

### HDF(\*)/AMF STACKABLE VALVES SYSTEM

#### ■ Generalities

- **HDF(\*) system** is designed to create very compact hydraulic control groups, by the use of stackable solenoid valves (and modules), that don't need the use of a base plate.  
All connections A and B to "users" are 1/4" BSP and they are located directly on the solenoid valves bodies or on the pilot operated check valves.

- The HDF(\*) system is optimized to control flows up to 20 l/min with max pressure of 250 bar.

- Ideal use of HDF(\*) system is on standard minipowerpacks type **SCLA** (see table AS-101).

- The basic system uses **HDF-ES-\*\*** solenoid valves, packed in a very compact overall dimensions, where the 4-way solenoid valve share common P and T lines (in parallel or in series connection) and A and B ports are located on the top of each 4-way valve.

- The more sophisticated systems uses **HDF2-ES-\*\*** solenoid valves, where connections to A and B lines are internal and therefore it is possible to stack modules that control flow or pressure on individual A and/or B ports : typically the use of p.o. check valve is current.

- Elements from HDF and HDF2 systems can be mixed and can be stacked together, then giving an optimum of flexibility

- Installation normally is made by fastening, by 3 tie rods, the stack of HDF(\*) valves on a plate or manifold or block where a surface presents suitably located P and T connections.

This principle permits the best installation of HDF(\*) stacks on minipowerpacks SCLA, on control blocks or, as a piggy back, on banks of larger 4-way control valves.

- In current application of HDF system, a "closing" plate is needed to seal the P and T lines that are passing through the stack of valves.

In case of repetitive or large scale application, the use of "blind" final elements could be of great help:

- solenoid valves type **HDFC-ES-\*\*** (P and T ports on face with seals)
- solenoid valves type **HDFB-ES-\*\*** (P and T ports on face without seals)
- p.o. check valves type **AMFC-CP-AB**

These eliminate the need of a "closing" plate and permit shorter tie rods

#### ■ Components for the HDF system

##### 4-way solenoid valves (see table AD-220)

- Valves type **HDF-ES-\*\***, see table AD-220. Those are the basic elements with A and B ports (1/4" BSP) on top of valve; P and T passing through.



**F2-ES-\*\***, see table AD-230. Those valves have P and T passing through and internal connection for A and B line.

Normally the A and B 1/4" BSP ports must be plugged and a suitable control module is associated to the valve.

- In the basic versions the spool can be manually shifted by acting on the emergency pins. This manual override can be replaced by lockable override nut device type **G01-E**

##### Control modules

- Pilot operated check valve type **AMF-CP-AB** (see table AD-250)

Associated to HDF2-ES-\*\*\* solenoid valve, operates on A and B lines and presents A and B ports connections 1/4" BSP on sides.



##### Relief valves

- **AMF-MOP/\*-CC**; (see table AM-F60)



Relief valve acting on main (common) P line (passing) with discharge on (common) T line (passing) **AMF-MOP/\*-P1**; **AMF-MOP/\*-T1**. Options: Version P1 presents an auxiliary 1/4" BSP port P on one side. In the same way Version T1 presents an auxiliary 1/4" BSP port T on one side.

- Relief combined with variable flow control valve type **AMF-MOP/\*-CF**

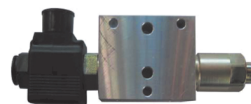
This valve presents, in parallel with the relief valve, a regulated bleeding flow from P line to T line. Version with graduated knob for the throttle valve is available (**AMF-MOP/\*-CV**).

- Relief combined with pressure compensated flow control valve type **AMF-MOP/\*-Q\*** (see table AM-F60)

This valve presents, in parallel with the relief valve, a pressure compensated bleeding flow from P line to T line. Bleeding flow rate can be fixed (**AMF-MOP/\*-Q(\*)**) or adjustable (**AMF-MOP/\*-QV**).

- Relief combined with electric by-pass valve type **AMF-MOP/\*-EV2\*** (see table AD-270)

This valve presents, in parallel with a pressure relief valve, a directional valve that allows connection of P and T lines with electric command. Normally open (**AMF-MOP/\*-EV20**) and normally closed (**AMF-MOP/\*-EV2C**) versions are available.



- A and B pressure relief valve type **AMF-MO-BA** (see table AD-265).

Relief valve acting on A and B line with discharge on (common) T line. P line is passing.

### Plates

- Inlet/outlet modules type **AMF-SE-\*** (see table AS-101).

This is a plate with standard HDF-ES interface (inlet) on one face and additional P and T ports (1/4" BSP) on one side. This plate is equipped with a NC 2/2 solenoid valve that discharge P line on T line (**AMF-SE-CO**);. This function is typical for simple acting cylinders.

In series with the NC 2/2 solenoid valve is possible to use a flow control valve that can be : throttle adjustable (**AMF-SE-CV**); fixed flow, pressure compensated (**AMF-SE-Q(\*)**); adjustable flow pressure compensated (**AMF-SE-QV**)

- Inlet/outlet module type **PD1-PT** (see table AS-101).

