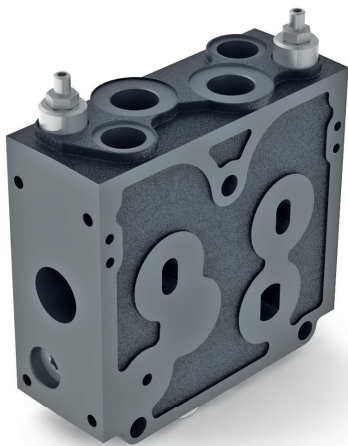
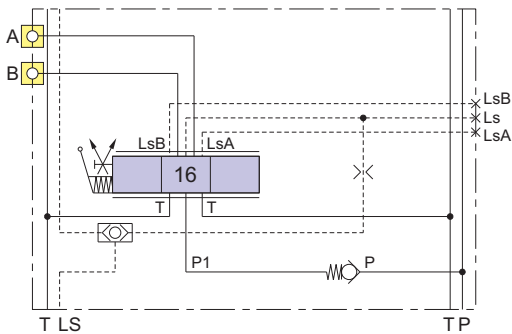
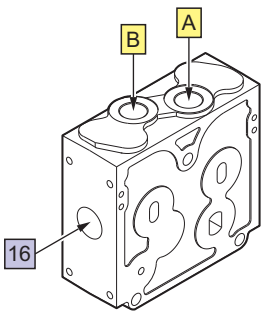


HPV 41



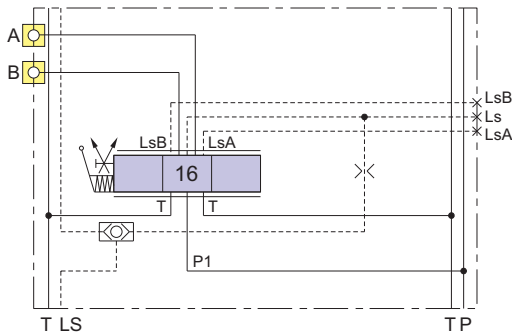
- **Features**
- Other hydraulic features: see page B-8.
- Connections: A,B: 1/2" BSPP or 7/8" - 14UNF-2B
- Made in cast iron

With no facilities for valves



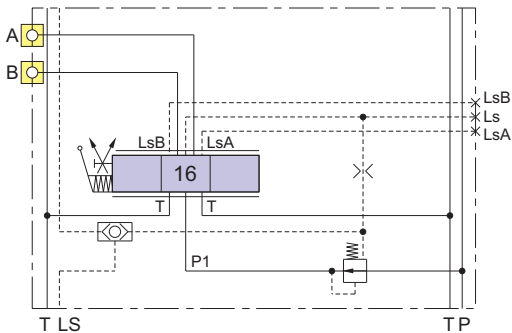
Without pressure compensator
With load drop check valve

Code	
BSPP	UN - UNF
HEM0004102071	HEM0004102081



Without pressure compensator

Code	
BSPP	UN - UNF
HEM0004102070	HEM0004102080



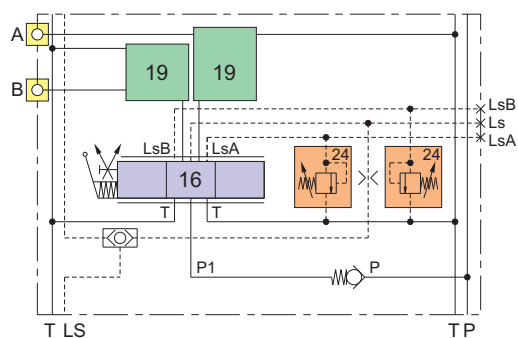
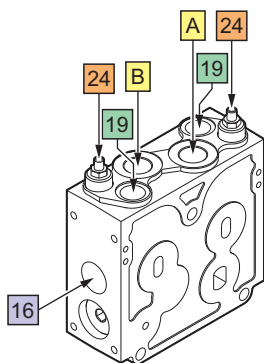
With pressure compensator

Code	
BSPP	UN - UNF
HEM0004102190	HEM0004102200

16 Spool page B-46

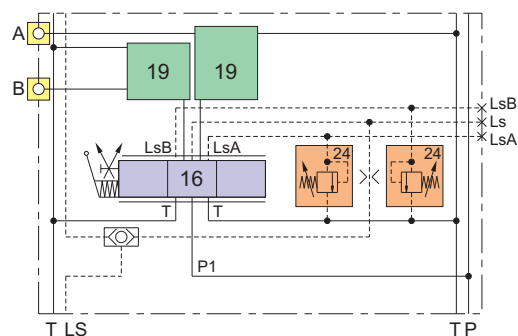
A/B Alternatively closing plug HETS004103002 page B-52

With adjustable LsA LsB pressure relief valves.
Prearranged for shock-suction valves



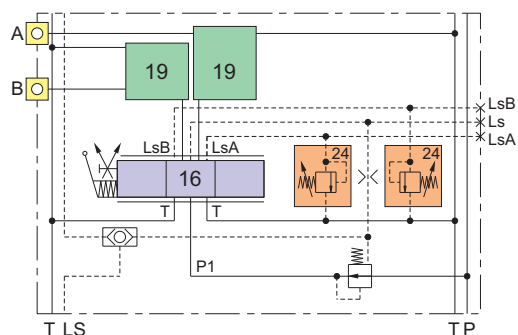
Without pressure compensator
With load drop check valve

Code	
BSPP	UN - UNF
HEM0004102031	HEM0004102041



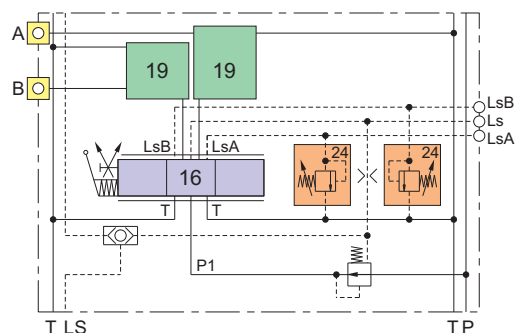
Without pressure compensator

Code	
BSPP	UN - UNF
HEM0004102030	HEM0004102040



With pressure compensator

Code	
BSPP	UN - UNF
HEM0004102150	HEM0004102160



With pressure compensator

Code	
BSPP	UN - UNF
HEM0004102130	HEM0004102140

Prearranged for: shock-suction valves
electrical LsA - LsB signal unloading
modules (MHFK, MHCP, MHFOX
modules).

16 Spool page B-46

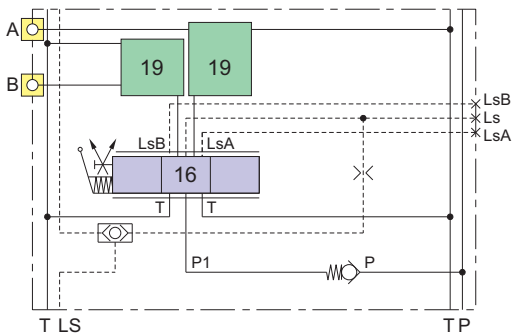
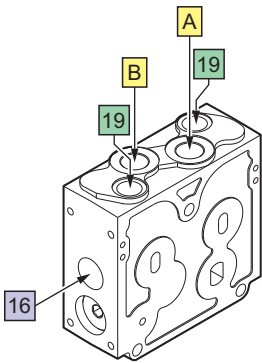
19 Seats for valve HEAA - HEAD - HEAT - HEAN or plug HETS page B-50

24 Pressure relief valves LsA e LsB, alternatively kit for closing seat HESC004103007 page B-52

A/B + 19 Alternatively plugs kit HESC004103008 page B-52

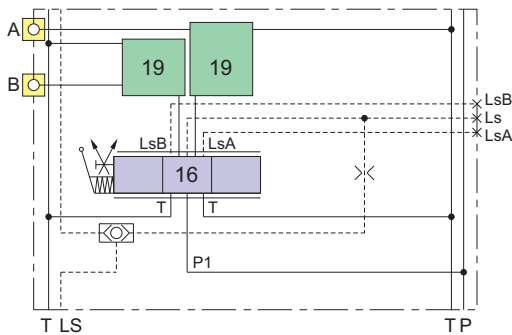
A/B + 19 + 24 Alternatively plugs kit HESC004103009 page B-52

Prearranged for shock-suction valves



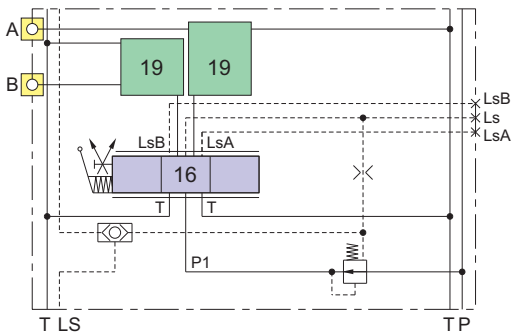
Without pressure compensator
With load drop check valve

Code	
BSPP	UN - UNF
HEM0004102051	HEM0004102061



Without pressure compensator

Code	
BSPP	UN - UNF
HEM0004102050	HEM0004102060



With pressure compensator

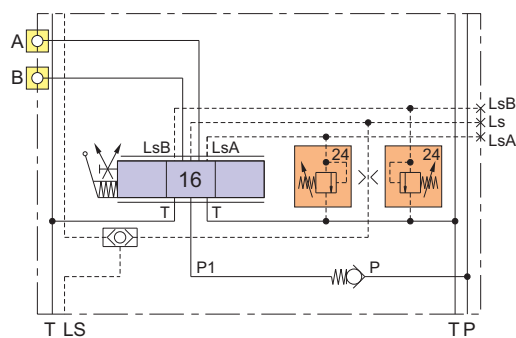
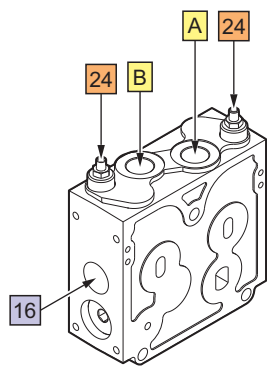
Code	
BSPP	UN - UNF
HEM0004102170	HEM0004102180

16 Spool page B-46

19 Seats for valve HEAA - HEAD - HEAT - HEAN or plug HETS page B-50

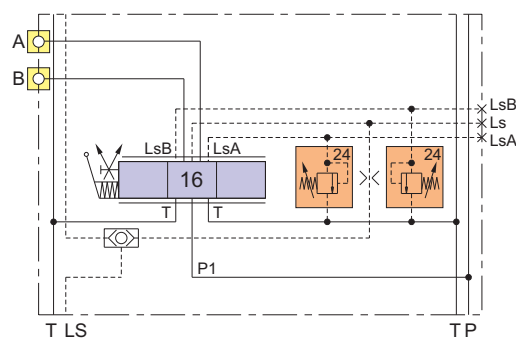
A/B + 19 Alternatively plugs kit HESC004103008 page B-52

With adjustable LsA LsB pressure relief valves



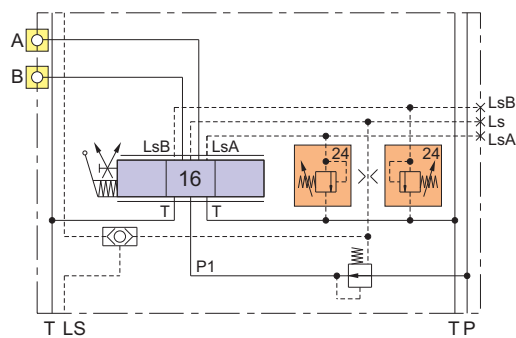
Without pressure compensator
With load check valve

Code	
BSPP	UN - UNF
HEM0004102091	HEM0004102101



Without pressure compensator

Code	
BSPP	UN - UNF
HEM0004102090	HEM0004102100



With pressure compensator

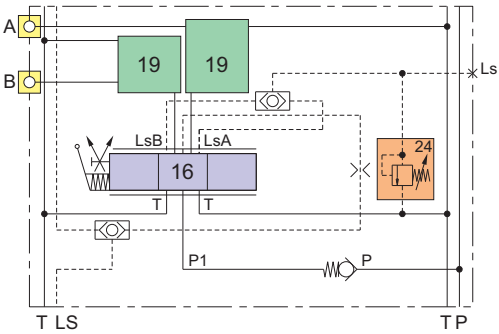
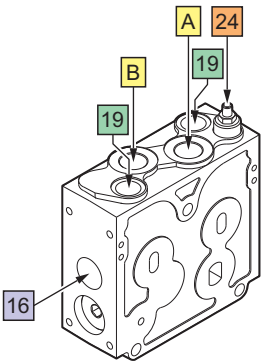
Code	
BSPP	UN - UNF
HEM0004102210	HEM0004102220

16 Spool page B-46

24 Pressure relief valves LsA e LsB, alternatively kit for closing seat HESC004103007 page B-52

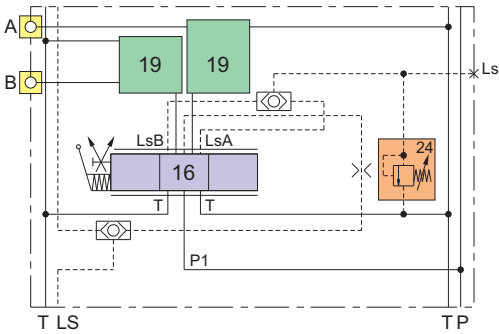
A/B Alternatively closing plug HETS004103002 page B-52

With single adjustable Ls pressure relief valve.
Prearranged for shock-suction valves



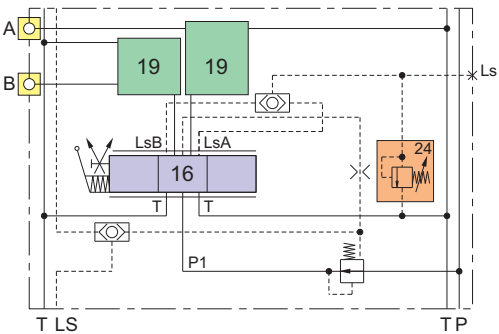
Without pressure compensator
With load drop check valve

Code	
BSPP	UN - UNF
HEM0004102111	HEM0004102121



Without pressure compensator

Code	
BSPP	UN - UNF
HEM0004102110	HEM0004102120



With pressure compensator

Code	
BSPP	UN - UNF
HEM0004102230	HEM0004102240

- 16

Spool page B-46
- 19

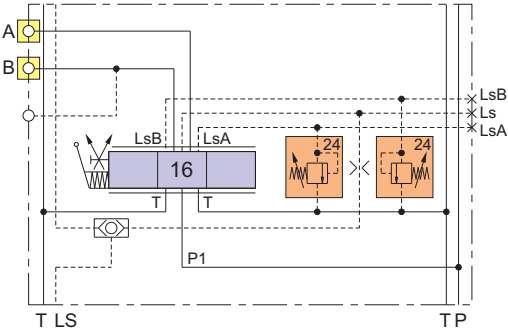
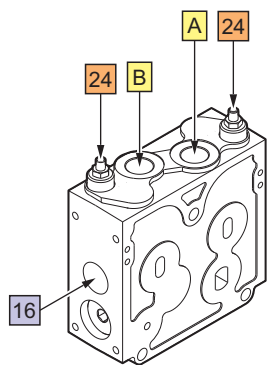
Seats for valve HEAA - HEAD - HEAT - HEAN or plug HETS page B-50
- 24

Pressure relief valves LsA e LsB, alternatively kit for closing seat HESC004103007 page B-52
- A/B + 19

Alternatively plugs kit HESC004103008 page B-52
- A/B + 19 + 24

Alternatively plugs kit HESC004103009 page B-52

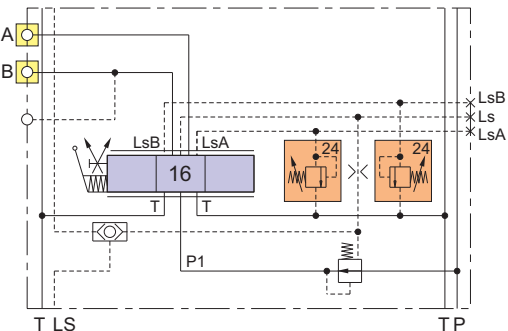
With adjustable LsA LsB pressure relief valves.
Prearranged for automatic hydraulic release (kick-out) in B port



Without pressure compensator

Code	
BSPP	UN - UNF
*	HEM0004102104

* available on request



With pressure compensator

Code	
BSPP	UN - UNF
HEM0004102221	*

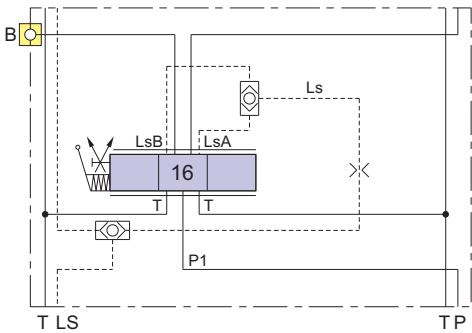
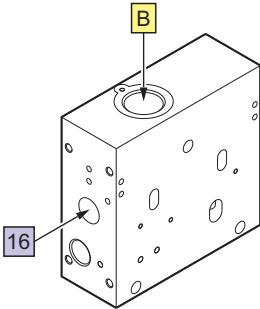
* available on request

16 Spool page B-46

24 Pressure relief valves LsA e LsB, alternatively kit for closing seat HESC004103007 page B-52

A/B Alternatively closing plug HETS004103002 page B-52

D. S. version (Special Distribution) for upstream / downstream subordinate actuator supply



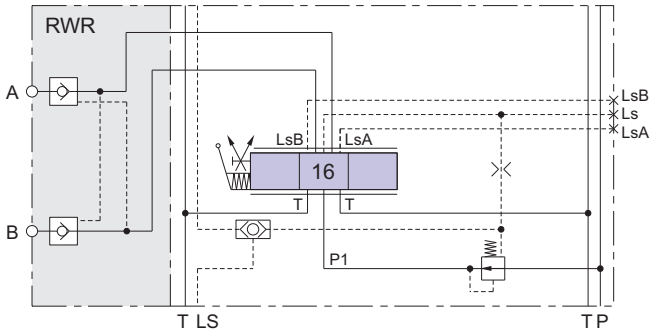
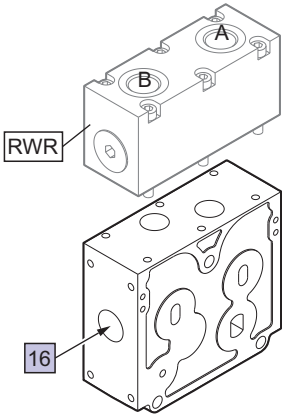
Without pressure compensator

