BUCHER hydraulics

Directional Control Valve HDM19EH

BUCHER
hydraulics

Contents

For controls, options and other technical details, please refer to HDM19WL catalogue.

1 Installation and maintanance - General information

1.1 Directional valve installation

For the installation of the directional control valve on the equipment frame it is important to consider the following recommendations:

- the valve can be assembled in any position but, in order to avoid deformations and spool sticking, the surface on which the product is mounted has to be flat;
- before connecting pipelines, make sure that the pipeline hollows as well as fittings and seals are thoroughly clean; check also that the work ports are protected until the connection of the pipelines
- during assembly and servicing operations, it is necessary to adopt clean procedures and work in an environment free of chips, swarf, dust and other possible source of pollution;
- if the spools are connected to the equipment controls through linkages, make sure that they do not affect their operations;
- before painting the valve, check that the work port plastic plugs are tightly in place.

1.2 Fittings

In the interest of safety, only fittings with STRAIGHT THREAD ENDS should be used.

Fittings with TAPERED THREAD ENDS (e.g. DIN 3852 form C) should never be used, as they can cause deformation and cracks in the valve body.

Our warranty conditions will be not valid in case tapered fittings are used.

The work port adaptors have to be fastened respecting the tightening torque values indicated in the following table (for different port types contact our Sales Dpt.):

Cavity	Recommended tightening torque for work port fittings - Nm / lbft			
Metric - ISO 261	M14X1.5	M18X1.5	M22X1.5	
With O-Ring seal (ISO 6149-1)	30/22.1	40/29.5	60/44.3	
With copper washer (ISO 9974-1)	30/22.1	40/29.5	60/44.3	
With rubber washer or steel (ISO 9974-1)	25/18.4	35/25.8	60/44.3	
BSP - ISO 228-1	1/4” BSP	3/8” BSP	1/2” BSP	3/4” BSP
With copper washer (ISO 1179-1)	30/22.1	40/29.5	60/44.3	90/66.4
With rubber washer or steel (ISO 1179-1)	25/18.4	35/25.8	60/44.3	70/51.7
UN-UNF - ISO 263	SAE6 - 9/16-18 UNF	SAE8 - 3/4-16 UNF	SAE10 - 7/8-14UNF	SAE12 - 1-1/16-12UNF
With O-Ring seal (ISO 11926-1)	30/22.1	40/29.5	60/44.3	90/66.4

IMPORTANT!: Tightening torques depends on several different factors including lubrication, coating and surfaces finish. The fitting manufacturer shall be consulted.

1.3 Hydraulic fluid

The main function of the fluid used in hydraulic systems is to transfer energy but it performs also other important functions: protect the components from corrosion, lubricate the directional valve moving parts, remove particles and heat from the system.

In order to ensure proper operation and long life of the system it is important to choose the correct hydraulic fluid with proper additives.

Bucher Hydraulics recommends to use a mineral based oil responding to ISO 6743/4 requirements, only.

The system should be operated only with hydraulic oil containing anti-foaming and antioxidant additives. Before using other types of fluid, please contact our Sales Dept, since they can cause serious damage to the directional valve components and jeopardize the correct function of the system.

1.4 Filtration

In order to ensure proper operation and long life of the directional valve components it is extremely important to provide a proper and effective filtration of the hydraulic fluid. It is advisable to follow filter manufacturers instruction and recommendations.

The fineness of the filter should be selected in order to guarantee that a contamination level of 21/19/16 ISO 4406:1999 (NAS 1638 class 10) is not exceeded.

When the high reliability of the system is an important requirement a 10 µm nominal pressure filter must be used. In these cases it is also advisable to use a pressure filter with by-pass and indicator.

For mechanical operated directional valves a <30 µm nominal return filter is adequate.

The size of the return filters must suit the maximum return flow whereas the size of the pressure filters must suit the maximum pump flow.

It is advisable to fit filters with pressure gauge or dirt indicator in order to make it possible to verify the filter condition.

Particular attention has to be paid to the cleaning of the machine hydraulic circuit and its components before the first run-in, since the presence of foreign materials could cause damages to the directional valve components even if a proper filtration is provided.

In order to obtain the best performance of the system we recommend to strictly follow the conditions advised here above, failing which warranty shall be void.

1.5 Directives and standards

- Atex:

Attention: The equipment and protective systems of these catalogue ARE NOT intended for use in potentially explosive atmospheres. Ref: Directive 99/92/EC and Directive 2014/34/UE

- ISO 9001:2008 / ISO 14001:2004

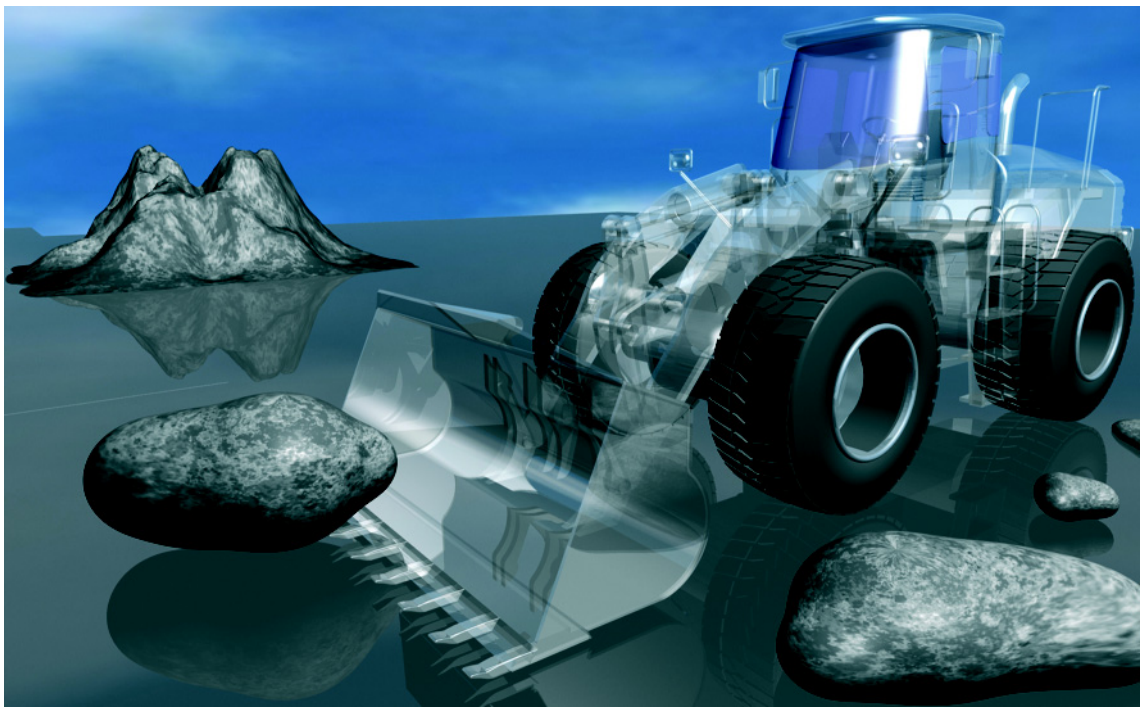
Bucher Hydraulics S.p.A. is certified for research, development and production of directional control valves, power units, gear pumps and motors, electro pumps, cartridge valves and integrated manifolds for hydraulic applications.

