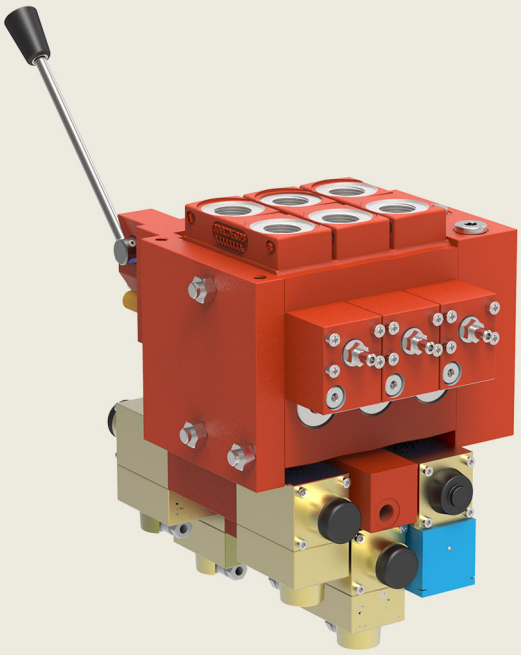
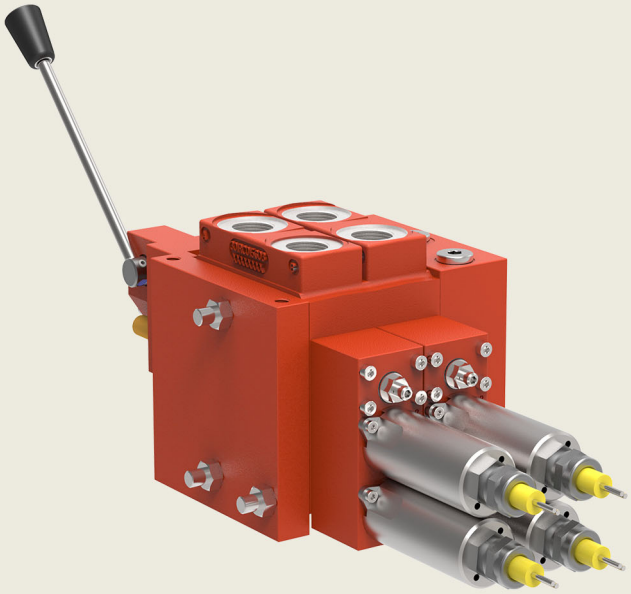
BUCHER hydraulics

Proportional Directional Valve System

in Sectional Design
Series SC 12



Geräteschutz durch Eigensicherheit „i“



Geräteschutz durch Vergusskapselung „m“

BUCHER hydraulics

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1 General

1.1 Description

The SC12EX proportional directional valve system is suitable for applications in potentially explosive areas. For example, in mining, offshore, and industrial applications that require such protective measures.

Our sectional proportional valves regulate the flow rate to the actuator by means of an internal closed-loop control system. Load-independent flow control is guaranteed by individual pressure compensators upstream of each proportional directional valve (load-sensing principle).

The highly adaptable modular system consists of an inlet module, actuator modules (with up to eight sections) and an end module.
(> 8 actuator modules on request).
The system is specially designed for use in mobile hydraulics. The user can be assured that the right system is always available for every application.

1.2 Advantages

- Valves and solenoids suitable for potentially explosive areas
- Load feedback
- Individual supply cut-off for each actuator port
- Actuator modules with individual pressure compensators and optional primary pressure relief valves
- Load-independent flow control, even with parallel operation of several actuators
- Can be used with fixed displacement pumps and load sensing pumps

1.3 Application examples

- Mining machines
- Tunneling equipment
- Offshore applications

1.4 Other applicable documents

Document type	Document number	Description
Directive (ATEX)	2014/34/EU	Directive for harmonizing the legal and administrative regulations of the member states for equipment and protective systems intended for use in potentially explosive areas
Standard	IEC 60079-0	Explosive atmospheres – Part 0: Equipment – General requirements
Operating instructions		Valve solenoid iE(A)22/1A (Tiefenbach)
Operating instructions		Valve solenoidiEA22/1AK (Tiefenbach)
Operating instructions		Valve solenoid iEA33/1RSL (Tiefenbach)
Operating instructions		Valve solenoid iEA33/1RSLK (Tiefenbach)
Operating instructions		Valve solenoid iEA34/1RSL (Tiefenbach)
Operating instructions		Ex-Valves Type „ExPPCD04“ (operating instructions) (Thomas Magnete)

2 Explosion protection

2.1 Certifications

2.1.1 Ignition protection type m: encapsulation

The solenoid valves are approved to ATEX (Atmosphères explosibles) and IECEx for explosion zones 1 and 21 with the corresponding equipment categories 2G, 2D and M2.

Certification: Solenoid valve										Description			
Designation to Directive 2014/34/EU					Designation to IEC Standard 60079-0					Area	Solenoid valve		Ordering code [1]
Design Conformity mark	Notified body	Explosion-protection symbol	Equipment group	Equipment category	Explosion protection designation	Ignition protection group	Explosion group	Temperature classification	Equipment protection level		Valve type	Connection type	Electrical operation
CE	0035	Ex	I	M2	Ex	mb	I		Mb	Mining	Proportional	Flying leads	E37X
CE	0035	Ex	II	2G	Ex	mb	IIC	T4	Gb	Gas			
CE	0035	Ex	II	2D	Ex	mb	IIIC	T130°C	Db	Dust			

1) For complete ordering code, see Section 5.7.

Equipment group	I II	Mining Other areas
Equipment category	M2 2G 2D	Mining - Areas that may be at risk Gas - Occasional hazard due to burning gas Dust - Occasional hazard due to burning dusts
Ignition protection type	mb	Level of protection: high
Explosion group	I IIC IIIC	Equipment for mine workings at risk from firedamp Equipment for areas at risk from gas explosions – other than mine workings (typical gas: hydrogen) Equipment for areas at risk from dust explosions – other than mine workings (type of dust: conductive dust)
Temperature classification	T4 T130°C	(Maximum surface temperature) Maximum surface temperature (Example 130 5C)
Equipment protection level	Mb Gb Db	Mine workings at risk from firedamp – adequate safety until the equipment is switched off Areas at risk from gas explosions – adequate safety in the case of foreseeable faults (Zone 1) Areas at risk from dust explosions – adequate safety in the case of foreseeable faults (Zone 21)

2.1.2 Ignition protection type i: intrinsic safety

The solenoid coils are approved to ATEX for equipment category M2 and to IECEx for Explosion Group I.

For mining applications in China, certificates for solenoid coils in accordance with Mining Products Safety Approval and Certification (MA) are available.

Certification (ATEX): solenoid coil										Description			
Designation to Directive 2014/34/EU					Designation to IEC Standard 60079-0					Area	Solenoid		Ordering code [1]
Conformity mark	Notified body	Explosion protection symbol	Equipment group	Equipment category	Explosion protection designation	Ignition protection type	Explosion group	Temperature classification	Equipment protection level		Coil	Connection type	Electrical operation
CE	0044	Ex	I	M2	EEx	ia	I			Mining	On-off	Flying leads	F23X
												Terminal box	F27X
												G4W1F	F29X
											Proportional	Terminal box	F26X
												G4W1F	F28X

Certification (IECEx): solenoid coil					Description			
Designation to IEC Standard 60079-0					Area	Solenoid		Ordering code [1]
Explosion protection designation	Ignition protection type	Explosion group	Temperature-classificaqtion	Equipment protection level		Coil	Connection type	Electrical operation
Ex	ia	I			Bergbau	proportional	G4W1F	F28X
Ex	ib	I				On-off	G4W1 F	F29X

Certification (MA): solenoid coil	Description			
Classification	Area	Solenoid		Ordering code [1]
		Coil	Connection type	Electrical operation
J2017026	Mining	Proportional	G4W1F	F47X
J2017027			Terminal box	F45X
J2017028		On-off	G4W1F	F48X
J2017029			Flying leads	F44X
J2017030			Terminal box	F46X

1) For complete ordering code, see Section 5.7.

Equipment group	I	Mining
Equipment category	M2	Mining - Areas that may be at risk
Ignition protection type	ia ib	Level of protection: very high Level of protection: high
Explosion group	I	Equipment for mine workings at risk from firedamp

3 Technical data

General characteristics	Unit	Description, value
Design		Proportional valves, sectional design
Types of operators		• Electrohydraulic proportional • Electrohydraulic on-off • Hydraulic • Manual (oil-tight enclosure) • For other types, please contact Bucher
Connection type		Threads to ISO 1179-Part 1 (Whitworth pipe thread)
Mounting attitude		unrestricted, but ensure good air-bleeding
Ambient temperature range	°C	-30 … +60

Hydraulic characteristics	Unit	Description, value
Hydraulic fluid		HL and HLP mineral oil to DIN 51524; for other fluids please contact BUCHER HYDRAULICS GmbH
Hydraulic fluid temperature range	°C	-20 … +80, recommended +20 … +60
Viscosity range	$mm^2/_s$ (cSt)	10 … 380, recommended 15…250
Maximum admissible level of contamination of the hydraulic fluid		ISO 4406 code 20/18/15
Maximum inlet flow rate	l/min	200
Maximum actuator flow rate ($\Delta p_{P\text{-}XL}$ = 13 bar) • Pressure compensator with load-holding function • Pressure compensator without load-holding function	l/min	 95 130
Maximum pump pressure	bar	370
Maximum load pressure	bar	420
Maximum tank pressure (port T)	bar	50
Maximum tank pressure for electrohydraulic pilot stage (port Y or T)	bar	5

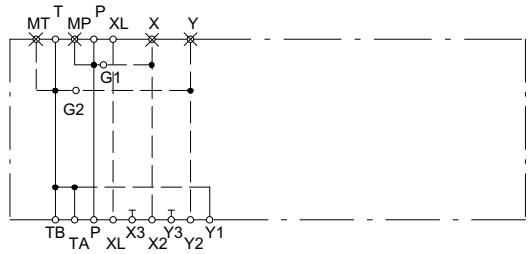
Hydraulic operation	Unit	Description, value
Pilot-pressure range	bar	6 … 20
Maximum pressure rating of pilot circuit	bar	50

Information on explosion protection
For information on explosion protection, see Section 2.

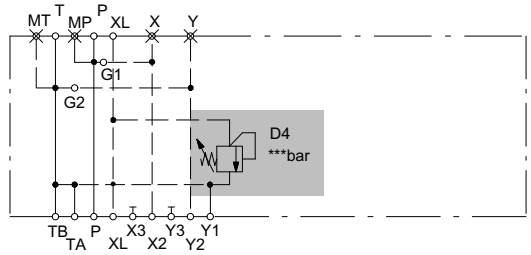
Electrical operation
Electrical operation, see Section 7.

4 Inlet modules

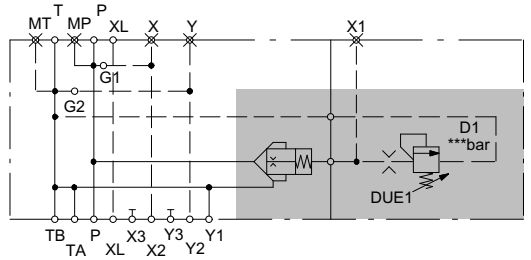
4.1 Module type G: No control function, with port threads

Type and symbol	Description
SC12EX-GG000-000-…-…-A-V…	
	• Without system pressure relief • Without load-sensing pressure relief Port threads: • P, T = G1“ X, XL, Y = G¼“ • Test point: MP, MT = G¼“

4.2 Module type H: Load-sensing pressure relief

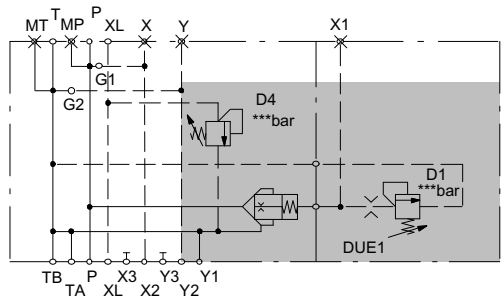
Type and symbol	Description
SC12EX-HG000-***-…-…-A-V…	
	• Without system pressure relief • With load-sensing pressure relief • Pressure setting in bar for load-sensing pressure relief (3-digit) Port threads: • P, T = G1“ X, XL, Y = G¼“ • Test point: MP, MT = G¼“

4.3 Module type M: System pressure relief

Type and symbol	Description
SC12EX-MG***-000-…-…-A-V…	
	• System pressure relief • Pressure setting in bar for system pressure relief (3-digit) • Without load-sensing pressure relief Port threads: • P, T = G1“ X, XL, Y = G¼“ • Port X1 = G¼“ : plugged • Test point: MP, MT = G¼“

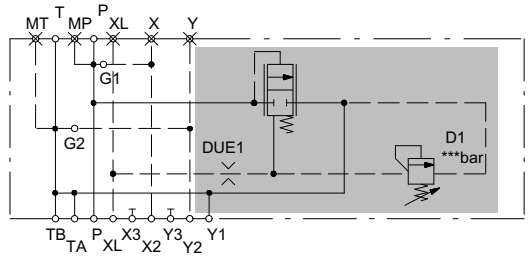
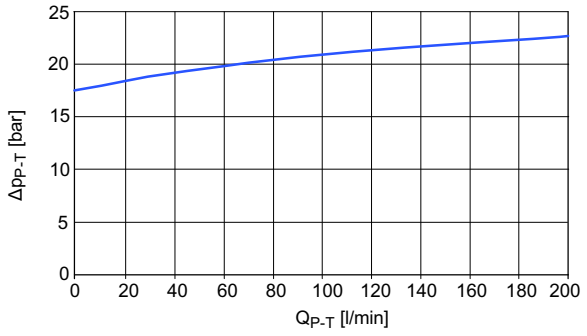
IMPORTANT!
The setting of the system pressure relief in the inlet module must be 20 bar higher than the highest value of the primary-pressure cut-off in the actuator modules.

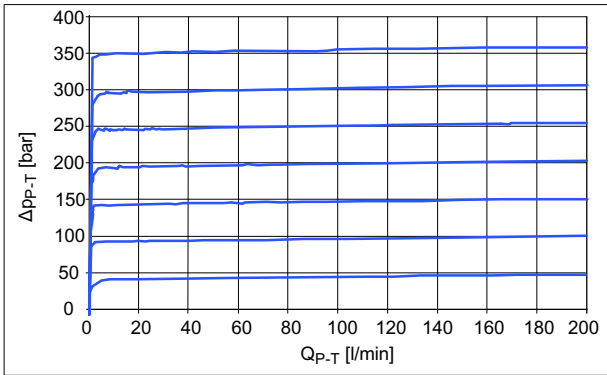
4.4 Module type N: System pressure relief and load-sensing pressure relief

Type and symbol	Description
SC12EX-NG***-***-…-…-A-V…	
	• System pressure relief • Pressure setting in bar for system pressure relief (3-digit) • With load-sensing pressure relief • Pressure setting in bar for load-sensing pressure relief (3-digit) Port threads: • P, T = G1“ X, XL, Y = G¼“ • Port X1 = G¼“ : plugged • Test point: MP, MT = G¼“

IMPORTANT!
The setting of the system pressure relief must be 20 bar higher than the highest value of the load-sensing pressure relief units.

4.5 Module type V: 3-way-pressure compensator with system pressure relief

Type and symbol and characteristic curves	Description
SC12EX-VG***-000-…-…-A-V…	
	• 3-way-pressure compensator with system pressure relief • Pressure setting in bar for system pressure relief (3-digit) Port threads: • P, T = G1“ X, XL, Y = G¼“ • Test point: MP, MT = G¼“
	3-way pressure compensator (pressure relief function) Q = pump flow rate P -> T Δp = pump pressure - tank pressure



3-way pressure compensator
(pressure relief function)

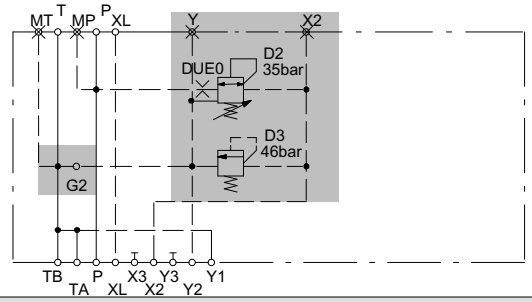
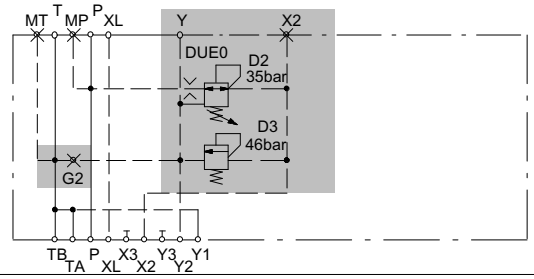
Q = pump flow rate P -> T

Δp = pump pressure - tank pressure

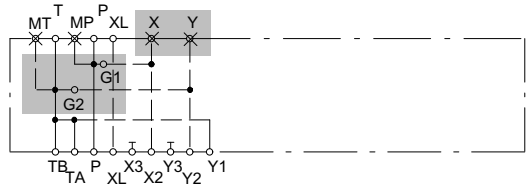
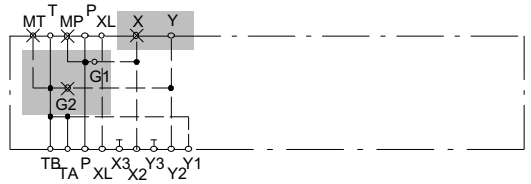
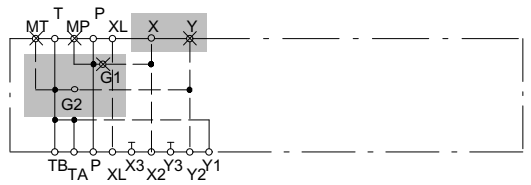
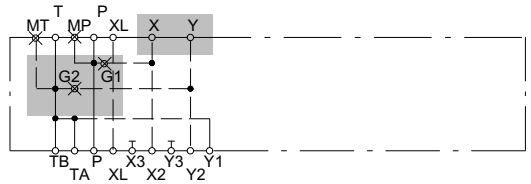
IMPORTANT!
The setting of the system pressure relief must be 20 bar higher than the highest value of the load-sensing pressure relief units.

