (59) | 250 (66) | 300 (79) |
| MEV25 | 250 (66) | 350 (92) | 390 (103) | 500 (132) |
| MEV32 | 400 (106) | 500 (132) | 550 (145) | 800 (211) |

[1]) For the MEV only valid with external pilot supply

[2]) Due to loss of pressure c.q. energy conversion into heat, we recommend the next largest size related to a lower Δp compensator.

| Spool types | Symbols | Operation Characteristic |
|---|---|---|
| A 4/3 way |   | In neutral position all ports blocked [3]) |
| B 4/3 way |   | In neutral position A-T 20% of nominal bore [3]) |
| C 4/3 way |   | In neutral position A+B-T 20% of nominal bore [3]) |
| D 4/3 way |   | In neutral position B-T 20% of nominal bore [3]) |
| E 4/2 way |   | P-B and A-T 70% of nominal bore |

| Spool types | Symbols | Operation Characteristic |
|---|---|---|
| F 4/2 way |   | In neutral position all ports blocked [3]) |
| G 4/2 way |   | In neutral position A+B-T 20% of nominal bore [3]) |
| K 3/3 way |   | Port A out of function position [3]) |
| M 3/2 way |   | Port A out of function, P-B 70% of nominal bore |
| O 3/2 way |   | Port B out of function, port T leakage flow [3]) |

[3]) recirculation at low pressure only with MUV

Conventional directional control valves control start, stop and directions of movement from hydraulic motors and cylinders. However, the speed of these users depends on the load pressure. If this load pressure varies, the speed is hardly controllable (figure 1)
The AMCA proportional directional control valves are pressure compensated and achieve an ideal control of force, speed, acceleration and deceleration, independent of the load and increased demands (figure 2)

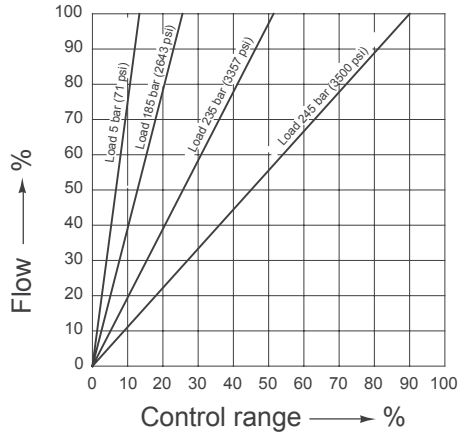



**Fig. 1**

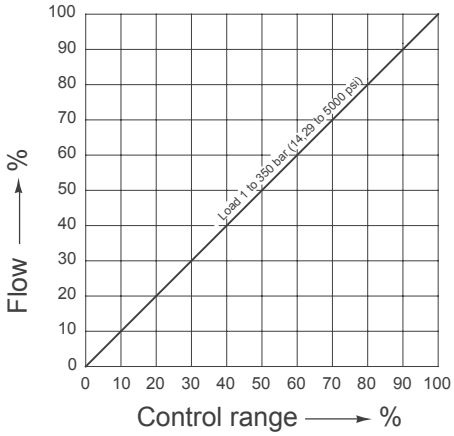



**Fig. 2**

The pressure compensator could be a pressure relief valve (MUV) or a pressure reducing valve (MDM), together with the throttling function of one or more directional control valve spools. This compensator acts as a **by-pass (3-way) flow control valve** (with MUV) or as **series (2-way) flow control valve** (with MDM).
See figures 3 and 4.

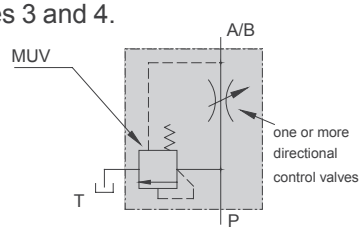



**Fig. 3**

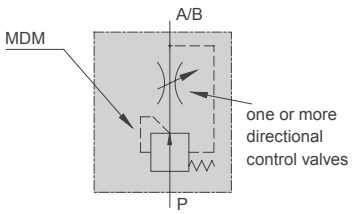



**Fig. 4**

**Advantages of the AMCA Proportional Directional Control Valves:**
The shape of the AMCA proportional directional control valve spool differs from the conventional one.
The result is a progressive flow curve (figure 5). To make optimal use of the maximum stroke of the spool the flow angles of the A and/or B port can be defined for the different flows. For a constant flow, the pressuredrop over the orifice of the spool remains constant, independent of the load pressure (figure 6).

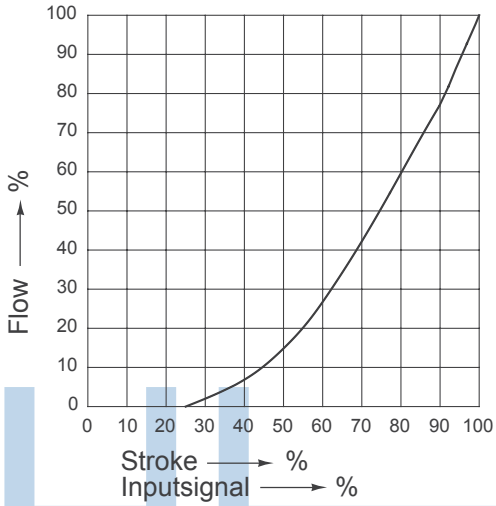



**Fig. 5**

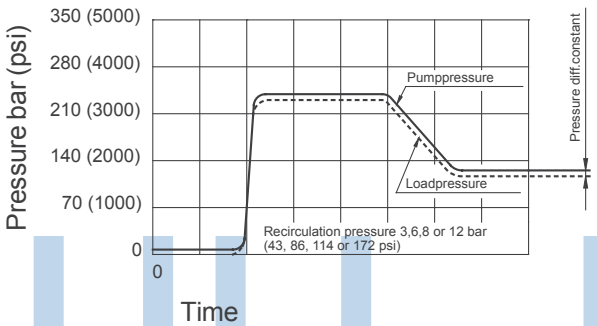



**Fig. 6**

**Functioning of the by-pass (3-way) flow control valve (with MUV)**

(this type is used in combination with fixed displacement pumps) (fig. 7 and 8)

The AMCA-MUV has three functions:

**1. Energy saving**
If the directional control spools are in neutral position (spool 1 in fig.7), and the pump is running, the pressure relief valve 1 (MUV) opens at low pressure (depending on the spring 3, 6, 8 or 12 bar (43, 86, 114 or 172 psi)).
P and T are connected. The power ($pxq_v$) turned into heat is very low.
The spring chamber is connected, via the "load-pressure check back system", to T (tank).
(example fig. 21)

**2. Load independent flow control**
(acting as a 3-way flow control valve)
If one directional control spool is actuated (spool 2 in fig. 7, where P is connected to B2), the load-pressure is connected to the spring chamber of the MUV. The left part of the "load pressure check back system" is closed by spool 2. The load-pressure added to the spring-equivalent pressure is in balance with the pressure at P. Therefore the $\Delta p$ over the directional control valve remains constant (3, 6, 8 or 12 bar (43, 86, 114 or 172 psi)).
As $q_v = k.\sqrt{\Delta p}$, the flow remains constant, at a given opening of port B2, independent of the load-pressure.
The output (flow) is proportional to the input signal (displacement of spool).
The unnecessary pumpflow returns to tank.

**3. Adjustable maximum load pressure**
The maximum load-pressure can be restricted by the adjustable relief valve 2.

**Functioning of the series (2-way) flow control valve (with MDM)**

(this type is used in combination with variable displacement/pressure compensated pumps (example fig. 9 and 10) or accumulator circuits.

The AMCA-MDM has three functions:

**1. Energy saving**
If the directional control spools are in neutral position (spool 1 in fig. 9) and the pump is running, the pressure reducing valve MDM (normally open) tends to close (is balancing).
The pressure controls the pump-capacity to a minimum. Again the power ($p \times q_v$) turned into heat is very low.
The spring chamber is connected, via the "load-pressure check back system" to T (tank).

**2. Load independent flow control**
(acting as a 2-way flow control valve)
If one directional control spool is actuated (spool 2 in fig. 9) MDM-orifice throttles the flow and reduces the pressure. This reduced pressure is connected to B2.
The left part of the "load pressure check back system" is closed by spool 2. The load pressure added to the spring-equivalent pressure (3, 6, 8 or 12 bar (43, 86, 114 or 172 psi)) is in balance with the reduced pressure.
Therefore the $\Delta p$ at flow angle 2 remains constant (3, 6, 8 or 12 bar (42, 86, 114 or 172 psi)). As $q_v = k.\sqrt{\Delta p}$, the flow remains constant at a given opening of port B2, independent of the load pressure.
The output (flow) is proportional to the input signal (displacement of spool).
There is no unnecessary pumpflow (pump capacity is controlled by pressure).

**3. Adjustable maximum load pressure**
The maximum load pressure can be restricted by the adjustable relief valve 2.

**Functioning of the by-pass (3-way) flow control valve (with MUV/R)**

(this type is used if there is a need to use the MUV as a sequence valve)
(fig. 11 and 12)
The function is the same as described in clause 1 (fig. 7). The return bore is blocked (as in fig. 9). There is an additional possibility of directing the pumpflow from P to R (fig. 12) to feed another circuit up to 350 bar, or to control the adjusting mechanism on a variable displacement pump (fig. 11).
(example fig. 24)

Note: (1) *If the systempump is of the load sensing type, no compensator is required. (example fig.25)*
(2) *For simultanious operation of the proportional directional control valve, independent of loadpressure, we advice a pressure compensator for each control valve.*
*For flows < 201 l/min. (53 USgpm) per control section, the MFC stacked valves are a good alternative in this case. (see Publ. F12/18K)*

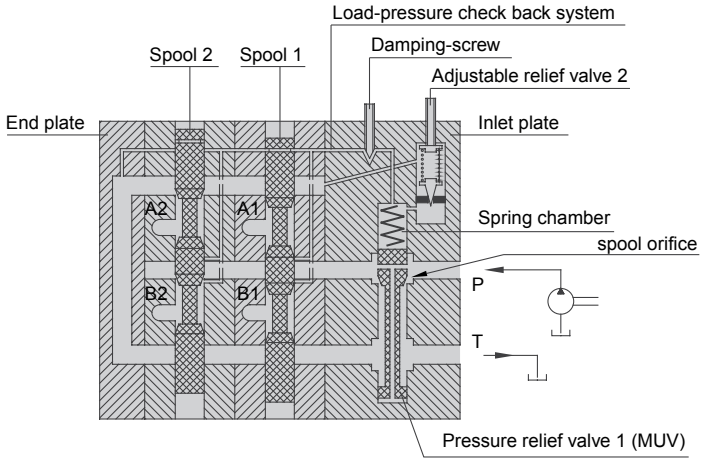



**Fig.7 By-pass control valve**

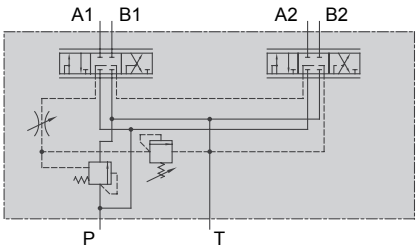



**Fig. 8 With MUV**

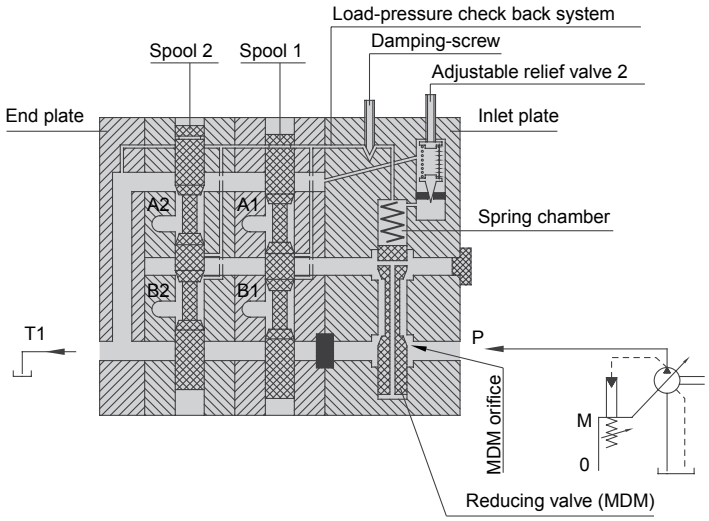



**Fig. 9 Series flow control valve**

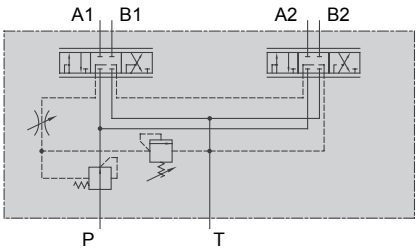



**Fig. 10 With MDM**

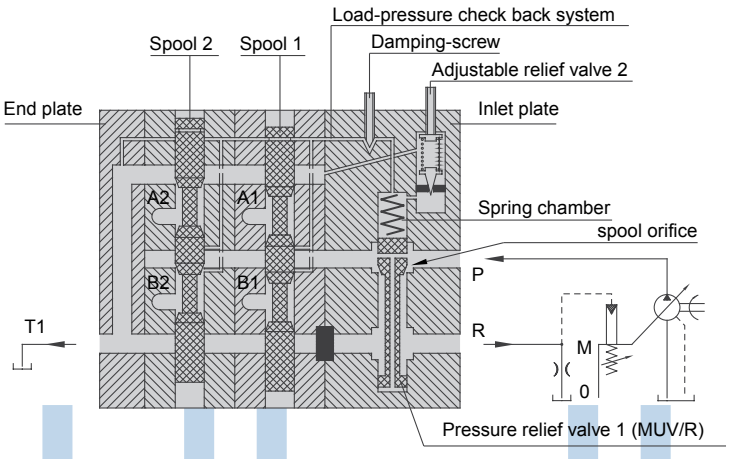



**Fig. 11 By-pass flow control valve**

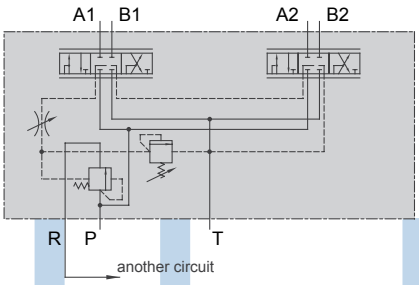



**Fig. 12 With MUV/R**

**Functioning of the proportional directional control valve with electrically controlled pilot stage. (MEV)**

(Fig. 13, 14 and 15)

When solenoid a is actuated it pushes the pilot spool towards solenoid b and opens throttle position 1.
This allows pilot pressure to the springchamber 1 (speed controlled by the adjustable restriction 5) and also through bore 3 to the end of the pilot spool opposite to solenoid a.
The balance force on the pilot spool is the force of the solenoid which is proportional to the electric input.
The balance force equates the pilot pressure in solenoid b and also in springchamber 1.
This pressure pushes the main spool against the spring in springchamber 2 and thus takes up a position proportional to the electric input signal.

With the screws on the springchambers the maximum flow can be adjust by turning in the screw and block the main spool in his stroke.