2 Hydraulic system

2.1 Typical applications

The monobloc directional control valve HDM19EH has been specifically designed to fulfill the typical requirements of compact wheeled and telescopic loaders.

The wide range of controls as well as integrated valves satisfy any application-adapted solutions.



2.2 Advantages

High metering spools combined with extremely low operating forces for a fine control of the load.

- Wide availability of integrated flow restrictors for maximum dumping speed setting
- Regenerative circuit for fast dumping speed as alternative

Very fine control during boom lowering to avoid vibrations and machine instability with full load

Hydraulic operated joysticks which allow a simultaneous control of two functions:

- boom/bucket (main handle)
- aux/bucket (auxiliary handle).

The manual version can be equipped with handles locking system, to avoid unwanted movement of boom/bucket, for safe travelling on roads

2.3 Technical specification:

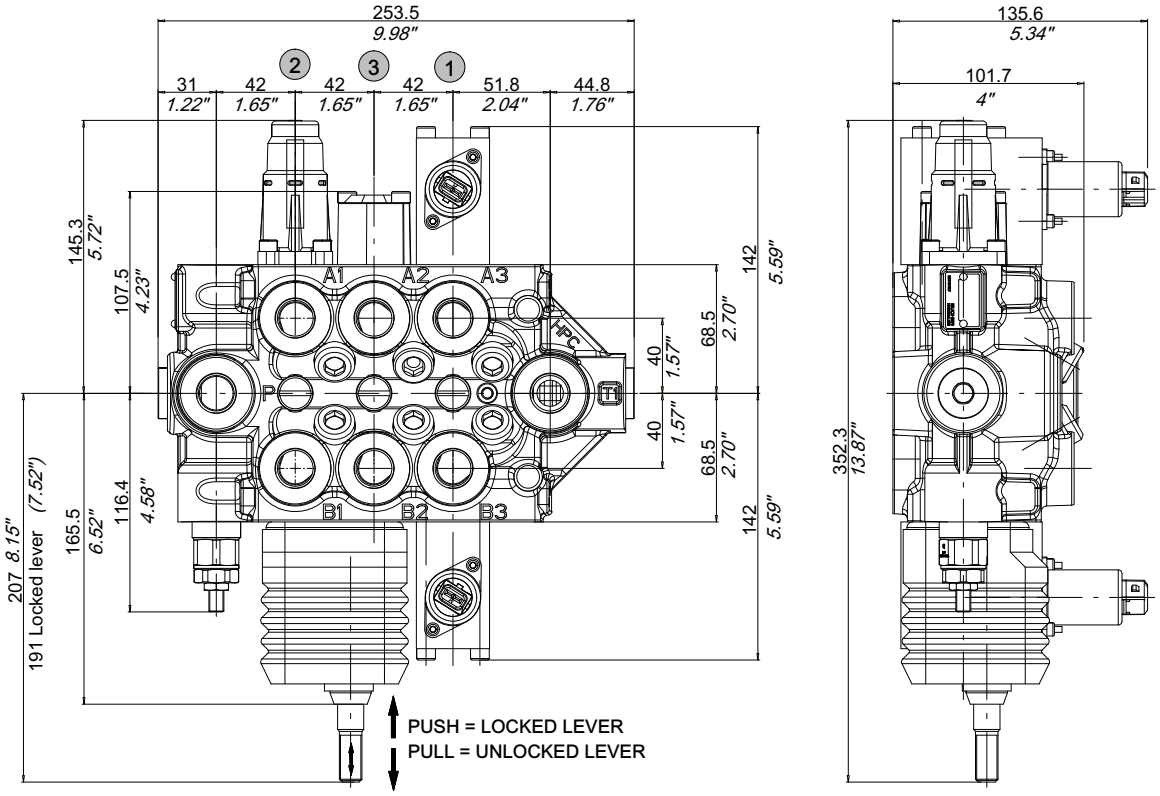
IMPORTANT!: Specification and diagrams shown in this catalogue are measured with mineral oil having a viscosity of 23 mm^2/s at 50° C

Features - Parallel circuit		
Nominal flow range		80 l/min *(21 US gpm)*
Max inlet pressure (P)(*)		290 bar *(4200 PSI)*
Max work port pressure (A/B)(*)		320 bar *(4640 PSI)*
Max back pressure (T)		30 bar *(430 PSI)*
Max back pressure (T) with electro-hydraulic positioner (EHO)		10 bar *(145 PSI)*
Max internal leakage A/B → T (100 bar, 23 mm^2/s) without service port valves		15 cc/min *(0.730 in^3/min) (**)*
Max internal leakage A/B → T (100 bar, 23 mm^2/s) with service port valves		20 cc/min *(0.973 in^3/min) (**)*
Fluid		mineral based oil (see 1.4)
Fluid temperature (with NBR seals)		from -20° to 80 °C *(from -4° to 176° F)*
Viscosity operating range	recommended	from 15 to 75 mm^2/s
	admissible	from 12 to 400 mm^2/s
Max contamination level	21/19/16 - ISO 4406:1999 *(NAS 1638 class 10)*	
Max contamination level with electro-hydraulic devices	20/18/15 - ISO 4406:1999 *(NAS 1638 class 9)*	
Ambient temperature in operating conditions:	With mechanical/hydraulic/ pneumatic controls	from -30 to +60 °C
	With electric/ electrohydraulic devices	from -30 to +50 °C