4.6 Pilot-pressure conditioning

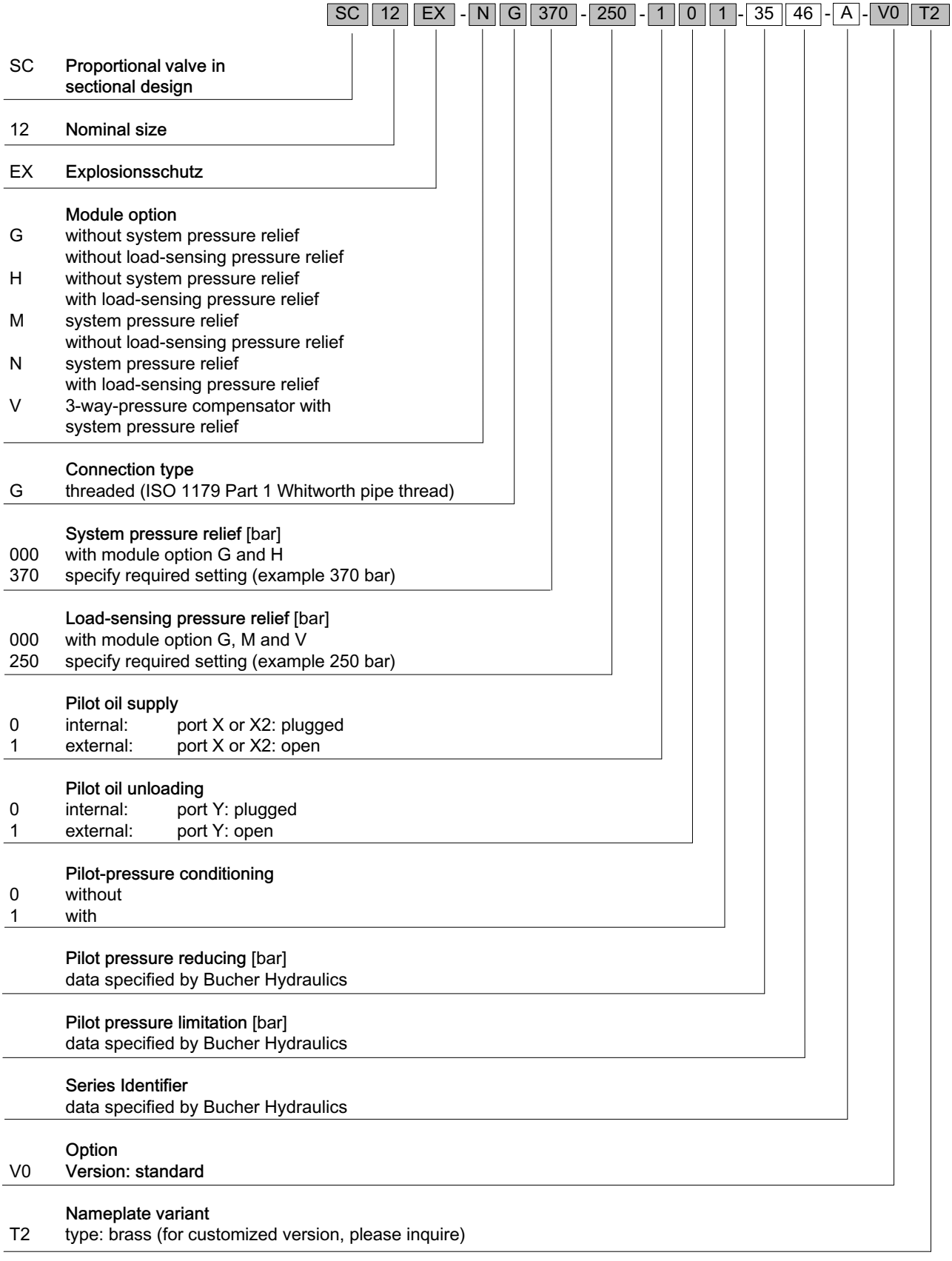
4.6.1 With pilot-pressure conditioning

Type and symbol	Description
SC12EX-…-…-001-3546-A-V…	
	• Pilot oil supply: internal • Pilot oil unloading: internal • Pilot-pressure conditioning Port threads: • X2 = G¼“ : plugged • Y = G¼“ : plugged
SC12EX-…-…-011-3546-A-V…	
	• Pilot oil supply: internal • Pilot oil unloading: external • Pilot-pressure conditioning Port threads: • X2 = G¼“ : plugged • Y = G¼“ : open

4.6.2 Without pilot-pressure conditioning

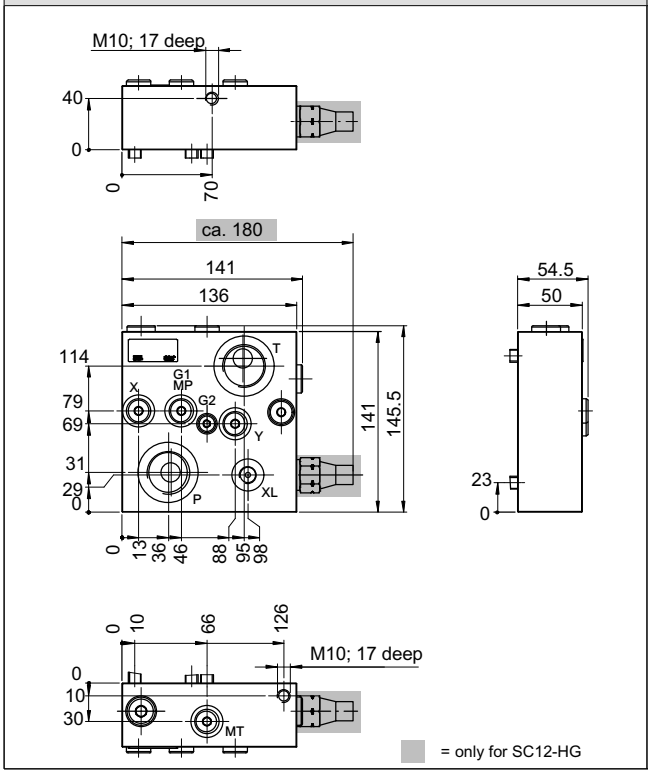
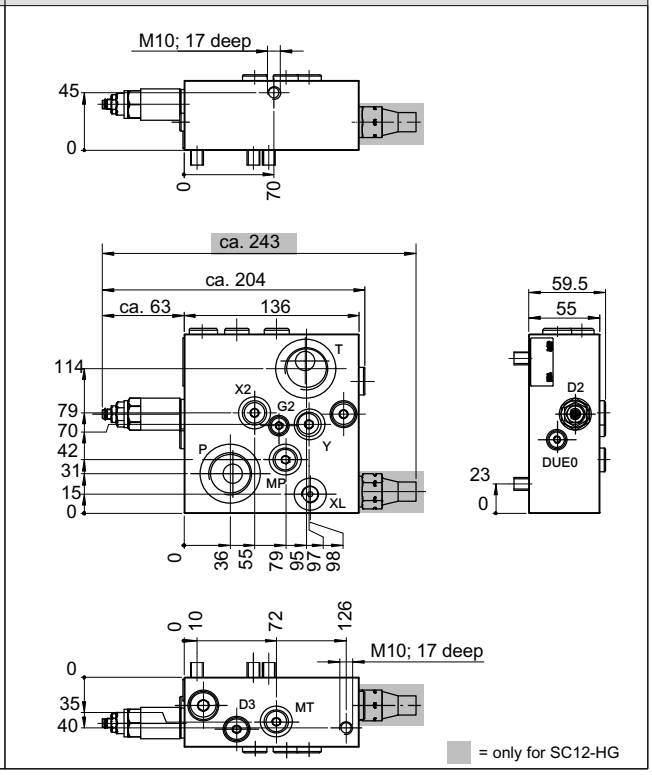
Type and symbol	Description
SC12EX-…-…-000-0000-A-V…	
	• Pilot oil supply: internal • Pilot oil unloading: internal • Without pilot-pressure conditioning Port threads: • X = G¼“ : plugged • Y = G¼“ : plugged
SC12EX-…-…-010-0000-A-V…	
	• Pilot oil supply: internal • Pilot oil unloading: external • Without pilot-pressure conditioning Port threads: • X = G¼“ : plugged • Y = G¼“ : open
SC12EX-…-…-100-0000-A-V…	
	• Pilot oil supply: external • Pilot oil unloading: internal • Without pilot-pressure conditioning Port threads: • X = G¼“ : open • Y = G¼“ : plugged
SC12EX-…-…-110-0000-A-V…	
	• Pilot oil supply: external • Pilot oil unloading: external • Without pilot-pressure conditioning Port threads: • X = G¼“ : open • Y = G¼“ : open

4.7 Ordering code



4.8 Dimensions

4.8.1 Dimensions SC12EX-GG… and SC12EX-HG…

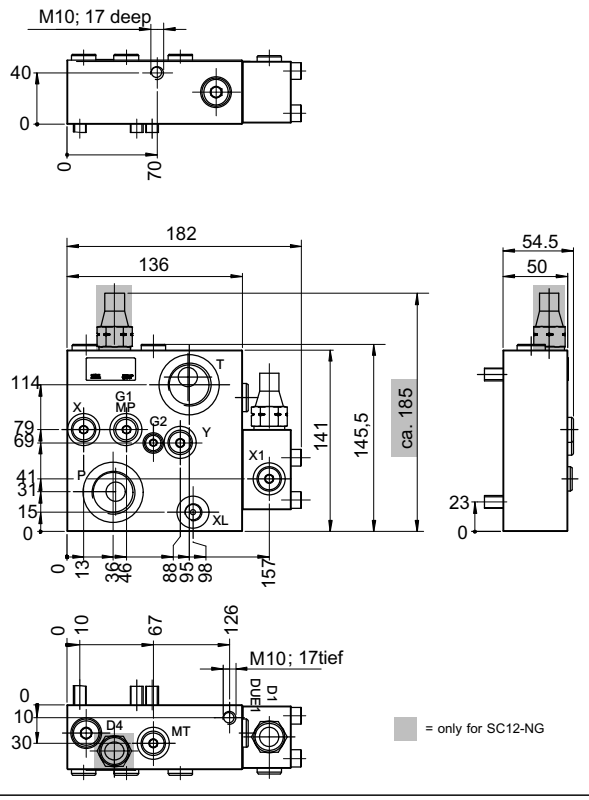
Type and dimensions	Type and dimensions
SC12EX-GG_ _ _-…- _ _0-…-A-V… SC12EX-HG_ _ _-…- _ _0-…-A-V…	SC12EX-GG_ _ _-…- _ _1-…-A-V… SC12EX-HG_ _ _-…- _ _1-…-A-V…
	

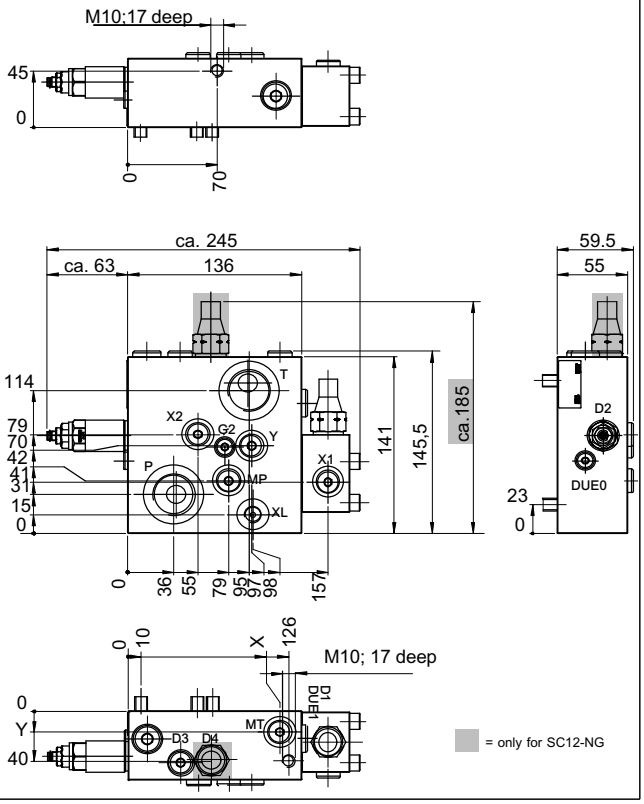
4.8.1.1 Port sizes

	Port	ISO 1179 Part 1
P	Pump	G1“
T	Tank	G1“
X, X2	Pilot oil supply	G¼“
XL	Load sensing	G¼“
Y	Pilot oil unloading	G¼“
MP	Test point, pump	G¼“
MT	Test point, tank	G¼“

4.8.2 Dimensions SC12EX-MG… and SC12EX-NG…

Type and dimensions	Type and dimensions
SC12EX-MG_ _ _-…- _ _0-…-A-V… SC12EX-NG_ _ _-…- _ _0-…-A-V…	SC12EX-MG_ _ _-…- _ _1-…-A-V… SC12EX-NG_ _ _-…- _ _1-…-A-V…





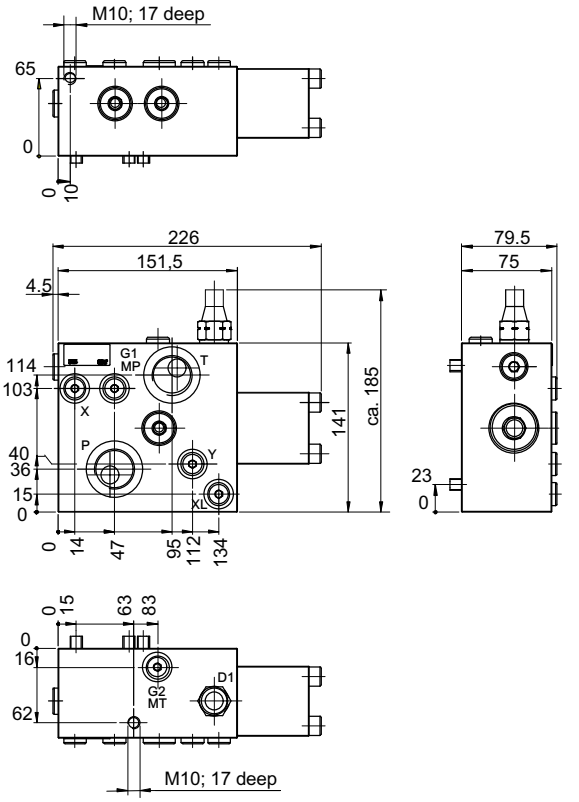
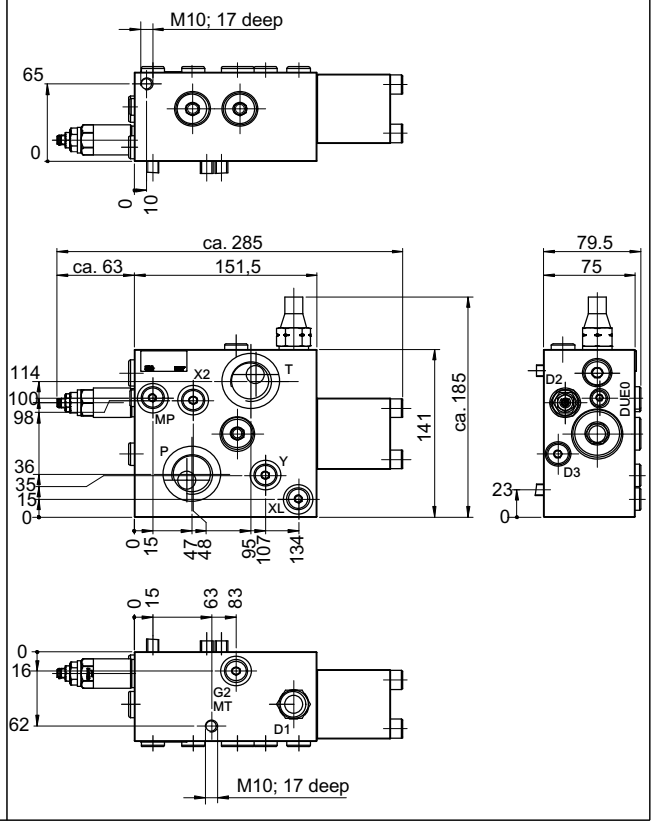
4.8.2.1 Port sizes

	Port	ISO 1179 Part 1
P	Pump	G1“
T	Tank	G1“
X, X2	Pilot oil supply	G¼“
X1	Port for external pressure valve	G¼“
XL	Load sensing	G¼“
Y	Pilot oil unloading	G¼“
MP	Test point, pump	G¼“
MT	Test point, tank	G¼“

4.8.2.2 Dimensions port MT

Ordering code	Port MT (coordinates)	
	X	Y
SC12EX-MG_ _ _-…- _ _ 1-…	72	35
SC12EX-NG_ _ _-…- _ _ 1-…	119	17

4.8.3 Dimensions SC12EX-VG…

Type and dimensions	Type and dimensions
SC12EX-VG_ _ _-…- _ _0-…-A-V…	SC12EX-VG_ _ _-…- _ _1-…-A-V…
	