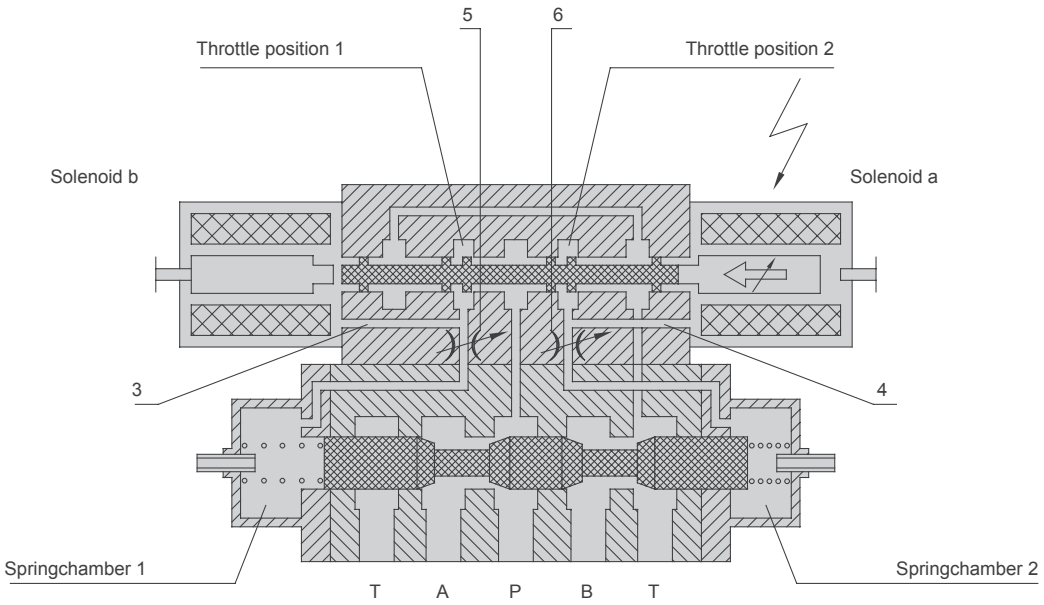



**Fig. 13 MEV**

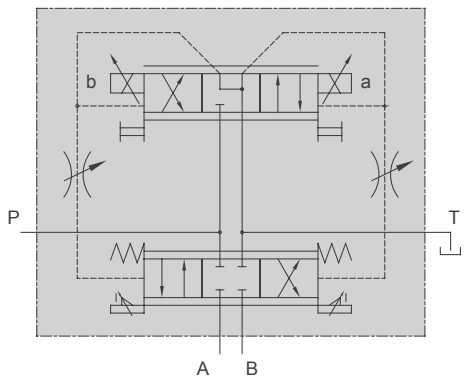



**Fig. 14 (detailed)**

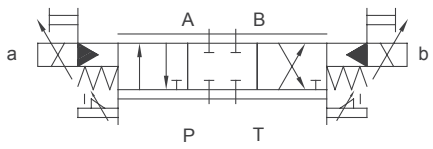
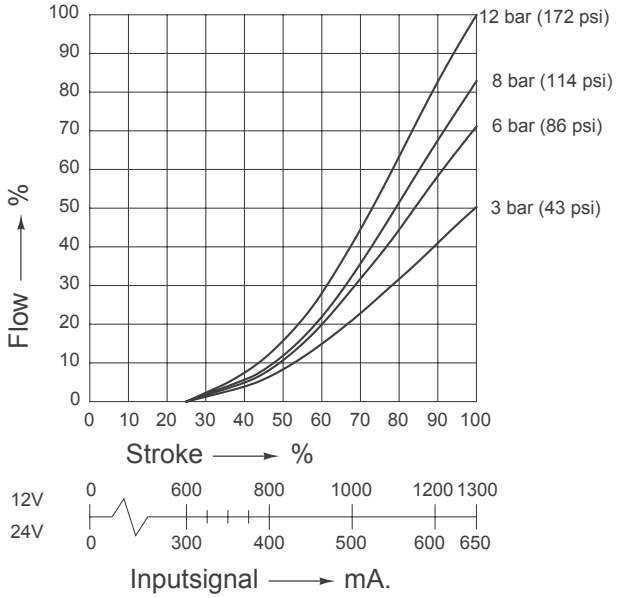
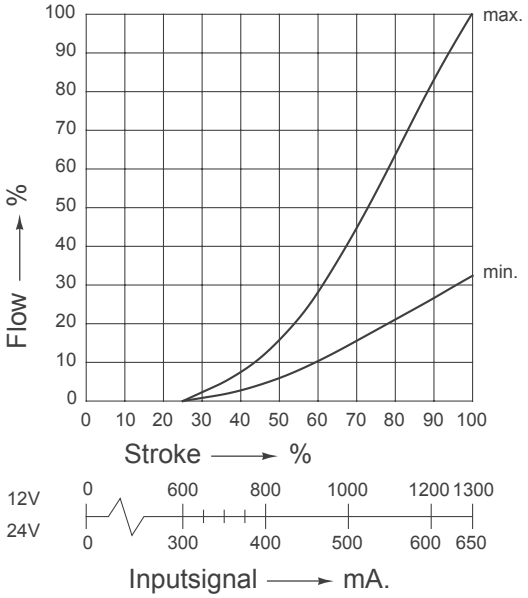



**Fig. 15 (simplified)**

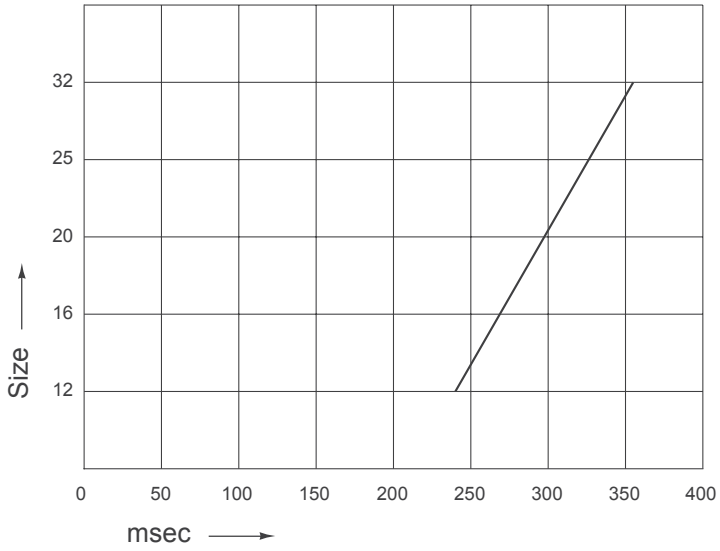
**Flow P → A/B**
**with max. spoolangles**
**with 3, 6, 8 or 12 bar spring**
**(43, 86, 114 or 172 psi)**



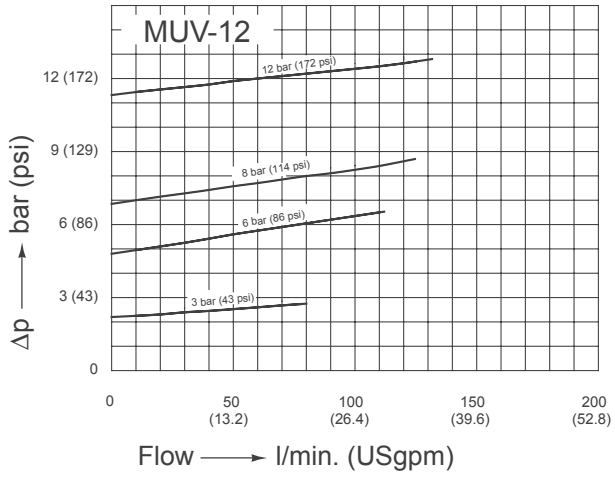

**Flow P → A/B**
**with min. spoolangles**
**to max. spoolangles**

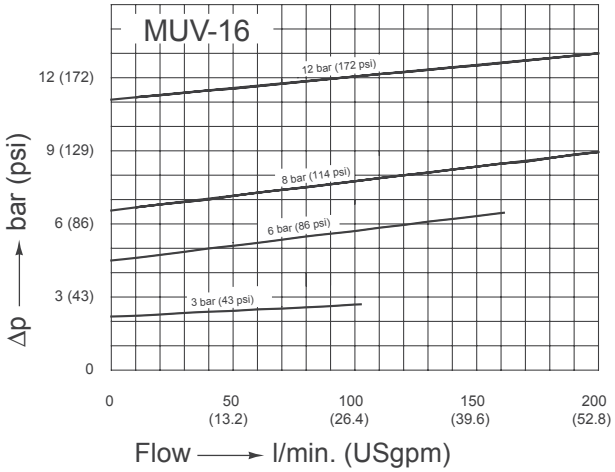


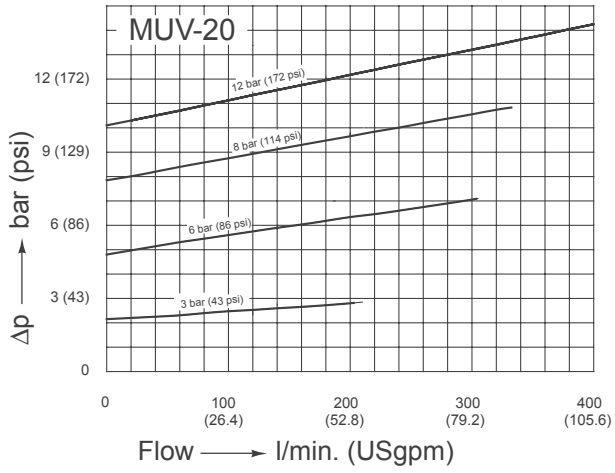

**Response time from neutral position**
**to maximum spool stroke.**
Measured with external pilot supply
on the pilot stage = 100 bar (1430 psi)
at 32 cSt.

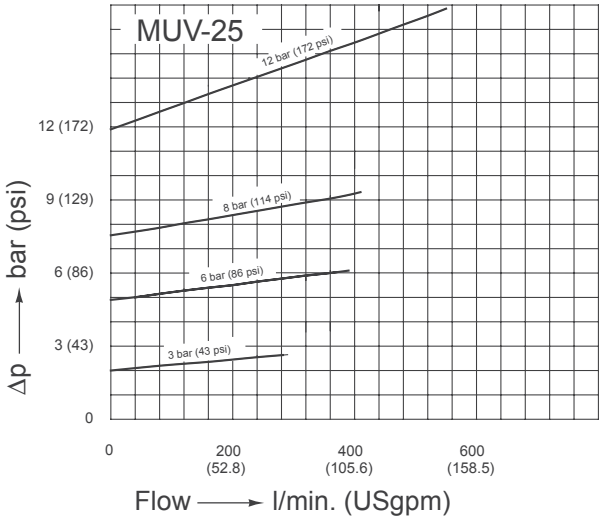


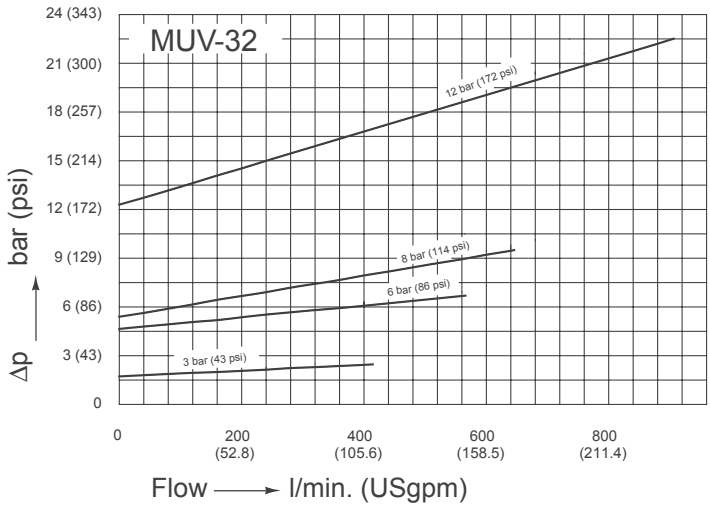
**Free recirculation pressure P⟶ T**
**MUV with 3, 6, 8 or 12 bar spring (43, 86, 114 or 172 psi).**