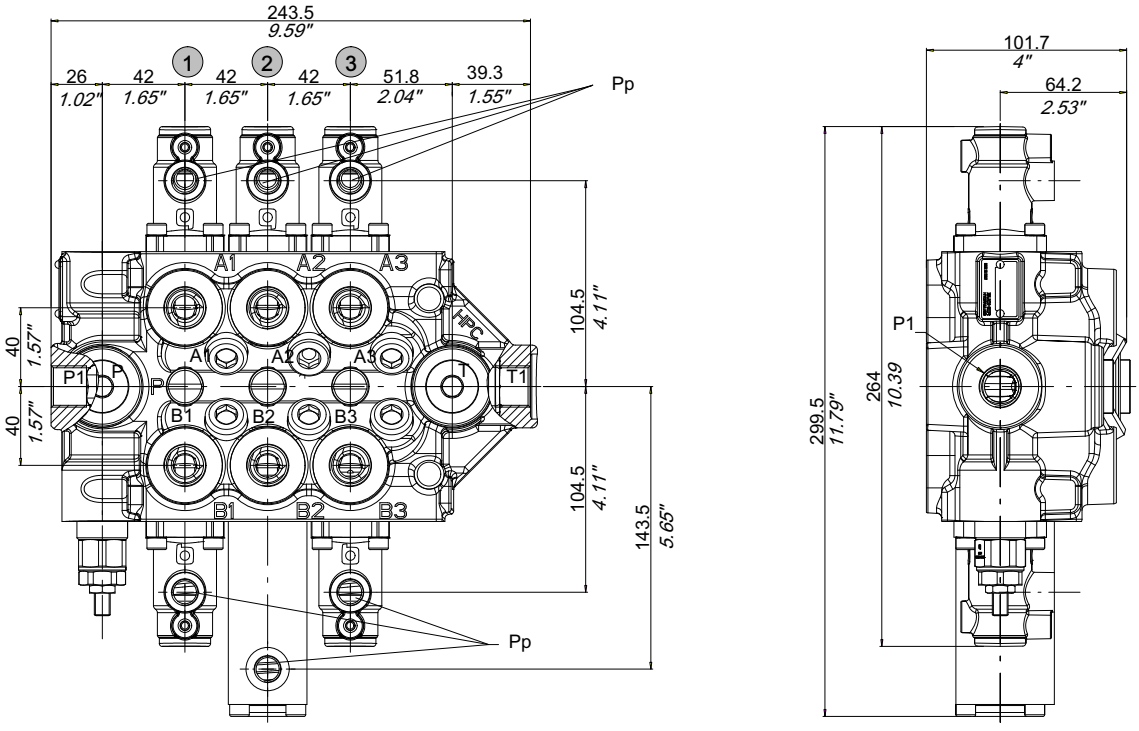
(*) Fatigue tested according to internal procedure at 1,1x rated pressure on 6 sample for 1.000.000 cycles
For different operating conditions, please contact our Sales Dept.
(**) Lower values for specific functions (BOOM/BUCKET) can be provided on demand