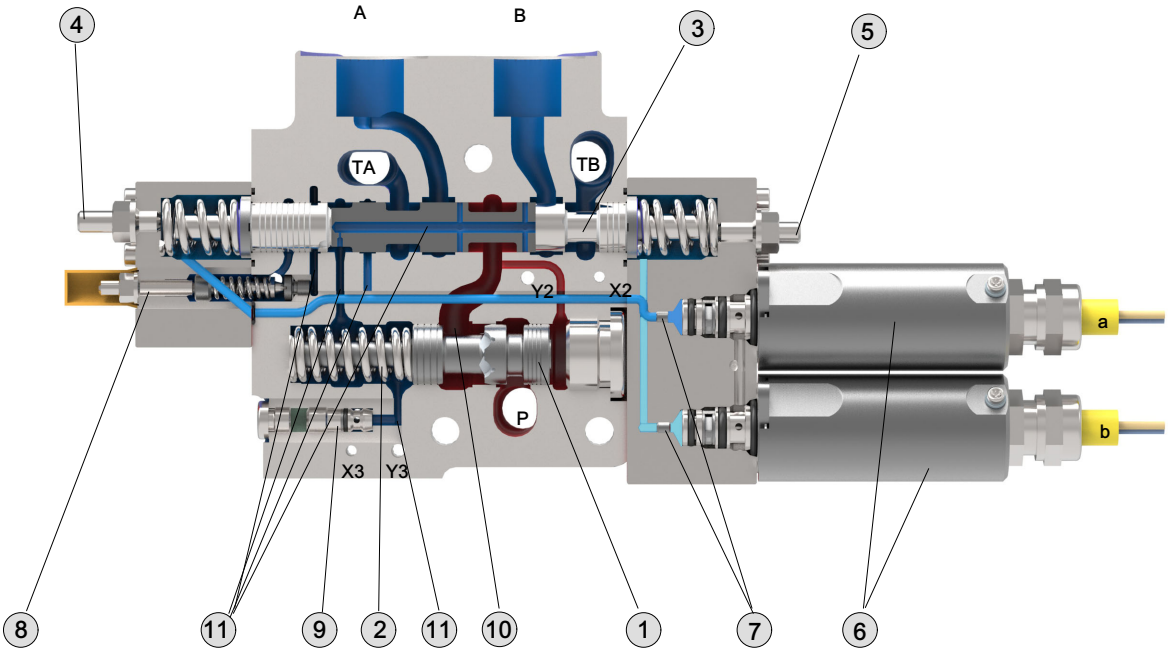
4.8.3.1 Port sizes

	Port	ISO 1179 Part 1
P	Pump	G1“
T	Tank	G1“
X, X2	Pilot oil supply	G¼“
XL	Load sensing	G¼“
Y	Pilot oil unloading	G¼“
MP	Test point, pump	G¼“
MT	Test point, tank	G¼“

5 Actuator modules

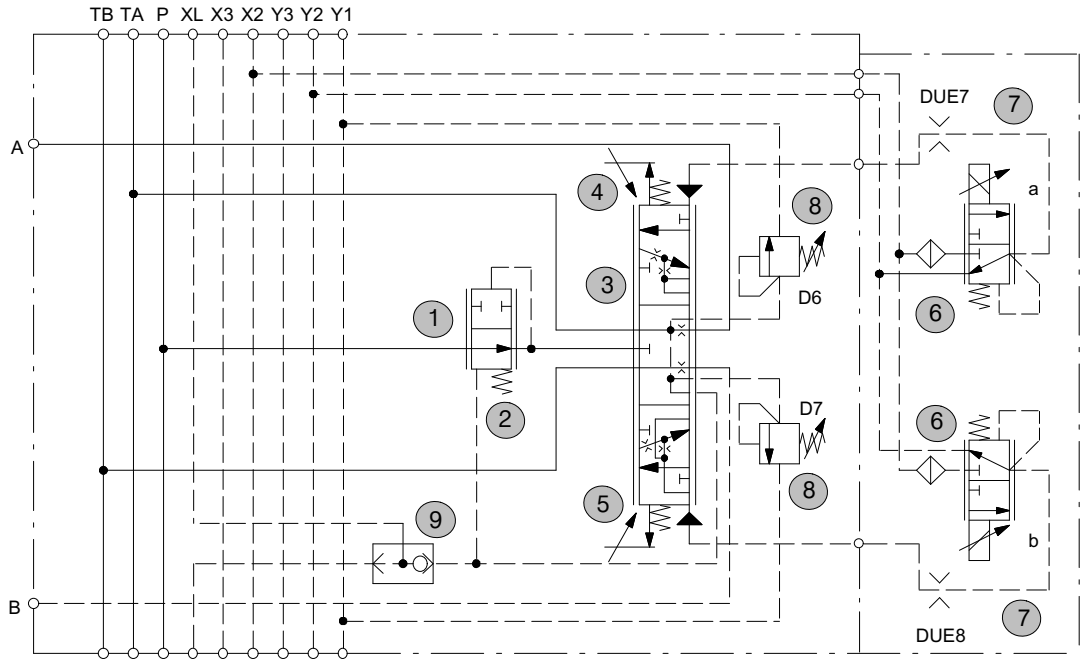
5.1 Functional description

The SC12EX series valve is a proportional directional control valve that works in accordance with the load-sensing principle.
The main control spool (3) determines the direction of flow and the rate of flow to the actuator ports A and B. When the main control spool is in the neutral position, there is no connection from pump port P to the actuator ports A and B. The load-sensing galleries are unloaded to tank. In this position, the pressure compensator spool (1) is pushed to the left against the pressure compensator control spring (2) by the pump pressure.
Adjustable stroke limiters (4, 5) determine the maximum flow rate for the respective actuator.
The pressure reducing valves (6) regulate the position of the main control spool. The magnitude of the electrical current at the pressure reducing valve determines the level of the pilot pressure. The pressure reducing valves are connected to the spring chambers of the main control spool, and the pilot pressure from one or other of these valves acts on the respective end face of the spool and thus controls the spool stroke (P -> A or P -> B).
The 2-way pressure compensator has several functions. When the proportional valve is operated, the load-sensing galleries (11) establish a connection between actuator port A or B and the spring chamber of the pressure compensator. The load pressure, assisted by the pressure compensator control spring (2), moves the pressure compensator spool (1) to the right against the reduced pump pressure (10) and into its control position. This process ensures that the flow rate through the actuator module is constantly controlled if there are pressure changes at the pump or the actuator ports. The flow rate to the actuator remains constant even under varying load pressures.
If the load pressure exceeds the value set at the pilot pressure relief valve (8), the pressure compensator spool (1) takes on the function of a pressure reducing valve. This restricts the flow rate from the pump to the actuator (primary pressure cut-off).
Backflow of the hydraulic fluid (A -> P or B -> P) can be prevented by using a pressure compensator with a load-holding function. This pressure compensator function is not leak-free. When using load-holding valves (load control valves, pilot-operated non-return valves), this pressure compensator function is not required.
The highest load pressure is signalled to the pump via shuttle valves (9).



Main valve spool in neutral position (spool pattern CA – A connected with TA, B with TB). Pressure compensator without load-holding function (actuator section Y)

5.1.1 Schematic



5.1.2 Description

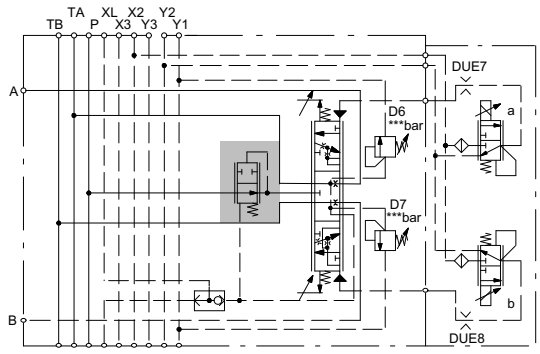
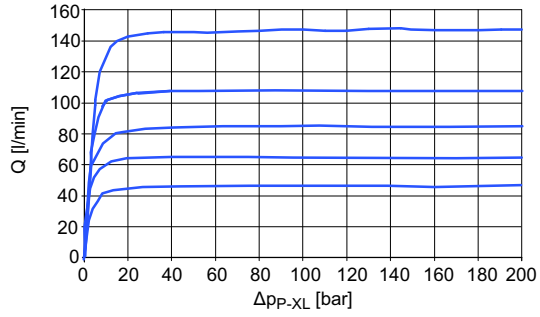
	Type
1	Pressure compensator spool
2	Pressure compensator control spring
3	Main spool
4	Stroke limiter, A-side
5	Stroke limiter, B-side
6	Pressure reducing valve
7	Damping orifice (pressure reducing valve)
8	Pilot pressure relief valve
9	Shuttle valve (load sensing system)
10	Reduced pump pressure
11	Load sensing gallery

5.1.3 Port

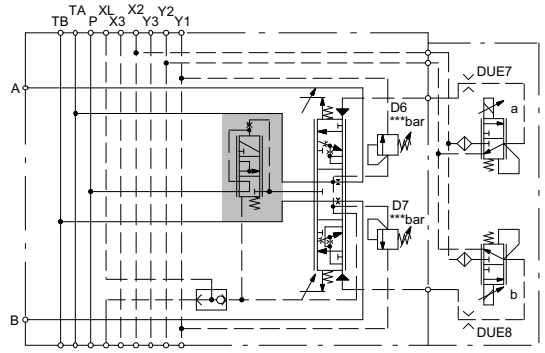
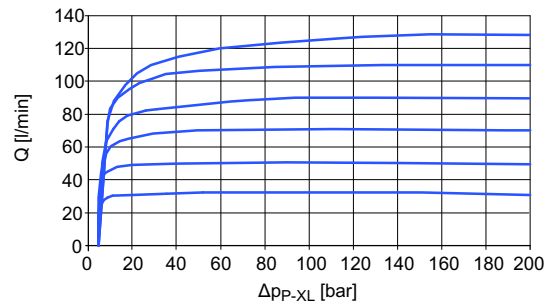
	Port
P	Pump
A, B	Actuator
TA, TB	Tank
X2, X3	Pilot oil supply
XL	Load sensing
Y1	Tank (pilot pressure relief valve)
Y2, Y3	Pilot oil unloading

5.2 Pressure compensator spool variants

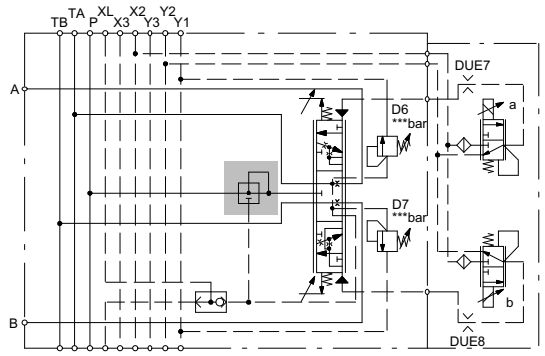
5.2.1 Pressure compensator without load-holding function

Type, symbol and characteristic curve	Description
SC12EX-Y…-…/…-…/…-…-…-…-…-…/…-A-V…	
	• Pressure compensator without load-holding function
	Flow control characteristics (2-way pressure compensator without load-holding function) Q = actuator flow A or B Δp = pump pressure - load pressure

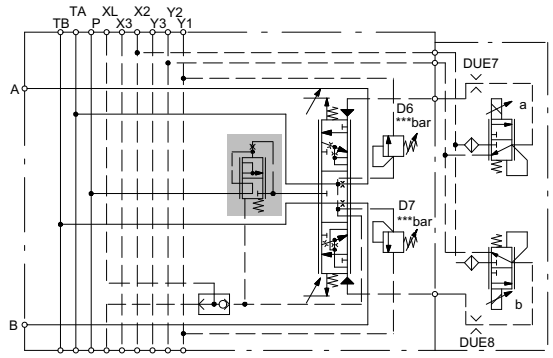
5.2.2 Pressure compensator with load-holding function

Type and symbol and characteristic curve	Description
SC12EX-Z…-…/…-…/…-…-…-…-…-…/…-A-V…	
	• Load-holding function is not leakage-free • Reduced pump pressure tap-off is plugged Caution: Maximum flow rate 95 l/min.
	Flow control characteristics (2-way pressure compensator with load holding function) Q = actuator flow, A or B Δp = pump pressure - load pressure

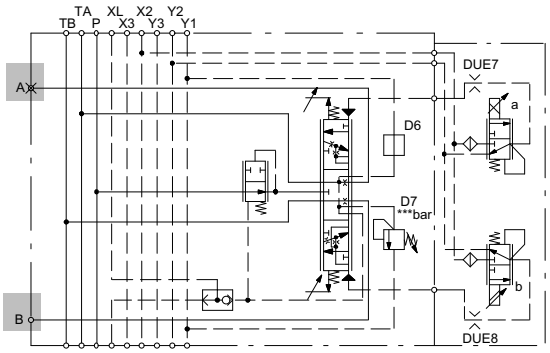
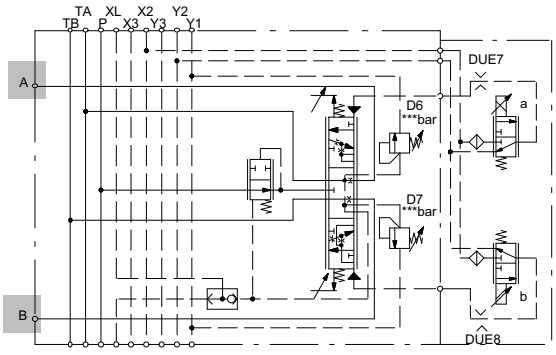
5.2.3 No pressure-compensator function

Type and symbol	Description
SC12EX-T…-…/…-…/…-…-…-…-…-…/…-A-V…	
	• Pressure compensator is disabled • No load-holding function Note: The actuator flow rate depends on the pump pressure and the load pressure.

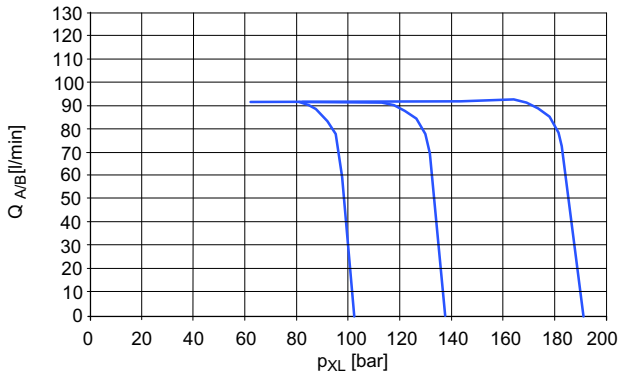
5.2.4 Load-holding valve function

Type and symbol	Description
SC12EX-R…-…/…-…/…-…-…-…-…-…/…-A-V…	
	• Pressure compensator is disabled • Load-holding function is not leakage-free • Reduced pump pressure tap-off is plugged Note: The actuator flow rate depends on the pump pressure and the load pressure.

5.3 Valve body variants

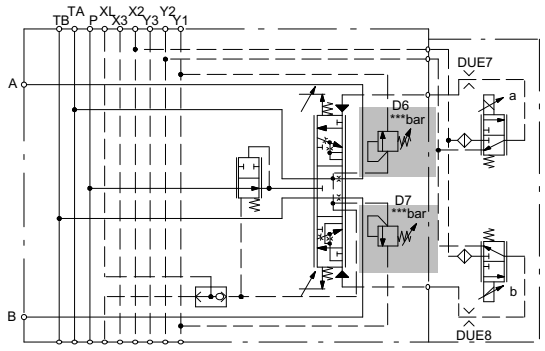
Type and symbol	Description
SC12EX-_ _ _ 2-…/…-…/…-…-…-…-…-…/…-A-V…	
	SC12EX-_ _G2-… • Port A = G½“: plugged • Port B = G½“ : open SC12EX-_ _H2-… • Port A = G¾“: plugged • Port B = G¾“ : open
SC12EX-_ _ _ _ 3-…/…-…/…-...-…-…-…/…-A-V…	
	SC12EX-_ _G3-… • Port A = G½“: open • Port B = G½“ : open SC12EX-_ _H3-… • Port A = G¾“: open • Port B = G¾“ : open

5.4 Primary-pressure cut-off

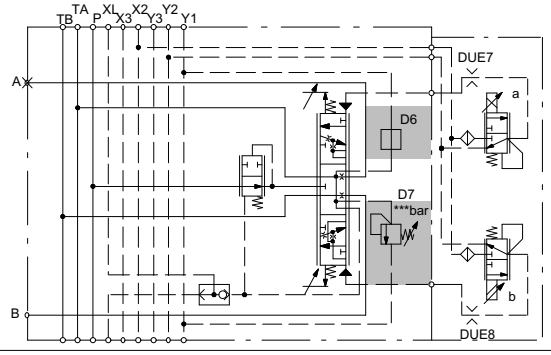
Type and symbol	Description
	Q = actuator flow, A oder B p_{XL} = load pressure minimum setting: 50 bar maximum setting: 370 bar

IMPORTANT!
The setting of the system pressure relief in the inlet module must be 20 bar higher than the highest value of the primary-pressure cut-off in the actuator modules.

