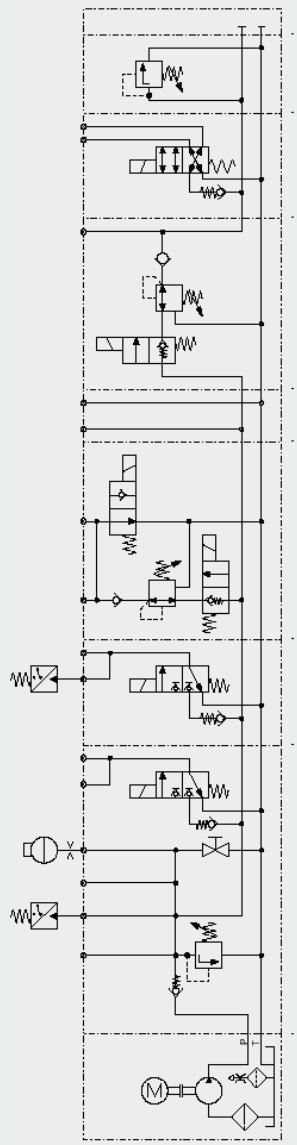
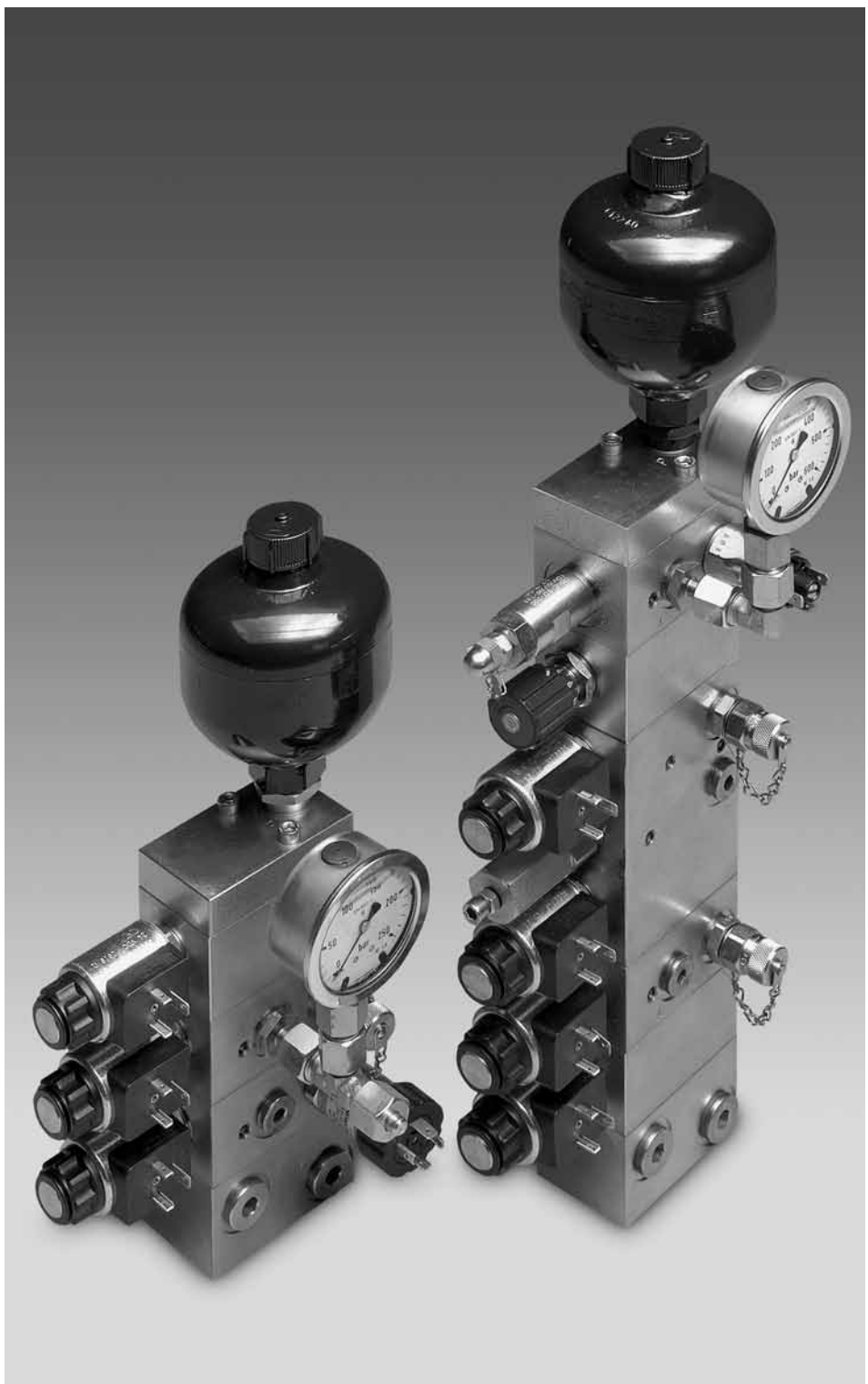
HYDAC INTERNATIONAL

HYDAC
Valve Stacking System
ML



Individually extendable stacking system with integrated mounting and sealing elements.

P_{max} = 350 bar
Q_{max} = 20 l/min



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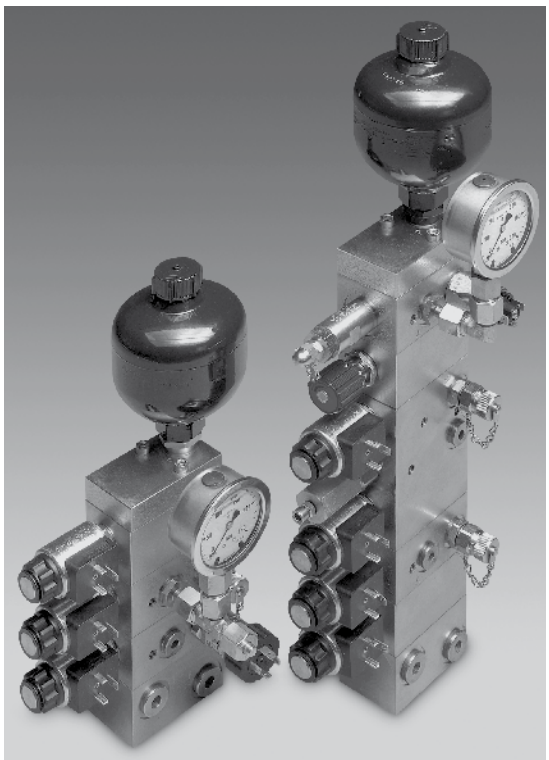


1. GENERAL

1.1 DESCRIPTION

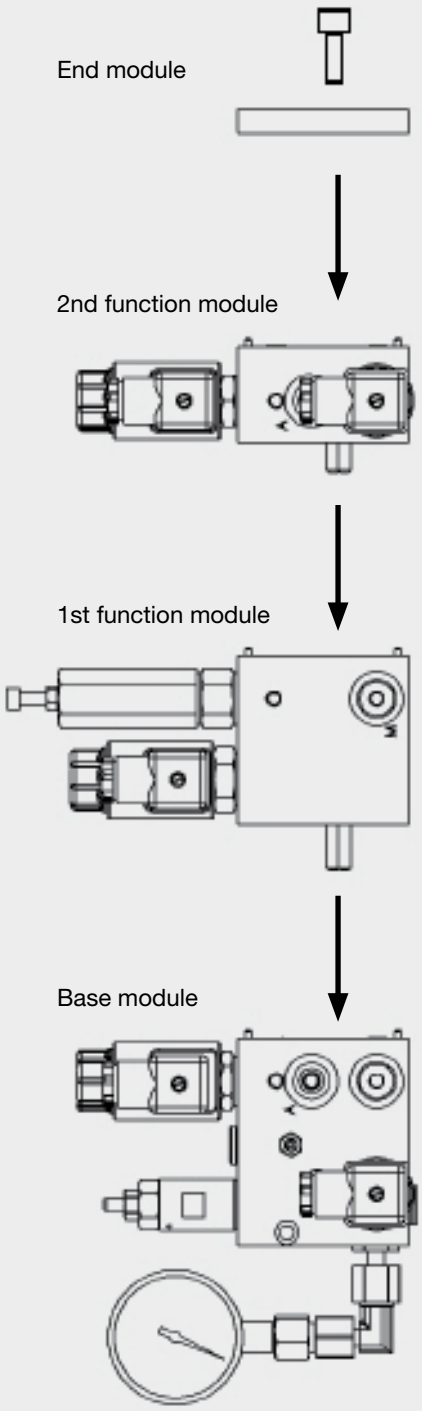
The HYDAC valve stacking system type ML is a control block composed of individual standard modules for hydraulic systems.
This system is designed chiefly for controlling low-volume consumers and for pressure/force resistance tasks.

Different function modules can be flanged to the base module.
The sequence of modules depends on the control task, as does the fitting of pressure, flow control, shut-off and directional valves. Additional modules such as pressure switches, pressure gauges and accumulators can also be incorporated.
An end module completes the block.

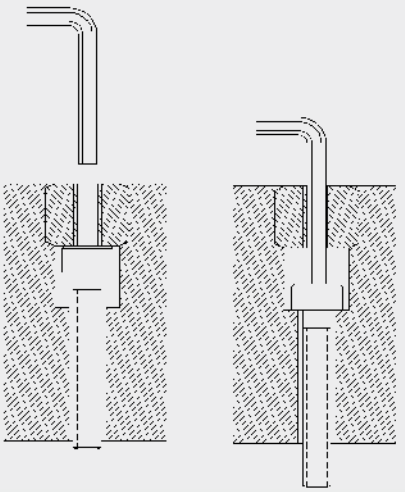
The ML valve stacking system can be built onto HYDAC CA, CO1, DC1 and HP power units using different base modules.
Similarly, the valve stacking system can be built onto any hydraulic system by using a module for inline mounting.
The system offers individual possibilities for very simple expansion and exchange.

This modular system ensures:

- **A high level of flexibility for both designers and builders**
- **Individual solutions for control problems**
- **Small dimensions combined with high performance**
- **No leakage thanks to short, robust connections**
- **Valve stack can be extended at a later date by adding modules**
- **Cost-effective control due to volume production**



Bolt connection
Module to module



1.2 FUNCTION

Oil is supplied to the valves in the modules through the pressure and return line in the centre of all modules. It is possible to separate the functions of consumers which are arranged in parallel by using check valves and special modules. Built-on pressure switches enable simple control of the pump and pressure monitoring, also on the consumer.

Leakage-free directional poppet valves provide secure positioning of the consumer and maintain pressures over a longer time without repeated oil supply. Through the use of appropriate modules, the pressure in the central pressure line can also be shut-off or altered.

1.3 APPLICATIONS

In conjunction with power units, valve stacking systems type ML can be used as ready-to-install oil supply units. Particularly compact systems can be built in combination with HYDAC Fluidtechnik HP, CA, DC and CO power units.

Valve stacking systems are used mainly in the following areas:

- Hydraulic clamping systems
- Machine tool engineering
- Press manufacture
- Fixture construction
- Loaders and feeders
- Auxiliary drives
- Mobile hydraulics
- Customized and other applications ...

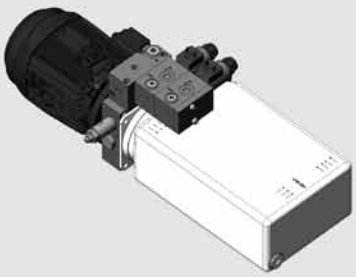
1.4 BASIC SETUP

Base module + Function modules + End module

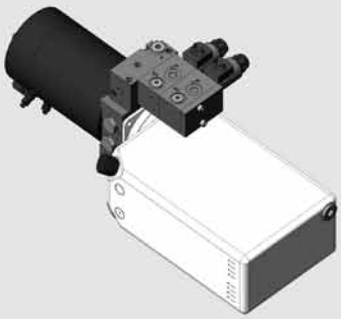
Technical benefits:

- Mounting bolts (captive) and sealing elements incorporated in the module
- Robust control stack possible through the use of short mounting bolts
- Easy to extend at a later date
- Housing and valves zinc-plated
- Compact design

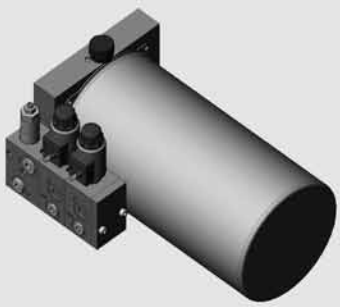
CO1



DC1



CA



HP

1.5 CONNECTION OF BASE MODULES TO POWER UNITS

This overview shows the HYDAC compact power units to which the ML valve stacking system can be mounted.
Depending on the power unit and base module selected, adapters may be required.
In Section 3.1 "BASE MODULES", the types of power unit possible and the adapters required are indicated for each base module.
Further technical information on the power units is given in the relevant brochures.

CO1 3-Phase Compact Power Unit up to 250 bar, up to 20 l/min
(For further technical information, see brochure on CO1, Brochure No. E 5.306)

DC1 DC Power Unit 12 V/24 V up to 250 bar, up to 18.4 l/min
(For further technical information, see brochure on DC1, Brochure No. E 5.307)

CA 3-Phase Compact Power Unit (oil-immersed motor) up to 250 bar, up to 20 l/min
(For further technical information, see brochure on CA, Brochure No. E 5.305)

HP High Pressure Power Unit up to 500 bar, up to 5.25 l/min
Important: When used in combination with ML, max. permitted pressure is 350 bar
(For further technical information, see brochure on HP, Brochure No. E 5.301)

1.6 MODEL CODE

ML + G24-Z4 + B1/20X + ML-GMS 210 CE + ML-BM + ML-ERZZ + ML-CR + ML-EM

- Valve stacking system ML
- Electrical voltage, see Section 4.1
- Adapter B1/20X, see Section 4.3 Accessories, or Brochure on CO1, No.: E 5.306
- Base module
- 1st function module
- 2nd function module
- 3rd function module
- End module

2. TECHNICAL SPECIFICATIONS

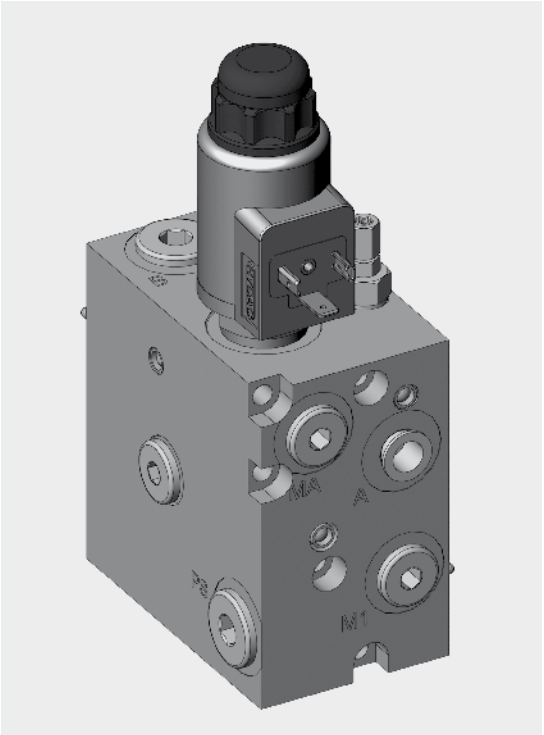
Design:	Valve stacking system
Type of mounting:	M6 hexagon bolt (when stack is approx. 500 mm or above in length, use mounting plate for additional support)
Dimensions:	For dimensions and weight, see individual modules
Ambient temperature range:	min. –20 °C to max. +40 °C
Installation:	No orientation restrictions
Direction of flow:	According to symbol, only permitted in direction of arrow.

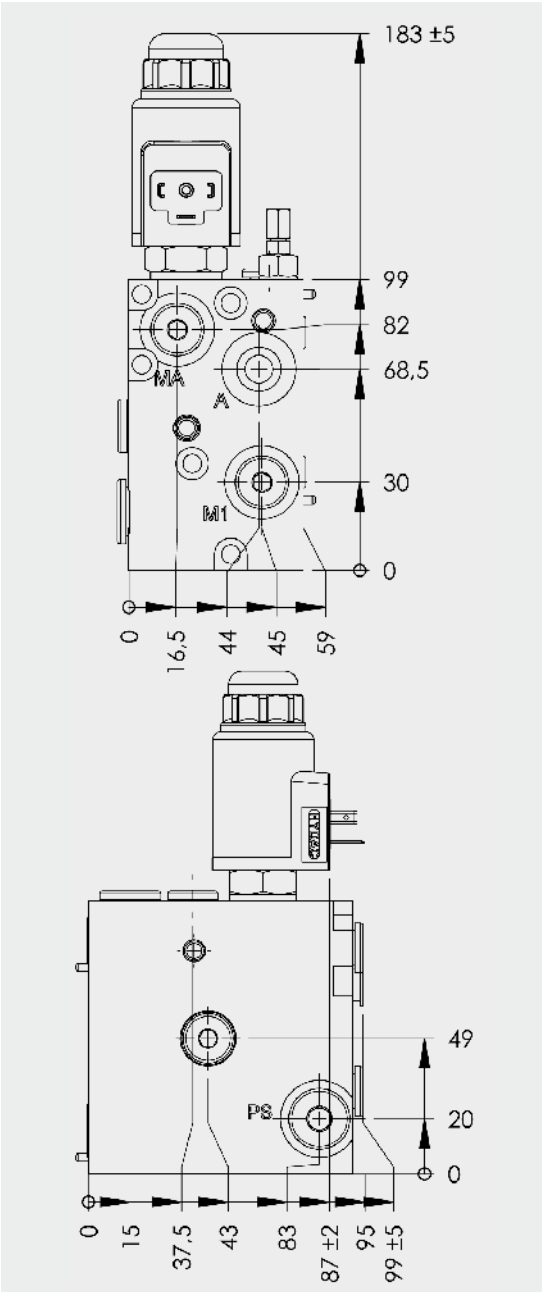
Hydraulic specifications

Nominal pressure:	PN = 350 bar Q_{max} = 12 l/min for consumer port G¼”
Flow rate:	Q_{max} = 20 l/min for consumer ports G⅜” Pressure-related performance limits of the individual components must be taken into account!
Operating fluid:	Hydraulic oil to DIN 51 524, Part 1 and 2
Temperature range of operating fluid:	min. –20 °C to max. +80 °C
Viscosity range:	Min. 10 mm²/s to max. 380 mm²/s
Filtration:	Min. cleanliness level of the operating fluid: ISO 4406 – class 21/19/16 or cleaner We therefore recommend a filter with a minimum retention rate of β20 ≥ 100 (The fitting of filters and regular replacement of filter elements guarantees correct function, reduces wear and tear and extends the service life)

Electrical details

Type of actuation:	Solenoid-operated by means of pressure-tight wet-pin single-stroke solenoids to VDE 0580
Coil voltage:	DC solenoid, AC voltage is rectified using a bridge rectifier built into the coil
Nominal voltage UN:	24 V DC or 230 V AC, other voltages on request
Voltage tolerance:	+/- 15%
Power consumption:	p20 = 18 – 26 W
Duty:	100 % = continuous
Protection class:	Protection class IP 65 to DIN 40050 (if fitted correctly)
Switching frequency:	3,600 per hour





All dimensions are subject to technical modifications.

3. MODULES

3.1 BASE MODULES

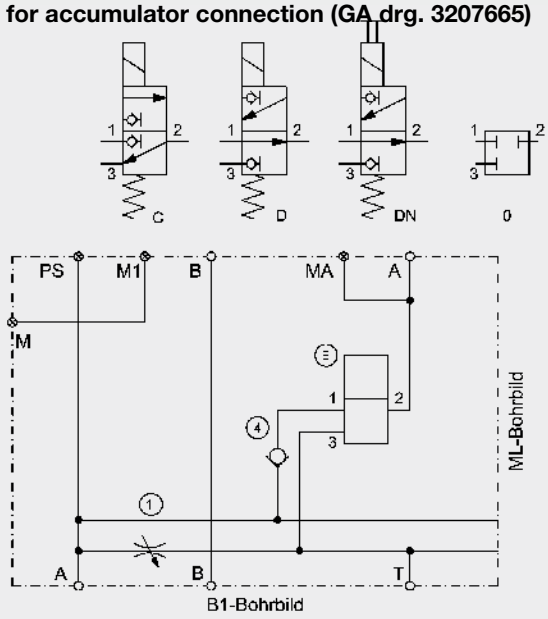
3.1.1 Base module with interface B1

CO1 Suitable for CO1 power unit without adapter

DC1 Suitable for DC1 power unit without adapter

B1 / GML Base module

for accumulator connection (GA drg. 3207665)



Base module for mounting an accumulator with manually-operated pressure release and a 3/2 directional poppet valve to control, for example, a single-acting cylinder.
Protection via a pressure relief valve (CE) required separately.
May be extended using ML function modules or end modules.