2.4 Examples

2.4.1 Manual and electro-hydraulic proportional operated

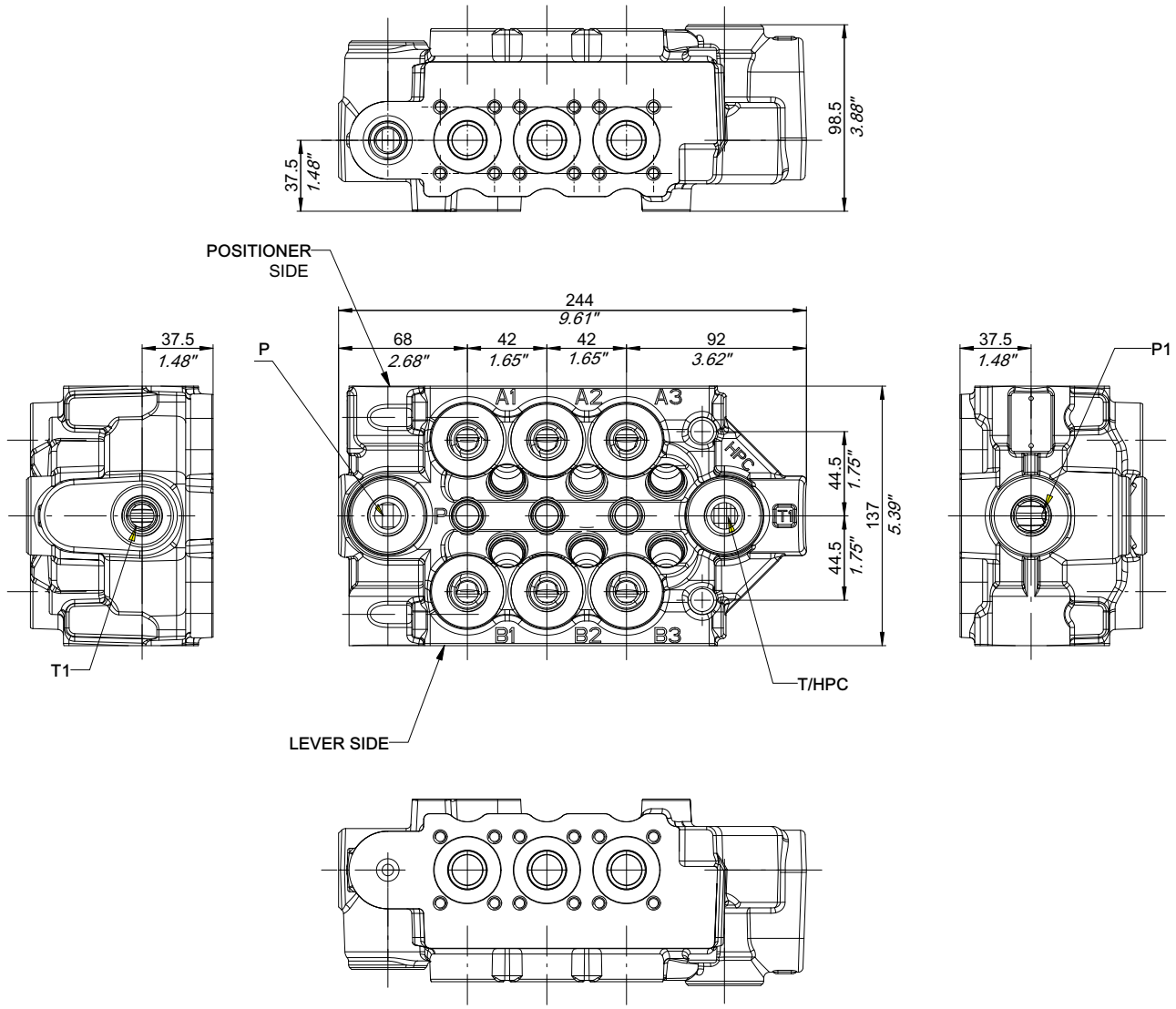


2.4.2 Hydraulic operated



① AUXILIARY ② BOOM ③ BUCKET

3 Ports



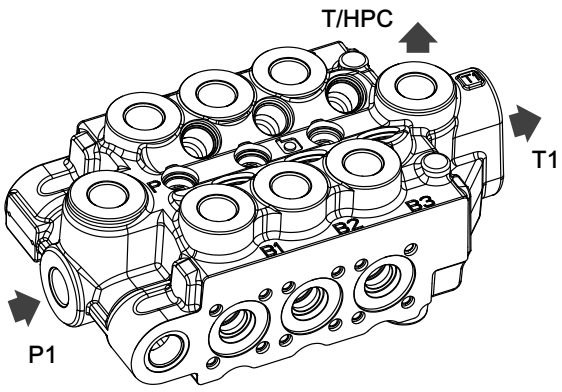
3.1 Port threads

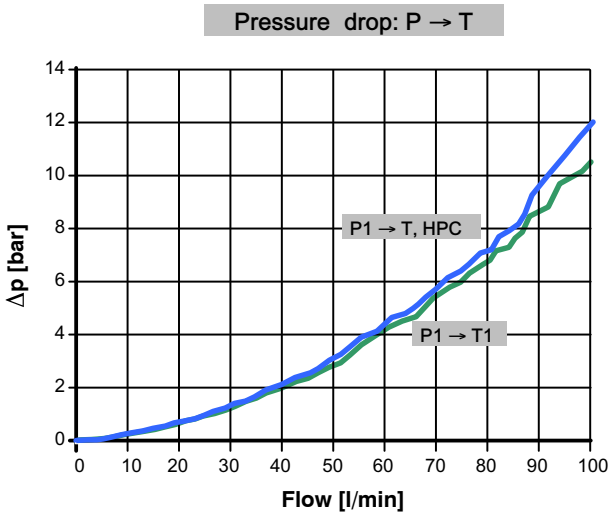
	BSP parallel thread	Metric straight thread	UN-UNF straight thread
Thread	ISO228-1	ISO 261	ISO 263
			SAE J475
Cavity	ISO 1179-1	ISO 9974-1	ISO 11926-1
	DIN 3852-2	DIN 3852-1	SAE J1926-1
PORT DIMENSIONS			
Main ports	BSP	Metric	UNF
Inlet P, P1	1/2”	M22X1.5	7/8”-14 (SAE10)
Ports A/B	1/2”	M18X1.5	3/4”-16 (SAE8)
Outlet T, T1, HPC	1/2”	M22X1.5	7/8”-14 (SAE10)
Controls	BSP	Metric	UNF
Hydraulic (Pp)	1/4”		9/16”-18 (SAE6)
Open loop proportional (Pp)	1/4”		9/16”-18 (SAE6)