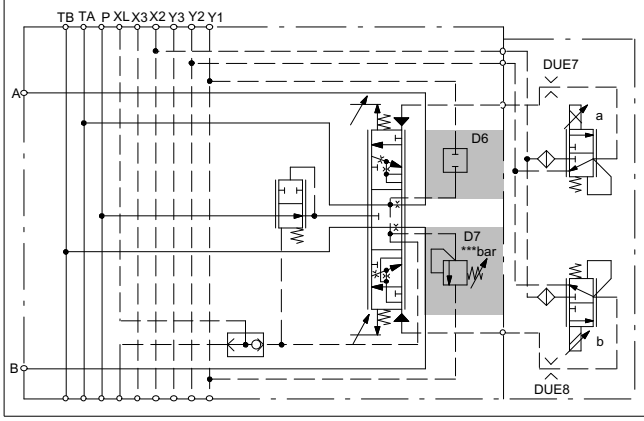
5.4.1 2 x primary-pressure cut-offs

Type and symbol	Description
SC12EX-…-D***/D***-…/…-…-…-…-…-…/…-A-V…	
	• Pressure setting in bar for actuator port A (3-digit) • Pressure setting in bar for actuator port B (3-digit)

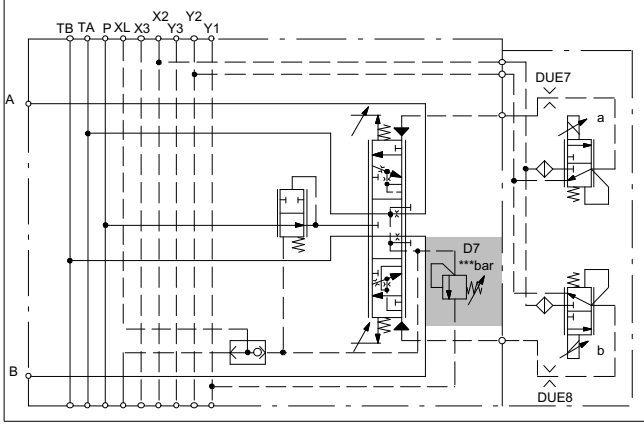
5.4.2 1 x venting plug and 1 x primary-pressure cut-off

Type and symbol	Description
SC12EX-…-T000/D***-…/…-…-…-…-…-…/…-A-V…	
	• Venting plug – primary-pressure cut-off (connection: open) for actuator port A • Pressure setting in bar for actuator port B (3-digit)

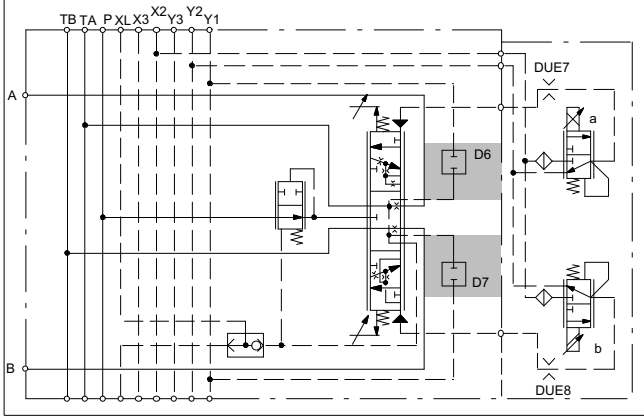
5.4.3 1 x sealing plug and 1 x primary-pressure cut-off

Type and symbol	Description
SC12EX-…-S000/D***-…/…-…-…-…-…/…-A-V…	
	• Sealing plug – primary-pressure cut-off (connection: shut off) for actuator port A • Pressure setting in bar for actuator port B (3-digit)

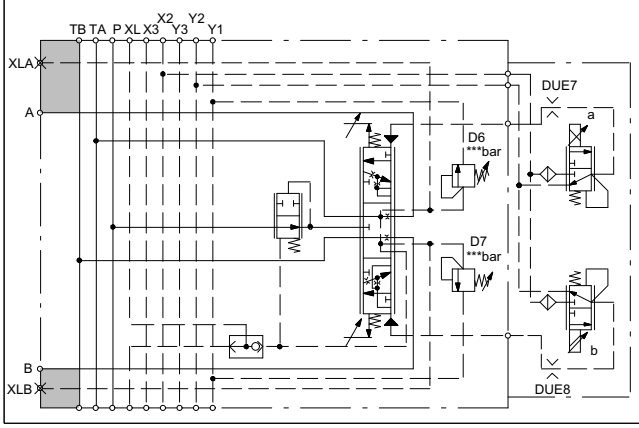
5.4.4 1 x primary-pressure cut-off (A- and B-side jointly)

Type and symbol	Description
SC12EX-…-X000/G***-…/…-…-…-…-…/…-A-V…	
	• Pressure setting in bar for actuator port A and B (3-digit)

5.4.5 Without primary-pressure cut-off

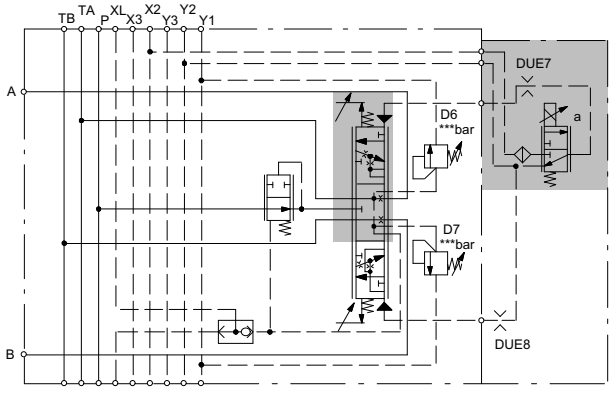
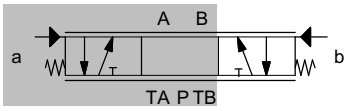
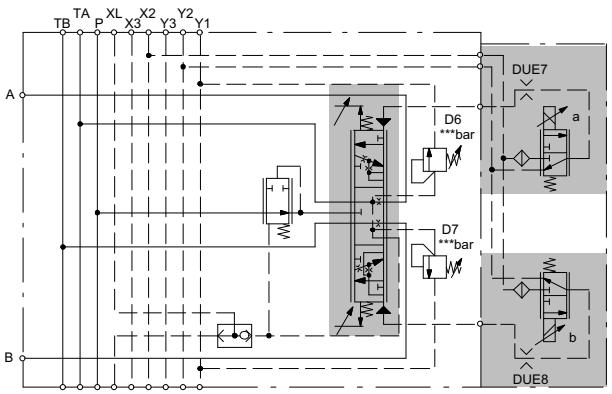
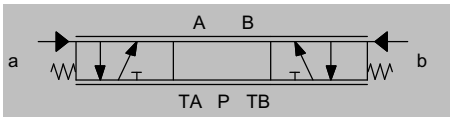
Type and symbol	Description
SC12EX-…-S000/S000-…/…-…-…-…-…/…-A-V…	
	• Sealing plug – primary-pressure cut-off (connection: shut off) for actuator port A • Sealing plug – primary-pressure cut-off (connection: shut off) for actuator port B

5.4.6 Separate load-sensing tapping

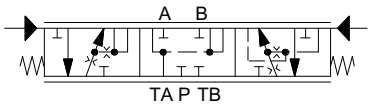
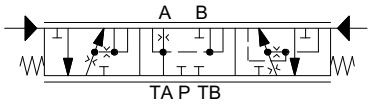
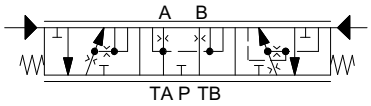
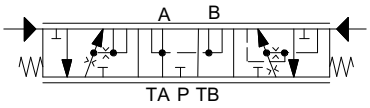
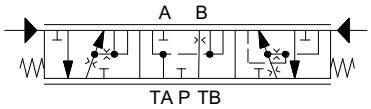
Type and symbol	Description
SC12EX-…-…/…-…/…-...-…-…-…-…/…-A-V 9	
	• Port XLA = G¼“: plugged • Port XLB = G¼“ : plugged

5.5 Main valve spool

5.5.1 Spool position

Type and symbol	Description
SC12EX-…-…/…-1_ …/…-...-…-…-…-…/…-A-V…	
	• Spool with 2 switched positions  • Control at a
SC12EX-…-…/…-3_…/…-...-…-…-…-…/…-A-V…	
	• Spool with 3 switched positions  • Control at a and b

5.5.2 Spool type

Type and symbol	Description
SC12EX-…-…/…-_AA _ _ _ / _ _ _ A00_-...-…-…-…-…/…-A-V…	
	• Spool type AA • Flow rate data in l/min for actuator port A (3-digit) • Flow rate data in l/min for actuator port B (3-digit) • Corresponding pressure-compensator spring
SC12EX-…-…/…-_BA _ _ _ / _ _ _ A00_-...-…-…-…-…/…-A-V…	
	• Spool type BA • Flow rate data in l/min for actuator port A (3-digit) • Flow rate data in l/min for actuator port B (3-digit) • Corresponding pressure-compensator spring
SC12EX-…-…/…-_CA _ _ _ / _ _ _ A00_-...-…-…-…-…/…-A-V…	
	• Spool type CA (throttled-open neutral position) • Flow rate data in l/min for actuator port A (3-digit) • Flow rate data in l/min for actuator port B (3-digit) • Corresponding pressure-compensator spring
SC12EX-…-…/…-_CB _ _ _ / _ _ _ A00_-...-…-…-…-…/…-A-V…	
	• Spool type CB (open neutral position) • Flow rate data in l/min for actuator port A (3-digit) • Flow rate data in l/min for actuator port B (3-digit) • Corresponding pressure-compensator spring
SC12EX-…-…/…-_DA _ _ _ / _ _ _ A00_-…-…-…-…-…/…-A-V…	
	• Spool type DA • Flow rate data in l/min for actuator port A (3-digit) • Flow rate data in l/min for actuator port B (3-digit) • Corresponding pressure-compensator spring

Note: For a spool with 2 operating positions (spool position 1), the flow rate for actuator port A is used to specify the flow rate for actuator port B.

5.5.3 Flow rate

5.5.3.1 Symmetrical spools

Flow rate (A-side / B-side) [l/min]

Compensator	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B	Q_A/Q_B
Y	130/130	090/090	060/060	040/040	027/027	018/018	012/012	008/008
Z	095/095	065/065	044/044	030/030	020/020	013/013	009/009	006/006
R								
T								

Note:
With the R and T pressure compensators, the circuit design is done by Bucher Hydraulics.

5.5.3.2 Asymmetrical spools

The higher flow rate should be assigned to the A side. For combinations, please contact Bucher Hydraulics.

5.5.3.3 Example

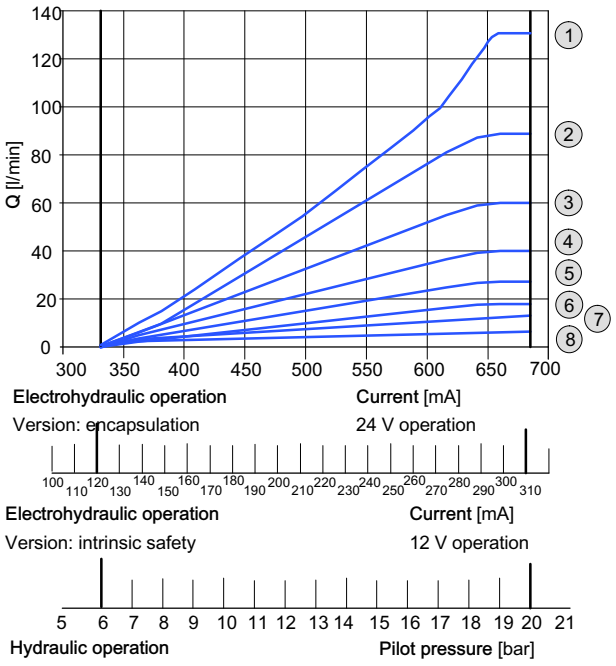
Flow rate A-side / B-side: 100/100 l/min

1. Table (Section 5.5.3.1): pressure compensator Y -> spool with flow rateQ_A/Q_B= 130/130 l/min
2. Changing the setting to 100/100 l/min is done with the stroke limiter.

5.5.4 Performance graphs

5.5.4.1 Flow-rate characteristic

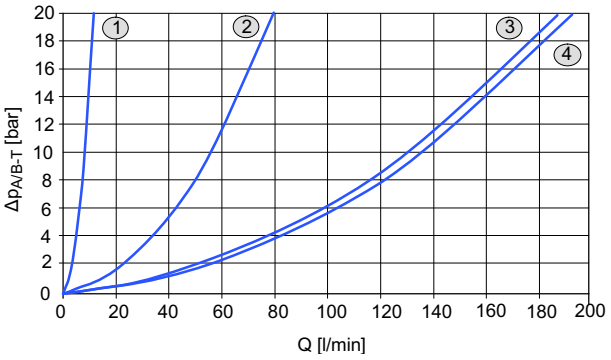
Q = actuator flow rate to A or B



Graph	Actuator flow rate [l/min]	
1	130	Compensator: Y (w/out load-hold function)
2	90	
3	60	Spool geometry: A00
4	40	
5	27	
6	18	Compensator spring: N
7	12	
8	8	

5.5.4.2 Pressure differential A/B - T

Q = actuator flow rate to A or B
Δp = actuator pressure - tank pressure

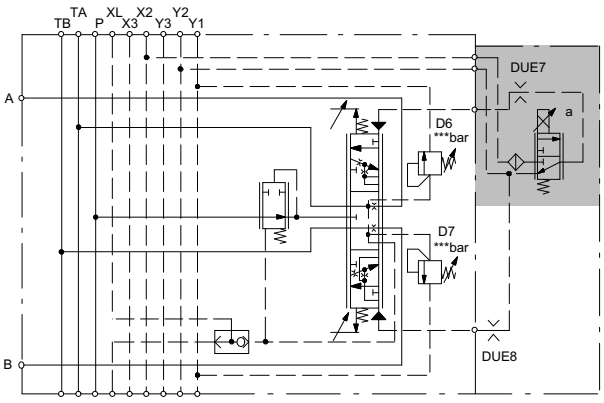
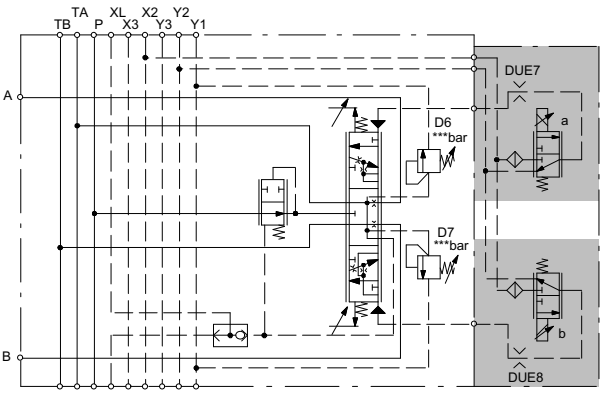


Graph	Spool pattern	
1	CA	Neutral position
2	CB	
3	AA or CA	100% energisation
4	CB	

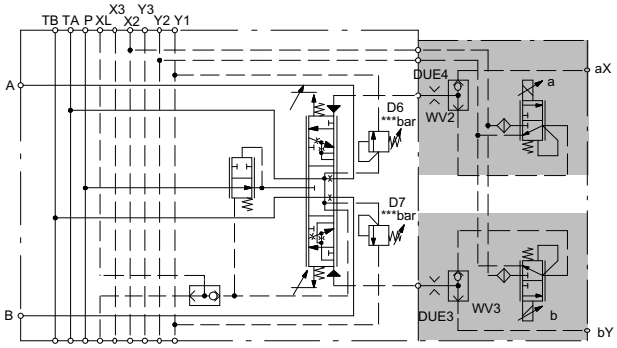
5.6 Types of operation

5.6.1 Operation type – electrohydraulic proportional

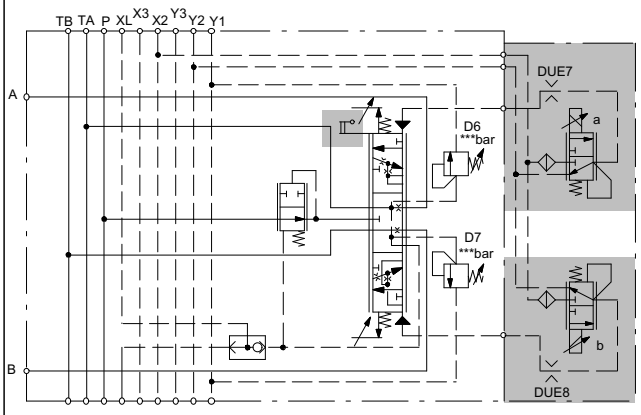
5.6.1.1 Electrohydraulic proportional (ignition protection type m: encasulation)

Type and symbol	Description
SC12EX-…-…/…-1…/…-E _ _ X-X-XX-…/…-A-V 1	
	• Explosion protection version (aluminium-free) • Proportional pressure reducing valve (ignition protection type m: encapsulation) (design: cartridge valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a • Damping orifice (at both sides) • Spool types AA, CA, CB Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning
SC12EX-…-…/…-3…/…-E _ _ X-X-XX-…/…-A-V 1	
	• Explosion protection version (aluminium-free) • Proportional pressure reducing valve (ignition protection type m: encapsulation) (design: cartridge valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning

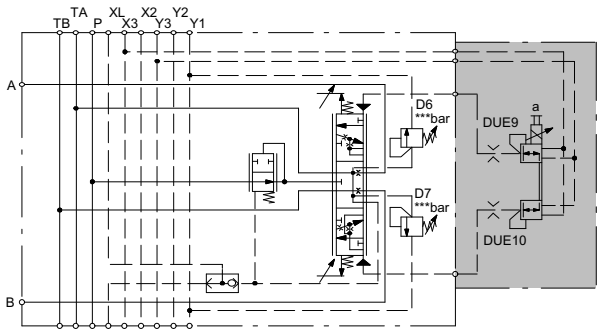
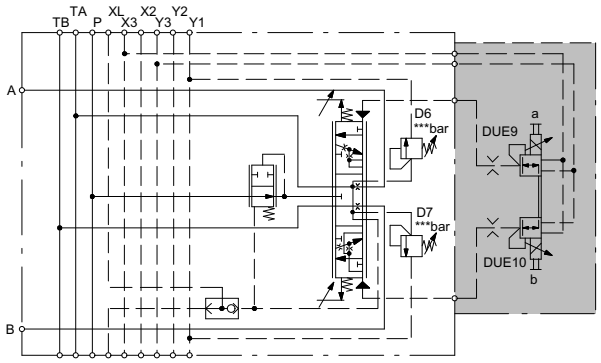
5.6.1.2 Electrohydraulic proportional (Ignition protection type m: encapsulation) and hydraulic operation