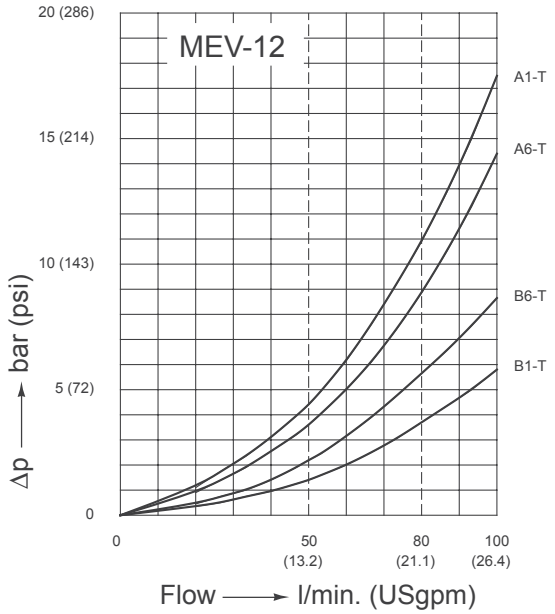



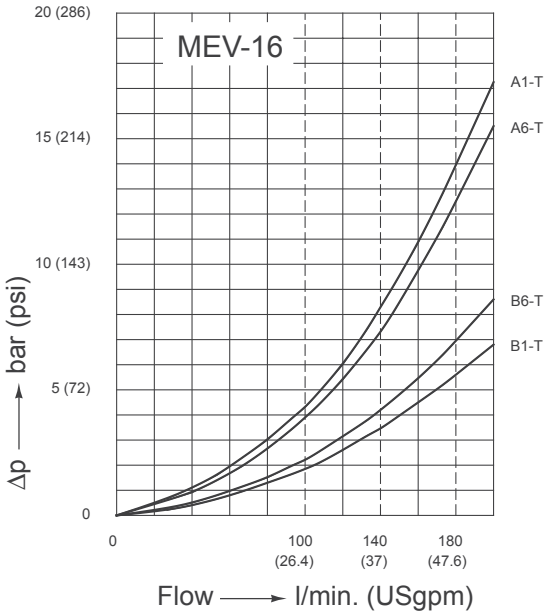



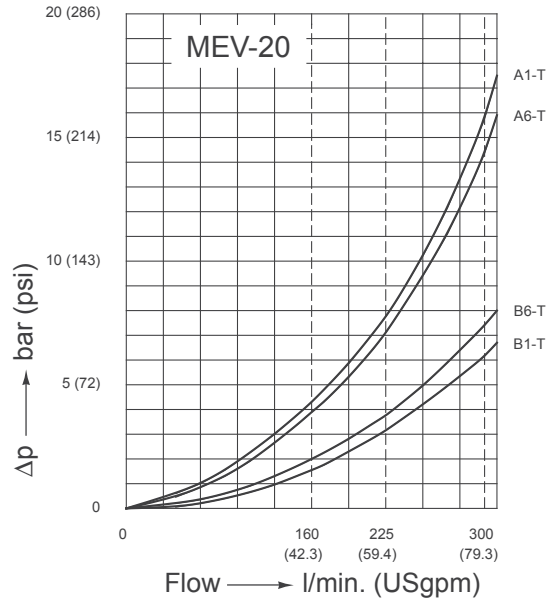



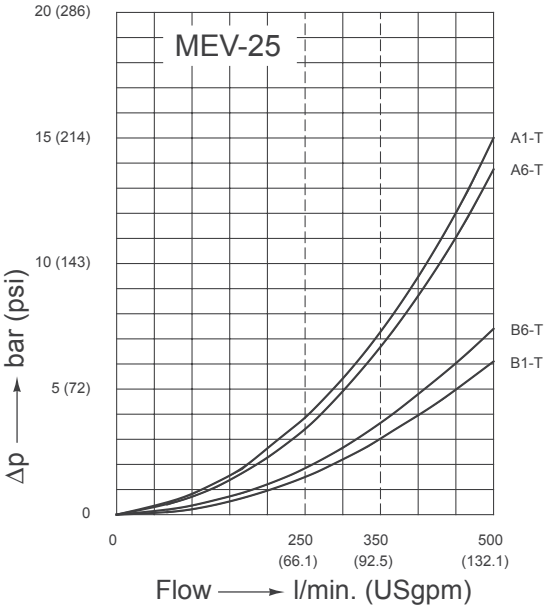



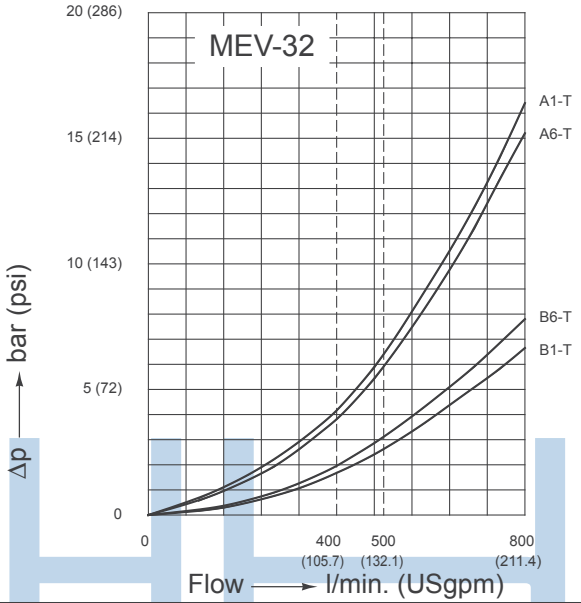
## Pressure drop A/B → T

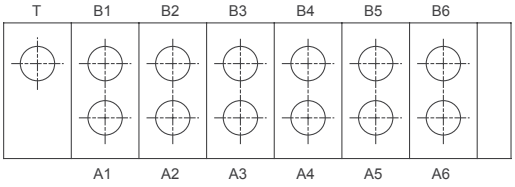


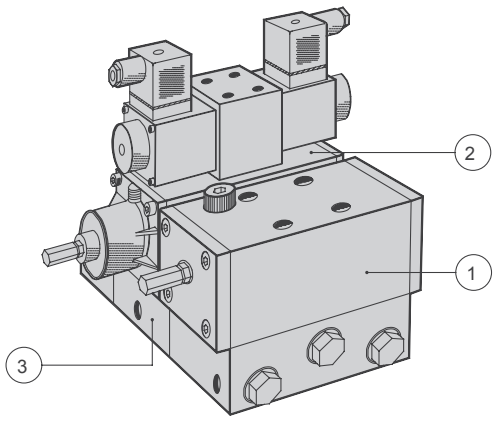




measured with C-spool and
max. spoolopening A/B → T
Viscosity 32 cSt.
Including subplates and couplings.

## TYPE OF VALVE MOUNTING

The AMCA proportional directional control valves series MEV...A are sub-plate-, multiple sub-plate- and ganged sub-plate valves. A complete AMCA-MEV..A system consists for example of three main parts (fig 16)

1. MUV or MDM : pressure relief (fig 17) or pressure reducing valve (fig 18)).
2. MEV : 4/3 directional control valve with electrically controlled pilot stage.
3. Ganged sub-plates : including inlet- and endplate




1 : MUV..A or MDM..A
2 : MEV..A (including pilot stage)
3 : A..UV or A..DM + A..EV + AP

**Fig. 16**

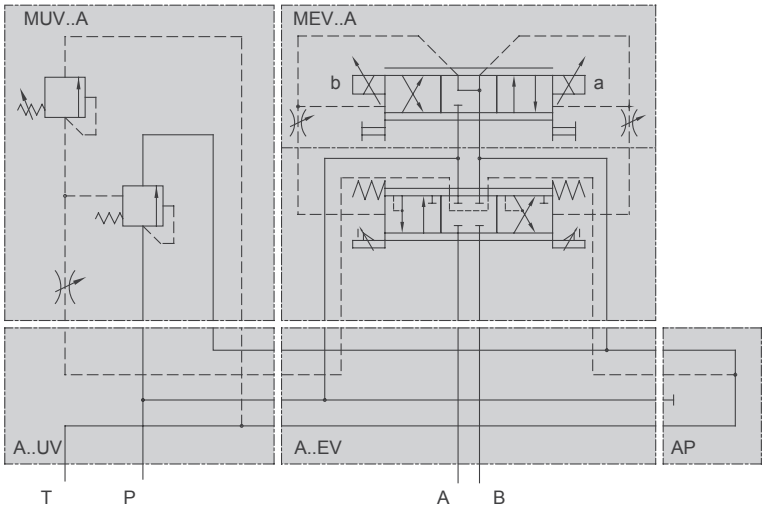



**Fig. 17 (detailed)**

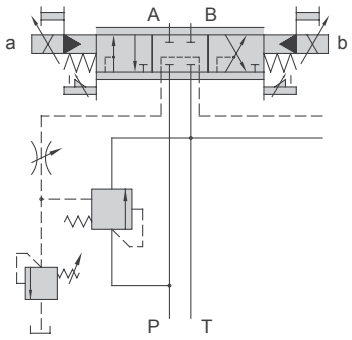



**Fig. 17ª (simplified)**

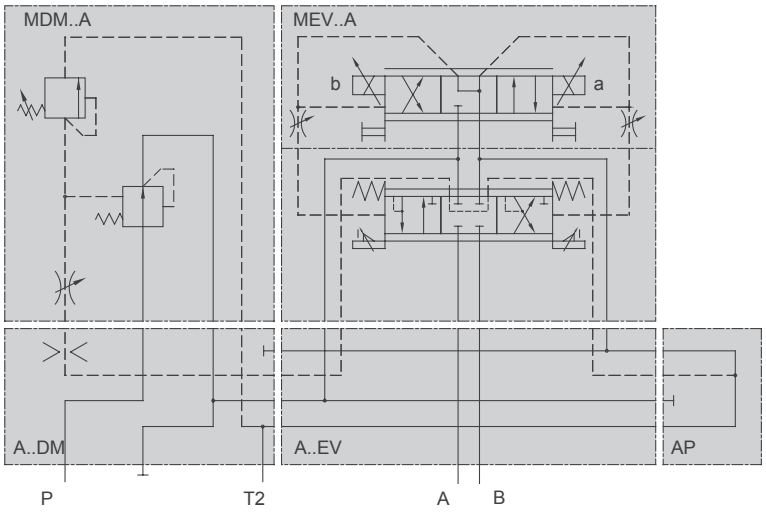



**Fig. 18 (detailed)**

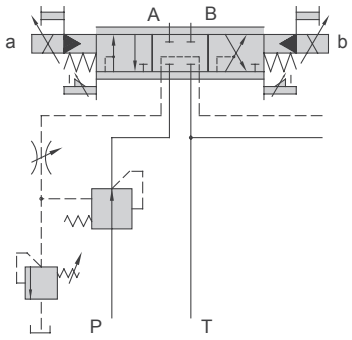



**Fig. 18ª (simplified)**

The following options are possible (see fig 19, application (example) and ordering code).

Port connections:

T2 : Low back pressure.
- if a MUV-valve is mounted, T2 is normally plugged in the subplate, or
- if there are cylinders in the circuit with a large returnflow, T2 shall be connected to tank for a lower return pressure in the valve, or
- if a MDM-valve is mounted on the subplate, T2 is the mainport to tank.

T3 : External pilot drain (on the pilot stage).
- is neccesary if the backpressure in the returnline rises continually above 6 bar, for example a spring loaded check valve in the returnline between T connection of the valve and the tank connection,
- T3 is a pilotdrain and has to be drained to tank seperately.

X : Auxiliary port (on inlet subplate).
- the maximum pressure-level in the entire system can be remotely controlled by the use of a small relief valve (size 4 mm (0.16 inch)) connected to the auxiliary port X, or
- the pressure in the entire system can be unloaded by the use of an electrically operated 2/2 valve connected to aux. port X (e.g. for load security systems on mobile cranes), or
- in case of a load sensing system, the load pressure check back signal on the X port can be connected to the load sense port of the variable displacement pump.

X2 : External pilot supply (on the pilot stage).
- if, due to very light loads, the pump pressure does not rise up to 12 bar (172 psi) during a part of the cycle, the pilot stage shall be fed by an external pilot supply source.

Y : Auxiliary port (on the directional control subplate).
- if it is necessary that one or more users in a circuit operate at reduced pressure, a small relief valve (size 4 mm (0.16 inch)) may be connected to port Y.

Z : Auxiliary port (on the directional control subplate).
- if valves are combined (with the same or different size), port Z is used, or
- for sensing the load pressure check back signal, this port shall be connected to port X of the next valve, which requires only a simple inlet plate AN (see ordering code).

Options are standard with BSP thread, SAE thread is optional

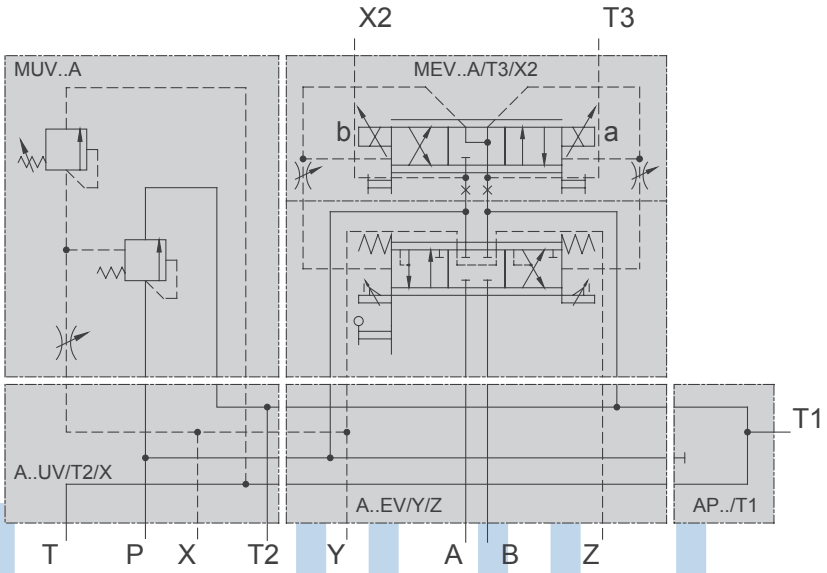



**Fig. 19 (detailed) with options**

## VARIANTS/OPTIONS

The following variants/options are possible (see ordering code, page 26 and 28).

**Compensator (MUV/MDM) variants:**

Recirculation pressure:

V : Adjustment 6...12 bar (86...172 psi). The spring in the spring chamber is adjustable between 6 and 12 bar (86 and 172 psi) for exact control of the max. flow on users A and B of the proportional directional control valve. (see page 26)

Max. pressure adjustments variants:

H : With handwheel (Ø 30mm, Ø 1.18inch) for manual adjustment without using tools

E2 : Electrical remote control up to 350 bar (5000 psi)

W : Without pressure adjustment, no relief valve.

Options:

Q : Normally, MUV spools have no connection between the P bore and the spring chamber. In certain cases, a small orifice (0,6 mm) to provide a “positive feed in” is desirable. As an example: for multi-section blocks.

P : Normally, MDM spools are mounted with a small orifice, to connect the reduced pressure to the spring chamber for quick response. If one or more MDM valves are connected to a load sensing pump, option P (plugged MDM-spool) is recommended.

---

**Control valve (MEV) variants:**

Electrical control system:

N : No proportional control, on/off

F : Proportional control

Spool types:

A,B,C,D,E,F,G,K,M,O : See page 2

Flow:

.../... : Flow port A/port B in litres/minute, the choice has to be made in combination with the Δp of the compensator (MUV or MDM). For the maximum flow per Δp compensator see page 2.

*Note: the control valve is standard equiped with stroke limitation screws in the spring caps, if the flow of a port is adjusted with this screw, the electrical input signal has a shorter bandwidth.*

Solenoid types:

A : 12 VDC IP65 with emergency control by pin

B : 24 VDC IP65 with emergency control by pin (standard)

E : 12 VDC IP65 with emergency control by button

F : 24 VDC IP65 with emergency control by button

H : 24 VDC IP67 with explosion proof, II 2 G EEx m II T4, IP 57, including connector and 5 metres (16.4 ft) cable

J : 24 VDC Military, IP 67, without female connector

Options:

ACS : Adjustable Centering Springs on the main spool, if the users A and B should have exactly the same flow in combination with the same current on solenoids a and b.

G : Cast iron spring caps. If the standard aluminium caps are not suitable for the environment conditions. (for instance sea-water resistance)

JS : Additional connection for hydraulical control, with shuttle valves and restriction for external pilot control e.g., through pilot pressure devices.

M : Additional manual control, a second control possibility in addition to the electrical control. (manual override)

MSW : As option M, suitable for special environment conditions like seawater. (the springcap is also in cast iron)

N : Neutral spool position signal, through inductive switch.

Many applications have been realized.
Some examples are described below.

| | | |
|---|---|---|
| 1. | Concrete pump | Australia |
| 2. | Swing Bridge | Britain |
| 3. | Grader | China |
| 4. | Fire Ladder | France |
| 5. | Arc Furnace | France |
| 6. | Road Bridge | France |
| 7. | Container Handling | France |
| 8. | Road Roller | France |
| 9. | Canal Lock | France |
| 10. | Injection Moulding Machine | France |
| 11. | Telescope Cranes | Germany |
| 12. | Rocker Truck | Germany |
| 13. | Winches for Mobile Cranes | Germany |
| 14. | Injection Moulding Machine | India |
| 15. | Ladle Carriage | Italy |
| 16. | Injection Moulding Machine | Italy |
| 17. | Grinding Machine | Italy |
| 18. | Deck Cranes | Norway |
| 19. | Winches | Norway |
| 20. | Waste Collection | Switzerland |
| 21. | Salt Spreader | Switzerland |
| 22. | Salt Spreader | The Netherlands |
| 23. | Skyworker | The Netherlands |
| 24. | Rubber Press | The Netherlands |
| 25. | Fire Brigade Skyworker | The Netherlands |
| 26. | Steering Gear (for ships) | The Netherlands |
| 27. | Cargo Cranes | The Netherlands |
| 28. | Grain Elevator | The Netherlands |
| 29. | Manipulator (Robot) | The Netherlands |
| 30. | Cargo Doors | The Netherlands |
| 31. | Ship cleaning Installations | The Netherlands |
| 32. | Probing Machines | The Netherlands |
| 33. | Winches for Fishing Vessels | The Netherlands |
| 34. | Diamond-, Exploration- and Rotary drilling equipment | USA |