For different ports size please contact our Sales Department

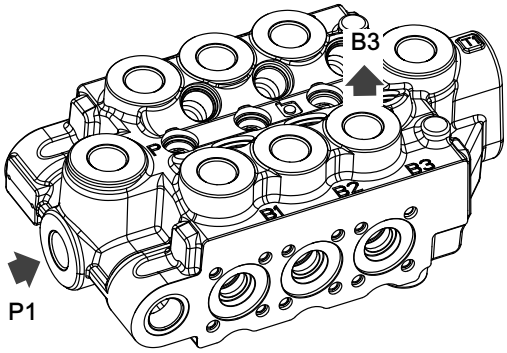
4 Performance data

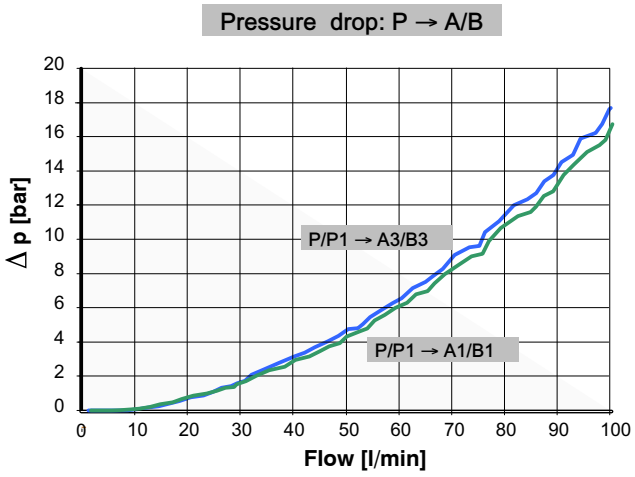
4.1 Open centre



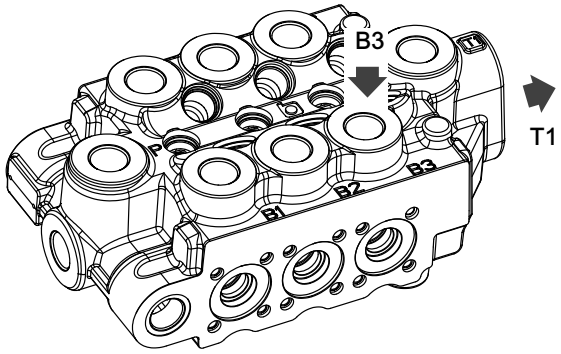


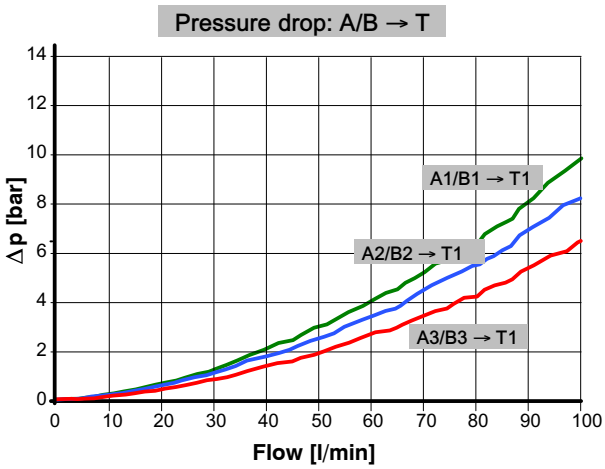
4.2 Inlet to work port





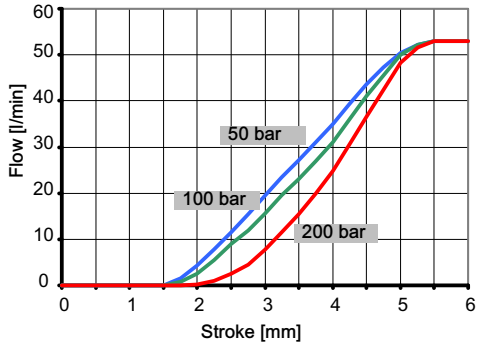
4.3 Work port to outlet



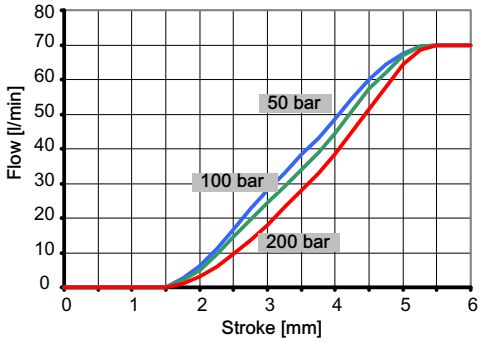


Note: the curves have been recorded with A5S spool

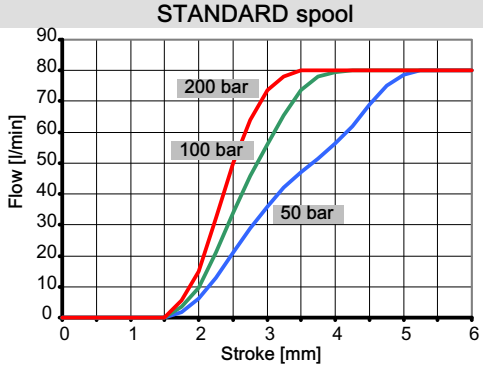
Spool metering: P → A/B (inlet flow 53 l/min)



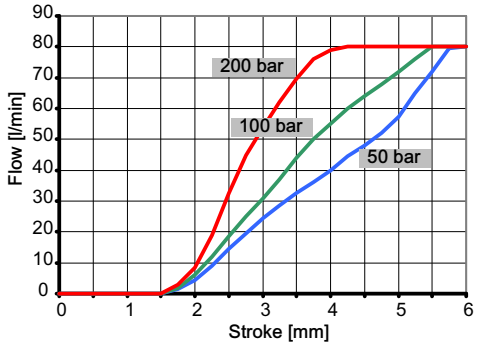
Spool metering: P → A/B (inlet flow 70 l/min)



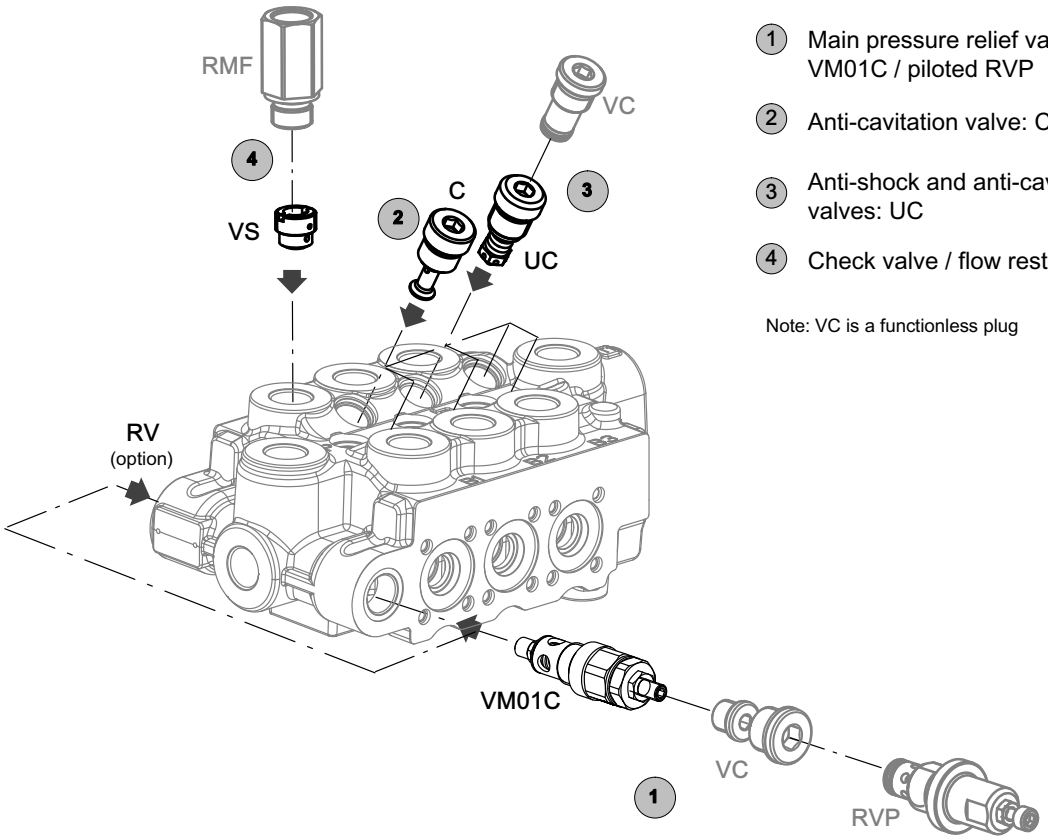
Spool metering: A/B → T (port flow 80 l/min)
STANDARD spool



Spool metering: A/B → T (port flow 80 l/min)
BOOM and BUCKET spools



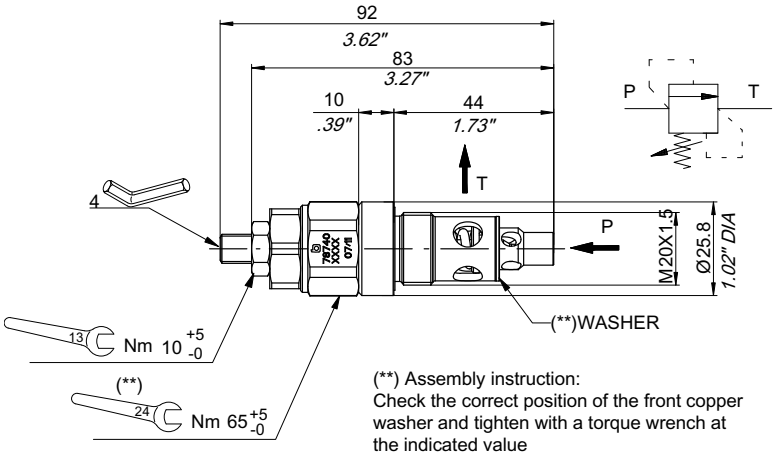
5 Valves



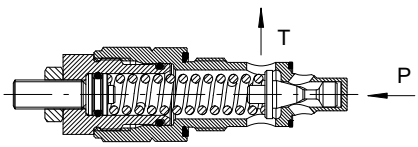
1. Main pressure relief valve : direct acting VM01C / piloted RVP
2. Anti-cavitation valve: C
3. Anti-shock and anti-cavitation valves: UC
4. Check valve / flow restrictor: VS/RMF