Type and symbol	Description
SC12EX-…-…/…-3…/…-E _ _ X-D-XX-…/…-A-V 1	
	• Explosion protection version (aluminium-free) • Proportional pressure reducing valves (ignition protection type m: encapsulation) (design: cartridge valve) • Without displacement sensor • With hydraulic operation • Without manual operation • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar Only in combination with • Inlet module with external pilot-oil supply oder • Inlet module with pilot-pressure conditioning

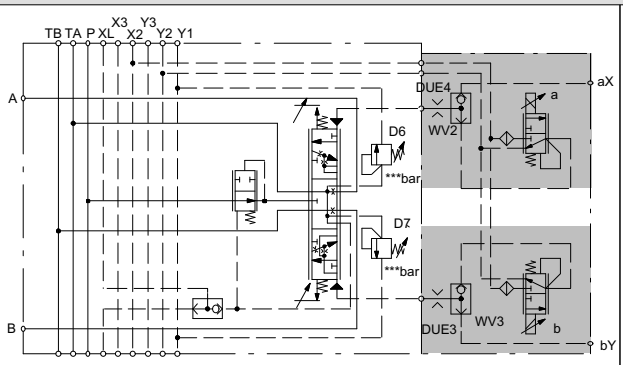
5.6.1.3 Electrohydraulic proportional (Ignition protection type m: encapsulation) and hand lever

Type and symbol	Description
SC12EX-…-…/…-3…/…-E _ _ X-X- _ _ -…/…-A-V 1	
	• Explosion protection version (aluminium-free) • Proportional pressure reducing valves (ignition protection type m: encapsulation) (design: cartridge valve) • Without displacement sensor • Without hydraulic operation • Manual operation • Follower-type hand lever: The mechanical operator can override the electro-hydraulic operation. The hand lever is directly connected to the main spool and follows the spool movement during electrohydraulic operation. • All lever positions can be supplied • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…-…- H_-…/…-A-V… **Emergency manual operation (short lever)** SC12EX-…-…/…-…/…-…-…-…- N_-…/…-A-V…

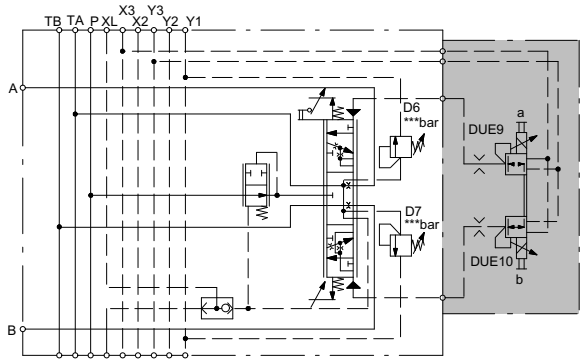
5.6.1.4 Electrohydraulic proportional (ignition protection type i: intrinsic safety)

Type and symbol	Description
SC12EX-…-…/…-1…/…-F _ _ X-X-XX-…/…-A-V 25	
	• Explosion protection version (aluminium free) • Proportional pressure reducing valve (Ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a • Damping orifice (at both sides) • Spool types AA, CA, CB Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3
SC12EX-…-…/…-3…/…-F _ _ X-X-XX-…/…-A-V 25	
	• Explosion protection version (aluminium-free) • Proportional pressure reducing valves (Ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3

5.6.1.5 Electrohydraulic proportional (ignition protection type i: intrinsic safety) and hydraulic operation

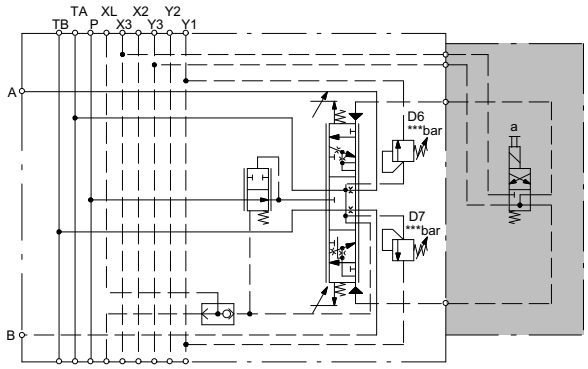
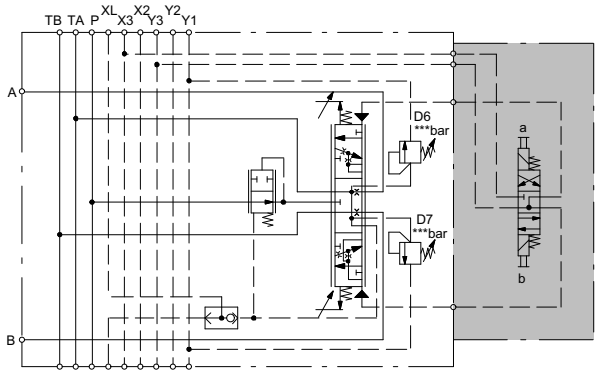
Type and symbol	Description
SC12EX-…-…/…-3…/…-F _ _ X-D-XX-…/…-A-V 25	
	• Explosion protection version (aluminium free) • Proportional pressure reducing valves (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • With hydraulic operation • Without manual operation • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3

5.6.1.6 Electrohydraulic proportional (ignition protection type i: intrinsic safety) and hand lever

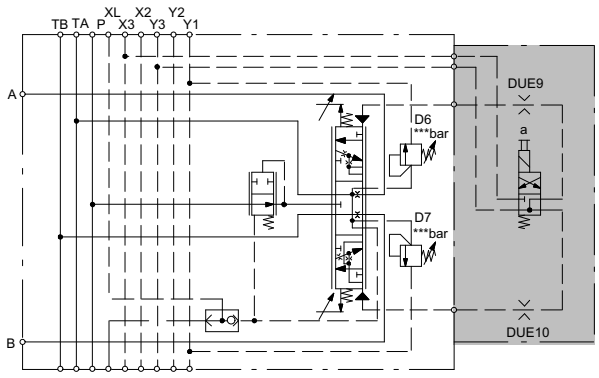
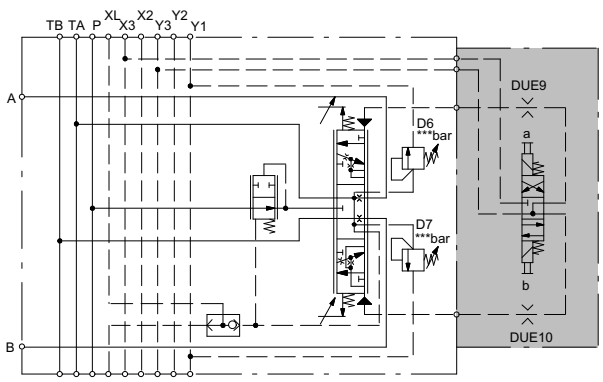
Type and symbol	Description
SC12EX-…-…/…-3…/…-F _ _ X-X- _ _ -…/…-A-V 25	
	• Explosion protection version (aluminium-free) • Proportional pressure reducing valves (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Manual operation • Follower-type hand lever: The mechanical operator can override the electro-hydraulic operation. The hand lever is directly connected to the main spool and follows the spool movement during electrohydraulic operation. • All lever positions can be supplied • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3 **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…- H_-…/…-A-V… **Emergency manual operation (short lever)** SC12EX-…-…/…-…/…-…-…- N_-…/…-A-V…

5.6.2 Operation type – electrohydraulic on-off

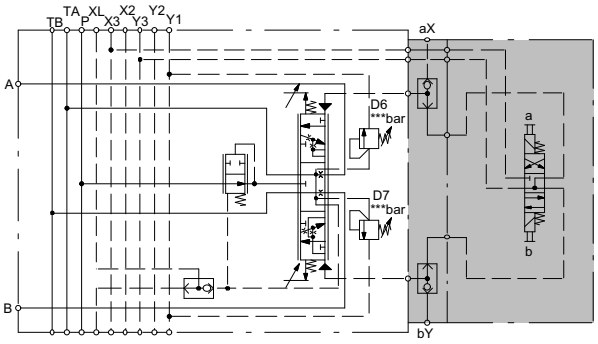
5.6.2.1 Electrohydraulic on-off (ignition protection type i: intrinsic safety), without damping orifice

Type and symbol	Description
SC12EX-…-…/…-1…/…-F _ _ X-X-XX-…/…-A-V 21	
	• Explosion protection version (aluminium-free) • On-off valve (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a • Without damping orifice • Spool types AA, CA, CB Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar. Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3
SC12EX-…-…/…-3…/…-F _ _ X-X-XX-…/…-AV 21	
	• Explosion protection version (aluminium-free) • On-off valves (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a and b • Without damping orifice • Spool types AA, BA, CA, CB, DA Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar. Only in combination with: • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning Only in combination with: • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3

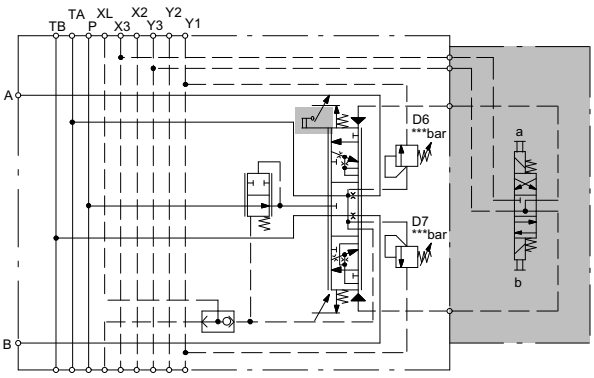
5.6.2.2 Electrohydraulic on-off (ignition protection type i: intrinsic safety), with damping orifice at both sides

Type and symbol	Description
SC12EX-…-…/…-1…/…-F _ _ X-X-XX-…/…-A-V 25	
	• Explosion protection version (aluminium-free) • On-off valve (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a • Damping orifice (at both sides) • Spool types AA, CA, CB Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar. Only in combination with: • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3
SC12EX-…-…/…-3…/…-F_ _X-X-XX-…/…-A-V 25	
	• Explosion protection version (aluminium-free) • On-off valves (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Without manual operation • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar. Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3

5.6.2.3 Electrohydraulic on-off (ignition protection type i: intrinsic safety) and hydraulic operation

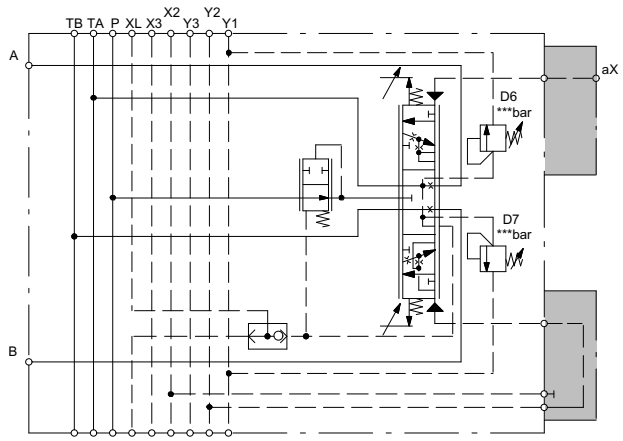
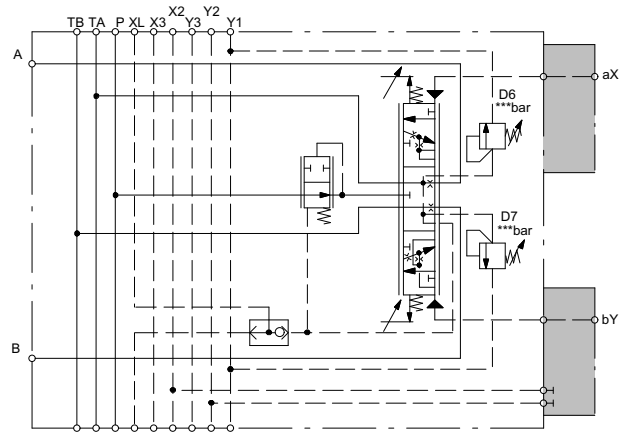
Type and symbol	Description
SC12EX-…-…/…-3…/…-F _ _ X-D-XX-…/…-A-V 21	
	• Explosion protection version (aluminium free) • On-off valves (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Hydraulic operation • Without manual operation • Control at a and b • Without damping orifice • Spool types AA, BA, CA, CB, DA Caution: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar. Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3

5.6.2.4 Electrohydraulic on-off (ignition protection type i: intrinsic safety) and hand lever

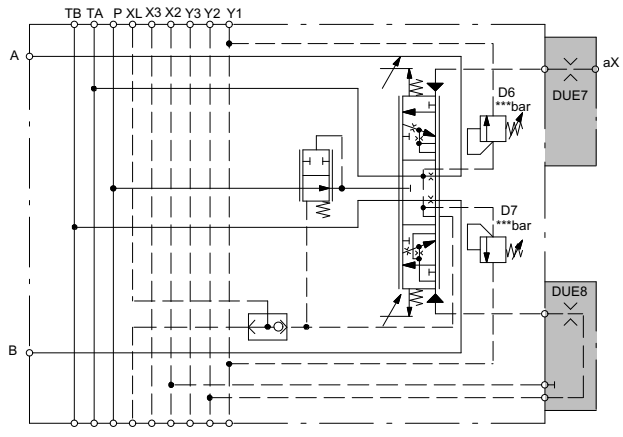
Type and symbol	Description
SC12EX-…-…/…-3…/…-F _ _ X-X-_ _-…/…-A-V 21	
	• Explosion protection version (aluminium-free) • On-off valves (ignition protection type i: intrinsic safety) (design: manifold-mounting valve) • Without displacement sensor • Without hydraulic operation • Manual operation • Follower-type hand lever: The mechanical operator can override the electro-hydraulic operation. The hand lever is directly connected to the main spool and follows the spool movement during electrohydraulic operation. • All lever positions can be supplied • Control at a and b • Without damping orifice • Spool types AA, BA, CA, CB, DA Note: Maximum supply pressure to the electrohydraulic pilot stage: 50 bar. Only in combination with • Inlet module with external pilot-oil supply or • Inlet module with pilot-pressure conditioning Only in combination with • End module SC12EX-…-A-V1 or • End module SC12EX-…-A-V3 **Manual operation (standard)** SC12-…-…/…-…/…-…-…- H_-…/…-A-V… **Emergency manual operation (short lever)** SC12-…-…/…-…/…-…-…- N_-…/…-A-V…

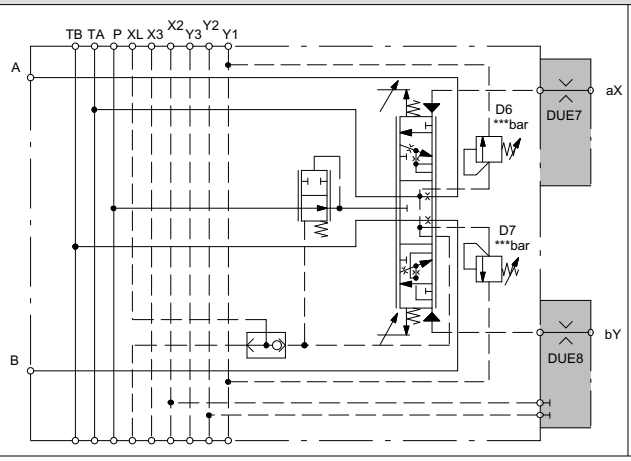
5.6.3 Operation type – hydraulic

5.6.3.1 Hydraulic, without damping orifices

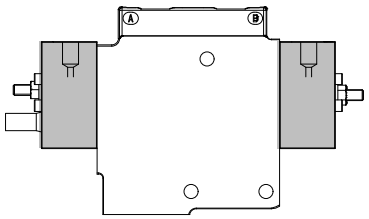
Type and symbol	Description
SC12EX-…-…/…-1…/…-X00X-Y-XX-…/…-A-V22	
	• Explosion protection version (aluminium-free) • Hydraulic operation of the main spool. When not operated, centred in neutral position by springs • Without electrical operation • Without manual operation • Control at a • Without damping orifices • Spool types AA, CA, CB
SC12EX-…-…/…-3…/…-X00X-Y-XX-…/…-A-V22	
	• Explosion protection version (aluminium-free) • Hydraulic operation of the main spool. When not operated, centred in neutral position by springs • Without electrical operation • Without manual operation • Control at a and b • Without damping orifices • Spool types AA, BA, CA, CB, DA

5.6.3.2 Hydraulic, with damping orifice at both sides

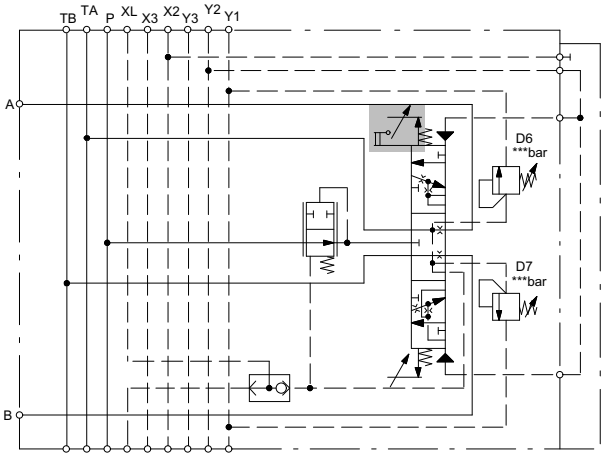
Type and symbol	Description
SC12EX-...-…/…-1…/…-X00X-Y-XX-…/…-A-V1	
	• Explosion protection version (aluminium-free) • Hydraulic operation of the main spool. When not operated, centred in neutral position by springs • Without electrical operation • Without manual operation • Control at a • Damping orifice (at both sides) • Spool types AA, CA, CB