**Fig. 20 Cone Penetration Testing Unit, The Netherlands**

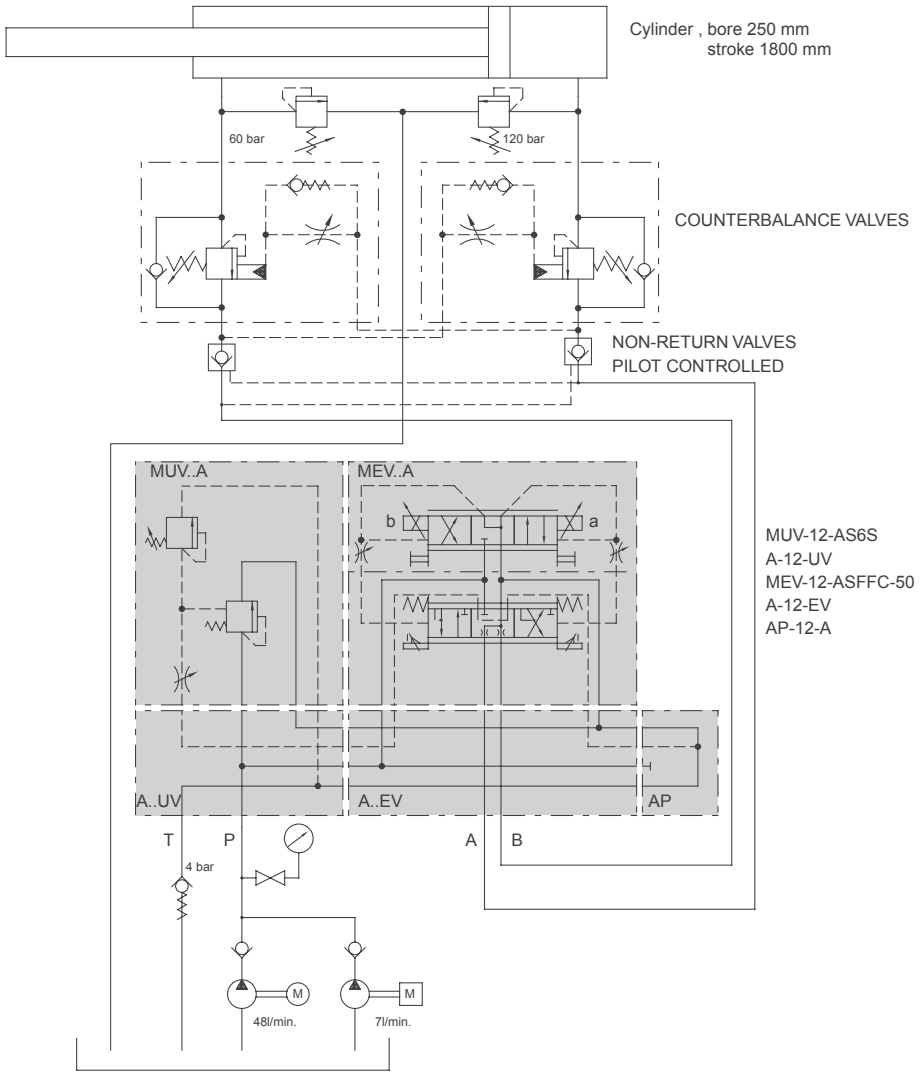



**Fig. 21 Circuit diagram example**

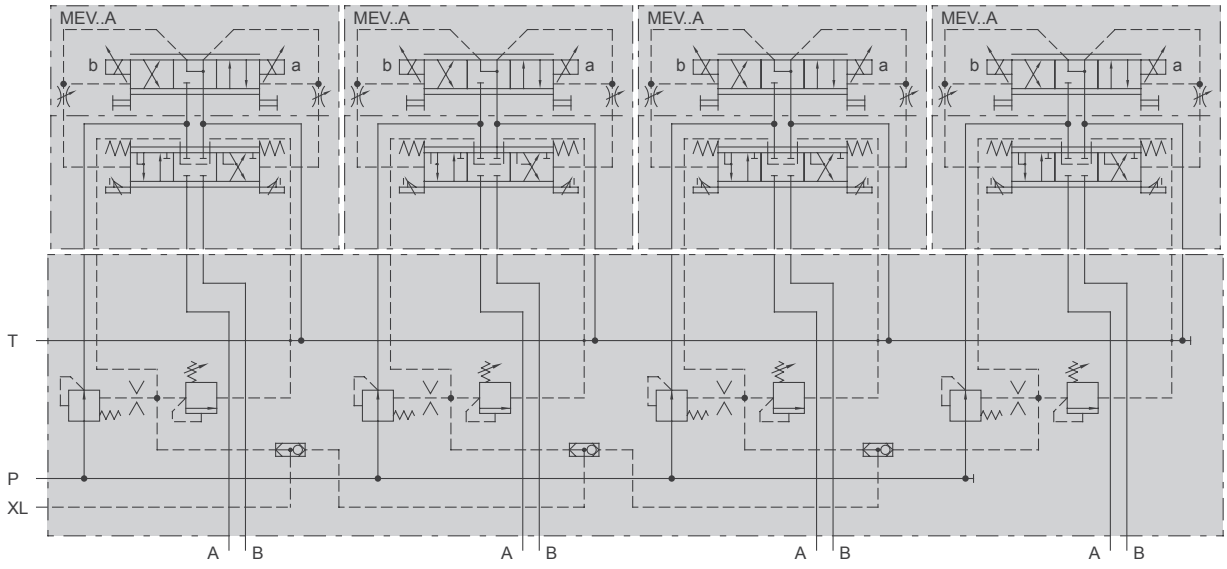



**Fig. 22 Example for simultaneous operation (independant of load pressure)**

See note on page 4.

**First control block**

**Second control block**

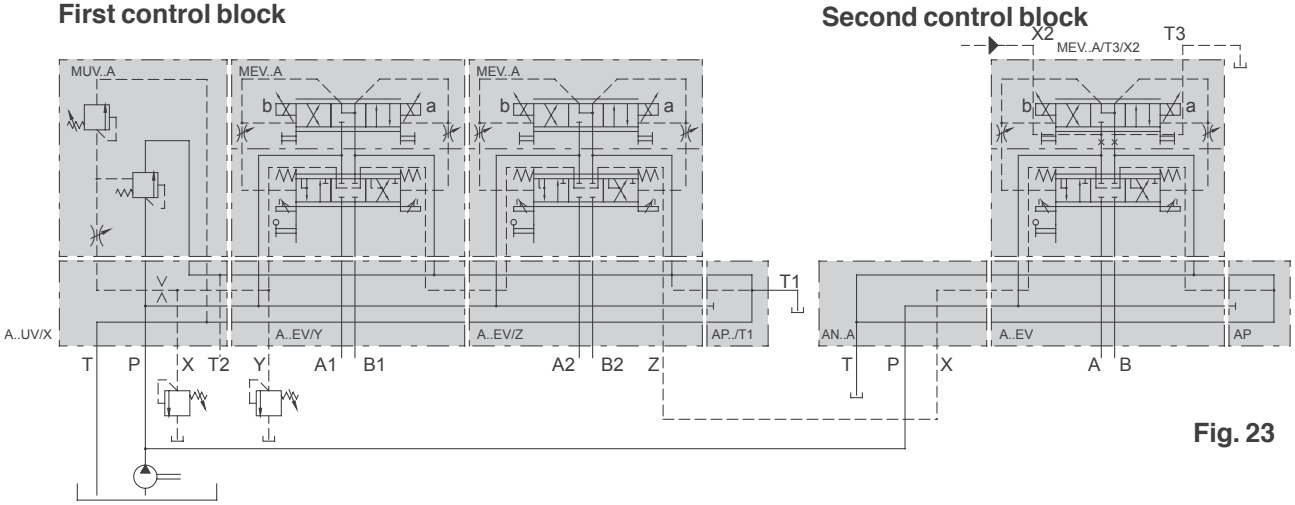



Fig. 23

**Parallel circuit with fixed displacement pump**

Two valve blocks using only one pressure compensator (MUV).

By connecting port X (the load pressure signal) of the second control block (AN..A) to port Z of the first control block (A..EV/Z), the MUV creates a load independent flow control for both valve-blocks (not for simultaneous operation).

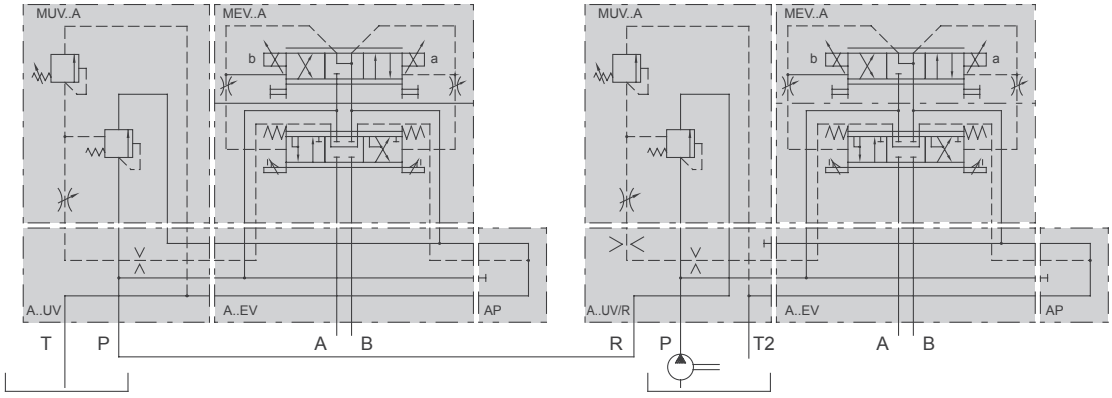



Fig. 24

**Series circuit with fixed displacement pump**

With the subplate A..UV/R there is an additional possibility of directing the pumpflow from P to R in order to feed another circuit.

Note: - Connecting T2 of the subplate A..UV/R must always be connected to tank.
- Not for simultaneous operation.

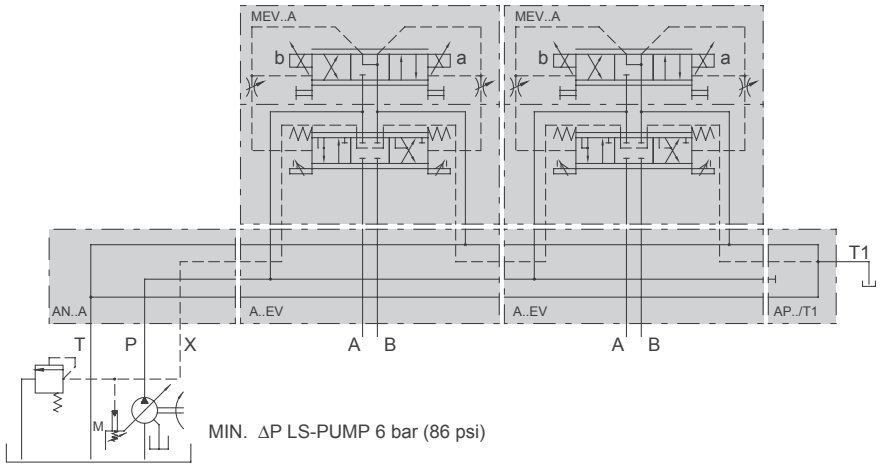



Fig. 25

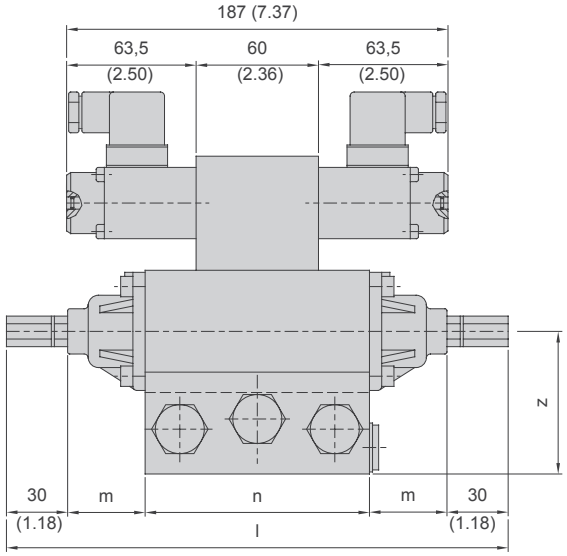
**Load independent flow control by using load sensing pump. (No AMCA compensator: AN)**

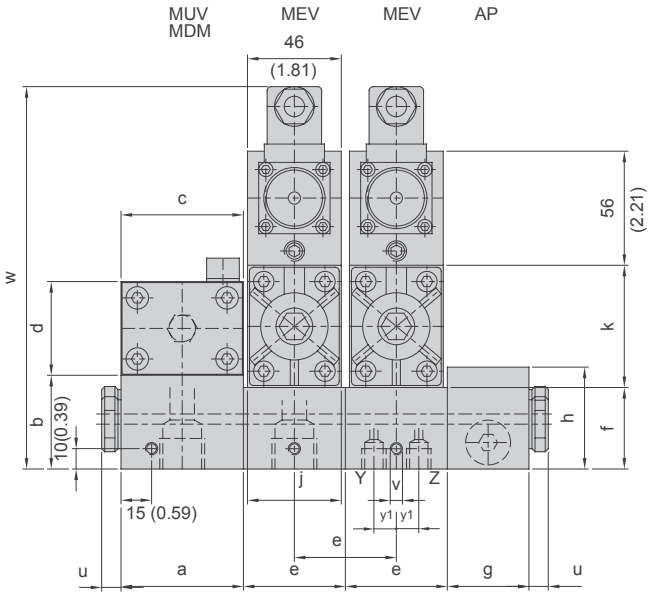
If the hydraulic system is equiped with a load sensing pump, the X port of the inlet plate AN..A has to be connected with the load sensing signal-port of the LS-pump. A pressure compensator MUV or MDM is not necessary in that case.

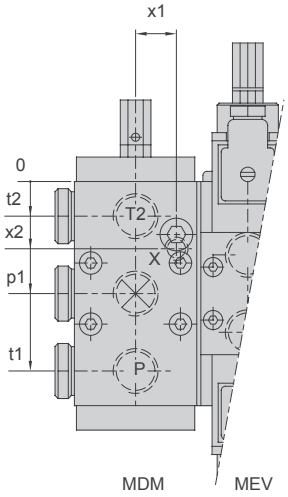
Note: If ordering the control valves (MEV) the Δp of the pump has to be specified, so the spools can be grinded for the ordered flow.