Code	
BSPP	UN - UNF
HEM0004102123	*

* available on request

- 16 Spool page B-46
- B Alternatively closing plug HETS004103002 page B-52

Prearranged for RWR module (double pilot operated check valve) only

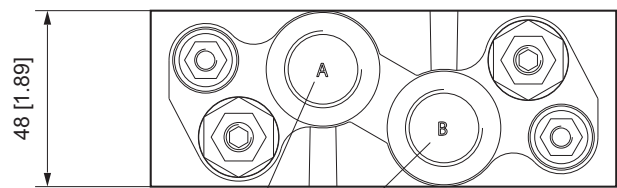
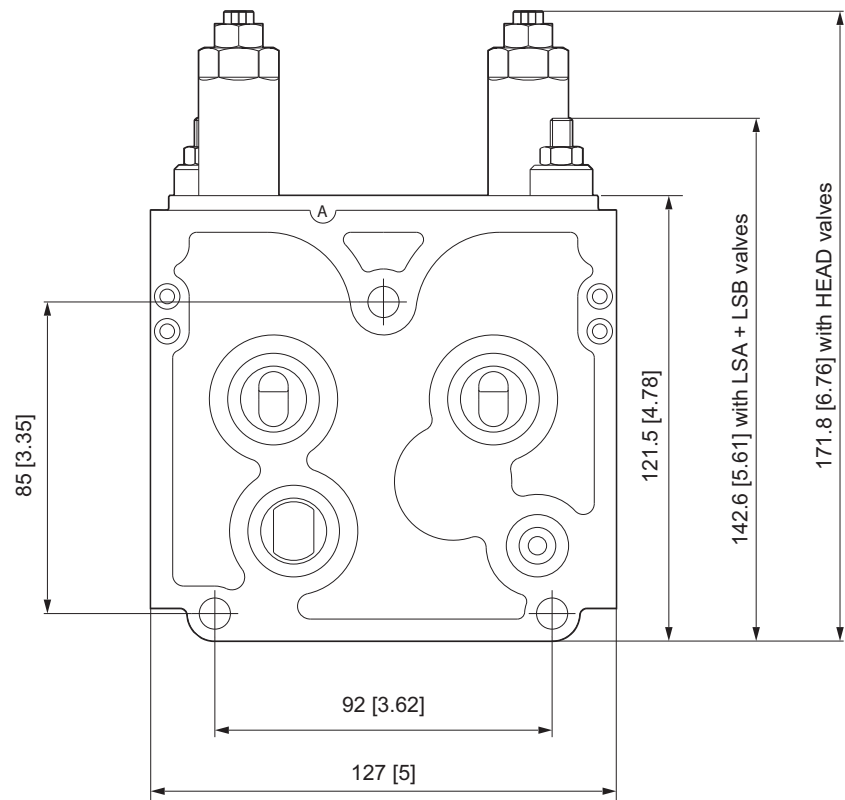


With pressure compensator

Code	
BSPP	UN - UNF
HEM0004102400	HEM0004102401

- 16 Spool page B-46

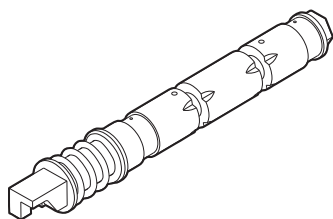
HEM module overall dimensions



A/B
1/2 BSPP
7/8" 14UNF - 2B

mm [inch]





Main spool for flow control, double acting

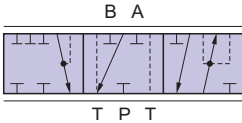
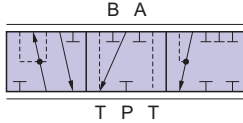
Size	Max. pressure compensated oil flow l/min [US gpm]	Symbol and ordering code			
		4-way, 3-position A, B closed	4-way, 3-position A, B → T	4-way, 3-position B → T; A closed	4-way, 3-position A → T; B closed
	3 [0.8]	HEAS004104014	HEAS004104038	—	—
	5 [1.3]	HEAS004104009	HEAS004104039	—	—
1	7.5 [2]	HEAS004104010	HEAS004104040	HEAS004104070	HEAS004104100
	12 [3.2]	HEAS004104012	HEAS004104042	—	—
2	15 [4]	HEAS004104013	HEAS004104043	HEAS004104073	HEAS004104103
3	20 [5.3]	HEAS004104015	HEAS004104045	HEAS004104075	HEAS004104105
	25 [6.6]	HEAS004104016	HEAS004104046	-	-
4	30 [7.9]	HEAS004104018	HEAS004104048	HEAS004104078	HEAS004104108
5	40 [10.6]	HEAS004104020	HEAS004104050	HEAS004104080	HEAS004104110
6	50 [13.2]	HEAS004104021	HEAS004104051	HEAS004104081	HEAS004104111
7	60 [15.9]	HEAS004104025	HEAS004104055	HEAS004104085	HEAS004104115
8	80 [21.1]	HEAS004104030	HEAS004104060	HEAS004104090	HEAS004104120
9	100 [26.4]	HEAS004104035	HEAS004104065	HEAS004104095	HEAS004104125
10	130 [34.3]	HEAS004104036	HEAS004104066	—	—

Main spool for flow control, double acting, asymmetric flow

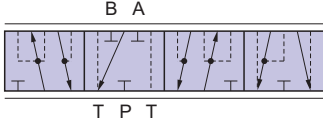
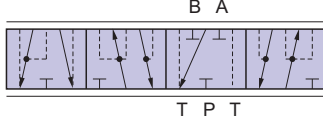
Max. pressure compensated oil flow l/min [US gpm]		Symbol and ordering code			
		4-way, 3-position A, B closed	4-way, 3-position A, B → T	4-way, 3-position B → T; A closed	4-way, 3-position A → T; B closed
A	B				
7.5 [2]	15 [4]	HEAS00410AAAB (*)	HEAS00410ABAB (*)	—	—
7.5 [2]	20 [5.3]	HEAS00410AAAD (*)	—	—	—
7.5 [2]	30 [7.9]	—	—	HEAS00410ACCF (*)	—
10 [2.6]	20 [5.3]	HEAS00410AACD (*)	—	—	—
12 [3.2]	20 [5.3]	HEAS004104017 (*)	HEAS004104047 (*)	—	—
12 [3.2]	30 [7.9]	—	—	—	HEAS004104076 (*)
15 [4]	30 [7.9]	HEAS00410AABF (*)	—	—	—
20 [5.3]	40 [10.6]	—	—	—	HEAS00410ACDH (*)
30 [7.9]	50 [13.2]	HEAS00410AAFI (*)	HEAS00410ABIF (*)	—	—
30 [7.9]	70 [18.5]	HEAS00410AAFO (*)	-	—	—
30 [7.9]	130 [34.3]	—	HEAS00410ABFZ (*)	—	—
40 [10.6]	60 [15.9]	—	HEAS00410ABMH (*)	—	—
50 [13.2]	80 [21.1]	HEAS00410AAIQ (*)	—	—	—
60 [15.9]	100 [26.4]	HEAS00410AAMU (*)	—	—	—
60 [15.9]	80 [21.1]	HEAS00410AAMQ (*)	—	—	—
70 [18.5]	130 [34.3]	—	HEAS00410ABOZ (*)	—	—

(*) Special spool, available upon request

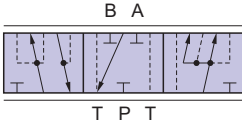
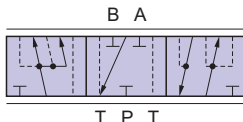
Main spool for flow control, single acting

Size	Max. pressure compensated oil flow l/min [US gpm]	Symbol and ordering code	
			
		3-way, 3-position P → A	3-way, 3-position P → B
1	7.5 [2]	HEAS004104130 (*)	HEAS004104160 (*)
2	15 [4]	HEAS004104133 (*)	HEAS004104163 (*)
3	20 [5.3]	HEAS004104135 (*)	HEAS004104165 (*)
4	30 [7.9]	HEAS004104138 (*)	HEAS004104168 (*)
5	40 [10.6]	HEAS004104140 (*)	HEAS004104170 (*)
6	50 [13.2]	HEAS004104141 (*)	HEAS004104171 (*)
7	60 [15.9]	HEAS004104145 (*)	HEAS004104175 (*)
8	80 [21.1]	HEAS004104150 (*)	HEAS004104180 (*)
9	100 [26.4]	HEAS004104155 (*)	HEAS004104185 (*)

Main spool for flow control, double acting, with 4th floating position

Size	Max. pressure compensated oil flow l/min [US gpm]	Symbol and ordering code	
			
		3-way, 4-position floating position on A port	3-way, 4-position floating position on B port
1	7.5 [2]	HEAS004104190 (*)	HEAS004104390 (*)
2	15 [4]	HEAS004104193 (*)	HEAS004104393 (*)
3	20 [5.3]	HEAS004104195 (*)	HEAS004104395 (*)
4	30 [7.9]	HEAS004104198 (*)	HEAS004104398 (*)
5	40 [10.6]	HEAS004104200 (*)	HEAS004104400 (*)
6	50 [13.2]	HEAS004104201 (*)	HEAS004104401 (*)
7	60 [15.9]	HEAS004104205 (*)	HEAS004104405 (*)
8	80 [21.1]	HEAS004104210 (*)	HEAS004104410 (*)
9	100 [26.4]	HEAS004104215 (*)	HEAS004104415 (*)

HEAS modules - Main spool for flow control, double acting, regenerative function

Size	Max. pressure compensated oil flow l/min [US gpm]	Symbol and ordering code	
			
		Regenerative circuit on A port	Regenerative circuit on B port
5	40 [10.6]	HEAS004104500 (*)	HEAS004104600 (*)
6	50 [13.2]	HEAS004104501 (*)	HEAS004104601 (*)

(*) Special spool, available upon request

Main spool for pressure control

When using a proportional directional valve, where the overcenter valves are present, instability problems can happen to the whole system, in the form of a rise and fall of pressure. A new series of spools will suit these kinds of problems.

This system of control is called Pressure Control, and has been devised to make the overcenter valves pilot pressure more stable.

Generally, the Pressure Control function is requested for only one port (A or B), while the other port maintains the normal flow control function.

The problem manifests almost always during the re-entry of the rod, under the force of the positive load, where the only pressure requested is that which is necessary to pilot the

overcenter valves, to lower and control the load.

The Pressure Control spools must always be used with compensating elements and with pilot load sensing relief valves for A/B ports.

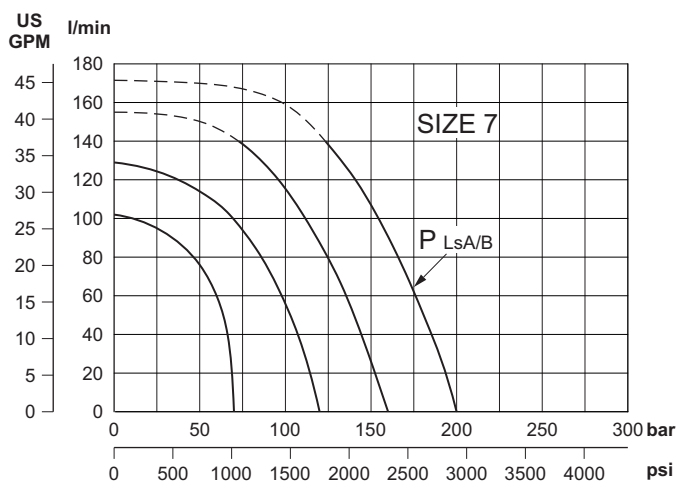
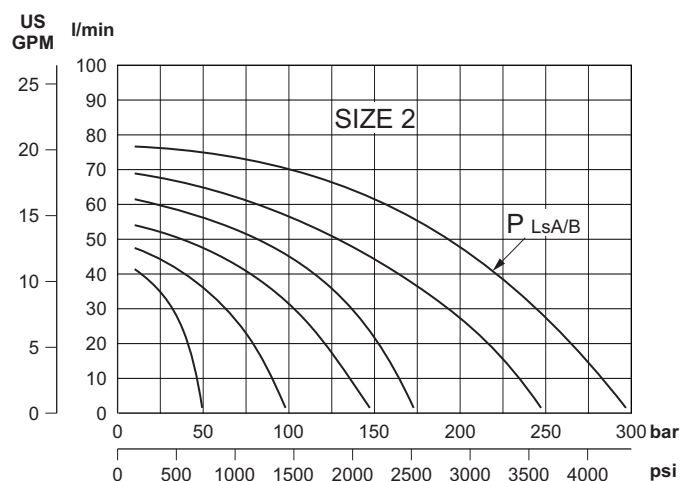
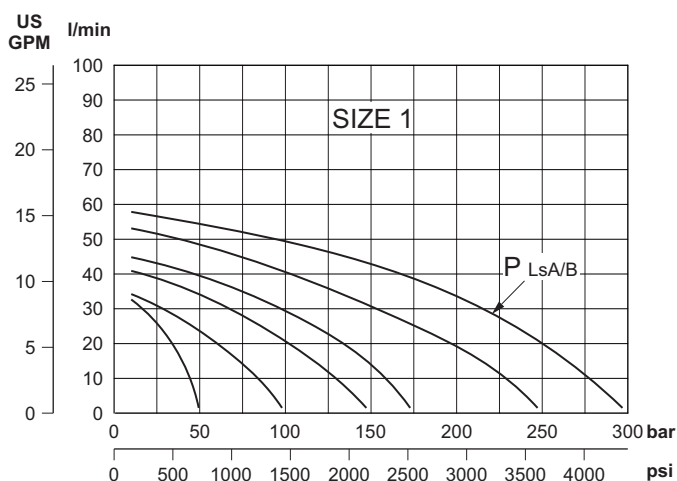
Using the Pressure Control solution allows a higher degree of stability to the system and the control of the function, however, we advise its use exclusively in severe cases, since:

- The valve loses own compensation, becoming "load dependent": namely, its performance varies at the variation of the working pressure;
- The pump pressure could be considerably higher than that necessary to move the load (the Δp through the spool is no more constant and controllable).

Symbol and ordering code (PC = Pressure Control - FC = Flow control)						
Size						
	4-way, 3-position, A, B closed	4-way, 3-position, A, B throttled open to T	4-way, 3-position, A, B closed	4-way, 3-position, A, B closed	4-way, 3-position, A throttled open to T, B closed	4-way, 3-position, A closed, B throttled open to T
1	HEAS00410AD07 (*) PC → A + B	HEAS00410AD11 (*) PC → A + B	HEAS00410AMAF (*) PC → A FC → B Q=30 l/min [7.9 US gpm]	—	HEAS00410AVAF (*) PC → A FC → B Q=30 l/min [7.9 US gpm]	—
	—	—	HEAS00410AMAI (*) PC → A FC → B Q=50 l/min [13.2 US gpm]	—	HEAS00410AVAI (*) PC → A FC → B Q=50 l/min [13.2 US gpm]	—
2	HEAS00410AD15 (*) PC → A + B	HEAS00410AD16 (*) PC → A + B	HEAS00410A040 (*) PC → A FC → B Q=60 l/min [15.8 US gpm]	—	—	—
7	—	—	HEAS00410A060 (*) PC → A FC → B Q=100 l/min [26.4 US gpm]	—	—	—

(*) Special spool, available upon request

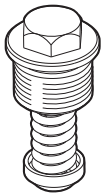
Pressure control flow characteristics, with end spool travel



P LsA/B: Pilot pressure relief valve setting

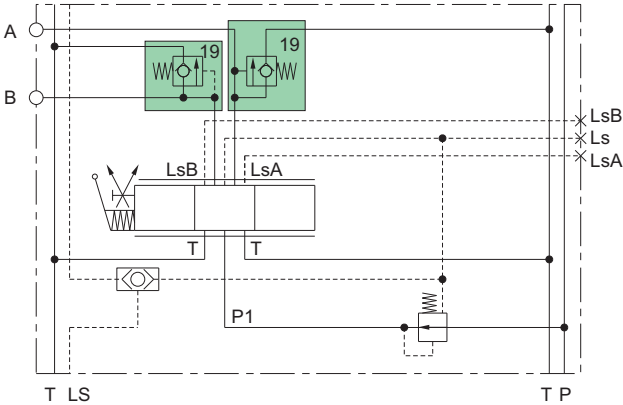
Typical spool oil flow tolerances

Size	Oil flow at max. spool travel	
	min l/min [US gpm]	max l/min [US gpm]
1	7 [1.8]	8.5 [2.2]
2	14.5 [3.8]	16 [4.2]
3	19 [5]	21 [5.5]
4	29 [7.7]	33 [8.7]
5	39 [10.3]	44 [11.6]
6	48.5 [12.8]	54 [14.3]
7	59 [15.6]	65 [17.2]
8	79 [20.9]	85 [22.5]
9	94 [24.8]	101 [26.7]
10	118 [31.2]	128 [33.8]



HEAA

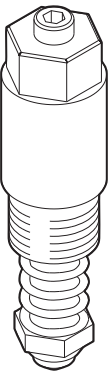
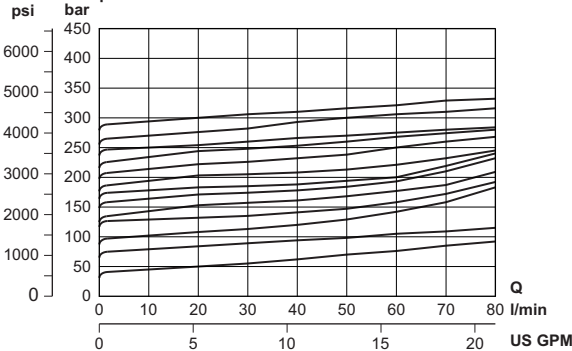
Hydraulic diagram example



Not adjustable shock and suction valve for A – B ports,
HEAA is designed to absorb shock effects only.
Don't use it as a pressure relief valve.

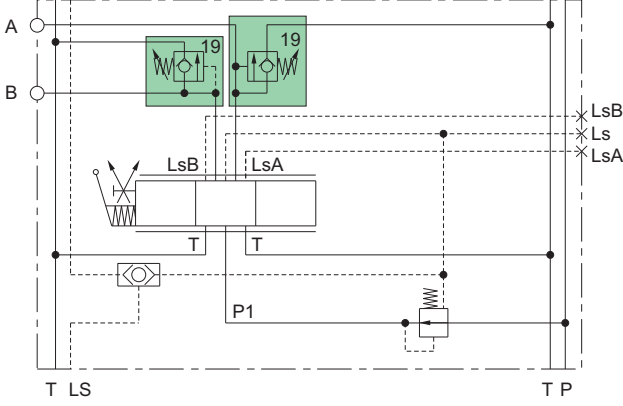
Range setting bar [psi]	Code (*)
45 [653]	HEAA004103045
60 [870]	HEAA004103060
75 [1088]	HEAA004103075
95 [1378]	HEAA004103095
120 [1740]	HEAA004103120
135 [1958]	HEAA004103135
155 [2248]	HEAA004103155
170 [2466]	HEAA004103170
190 [2756]	HEAA004103190
220 [3191]	HEAA004103220
240 [3481]	HEAA004103240
250 [3626]	HEAA004103250
270 [3916]	HEAA004103270
290 [4206]	HEAA004103290
320 [4641]	HEAA004103320

Characteristics curve



HEAD

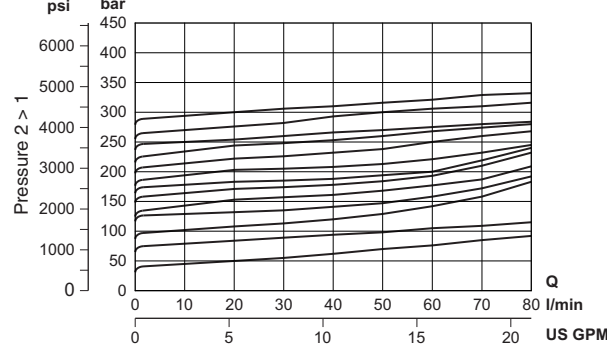
Hydraulic diagram example



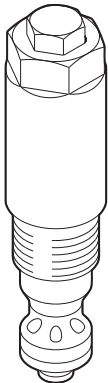
Adjustable shock and suction valve for A – B ports.
HEAD is designed to absorb shock effects only.
Don't use it as a pressure relief valve.