P_{max}	250 bar
Q_{max}	12 l/min
Interface	B1 / ML
Weight	approx. 4.4 kg
Ports	A, MA, M1 = G1/4'' B, PS = 3/8''

Model code

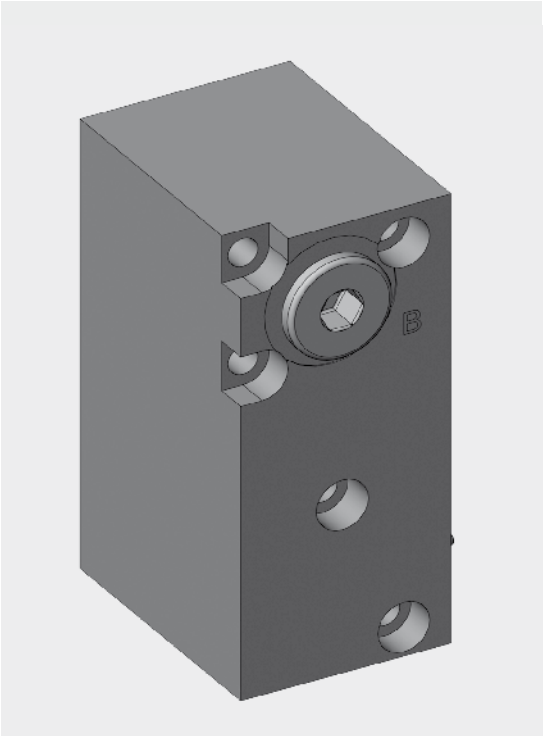
③ ④
B1 / GML – C R – XXX

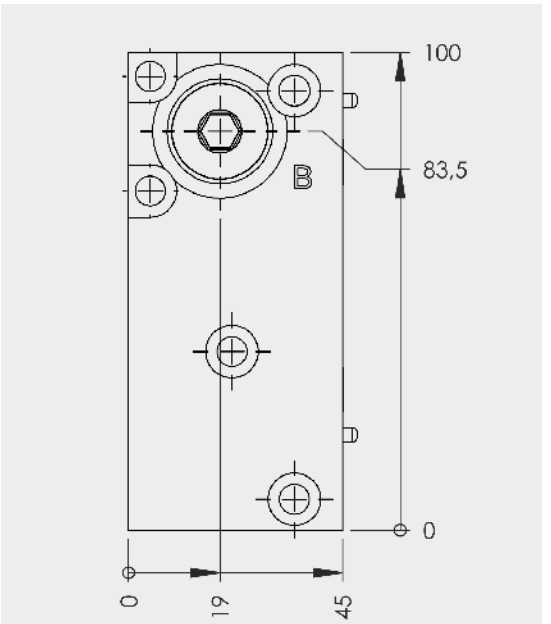
Basic model
B1/GML = Base module

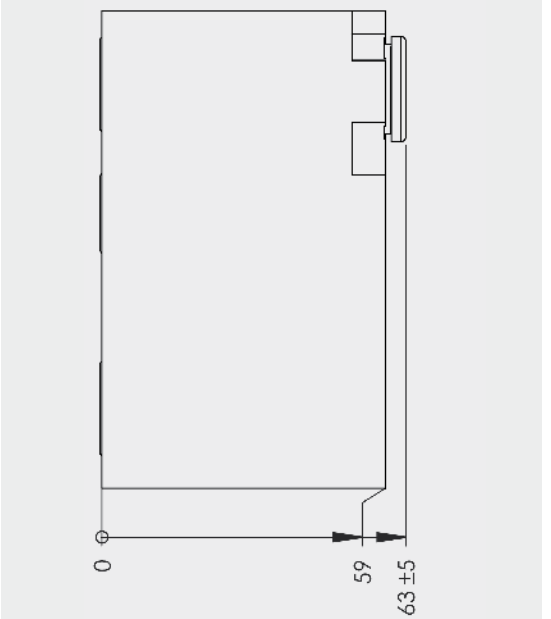
Directional valves
C = WSM08130C
D = WSM08130D
DN = WSM08130D-01M with manual override
0 = with blanking plug instead of directional valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, accumulator, etc. (supplied loose) see Section 4
without details = no accessories







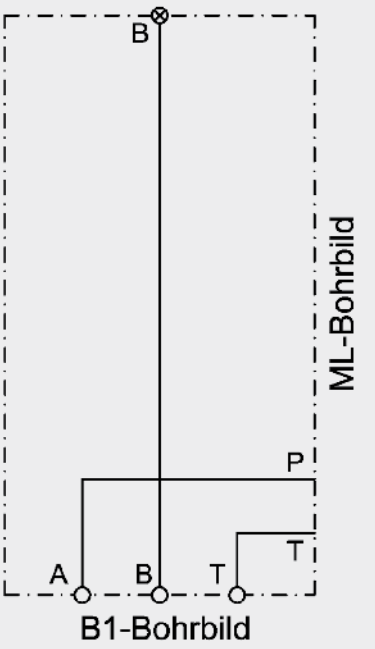
All dimensions are subject to technical modifications.

3.1.1 Base module with interface B1

CO1 Suitable for CO1 power unit without adapter

DC1 Suitable for DC1 power unit without adapter

B1 / ML Base module without valve (GA drg. 3243460)



Base module without additional functionality for extending, with ML function modules.
May also be extended using end modules.

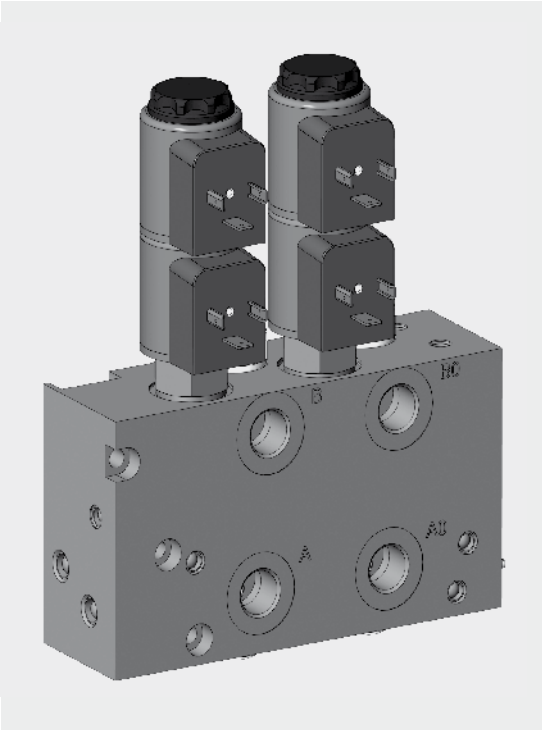
P_{max}	250 bar
Q_{max}	20 l/min
Interface	B1 / ML
Weight	approx. 2.0 kg
Ports	B = G⅜''

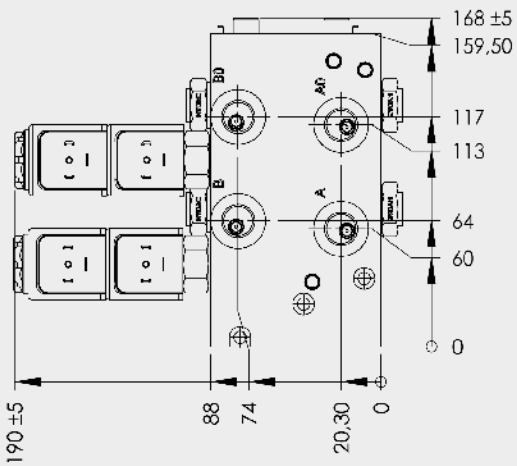
Model code

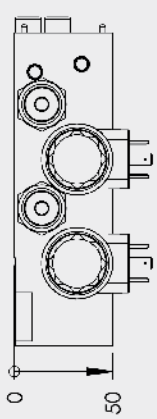
B1 / ML – XXX

Basic model
B1/ML = Base module

Accessories
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
without details = no accessories







All dimensions are subject to technical modifications.

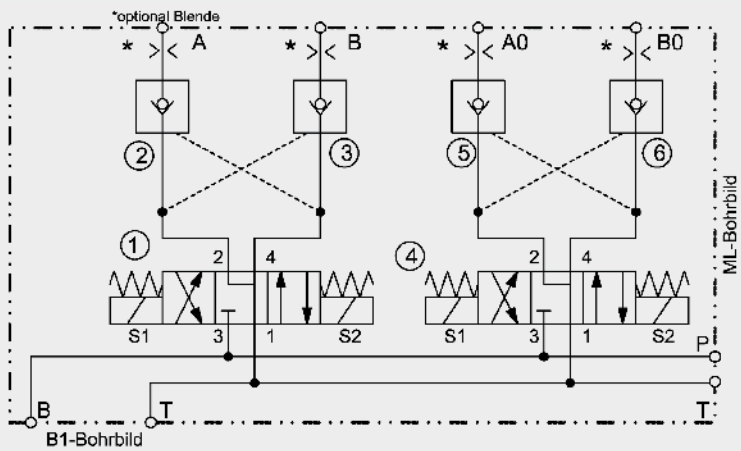
3.1.1 Base module with interface B1

CO1 Suitable for CO1 power unit without adapter

DC1 Suitable for DC1 power unit without adapter

B1 / ML 2xSC Base module

with two 4/3 Directional spool valves (GA drg. 3398242)



Base module to actuate two double-acting cylinders
with pilot-operated non-return function.
An orifice for determining the travel speed is possible.
May be extended using ML function modules or end modules.

P_{max}	250 bar	
Q_{max}	20 l/min	
Control ratio 2.8:1		
Interface	B1 / ML	
Weight	approx. 6 kg	
Ports	A, B, A0, B0 = G⅜''	
$\Delta p/Q_{max}$	25 bar P → A0	17 bar B → T
$\Delta p/Q_{max}$	27 bar P → B0	18 bar B0 → T

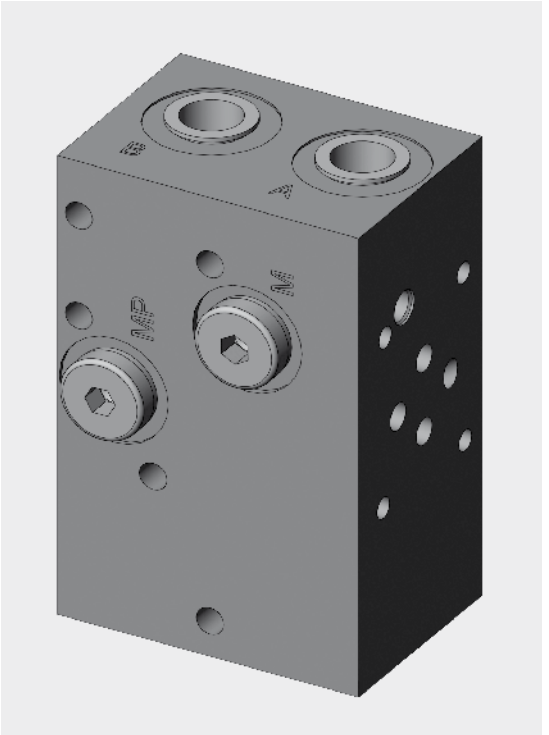
Model code

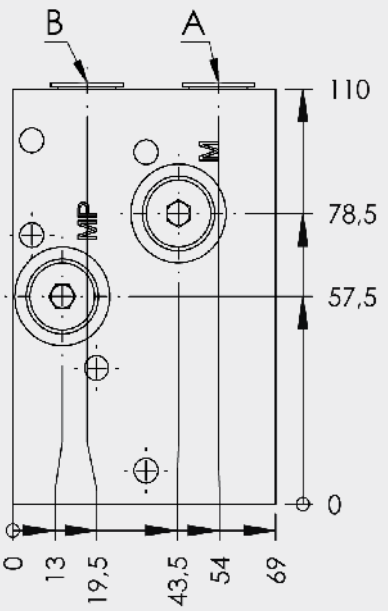
B1 / ML-2xSC – B0.6 – XXX

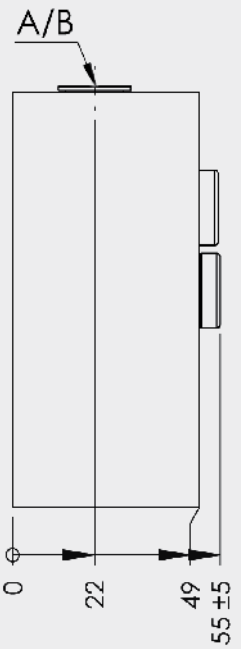
Basic model
B1/ML-2xSC = Base module

Orifice
no details = without orifices
B0.6 = orifices in A, A0 and B, B0
(available in sizes from 0.6 to 4.0)

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc.
(supplied loose) see Section 4
no details = without accessories







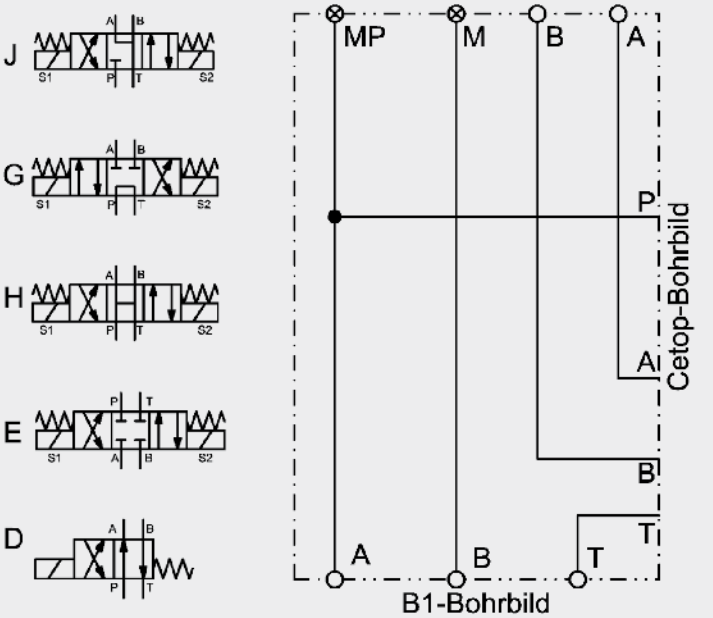
All dimensions are subject to technical modifications.

3.1.1 Base module with interface B1

CO1 Suitable for CO1 power unit without adapter

DC1 Suitable for DC1 power unit without adapter

B1/ A6 Base module for a directional spool valve with DIN interface (GA drg. 3191873)



Base module for mounting a spool valve with DIN interface
to actuate a double-acting cylinder.
May be extended using extension module 3A6 with DIN interface.

P_{max}	250 bar
Q_{max}	20 l/min
Interface	B1 / ML
Weight	approx. 2.8 kg
Ports	M, MP = G¼" A, B = G⅜"

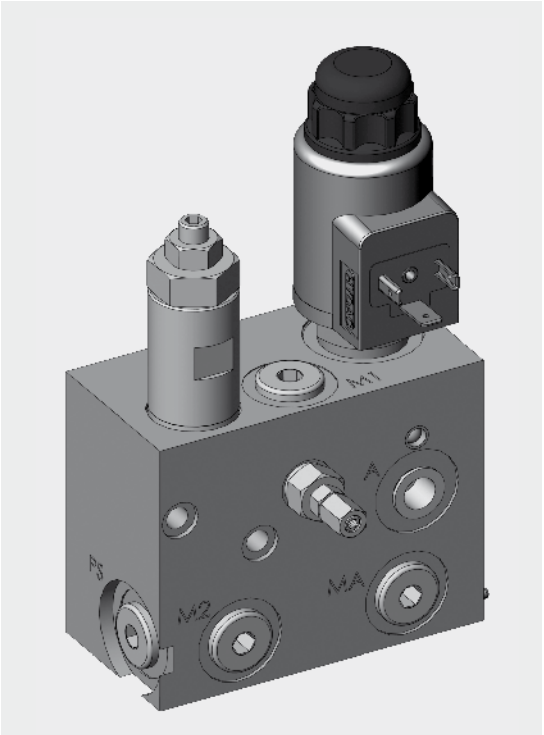
Model code

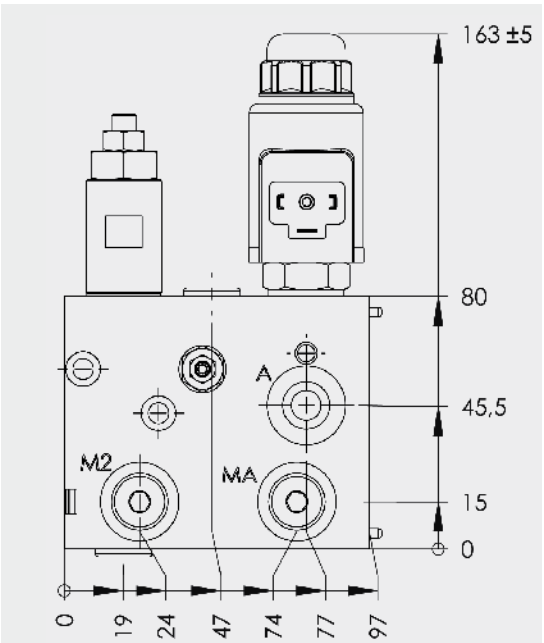
B1 / A6 – J – XXX

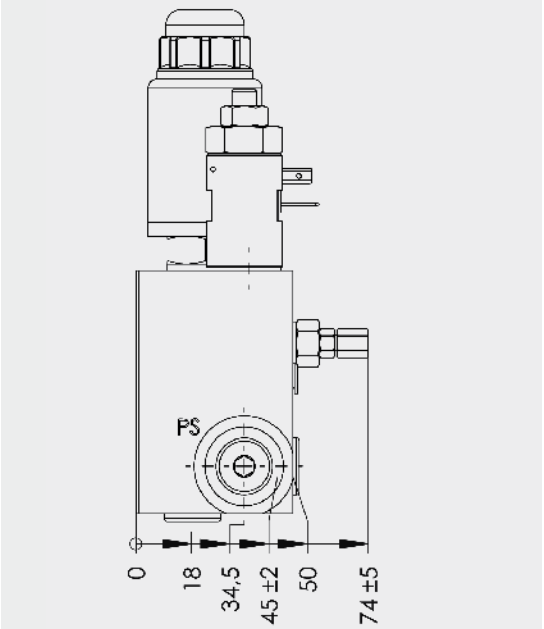
Basic model
B1/A6 (adapter plate with interface A6)

Design of spool valve
J = Spool valve symbol J
(D, J, G, H, E symbols available)
no details = without spool valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc.
(supplied loose) see Section 4
no details = without accessories







All dimensions are subject to technical modifications.