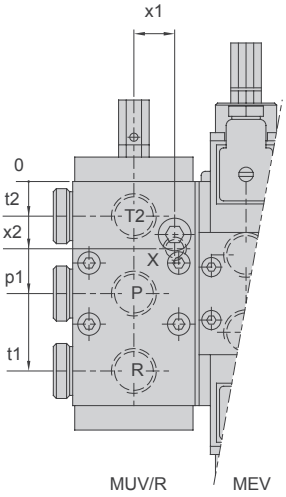
## DIMENSIONS

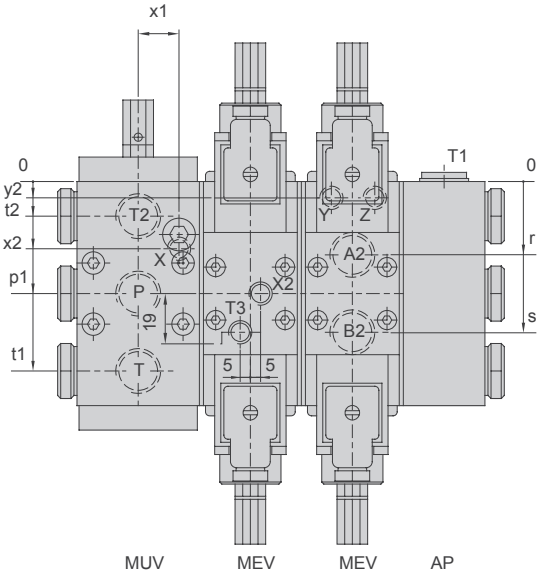
| Nominal bore | 12 | 16 | 20 | 25 | 32 |
|---|---|---|---|---|---|
| **Connecting threads in BSP (SAE thraight thread 'O'ring BOSS)** (Other thread on request) | | | | | |
| A,B,P,T,T2 | 1/2" (8) | 3/4" (12) | 1" (16) | 1 1/4" (20) | 1 1/2" (24) |
| X | 1/8" (4) | 1/8" (4) | 1/4" (6) | 1/4" (6) | 1/4" (6) |
| Y,Z | 1/8" (4) | 1/4" (6) | 1/4" (6) | 1/4" (6) | 1/4" (6) |
| X2,T3 | 1/8" (4) | 1/8" (4) | 1/8" (4) | 1/8" (4) | 1/8" (4) |
| T1 | 3/8" (6) | 3/8" (6) | 1/2" (8) | 3/4" (12) | 1" (16) |
| Control spool stroke in mm. (inch) | 2 x 8 (2 x 0.32) | 2 x 10 (2 x 0.39) | 2 x 12 (2 x 0.47) | 2 x 14 (2 x 3.15) | 2 x 16 (2 x 0.63) |
| **Dimensions in mm. (inch)** | | | | | |
| a | 60 (2.36) | 60 (2.36) | 70 (2.76) | 86 (3.39) | 100 (3.94) |
| b | 46 (1.81) | 46 (1.81) | 55 (2.17) | 68 (2.68) | 76 (2.99) |
| c | 60 (2.36) | 55 (2.17) | 68 (2.68) | 76 (2.99) | 90 (3.55) |
| d | 46 (1.81) | 70 (2.76) | 86 (3.39) | 100 (3.94) | 120 (4.73) |
| e | 50 (1.97) | 60 (2.36) | 70 (2.76) | 86 (3.38) | 100 (3.94) |
| f | 40 (1.58) | 46 (1.81) | 55 (2.17) | 68 (2.68) | 76 (2.99) |
| g | 40 (1.58) | 40 (1.58) | 46 (1.81) | 55 (2.17) | 68 (2.68) |
| h | 50 (1.97) | 50 (1.97) | 60 (2.36) | 70 (2.76) | 86 (2.39) |
| j | 46 (1.81) | 55 (2.17) | 68 (2.68) | 76 (2.99) | 90 (3.55) |
| k | 60 (2.36) | 70 (2.76) | 86 (3.39) | 100 (3.94) | 120 (4.73) |
| l | 246 (9.69) | 296 (11.66) | 338 (13.32) | 376 (14.81) | 425 (16.75) |
| m | 38 (1.50) | 48 (1.89) | 54 (2.13) | 58 (2.29) | 66 (2.60) |
| n | 110 (4.33) | 140 (5.52) | 170 (6.70) | 200 (7.88) | 235 (9.26) |
| p1 | 55 (2.17) | 70 (2.76) | 85 (3.35) | 100 (3.94) | 117,5 (4.63) |
| r | 36 (1.42) | 46 (1.81) | 55 (2.17) | 65 (2.56) | 75,5 (2.97) |
| s | 74 (2.92) | 94 (3.70) | 115 (4.53) | 135 (5.32) | 159,5 (6.28) |
| t1 | 93 (3.66) | 118 (4.65) | 145 (5.71) | 170 (6.70) | 201,5 (7.94) |
| t2 | 17 (0.67) | 22 (0.87) | 25 (0.99) | 30 (1.18) | 33,5 (1.32) |
| u | 10 (0.39) | 12 (0.47) | 14 (0.55) | 16 (0.63) | 17 (0.67) |
| v | M6x8 | M6x8 | M8x10 | M8x10 | M8x10 |
| w | 188 (7.41) | 204 (8.04) | 229 (9.02) | 256 (10.09) | 284 (11.19) |
| x1 | 20 (0.79) | 19 (0.75) | 25 (0.99) | 27 (1.06) | 31 (1.22) |
| x2 | 33 (1.30) | 46 (1.81) | 55 (2.17) | 65 (2.56) | 75,5 (2.97) |
| y1 | 11 (0.43) | 11 (0.43) | 15 (0.59) | 18,5 (0.73) | 21 (0.83) |
| y2 | 8 (0.32) | 11 (0.43) | 11 (0.43) | 11 (0.43) | 11 (0.43) |
| z | 70 (2.76) | 81 (3.19) | 98 (3.86) | 118 (4.65) | 136 (5.36) |
| **Dimensions option M in mm. (inch)** | | | | | |
| n | 110 (4.33) | 140 (5.52) | 170 (6.70) | 200 (7.88) | 235 (9.26) |
| m1 | 45 (1.77) | 58 (2.29) | 70 (2.76) | 80 (3.15) | 88 (3.47) |
| m2 | 75 (2.96) | 79 (3.11) | 90 (3.55) | 164 (6.46) | 171 (6.74) |
| m3 | 30 (1.18) | 30 (1.18) | 30 (1.18) | 30 (1.18) | 30 (1.18) |
| m4 | 30 (1.18) | 30 (1.18) | 30 (1.18) | 25 (0.99) | 23 (0.91) |
| m5 | Ø25 (Ø0.99) | Ø32 (Ø1.26) | Ø32 (Ø1.26) | Ø40 (Ø1.58) | Ø40 (Ø1.58) |
| m6 | Ø8 (Ø0.32) | Ø10 (Ø0.39) | Ø10 (Ø0.39) | Ø12 (Ø0.47) | Ø12 (Ø0.47) |
| mr | 182,5 (7.19) | 234 (9.22) | 234 (9.22) | 270 (10.64) | 270 (10.64) |
| m$\alpha$ | $18^0$ | $18^0$ | $18^0$ | $12^0$ | $12^0$ |
| m $\beta$ | $51^0$ | $58^0$ | $66^0$ | $71^0$ | $82^0$ |
| m $\gamma$ | $10^0$ | $5^0$ | - | - | - |
| **Weight in N (lbs)** | | | | | |
| MUV | 26,48 (5.95) | 41,19 (9.26) | 78,45 (17.64) | 125,53 (28.22) | 205,94 (46.30) |
| MDM | 26,48 (5.95) | 41,19 (9.26) | 78,45 (17.64) | 125,53 (28.22) | 205,94 (46.30) |
| A-UV | 17,65 (3.97) | 23,54 (5.29) | 34,32 (7.72) | 78,45 (17.64) | 93,16 (20.94) |
| MEV | 44,13 (9.92) | 58,84 (13.23) | 93,16 (20.94) | 132,39 (29.76) | 181,42 (40.78) |
| A-EV | 17,65 (3.97) | 23,54 (5.29) | 34,32 (7.72) | 78,45 (17.64) | 88,26 (19.84) |
| AP | 13,73 (3.09) | 16,67 (3.75) | 29,42 (6.61) | 58,84 (13.23) | 93,16 (20.94) |


187 (7.37)
63,5
(2.50)
60
(2.36)
63,5
(2.50)
z
30
(1.18)
m
n
m
30
(1.18)
l

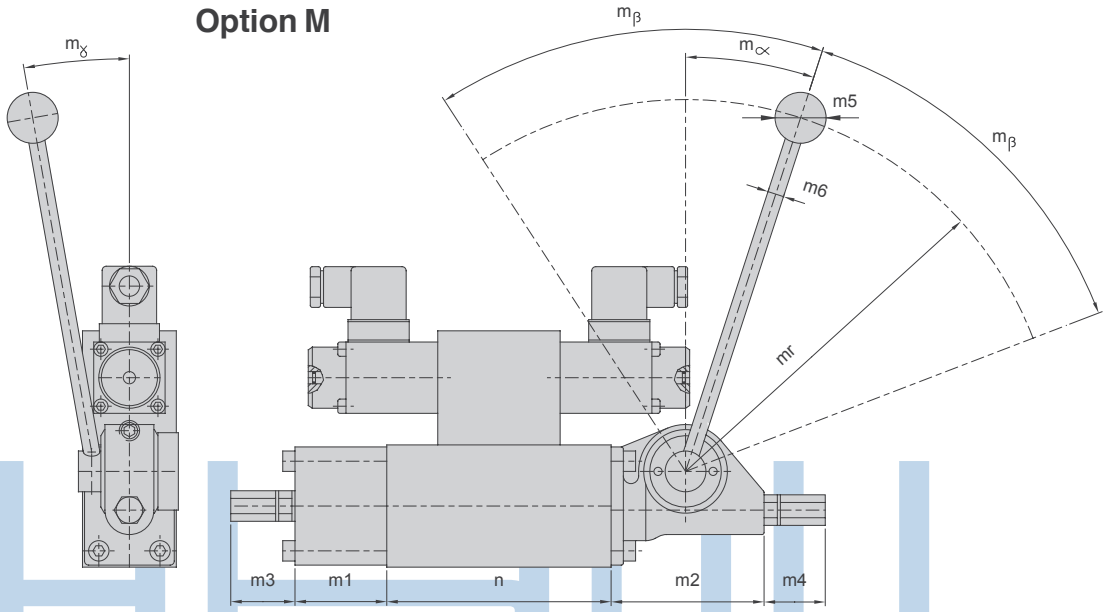

MUV
MDM
MEV
MEV
AP
46
(1.81)
c
w
d
b
10(0.39)
15 (0.59)
j
Y
v
Z
y1
y1
e
e
e
u
a
g
u
56
(2.21)
k
h
f


x1
0
t2
x2
p1
t1
T2
X
P
MDM
MEV


x1
0
t2
x2
p1
t1
T2
X
P
R
MUV/R
MEV

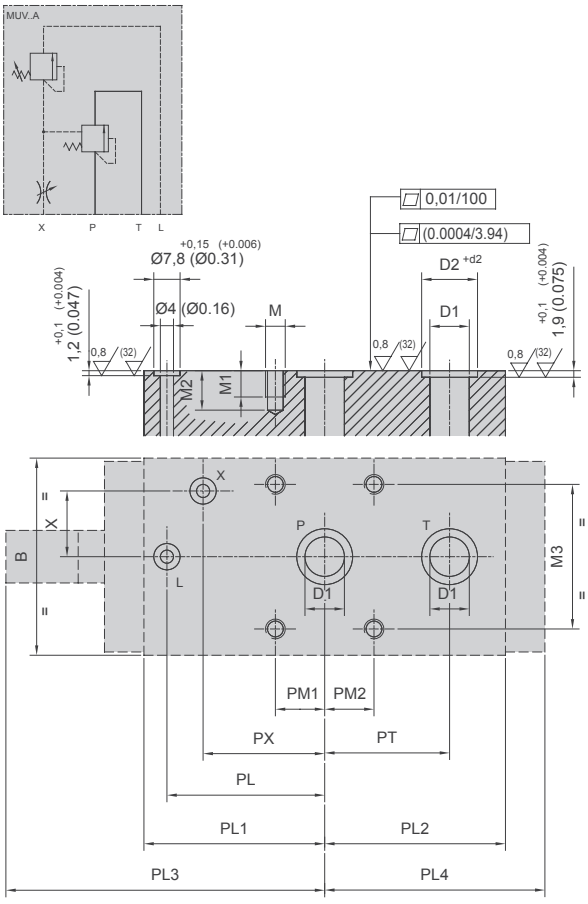

x1
0
y2
t2
x2
p1
t1
T2
X
P
T
T1
0
r
s
Y
Z
A2
X2
T3
B2
19
5
5
MUV
MEV
MEV
AP

## Option M

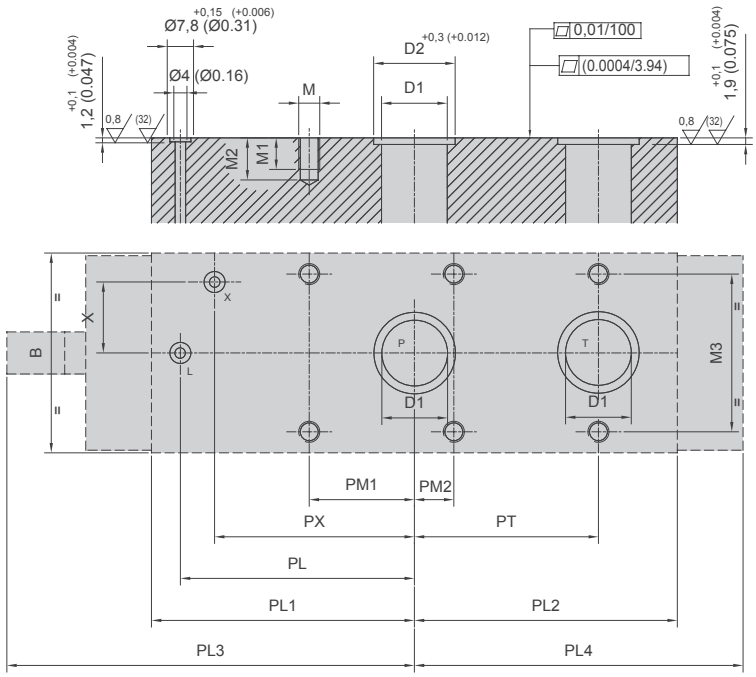

mδ
mβ
mα
m5
mβ
m6
mr
m3
m1
n
m2
m4

Dimensions in milimeters (inches)

## DIMENSIONS + LAY-OUT FOR SUBPLATES MUV; TO PRODUCE BY CUSTOMERS




| MUV | 12 | 16 | 20 |
|---|---|---|---|
| B | 60 (2.36) | 55 (2.17) | 68 (2.68) |
| D1 | Ø12 (Ø0.47) | Ø16 (Ø0.63) | Ø20 (Ø0.79) |
| D2 | Ø17,25 (Ø0.68) | Ø21,9 (Ø0.86) | Ø26,6 (Ø1.05) |
| d2 | 0,15 (0.006) | 0,2 (0.008) | 0,2 (0.008) |
| D3 | Ø17,25 (Ø0.68) | Ø21,9 (Ø0.86) | Ø26,6 (Ø1.05) |
| M | M6 | M8 | M10 |
| M1 | 8 (0.32) | 12 (0.47) | 12 (0.47) |
| M2 | 12 (0.47) | 17 (0.67) | 17 (0.67) |
| M3 | 44 (1.73) | 38 (1.50) | 50 (1.97) |
| PM1 | 15 (0.59) | 24 (0.95) | 31 (1.22) |
| PM2 | 15 (0.59) | 24 (0.95) | 31 (1.22) |
| PX | 37 (1.46) | 51 (2.01) | 63 (2.48) |
| PT | 38 (1.50) | 48 (1.89) | 60 (2.36) |
| PL | 48 (1.89) | 59 (2.32) | 75 (2.96) |
| PL1 | 55 (2.17) | 70 (2.76) | 70 (2.76) |
| PL2 | 55 (2.17) | 70 (2.76) | 70 (2.76) |
| PL3 | 97 (3.82) | 115 (4.53) | 135 (5.32) |
| PL4 | 67 (2.64) | 85 (3.35) | 105 (4.14) |
| X | 20 (0.79) | 19 (0.75) | 25 (0.99) |