Range setting bar [psi]	Code (*)
10 ÷ 70 [150 ÷ 1020]	HEAD004103020
71 ÷ 120 [1021 ÷ 1740]	HEAD004103022
121 ÷ 200 [1741 ÷ 2900]	HEAD004103024
201 ÷ 270 [2901 ÷ 3920]	HEAD004103026
271 ÷ 320 [3921 ÷ 4640]	HEAD004103028
321 ÷ 380 [4641 ÷ 5510]	HEAD004103030

Characteristics curve

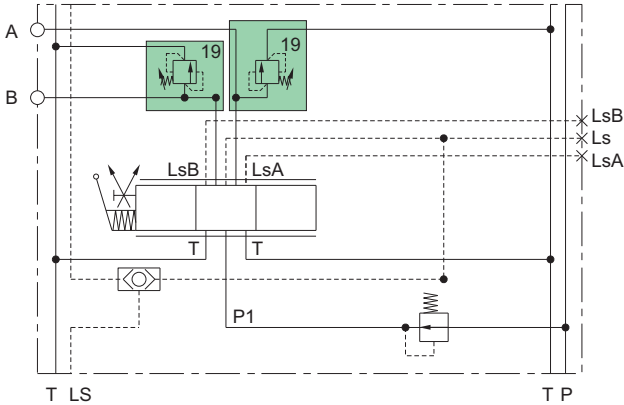


(*) In the order form indicate the lines A and/or B on which the valves are to be mounted

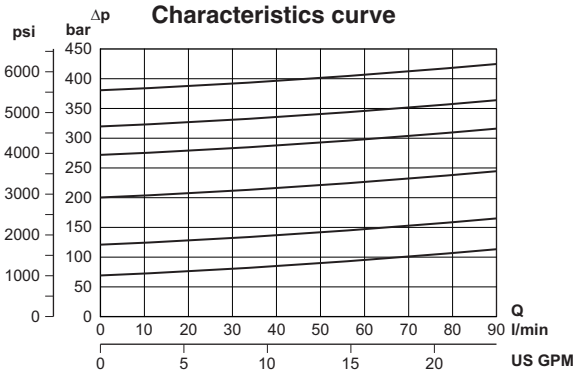


HEAT

Hydraulic diagram example



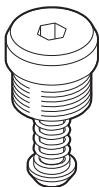
Characteristics curve



Adjustable shock valve for A – B ports

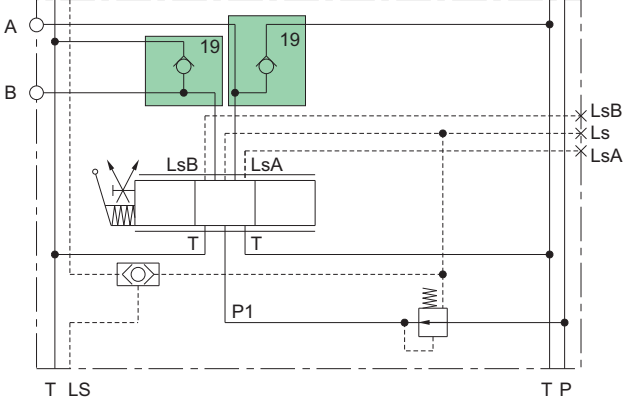
Don't use it as a pressure relief valve.

Range setting bar [psi]	Code (*)
10 ÷ 70 [150 ÷ 1020]	HEAT004103020
71 ÷ 120 [1021 ÷ 1740]	HEAT004103022
121 ÷ 200 [1741 ÷ 2900]	HEAT004103024
201 ÷ 270 [2901 ÷ 3920]	HEAT004103026
271 ÷ 320 [3921 ÷ 4640]	HEAT004103028
321 ÷ 380 [4641 ÷ 5510]	HEAT004103030



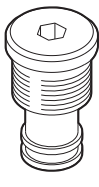
HEAN

Hydraulic diagram example



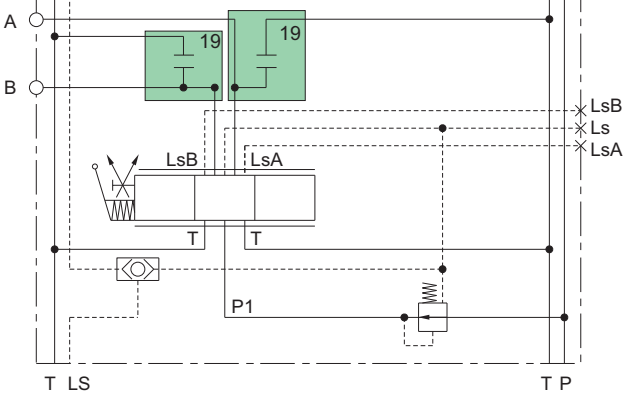
Suction valve

Code (*)
HEAN004103005



HETS

Hydraulic diagram example



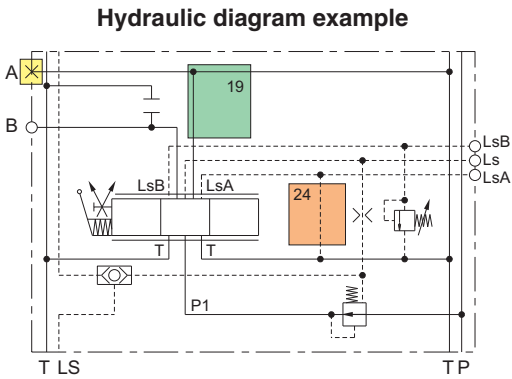
Replacing plug

Code (*)
HETS004103000

(*) In the order form indicate the lines A and/or B on which the valves/plugs are to be mounted



HESC

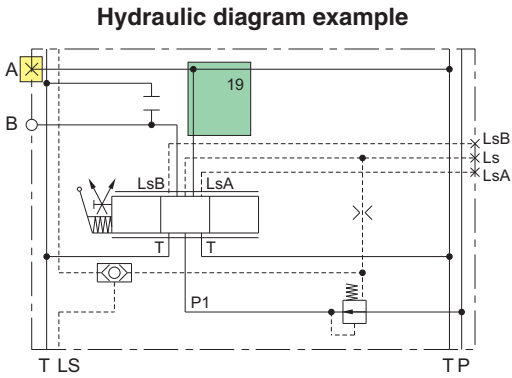


Kit for connecting the non-active port to tank, when using a single acting spool - to be fitted with HEM modules with LsA-LsB + shock and suction valves cavities

Code (*)
HESC004103009



HESC

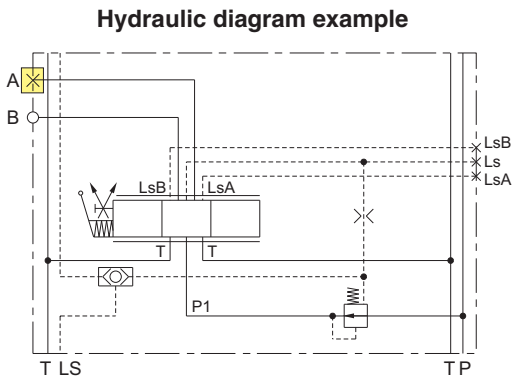


Plug for connecting the non-active port to tank, when using a single acting spool

Code (*)
HESC004103008

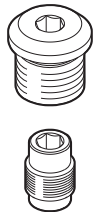


HETS

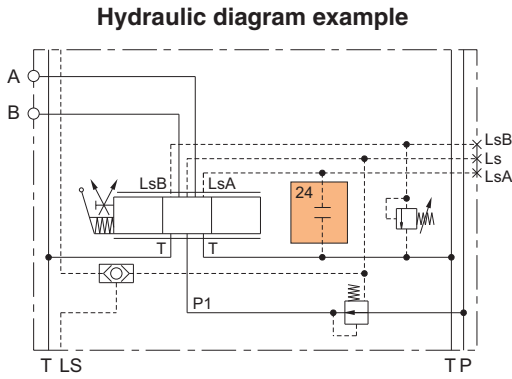


Plug for closing A or B port

Code (*)
HETS004103002



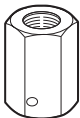
HESC



Kit for closing LsA and/or LsB pressure relief valve cavity

Code (*)
HESC004103007

(*) In the order form indicate the lines A and/or B on which the kit are to be mounted



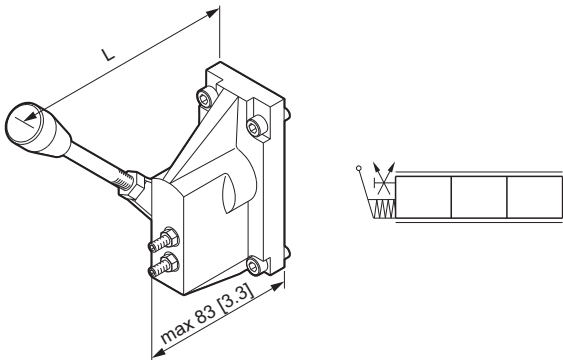
Protection cap for Ls pressure relief valve regulation screw for HEM (working sections) and HSE (inlet sections). Code number and quantity (related to no. of Ls valve mounted) must be indicated under the HEM.. or HSE.. field of the order form.

Code
KIT0004103995

(*) In the order form indicate the lines A and/or B on which the valves/plugs are to be mounted

The control modules can be made up in aluminum or cast iron.
For standard applications aluminum is used normally, for

marine or mining applications we advise the choice of cast iron.
For the ATEX versions you need to use the cast iron controls.

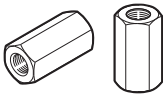


HCM

Mechanical control
Control positions: see page B-4.

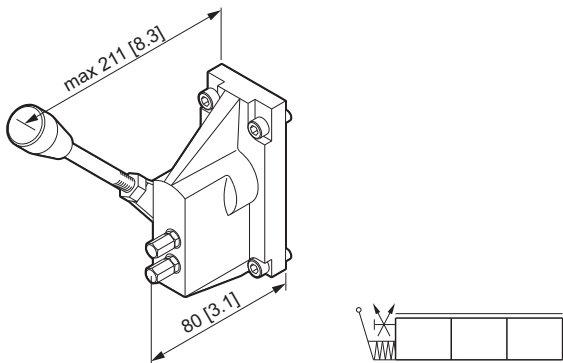
L mm [inch]	Code (Aluminum)	Code (Cast iron)
211 [8.3]	HCM0004104001	HCM0004104000
261 [10.3]	HCM000410C000	*

* available on request



Code
KIT0004103994

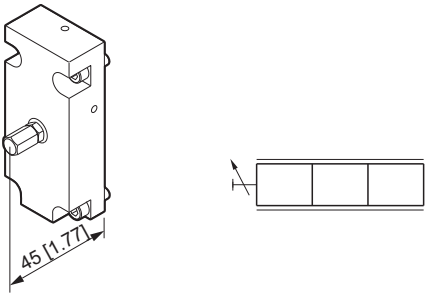
**Flow adjustment protective
nuts kit for HCM mechanical
control**



HCM

Mechanical control, with flow adjustment nuts protection
Control positions: see page B-4.

Code (Aluminum)	Code (Cast iron)
HCM0004104801	HCM0004104800

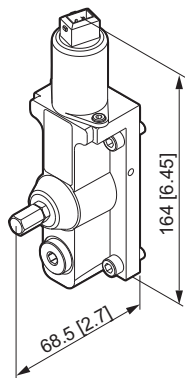


HCF

Rear cover flow adjustment for:

- MHPF electrical module
- MHPH module with stroke adjustment
- ATEX modules.

Code (Aluminum)	Code (Cast iron)
HCF0004103996	HCF0004103997



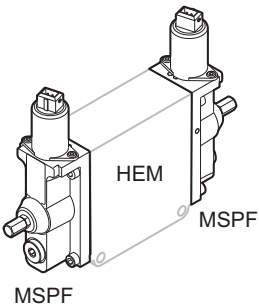
MSPF

MSPF electrohydraulic proportional module
MSPF is one of the series of PWM open loop electrical activation units.
MSPF can be controlled either in proportional or in on-off mode. With electrical proportional actuation, the main spool position is adjusted by the pilot pressure, so that it corresponds to an electrical signal (PWM) coming from a remote control unit. With electrical on-off actuation, the main spool is moved from neutral to maximum stroke when one of the two pressure reducing solenoid valves is energized.
MSPF is recommended where there is a requirement for medium resolution proportional control and where hysteresis is not critical.

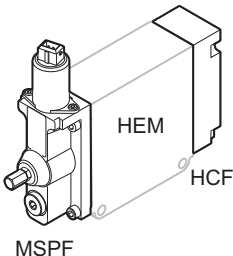
MSPF is being supplied without manual spool control, thus allowing both smaller overall dimensions and cost effective compared to MHPF, HCK modules.

The MSPF module has the following main features:

- On-off and proportional mode;
- Quick reaction time;
- Electro-proportional pressure reducing valves;
- PWM control of low-frequency solenoid valves;
- Low hysteresis and good sensitivity;
- Mechanical flow adjustment;
- Pilot pressure ports;
- Possibility of operating in double acting or single acting with HCF module (see page B-53).



Example with 2 modules MSPF (double effect)



Example with 1 module MSPF and rear cover HCF (single effect in B)

Voltage	Code (Aluminum)	
	BSPF	UN - UNF
12 Vdc	MSPF004107065	*
24 Vdc	MSPF004107066	*

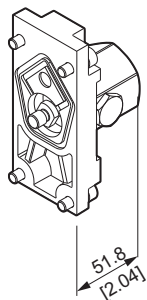
* available on request

Rated voltage	12 Vdc	24 Vdc
Supply voltage	11 to 15 V	22 to 30 V
Max. ripple	8 %	
Max. current	1500 mA ± 10	750 mA ± 10
Power consumption	18 W at 22 °C [71.6 °F] coil temperature	
Start spool travel	560 mA	260 mA
End spool travel	1050 mA	520 mA
R ₂₀	4.72 Ω ± 5 %	20.8 Ω ± 5 %
Heat insulation	Class H, 180 °C [356 °F]	
Oil temperature	Recommended	-30 ÷ +60 °C [-22 ÷ +140 °F]
	Min	-30 °C [-22 °F]
	Max	+90 °C [+194 °F]
Dither adjustment	75 Hz	
Inductance	8.5 mH	70 mH
Current variation	100 mA/s	50 mA/s
Duty cycle % ED on-off operating	14 V = 100	28 V = 100
	15 V = 50	30 V = 50
Plug connector	2-pole AMP Junior Power Timer	
Reaction time from neutral position to end spool stroke (constant voltage)	120 ms	
Reaction time from end spool stroke to neutral position (constant voltage)	90 ms	
Grade of enclosure to IEC 529, with female connector	IP 65	

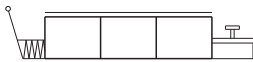
Electrical connections for MSPF-MHPF-HCK working sections, see page: E-2

The control modules can be made up in aluminum or cast iron.
For standard applications aluminum is used normally, for

marine or mining applications we advise the choice of cast iron.
For the ATEX versions you need to use the cast iron controls.

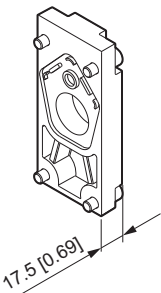


HCN

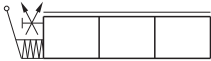


Friction control

Code (Aluminum)	Code (Cast iron)
HCN0004103501	HCN0004103500

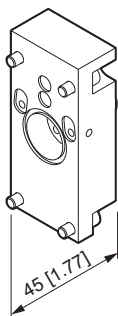


HCP

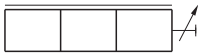


Rear cover

Code (Aluminum)	Code (Cast iron)
HCP0004104002	HCP0004104008



HCPA



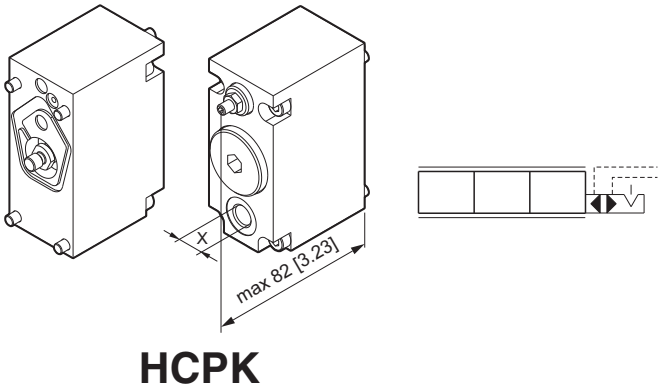
Rear cover with stroke adjustment

Code (Aluminum)	Code (Cast iron)
—	HCPA004103990

The control modules can be made up in aluminum or cast iron.
For standard applications aluminum is used normally, for

marine or mining applications we advise the choice of cast iron.
For the ATEX versions you need to use the cast iron controls.

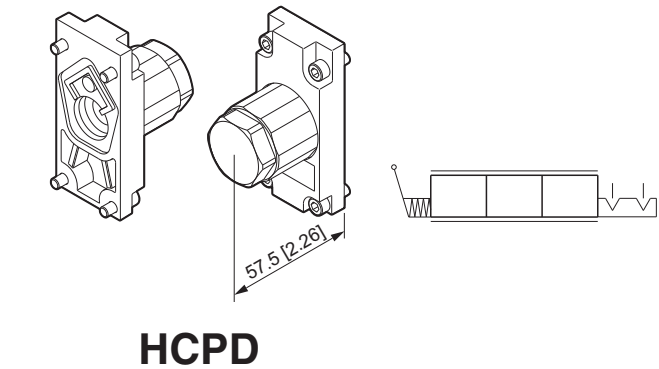
HPV 41



HCPK

Mechanical B-port lock device, with automatic hydraulic release (kick-out)
For the working section HEM0004102221 (see page B-43).

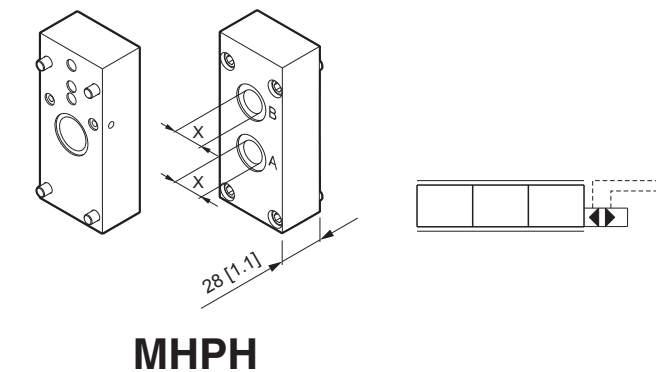
Control	Code (Cast iron)
	(X) 1/4 BSPP
P → B lock P → A free	HCPK004104218



HCPD

Mechanical spool lock device, manual release

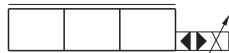
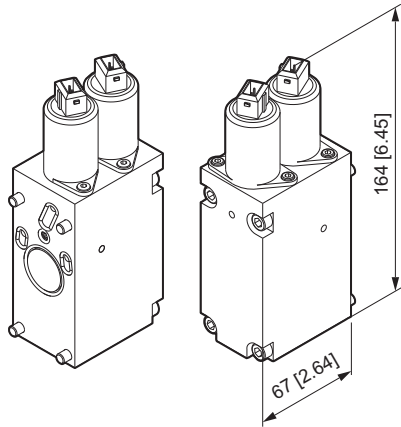
Control	Code (Aluminum)	Code (Cast iron)
P → A lock P → B free	HCPD004104003	HCPD004103900
P → B lock P → A free	HCPD004104004	HCPD004103901
P → A lock P → B lock	HCPD004104005	HCPD004103902
P → A float P → B free	HCPD004103998	HCPD004103898
P → B float P → A free	HCPD004103999	HCPD004103899



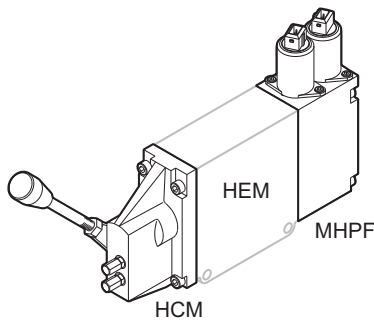
MHPH

- Hydraulic activation**
- Start pilot pressure: 4.5 bar [65 psi]
 - End stroke pressure: 15 bar [218 psi]
 - Max. pilot pressure: 30 bar [435 psi]

Thread	Code (Aluminum)	Code (Cast iron)
(X) 1/4 BSPP	MHPH004104222	MHPH004104229
(X) 7/16" - 20 UNF	MHPH004104223	MHPH004104235



MHPF



Example with module MHPF and manual control HCM

MHPF electrohydraulic PROPORTIONAL module

MHPF proportional electrohydraulic module shifts the position of the spool precisely in proportion to an electric current signal generated by the remote control.