3.1.2 Base modules with interface 20X

CO1 Suitable for CO1 power unit with adapter block B1 / 20X (GA drg. 3243461)

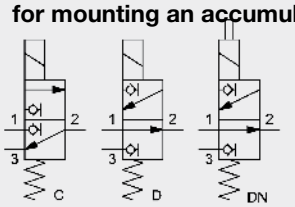
DC1 Suitable for DC1 power unit with adapter block B1 / 20X (GA drg. 3243461)

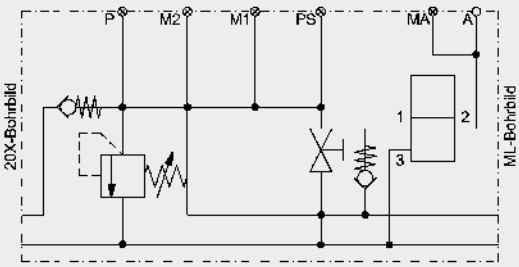
CA Suitable for CA power unit without adapter

HP Suitable for HP power unit with sandwich plate HP 9.5 mm (Part No. 3114749)

ML Base module

for mounting an accumulator (GA drg. 3090671)





Base module for mounting an accumulator protected by a pressure relief valve (CE), with manually-operated pressure release and a 3/2 directional poppet valve to control, for example, a single-acting cylinder.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	20X / ML
Weight	approx. 4.4 kg
Ports	A, M1, M2, MA, P, PS = G¼''
$\Delta p/Q_{max}$	15 bar P → A

Model code

ML – 210CE – C R – XXX

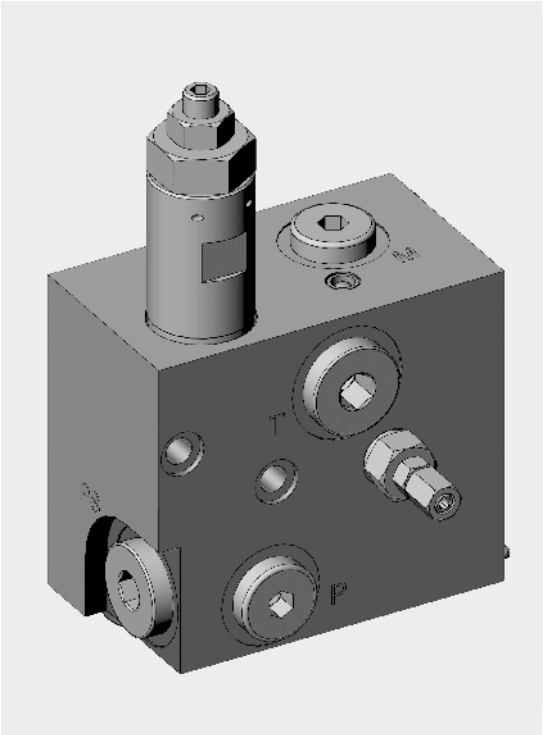
Basic model
ML = Base module

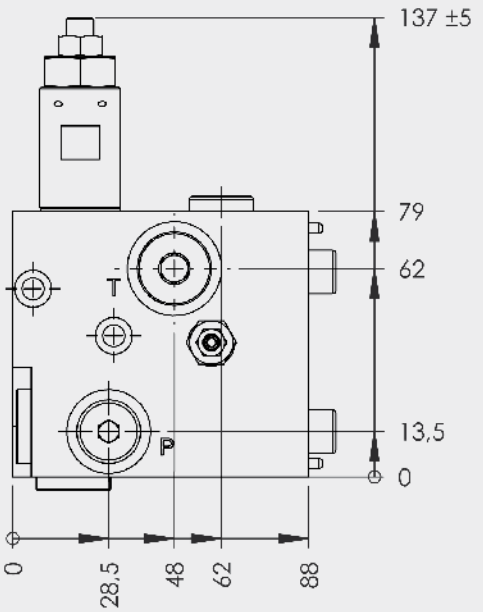
Pressure relief valve
Setting range:
100 V = 100 bar (adjustable)
250 V = 250 bar (adjustable)
350 V = 350 bar (adjustable)
210 CE = 210 bar with CE mark

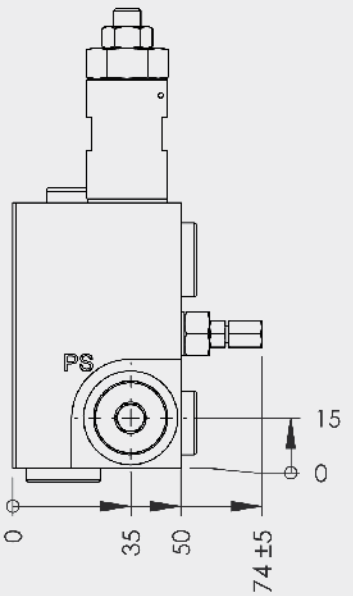
Directional valves
C = WSM08130C
D = WSM08130D
DN = WSM08130D-01M with manual override
0 = with blanking plug instead of directional valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories







All dimensions are subject to technical modifications.

3.1.2 Base modules with interface 20X

CO1 Suitable for CO1 power unit with adapter block B1 / 20X (GA drg. 3243461)

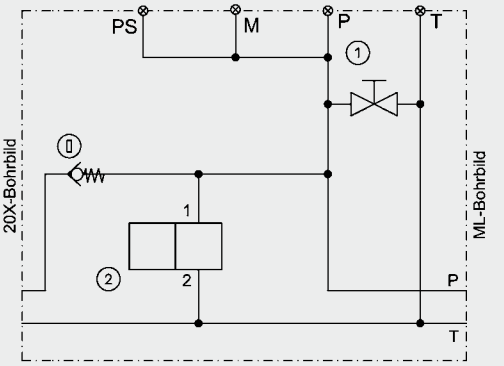
DC1 Suitable for DC1 power unit with adapter block B1 / 20X (GA drg. 3243461)

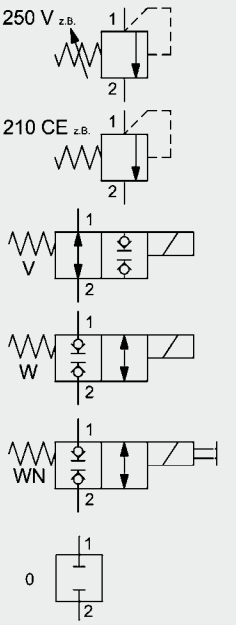
CA Suitable for CA power unit without adapter

HP Suitable for HP power unit with sandwich plate HP 9.5 mm (Part No. 3114749)

ML-GMS Base module

for mounting an accumulator (GA drg. 3227906)





Base module for mounting an accumulator protected by a pressure relief valve (CE), with manually-operated pressure release valve.

May be extended using ML function modules or end modules.

P_{max}	350 bar		
Q_{max}	12 l/min		
Interface	20X / ML		
Weight	approx. 2.8 kg		
Ports	P, M = G¼''	T, PS = G⅜''	
$\Delta p/Q_{max}$	2 bar T1 → T	6 bar P → PS	6 bar P → P1

Model code

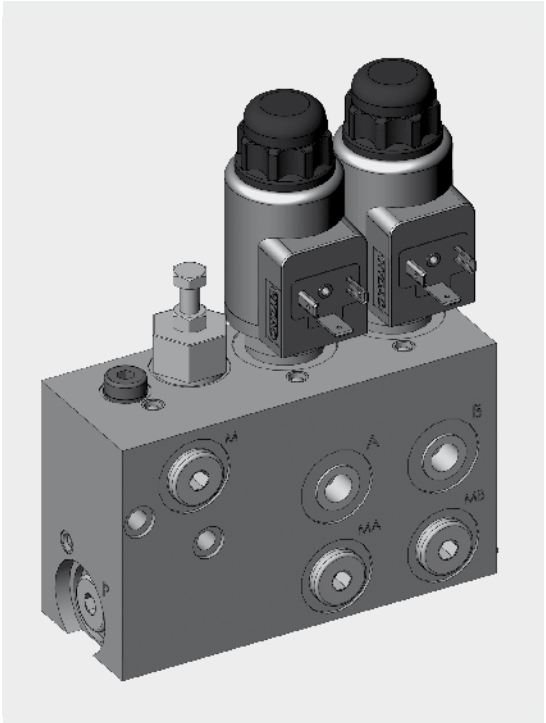
② **ML-GMS – 210CE – XXX**

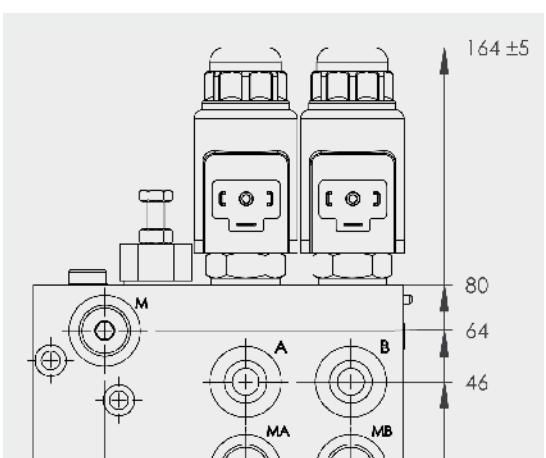
Basic model
ML-GMS = Base module

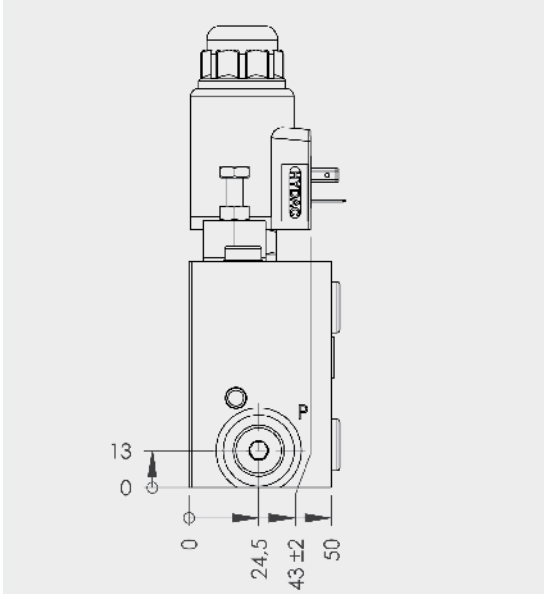
Pressure relief valve or directional valve

100 V	= 100 bar (adjustable)
250 V	= 250 bar (adjustable)
350 V	= 350 bar (adjustable)
210 CE	= 210 bar CE pressure relief valve
V	= WSM06020V
W	= WSM06020W
WN	= WSM06020W-01M with manual override
0	= with blanking plug instead of valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories







All dimensions are subject to technical modifications.

3.1.2 Base modules with interface 20X

CO1 Suitable for CO1 power unit with adapter block B1 / 20X (GA drg. 3243461)

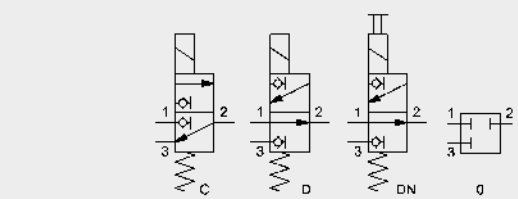
DC1 Suitable for DC1 power unit with adapter block B1 / 20X (GA drg. 3243461)

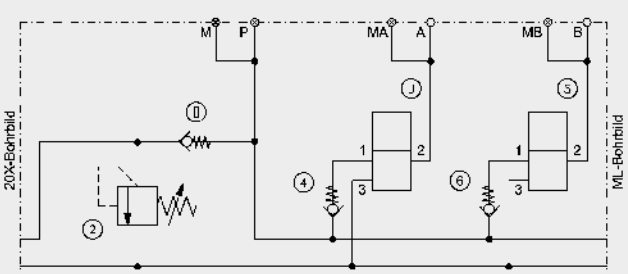
CA Suitable for CA power unit without adapter

HP Suitable for HP power unit with sandwich plate HP 9.5 mm (Part No. 3114749)

ML-2BR Base module

with two 3/2 directional poppet valves (GA drg. 3088420)





Base module with pressure relief valve and check valve.
With two 3/2 directional poppet valves to control, for example, two single-acting clamping cylinders.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	20X / ML
Weight	approx. 3.5 kg
Ports	A, B, M, P, MA, MB = G¼"

Model code

② ③④ ⑤⑥

ML-2BR – 250V – C R C R – XXX

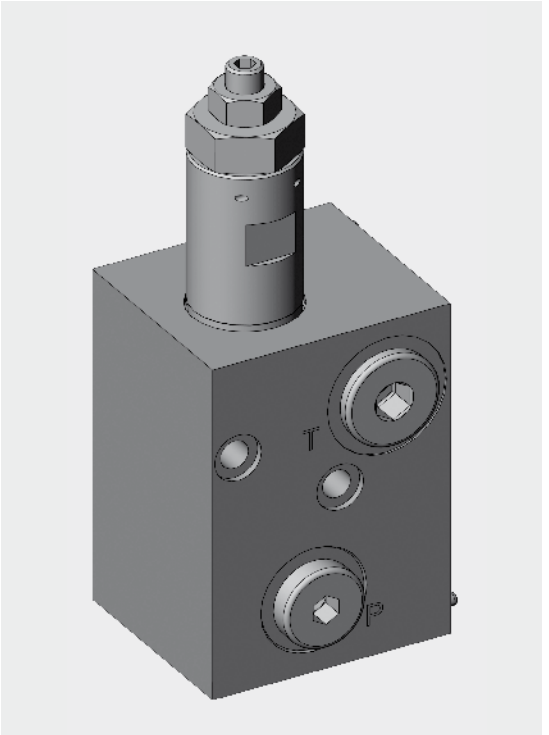
Basic model
ML-2BR = Base module

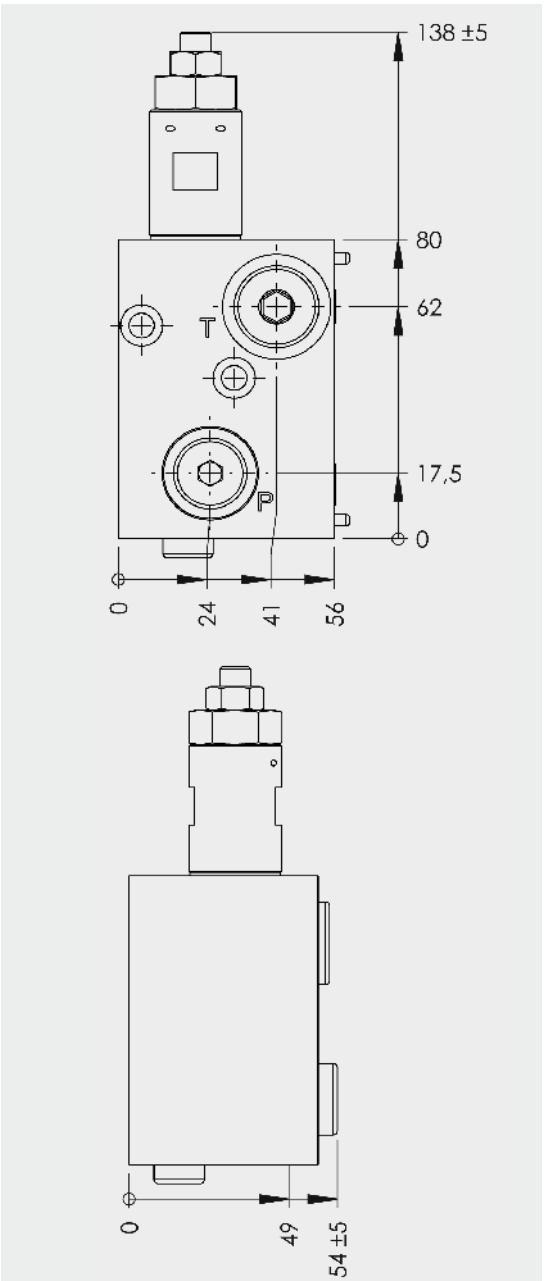
Pressure relief valve
Setting range: 100 V = 100 bar (adjustable)
250 V = 250 bar (adjustable)
350 V = 350 bar (adjustable)

Directional valves
C = WSM08130C
D = WSM08130D
DN = WSM08130D-01M with manual override
0 = with blanking plug instead of directional valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories





All dimensions are subject to technical modifications.

3.1.2 Base modules with interface 20X

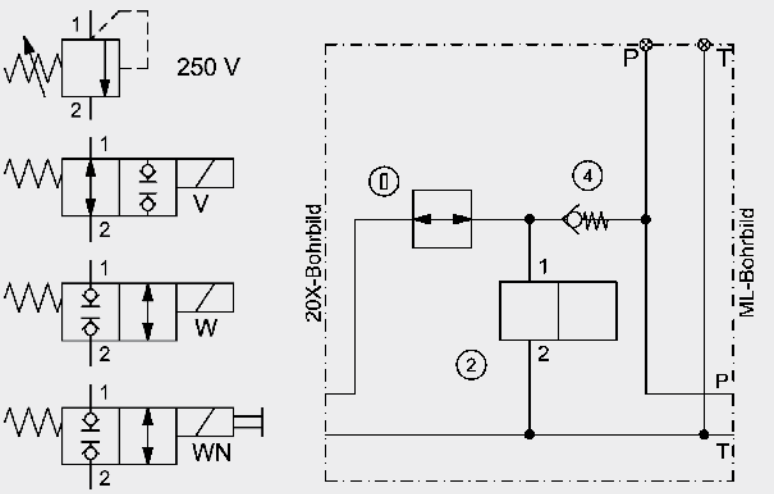
CO1 Suitable for CO1 power unit with adapter block B1 / 20X (GA drg. 3243461)

DC1 Suitable for DC1 power unit with adapter block B1 / 20X (GA drg. 3243461)

CA Suitable for CA power unit without adapter

HP Suitable for HP power unit with sandwich plate HP 9.5 mm (Part No. 3114749)

ML-2RV Base module with check valve
2 positions selectable (GA drg. 3126482)



Base module for pressure relief where the position of the check valve can be selected (before or after the pressure relief valve).
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	20X / ML
Weight	approx. 1.8 kg
Ports	P = G¼'' T = G⅜''

Model code

ML-2RV R 100V – R – XXX

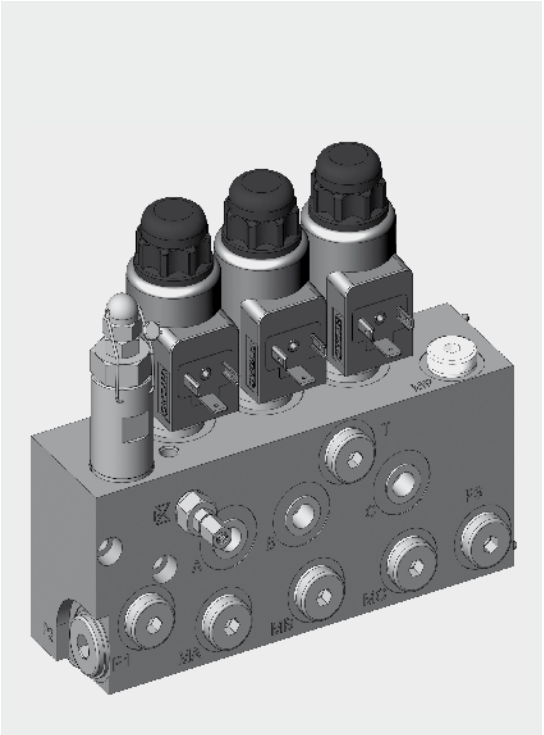
Basic model
ML-2RV = Base module with two positions for RV check valve

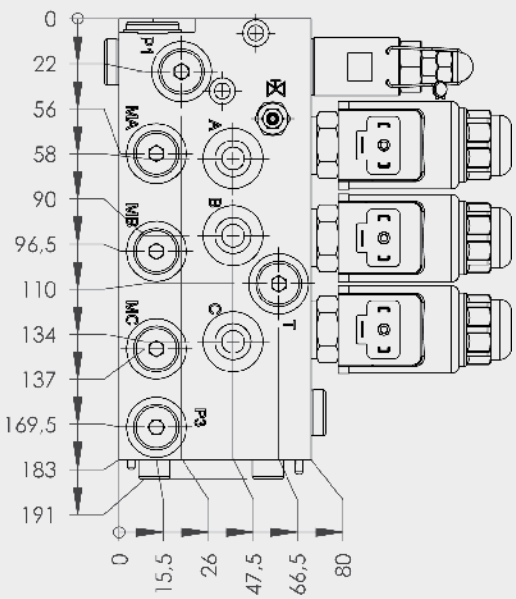
Check valve
no details =without check valve
R =check valve

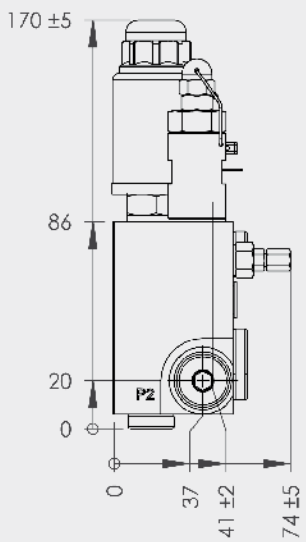
Pressure relief valve or directional valve
100 V = 100 bar (adjustable)
250 V = 250 bar (adjustable)
350 V = 350 bar (adjustable)
210 CE = 210 bar CE pressure relief valve
V = WSM06020V
W = WSM06020W
WN = WSM06020W-01M with manual override
0 = with blanking plug instead of valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories







All dimensions are subject to technical modifications.