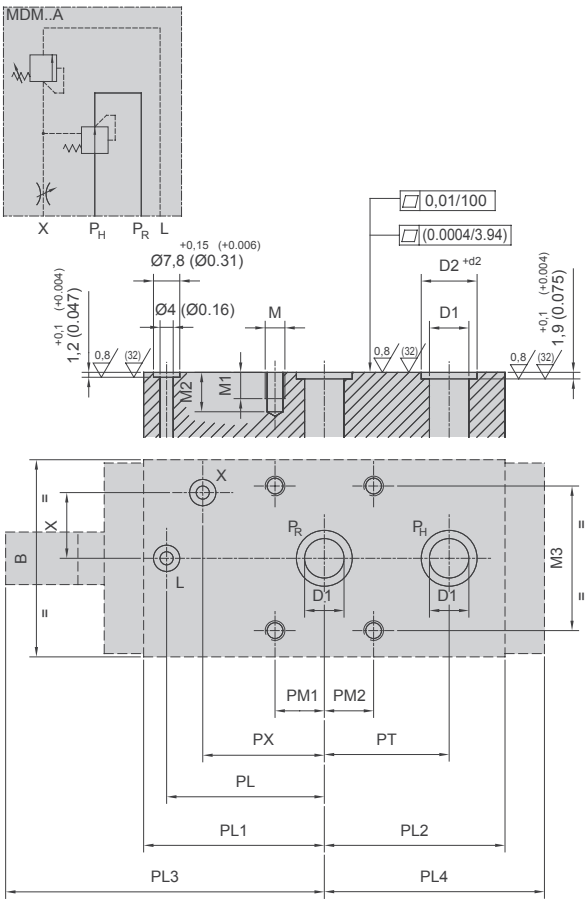



| MUV | 25 | 32 |
|---|---|---|
| B | 76 (2.99) | 90 (3.55) |
| D1 | Ø25 (Ø0.99) | Ø32 (Ø1.26) |
| D2 | Ø31,25 (Ø1.23) | Ø37,5 (Ø1.48) |
| M | M8 | M10 |
| M1 | 10 (0.39) | 12 (0.47) |
| M2 | 14 (0.55) | 15 (0.59) |
| M3 | 60 (2.36) | 70 (2.76) |
| PM1 | 40 (1.58) | 46 (1.81) |
| PM2 | 15 (0.59) | 19 (0.75) |
| PX | 76 (2.99) | 84,5 (3.33) |
| PT | 70 (2.76) | 84 (3.31) |
| PL | 89 (3.51) | 105,5 (4.16) |
| PL1 | 100 (3.94) | 117,5 (4.63) |
| PL2 | 100 (3.94) | 117,5 (4.63) |
| PL3 | 155 (6.11) | 177,5 (6.99) |
| PL4 | 125 (4.93) | 147,5 (5.81) |
| X | 27 (1.06) | 31 (1.22) |

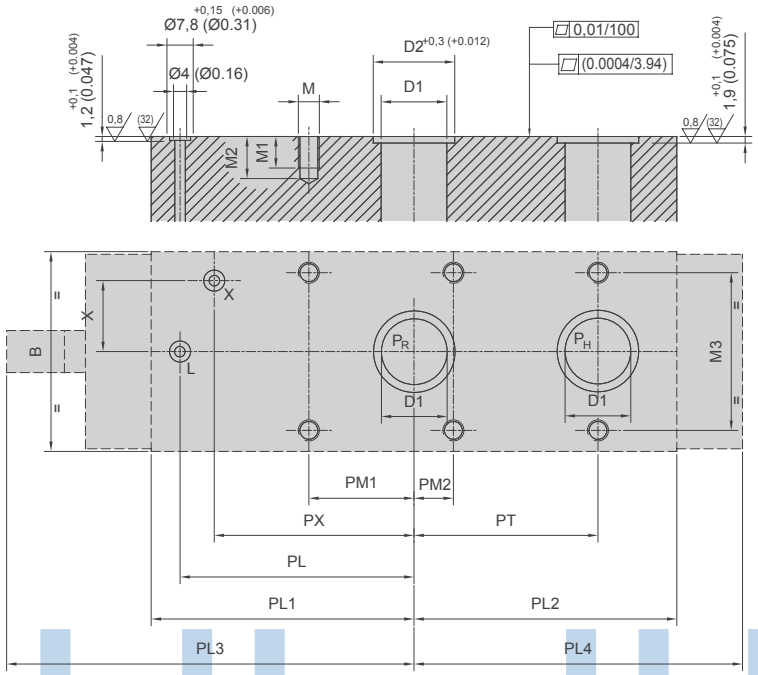
ALL COORDINATES ⌖ 0,25 (0.001)

Dimensions in milimeters (inches)

DIMENSIONS + LAY-OUT FOR SUBPLATES MDM; TO PRODUCE BY CUSTOMERS




| MDM | 12 | 16 | 20 |
|---|---|---|---|
| B | 60 (2.36) | 55 (2.17) | 68 (2.68) |
| D1 | Ø12 (Ø0.47) | Ø16 (Ø0.63) | Ø20 (Ø0.79) |
| D2 | Ø17,25 (Ø0.68) | Ø21,9 (Ø0.86) | Ø26,6 (Ø1.05) |
| d2 | 0,15 (0.006) | 0,2 (0.008) | 0,2 (0.008) |
| D3 | Ø17,25 (Ø0.68) | Ø21,9 (Ø0.86) | Ø26,6 (Ø1.05) |
| M | M6 | M8 | M10 |
| M1 | 8 (0.32) | 12 (0.47) | 12 (0.47) |
| M2 | 12 (0.47) | 17 (0.67) | 17 (0.67) |
| M3 | 44 (1.73) | 38 (1.50) | 50 (1.97) |
| PM1 | 15 (0.59) | 24 (0.95) | 31 (1.22) |
| PM2 | 15 (0.59) | 24 (0.95) | 31 (1.22) |
| PX | 37 (1.46) | 51 (2.01) | 63 (2.48) |
| PT | 38 (1.50) | 48 (1.89) | 60 (2.36) |
| PL | 48 (1.89) | 59 (2.32) | 75 (2.96) |
| PL1 | 55 (2.17) | 70 (2.76) | 70 (2.76) |
| PL2 | 55 (2.17) | 70 (2.76) | 70 (2.76) |
| PL3 | 97 (3.82) | 115 (4.53) | 135 (5.32) |
| PL4 | 67 (2.64) | 85 (3.35) | 105 (4.14) |
| X | 20 (0.79) | 19 (0.75) | 25 (0.99) |

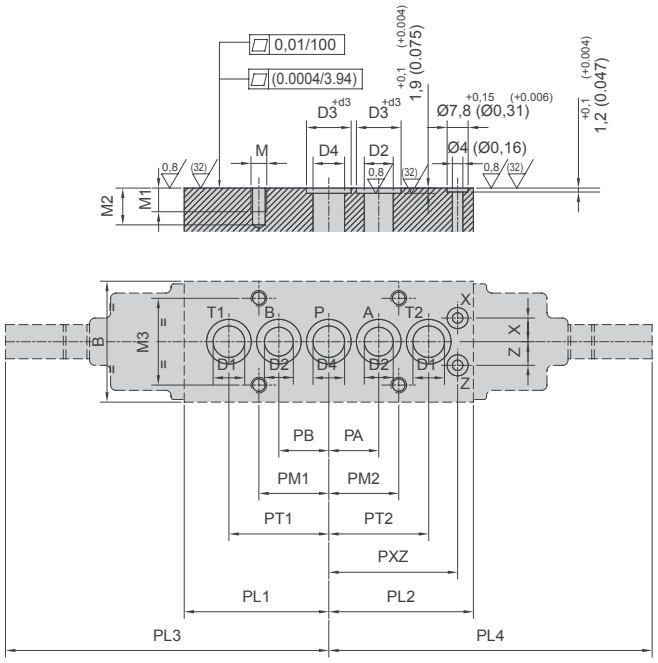



| MDM | 25 | 32 |
|---|---|---|
| B | 76 (2.99) | 90 (3.55) |
| D1 | Ø25 (Ø0.99) | Ø32 (Ø1.26) |
| D2 | Ø31,25 (Ø1.23) | Ø37,5 (Ø1.48) |
| M | M8 | M10 |
| M1 | 10 (0.39) | 12 (0.47) |
| M2 | 14 (0.55) | 15 (0.59) |
| M3 | 60 (2.36) | 70 (2.76) |
| PM1 | 40 (1.58) | 46 (1.81) |
| PM2 | 15 (0.59) | 19 (0.75) |
| PX | 76 (2.99) | 84,5 (3.33) |
| PT | 70 (2.76) | 84 (3.31) |
| PL | 89 (3.51) | 105,5 (4.16) |
| PL1 | 100 (3.94) | 117,5 (4.63) |
| PL2 | 100 (3.94) | 117,5 (4.63) |
| PL3 | 155 (6.11) | 177,5 (6.99) |
| PL4 | 125 (4.93) | 147,5 (5.81) |
| X | 27 (1.06) | 31 (1.22) |

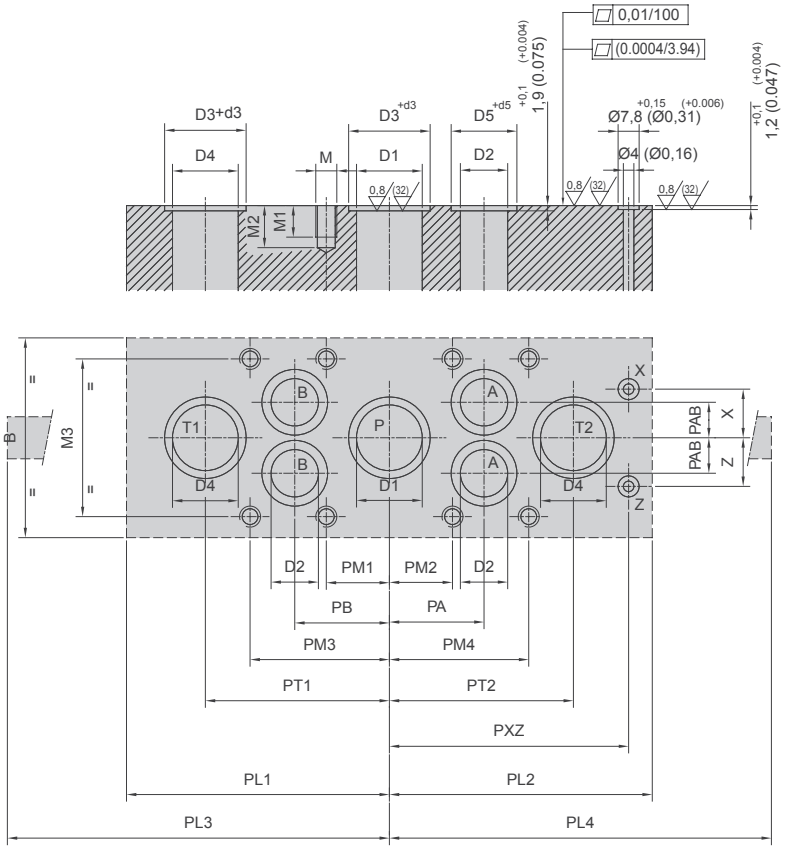
ALL COORDINATES ⌖ 0,25 (0.001)

Dimensions in milimeters (inches)

DIMENSIONS + LAY-OUT FOR SUBPLATES MEV; TO PRODUCE BY CUSTOMERS




| MEV | 12 | 16 | 20 |
|---|---|---|---|
| B | 46 (1.81) | 55 (2.17) | 68 (2.68) |
| D1 | Ø12 (Ø0.47) | Ø16 (Ø0.63) | Ø20 (Ø0.79) |
| D2 | Ø11 (Ø0.43) | Ø14 (Ø0.55) | Ø17 (Ø0.67) |
| D3 | Ø17,25 (Ø0.68) | Ø21,9 (Ø0.86) | Ø26,6 (Ø1.05) |
| d3 | 0,15 (0.006) | 0,2 (0.008) | 0,2 (0.008) |
| D4 | Ø12 (Ø0.47) | Ø14 (Ø0.55) | Ø18 (0.008) |
| M | M6 | M8 | M10 |
| M1 | 9 (0.35) | 12 (0.47) | 12 (0.47) |
| M2 | 14 (0.55) | 15 (0.59) | 17 (0.67) |
| M3 | 33 (1.30) | 40 (1.58) | 50 (1.97) |
| PA | 19 (0.75) | 24 (0.95) | 30 (1.18) |
| PB | 19 (0.75) | 24 (0.95) | 30 (1.18) |
| PM1 | 26,6 (1.05) | 30 (1.18) | 43 (1.69) |
| PM2 | 26,6 (1.05) | 30 (1.18) | 43 (1.69) |
| PT1 | 38 (1.50) | 48 (1.89) | 60 (2.36) |
| PT2 | 38 (1.05) | 48 (1.89) | 60 (2.36) |
| PL1 | 55 (2.17) | 70 (2.76) | 85 (3.35) |
| PL2 | 55 (2.17) | 70 (2.76) | 85 (3.35) |
| PL3 | 123 (4.85) | 148 (5.83) | 169 (6.66) |
| PL4 | 123 (4.85) | 148 (5.83) | 169 (6.66) |
| PXZ | 49 (1.93) | 64 (2.52) | 77 (3.03) |
| X | 9 (0.35) | 10 (0.39) | 15 (0.59) |
| Z | 9 (0.35) | 10 (0.39) | 15 (0.59) |




| MEV | 25 | 32 |
|---|---|---|
| B | 76 (2.99) | 90 (3.55) |
| D1 | Ø25 (Ø0.99) | Ø30 (Ø1.18) |
| D2 | Ø18 (Ø0.71) | Ø23 (Ø0.91) |
| D3 | Ø31,25 (Ø1.23) | Ø37,5 (Ø1.48) |
| d3 | 0,3 (0.01) | 0,3 (0.01) |
| D4 | Ø25 (Ø0.99) | Ø32 (Ø1.26) |
| D5 | Ø25 (Ø0.99) | Ø29,7 (Ø1.17) |
| d5 | 0,2 (0.008) | 0,3 (0.01) |
| M | M8 | M10 |
| M1 | 12 (0.47) | 12 (0.47) |
| M2 | 16 (0.63) | 17 (0.67) |
| M3 | 60 (2.36) | 70 (2.76) |
| PA | 36 (1.42) | 43 (1.69) |
| PB | 36 (1.42) | 43 (1.69) |
| PM1 | 24 (0.95) | 28,5 (1.12) |
| PM2 | 24 (0.95) | 28,5 (1.12) |
| PM3 | 53 (2.09) | 63 (2.48) |
| PM4 | 53 (2.09) | 63 (2.48) |
| PT1 | 70 (2.76) | 84 (3.31) |
| PT2 | 70 (2.76) | 84 (3.31) |
| PL1 | 100 (3.94) | 117,5 (4.63) |
| PL2 | 100 (3.94) | 117,5 (4.63) |
| PL3 | 188 (7.41) | 212,5 (8.37) |
| PL4 | 188 (7.41) | 212,5 (8.37) |
| PXZ | 91 (3.59) | 108,5 (4.27) |
| PAB | 13,5 (0.53) | 16 (0.63) |
| X | 18,5 (0.73) | 21 (0.83) |
| Z | 18,5 (0.73) | 21 (0.830) |

ALL COORDINATES ⌖ 0,25 (0.001)

**Mounting procedure**

- AMCA-valves shall not be mounted by overtightening of mounting bolts, causing mechanical distortion and thus spool lock. (see tightening torques).
- Mounting on flat surface, flatness □0,01/100 mm (0.0004/3.9 inch).
- Don't use conical thread for port-fittings.
- For sealing purposes, use O-rings.
- At the port-connections at the sub-plates, the B-port shall be connected to the line with the largest return-flow (e.g. piston-side of differential cylinder), because in the valve the distance B-T is shorter than A-T.
- Check the voltage and current of the solenoids, before operation.
- Avoid ingression of contaminants during mounting.