The spool is shifted by means of the hydraulic pressure generated by the pressure-reduction proportional solenoid valves. The MHPF module is not equipped with an inductive position transducer (LVDT) and the entire electronic circuit to detect and signal faults.

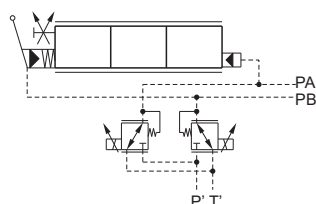
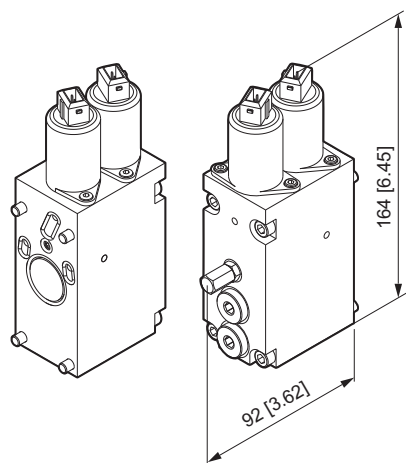
This means that in the joystick remote control phase, any control (for example a manual control) that overrides the force exerted by the pressure reduction valves on the spool, may vary the position of that spool without any error signal and without inhibition, leaving the safety of the entire hydraulic system to the visual operator control, only.

MHPF module has the following main features:

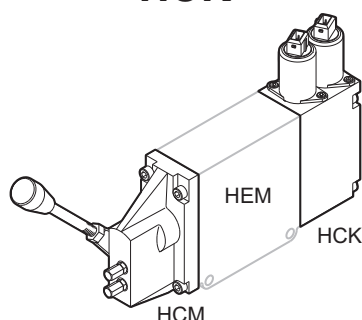
- It can be operated with on-off signals also
- Short response time
- Electro-proportional pressure reduction valves
- PWM electric control of low-frequency solenoid valves
- Any adjustment to limit the flow or to create work ramps will be made directly on the remote control
- Very low hysteresis and excellent sensitivity

Voltage	Code (Aluminum)	Code (Cast iron)
12 Vdc	MHPF004107051	MHPF004107053
24 Vdc	MHPF004107052	MHPF004107054

Rated voltage	12 Vdc	24 Vdc
Power supply voltage range	11 to 15 V	22 to 30 V
Max. ripple	8 %	
Max. current	1500 mA $\pm$ 10	750 mA $\pm$ 10
Power consumption	18 W at 22 °C [71.6 °F] coil temperature	
Start spool travel	560 mA	280 mA
End spool travel	1080 mA	520 mA
R ₂₀	4.72 Ω $\pm$ 5 %	20.8 Ω $\pm$ 5 %
Heat insulation	Class H, 180 °C [356 °F]	
Oil temperature	Recommended	-30 $\div$ +60 °C [-22 $\div$ +140 °F]
	Min	-30 °C [-22 °F]
	Max	+90 °C [+194 °F]
Dither adjustment	75 Hz	
Inductance	8.5 mH	70 mH
Current variation	100 mA/s	50 mA/s
Duty cycle % ED on-off operating	14 V = 100	28 V = 100
	15 V = 50	30 V = 50
Plug connector	2-pole AMP Junior Power Timer	
Reaction time from neutral position to end spool stroke (constant voltage)	120 ms	
Reaction time from end spool stroke to neutral position (constant voltage)	90 ms	
Grade of enclosure to IEC 529, with female connector	IP 65	



HCK



Example with module HCK and manual control HCM

HCK electrohydraulic PROPORTIONAL module with pilot oil connections

HCK proportional electrohydraulic module shifts the position of the spool precisely in proportion to an electric current signal generated by the remote control.

The spool is shifted by means of the hydraulic pressure generated by the pressure-reduction proportional solenoid valves. HCK module is not equipped with an inductive position transducer (LVDT) and the entire electronic circuit to detect and signal faults. This means that in the joystick remote control phase, any control (for example a manual control) that overrides the force exerted by the pressure reduction valves on the spool, may vary the position of that spool without any error signal and without inhibition, leaving the safety of the entire hydraulic system to the visual operator control, only.

Thanks to the 2 additional pilot oil supply connections, HCK is recommended where there is a requirement for a single output control to be used to achieve 2 simultaneously or sequence spool movements, or to change the displacement onto hydraulic motors, making the use of HPV even more flexible.

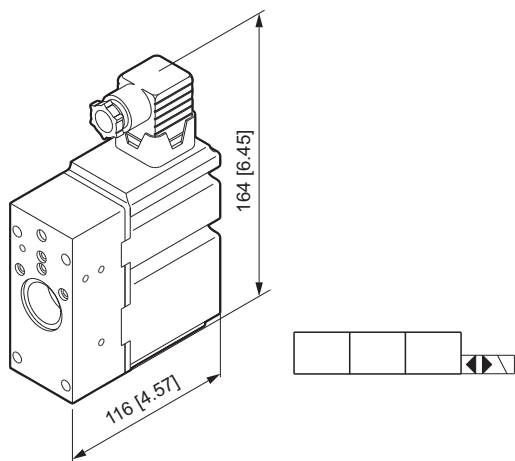
HCK module has the following main features:

- It can be operated with on-off signals also
- Short response time
- Electro-proportional pressure reduction valves
- PWM electric control of low-frequency solenoid valves
- Any adjustment to limit the flow or to create work ramps can be made directly on the remote control
- Very low hysteresis and excellent sensitivity

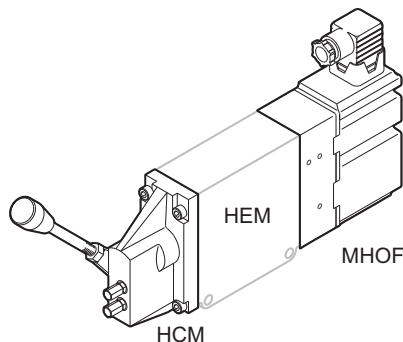
Voltage	Code (Cast iron)
12 Vdc	HCK0004108100
24 Vdc	HCK0004108101

Rated voltage	12 Vdc	24 Vdc
Power supply voltage range	11 to 15 V	22 to 30 V
Max. ripple	8 %	
Max. current	1500 mA $\pm$ 10	750 mA $\pm$ 10
Power consumption	18 W at 22 °C [71.6 °F] coil temperature	
Start spool travel	560 mA	280 mA
End spool travel	1080 mA	520 mA
R ₂₀	4.72 Ω $\pm$ 5 %	20.8 Ω $\pm$ 5 %
Max. pressure pilot oil supply	30 bar [435 psi]	
Heat insulation	Class H, 180 °C [356 °F]	
Oil temperature	Recommended	-30 $\div$ +60 °C [-22 $\div$ +140 °F]
	Min	-30 °C [-22 °F]
	Max	+90 °C [+194 °F]
Dither adjustment	75 Hz	
Inductance	8.5 mH	70 mH
Current variation	100 mA/s	50 mA/s
Duty cycle % ED on-off operating	14 V = 100	28 V = 100
	15 V = 50	30 V = 50
Plug connector	2-pole AMP Junior Power Timer	
Reaction time from neutral position to end spool stroke (constant voltage)	120 ms	
Reaction time from end spool stroke to neutral position (constant voltage)	90 ms	
Grade of enclosure to IEC 529, with female connector	IP 65	

Electrical connections for MSPF-MHPF-HCK working sections, see page: E-2



MHOF



Example with module MHOF and manual control HCM

MHOF electrohydraulic ON-OFF module
The MHOF electrohydraulic module moves the spool in relation to an electric signal generated by the joystick or by a switch.

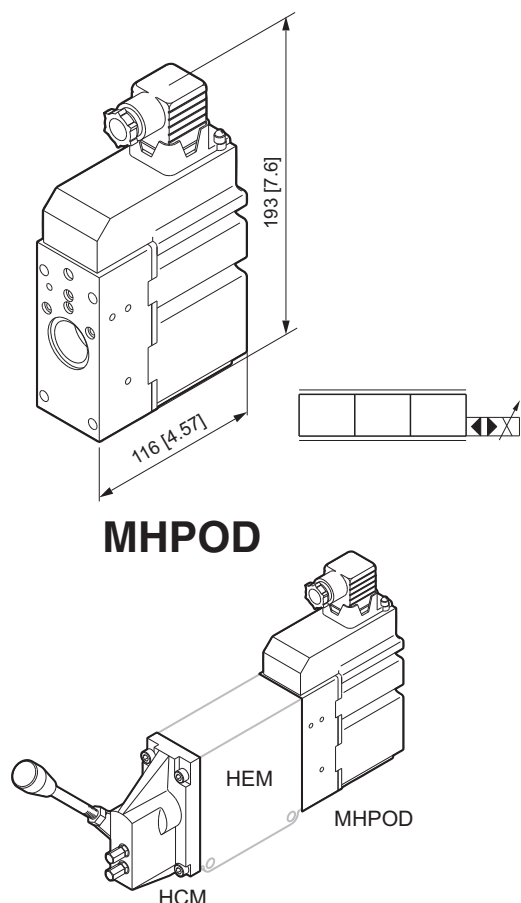
The hydraulic pressure generated by the on-off solenoid valves forces the spool not to stop in any intermediate position between the neutral position and the maximum stroke

Voltage	Code (Aluminum)
12 Vdc	MHOF004107027
24 Vdc	MHOF004107028

HPV 41

Rated voltage	12 Vdc	24 Vdc
Power supply voltage range	11 to 15 V	21 to 28 V
Resistance at 20 °C [68 °F]	9.1 Ω	36.2 Ω
Current consumption	1480 mA	750 mA
Rated absorbed power	16 W	
Heat insulation	Class H, 180 °C [356 °F]	
Duty cycle	ED 100%	
Reaction time	From neutral position to max. spool travel	130 ms
	From max. spool travel to neutral position	110 ms
Max. operating temperature	80° C [176 °F]	
Ambient temperature	-30 ÷ +60 °C [-22 ÷ +140 °F]	
Connector	Standard (IP 65) according to DIN 43650 / ISO 4400	
Enclosure to IEC 529	IP 65	

Electrical connections for MHOF controls, see page: E-3



MHPOD

MHPOD electrohydraulic PROPORTIONAL module

MHPOD is an open loop electrohydraulic activation unit, whose design is based on digital technology.

MHPOD has been specially developed to meet the harsh operating requirements of today's mobile machine market. MHPOD electrical open loop proportional actuation operates the main spool's shift according to an electrical signal coming from a remote control unit, and is recommended where a simple proportional control is required, and where hysteresis and reaction time are not critical.

MHPOD does not have the inductive position transceiver (LVDT) and any electronic circuit for faults monitoring. This means that any forces that override the pilot pressure spool forces may change the spool position with no error signal, and the safety of the whole system is left to the operator's visual control, only.

MHPOD is defined by:

- Capacity to handle three different kinds of input signal control (see chart below).
- The required signal control is to be stated in the order phase
- Integrated PWM (Pulse Width Modulator)
- Good flow regulation
- Simple built-up.

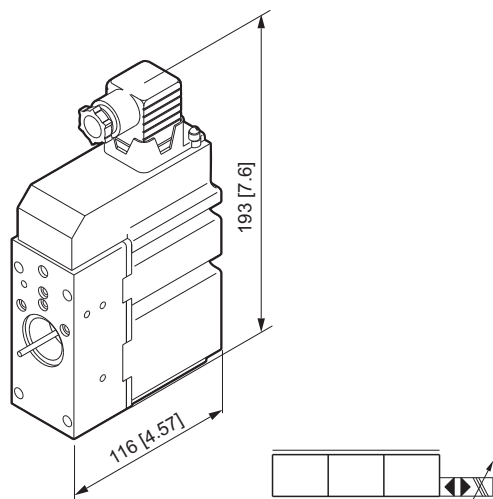
Voltage	Input signal control		
	0.5 x U _{bc} (A) joystick	0 ÷ 10 V _{dc} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPOD04108077	MHPOD04108082	MHPOD04108086
24 Vdc	MHPOD04108075	MHPOD04108084	MHPOD04108088

Aluminum body

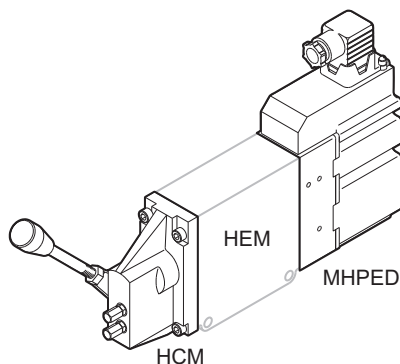
Example with module MHPOD and manual control HCM

Rated voltage		12 Vdc	24 Vdc
Power supply voltage range		11 ÷ 15 V	20 ÷ 28 V
Max. ripple		5 %	
Current supply		520 mA	260 mA
Current consumption (neutral position, constant voltage)		36 mA	46 mA
Power consumption		6 W	
Heat insulation		Class H 180 °C [256 °F]	
Reaction time (constant voltage)	From neutral position to max. spool travel	110 ÷ 140 ms	
	From max. spool travel to neutral position	70 ÷ 90 ms	
Reaction time (neutral switch)	From neutral position to max. spool travel	130 ÷ 170 ms	
	From max. spool travel to neutral position	70 ÷ 90 ms	
Connector		Standard (IP 65) according to DIN 43650 / ISO 4400	
Enclosure to IEC 529		IP 65	
(A) joystick	Input signal control	Neutral position	0.5 x U _{DC}
		Control range	0.25 x U _{DC} to 0.75 x U _{DC}
	Max. current signal control		0.5 mA 1 mA
	Input impedance in relation to 0.5 x U _{DC}		12 kΩ
(B) PLC	Input signal control	Voltage	0 ÷ 10 VDC
		Neutral position	5 VDC
		Control range	0.25 x 10 VDC to 0.75 x 10 VDC
	Current signal control		0.5 mA
(C) PLC	Input impedance in relation to 0 ÷ 10 VDC		20 kΩ
	Input signal control	Current	0 ÷ 20 mA
		Neutral position	10 mA
		Control range	0.25 x 20 mA to 0.75 x 20 mA
	Input impedance in relation to 0 ÷ 20 mA		0.5 kΩ

Electrical connections for MHPOD controls, see page: E-4



MHPED



Example with module MHPED and manual control HCM

Thanks to the developments in digital electronics, it has been possible to integrate in the MHPED modules, besides all the algorithms needed for the spool movement control, also a wide range of advanced circuits above all conceived for the safety and handling of complete systems.

The use of the module in the **passive or active version** allows the electrohydraulic system to be obtained with different safety degrees, for the choice of which it is essential to know the required functions exactly.

Once this condition has been fulfilled, and work is going on in the area stated above, with the four examples described in the following pages, we can always give you the best solution.

The diagrams represents just a few possibilities, advised by experience, of how the assesment of degree of protection system ought always to be made. This does not mean that considering the enormity of the subject and need for ever-increasing flexibility and performance of the industrial machinery with tighter and tighter safety rules, custom-built solutions can not be taken into account.

MHPED electrohydraulic PROPORTIONAL module
MHPED is a closed loop electrohydraulic activation unit, whose design is based on digital technology.
MHPED has been specially developed to meet the harsh operating requirements of today's mobile machine market.

MHPED electrical closed loop proportional actuation operates safely and precisely the main spool's shift according to an electrical signal coming from a remote control unit, and is recommended where precise metering control, low hysteresis, fault monitoring, and fast system reaction are paramount.

The input signal, by means of the PCB and the two reducing proportional solenoid valves, is converted into a low pilot pressure which inturn moves the HPV's spool.

The inductive transducer position (LVDT) ensures that the spool is being moved in the correct position, otherwise, in the event of uncontrolled spool positioning, the feed-back signal wuill detect it as an error and it will fast react operator independent (fault monitoring system, see diagrams in the following pages).

- MHPED is defined by:
- Capacity to handle three different kinds of input signal control (see chart below).
The required signal control is to be stated in the order phase.
 - Inductive transducer position, LVDT (Linear Variable Differential Transformer)
 - Integrated PWM (Pulse Width Modulator)
 - Fault monitoring, transistor output for signal source
 - Excellent regulation
 - Low hysteresis
 - Short reaction time

Voltage	Input signal control		
	0.5 x U _{DC} (A) joystick	0 ÷ 10 V _{DC} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPED04108011	MHPED04108018	MHPED04108026
24 Vdc	MHPED04108010	MHPED04108020	MHPED04108028

Voltage	Input signal control		
	0.5 x U _{DC} (A) joystick	0 ÷ 10 V _{DC} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPED04108009	MHPED04108022	MHPED04108030
24 Vdc	MHPED04108007	MHPED04108024	MHPED04108032

Aluminum body

Electrical connections for MHPED controls, see page: E-5

Rated voltage			12 Vdc	24 Vdc
Power supply voltage range			11 ÷ 15 V	20 ÷ 28 V
Max. ripple			5 %	
End stroke spool current consumption			520 mA	260 mA
Current consumption (neutral position, constant voltage)			36 mA	46 mA
Power consumption			6 W	
Heat insulation			Class H 180 °C [356 °F]	
Fault monitoring system	Max. current on safety output (pin no. 3, page D-5)		50 mA	
	Reaction time at fault		550 ms	
Reaction time (constant voltage)	From neutral position to max. spool travel		110 ÷ 140 ms	
	From max. spool travel to neutral position		70 ÷ 90 ms	
Reaction time (neutral switch)	From neutral position to max. spool travel		130 ÷ 170 ms	
	From max. spool travel to neutral position		70 ÷ 90 ms	
Connector			Standard (IP 65) according to DIN 43650 / ISO 4400	
Enclosure to IEC 529			IP 65	
(A) joystick	Input signal control	Neutral position	0.5 x UDC	
		Control range	0.25 x UDC ÷ 0.75 x UDC	
	Max. current signal control		0.5 mA	1 mA
	Input impedance in relation to 0.5 x UDC		12 kΩ	
(B) PLC	Input signal control	Voltage	0 ÷ 10 VDC	
		Neutral position	5 VDC	
		Control range	0.25 x 10 VDC ÷ 0.75 x 10 VDC	
	Current signal contro		0.5 mA	
	Input impedance in relation to 0 ÷ 10 VDC		20 kΩ	
(C) PLC	Input signal control	Current	0 ÷ 20 mA	
		Neutral position	10 mA	
		Control range	0.25 x 20 mA ÷ 0.75 x 20 mA	
	Input impedance in relation to 0 ÷ 20 mA		0.5 kΩ	

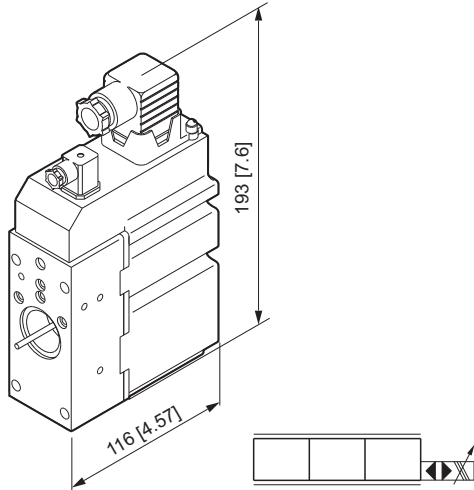
MHPED (active version) modules behaviour in relation to the signal control

UDC	Signal control	Ground	Safety output (pin no. 3)	Effect
24 V	12 V (50% of UDC)	Connected	No output	Spool held electrical in neutral position
24 V	6 V (25% of UDC)	Connected	No output	Full flow P → A
24 V	18 V (75% of UDC)	Connected	No output	Full flow P → B
24 V	20.4 V (85% of UDC)	Connected	Output	Spool stays in neutral position (red light comes on)
24 V	21.6 V (90% of UDC)	Connected	Output	Spool stays in neutral position (red light comes on)
24 V	24 V (100% of UDC)	Connected	Output	Spool stays in neutral position (red light comes on)
24 V	0 V (0% of UDC) selected	Connected	Output	Spool stays in neutral position (red light comes on)
24 V	0 V (0% of UDC) interrupted	Connected	Output	Spool stays in neutral position (red light comes on)
24 V	1 V (4% of UDC)	Connected	Output	Spool stays in neutral position (red light comes on)
0 V	15.6 V (65% of UDC)	Connected	No output	Spool stays in neutral position (no light)
24 V	15.6 V (65% of UDC)	Disconnected	No output	Spool stays in neutral position (no light)

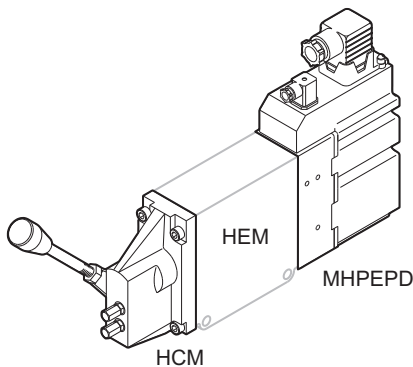
With the same data, given in percentages, the behaviour of the module is equal to the 12 VDC, 0 ÷ 20 mA and 0 ÷ 10 V also.