3.1.2 Base modules with interface 20X

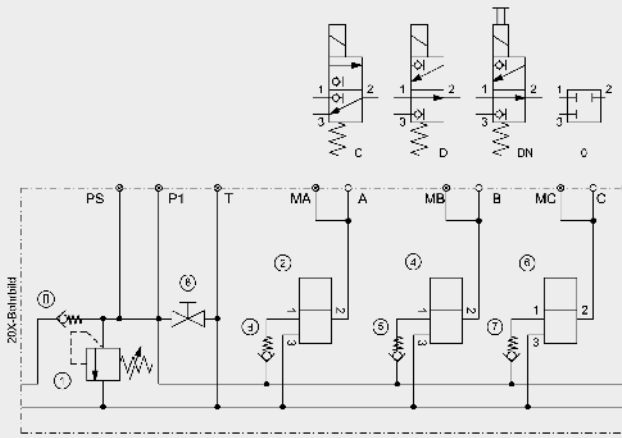
CO1 Suitable for CO1 power unit with adapter block B1 / 20X (GA drg. 3243461)

DC1 Suitable for DC1 power unit with adapter block B1 / 20X (GA drg. 3243461)

CA Suitable for CA power unit without adapter

HP Suitable for HP power unit with sandwich plate HP 9.5 mm (Part No. 3114749)

Flexi-ML Base module with three 3/2 directional valves and accumulator port (GA drg. 3304515)



Base module for mounting an accumulator protected by a pressure relief valve (CE), with manually-operated pressure release valve.
With up to three 3/2 directional poppet valves to control, for example, three single-acting cylinders.
May be extended using ML function modules or end modules.

P_{max}	250 bar
Q_{max}	12 l/min
Interface	20X / ML
Weight	approx. 6.4 kg
Ports	A, MA, B, MB, C, MC, P1, T, MP P3 = G¼" P2 = G⅜"

Model code

⓪ ① ②③ ④⑤ ⑥⑦

Flexi-ML – R / 210CE C R C R C R XXX

Basic model
Flexi-ML = Base module with 3x 3/2 directional valves

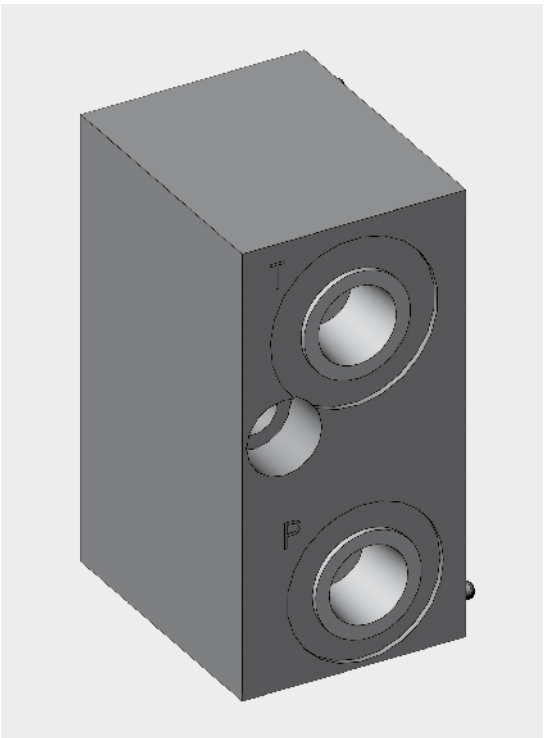
Check valve
no details = without check valve
R = check valve E-R¼

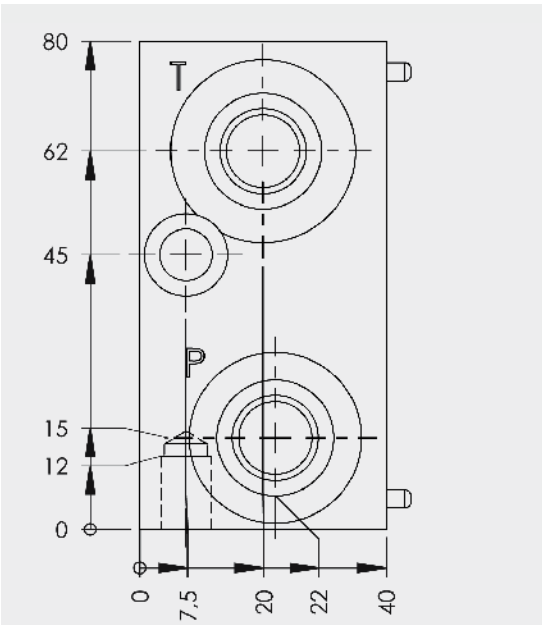
Pressure relief valve
Setting range: 100 V = 100 bar (adjustable)
250 V = 250 bar (adjustable)
350 V = 350 bar (adjustable)
210 CE = 210 bar with CE mark

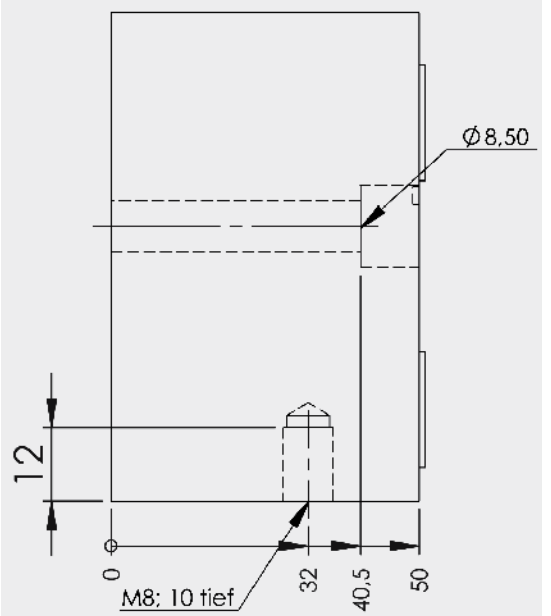
Directional valves
C = WSM08130C
D = WSM08130D
DN = WSM08130D-01M with manual override
0 = with blanking plug instead of valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories





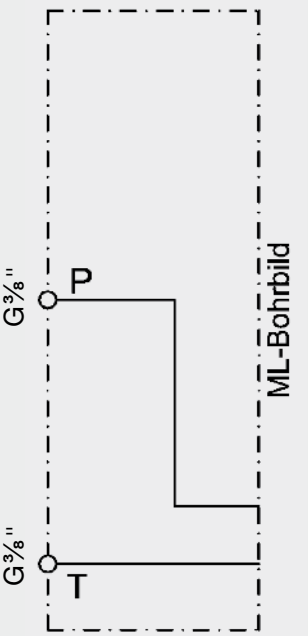


All dimensions are subject to technical modifications.

3.1.3 Base module for inline mounting G⅜”

ML Base module for inline mounting G⅜”
for further mounting of function modules

MRL Base module without valve connection port
(GA drg. 3090673)



Base module for mounting an ML valve stacking system separately.
Has G⅜” inline connection mounting.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	20 l/min
Interface	G⅜'' / ML
Weight	approx. 1.2 kg
Ports	P, T = G⅜''

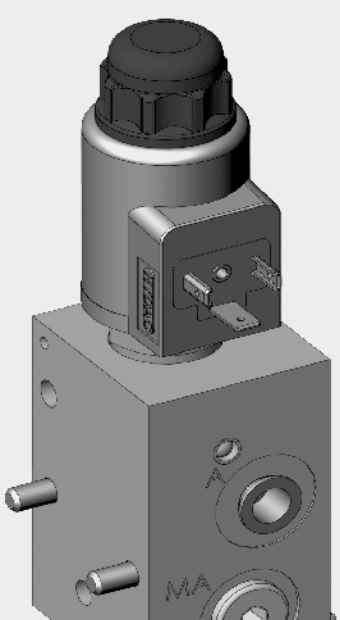
Model code

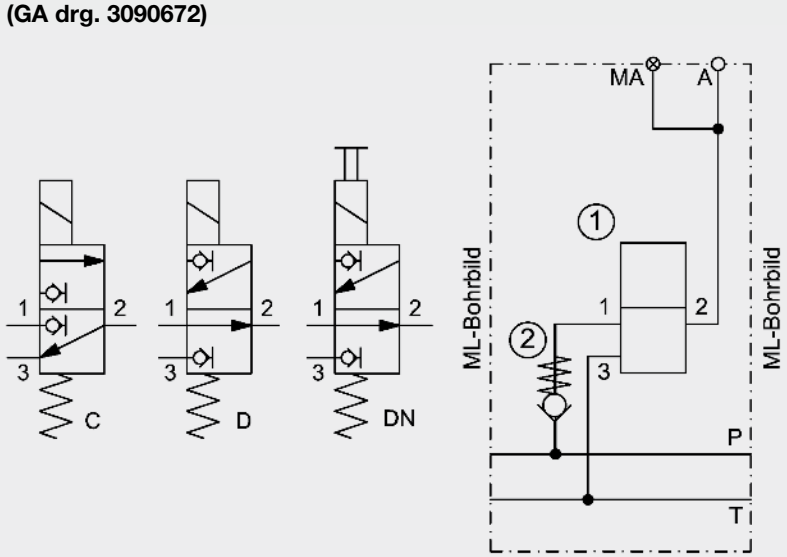
MRL

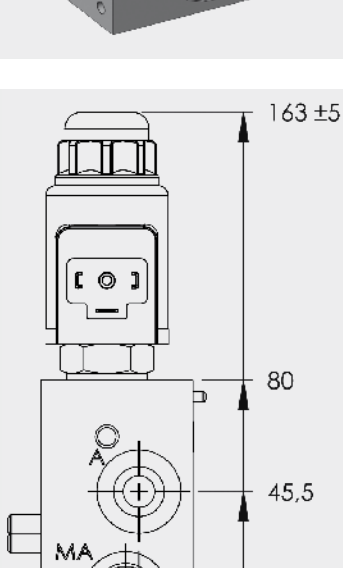
Basic model
MRL = Base module

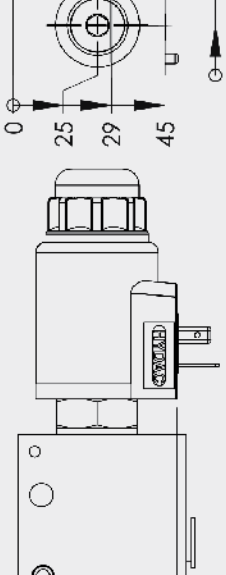
ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-C/D Function module with a 3/2 directional poppet valve (GA drg. 3090672)









All dimensions are subject to technical modifications.

Function module, for example, to control a single-acting cylinder.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	ML / ML
Weight	approx. 1.6 kg
Ports	A, MA = G¼''
$\Delta p/Q_{max}$	15 bar P → A

Model code

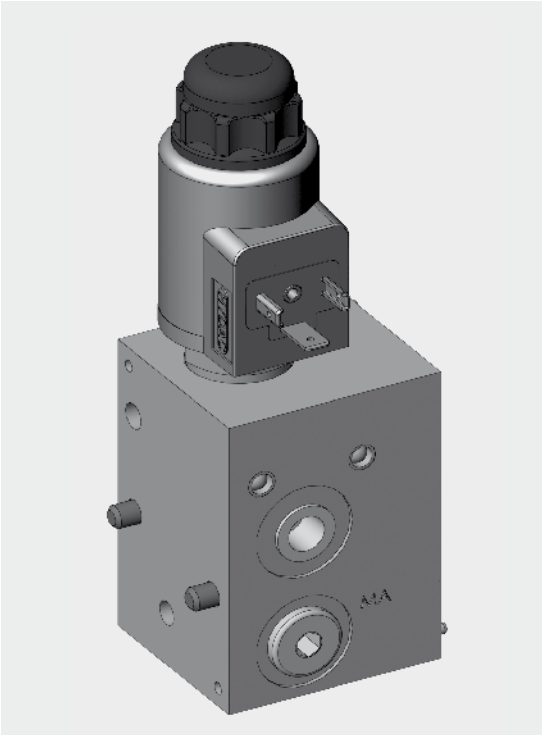
① ② ML – C R – XXX

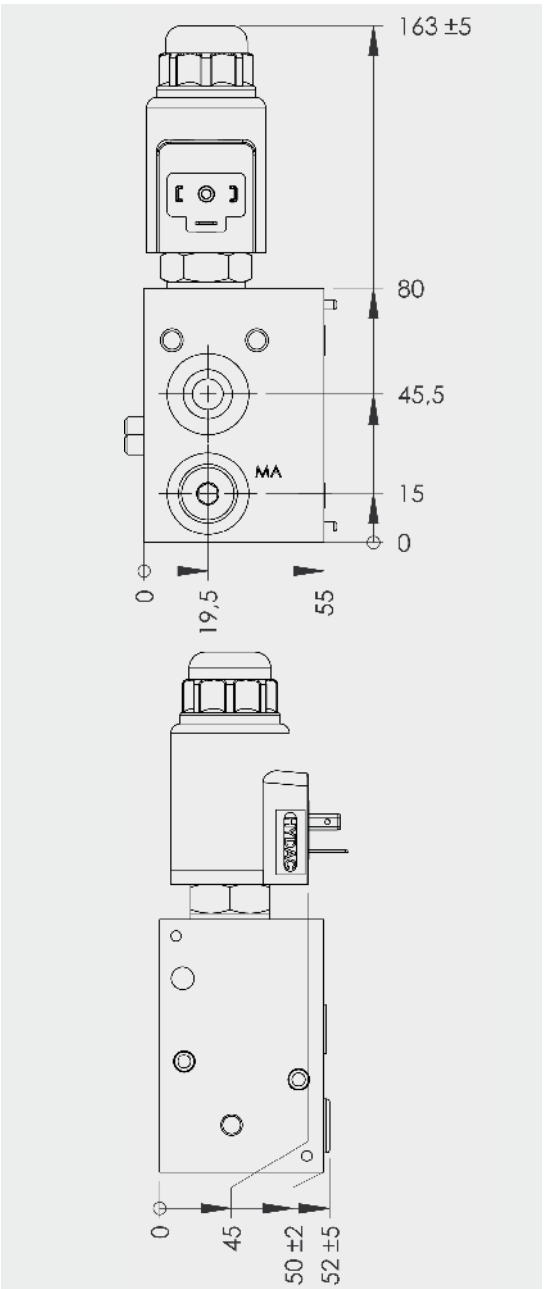
Basic model
ML-C/D

Directional valves
C = WSM08130C
D = WSM08130D
DN = WSM08130D-01M with manual override
0 = with blanking plug instead of valve

Check valve
no details = without check valve
R = check valve R¼

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



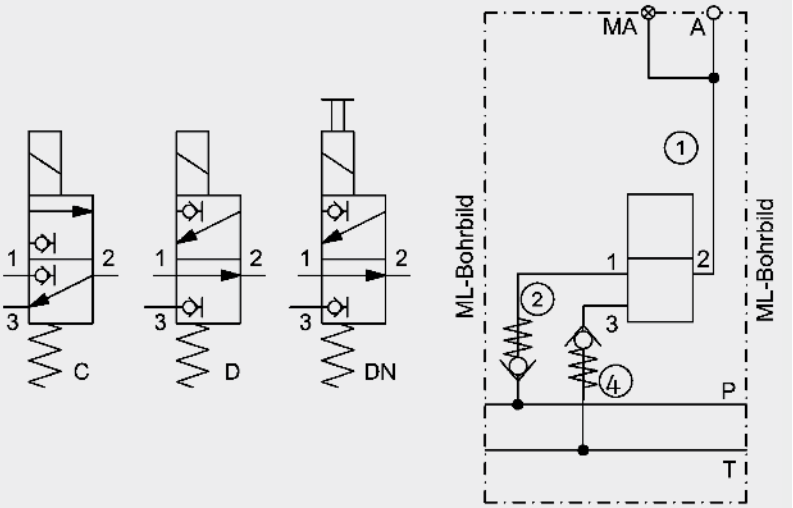


All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-CTR/DTR Function module

with a 3/2 directional poppet valve (GA drg. 3146872)



Function module, for example, to control a single-acting cylinder.
With check valve in the T-line.
This valve prevents draining of the consumer line and prevents back-pressures from reaching the consumer.
May be extended using additional ML function modules or an end module.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	ML / ML
Weight	approx. 1.9 kg
Ports	A, MA = G¼''
$\Delta p/Q_{max}$	15 bar P → A

Model code

① ② ④
ML – C R TR – XXX

Basic model
ML-CTR/DTR

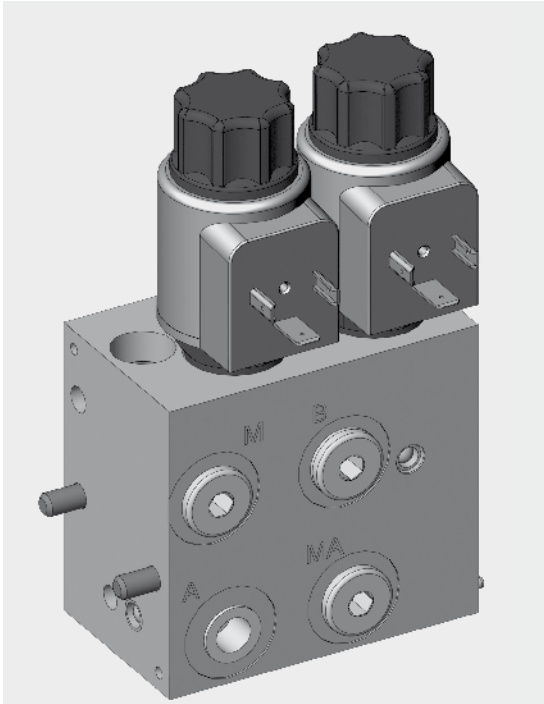
Directional valves

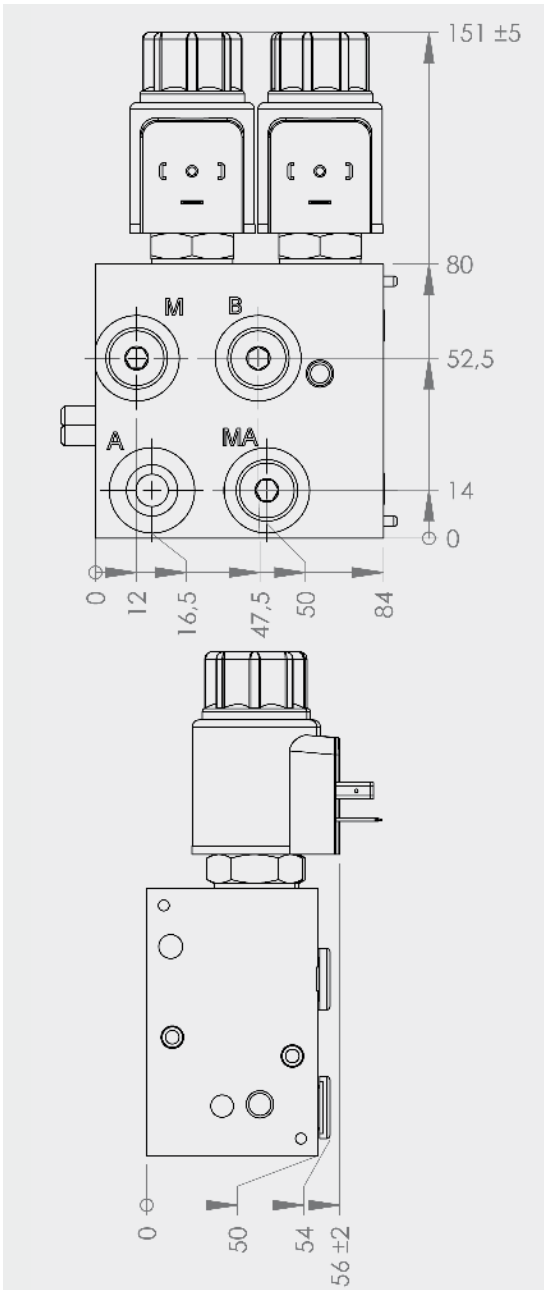
C	= WSM08130C
D	= WSM08130D
DN	= WSM08130D-01M with manual override
0	= with blanking plug instead of valve