**Start-up procedure**

- Start the system-flushing procedure with the adjustment-screw of relief valve (see fig. 29-31, (1) on page 22) fully released to achieve the minimum pressure.
- Turning the adjustment-screw clockwise (360 turn = ca. 100 bar (143 psi)), the maximum load-pressure rises up to the desired level. (max. 350 bar (5000 psi)). During this adjustment the end-users (cylinder and/or motor) should be blocked.
- Check the valve-function and the tightness of fittings etc.
- Use the stroke limiting screws to bleed the end-caps, during system bleeding.

**Adjustment procedure**

MDM/MUV

To avoid instability of the MDM- or MUV-spool, the damping-screw (see fig. 32, (2) on page 22) is factory-setted. Adjustment on location is possible as follows:

- Remove the cover-screw (width 5 mm (0.2 inch))
- Adjust the damping with the damping-screw (width 5 mm (0.2 inch)), turning clockwise or anti-clockwise for more or less throttling.

*Note: Don't throttle too much especially in the case of MDM otherwise the load signal can be disturbed.*

Valve response time

The valve response time is adjustable from 0,24 - 10 seconds. Adjustment screws are on the pilot stage below the solenoids.

- Turn the adjustment screws clockwise to enlarge valve response time.
- Turn the adjustment screws anti-clockwise to shorten valve response time.

Flow-adjustment

Factory-setting of flows, as ordered in ordering code. If, after long life-cycle, re-adjustment should be necessary, two possibilities are available, depending on the configuration:

1. Stroke limiter (see fig. 33, (5) on page 22)
- Remove cover-screw of stroke limiter
- Loosen the lock-nut (width 13 mm (0.51 inch))
- Turn the stroke limiting screw (width 4 mm (0.16 inch)) clockwise to reduce flow and anti-clockwise to enlarge flow.

2. $\Delta$p adjustment (see page 26)
- Loosen the lock-nut (width 13 mm (0.51 inch))
- Turn the adjustment screw (width 4 mm (0.16 inch)) clockwise to enlarge the preset spring-force, to achieve more flow. (anti-clockwise to reduce flow)
- Tighten lock-nut.

*Note: If the flow through A-port is sufficient and the flow through B-port should be enlarged, adjust first the B-flow by $\Delta$p-adjustment and reduce after that the A-flow by stroke limitation.*

**Fluid maintenance**

Due to the construction, these AMCA-valves, are not highly susceptible to particulate (silt type) lock, nor to contaminant wear. Therefore the contaminant sensitivity is very low.

- Use mineral oil (recommended ISO/VG-32). Other fluids on request.
- Keep the contamination level better or equal NAS 1638 class 9 or ISO 18/15.

Fig.29

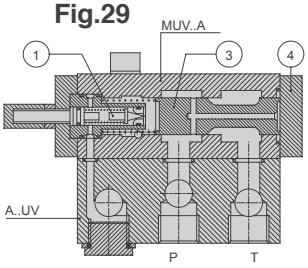



Fig.30

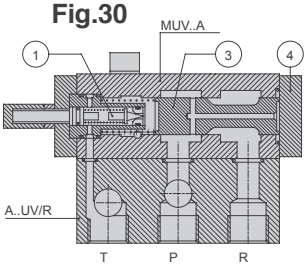



Fig.31

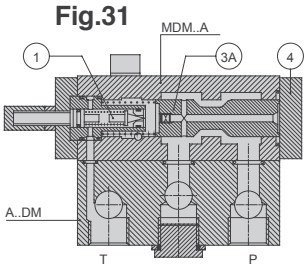
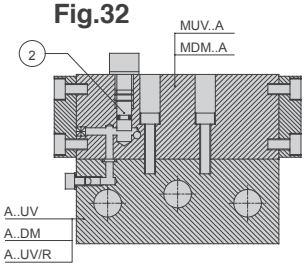



Fig.32




**A. System pressure too low or set pressure cannot be reached**

1. *Relief valve cartridge fouled*
   Dirt particles jammed between cone and seat of relief valve (1) and prevent pressure being built up.
   Turn adjustment anti-clock wise, switch a directional valve several times. If necessary, dismantle (a M4 bolt assists in removing the springcup). If damaged, replace cone and seat.
   Examine the system filter.

2. *Damping throttle (2) blocked (dirt or maladjustment).*
   If necessary, remove, clean and replace.
   Adjust to 1 1/2 - 2 1/2 turns from fully closed position. Find the right damping position. Turn the throttle only by unloaded pump.

3. *MUV-spool (3) or MDM-spool (3A) jammed open*
   When removing lower end-cover (4) the spring should push out of the spool. Remove and examine the spool and bore for damage. Deburr with care. Flush the spool to remove dirt.

4. *Faults in other components of the system*
   Damaged pump, motor, seals etc.

   Note: The set pressure can only be reached if a cylinder is at the end of its stroke or a motor is stalled.

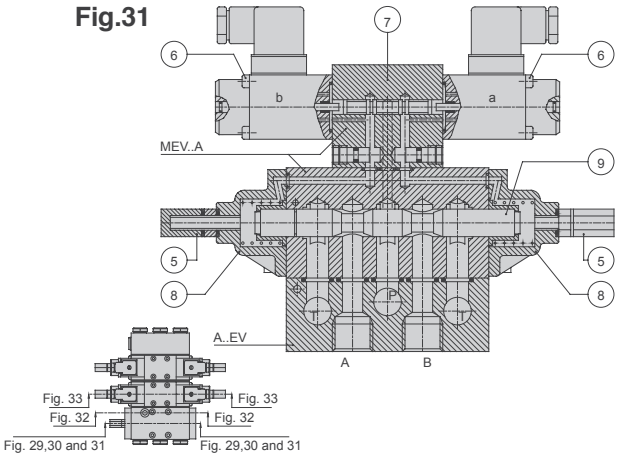
**B. User moves erratically**

1. *Air in system*
   Bleed both end-caps with stroke limiting screws (5).
   Slacken bolts (6) fixing the solenoids to body and retighten after repeated operation.

2. *Pilot valve faulty*
   Fit a pressure gauge in place of the stroke limiting screws to observe pilot pressure.
   If persistent, swap pilot stage (7) to another section to detect faulty unit.

3. *Excessive friction of directional spool*
   Remove both end-caps (8) and examine spool (9) and bore from dirt or damage. Deburr with care.
   Examine system filter.

Fig.31




   Also spool lock, when mounting faces are not flat.

4. *Excessive damping*
   See B2.

5. *Excessive friction in other components of the system*

**C. User does not move or moves at slow speed**

1. *Damping throttle blocked or dirty*
   See A2.

2. *Relief valve setting too low*
   See A1.

3. *Directional spool does not shift*
   See B3.

4. *MUV or MDM-spool jammed open*
   See A3.

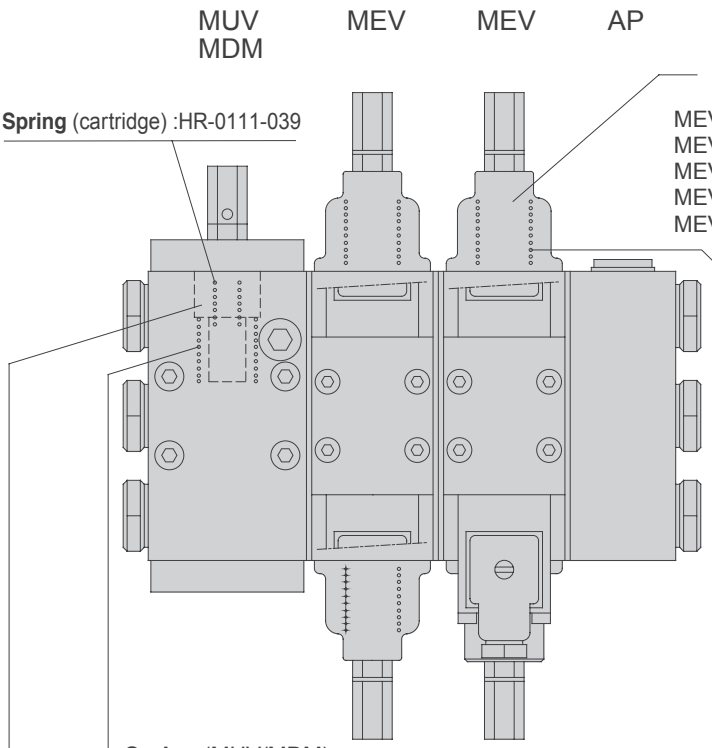
5. *There is insufficient user load.*

6. *Filter in returnline is contaminated.*

**D. Pump does not unload**

1. *MUV-spool jammed (see A3)*

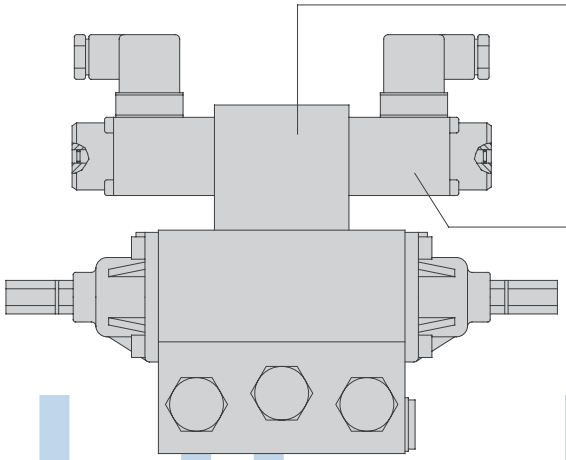
2. *Directional spool not centring*
   Excessive friction (see B3).
   Electrical fault. Check the electrical circuit.




| Size | 3 bar(with X2) | 6 bar | 8 bar | 12 bar |
|---|---|---|---|---|
| 12 | HR-0111-040 | HR-2121-032 | HB-0014-001 | HR-2121-040 |
| 16 | HR-0111-040 | HR-2121-032 | HB-0014-001 | HR-2121-040 |
| 20 | HR-0113-040 | HR-2123-032 | HB-0014-003 | HR-2123-040 |
| 25 | HR-0114-040 | HR-2124-032 | HB-0014-002 | HR-2124-040 |
| 32 | HR-0115-040 | HR-2125-032 | HB-0112-014 | HR-2125-040 |

**Relief valve insert**

| Size | With standard seals | With Viton seals |
|---|---|---|
| 12 | HR-0111-335 | HR-0111-635 |
| 16 | HR-0111-335 | HR-0111-635 |
| 20 | HR-0113-335 | HR-0113-635 |
| 25 | HR-0114-335 | HR-0114-635 |
| 32 | HR-0115-335 | HR-0115-635 |



**Pilot stage**
HR-2121-264 : Pilot stage without solenoid
HR-2121-264V : Ditto with Viton seals

**Solenoid** (including BUNA-N seal)
WX-2170K001 : SOLENOID 24 V + MANUAL PIN
WX-2170K002 : SOLENOID 12 V + MANUAL PIN
WX-2170K011 : SOLENOID 24 V + MANUAL BUTTON
WX-2170K012 : SOLENOID 12 V + MANUAL BUTTON
WX-2270K051 : SOLENOID 24 V + EEx m II T4 (Explosion Proof)
WX-2270K041 : SOLENOID 24 V + IP67 and MIL.
WX-2170K101 : Female connector for MIL. solenoid

## Seals and assembly kits

R – .. – .. – ..

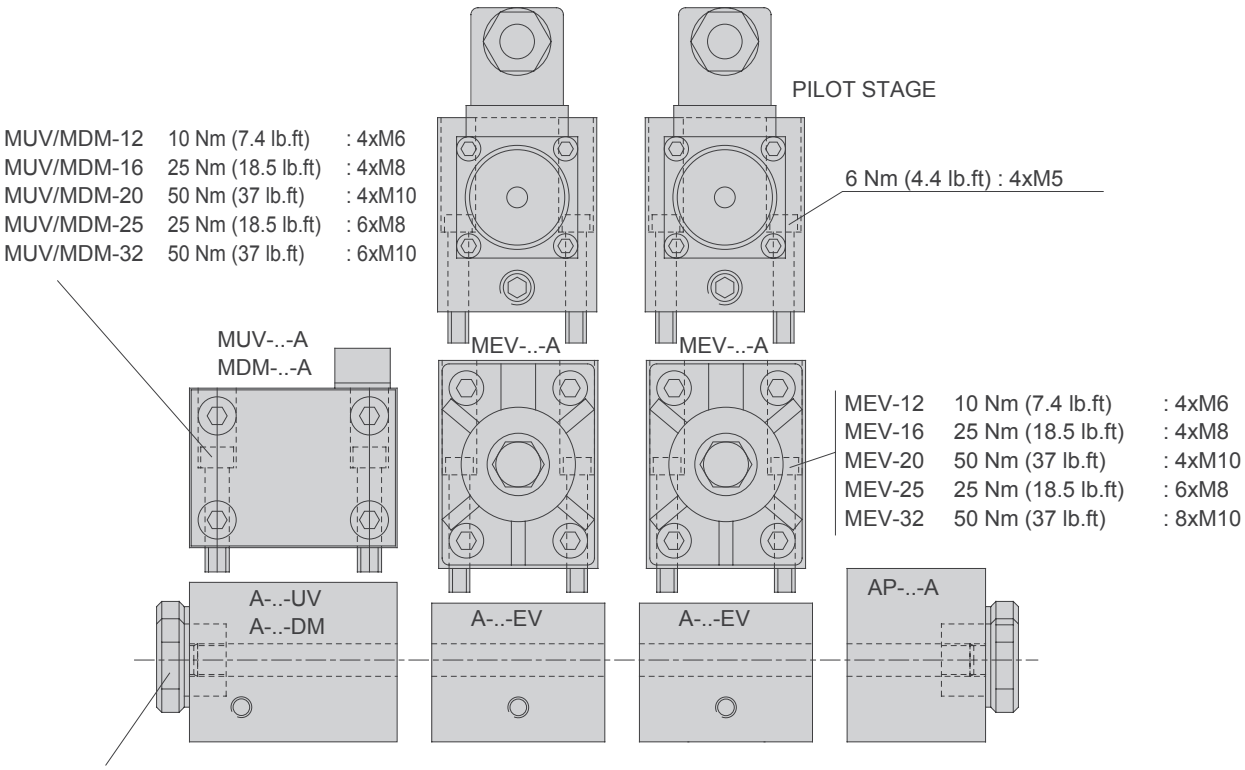
| | |
|---|---|
| R | SPARE KIT |

| | |
|---|---|
| 01 | SEALS (BUNA-N 70$^0$ Shore) |
| 06 | ASSEMBLY KIT:SEALS(BUNA-N 70$^0$ Shore), SCREWS OR BUSHES |
| 11 | SEALS (VITON 70$^0$ Shore) |
| 16 | ASSEMBLY KIT:SEALS(VITON 70$^0$ Shore), SCREWS OR BUSHES |
| 21 | SEALS (VITON 90$^0$ Shore) |
| 26 | ASSEMBLY KIT:SEALS(VITON 90$^0$ Shore), SCREWS OR BUSHES |

| | |
|---|---|
| 12 | SIZE 12 |
| 16 | SIZE 16 |
| 20 | SIZE 20 |
| 25 | SIZE 25 |
| 32 | SIZE 32 |

| | | | |
|---|---|---|---|
| 010 | for MUV-..-A/ED | 031 | for MUV-..-A |
| 011 | for MUV-..-A + A-..-UV | 032 | for MDM-..-A |
| 012 | for MDM-..-A + A-..-DM | 033 | for AN-..-A + A-..-UV |
| 013 | for AN-..-A | 035 | for MEV-..-A..F. |
| 015 | for MEV-..-A..F. + A-..-EV | 038 | for MEV-..-A..N. |
| 016 | for MDM-5 | 040 | for MDM-..-A/ED + A-..-DM |
| 017 | for AP-..-A | 061 | for MUV-..-A/V + A-..-UV |
| 018 | for MEV-..-A..N. + A-..-EV | 062 | for MDM-..-A/V + A-..-DM |
| 020 | for MDM-..-A/ED | 071 | for MUV-..-A/V |
| 030 | for MUV-..-A/ED + A-..-UV | 072 | for MDM-..-A/V |