No. of flashes	Cause
1	LVDT outside of its own position
2	The demanded spool position doesn't correspond to the input signal
3	LVDT is broken
4	Short circuit in the output signal for direction indicator (MHPEPD)
5	Internal electrical faults
6	Short circuit in the proportional solenoid valves
7	Short circuit in the warning output signal (pin no. 3)
8	Input signal control exceeds min. / max. values (15% ÷ 85% of supply voltage)

When an error state is detected the lamp of the module starts flashing red, and the number of flashes indicates the probable cause of failure.



MHPEPD



Example with module MHPEPD and manual control HCM

MHPEPD electrohydraulic PROPORTIONAL module
MHPEPD closed loop electrohydraulic proportional activation unit is the most advanced version of the closed loop control modules.

- MHPEPD is defined by:
- Spool direction indicator output;
 - Capacity to handle three different kinds of input signal control. The required signal control is to be stated in the order phase;
 - Inductive transducer position, LVDT (Linear Variable Differential Transformer);
 - Integrated PWM (Pulse Width Modulator);
 - Fault monitoring, transistor output for signal source;
 - Excellent regulation;
 - Low hysteresis;
 - Short reaction time.

Besides the afore mentioned features, another purpose of the module is to give an indication of the spool's movement, through an on/off output signal in the smaller connector (also when the spool is manually activated).

The diagrams on page E-11 show an example of how the direction output can be handled to activate or deactivate the Ls on/off pilot solenoid valve by means of the two relay (K1 - K2) and two electrical end of strokes.

This is just an example, as the use of MHPEPD is also destined for more demanding surroundings, that is solutions using artificial intelligence which dialogue at the higher level via bus, and which realize a real distributed control system able to carry out "stand-alone" processes.

This in turn send to the raised level only that information read as "positive" for the safe handling of machine.
All the electrohydraulics features, performance, and choice of safety degree system, are the same of those already described for the MHPED module.

Voltage	Input signal control		
	0.5 x U _{DC} (A) joystick	0 ÷ 10 V _{DC} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPEPD4108048	MHPEPD4108058	MHPEPD4108066
24 Vdc	MHPEPD4108047	MHPEPD4108060	MHPEPD4108068

Voltage	Input signal control		
	0.5 x U _{DC} (A) joystick	0 ÷ 10 V _{DC} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPEPD4108046	MHPEPD4108054	MHPEPD4108062
24 Vdc	MHPEPD4108045	MHPEPD4108056	MHPEPD4108064

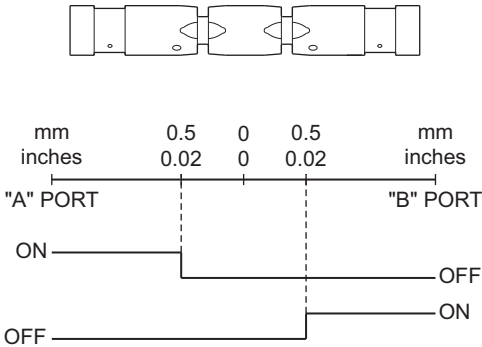
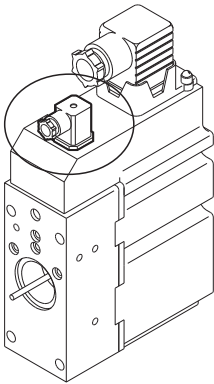
Aluminum body

Electrical connections for MHPEPD working sections, see page: E-11

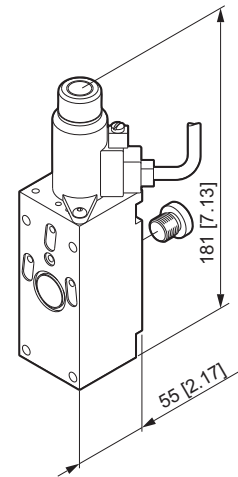
Rated voltage		12 Vdc	24 Vdc
Power supply voltage range		11 ÷ 15 V	20 ÷ 28 V
Max. ripple		5 %	
End stroke spool current consumption		520 mA	260 mA
Current consumption (neutral position, constant voltage)		36 mA	46 mA
Power consumption		6 W	
Heat insulation		Class H 180 °C [356 °F]	
Fault monitoring system	Max. current on safety output (pin no. 3)	50 mA	
	Reaction time at fault	550 ms	
Max. current output signal for indication actuating direction		50 mA	
Reaction time (constant voltage)	From neutral position to max. spool travel	110 ÷ 140 ms	
	From max. spool travel to neutral position	70 ÷ 90 ms	
Reaction time (neutral switch)	From neutral position to max. spool travel	130 ÷ 170 ms	
	From max. spool travel to neutral position	70 ÷ 90 ms	
Connectors		Standard (IP 65) according to DIN 43650 / ISO 4400	
		Spool direction indicator output (IP 65) according to DIN 40050	
Enclosure to IEC 529		IP 65	

(A) joystick	Input signal control	Neutral position	0.5 x UDC	
		Control range	0.25 x UDC ÷ 0.75 x UDC	
	Max. current signal control		0.5 mA	1 mA
	Input impedance in relation to 0.5 x UDC		12 kΩ	
(B) PLC	Input signal control	Voltage	0 ÷ 10 VDC	
		Neutral position	5 VDC	
		Control range	0.25 x 10 VDC ÷ 0.75 x 10 VDC	
	Current signal contro		0.5 mA	
	Input impedance in relation to 0 ÷ 10 VDC		20 kΩ	
(C) PLC	Input signal control	Current	0 ÷ 20 mA	
		Neutral position	10 mA	
		Control range	0.25 x 20 mA ÷ 0.75 x 20 mA	
	Input impedance in relation to 0 ÷ 20 mA		0.5 kΩ	

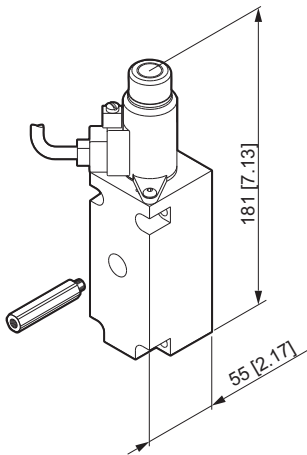
Spool direction signals



PIN	Center position	Movement to A port	Movement to B port
1	free	free	free
2	no output	Udc (+)	no output
3	no output	no output	Udc (+)
4	To get the manual control this pin must be feeded with the supply voltage. To get the remote control the supply voltage must be taken off from this pin.		



MHOXA



MHOXB



MHOX electro-hydraulic ON/OFF operated

The MHOXA and MHOXB modules are electro-hydraulics ON/OFF devices that allows the primary hydraulic state (HEM) to be monitored at a distance by means of an electric signal.

Single acting for A or B ports:

MHOXA: the distribution spool in the HEM element is moved onto port B by a manual HCM command and onto port A by the side MHOXA module.

MHOXB: the distribution spool in the HEM element is moved onto port A by a manual HCM command and onto port B by the side MHOXB module

Double acting for A and B ports:

The MHOXA and MHOXB modules can be coupled in order to activate both modules by means of the remote control. The operating principle is similar to that of the two separate modules, with the V1 and V2 solenoid valves that, alternatively, can adjust the pilot pressure on the distribution spool.

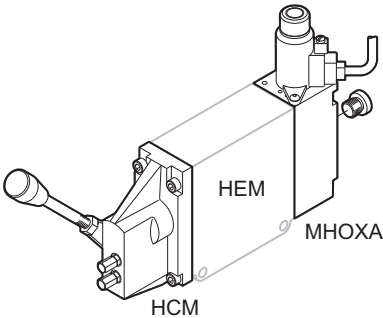
HCM/HCF cast iron modules must be used.

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

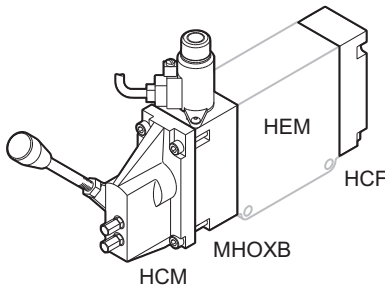
For the wiring diagram of module, please refer to Instruction manual.

Voltage	Code	
	Port A	Port B
12 Vdc	MHOXA04107157	MHOXB04107159
24 Vdc	MHOXA04107158	MHOXB04107160

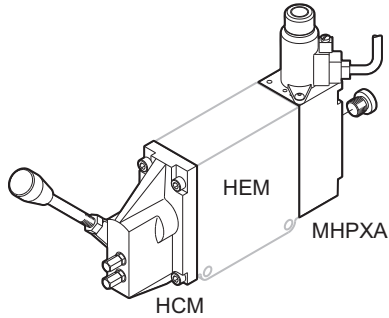
Cast iron body



Example with module MHOXA, single acting for A port



Example with module MHOXA, single acting for A port



Example with moduli MHOXA-MHOXB, double acting for A and B ports



Nominal voltage	12 Vdc	24 Vdc
Coil resistance, R20	9 $\Omega \pm 6 \%$	35.8 $\Omega \pm 6 \%$
Min. current	700 mA	350 mA
Rated current	1330 mA	670 mA
Max. current	1850 mA	930 mA
Limit power	14.3 W	14.4 W
Ambient temperature	-20 $\div$ +50 $^{\circ}\text{C}$ [-4 $\div$ +122 $^{\circ}\text{F}$]	
Connection cable	FL4G11Y - 3 x 1.5 mm ² [3 x 15 AWG] L = 5-5.1 m [197-201 inch]	
Integrated diode to limit switch-off overvoltage	See coil manufacturer manual	
Short-circuit protection	With fuse - See coil manufacturer manual	
Duty cycle	100%	
Input pressure	Max. 50 bar [725 psi]	
Switching pressure	>23 bar [334 psi]	
Fluid temperature	-20 $\div$ +80 $^{\circ}\text{C}$ [-4 $\div$ +176 $^{\circ}\text{F}$]	
Ground connection	Up to 4 mm ² - 11 AWG	
Protection class (DIN VDE 0580)	I	
Fluids	Hydraulic oil to DIN 51524. ATF-oil	
Protection ratings (DIN VDE 0470 / EN 60529)	IP67 / IP69K	
Shock-resistance to EN 50014	4 J	

Hydraulic features

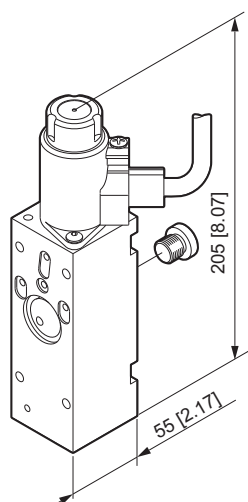
Max pilot pressure oil supply	30 bar [435 psi]
Start spool flow	4.5 bar [65 psi]
End spool flow	15 bar [218 psi]

HEM module hydraulic data

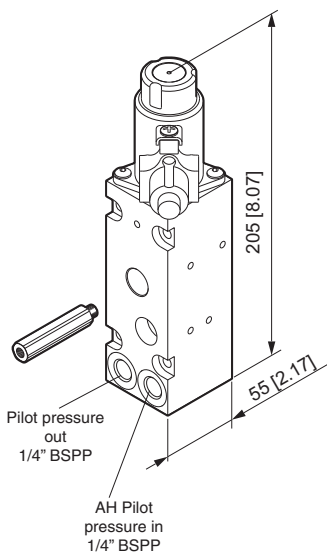
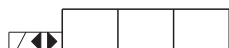
Max pressure (static - input)	350 bar [5076 psi]
Max flow	130 l/min [34.3 US gpm]

ATEX modules marking

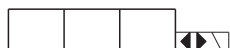
MHOX on complete proportional valve with or without HSEVX valve	 	II GD C T4 / T135 $^{\circ}\text{C}$ T _{amb} = -20 $^{\circ}\text{C}$ $\div$ +50 $^{\circ}\text{C}$ T _{fluid} = -20 $^{\circ}\text{C}$ $\div$ +80 $^{\circ}\text{C}$ p max HEM = 350 bar
MHOX individually supplied	 	II GD C T4 / T135 $^{\circ}\text{C}$ T _{amb} = -20 $^{\circ}\text{C}$ $\div$ +50 $^{\circ}\text{C}$ T _{fluid} = -20 $^{\circ}\text{C}$ $\div$ +80 $^{\circ}\text{C}$
Solenoids mounted on MHOX modules	 	II GEx mb II T4 II D Ex mbD 21 T130 $^{\circ}\text{C}$ T _{amb} = -20 $^{\circ}\text{C}$ $\div$ +50 $^{\circ}\text{C}$ T _{fluid} = -20 $^{\circ}\text{C}$ $\div$ +80 $^{\circ}\text{C}$



MHOXAH



MHOXBH



ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

For the wiring diagram of module, please refer to Instruction manual.

MHOXAH electro-hydraulic ON/OFF operated and hydraulic activation

The MHOXAH and MHOXAH modules are electro-hydraulics ON/OFF devices that allows the primary hydraulic state (HEM) to be monitored at a distance by means of both an electric signal and hydraulic control.

Especially designed for those applications where the HPV (distributor) proportional valves must be controlled with a double remote control (electric and hydraulic). The module maintains the same electrical characteristics already described for the MHOXA / MHOXB modules. The value of the pilot pressure of the hydraulic control (coming from hydraulic manipulators) must be included between 3.5 bar and 28 bar [51 and 406 psi].

The distribution spool is positioned precisely by the hydraulic pressure generated by the hydraulic manipulator or, alternatively, by the solenoid valve V1 proportionally with an electric signal generated by the remote control. The solenoid valve and the hydraulic manipulator are fed by an internal line P at a pressure ranging between 20 and 35 bar [290 and 507 psi], while the discharges are gathered in line T.

Single acting for A or B ports:

MHOXAH: the distribution spool in the HEM element is moved onto the B port by means of a manual control HCM and onto port A by the side MHOXAH module.

MHOXBH: the distribution spool in the HEM element is moved onto the B port by means of a manual control HCM and onto port B by the side MHOXBH module.

Double acting for A and B ports:

The MHOXAH and MHOXBH modules can be coupled in order to activate both modules by means of the remote control.

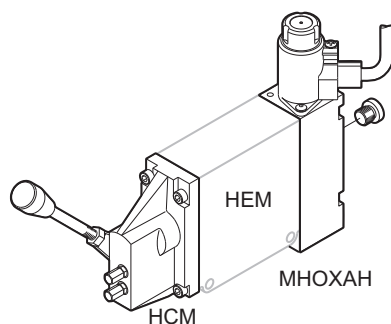
The operating principle is similar to that of the two separate modules, with the V1 and V2 solenoid valves that, alternatively, can adjust the pilot pressure on the distribution spool.

HCM/HCF cast iron modules must be used.

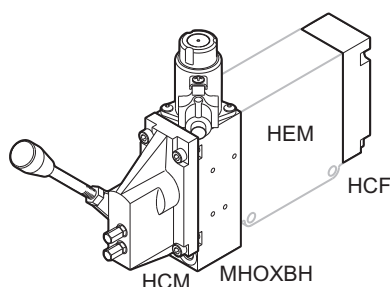
Voltage	Code	
	Port A	Port B
12 Vdc	MHOXAH4107357	MHOXBH4107359
24 Vdc	MHOXAH4107358	MHOXBH4107360

Cast iron body

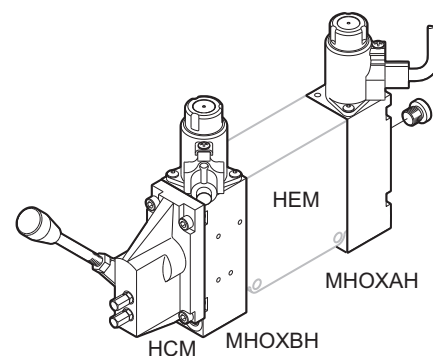
Hydraulic command outputs 1/4" BSPP.



Example with module MHOXAH, single acting for A port



Example with module MHOXBH, single acting for A port



Example with moduli MHOXAH-MHOXBH, double acting for A and B ports



Nominal voltage	12 Vdc	24 Vdc
Coil resistance, R20	9 $\Omega \pm 6 \%$	35.8 $\Omega \pm 6 \%$
Min. current	700 mA	350 mA
Rated current	1330 mA	670 mA
Max. current	1850 mA	930 mA
Limit power	14.3 W	14.4 W
Ambient temperature	-20 $\div$ +50 °C [-4 $\div$ +122 °F]	
Connection cable	FL4G11Y - 3 x 1.5 mm ² [3 x 15 AWG] L = 5-5.1 m [197-201 inch]	
Integrated diode to limit switch-off overvoltage	See coil manufacturer manual	
Short-circuit protection	With fuse - See coil manufacturer manual	
Duty cycle	100%	
Input pressure	Max. 50 bar [725 psi]	
Switching pressure	>23 bar [334 psi]	
Fluid temperature	-20 $\div$ +80 °C [-68 $\div$ +176 °F]	
Ground connection	Up to 4 mm ² - 11 AWG	
Protection class (DIN VDE 0580)	I	
Fluids	Hydraulic oil to DIN 51524. ATF-oil	
Protection ratings (DIN VDE 0470 / EN 60529)	IP67 / IP69K	
Shock-resistance to EN 50014	4 J	

Hydraulic features

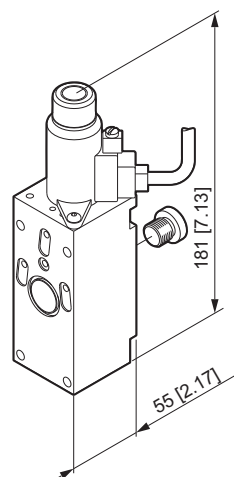
Max pilot pressure oil supply	30 bar [435 psi]
Start spool flow	4.5 bar [65 psi]
End spool flow	15 bar [218 psi]

HEM module hydraulic data

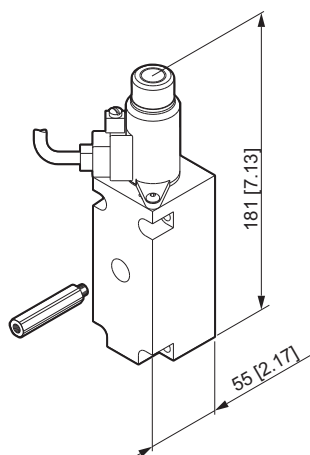
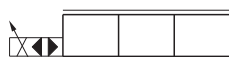
Max pressure (static - input)	350 bar [5076 psi]
Max flow	130 l/min [34.3 US gpm]

ATEX modules marking

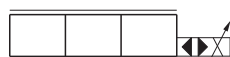
MHOX on complete proportional valve with or without HSEVX valve	 	II GD C T4 / T135°C T _{amb} = -20°C $\div$ +50°C T _{fluid} = -20°C $\div$ +80°C p max HEM = 350 bar
MHOX individually supplied	 	II GD C T4 / T135°C T _{amb} = -20°C $\div$ +50°C T _{fluid} = -20°C $\div$ +80°C
Solenoids mounted on MHOX modules	 	II GEx mb II T4 II D Ex mbD 21 T130°C T _{amb} = -20°C $\div$ +50°C T _{fluid} = -20°C $\div$ +80°C



MHPXA



MHPXB



MHPX electro-hydraulic PROPORTIONAL operated

The MHPXA module is an electro-hydraulic proportional device that allows the primary hydraulic state (HEM) to be monitored at a distance by means of an electric signal.