This plate presents HDF-ES interface (inlet) on one face and P and T ports (1/4" BSP) on one side.

- Inlet/outlet module type **PD1-03/32-5** (see table AD-220).

This plate presents HDF-ES interface (outlet) on one face and P and T ports (1/4" BSP) on the other face.

- Intermediate plate type **AMF-PM-TP**. This module permits change of circuit from "parallel" to "series" (T1 → P2).



- Steel closing plate type **PD1-03/32-0** (see table AD-220).

- Closing plate is not necessary when HDF-ES-\*\*\* or AMFC-ES-\*\*\* are used.



### In line valves and accessories

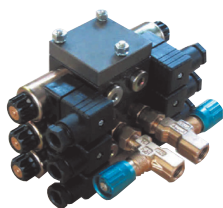
- In line throttle and check valve type **HFC-14** (see table AF-114).

This valve can be screwed directly on the A and B exit ports of the HDF-ES-\*\*\* valves, obtaining free direct flow and restricted reverse flow (adjustable).

The presence of a "turning connector" allows the contemporary mounting of two valves on both ports of the solenoid valve.

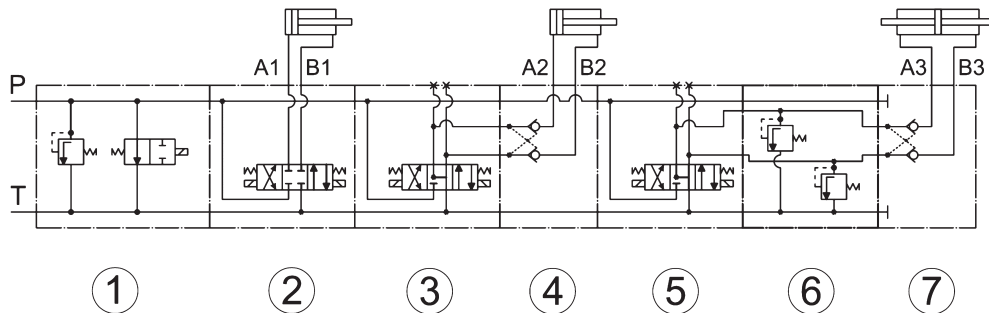
- If a fixed throttle on P or T lines is needed is possible to use the "section reducers" type 3S-\*\*, that can be installed on the interested port under the seal.

- A standard mounting kit angulare **MAF-KIT-2**, in case of HDF\*/AMF standing alone block (not connected to power pack SCLA), helps to connect the valves block by screws to the chassis of machine or to the tank of power unit.

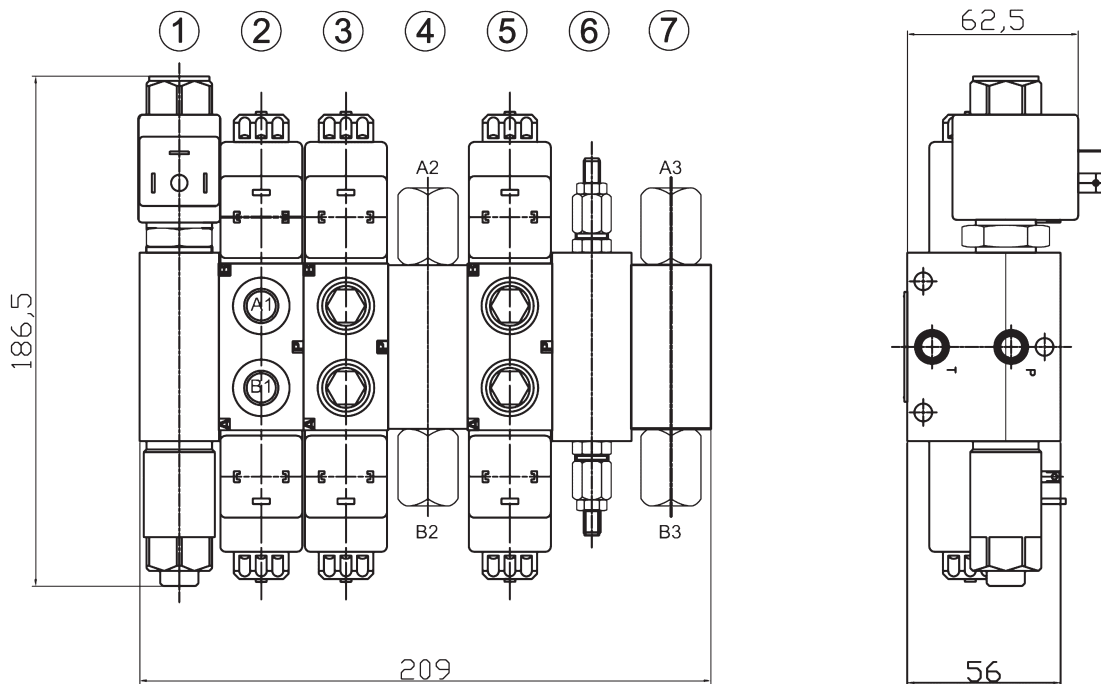


**CIRCUIT EXAMPLES**

- The use of HDF system permits to obtain hydraulic circuits in very low dimensions. The following scheme can be taken as an example :