Check valve

no details	= without check valve
R	= check valve
TR	= Pre-charge in return line (0.5 bar)

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories

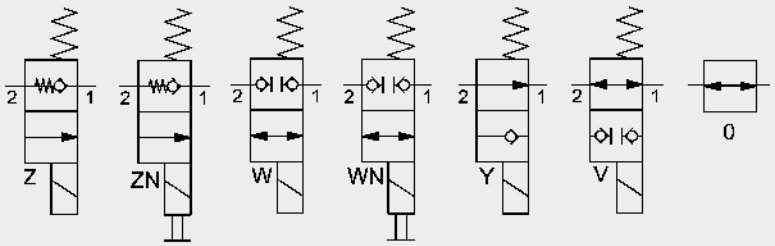


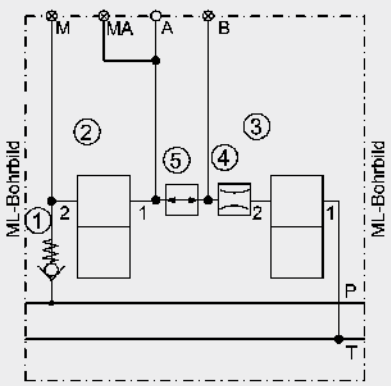


All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-E Function module with two 2/2 directional poppet valve (GA drg. 3101119)





Function module, for example, to control a single-acting cylinder which can be held in any position.
An orifice for determining the travel speed is possible.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	ML / ML
Weight	approx. 3.0 kg
Ports	A, MA, B, M = G¼''
$\Delta p/Q_{max}$	17 bar P → A 7.5 bar A → T 17.5 bar P → B

Model code

①	②	③	④	⑤	
ML-E	R	Z	Y	B0.8	G – XXX

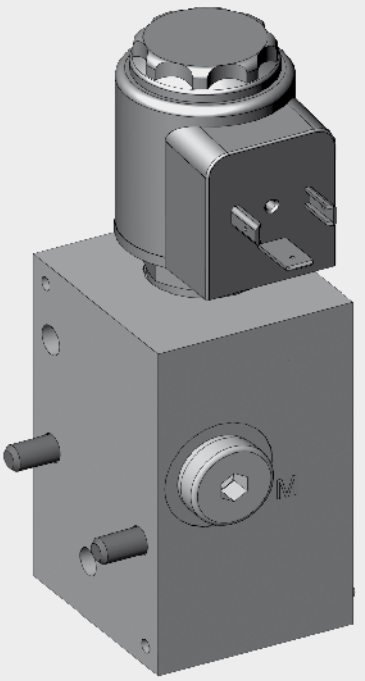
Basic model
ML-E

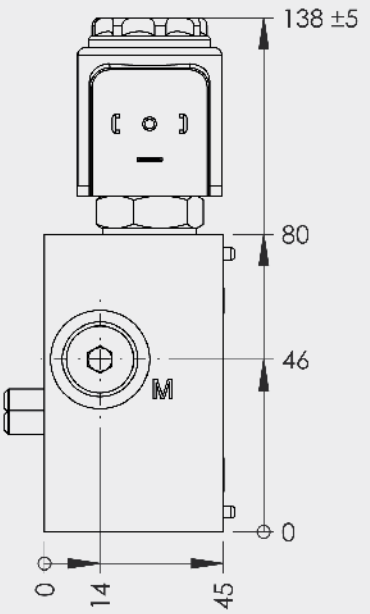
Check valve
no details = without check valve
R = check valve R1/4

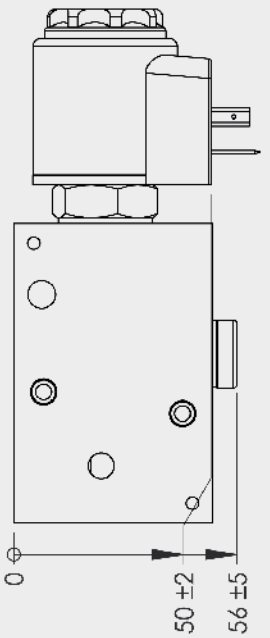
Directional valves
Y = WSM06020Y
W = WSM06020Z
WN = WSM06020Z-01M with manual override
0 = with blanking plug instead of directional valve

Orifice
no details = without orifice
B0.6 = orifice M6 in B ...3.0
(available in sizes 0.6 to 3.0)
G = plugged with threaded pin

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



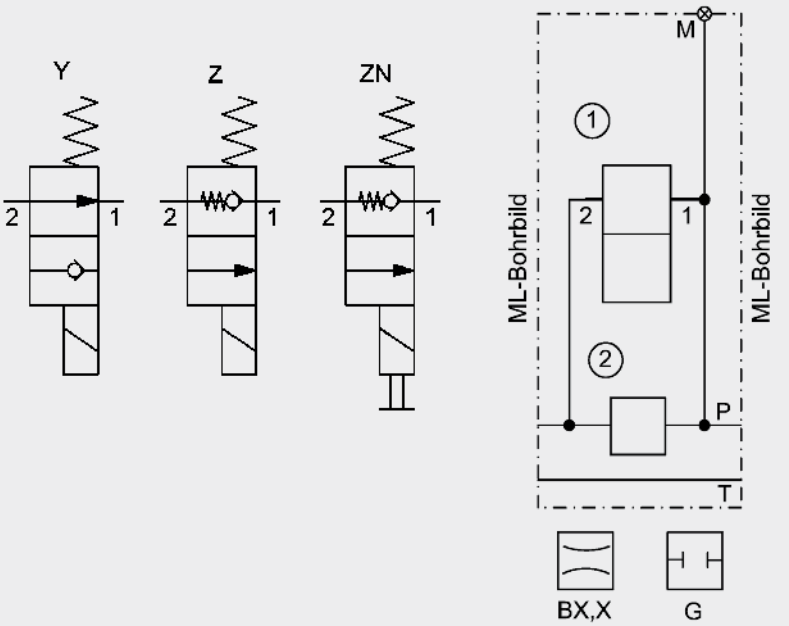




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-P Function module with a 2/2 directional poppet valve (GA drg. 3189815)



Function module for fast/slow speed function.
An orifice for determining travel speed is possible in central pressure line. (Supply speed regulation).
Can also be used to shut off the central pressure line. May be extended using ML function modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface	ML / ML
Weight	approx. 1.7 kg
Ports	M = G¼''

Model code

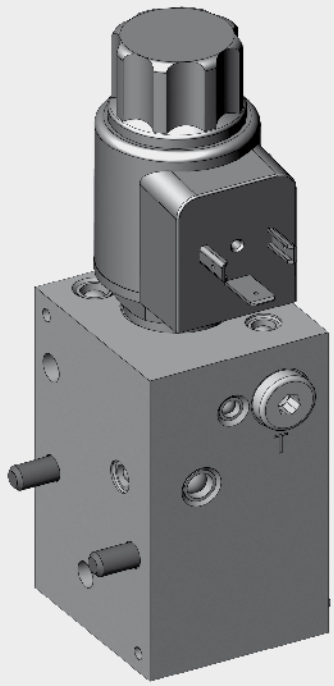
ML-P	Y	–	B0.8	–	XXX
	①		②		

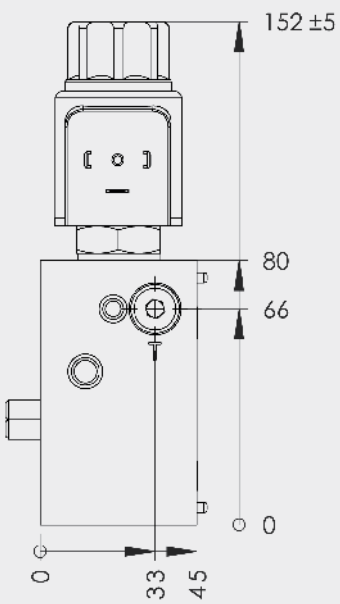
Basic model
ML-P = Function module for central P-line

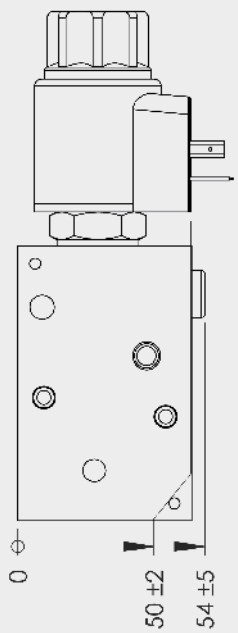
Directional valves
Y = WSM06020Y
W = WSM06020Z
WN = WSM06020Z-01M with manual override
0 = with blanking plug instead of directional valve

Orifice
no details = without orifice
B0.8 = orifice M6 0.8 mm (available in sizes 0.6 to 3.0 mm)
G = plugged with threaded pin

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



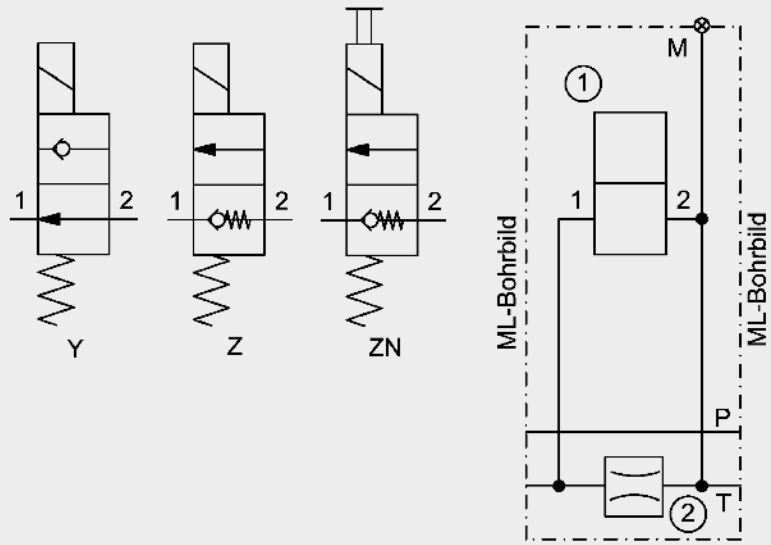




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-T Function module with a 2/2 directional poppet valve (GA drg. 3358267)



Function module for fast/slow speed function.
An orifice for determining travel speed is possible in the central tank line. (Drain speed regulation).
May be extended using ML function modules.

P_{max}	350 bar
Q_{max}	20 l/min
Interface	ML / ML
Weight	approx. 1.7 kg
Ports	T = G⅛"

Model code

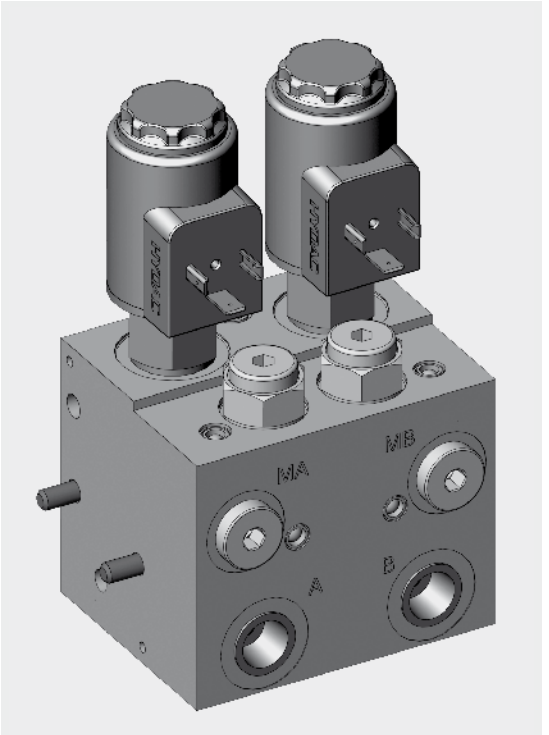
① ②
ML-T Y – B0.8 – XXX

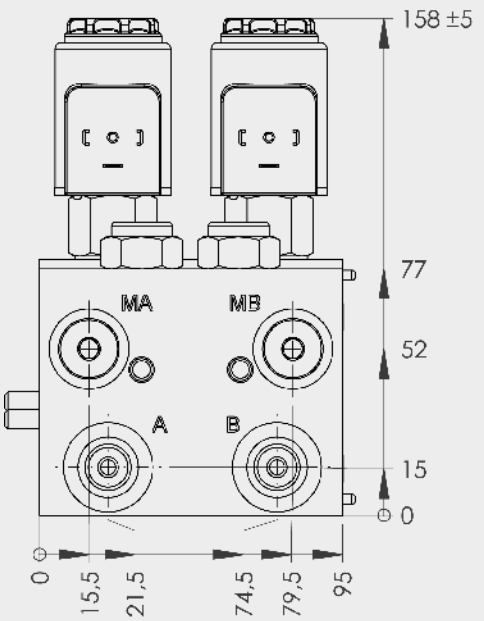
Basic model
ML-P = Function module for central T-line

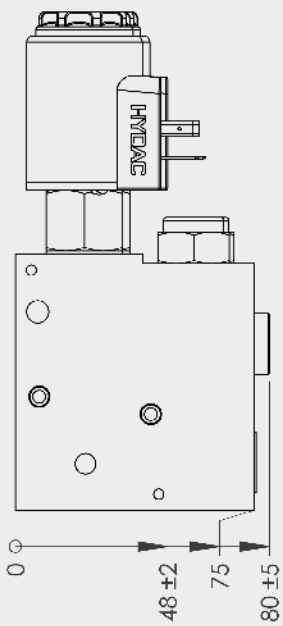
Directional valves
Y = WSM06020Y
W = WSM06020Z
WN = WSM06020Z-01M with manual override
0 = with blanking plug instead of directional valve

Orifice
B0.8 = Orifice M6 0.8 mm (available in sizes 0.6 to 3.0 mm)

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



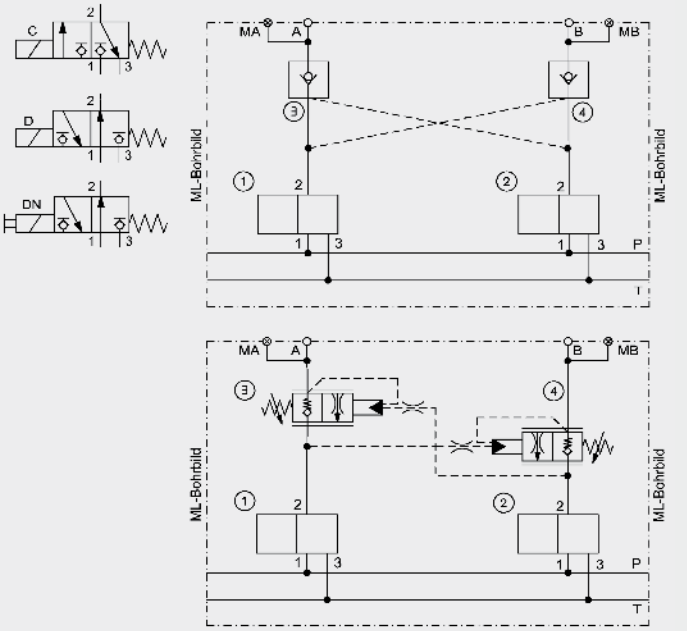




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-K Function module with two 3/2 directional poppet valves (GA drg. 3287660)



Function module, for example, to control a double-acting cylinder.
Includes two pilot-operated check valves to hold the cylinder in any position, leakage-free.
Alternatively with counterbalance valves to prevent overrunning of the load.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	20 l/min
Control ratio	4:1 for appropriate check valves
Interface	ML / ML
Weight	approx. 5.2 kg
Ports	A, B = G⅜'' MA, MB = G¼''
$\Delta p/Q_{max}$	20 bar P → B

Model code

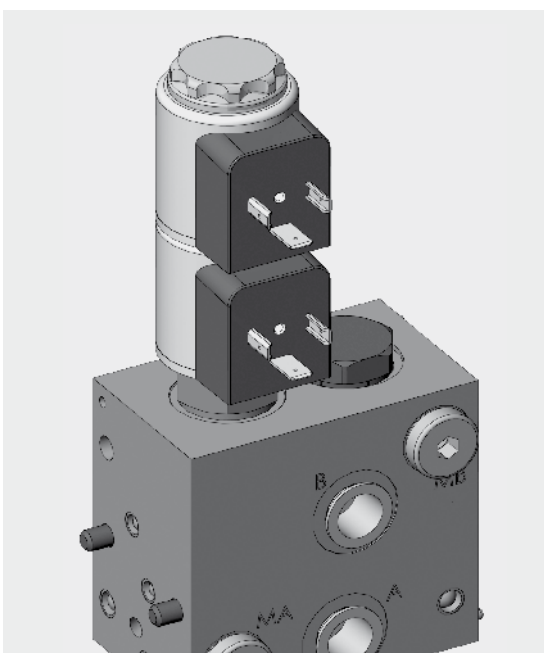
①② ③+④
ML-K C / 2x RP08 – XXX

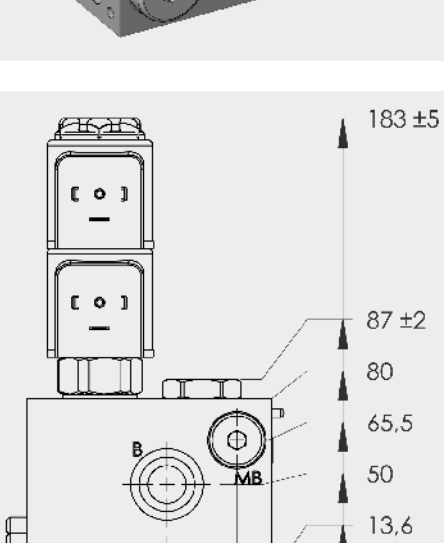
Basic model
ML-K

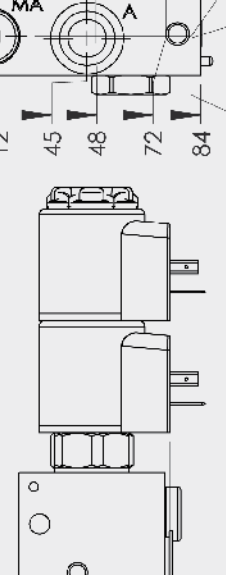
With 2 directional valves
C = WSM08130C (standard no details)
D = WSM08130D

Check valve
2x RP08 = Check valves RP08
2x RS08 = Counterbalance valves RS08

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



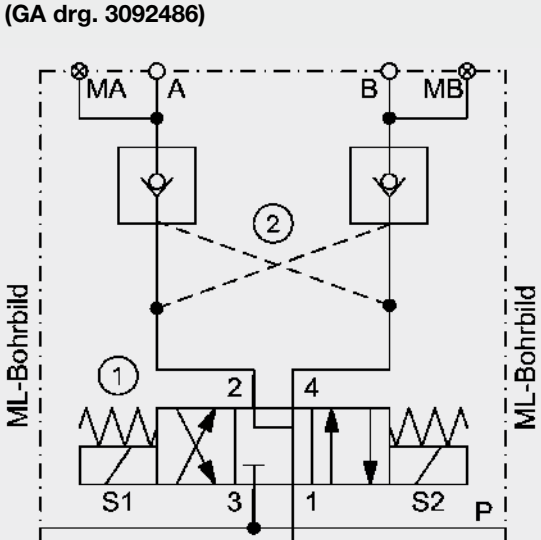




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-SC Function module with one 4/3 directional spool valve (GA drg. 3092486)



Function module, for example, to control a double-acting cylinder.
Includes two pilot-operated check valves to hold the cylinder in any position.
May be extended using ML function modules or end modules.