SC12EX-…-…/…-3…/…-X00X-Y-XX-…/…-A-V1	
	• Explosion protection version (aluminium-free) • Hydraulic operation of the main spool. When not operated, centred in neutral position by springs • Without electrical operation • Without manual operation • Control at a and b • Damping orifice (at both sides) • Spool types AA, BA, CA, CB, DA

5.6.3.3 Orientation of the ports

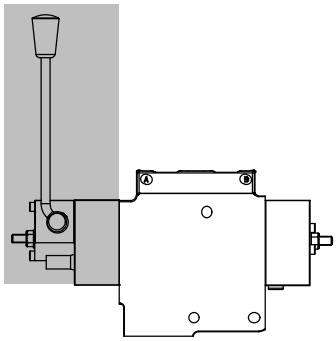
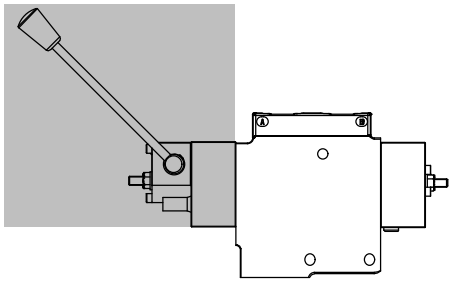
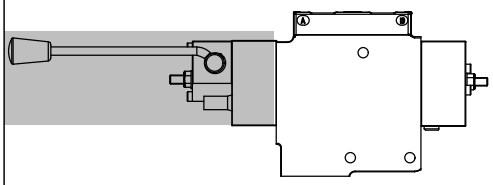
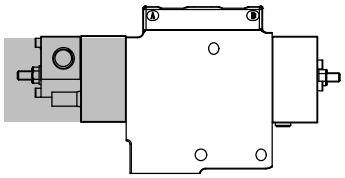
Type and symbol	Description
SC12EX-…-…/…-…/…-…- Y -…-…/…-A-V…	
	• Hydraulic operation • 2 covers, each with 1 vertical port (standard)

5.6.4 Operation type – mechanical

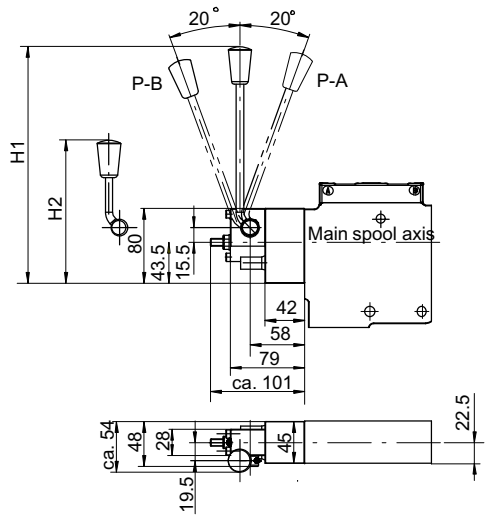
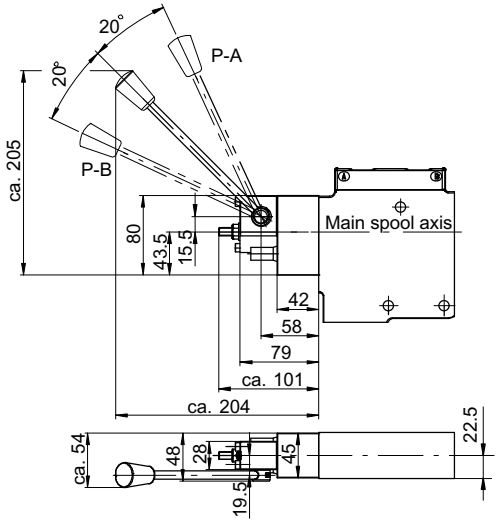
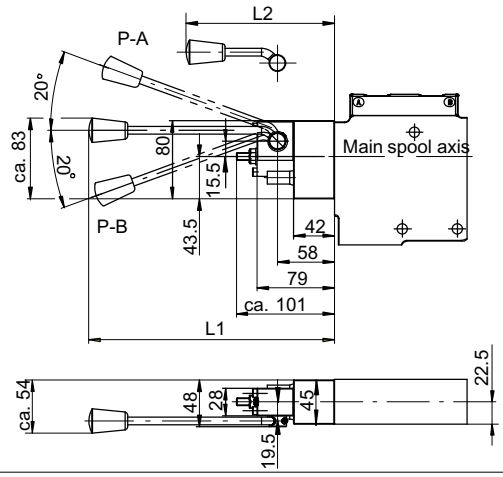
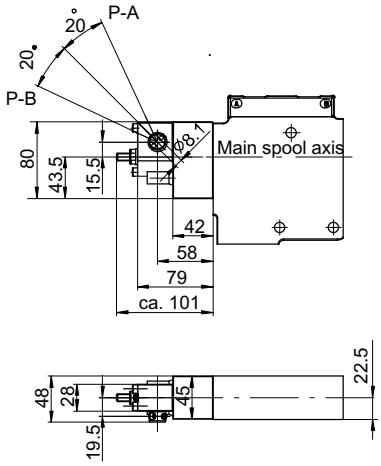
Type and symbol	Description
SC12EX-…-…/…-3…/…-X00X-X- _ _ -…/…-A-V22	
	• Explosion protection version (aluminium-free) • Mechanical operation of the main spool. When not operated, centred in neutral position by springs • Without electrical operation • Without hydraulic operation • All lever positions can be supplied • Control at a and b • Spool types AA, BA, CA, CB, DA **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…- H_-…/…-A-V… **Emergency manual operation (short lever)** SC12EX-…-…/…-…/…-…-…- N_-…/…-A-V…

5.6.5 Lever

5.6.5.1 Lever orientation

Type and symbol	Description
SC12EX-…-…/…-…/…-…-…- _G-…/…-A-V…	
	• Manual operation • Lever position G • Cranked hand lever **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…- HG-…/…-A-V… **Emergency manual operation (short lever)** SC12EX-…-…/…-…/…-…-…- NG-…/…-A-V…
SC12EX-…-…/…-…/…-…- _O-…/…-A-V…	
	• Manual operation • Lever position O • Straight hand lever **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…- HO-…/…-A-V…
SC12EX-…-…/…-…/…-…-…- _S-…/…-A-V…	
	• Manual operation • Lever position S • Cranked hand lever **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…- HS-…/…-A-V… **Emergency manual operation (short lever)** SC12EX-…-…/…-…/…-…-…- NS-…/…-A-V…
SC12EX-…-…/…-…/…-…- _X-…-…/…-A-V…	
	• Manual operation • Lever position X • Without hand lever **Manual operation (standard)** SC12EX-…-…/…-…/…-…-…- HX-…/…-A-V…

5.6.5.2 Lever position

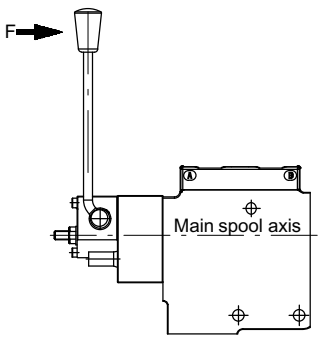
Lever position: G	Lever position: O
	
Lever position: S	**Lever position: X**
	

5.6.5.3 Total length

Ordering code	Cover height	
	H1	H2
SC12EX-…- HG-…	ca. 253	
SC12EX-…- NG-…		ca. 153

Ordering code	Cover length	
	L1	L2
SC12EX-…- HS-…	ca. 252	
SC12EX-…- NS-…		ca. 152

5.6.5.4 Operating force on hand lever

Type and symbol	Description
	**Operator:** E37X-X-H_, X00X-X-H_ Maximum force: 40 N **Operator:** E37X-X-N_ Maximum force: 92 N **Operator:** F23X-X-H_, F26X-X-H_, F27X-X-H_, F28X-X-H_, F29X-X-H_, F44X-X-H_, F45X-X-H_, F46X-X-H_, F47X-X-H_, F48X-X-H_ Maximum force: 23 N **Operator:** F23X-X-N_, F26X-X-N_, F27X-X-N_, F28X-X-N_, F29X-X-N_, F44X-X-N_, F45X-X-N_, F46X-X-N_, F47X-X-N_, F48X-X-N_ Maximum force: 54 N

5.7 Ordering code

5.7.1 Ordering code for actuator module, part 1

SC | 12 | EX | - | Y | 3 | G | 3 | - | D | 330 | / | S | 000 | - | 3 | CA | 130 | / | 130

SC Sectional design

12 Nominal size

EX Explosion protection

Actuator section
- R load-holding valve function
- T without pressure compensator
- Y pressure comp. without load-holding function
- Z pressure comp. with load-holding function

3 **Actuator section number**
(max. 8; > 8 on application)

Connection type
- G threaded port (ISO 1179-Part 1 G½")
- H threaded port (ISO 1179-Part 1 G¾")

Open ports
- 2 port A: plugged, port B: open
- 3 port A: open, port B: open

Load sensing A (D6)
- D primary pressure cut-off D6, manual setting
- S sealing plug – primary-pressure cut-off, (connection shut off)
- T venting plug – primary-pressure cut-off, (connection open)
- X without primary-pressure cut-off D6, (valve cannot be retrofitted)

Pressure cut-off port A, primary [bar]
- 000 without (only in combination with load sensing S, T or X)
- 330 specify the required setting (e.g. 330 bar)

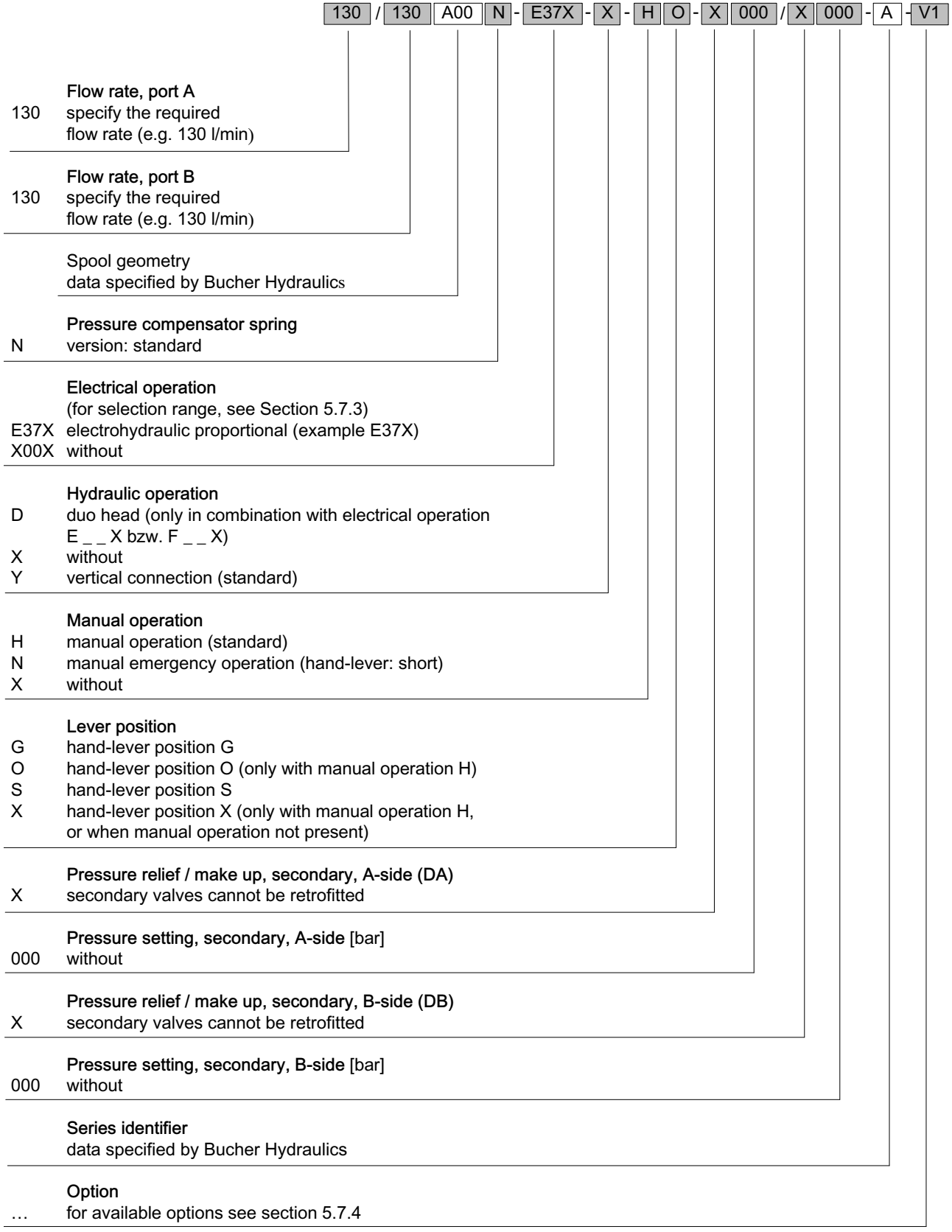
Load sensing B (D7)
- D primary pressure cut-off D7, manual setting (load sensing B)
- G primary pressure cut-off D7, manual setting (load sensing A and B)
- S sealing plug – primary-pressure cut-off, (connection shut off)

Pressure cut-off port B, primary [bar]
- 000 without (only in combination with load sensing S or X)
- 330 specify the required setting

Spool position
- 1 control at a
- 3 control at a and b

Spool symbol
- CA specify required spool symbol, (e.g. CA)

5.7.2 Ordering code for actuator module, part 2



5.7.3 Electrical operation

5.7.3.1 Electrohydraulic proportional, without displacement sensor

Ignition protection type m: encapsulation						
Manual emergency operation	Plug connector (solenoid)	Certificate (solenoid valve)			Supply voltage	Ordering code
		ATEX	IECEx	MA		
Without	Flying leads	x	x		24 V	E37X

Ignition protection type i: intrinsic safety						
Manual emergency operation	Plug connector (solenoid)	Certificate (solenoid)			Nominal voltage	Ordering code
		ATEX	IECEx	MA		
w´With	G4W1F	x			12 V	F28X
				x	12 V	F47X
	Terminal box	x			12 V	F26X
				x	12 V	F45X

5.7.3.2 Electrohydraulic on-off, without displacement sensor

Zündschutzart i: intrinsic safety						
Manual emergency operation	Plug connector (solenoid)	Certificate (solenoid)			Nominal voltage	Ordering code
		ATEX	IECEx	MA		
With	Flying leads	x			12 V	F23X
					12 V	F44X
	G4W1F	x			12 V	F29X
					12 V	F48X
	Terminal box	x			12 V	F27X
					12 V	F46X

5.7.4 Options

V1 Explosion protection version (aluminium-free)
Damping orifice in the operator (both sides)

V9 Explosion protection version (aluminium-free)
Damping orifice in the operator (both sides)
separate load-sensing tapping
port XLA = G¼“ : plugged
port XLB = G¼“ : plugged

V17 Explosion protection version (aluminum-free)
No damping orifice in the operator
Manifold-mounting valve (electrical operation)

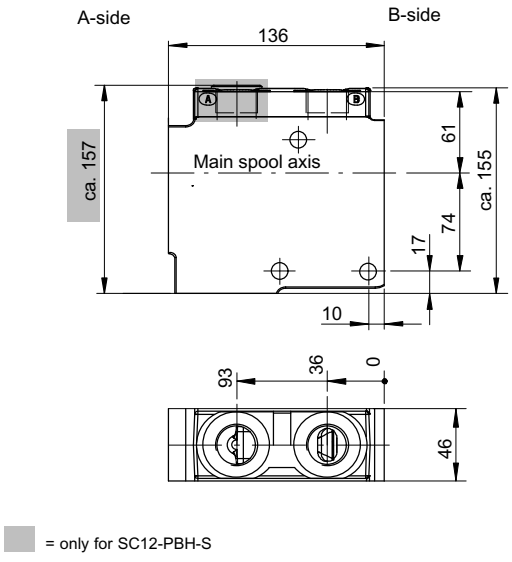
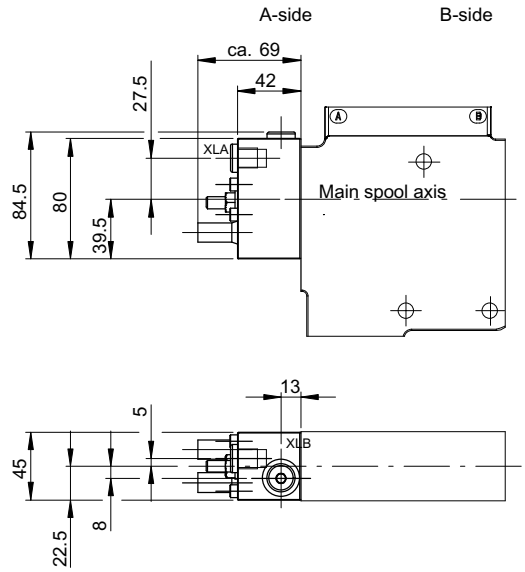
V22 Explosion protection version (aluminium-free)
No damping orifice in the operator

V25 Explosion protection version (aluminum-free)
Damping orifice in the operator (both sides)
Manifold-mounting valve (electrical operation)

Combinations of different options (e.g. V9 and V25) are possible. When ordering, they are specified individually in the ordering code and later replaced by a single option number by Bucher Hydraulics .