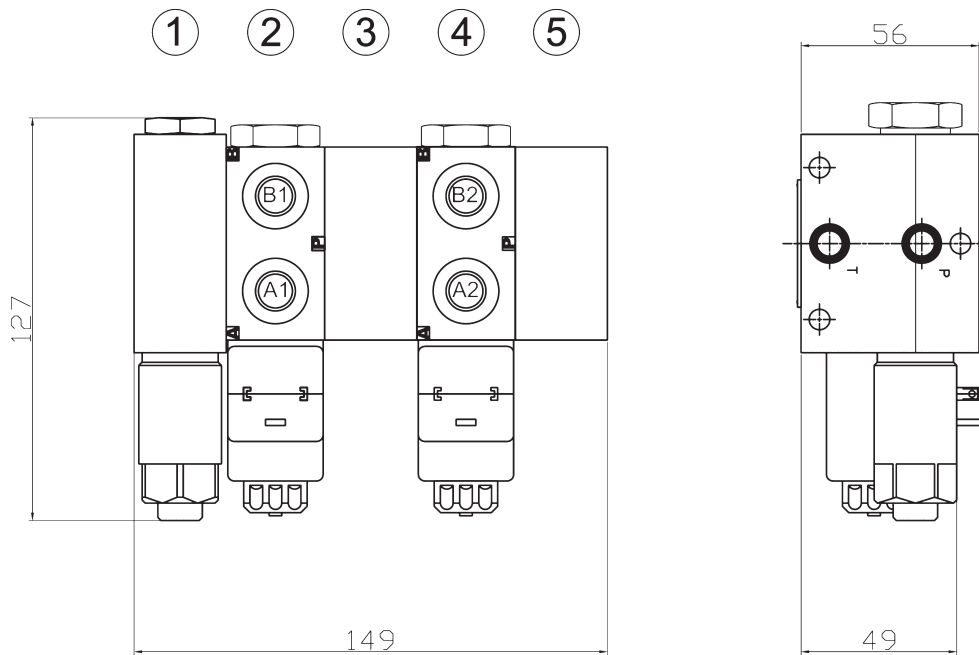
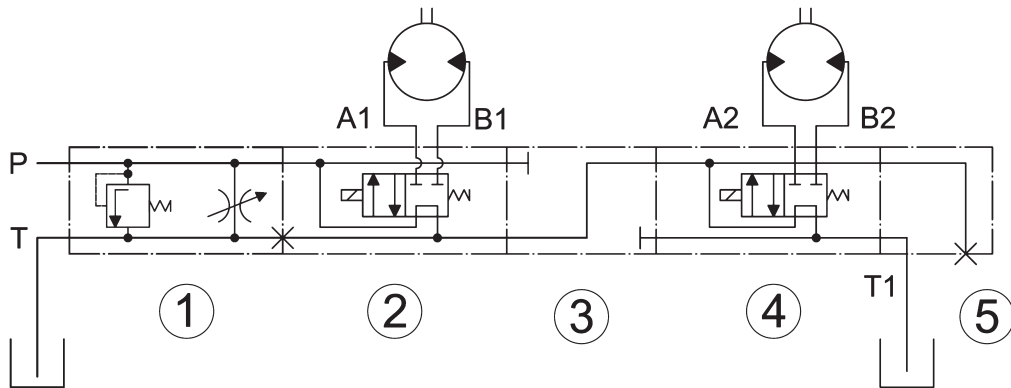
- With HDF(\*) stackable system is possible to realize this circuit using seven elements :



<b>1</b>	By-pass valve in parallel with a relief valve (AMF-MOP/*-EV20)	<b>5</b>	4-way solenoid operated valve with internal A and B ports (HDF2-ES-3C-****)
<b>2</b>	4-way solenoid operated valve (HDF-ES-1C-****)	<b>6</b>	Relief valve operating on A and B lines separately (AMF-MO-BA)
<b>3</b>	4-way solenoid operated valve with internal A and B ports (HDF2-ES-3C-****)	<b>7</b>	Double p.o. check valve, blind version(AMFC-CP-AB)
<b>4</b>	Double p.o. check valve (AMF-CP-AB)		

**TANDEM CIRCUIT EXAMPLE**

- The use of AMF-PM-TP module permits to realize, shifting the flow from P to T line, a tandem circuit in very simple way. This leads to a small size of the block. This solution implies the need for an additional T port, which is available, for example, in the closing element PD1-PT.
- An example of a circuit with series connection of two hydraulic motors is shown in the following figures :



1	Pressure relief valve in parallel with a variable bleeding flow (AMF-MOP/*-CF)
2	4- way solenoid operated valve (HDF-ES-4ML-****)
3	Intermediate plate for tandem circuit (AMF-PM-TP)
4	4-way solenoid operated valve (HDF-ES-4ML-****)
5	Closing plate with additional G1/4 P(plugged) and T port (PD1-PT)