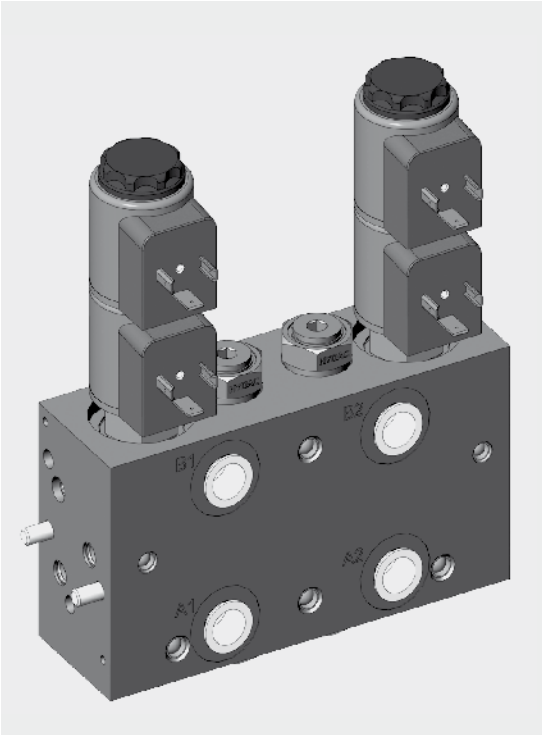
P_{max}	350 bar	
Q_{max}	20 l/min	
Control ratio	9.7:1	
Interface	ML / ML	
Weight	approx. 2.8 kg	
Ports	A, B = G⅜''	MA, MB = G¼''
$\Delta p/Q_{max}$	13 bar P → A	17 bar B → T

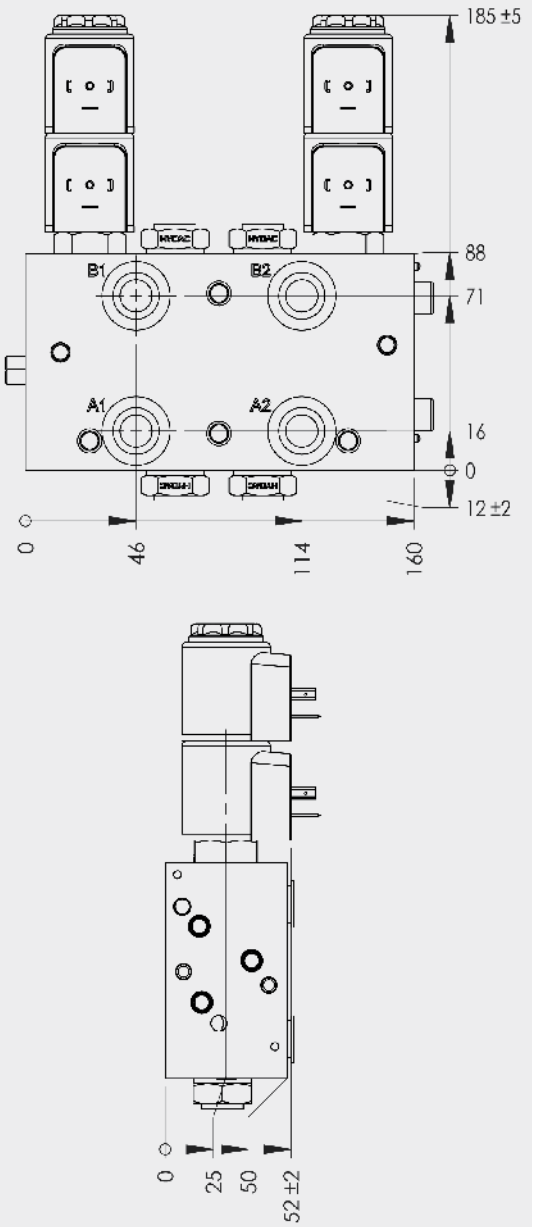
Model code

ML-SC – XXX

Basic model
ML-SC

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



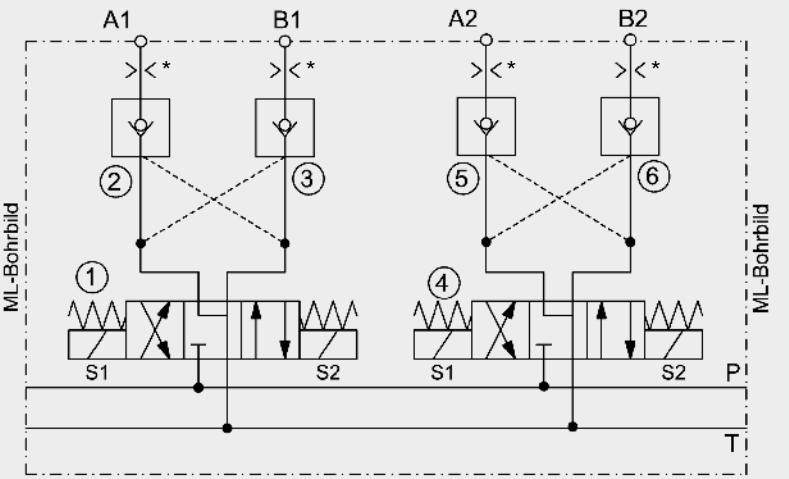


All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-2xSC1 Function module

with two 4/3 Directional spool valves (GA drg. 3405025)



* optional orifices

Function module, for example, to control two double-acting cylinders.
Includes pilot-operated check valves to hold cylinders in any position leakage-free.
Orifice for determining the travel speed.
May be extended using ML function modules or end modules.

P_{max}	350 bar	
Q_{max}	20 l/min	
Control ratio	2.8:1	
Interface	ML / ML	
Weight	approx. 5.5 kg	
Ports	A1, B1, A2, B2 = G⅜''	
$\Delta p/Q_{max}$	25 bar P → A1	17 bar A1 → T
	27 bar P → B1	18 bar B1 → T

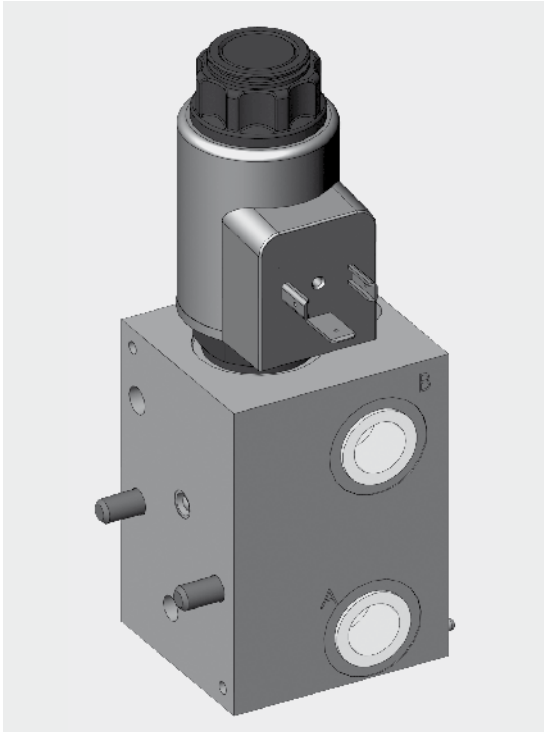
Model code

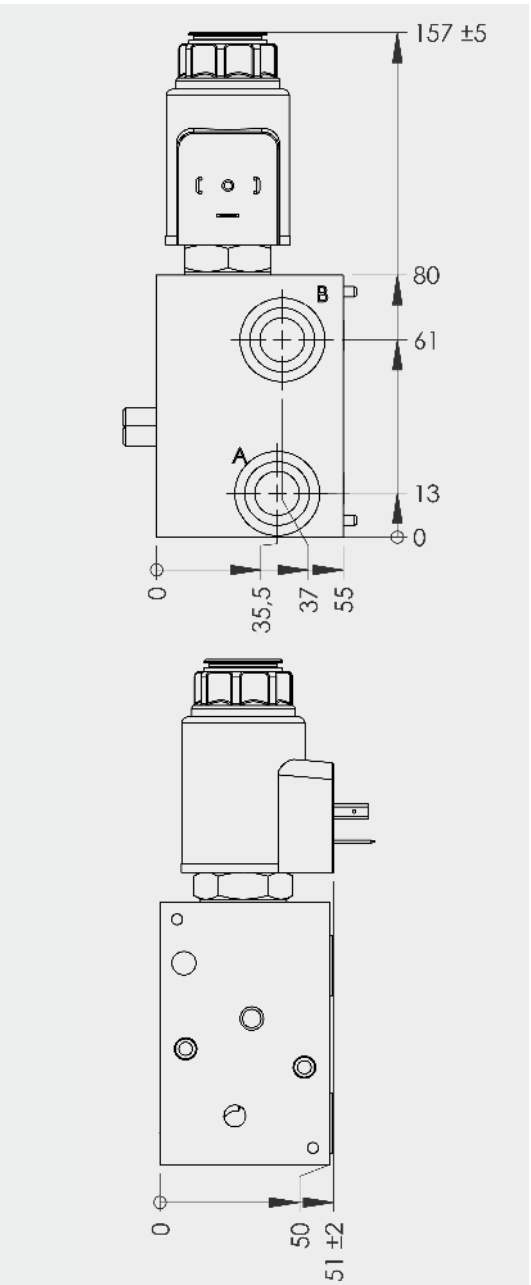
ML-2xSC1 – A1/B0.8 – B1/B0.8 – XXX

Basic model
ML-2xSC1

Orifices
A1/B0.8 = Orifice M8 0.8 mm in port A1
(ports AX, X, B1, A2, B2 also)
(available in sizes 0.6 to 4.0 mm)
B1/B0.8 = orifice M8 0.8 mm in port B1

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



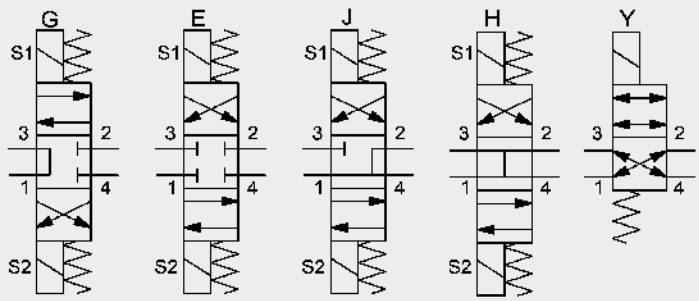


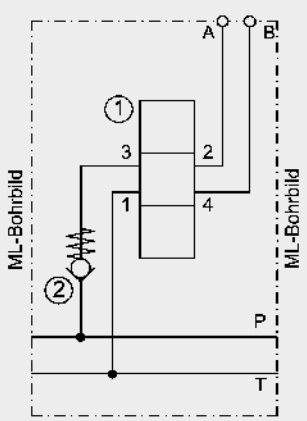
All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-U Function module

with a 4/3 or 4/2 directional spool valve (GA drg. 3156612)





Function module, for example, to control a double-acting cylinder.
May be extended using ML function modules or end modules.

P_{max}	350 bar		
Q_{max}	20 l/min		
Interface	ML / ML		
Weight	approx. 1.8 kg		
Ports	A, B = G⅜''		
$\Delta p/Q_{max}$	7 bar P → A	6 bar B → T	(ML-UY)

Model code

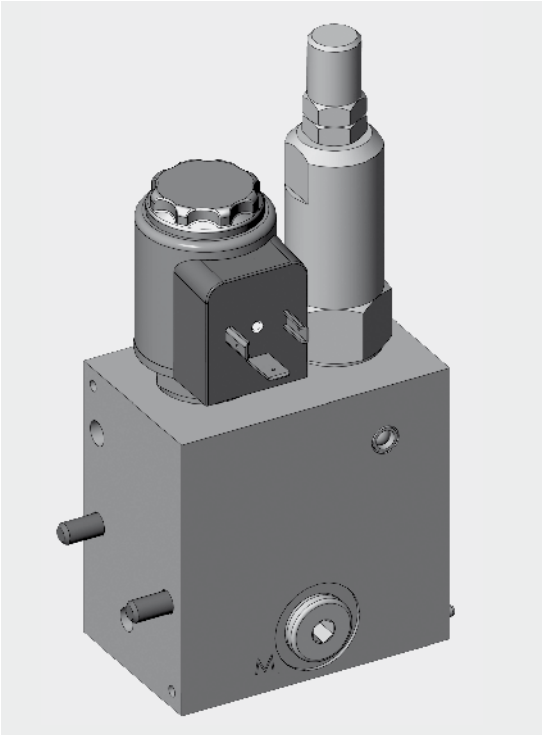
① ②
ML-U E R – XXX

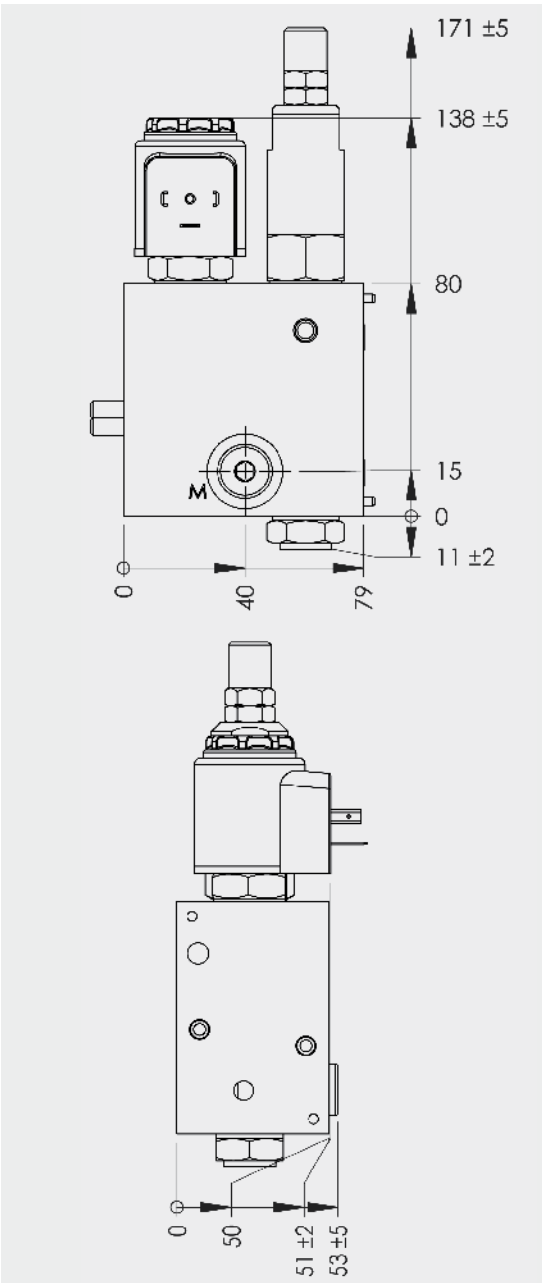
Basic model
ML-U

Directional valves
E = WK10E spool valve
G = WK10G spool valve
J = WK10J spool valve
Y = WK10Y spool valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories

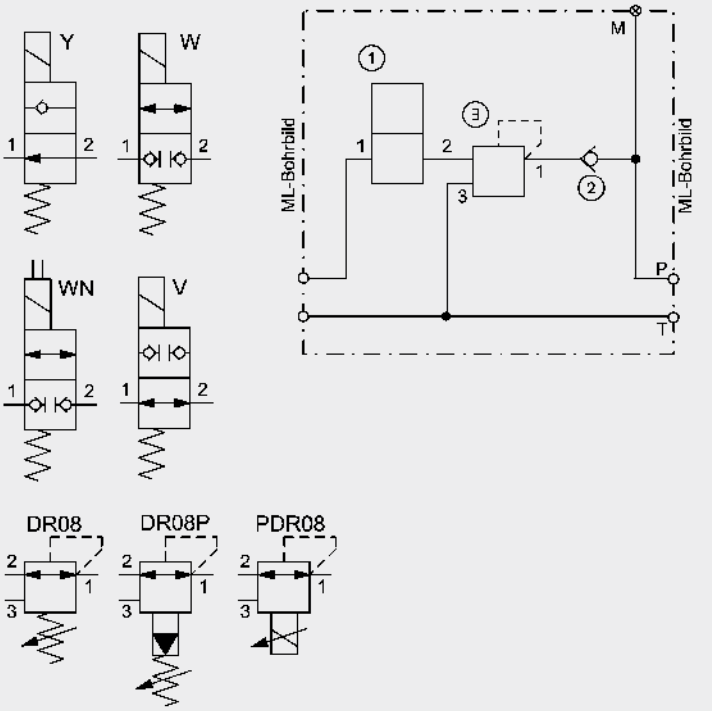




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-DM1 Function module with pressure reducing function and a 2/2 directional poppet valve installed before it (GA drg. 3385238)



Function module to reduce pressure in central pressure line.
Alternatively, proportional pressure reducing valve possible.
A directional poppet valve shuts off the control oil.
May be extended using ML function modules or end modules.

P_{max}	350 bar (250 bar W valve)
Q_{max}	15 l/min
Interface:	ML / ML
Weight:	approx. 2.8 kg
Ports:	M = G¼"

Model code

① ②
ML-DM1 – Y – R – XXX

Basic model
ML-DM1
Including DR08 pressure reducing valve, direct-acting

Directional valves

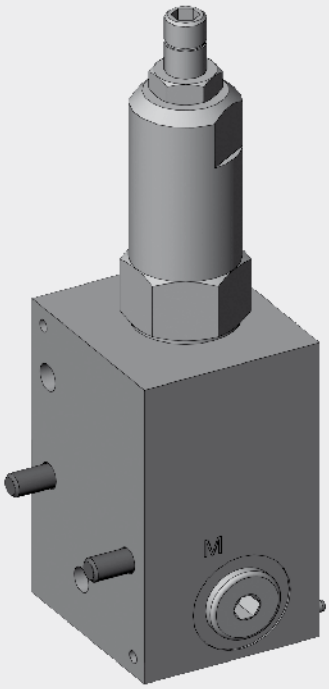
Y	= WSM06020Y
W	= WSM06020W
WN	= WSM06020W-01M with manual override
0	= with blanking plug instead of directional valve

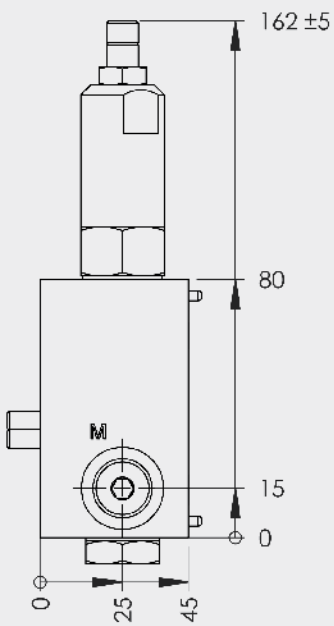
Check valve

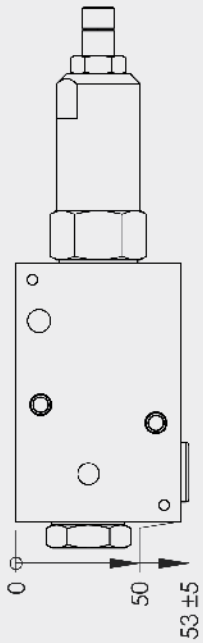
no details	= without check valve
R	= check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4

no details	= without accessories



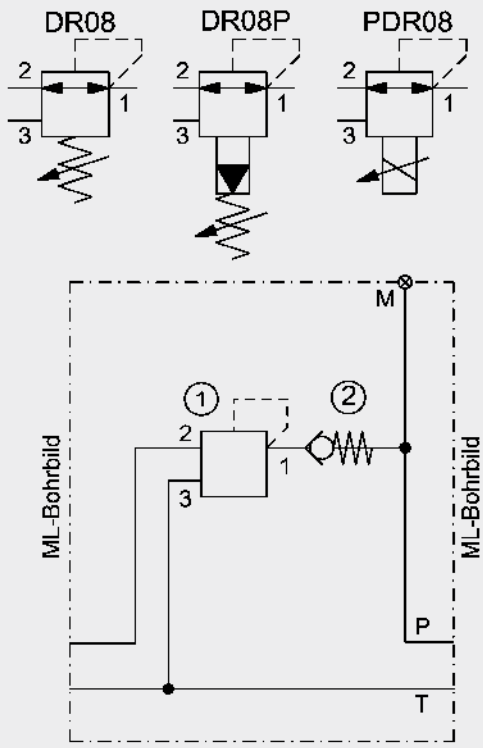




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-DM2 Function module with pressure reducing function (GA drg. 3153189)