Single acting for A or B ports:

MHPXA: the distribution spool in the HEM element is moved onto port B by a manual HCM command and onto port A by the side MHPXA module.

MHPXB: the distribution spool in the HEM element is moved onto port A by a manual HCM command and onto port B by the side MHPXB module.

Double acting for A and B ports:

I moduli MHPXA e MHPXB possono essere accoppiati affinché tramite il comando remoto sia possibile azionare entrambi i moduli. Il principio di funzionamento è analogo a quello dei due moduli separati, con le elettrovalvole V1 e V2 che, alternativamente, possono regolare in modo continuo la pressione pilota agente sull'asta di distribuzione.

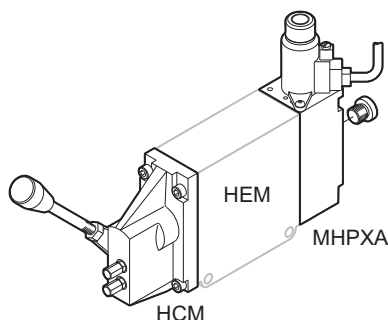
HCM/HCF cast iron modules must be used.

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

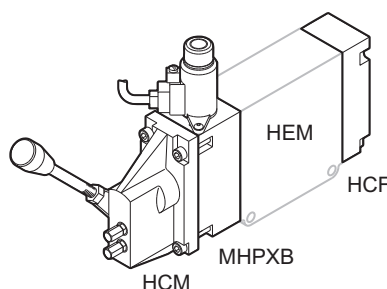
For the wiring diagram of module, please refer to Instruction manual.

Voltage	Code	
	Port A	Port B
12 Vdc	MHPXA04107147	MHPXB04107149
24 Vdc	MHPXA04107148	MHPXB04107150

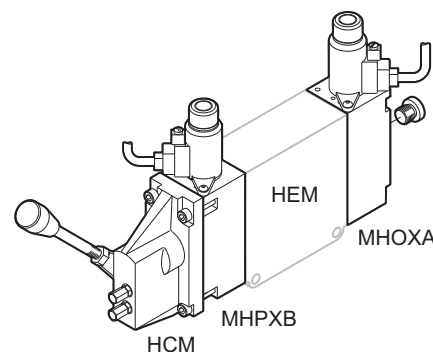
Cast iron body



Example with module MHPXA, single acting for A port



Example with module MHPXA, single acting for A port



Example with moduli MHPXA-MHPXB, double acting for A and B ports



Nominal voltage	12 Vdc	24 Vdc
Voltage range	11 ÷ 15 Vdc	22 ÷ 28 Vdc
Coil resistance, R20	4.3 Ω	15.3 Ω
Rated current, I _N	1360 mA	686 mA
Max. current regulation range	0 ÷ 1500 mA	0 ÷ 750 mA
Max. power	14.8 W	12.8 W
Start spool travel	490 mA	240 mA
Start spool flow	510 mA	260 mA
End spool travel	875 mA	500 mA
Pilot pressure	28 bar [406 psi]	
Power supply	PWM 100 Hz	
Max. pressure (static)	50 bar [725 psi]	
Ambient temperature	-20 ÷ +50 °C [-4 ÷ +122 °F]	
Fluid temperature	-20 ÷ +80 °C [-4 ÷ +176 °F]	
Connection cable	FL4G11Y - 3 x 1.5 mm ² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Integrated diode to limit switch-off overvoltage	See coil manufacturer manual	
Short-circuit protection	With fuse - See coil manufacturer manual	
Groud connection	Up to 4 mm ² - 11 AWG	
Fluids	Hydraulic oil to DIN 51524. ATF-oil	
Grade of enclosure (DIN VDE 0470 / EN 60529)	IP67 / IP69K	
Shock-resistance to EN 50014	4 J	

Hydraulic features

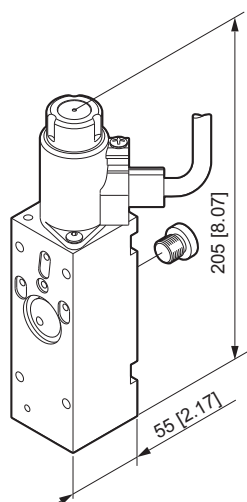
Max pilot pressure oil supply	30 bar [435 psi]
Start spool flow	4.5 bar [65 psi]
End spool flow	15 bar [218 psi]

HEM module hydraulic data

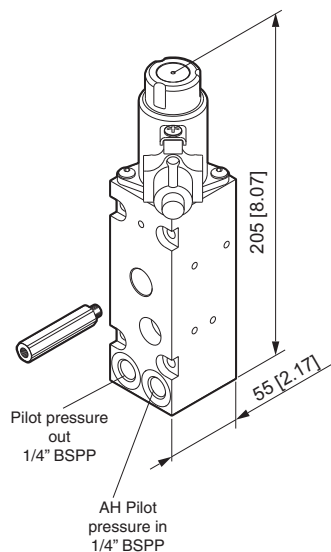
Max pressure (static - input)	350 bar [5076 psi]
Max flow	130 l/min [34.3 US gpm]

ATEX modules marking

MHPX on complete proportional valve with or without HSEVX valve	CE	II GD C T4 / T135°C T _{amb} = -20°C ÷ +50°C T _{fluid} = -20°C ÷ +80°C p max HEM = 350 bar
MHPX individually supplied	CE	II GD C T4 / T135°C T _{amb} = -20°C ÷ +50°C T _{fluid} = -20°C ÷ +80°C
Solenoids mounted on MHPX modules	CE	II GEx mb II T4 II D Ex mbD 21 T130°C T _{amb} = -20°C ÷ +50°C T _{fluid} = -20°C ÷ +80°C



MHPXAH



MHPXBH



ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

For the wiring diagram of module, please refer to Instruction manual.

MHPXAH electro-hydraulic PROPORTIONAL operated and hydraulic activation

The MHPXAH module is an electro-hydraulic proportional device that allows the primary hydraulic state (HEM) to be monitored at a distance by means of both an electric signal and hydraulic control.

Especially designed for those applications where the HPV (distributor) proportional valves must be controlled with a double remote control (electric and hydraulic). The module maintains the same electrical characteristics already described for the MHPXA / MHPXB modules. The value of the pilot pressure of the hydraulic control (coming from hydraulic manipulators) must be included between 3.5 bar and 28 bar [51 and 406 psi].

The distribution spool is positioned precisely by the hydraulic pressure generated by the hydraulic manipulator or, alternatively, by the solenoid valve V1 proportionally with an electric signal generated by the remote control. The solenoid valve and the hydraulic manipulator are fed by an internal line P at a pressure ranging between 20 and 35 bar [290 and 507 psi], while the discharges are gathered in line T.

Single acting for A or B ports:

MHPXAH: the distribution spool in the HEM element is moved onto the B port by means of a manual control and onto port A by the side MHPXAH module.

MHPXBH: , the distribution spool in the HEM element is moved onto the A port by means of a manual control and onto port B by the side MHPXBH module.

Double acting for A and B ports:

The MHPXAH and MHPXBH modules can be coupled in order to activate both modules by means of the remote control.

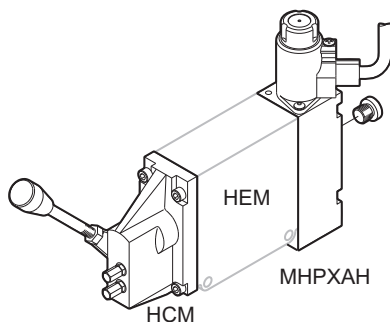
The operating principle is similar to that of the two separate modules, with the V1 and V2 solenoid valves that, alternatively, can adjust the pilot pressure on the distribution spool.

HCM/HCF cast iron modules must be used.

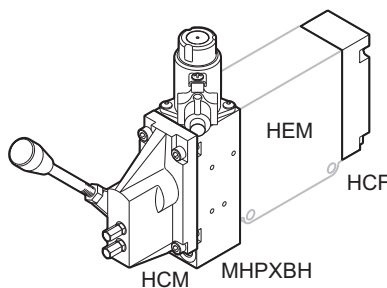
Voltage	Code	
	Port A	Port B
12 Vdc	MHPXAH4107347	MHPXBH4107349
24 Vdc	MHPXAH4107348	MHPXBH4107350

Cast iron body

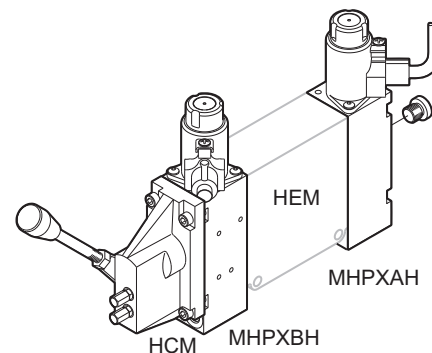
Hydraulic command outputs 1/4" BSPP.



Example with module MHPXAH, single acting for A port



Example with module MHPXBH, single acting for A port



Example with moduli MHPXAH-MHPXBH, double acting for A and B ports



Nominal voltage	12 Vdc	24 Vdc
Voltage range	11 ÷ 15 Vdc	22 ÷ 28 Vdc
Coil resistance, R20	4.3 Ω	15.3 Ω
Rated current, I _N	1360 mA	686 mA
Max. current regulation range	0 ÷ 1500 mA	0 ÷ 750 mA
Max. power	14.8 W	12.8 W
Start spool travel	490 mA	240 mA
Start spool flow	510 mA	260 mA
End spool travel	875 mA	500 mA
Pilot pressure	28 bar [406 psi]	
Power supply	PWM 100 Hz	
Max. pressure (static)	50 bar [725 psi]	
Ambient temperature	-20 ÷ +50 °C [-4 ÷ +122 °F]	
Fluid temperature	-20 ÷ +80 °C [-4 ÷ +176 °F]	
Connection cable	FL4G11Y - 3 x 1.5 mm ² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Integrated diode to limit switch-off overvoltage	See coil manufacturer manual	
Short-circuit protection	With fuse - See coil manufacturer manual	
Groud connection	Up to 4 mm ² - 11 AWG	
Fluids	Hydraulic oil to DIN 51524. ATF-oil	
Grade of enclosure (DIN VDE 0470 / EN 60529)	IP67 / IP69K	
Shock-resistance to EN 50014	4 J	

Hydraulic features

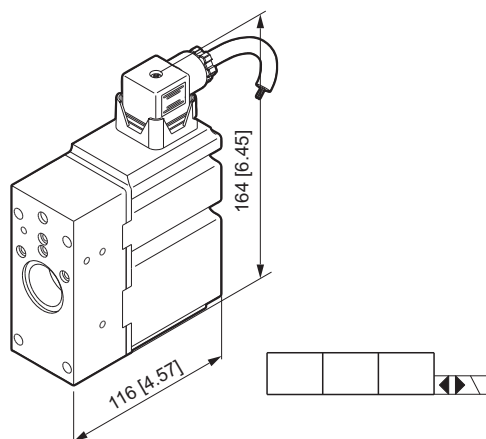
Max pilot pressure oil supply	30 bar [435 psi]
Start spool flow	4.5 bar [65 psi]
End spool flow	15 bar [218 psi]

HEM module hydraulic data

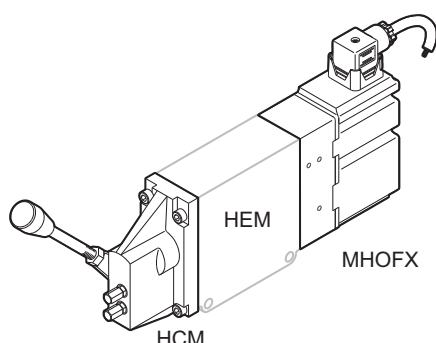
Max pressure (static - input)	350 bar [5076 psi]
Max flow	130 l/min [34.3 US gpm]

ATEX modules marking

MHPX on complete proportional valve with or without HSEVX valve	 	II GD C T4 / T135°C T _{amb} = -20°C ÷ +50°C T _{fluid} = -20°C ÷ +80°C p max HEM = 350 bar
MHOX individually supplied	 	II GD C T4 / T135°C T _{amb} = -20°C ÷ +50°C T _{fluid} = -20°C ÷ +80°C
Solenoids mounted on MHPX modules	 	II GEx mb II T4 II D Ex mbD 21 T130°C T _{amb} = -20°C ÷ +50°C T _{fluid} = -20°C ÷ +80°C



MHOFX



Example with module MHOFX and manual control HCM

MHOF electrohydraulic ON-OFF module

The MHOF electrohydraulic module moves the spool in relation to an electric signal generated by the joystick or by a switch.

The hydraulic pressure generated by the on-off solenoid valves forces the spool not to stop in any intermediate position between the neutral position and the maximum stroke

Standard connector

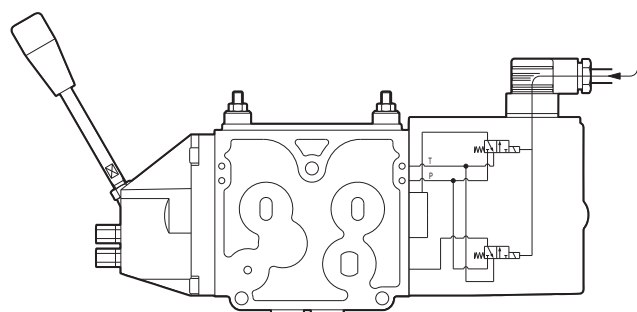
Voltage	Code
12 Vdc	MHOFX041E7025
24 Vdc	MHOFX041E7030

D-Type connector

Voltage	Code
12 Vdc	MHOFX041E7027
24 Vdc	MHOFX041E7028

Cast iron body

Rated voltage	12 Vdc	24 Vdc
Power supply voltage range	10.8 ÷ 13.2 V	21.6 ÷ 26.4 V
Resistance at 20 °C [68 °F]	9.2 Ω	34.8 Ω
Rated absorbed power	16 W	
Heat insulation	Class H, 180 °C [356 °F]	
Duty cycle	ED 100%	
Reaction time	From neutral position to max. spool travel	130 ms
	From max. spool travel to neutral position	110 ms
Ambient temperature	-35° ÷ 60 °C [-31 ÷ +140 °F]	
Connector	DIN 43650 / ISO 4400	
Connection cable	FL4G11Y - 3 x 1.5 mm² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Enclosure to IEC 529	IP 67	



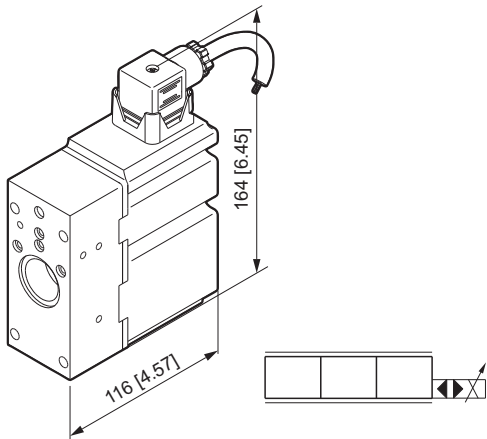
ATEX marking	CE Ex	II 2G Ex mb IIC T4 GB II 2D Ex mb IIIC T135 °C Db
IECEx marking	CE Ex	Ex mb IIC T4 GB Ex mb IIIC T135 °C Db

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

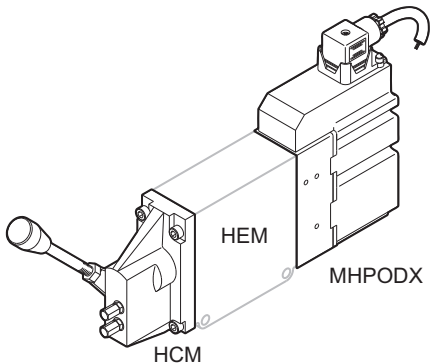
For the wiring diagram of module, please refer to Instruction manual.



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MHPCX



Example with module MHPCX and manual control HCM

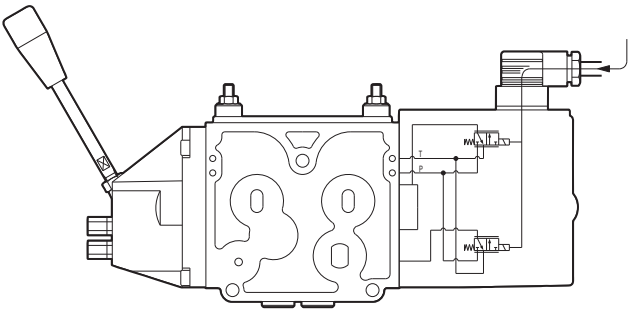
MHPCX electrohydraulic PROPORTIONAL module
MHPCX proportional electrohydraulic module shifts the position of the spool precisely in proportion to an electric current signal generated by the remote control.

The spool is shifted by means of the hydraulic pressure generated by the pressure-reduction proportional solenoid valves. The MHPCX module is not equipped with an inductive position transducer (LVDT) and the entire electronic circuit to detect and signal faults.
This means that in the joystick remote control phase, any control (for example a manual control) that overrides the force exerted by the pressure reduction valves on the spool, may vary the position of that spool without any error signal and without inhibition, leaving the safety of the entire hydraulic system to the visual operator control only.