## Maximum tightening torques MEV




| | | |
|---|---|---|
| MUV/MDM-12 | 10 Nm (7.4 lb.ft) | : 4xM6 |
| MUV/MDM-16 | 25 Nm (18.5 lb.ft) | : 4xM8 |
| MUV/MDM-20 | 50 Nm (37 lb.ft) | : 4xM10 |
| MUV/MDM-25 | 25 Nm (18.5 lb.ft) | : 6xM8 |
| MUV/MDM-32 | 50 Nm (37 lb.ft) | : 6xM10 |

| | | |
|---|---|---|
| MEV-12 | 10 Nm (7.4 lb.ft) | : 4xM6 |
| MEV-16 | 25 Nm (18.5 lb.ft) | : 4xM8 |
| MEV-20 | 50 Nm (37 lb.ft) | : 4xM10 |
| MEV-25 | 25 Nm (18.5 lb.ft) | : 6xM8 |
| MEV-32 | 50 Nm (37 lb.ft) | : 8xM10 |

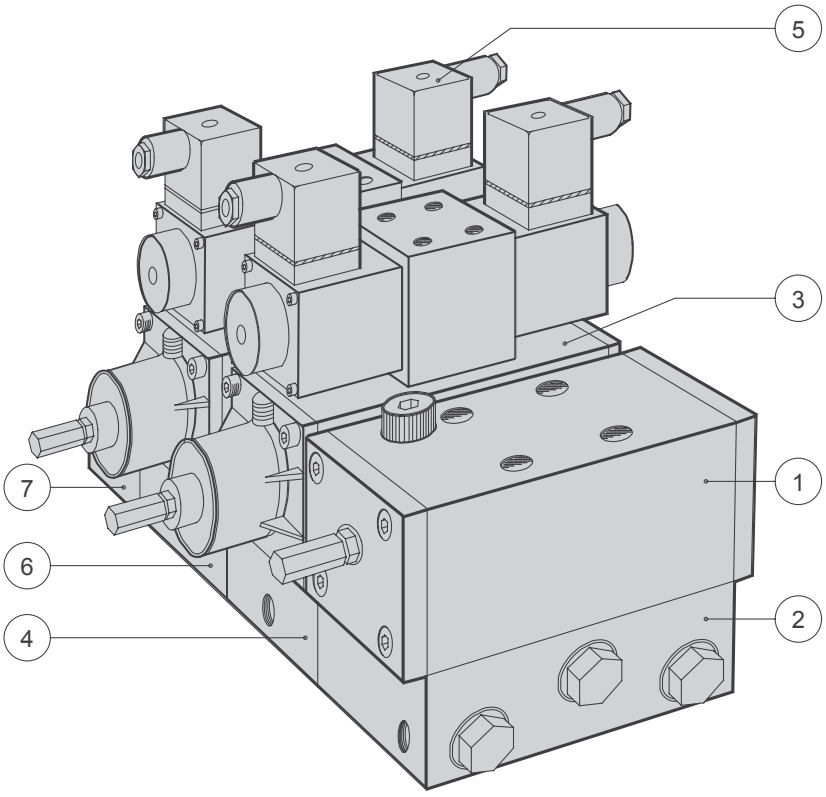
| | | |
|---|---|---|
| TIEROD SIZE 12: | 40 Nm (29.6 lb.ft) | : 3x 8 |
| TIEROD SIZE 16: | 80 Nm (59.2 lb.ft) | : 3x 10 |
| TIEROD SIZE 20: | 135 Nm (99.9 lb.ft) | : 3x 12 |
| TIEROD SIZE 25: | 215 Nm (159.1 lb.ft) | : 3x 14 |
| TIEROD SIZE 32: | 330 Nm (244.2 lb.ft) | : 3x 16 |

**Example for Ordering**

One electrically controlled directional control valve assembly, nominal bore 16, mounting type; sub-plate, consists of:

1. MUV Pressure relief valve, Δp compensator 6 bar (86 psi)
2. A..UV/X Inlet plate for ganged sub-plate and pressure relief valve with X connection for remote control
3. MEV 4/3 way controlvalve, spool type A, flow range 100 l/min (26 USgpm) (at ports A + B , with spring return to neutral position and adjustable flow limiter
4. A..EV Sub-plate for 4/3 way valve, standard
5. MEV 4/3 way controlvalve, spool type A, flow range at port A = 50 l/min (13 USgpm) port B = 100 l/min (26 USgpm) with spring return to neutral position and adjustable flow limiter
6. A..EV Sub-plate for 4/3 way control valve, standard
7. AP..A AP endplate, standard

(Ordering codes see page 26, 27, 28 and 29)



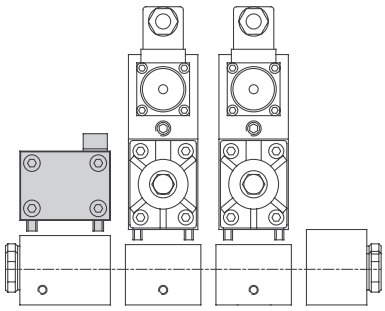

1: MUV 16 AS6S
2: A 16 UV/X
3: MEV 16 ASFFA 100/100
4: A 16 EV
5: MEV 16 ASFFA 50/100
6: A 16 EV
7: AP 16 A

## ORDERING CODE

(For composing a valve block use a copy of the order form, page 30)

### MUV OR MDM

Model Number **M U V 1 6 A S 6 S / Viton**



**Compensator type**
MUV = pressure relief valve
MDM = pressure reducing valve

**Size**
12 = for size 12
16 = for size 16
20 = for size 20
25 = for size 25
32 = for size 32

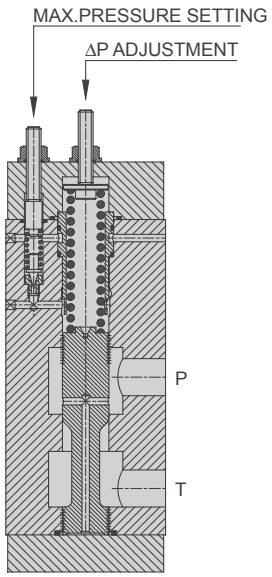
**Mounting type**
A = Sub-plate

**Series**
S = max. operating pressure
350 bar (5000 psi)

**Δp Compensator**
3 = 3 bar version (43 psi) *
6 = 6 bar version (86 psi)
8 = 8 bar version (114 psi)
12 = 12 bar version (172 psi) **
V = 6-12 bar (86-172 psi) adjustable, see picture below.
(to increase or decrease the flows of the control valves)

**Maximum pressure adjustment**
S = With screw (standard)
H = With handwheel for manual adjustment
E2 = Electrical remote control up to 350 bar (5000 psi)
W = Without pressure adjustment

Option V
( ΔP Adjustment 6-12 bar)




**Options**
P = Plugged MDM-spool (standard)
Q = Orifice in MDM-spool
Viton = With Viton seals 70 Shore
... = Factory setting of operating pressure: 350 bar (5000 psi)
Indicate here other desired operating pressure in bar.

* Only with external pilot pressure (X2) on MEV-section.
** Due to loss of pressure, c.q. energy conversion into heat, we recommend the next largest series.

## ORDERING CODE

(For composing a valve block use a copy of the order form, page 30)

### INLETPLATE FOR GANGED SUB-PLATES

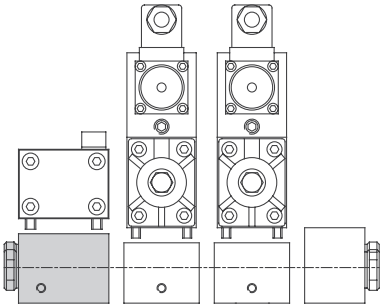
Model Number **A 16 UV / T2**

**Series**
A = Sub-plate

**Size**
12 = for size 12
16 = for size 16
20 = for size 20
25 = for size 25
32 = for size 32

**Sub-plate**
UV = for MUV
DM = for MDM

**Options**
R = allows serial connection with 2nd MUV (only for sub-plate UV)
SAE = S.A.E. straight thread O RING BOSS
T2 = 2nd tankport (only for sub-plate UV)
Viton = With Viton seals
X = Remote Control Connection



### INLETPLATE FOR GANGED SUB-PLATES (WITHOUT MOUNTED MUV OR MDM)

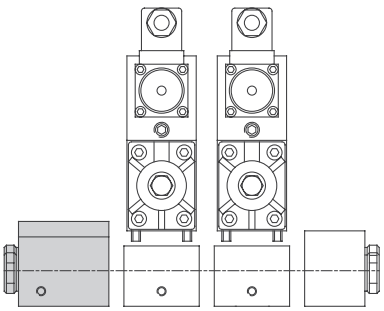
Model Number **AN 16 A / T2**

**Series**
AN = Inlet plate*

**Size**
12 = for size 12
16 = for size 16
20 = for size 20
25 = for size 25
32 = for size 32

**Mounting type**
A = Sub-plate

**Options**
SAE = S.A.E. straight thread 'O'RING BOSS
T2 = 2nd tankport
Viton = With Viton seals



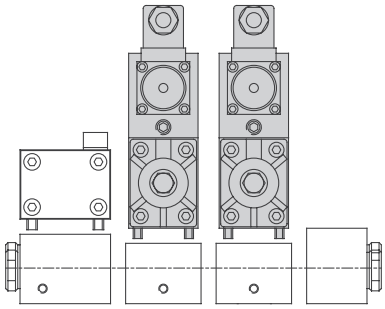
* AN = Inlet plate for use with variable displacement pump (L.S. pump) or two valve systems in parallel use, with one MUV. Standard with X-port in sub-plate

## ORDERING CODE

(For composing a valve block use a copy of the order form, page 30)

### CONTROL VALVE (MEV)

Model Number: MEV 16 A S F F A 50/50 / T3 / X2 / A



**Series**
MEV = Directional control valve, electrically controlled

**Size**
12 = for size 12
16 = for size 16
20 = for size 20
25 = for size 25
32 = for size 32

**Mounting type**
A = Sub-plate

**Series**
S = Max. operating pressure 350 bar (5000 psi)

**Position lock**
F = Spring return (spring ctr)

**Control system**
N = on/off
F = proportional

**Spool type**
A, B, C, D, E, F, G, K, M or O. See page 2

**Maximum Flow (l/min)**
.../... = choose the flow for port A and port B (see for max. flows page 2 , choose the flow in combination with the Δp compensator)

In case of differing flow ranges for ports A + B, the range for port A is given first, followed by the range for B, eg. 50/100.

**Options**
ACS = Adjustable Centering Springs
G = Cast iron spring caps
JS = Additional connection for hydraulical control
M = Additional manual control
MSW = Additional manual control Seawater Resistant
N = Neutral spool position signal, through inductive switch
SAE = S.A.E. straight thread 'O'RING BOSS (Option T3 and/or X2)
T3 = External pilot drain
Viton = With Viton seals
X2 = External pilot pressure

**Solenoid types**
A = 12V DC IP65 with emergency control by pin
B = 24V DC IP65 with emergency control by pin (standard)
E = 12V DC IP65 with emergency control by button
F = 24V DC IP65 with emergency control by button
H = 24V DC IP57 EEx m II T4 (Explosion Proof)
J = 24V DC IP67 Military, without female connector

## ORDERING CODE

(For composing a valve block use a copy of the order form, page 30)

### GANGED SUB-PLATE

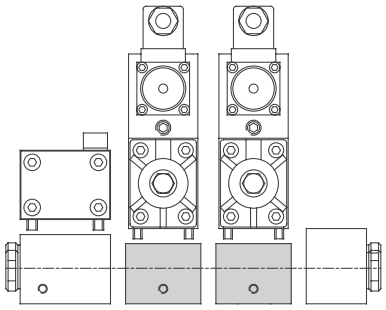
Model Number **A 16 EV / Y**

**Series**
A = Sub-plate

**Size**
12 = for size 12
16 = for size 16
20 = for size 20
25 = for size 25
32 = for size 32

**Sub-plate**
EV = for MEV

**Options**
SAE = S.A.E. straight thread 'O'RING BOSS
Viton = With Viton seals
Y = Remote Control Connection
Z = Remote Control Connection



### END PLATE (AP)

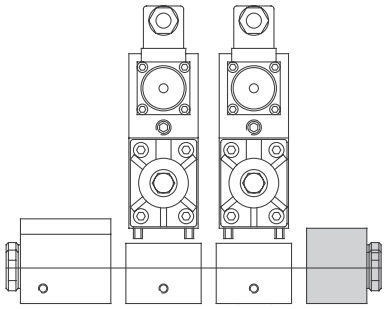
Model Number **AP 16 A / T1**

**Series**
AP = End-plate

**Size**
12 = for size 12
16 = for size 16
20 = for size 20
25 = for size 25
32 = for size 32

**Mounting type**
A = Sub-plate

**Options**
SAE = S.A.E. straight thread 'O'RING BOSS
T1 = With additional tank port.
Viton = With Viton seals



## ORDER FORM

Company :

Name :

Order No. :

Quantity (complete system) :

Date :

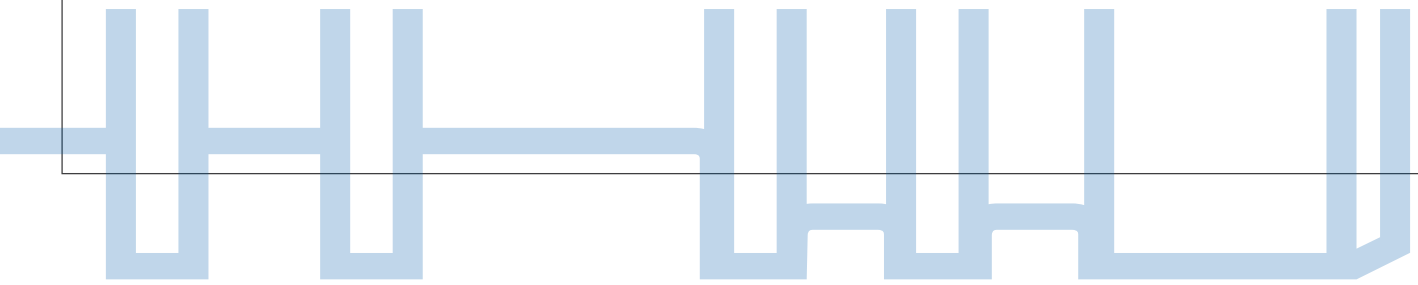
(stamp)

Size

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| MUV or MDM | | M | | AS | | | / | | |
| INLET PLATE | | A | | / | | | Spool type / Flow / A / B | | |
| INLET PLATE | | AN | | / | | | | | |
| MEV + GANGED SUBPLATE | 1 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 2 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 3 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 4 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 5 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 6 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 7 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| | 8 | MEV | | AS | F | | | / | / |
| | | A | | EV | / | | | | |
| END PLATE | | AP | | A | / | | | | |

DO NOT WRITE ON THIS CHART - make a photocopy of this page and record the valve ordering code on the copy (then the chart can be used more than once)

NOTES



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