Function module to reduce pressure in central pressure line.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	12 l/min
Interface:	ML / ML
Weight:	approx. 1.7 kg
Ports:	M = G¼"

Model code

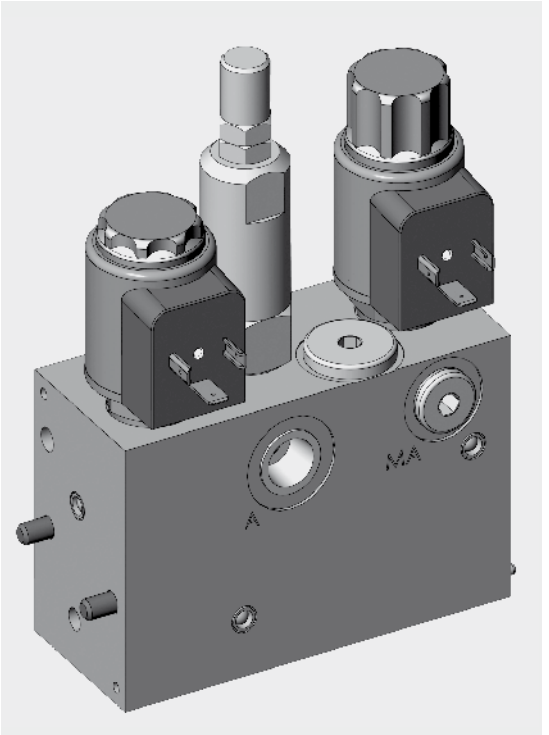
① ②
ML-DM2 – S – R – XXX

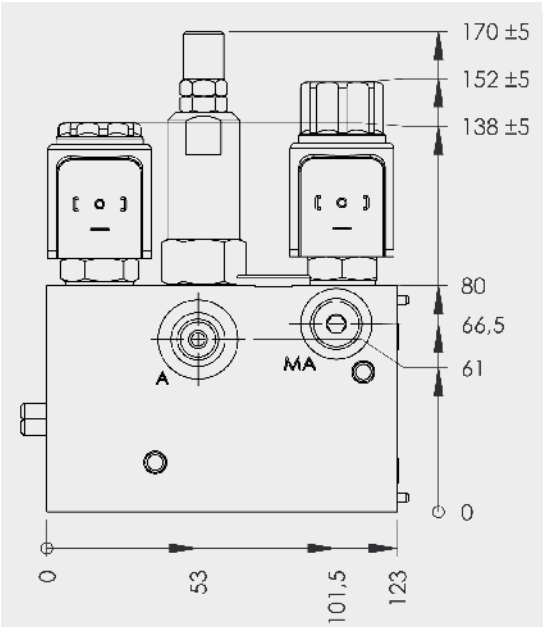
Basic model
ML-DM2 = Function module DM2

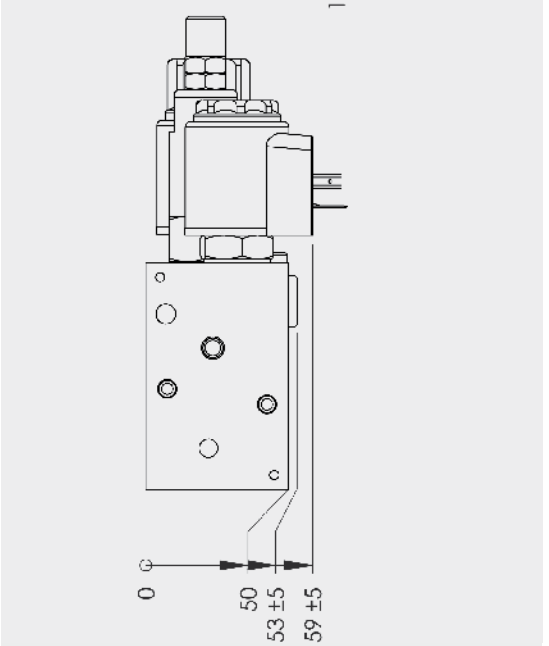
Pressure reducing valves
S = pressure reducing valve, direct-acting DR08
V = pressure reducing valve pilot operated DR08P
P = pressure reducing valve, proportional PDR08

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



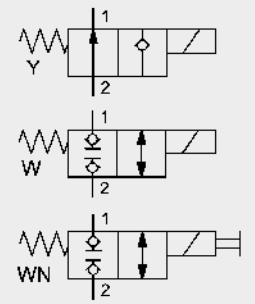


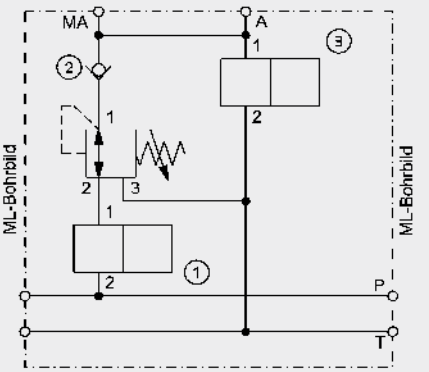


All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-DM3 Function module with pressure reducing function (GA drg. 3386760





Function module for reducing the pressure to the consumer.
Alternatively, proportional pressure reducing valve possible.
A directional poppet valve shuts off the control oil.
The consumer line is relieved to tank via 2/2 directional poppet valve.
May be extended using ML function modules or end modules.

P_{max}	350 bar (250 bar W valve)
Q_{max}	12 l/min
Interface	ML / ML
Weight	approx. 4.3 kg
Ports	A = G⅜'' MA = G¼''

Model code

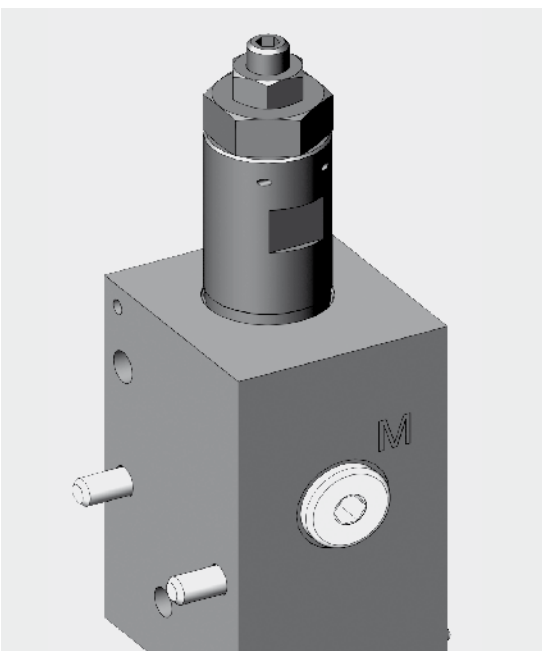
① ② ③
ML-DM3 – W – R – W – XXX

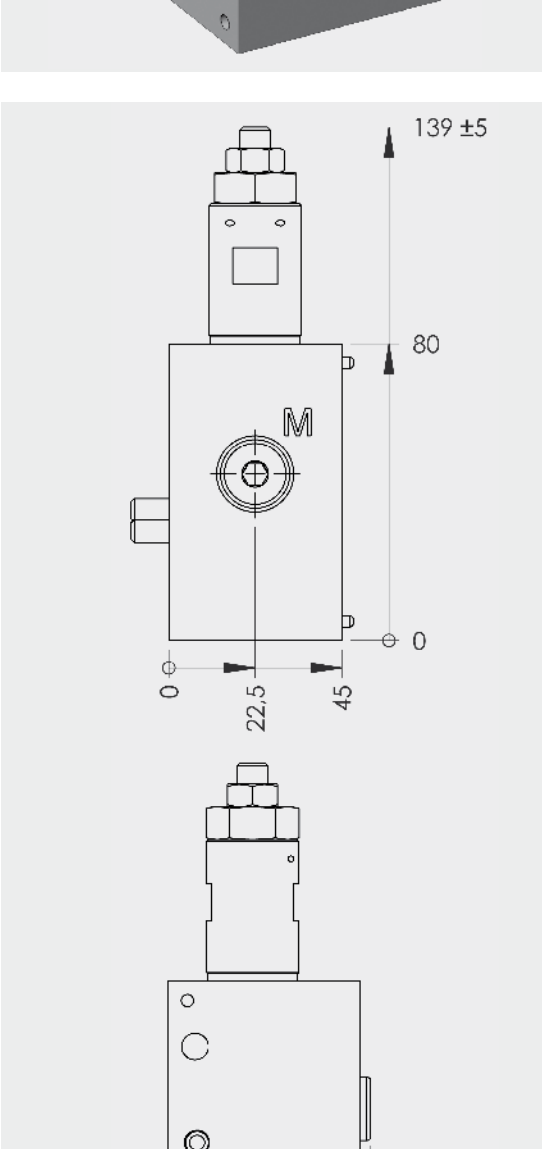
Basic model
ML-DM3

Directional valves
Y = WSM06020Y
W = WSM06020W
WN = WSM06020W-01M with manual override
0 = with blanking plug instead of directional valve

Check valve
no details = without check valve
R = check valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories

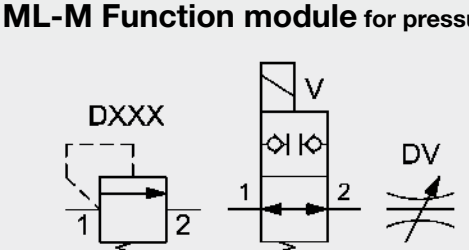


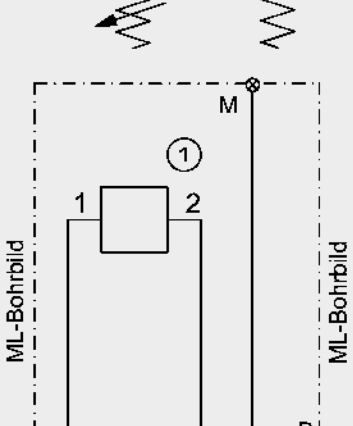


All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-M Function module for pressure relief (GA drg. 3090675)





Function module for example to relieve pressure in the central pressure line, adjustable mechanically or proportionally.
May be extended using ML function modules or end modules.

P_{max}	350 bar
Q_{max}	20 l/min
Interface	ML / ML
Weight	approx. 1.6 kg
Ports	M = G¼''

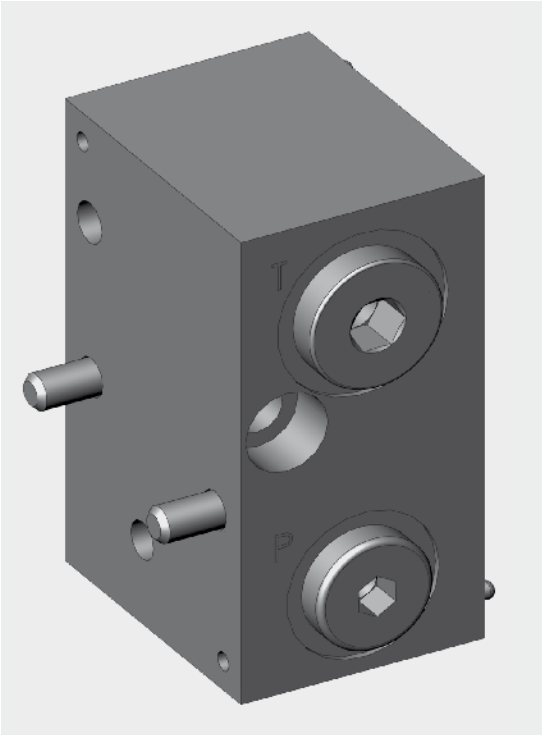
Model code

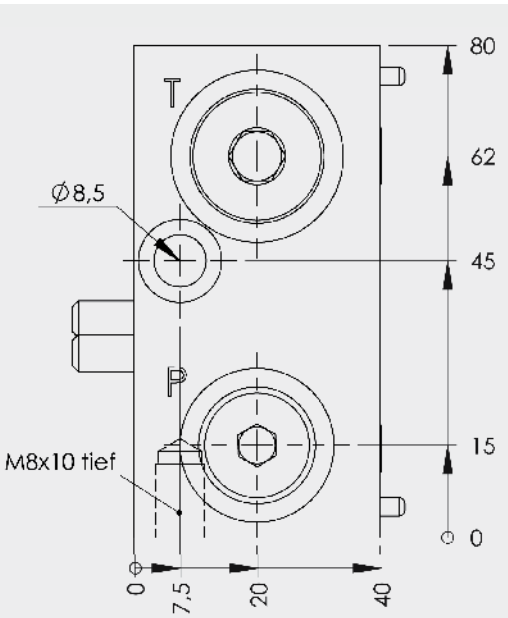
① ML-M – D100V – XXX

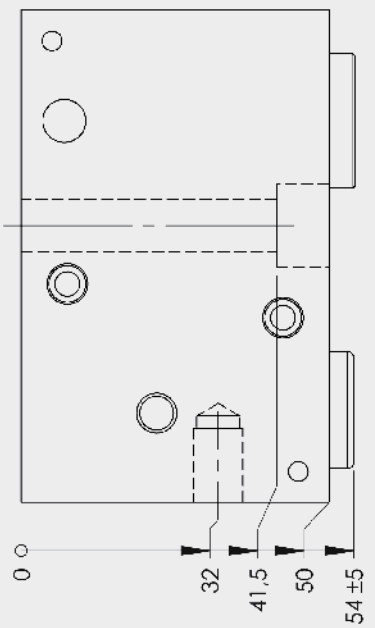
Basic model
ML-M = Function module M for pressure relief

Valve
D100V = 100 bar (Allen head)
D250V = 250 bar (Allen head)
D350V = 350 bar (Allen head)
V = WSM06020V
DV = DV5Z

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories



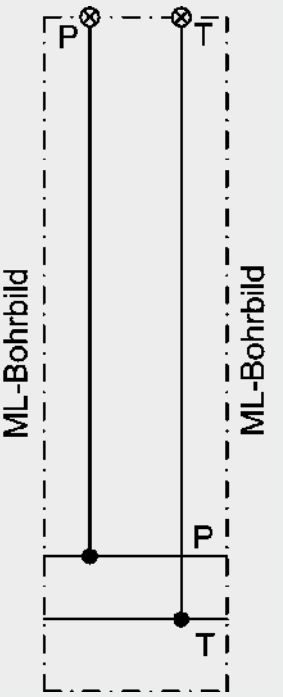




All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-BM Mounting module (GA drg. 3076803)



Function module without valves, with P and T port.
With through-bore as additional mounting point
for ML valve stacking systems.
May be extended using ML function modules or end modules.

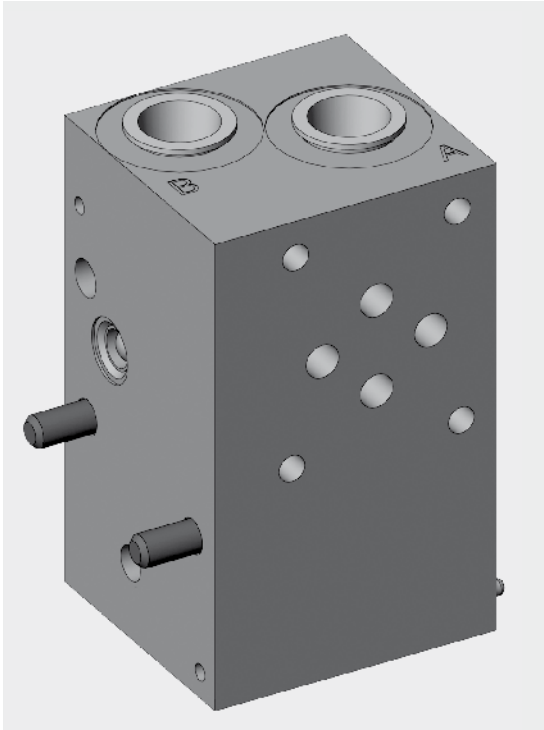
P_{max}	350 bar
Q_{max}	12 l/min
Interface	ML / ML
Weight	approx. 1.2 kg
Ports	P = G¼'' T = G⅜''

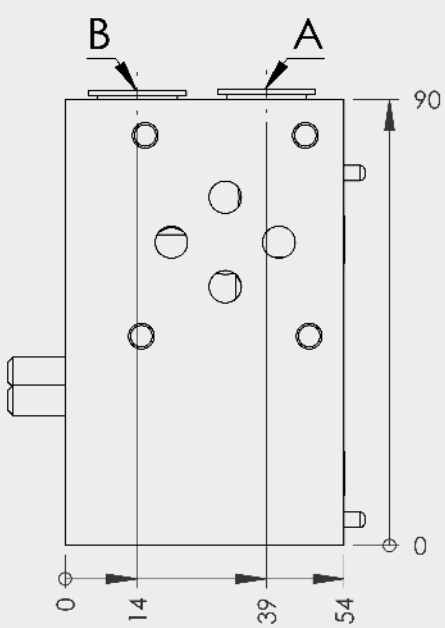
Model code

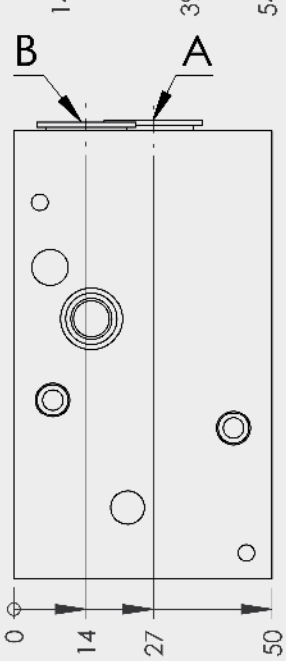
ML-BM – XXX

Basic model
ML-BM = Mounting module

Accessories
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
No details = without accessories



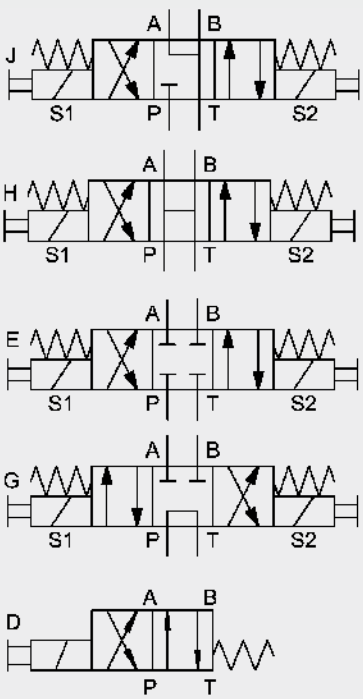


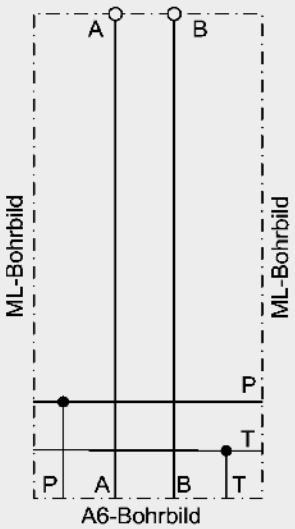


All dimensions are subject to technical modifications.

ML Function module for mounting onto base and function modules of ML valve stacking systems

ML-MA6 Function module for a directional spool valve with DIN interface (GA drg. 3287303)





Function module, for example, to mount a spool valve with DIN interface to actuate a double-acting cylinder.
May be extended using ML function modules or end modules.