Note: VC is a functionless plug

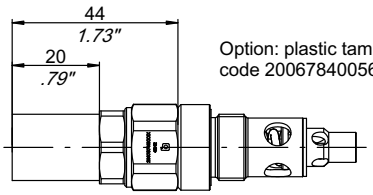
5.1 Direct acting relief valve VM01C



(**) Assembly instruction:
Check the correct position of the front copper washer and tighten with a torque wrench at the indicated value



The valve can be sealed against tampering

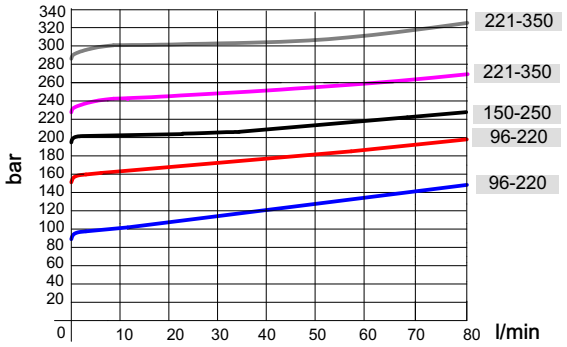


Option: plastic tamper proof cap code 200678400561

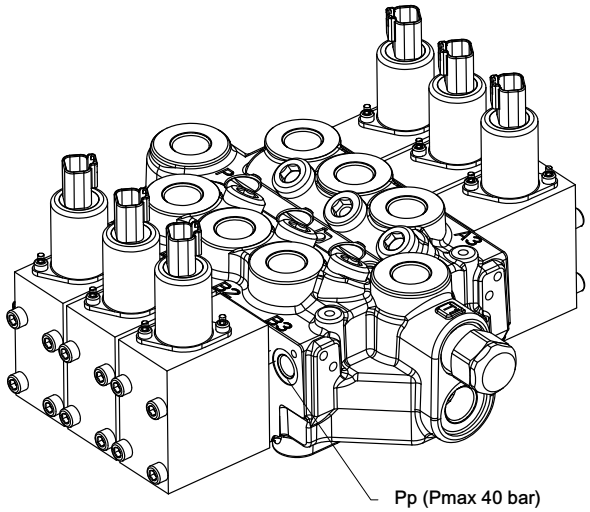
Pressure setting range bar (PSI)	Type	Relief valve code
96 - 220 (1390 - 3190)	12VM01C	200787403420
150 - 250 (2170 - 3620)	15VM01C	200787403470
221 - 350 (3200 - 5070)	23VM01C	200787403430
VC (plug)		200978400140

Pressure setting valve referred to 10 l/min

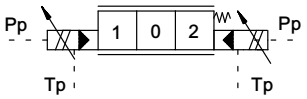
Pressure viscosity characteristic 46 cSt at 40°C

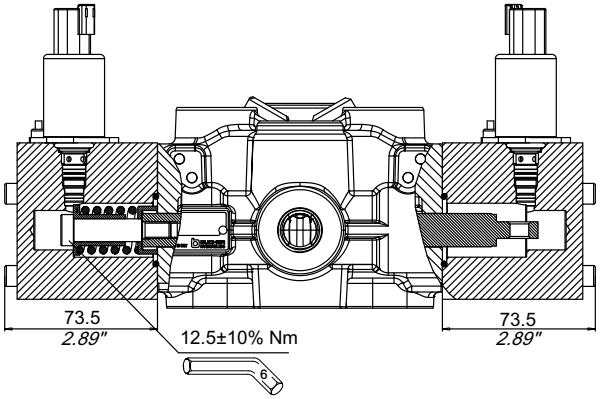


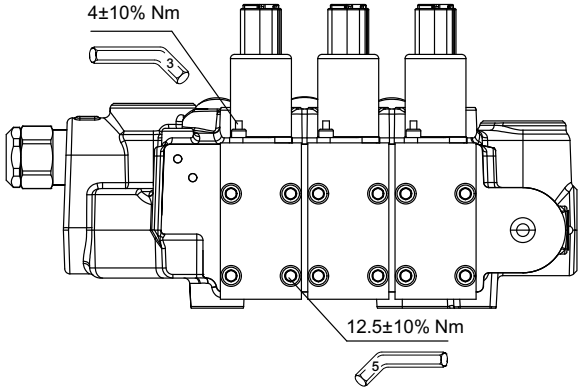
6 Electro-hydraulic open loop proportional / ON-OFF control (EHO) For HDM19EH only