Voltage	Code
12 Vdc	MHPCX041E7014
24 Vdc	MHPCX041E7013

Cast iron body

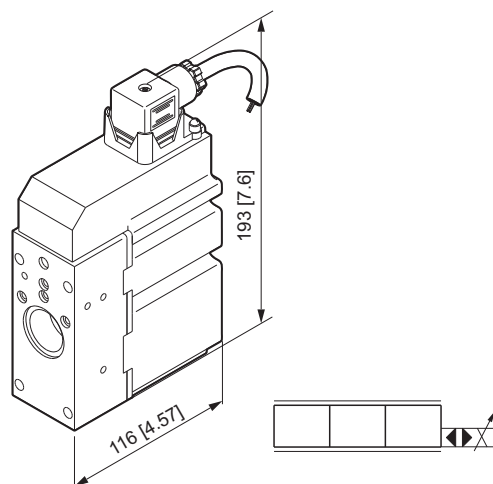
Rated voltage	12 Vdc	24 Vdc
Power supply voltage range	10.8 ÷ 13.2 V	21.6 ÷ 26.4 V
Resistance at 20 °C [68 °F]	9.2 Ω	34.8 Ω
Rated absorbed power	16 W	
Heat insulation	Class H, 180 °C [356 °F]	
Duty cycle	ED 100%	
Reaction time	From neutral position to max. spool travel	130 ms
	From max. spool travel to neutral position	110 ms
Ambient temperature	-35 ÷ +60 °C [-31 ÷ +140 °F]	
Connector	DIN 43650 / ISO 4400	
Connection cable	FL4G11Y - 3 x 1.5 mm² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Enclosure to IEC 529	IP 67	



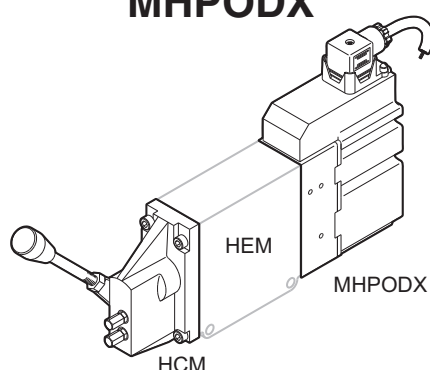
ATEX marking	CE Ex	II 2G Ex mb IIC T4 GB II 2D Ex mb IIIC T135 °C Db
IECEx marking	CE Ex	Ex mb IIC T4 GB Ex mb IIIC T135 °C Db

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

For the wiring diagram of module, please refer to Instruction manual.



MHPODX



Example with module MHPODX and manual control HCM

MHPODX electrohydraulic PROPORTIONAL module

MHPOD is an open loop electrohydraulic activation unit, whose design is based on digital technology.

MHPOD has been specially developed to meet the harsh operating requirements of today's mobile machine market. MHPOD electrical open loop proportional actuation operates the main spool's shift according to an electrical signal coming from a remote control unit, and is recommended where a simple proportional control is required, and where hysteresis and reaction time are not critical.

MHPOD does not have the inductive position transceiver (LVDT) and any electronic circuit for faults monitoring. This means that any forces that override the pilot pressure spool forces may change the spool position with no error signal, and the safety of the whole system is left to the operator's visual control, only.

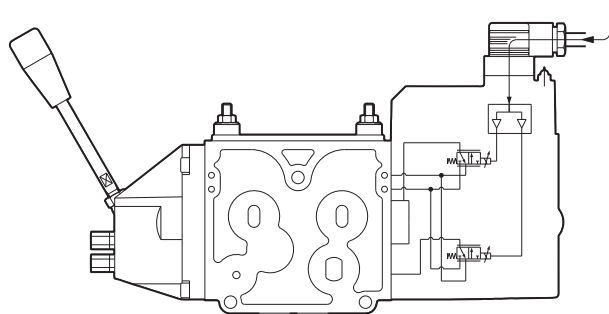
MHPOD is defined by:

- Capacity to handle three different kinds of input signal control (see chart below).
- The required signal control is to be stated in the order phase
- Integrated PWM (Pulse Width Modulator)
- Good flow regulation
- Simple built-up.

Voltage	Input signal control		
	0.5 x U _{dc} (A) joystick	0 ÷ 10 V _{dc} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPODX41E8077	MHPODX41E8082	MHPODX41E8086
24 Vdc	MHPODX41E8075	MHPODX41E8084	MHPODX41E8088

Cast iron body

Rated voltage	12 V ± 10%	24 V ± 10%
Max. power consumption	6 W	
Analog control input (Us) to choose from:	Ratiometric 0.25xUDC ÷ 0.75xUDC	
	0 ÷ 10 V (available signal 2.5 ÷ 7.5 V)	
	0 ÷ 20 mA (available signal 5 ÷ 15 mA)	
	3.5 V (available signal 2 ÷ 5 V)	
Analog input impedance, ratiometric version, 0.25xUDC ÷ 0.75xUDC	12 kΩ	
Analog input impedance 0 ÷ 10 V version	10 kΩ	
Analog input impedance 0 ÷ 20 mA	500 Ω	
Spool positioning sensor	LVDT	
PWM outputs with current feedback	2	
PWM frequency	80 ÷ 250 Hz	
Max. current consumption	600 mA	330 mA
Error / Fault Message output (pin 3)	Max. Load 50 mA	
Working parameters setting	By software and serial interface	
Main electrical connection	3 pins Connector +PE	
Connection cable	FL4G11Y - 3 x 1.5 mm ² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Enclosure	IP67	
Ambient working temperature	-35 ÷ +60 °C [-31 ÷ +140 °F]	
EMC requirements	EN61000-6-2, EN61000-6-4	



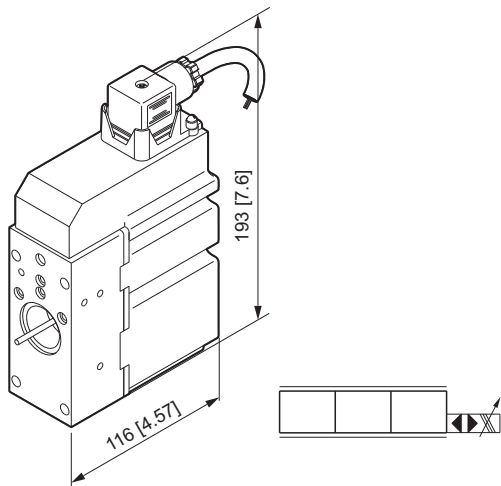
ATEX marking		II 2G Ex mb IIC T4 GB II 2D Ex mb IIIC T135 °C Db
IECEx marking		Ex mb IIC T4 GB Ex mb IIIC T135 °C Db

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

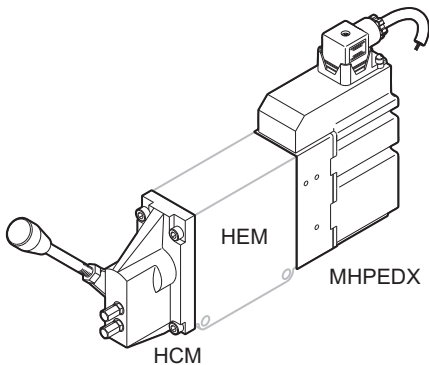
For the wiring diagram of module, please refer to Instruction manual.



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MHPEDX



Example with module MHPEDX and manual control HCM

MHPEDX electrohydraulic PROPORTIONAL module
MHPEDX is a closed loop electrohydraulic activation unit, whose design is based on digital technology. MHPEDX has been specially developed to meet the harsh operating requirements of today's mobile machine market.

MHPEDX electrical closed loop proportional actuation operates safely and precisely the main spool's shift according to an electrical signal coming from a remote control unit, and is recommended where precise metering control, low hysteresis, fault monitoring, and fast system reaction are paramount. The input signal, by means of the PCB and the two reducing proportional solenoid valves, is converted into a low pilot pressure which in turn moves the HPV's spool.

The inductive transducer position (LVDT) ensures that the spool is being moved in the correct position, otherwise, in the event of uncontrolled spool positioning, the feed-back signal will detect it as an error and it will fast react operator independent (fault monitoring system, see diagrams in the following pages)

- MHPOD is defined by:
- Capacity to handle three different kinds of input signal control (see chart below). The required signal control is to be stated in the order phase.
 - Inductive transducer position, LVDT (Linear Variable Differential Transformer)
 - Integrated PWM (Pulse Width Modulator)
 - Fault monitoring, transistor output for signal source
 - Excellent regulation
 - Low hysteresis
 - Short reaction time

Active version

Voltage	Input signal control		
	0.5 x U _{dc} (A) joystick	0 ÷ 10 V _{dc} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPED04108011	MHPED04108018	MHPED04108026
24 Vdc	MHPED04108010	MHPED04108020	MHPED04108028

Passive version

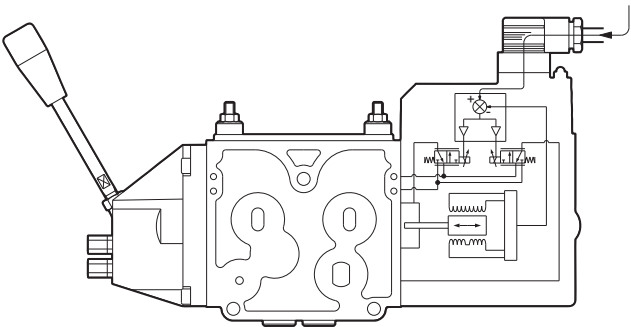
Voltage	Input signal control		
	0.5 x U _{dc} (A) joystick	0 ÷ 10 V _{dc} (B) PLC	0 ÷ 20 mA (C) PLC
12 Vdc	MHPED04108009	MHPED04108022	MHPED04108030
24 Vdc	MHPED04108007	MHPED04108024	MHPED04108032

Cast iron body





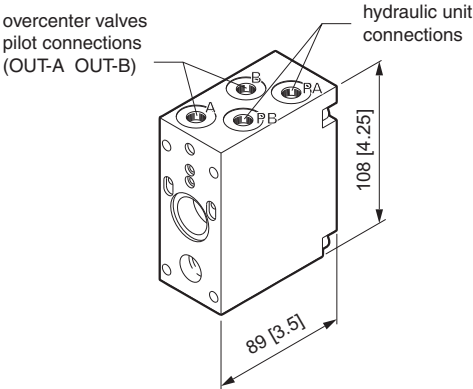
Rated voltage	12 V ± 10%	24 V ± 10%
Max. power consumption	6 W	
Analog control input (Us) to choose from:	Ratiometric 0.25xUDC ÷ 0.75xUDC	
	0 ÷ 10 V (available signal 2.5 ÷ 7.5 V)	
	0 ÷ 20 mA (available signal 5 ÷ 15 mA)	
	3.5 V (available signal 2 ÷ 5 V)	
Analog input impedance, ratiometric version, 0.25xUDC ÷ 0.75xUDC	12 kΩ	
Analog input impedance 0 ÷ 10 V version	10 kΩ	
Analog input impedance 0 ÷ 20 mA	500 Ω	
Spool positioning sensor	LVDT	
PWM outputs with current feedback	2	
PWM frequency	80 ÷ 250 Hz	
Max. current consumption	600 mA	330 mA
Error / Fault Message output (pin 3)	Max. Load 50 mA	
Working parameters setting	By software and serial interface	
Main electrical connection	3 pins Connector +PE	
Connection cable	FL4G11Y - 3 x 1.5 mm² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Enclosure	IP67	
Ambient working temperature	-35 ÷ +60 °C [-31 ÷ +140 °F]	
EMC requirements	EN61000-6-2, EN61000-6-4	



ATEX marking	CE Ex	II 2G Ex mb IIC T4 GB II 2D Ex mb IIIC T135 °C Db
IECEx marking	CE Ex	Ex mb IIC T4 GB Ex mb IIIC T135 °C Db

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

For the wiring diagram of module, please refer to Instruction manual.



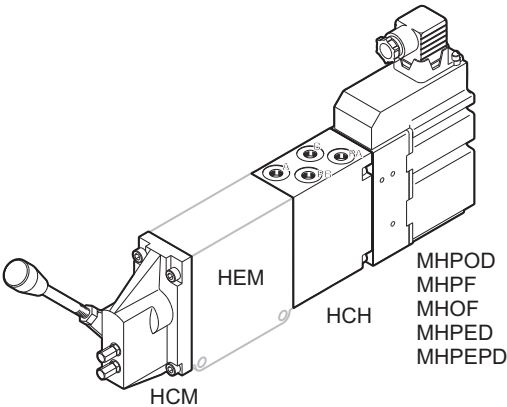
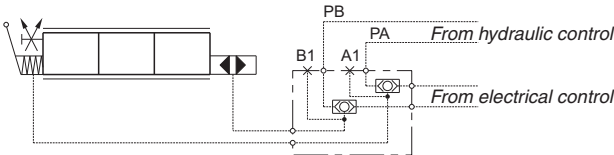
HCH

HCH module to get hydraulic and electrical remote control
HCH module is a small manifold that can be matched with all the HPV 41 proportional directional valves' elements, and with all the HPV electrohydraulic controls. The use of the HCH module, besides and in conjunction with electrohydraulic proportional, radio and on-off controls, also allows the hydraulic proportional control to be reached.

This new device features two supplementary work ports which can be used to pilot the overcenter valves through the same low pressure HPV spool. With this solution the control of the overcenter valves turns out to be much more precise, since the pilot pressure acting on them is never influenced by variations in pressure owing to moving loads.

Max. pilot pressure 36 bar [522 psi].

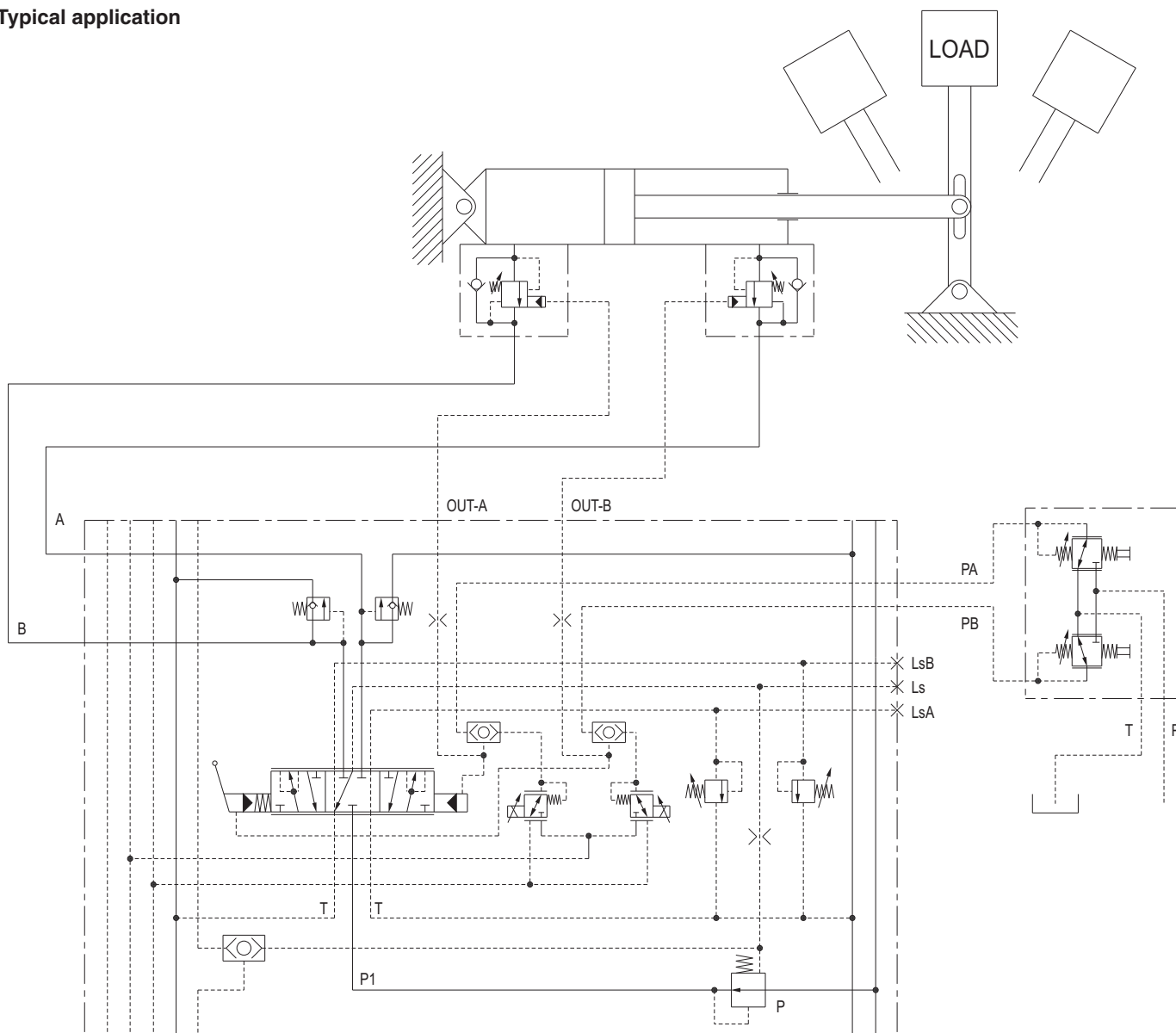
It is essential to use overcenter valves with high pilot ratio (15:1 ÷ 20:1)

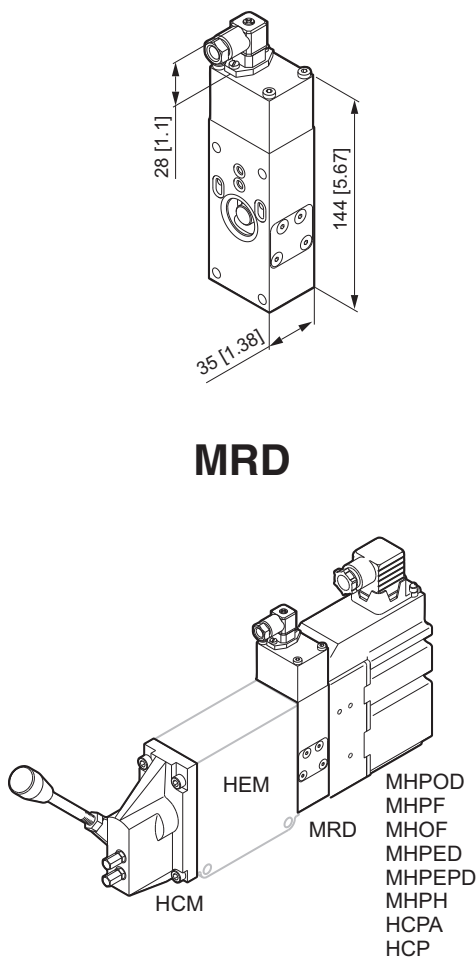


Example with module HCH, manual control HCM and MHPD module

Type	Code (Aluminum)	
	Connections 1/4 BSPP	Connections 7/16" - 20 UNF - 2B
For MHPD, MHPF, MHOF modules (open ring version)	HCH0004104225	HCH0004104226
For MHPED, MHPEPD modules (closed ring version)	HCH0004104227	HCH0004104228

Typical application





MRD

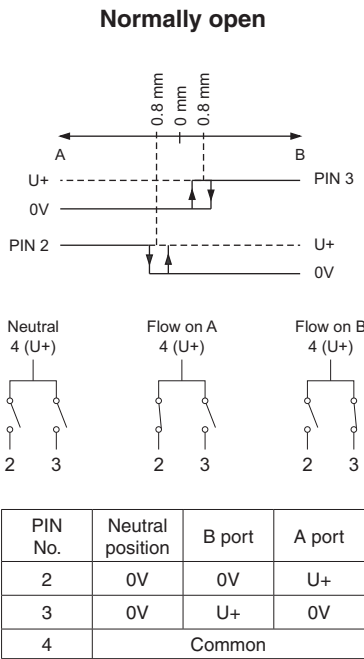
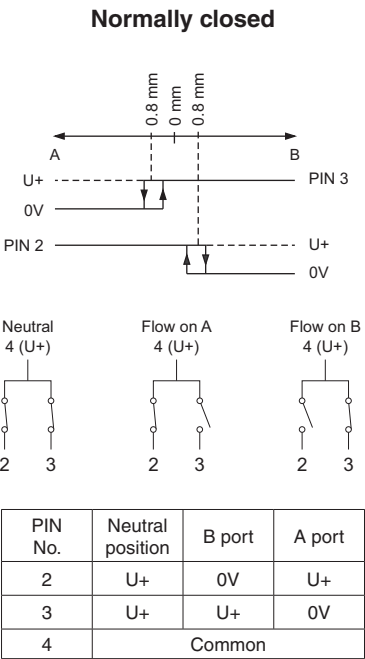
MRD electrical spool movement device
The main purpose of this module is to give an indication of the spool's movement, by mean of an on-off signal. Suitable for all those applications where, to satisfy the safety demands, the spool travel has to be remotely monitored or integrated wiht the whole machine electrical system.
Spool direction indicator output Hirshmann connector according to DIN 40050.