5.8 Dimensions

5.8.1 Dimensions, valve body variants and primary-pressure cut-off

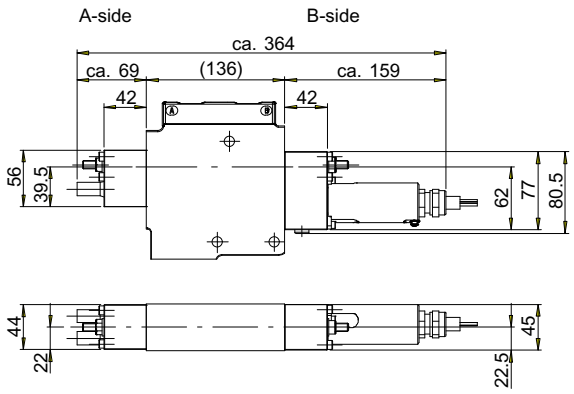
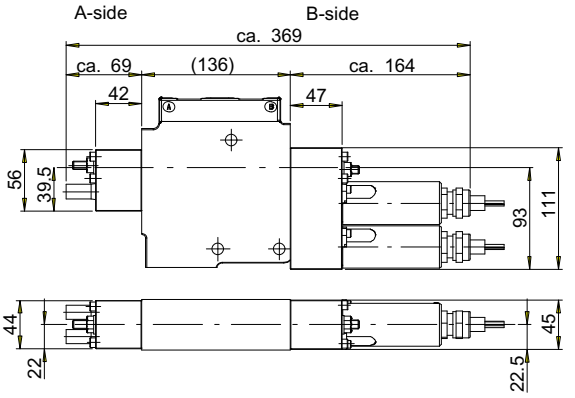
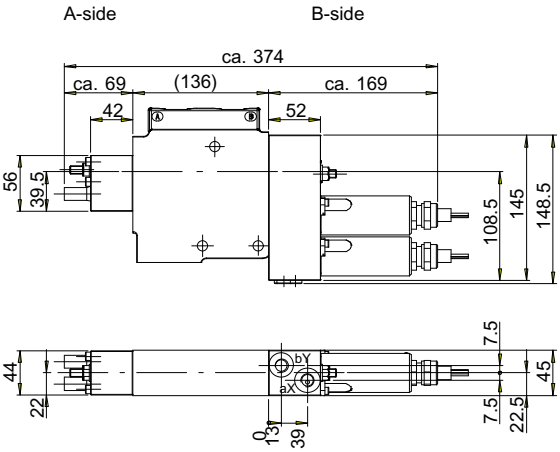
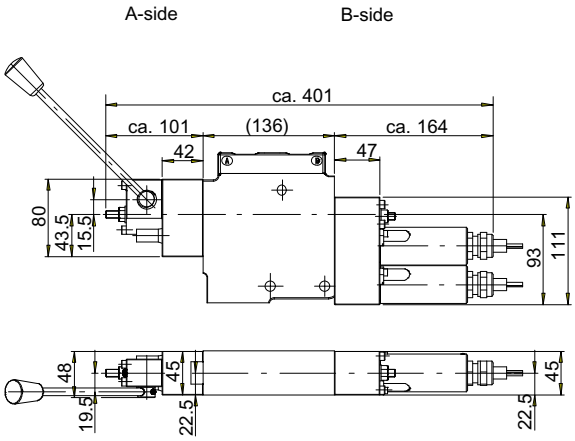
Type and Dimensions	Type and Dimensions
SC12EX- _ _ _ 2-…/…-…/…-…-…-…-…-…/…-A-V… SC12EX- _ _ _ 3-…/…-…/…-…-…-…-…-…/…-A-V…	SC12EX-…-…/…-…/…-…-…-…-…-…/.-A-V 9
	

5.8.1.1 Port sizes

Ordering code	Port		ISO 1179 Part 1
SC12EX- _ _ G _-…	A, B	Actuator	G½“
SC12EX- _ _ H _-…	A, B	Actuator	G¾“
SC12EX- …-V9	XLA, XLB	Load signal	G¼“

5.8.2 Types of operation

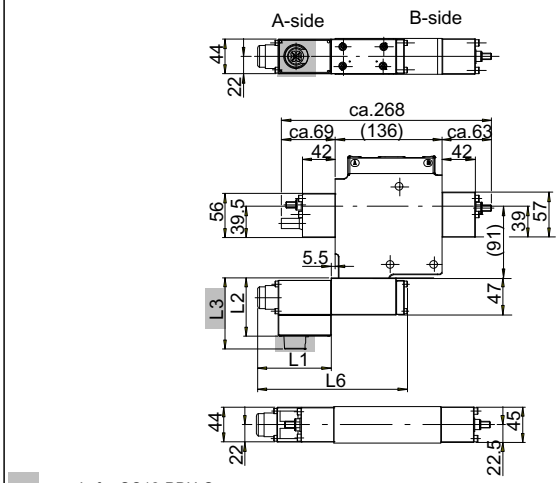
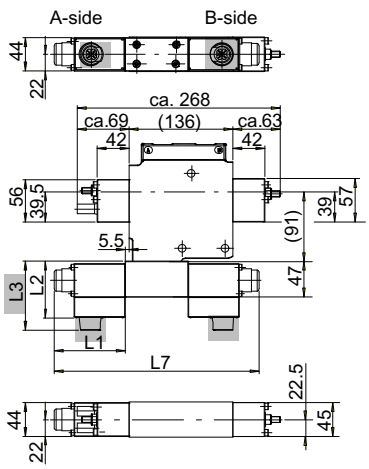
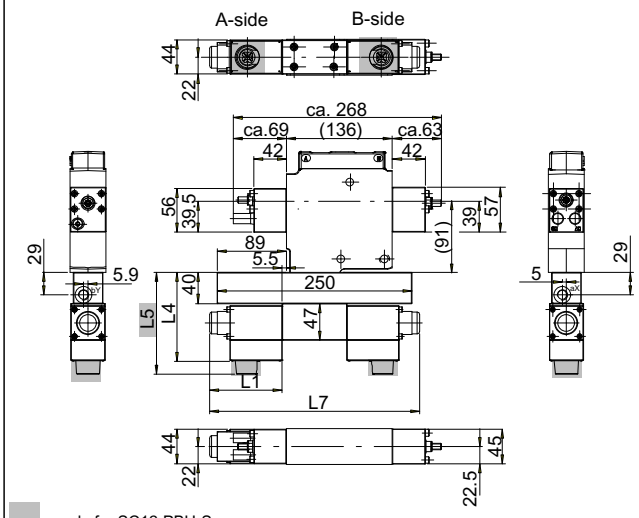
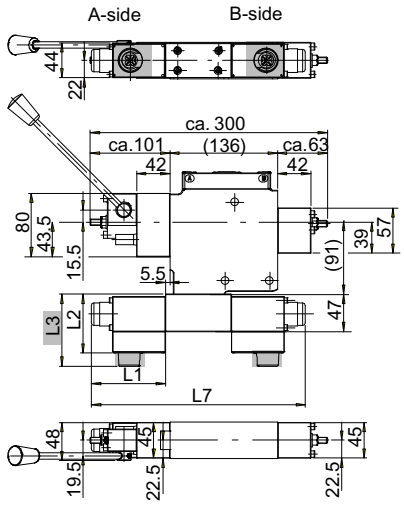
5.8.2.1 Dimensions, types of operation, part 1

Type and dimensions	Type and dimensions
SC12EX-…-…/…-1…/…-E _ _ X-X-XX-…/…-A-V1	SC12EX-…-…/…-3…/…-E _ _ X-X-XX-…/…-A-V1
	
Type and dimensions	**Type and dimensions**
SC12EX-…-…/…-3…/…-E _ _ X-D-XX-…/…- A-V1	SC12EX-…-…/…-3…/…-E _ _ X-X-H_-…/…-A-V1 SC12EX-…-…/…-3…/…-E _ _ X-X-N_-…/…-A-V1
	

5.8.2.2 Port sizes, part 1

Ordering code	Port		ISO 1179 Part 1
SC12EX-…-D-…	aX, bY	Steueröl	G¼“

5.8.2.3 Dimensions, types of operation, part 2

Type and dimensions	Type and dimensions
SC12EX-…-…/…-1…/…-F _ _ X-X-XX-…/…-A-V1 SC12EX-…-…/…-1…/…-F _ _ X-X-XX-…/…-A-V22	SC12EX-…-…/…-3…/…-F _ _ X-X-XX-…/…-A-V1 SC12EX-…-…/…-3…/…-F _ _ X-X-XX-…/…-A-V22
 = only for SC12-PBH-S	 = only for SC12-PBH-S
Type and dimensions	**Type and dimensions**
SC12EX-…-…/…-3…/…-F _ _ X-D-XX-…/…-A-V1 SC12EX-…-…/…-3…/…-F _ _ X-D-XX-…/…-A-V22	SC12EX-…-…/…-3…/…-F _ _ X-X-H_-…/…-A-V1 SC12EX-…-…/…-3…/…-F _ _ X-X-H_-…/…-A-V22 SC12EX-…-…/…-3…/…-F _ _ X-X-N_-…/…-A-V1 SC12EX-…-…/…-3…/…-F _ _ X-X-N_-…/…-A-V22
 = only for SC12-PBH-S	 = only for SC12-PBH-S

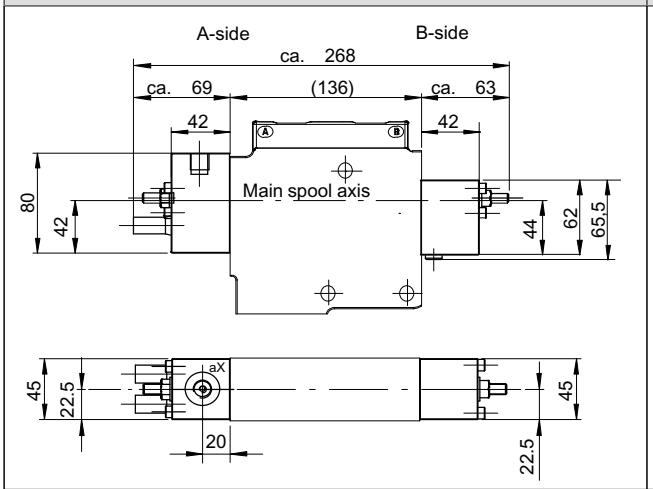
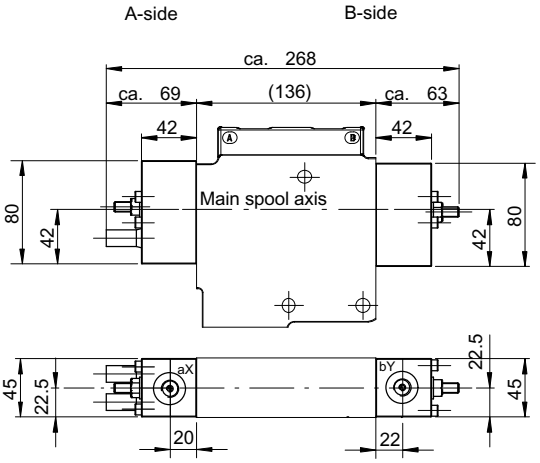
5.8.2.4 Total length, part 2

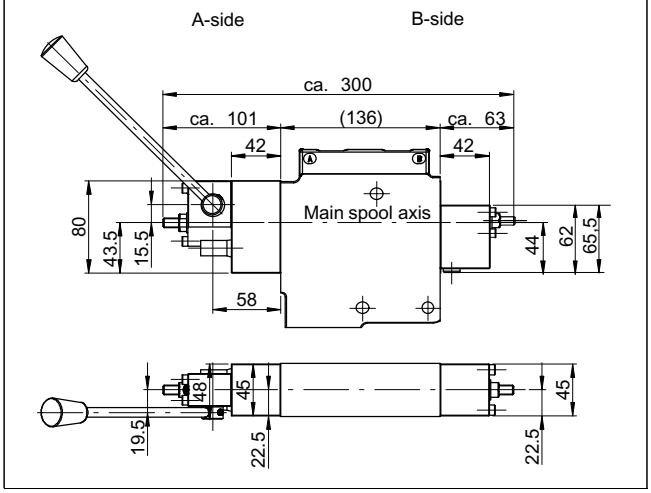
		Sol. length	Valve length					
		L1	L2	L3	L4	L5	L6	L7
F23X	F44X	90	77,5		117,5		ca. 195	ca. 271
F26X	F45X	90	ca. 92		ca. 132		ca. 187	ca. 263
F27X	F46X	90,5	ca. 93		ca. 133		ca. 196	ca. 272
F28X	F47X	93,5	ca. 74	ca. 91	ca. 114	ca. 131	ca. 191	ca. 270
F29X	F48X	90	77,5		117,5		ca. 195	ca. 271

5.8.2.5 Port sizes, part 2

Ordering code	Port		ISO 1179 Part 1
SC12EX-…-D-…	aX, bY	Steueröl	G¼“

5.8.2.6 Dimensions, types of operation, part 3

Type and dimensions	Type and dimensions
SC12EX-…-…/…-1…/…-X00X-Y-XX-…/…-A-V1 SC12EX-…-…/…-1…/…-X00X-Y-XX-…/…-A-V22	SC12EX-…-…/…-3…/…-X00X-Y-XX-…/…-A-V1 SC12EX-…-…/…-3…/…-X00X-Y-XX-…/…-A-V22
	

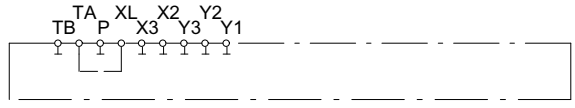
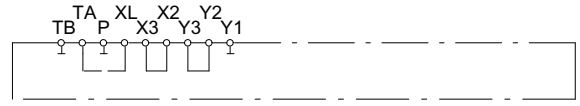
Type and dimensions
SC12EX-…-…/…-3…/…-X00X-X-H_-…/…-A-V22 SC12EX-…-…/…-3…/…-X00X-X-N_-…/…-A-V22


5.8.2.7 Port sizes, part 3

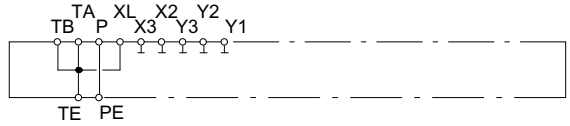
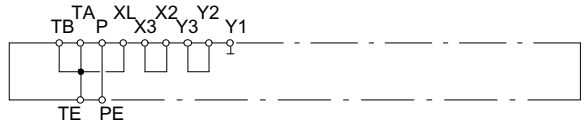
Ordering code	Port		ISO 1179 Part 1
SC12EX-…-1…-Y-…	aX	Pilot oil	G¼“
SC12EX-…-3…-Y-…	aX, bY		

6 End modules

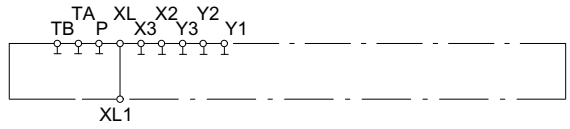
6.1 End module (no control function)

Type and symbol	Description
SC12EX-EX-00-A-V0	
	• No control function Caution: Not in combination with • Actuator module with electrical operation F _ _ X
SC12EX-EX-00-A-V1	
	• No control function Caution: Only in combination with • Actuator module with electrical operation F _ _ X

6.2 End module with additional P and T ports

Type and symbol	Description
SC12EX-EG-11-A-V2	
	• Tank bridge Port threads: • PE = G1“ : open • TE = G1“ : open Caution: Not in combination with • Actuator module with electrical operation F _ _ X
SC12EX-EG-11-A-V3	
	• Tank bridge Port threads: • PE = G1“ : open • TE = G1“ : open Caution: Only in combination with • Actuator module with electrical operation F _ _ X

6.3 End module with additional XL1 port

Type and symbol	Description
SC12EX-EX-00-A-V4	
	Port threads: • XL1 = G¼“ : open Caution: To unload the load sensing signal via port XL1, external means must be used. Caution: Not in combination with • Actuator module with electrical operation F _ _ X

6.4 Ordering code

SC 12 EX - E G - 0 0 - A - V0

SC — Proportional valve in sectional design

12 — Nominal size

EX — Explosion protection

Module variant
E — end module

Connection type, P and T
G — threaded (ISO 1179-Part 1 Whitworth pipe thread)
X — ports P and T not present

Port P
0 — not present
1 — open
2 — plugged

Port T
0 — not present
1 — open
2 — plugged

Series identifier
(data specified by Bucher Hydraulics)

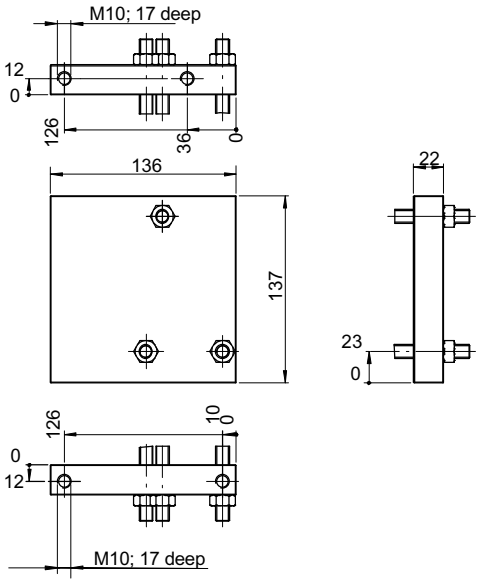
Option
… — for available options, see Section 6.4.1

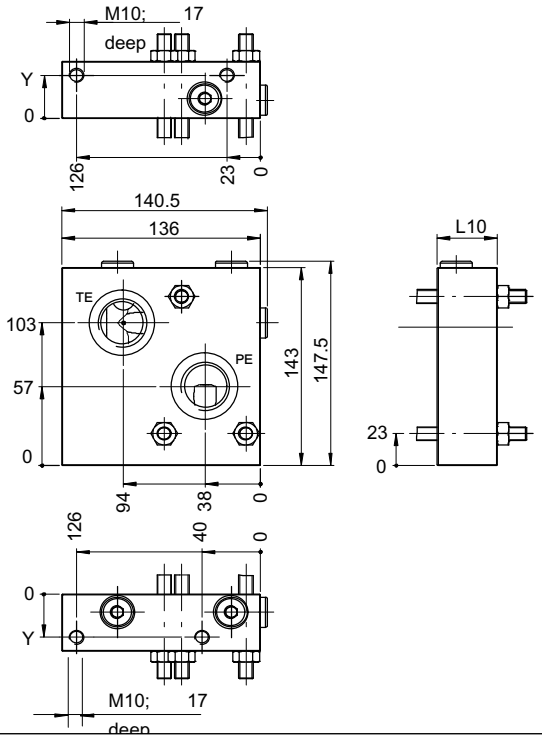
6.4.1 Options

V0 no control function
V1 no control function
(additional connections for actuator module with electrical operation F _ _ X)
V2 additional P and T ports
V3 additional P and T ports
(additional connections for actuator module with electrical operation F _ _ X)
V4 additional port XL1 = G¼“ : open