P_{max}	315 bar
Q_{max}	20 l/min
Interface	ML / ML
Weight	approx. 1.9
Ports	A, B = G⅜''

Model code

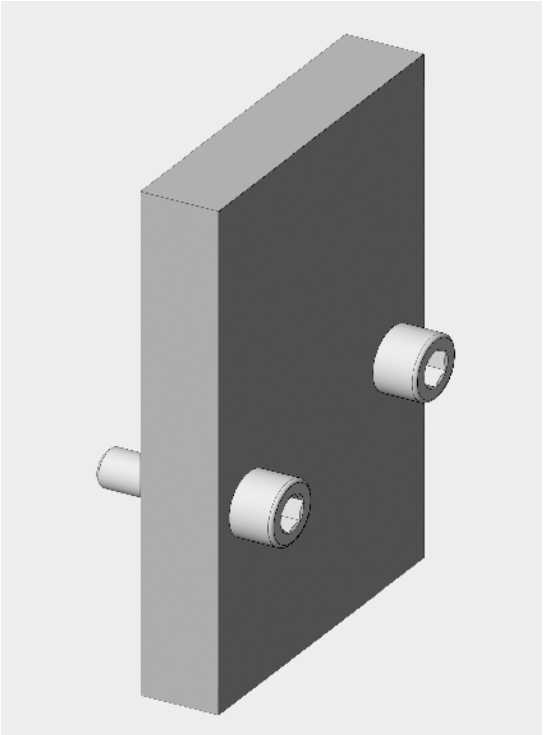
ML-MA6 – J – XXX

Basic model
ML-MA6 = Function module with A6 interface

Directional valves
E = 4WE6E 4/3 spool valve
G = 4WE6G 4/3 spool valve
J = 4WE6J 4/3 spool valve
H = 4WE6H 4/3 spool valve
D = 4WE6D 4/2 spool valve

Accessories, coil voltage
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
no details = without accessories

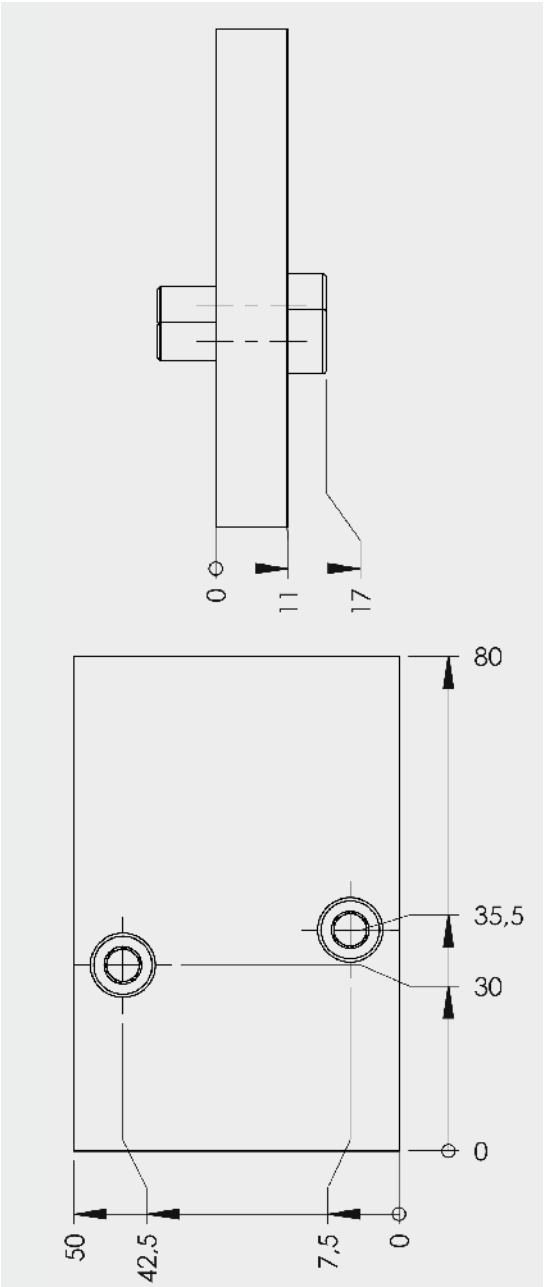
ML



ML-EM End module (GA drg. 3090911)

End module to blank off the central P-line and T-line of the ML valve stacking system.
Final module (cannot be extended).

P_{max}	350 bar
Q_{max}	0 l/min (not relevant)
Interface	ML
Weight	approx. 0.5 kg
Ports	none

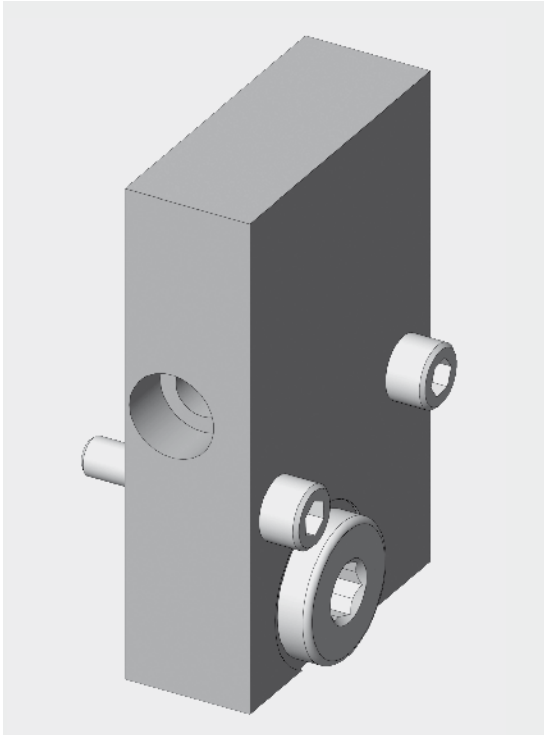


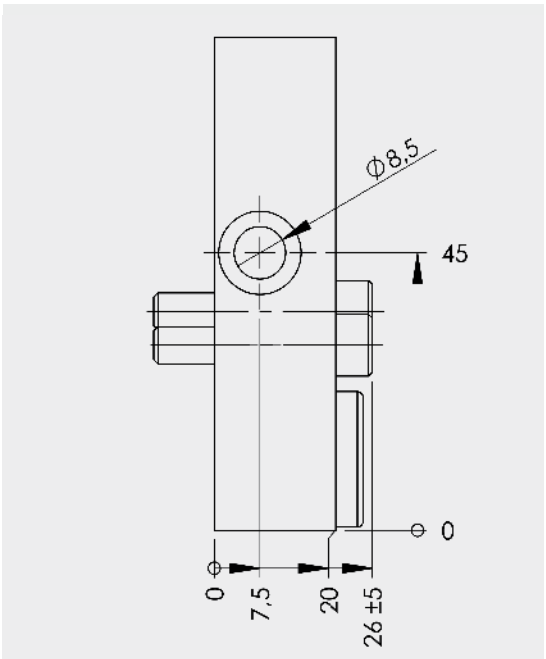
All dimensions are subject to technical modifications.

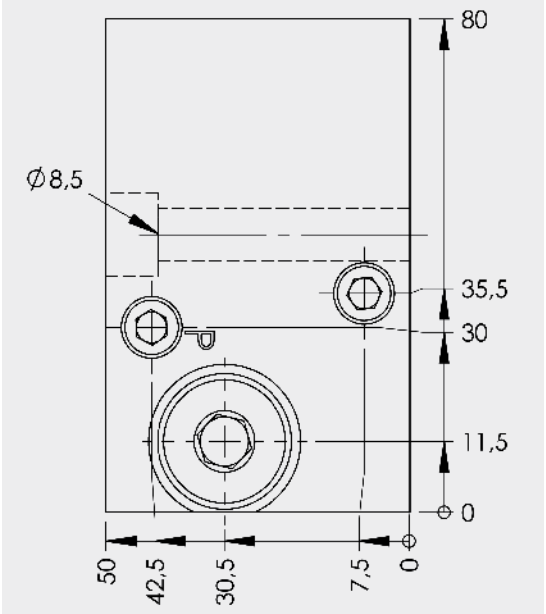
Model code

ML-EM

Basic model
ML-EM = End module







All dimensions are subject to technical modifications.

ML

ML-EMS D End module (GA drg. new 3205054, 3090911)

End module to blank off the central P-line and T-line of the ML valve stacking system, with a G⅜'' port for accumulator or pressure gauge. With through-bore as additional mounting point. Final module (cannot be extended).

P_{max}	350 bar
Q_{max}	20 l/min
Interface	ML
Weight	approx. 0.7 kg
Ports	P = G⅜''

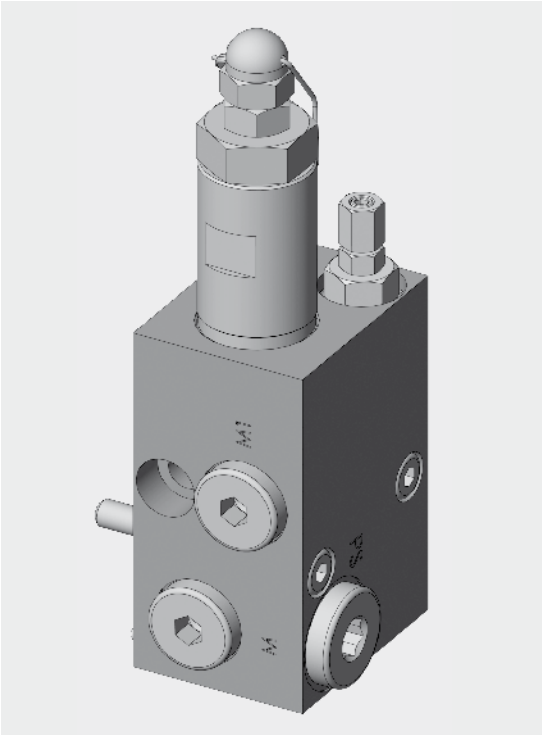
Model code

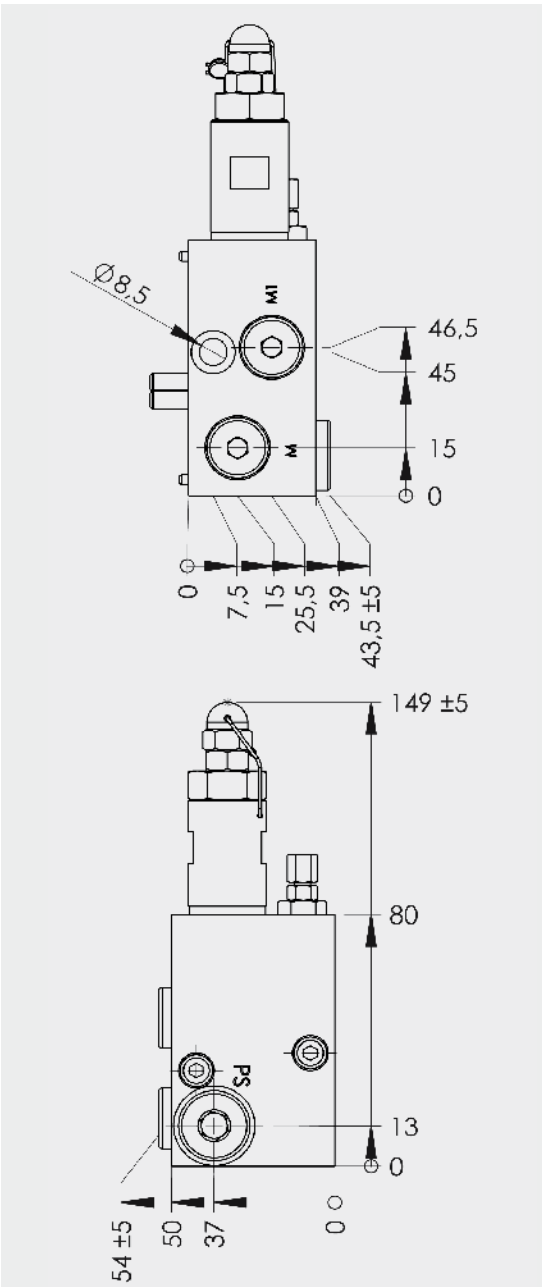
ML-EMS D – XXX

Basic model
ML-EMS D = End module

Through-bore
No details = no through-bore
D = with through-bore

Accessories
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
No details = without accessories

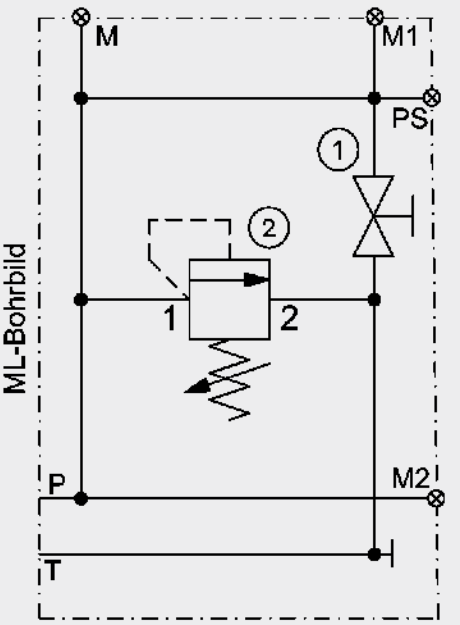




All dimensions are subject to technical modifications.

ML

ML-EMD Accumulator Safety End Module
(GA drg. 3310364)



Accumulator safety end module for mounting an accumulator with manually-operated pressure release.
Pressure relief valve (CE)
With through-bore as additional mounting point.
Final module (cannot be extended).

P_{max}	350 bar
Q_{max}	20 l/min
Interface	ML
Weight	approx. 1.4 kg
Ports	P = G⅜'' M, M1, M2 = G¼''

Model code

ML-EMD – 210 CE – XXX

Basic model
ML-EMD = End module

Pressure relief valve
210 = pressure range 210 bar (not adjustable)

Accessories
For accessories such as pressure gauge, pressure switch, etc. (supplied loose) see Section 4
No details = without accessories

4. ACCESSORIES

4.1 COIL VOLTAGE AND CONNECTORS

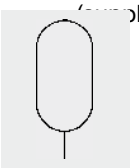
24DG = 24 Volt DC
with DIN male connector to EN175301-803
230DG = 230 Volt AC
with DIN male connector to EN175301-803

Other voltages on request

Z4 = Female connector Z4 (2-pole)
for connection to DIN male connection

4.2 ACCESSORIES FOR MOUNTING ONTO MODULES

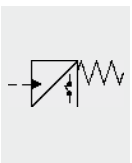
(supplied loose)



SBO1 = accumulator SBO210-0.16E1 / 112U-210AK80
SBO3 = accumulator SBO210-0.32E1 / 112U-250AK80
SBO5 = accumulator SBO210-0.5 E1 / 112U-250AK70

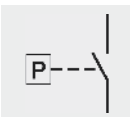
(Please take accumulator pre-charge pressure into account!)

MA1 = pressure gauge Ø 63mm
incl. threaded connection 160 bar
MA2 = pressure gauge Ø 63mm
incl. threaded connection 250 bar
MA4 = pressure gauge Ø 63mm
incl. threaded connection 400 bar



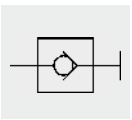
DS1 = mechanical pressure switch
10 - 100 bar

DS2 = mechanical pressure switch
50 - 200 bar



DS4 = mechanical pressure switch
100 - 400 bar

EDS3 = electronic pressure switch
EDS3446-2-250-000
EDS8 = electronic pressure switch
EDS8000-2-250



M = Minimess

4.3 ACCESSORIES, OTHER MODULES AND ADAPTERS

ML-MRL2 (GA drg. 3061157)
Base module without valve with 20X interface and for inline mounting

Module for separate mounting of an ML valve stacking system with G⅜" inline port.
Unlike the MRL base module,
may only be extended using ML base modules 20X.

P_{max}	350 bar
Q_{max}	20 l/min
Interface	G⅜'' / 20X
Weight	approx. 1.3 kg
Ports	P, T = G⅜''

Model code: **ML-MRL2**

Basic model
ML-MRL2 = Base module

ML-B1/20x (GA drg. 3243461) Adapter plate
(For documentation see CO1 brochure, No. E 5.306.)

To convert interface B1 (CO1/DC1) to interface 20X

P_{max}	250 bar
Q_{max}	20 l/min
Interface	B1/ 20X
Ports	none

Model code: **ML-B1/20X**

Basic model
ML-B1/20X = Adapter plate

S6-C (GA drg. 3054485) Cooler module

Special module as a sandwich plate with interface 20X with oil/air cooler.
Also available as unpressurized circulating module without cooler (Version S6-0).

P_{max}	250 bar
Q_{max}	20 l/min (pressure and tank line)
Interface	20X / 20X
Ports	none
Cooling capacity	0.8 kW at ΔT 40 °C (see graph)
Max. permitted operating pressure cooler element	16 bar
Nominal voltage Fan motor	220 - 240 V, 50 / 60 Hz
Power consumption Fan motor	35 W
Type of operation	S1 (Continuous operation)
Protection class	IP54 to DIN EN 60034-5

Model code: **S6-C**

Basic model
S6-C = Cooler module

ML-3A6 (GA drg. 3096922) Extension module
to a DIN interface
for connection, for example, to EML / A6 or B1 / A6

Module for mounting two spool valves onto DIN-interface.
May only be extended using 3A6 modules.

P_{max}	350 bar (Take note of permitted operating pressure of built-on valve with DIN interface)
Q_{max}	20 l/min
Interface	A6 / A6
Ports	A, B = G⅜''

Type code: **ML-3A6**

Basic model
ML-3A6 = Adapter plate with 3 interfaces

FP3 (GA drg. 3129987) Pressure filter module

Special module as sandwich plate with interface 20X with filter in the pressure line and clogging indicator

P_{max}	320 bar
Q_{max}	20 l/min
Interface	20X / 20X
Ports	M = G¼''

Model code: **FP3 – 20 – B**

Basic model
FP3 = Special module with pressure filter

Filtration rating
20 µm = Filtration rating
10 µm = Filtration rating

Clogging indicator
B = visual
C = electrical

(Replacement filter element = Part No.)

FA25 (GA drg. 3114513) Pressure Filter

Cartridge pressure filter in the consumer ports

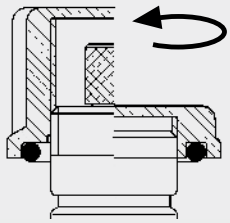
P_{max}	350 bar
Q_{max}	12 l/min
Interface	none
Ports	A, B = G¼'' male and female

Model code: **FA25**

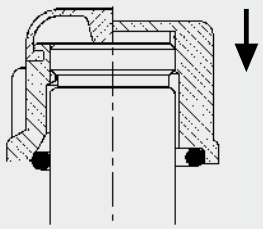
Basic model
FA25 = Module with pressure filter
(filtration rating 25 µm)

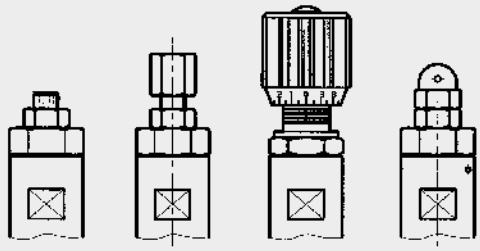
Part No. 715896
(Replacement filter element = Part No.)

Pulling action



Pressing action





5. DESIGN RECOMMENDATIONS

5.1 Manual override

Pulling action
(Remove mounting nut,
turn knurled screw anti-clockwise.
Remember: Turn back after use – will not function otherwise)

-01M

WS Symbol Z / ZR

WK Symbol /D /L/P /W /X

except:
(WK08D / WK08L)

Pressing action
(Activated by thumb pressure on rubber cap)

-01M

WS Symbol Y /YR /W /X

WK Symbol A /C /K /R /V /Y /Z /EB

+ WK08D +WK08L

5.2 Order details for pressure valves

Pressure relief valves **350 M 315 – 300**

Pressure range
100 = 100 bar
200 = 200 bar
350 = 350 bar
630 = 630 bar

Type of adjustment
V = Allen head
M = adjustable, maximum pressure relief
S = scaled knob, maximum pressure relief
P = can be lead-sealed

Maximum pressure setting
315 = 315 bar (as example)
Must be specified for M, SM,
Not required for V, P

Pre-set opening pressure
no details = valve not set, spring relaxed
300 = 300 bar (for example)
(optional information)

Pressure reducing valves

Adjustable
V = Allen head
H = hand wheel

Accumulators

For further diaphragm accumulators, see Brochure E 3.100,
for further bladder accumulators, see brochure E 3.201
(give full details when ordering)

Please check the mounting compatibility with regard to thread, diameter and weight of the accumulator!

Modules

The reference axes X and Y given in the dimensions column allow the installation size of the complete control block to be calculated.
The reference axis X applies only to HP and CA power units!

NOTE
The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.
Subject to technical modifications.

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