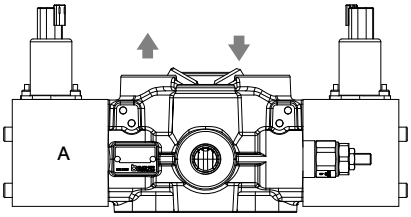


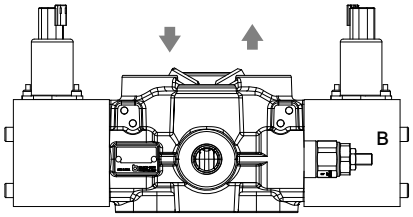
Simplified scheme





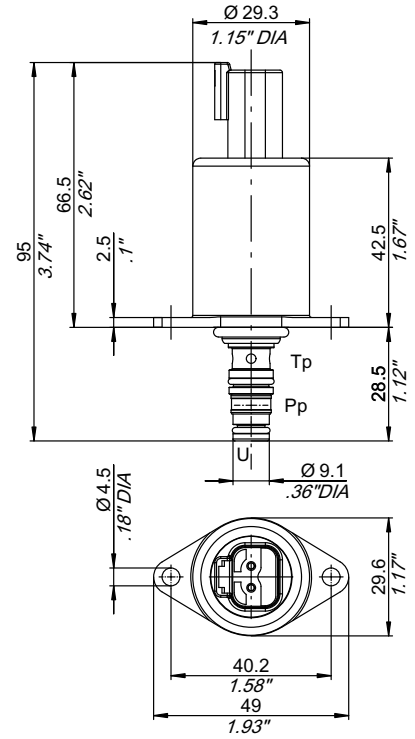


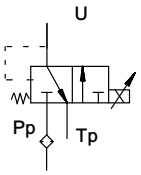


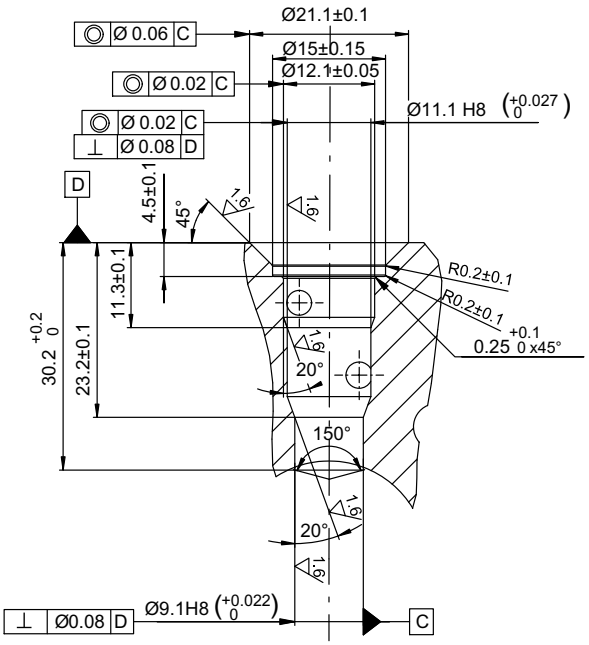


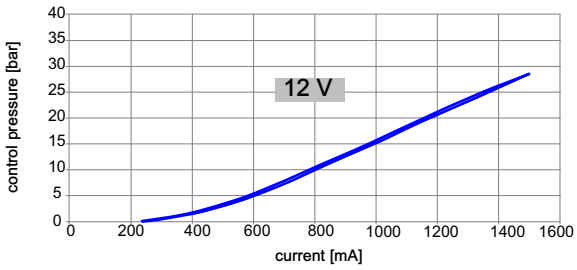
Type*	Code	Voltage	Connector
POS 400	200768661070	12 VDC	AMP
		24 VDC	AMP
		12 VDC	Deutsch
		24 VDC	Deutsch

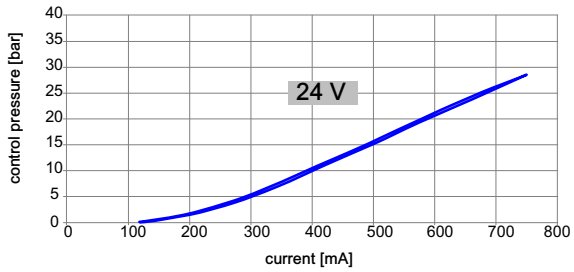
The pressure differential between pilot lines Pp and Tp should be > 25 bar in order to be sure to switch the spool to full stroke in all operating conditions.







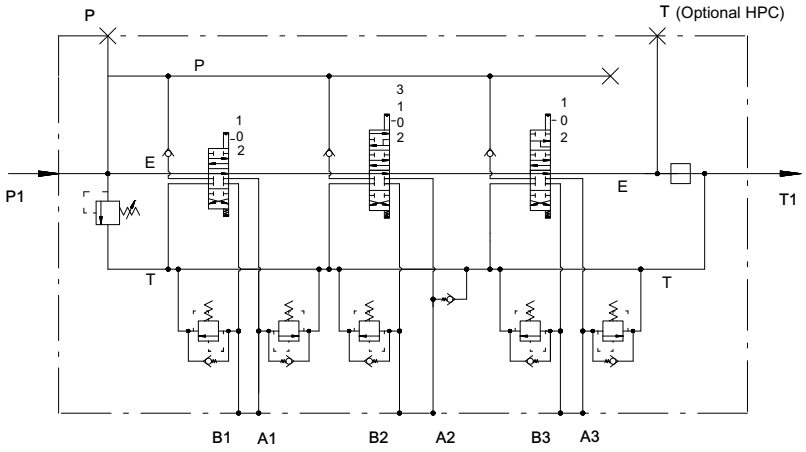


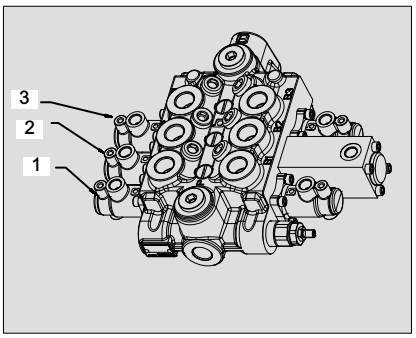


Ectro-hydraulic specifications	12 V	24 V
Nominal flow rate	4 l/min *(1 GPM)*	
Max inlet pressure	50 bar *(725 PSI)*	
Rated supply voltage	12 VDC	24 VDC
Current supply characteristic	PWM (Pulse width modul.)	
Maximal current	1500±10 mA	750±10 mA
Superimposed dither frequency	100	
Degree of protection	AMP IP65 / Deutsch IP69K	
Pp filter screen	125 µm	
Coil resistance	4.7 Ohm ±5%	20.8 Ohm ±5%
Response time	< 50 ms	
Leakage from Pp to Tp	< 30 cc/min. at 35 bar and 50°C *(< 0.9 cu:in./min. at 500 psi and 176 °F)*	
Duty cycle	ED 100%	
Connector Type	AMP Junior timer (AMP84-9419) / DEUTSCH DT04-2P	
Connector colour	MOSSY-GREY	BLACK
Code (*)	200533960015 (DEUTSCH) 200533960016 (AMP)	200533960013 (DEUTSCH) 200533960014 (AMP)