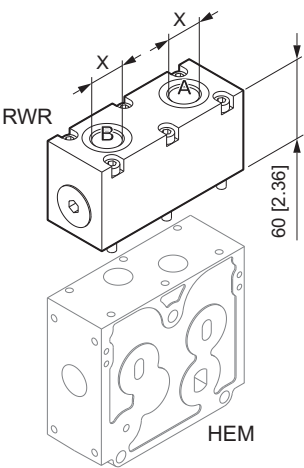
Voltave	12 VDC – 24 VDC (min. 10 VDC - max. 30 VDC)
Maximum current	Resistive load 5A Inductive load: 3A
Switch position	± 0.8 mm (+0.2 / 0.3 mm)
Protection degree	IP40

Not suitable for ATEX modules.

Type	Code
Normally closed	MRD0004104243
Normally open	MRD0004104245

Example with module MRD, manual control HCM and MHPOD module



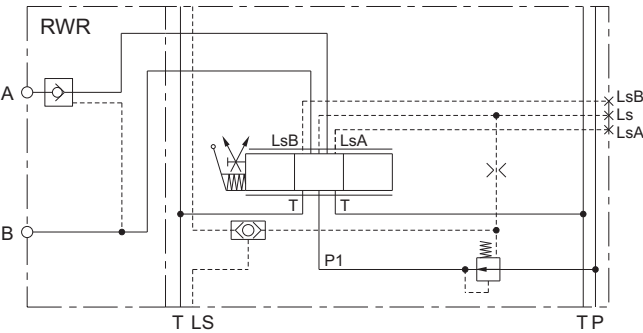


RWR double pilot operated check valve module

Developed for applications where integrated pilot operated check valves in the work ports are required to limit the port leakage down to zero. Suitable for load locking applications.

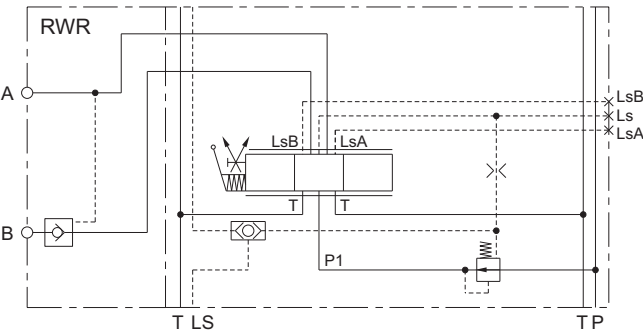
Cast iron body.

Suitable on prearranged elements only, HEM0004102400 - HEM0004102401.



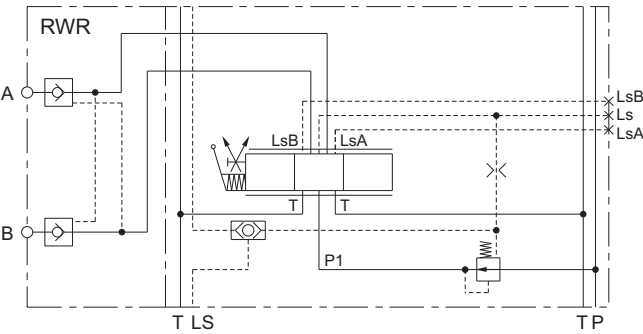
Check valve on A port

Code	
(X) Ports 1/2 BSPP	(X) Ports 7/8" - 14 UNF - 2B
RWR0004102506	RWR0004102507



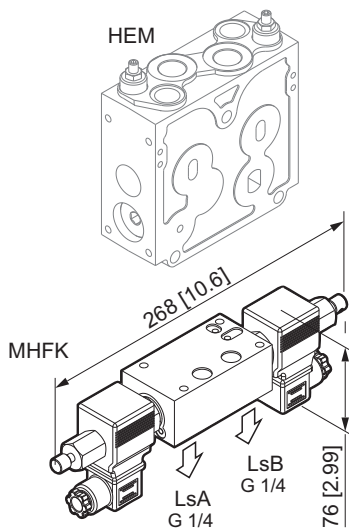
Check valve on B port

Code	
(X) Ports 1/2 BSPP	(X) Ports 7/8" - 14 UNF - 2B
RWR0004102508	RWR0004102509



Check valve on A and B ports

Code	
(X) Ports 1/2 BSPP	(X) Ports 7/8" UNF - 2B
RWR0004102510	RWR0004102511



With the electrical LsA/B unloading modules, the EU flow restrictors must always be mounted onto the spools (HEAS) see page B-86.

MHFK electrical Ls A/B unloading module

Developed for those applications where the max. working pressure can be selected according to an on-off electric signal. Normally open valves. Aluminum body.

Technical features

Max. operating pressure	370 bar [5366 psi]
Max. flow	30 l/min [7.9 US gpm]
Max. Leakage (0-5 drops/min)	0-0,25 cm³/min
Max. excitation frequency	2 Hz
Duty cycle	100% ED
Hydraulic fluids	Mineral Oil DIN 51524
Oil viscosity	10 ÷ 500 mm²/s (cSt)
Oil temperature	-25 ÷ +75 °C [-13 ÷ +167 °F]
Ambient temperature	-25 ÷ +60 °C [-13 ÷ +140 °F]
Max. contamination level class with filter	ISO 4406:1999 class 21/19/16
Cartridge filter	280µm
Degree of enclosure (depending on connector)	IP 65
Weight (with coil)	0.350 kg [0.77 lb]
Cartridge tightening torque	25 ÷ 30 Nm [18.4 ÷ 22 lbf·ft]
Coil ring nut tightening torque	7 Nm [5.2 lbf·ft]

Active on LsA	Voltage	Code
	14 VDC	MHFK004106430
	28 VDC	MHFK004106438

Thread BSPP G 1/4

Active on LsB	Voltage	Code
	14 VDC	MHFK004106432
	28 VDC	MHFK004106440

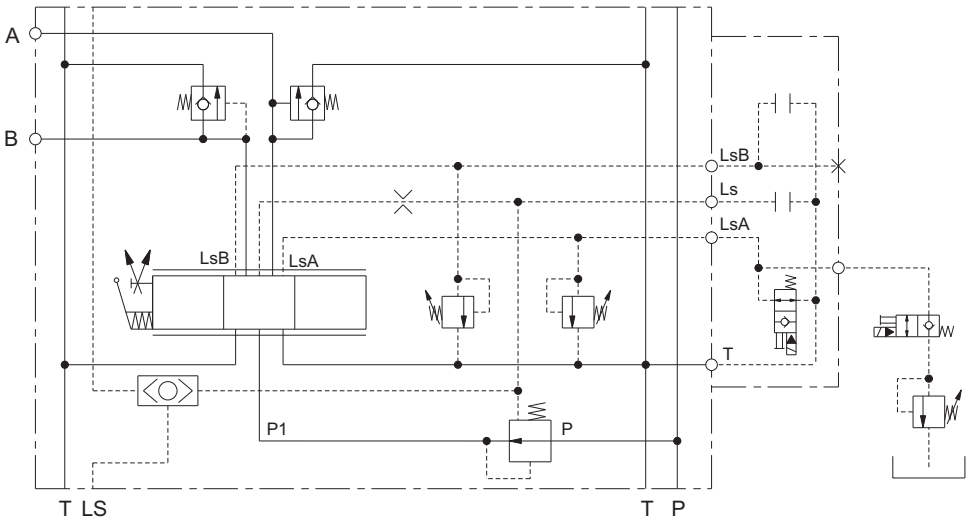
Thread BSPP G 1/4

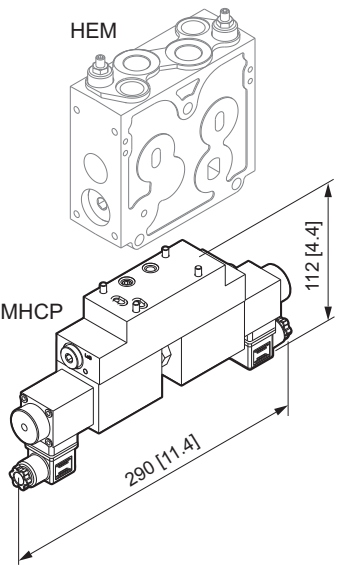
Active on LsA + LsB	Voltage	Code
	14 VDC	MHFK004106434
	28 VDC	MHFK004106442

Thread BSPP G 1/4

Active on Ls	Voltage	Code
	14 VDC	MHFK004106436
	28 VDC	MHFK004106444

Thread BSPP G 1/4





Electrohydraulic proportional module for remote A / B ports working pressure control

MHCP is a electric proportional module that allows the working pressure to be remotely operated by means of a current signal MHPF is designed to ensure system pressure to be infinitely adjust in accordance upon the electrical command valve. When the working pressure exceed the setting pressure value, the A – B ports flow is being cut-off.

When MHCP is not energized, both pressure and flow will be maintain close to zero.

MHCP is always to be used with pressure compensated working sections.

Cast iron body.

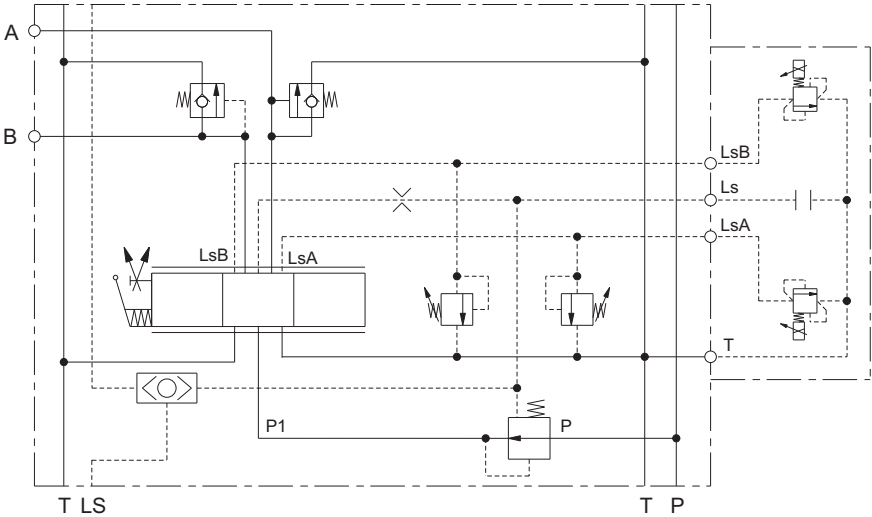
With the electrical LsA/B unloading modules, the EU flow restrictors must always be mounted onto the spools (HEAS) see page B-86.

Active on LsA	Voltage	Code
	24 VDC	MHCP004106020

Active on LsB	Voltage	Code
	24 VDC	MHCP004106040

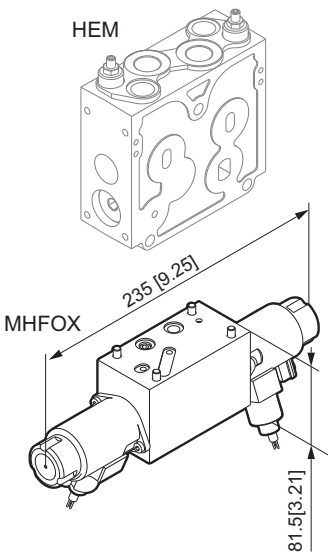
Active on LsA + LsB	Voltage	Code
	24 VDC	MHCP004106060

Active on Ls	Voltage	Code
	24 VDC	MHCP004106275





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With the electrical LsA/B unloading modules, the EU flow restrictors must always be mounted onto the spools (HEAS) see page B-86.

MHFOX electrical LsA/B signal unloading module Atex version
LsA / LsB pilot signal unloading solenoid valve. If the Atex on/off solenoids are not energized, there is no flow on A/B work ports, while the pressure in the open centre circuits will be equal to the P → T unloading pressure value on the inlet section, plus the counterpressure acting on T line. In closed centre circuits (under the same operating conditions) the pressure will be equal to the stand-by pump pressure.
Normally open valves. Cast iron body.

Active on LsA + LsB	Voltage	Code
	12 VDC	MHFOX04106050
	24 VDC	MHFOX04106060

Technical features

Nominal voltage	12 VDC	24 VDC
Coil resistance, R20	9 Ω ± 6%	35.8 Ω ± 6%
Min. current	700 mA	350 mA
Max. current	1850 mA	930 mA
Limit power	14.3 W	14.4 W
Ambient temperature	-20 ÷ +50 °C [-4 ÷ +122 °F]	
Connection cable	FL4G11Y - 3 x 1.5 mm² [3 x 15 AWG] L = 5-5.1 mt [197-201 inch]	
Integrated diode to limit switch-off overvoltage	See coil manufacturer manual	
Short-circuit protection	With fuse - See coil manufacturer manual	
Duty cycle	100%	
Input pressure	Max. 400 bar [5800 psi]	
Switching pressure	Max 200 bar [2900 psi]	
Operating Limits	400 bar at max. flow 7 l/min [2900 psi at max. flow 1.85 US gpm]	
Flow P → T at Δp =2 bar [19 psi]	> 6.5 l/min [1.72 UD gpm]	
Leakage P → T (Oil Temp. 50°C / Input press. 400 bar [5800 psi])	< 20 ml/min [0.002 UD gpm]	
Fluid temperature	-20 ÷ +80 °C [-4 ÷ +176 °F]	
Ground connection	Up to 4 mm² - 11 AWG	
Protection class (DIN VDE 0580)	I	
Fluids	Hydraulic oil to DIN 51524.ATF-oil	
Protection ratings (DIN VDE 0470 / EN 60529)	IP67 / IP69K	
Shock-resistance to EN 50014	4 J	

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

For the wiring diagram of module, please refer to Instruction manual.

These modules, fitted on the proportional valve with MHOX modules, are subject to the complete certification of the valve; in this case the label will refer to the complete valve: MHOX - HEM.

When the modules are individually supplied, a label is attached to the module with the following labelling:



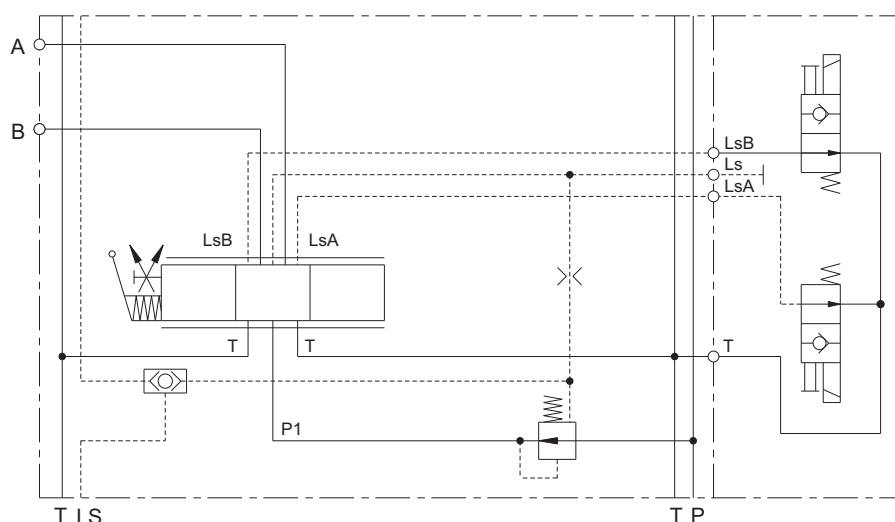
 II 2 GD c T4 / T135°C
 $T_{amb} = -20\text{ °C} \div +50\text{ °C}$
 $T_{fluid} = -20\text{ °C} \div +80\text{ °C}$

This labelling is printed on the label of modules, in a visible position.

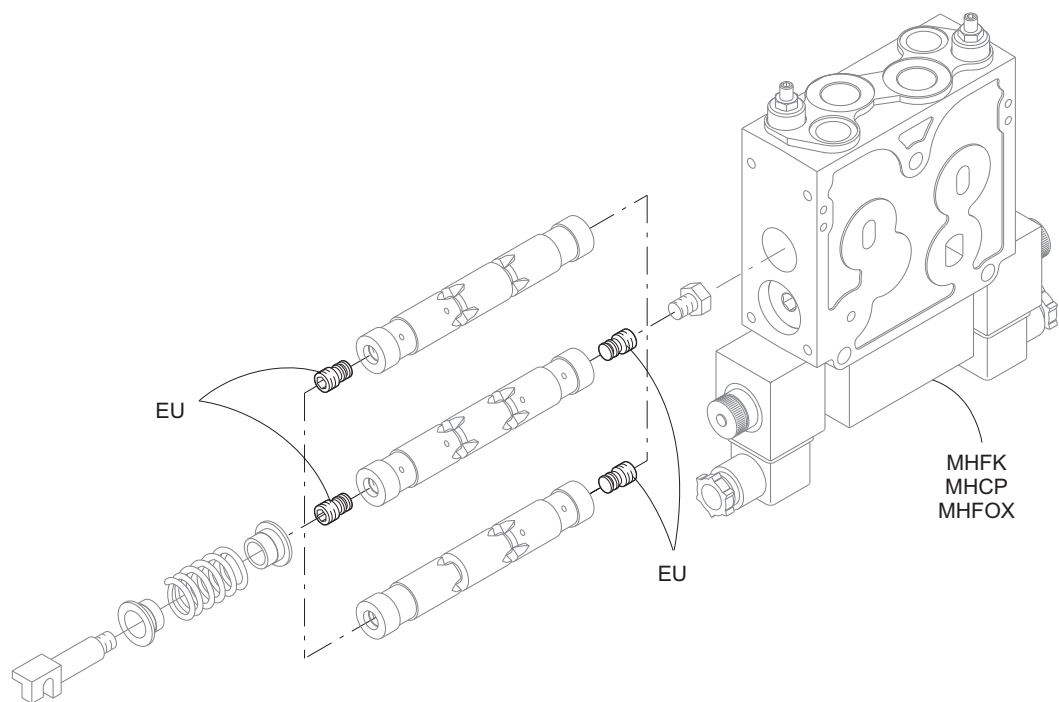
The final customer, when buying this module individually, is in charge of the assembly and coupling of such component with others ATEX components of different classes, groups and temperatures.

ATEX electro-hydraulic modules for HPV features and safety instructions see page A-3.

For the wiring diagram of module, please refer to Instruction manual.



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Modules, EU flow restrictors for HPV 41 spools, for LsA/B electrical unloading modules
When the working sections (HEM) are equipped with the MHFK-MHCP-MHFOX electrical LsA/B unloading modules, the EU flow restrictors must always be mounted onto the spools (HEAS).

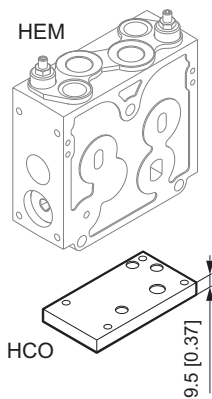
The code number has to be indicated under the spool code field in the order form.

Any kind of spool are always prearranged for EU modules.

Description	Code
Active onLsA or LsB only	HEAU004104700
Active on LsA + LsB	HEAU004104701

HCO module - bottom plate to close the MHFK, MHCP facilities

Aluminum body.



HCO	Code
	HCO0004104224

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