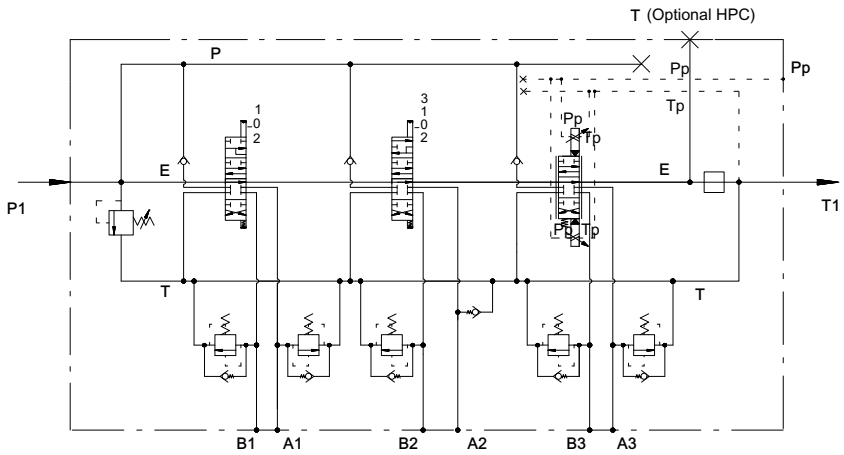
(*) nr. 2 screws M4x12 are not included

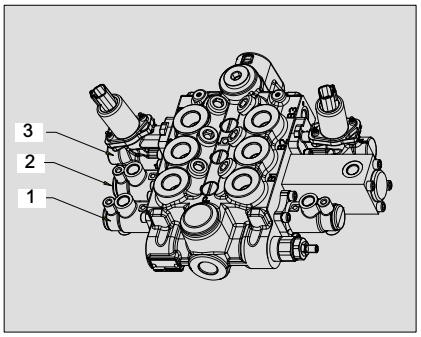
7 Hydraulic schematic examples





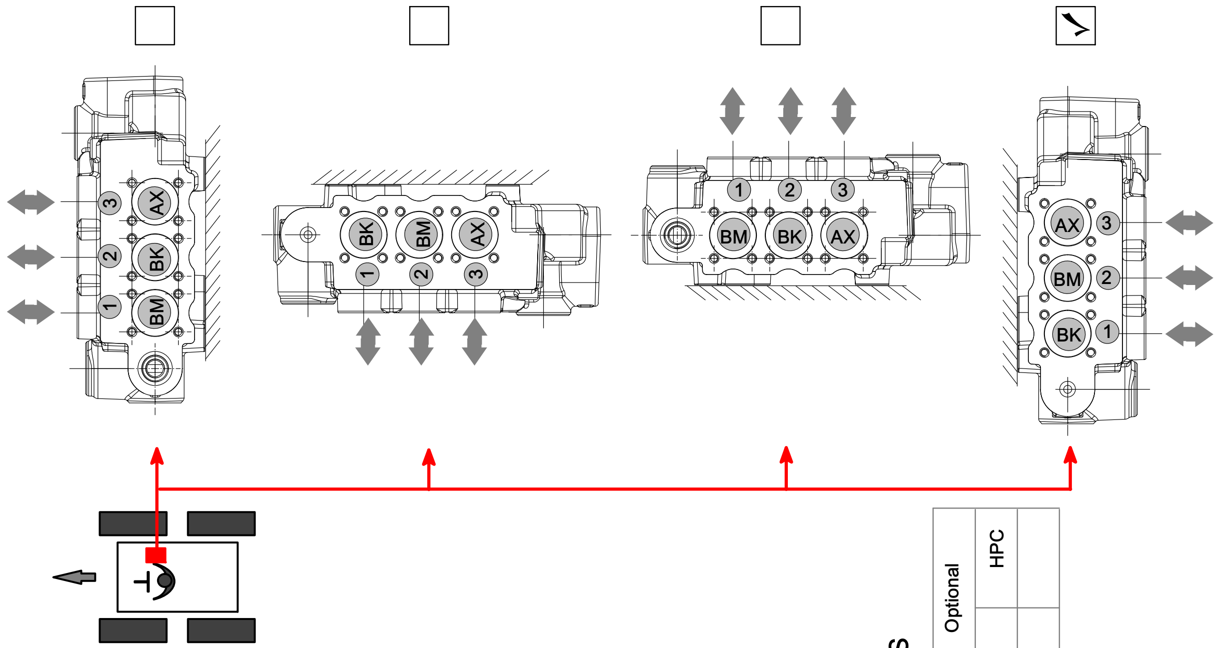
AUX 1	BOOM 2	BUCKET 3
A5S -POS55 UC/A23-B23	W5P- POS52 C/A UC/B28	R5RB - POS55 UC/A13 -B28





BUCKET 1	BOOM 2	AUX 3
R5RB - POS55 UC/A13-B28	W5P - POS52 C/A - UC/B28	A5S-POS400 UC/A23-B23

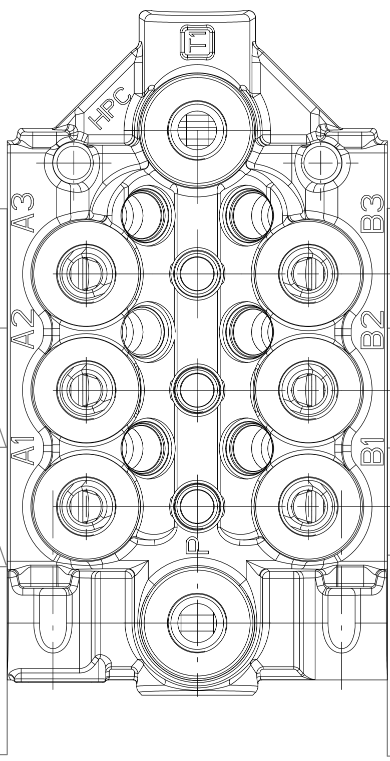
8 Composition of HDM19EH ordering code example



PORTS				
Optional			Optional	
P1	P	T1	T	HPC
	1/2"BSP	PLUG		

BOOM= BM BUCKET= BK AUX= AX

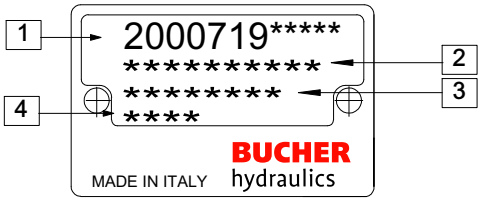
RELIEF VALVE	22VM14		
SHRINK RVP			
FLOW SETTING	80 l/min		
SPOOL	A5S	W5P	R5RB
POSITIONER	50	51	50
LEVER			
VALVE	UC/A23-B23	C/A UC/B28	UC/A13-B28
VS/RMF			
VOLTAGE			
CONNECTOR			
EHO			



SPOOL FUNCTION	AUX	BOOM	BUCKET
BOOM LIFT PORT		-	-
BUCKET TILT PORT	-		-
PAINTING RAL9005	✓		
CUSTOMER CODE			

VOLTAGE	13 = 12 VDC	23 = 24 VDC

8.1 Product identification plate



1 : Bucher Product Code.

2 : Customer Code (on demand, only - if not requested manufacturing year and month are printed).

3 : WO : Production Work Order .

4 : WO progressive number.

Manufacturing month	Manufacturing year					
	2014	2015	2016	2017	2018	2019
January	4A	5A	6A	7A	8M	9M
February	4B	5B	6B	7B	8N	9N
March	4C	5C	6C	7C	8P	9P
April	4D	5D	6D	7D	8Q	9Q
May	4E	5E	6E	7E	8R	9R
June	4F	5F	6F	7F	8S	9S
July	4G	5G	6G	7G	8T	9T
August	4H	5H	6H	7H	8U	9U
September	4I	5I	6I	7I	8V	9V
October	4J	5J	6J	7J	8Z	9Z
November	4K	5K	6K	7K	8X	9X
December	4L	5L	6L	7L	8Y	9Y

BUCHER
hydraulics

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Classification: 430.300.000