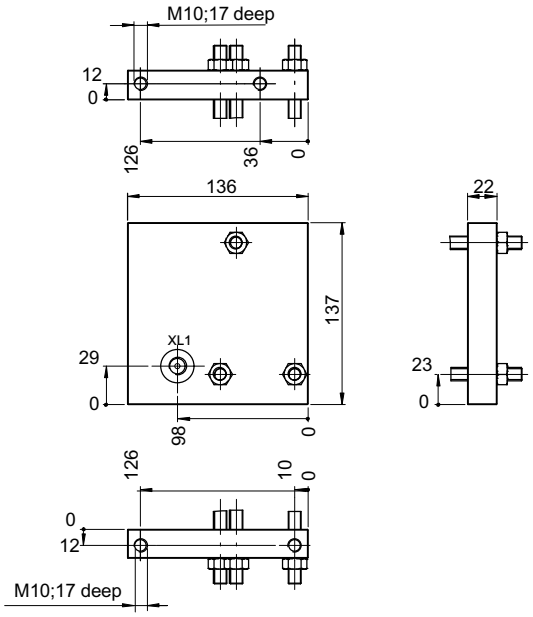
6.5 Dimensions

Type and dimensions	Type and dimensions
SC12EX-EX-00-A-V0 SC12EX-EX-00-A-V1	SC12EX-EG-11-A-V2 SC12EX-EG-11-A-V3





Type and dimensions
SC12EX-EX-00-A-V4



6.5.1 Port sizes

Ordering code	Port		ISO 1179 Part 1
SC12EX-…-V2	PE	pump	G1“
SC12EX-…-V3	TE	tank	
SC12EX-…-V4	XL1	Load signal from external actuator	G¼“

6.5.2 Overall lengths

Ordering code	Mounting thread (coordinates)	Module width
	Y	L10
SC12EX-…-V2	31	41
SC12EX-…-V3	34	44

7 Solenoid valves

7.1 Electrohydraulic pilot valves, on-off (Ignition protection type m: encapsulation)

General characteristics	Unit	Ordering code (Electrical operation)
		E37X
Supply voltage	V DC	24
Control current at opening point	mA	330
Control current at maximum stroke	mA	680
PWM frequency (recommended) The PWM frequency should be optimized to suit the application and operating conditions.	Hz	100
Protection class to EN 60529		up to IP6K6 / IPX7 / IPX9K
Coil resistance at 20 °C	Ω	21,2 ± 5%
Relative duty cycle Maximum current at::	mA	750
Electrical connection		see ordering code

7.1.1 Information on explosion protection (solenoid valve)

	Designation	Zertifikat-Nr.	Ordering code (Electrical operation)
ATEX	I M2 Ex mb I Mb II 2G Ex mb IIC T4 Gb II 2D Ex mb IIIC T130°C Db	TÜV13 ATEX 7418 X	E37X
IEC	Ex m	IECEx TUR 13.0015 X	

7.2 Electrohydraulic pilot valves, proportional (ignition protection type i: intrinsic safety)

General characteristics	Unit	Ordering code (Electrical operation)			
		F26X	F28X	F45X	F47X
Nominal voltage U_{Nom}	V DC	12,0			
Maximum voltage U_{Max}	V DC	13,5			
Current consumption I_{Nom}	mA	540			
Power	Watt	ca. 7,5			
Resistance	Ω	30 ± 5%			
Temperature range	°C	-20 … +60			
Protection class to EN 60529		IP 54			
Electrical connection		see ordering code			

7.2.1 Information on explosion protection (coil)

	Designation	Certificate-No.	Ordering code (Electrical operation)
ATEX	I M2 EEx ia I	DMT99 ATEX E 102	F26X
			F28X
IEC	Ex ia I	IECEx TSA 08.0023X	F28X
MA		J2017026	F47X
		J2017027	F45X

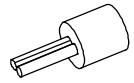
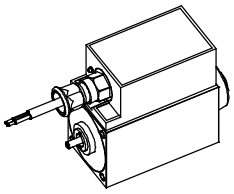
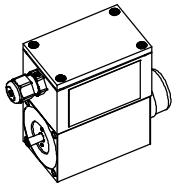
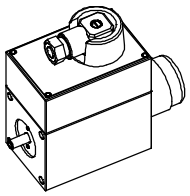
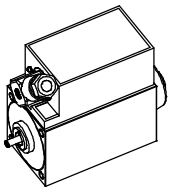
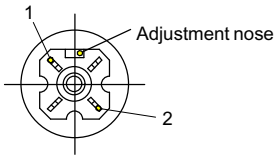
7.3 Electrohydraulic pilot valves, on-off (Ignition protection type i: intrinsic safety)

General characteristics	Unit	Ordering code (Electrical operation)					
		F23X	F27X	F29X	F44X	F46X	F48X
Nominal voltage U_{Nom}	V DC	12,0					
Maximum voltage U_{Max}	V DC	13,5					
Power consumption I_{Nom}	mA	260 / 130 reduced					
Power	Watt	ca. 3 / ca. 1,5 reduced					
Resistance	Ω	46 ± 5%					
Temperature range	°C	-20 … +60					
Protection class to EN 60529		IP 54					
Electrical connection		see ordering code					

7.3.1 Information on explosion protection (coil)

	Designation	Certificate No.	Ordering code (Electrical operation)
ATEX	I M2 EEx ia I	DMT99 ATEX E 102	F23X
			F27X
			F29X
IEC	Ex ib I	IECEx TSA 08.0023X	F29X
MA		J2017028	F48X
		J2017029	F44X
		J2017030	F46X

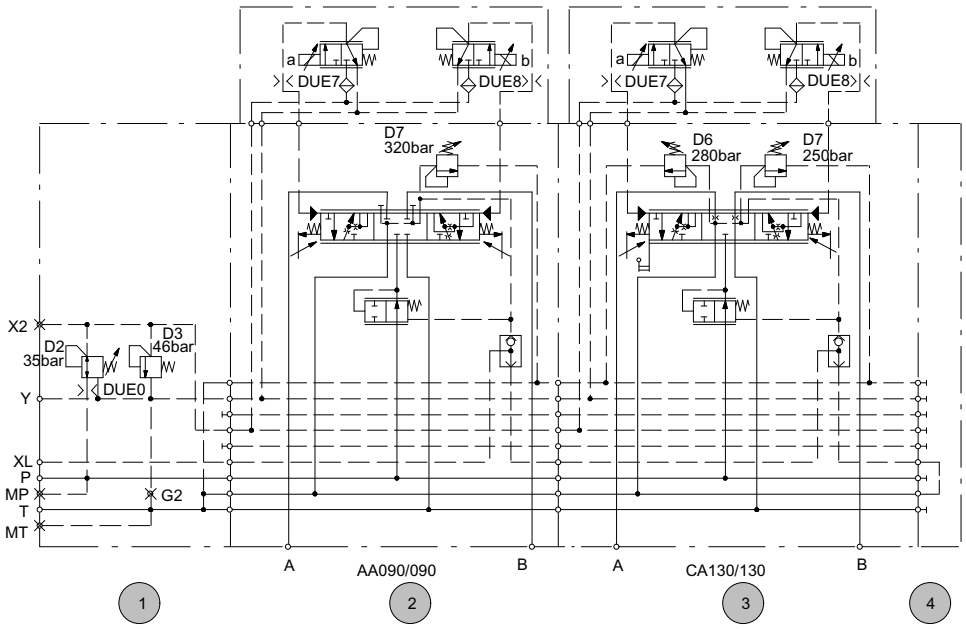
7.4 Connection type

Ordering code (Electrical operation)					
E37X	F23X	F26X	F27X	F28X	F29X
	F44X	F45X	F46X	F47X	F48X
					
Flying leads Wire lead: NSSHOU-O 2 x 1,5 mm2 Cable outside diameter: 10,6 mm 0 12,2 mm Cable length: 2 m	**Flying leads** Oil-resistant PVC control cable 2 x 0,75 mm2 Cable outside diameter: 5 mm Cable length: 1,5 m	**Terminal box** 2 screw terminals Recommended cable outside diameter: 6 mm 0 13 mm		**G4W1F** 4- pin Terminal assignment: 	

ACHTUNG:
Mating plugs are not included in the delivery..

8 Ordering examples

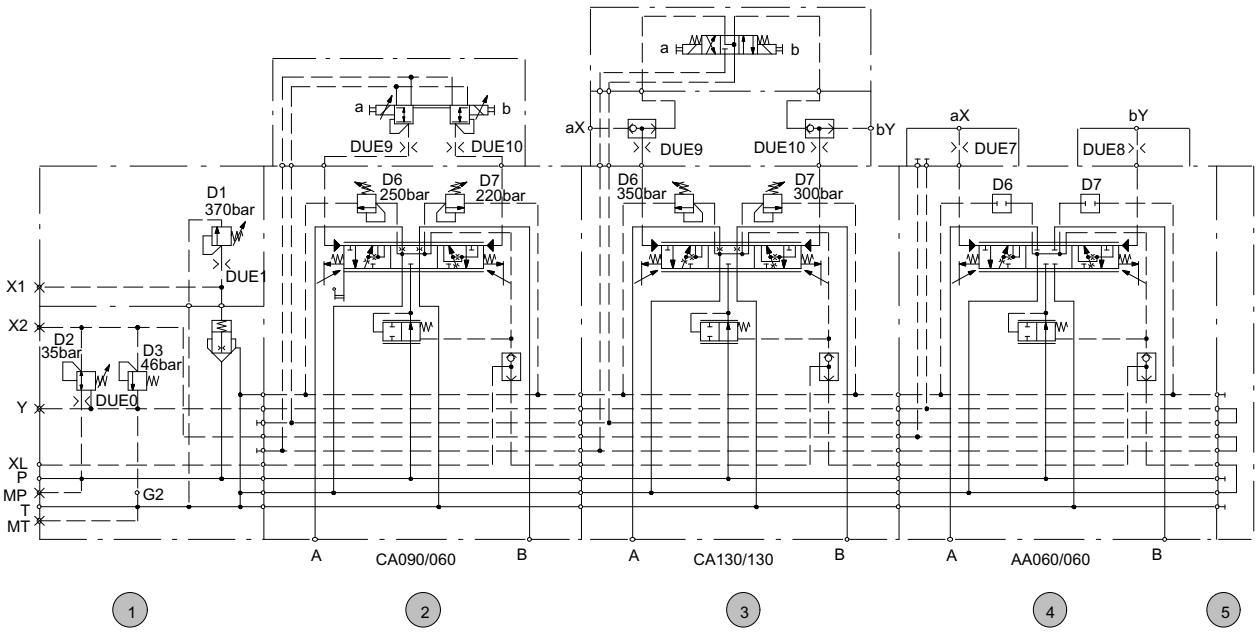
8.1 Valve system (Ignition protection type m: encapsulation)



	Description	Ordering code
	General • valve series: SC • Nominal size: 12 • Design: Explosions protection	
1	**Inlet module** • Without system pressure relief • Connection type: threaded (inch) • Without load-sensing pressure relief • Pilot oil supply: internal • Pilot oil drain: external • Pilot-pressure conditioning • Nameplate (type: brass)	SC12EX-GG000-000-011-3546-A-V0T2
2	**1st actuator module** • Pressure compensator without load-holding function • Actuator section number: 1 • Connection type: threaded G¾“, ports A and B: open • Without primary pressure cut-off: D6 • Primary pressure cut-off: D7 = 320 bar (Lastmeldung A und B) • Spool with 3 operating positions, spool pattern AA • Flow rate for actuator A and B: 90 l/min • Pressure compensator spring: N • Type of operation: electrohydraulic, proportional pressure reducing valve (ignition protection type m: encapsulation) • Certification to ATEX and IECEx • Design: cartridge valve • Supply voltage: 24 V • Connection type: flying leads, without emergency operation • Without displacement sensor • Without hydraulic operation • Without manual operation • Damping orifice (at both sides) • Without secondary valves • Aluminium-free	SC12EX-Y1H3-X000/G320-3AA090/090A00N-E37X-X-XX-X000/X000-A-V1

	Description	Ordering code
3	2nd actuator module • Pressure compensator without load-holding function • Actuator section number: 2 • Connection type: threaded G½", ports A and B: open • Primary pressure cut-off: D6 = 280 bar, D7 = 250 bar • Spool with 3 operating positions, spool pattern CA • Flow rate for actuator A and B: 130 l/min • Pressure compensator spring: N • Type of operation: electrohydraulic, proportional reducing valve (Ignition protection type m: encapsulation) • Certification to ATEX and IECEx • Supply voltage: 24 V • Connection type: flying leads, without manual override • Without displacement sensor • Without hydraulic operation • Emergency manual operation (lever length: short), lever position S (cranked hand lever) • Damping orifice (at both sides) • Without secondary valves • Aluminium-free	SC12EX-Y2G3-D280/D250-3CA130/130A00N-E37X-X-NS-X000/X000-A-V1
4	End module • N • No control function	SC12EX-EX-00-A-V0

8.2 Valve system (Ignition protection type i: intrinsic safety)



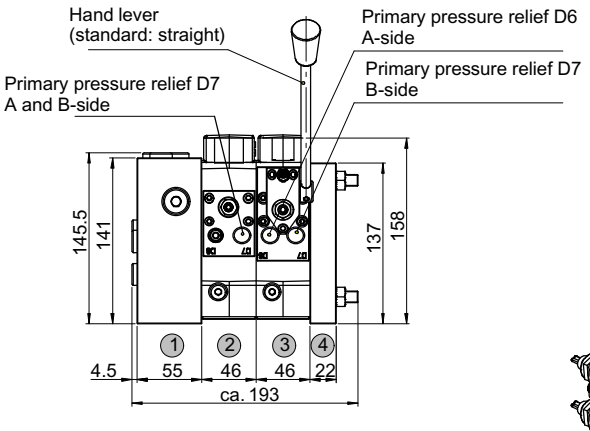
	Description	Ordering code
	General • Valve series: SC • Nominal size: 12 • Design: Explosion protection	
1	**Inlet module** • System pressure relief: 370 bar • Connection type: threaded (inch) • Without load-sensing pressure relif • Pilot oil supply / pilot oil drain: internal • Pilot pressure conditioning • Nameplate (type: brass)	SC12EX-MG370-000-001-3546-A-V0T2
2	**1st actuator module** • Pressure compensator without load-holding function • Actuator section number: 1 • Connection type: G¾“, ports A and B: open • Without primary pressure cut-off: D6 = 250 bar, D7 = 220 bar • Spool with 3 operating positions, spool pattern CA • Flow rate for actuator A: 90 l/min, actuator B: 60 l/min • Pressure compensator spring: N • Type of operation: electrohydraulic, proportional pressure reducing valve (ignition protection type i: intrinsic safety) • Certification to ATEX • Design: manifold-mounting valve • Supply voltage: 12 V • Connection type: terminal housing, emergency operation • Without displacement sensor • Without hydraulic operation • Manual operation, lever position O (straight hand lever) • Damping orifice (at both sides) • Without secondary valves • Aluminium-free	SC12EX-Y1H3-D250/D220-3CA090/060A00N-F26X-X-HO-X000/X000-A-V25

	Description	Ordering code
3	2nd actuator module • Pressure compensator without load-holding function • Actuator section number: 2 • Connection type: threaded G¾", ports A and B: open • Primary pressure cut-off: D6 = 350 bar, D7 = 300 bar • Spool with 3 operating positions, spool pattern CA • Flow rate for actuator A and B: 130 l/min • Pressure compensator spring: N • Operation type: electrohydraulic, on-off (ignition protection type i: intrinsic safety) • Certification to ATEX • Design: manifold-mounting valve • Supply voltage: 12 V • Connection type: terminal box, emergency operation • Hydraulic operation • Without manual operation • Damping orifice (at both sides) • Without secondary valves • Aluminium-free	SC12EX-Y2H3-D350/D300-3CA130/130A00N-F27X-D-XX-X000/X000-A-V25
4	3rd actuator module • Pressure compensator without load-holding function • Actuator section number: 3 • Connection type: threaded G¾", ports A and B: open • Primary pressure cut-off: D6 and D7 = sealing plug (connection: shut off) • Spool with 3 operating positions, spool pattern AA • Flow rate for actuator A and B: 60 l/min • Pressure compensator spring: N • Without electrohydraulic operation • Without displacement sensor • Hydraulic operation, vertical port (standard) • Without manual operation • Damping orifice (at both sides) • Without secondary valves • Aluminium-free	SC12EX-Y3H3-S000/S000-3AA060/060A00N-X00X-Y-XX-X000/X000-A-V1
5	End module • No control function (additional connections for actuator module)	SC12EX-EX-00-A-V1

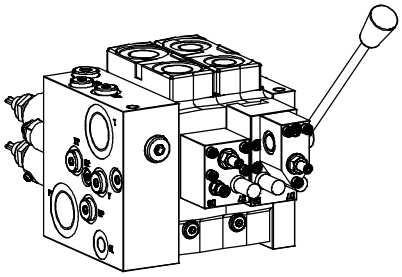
9 Dimensions

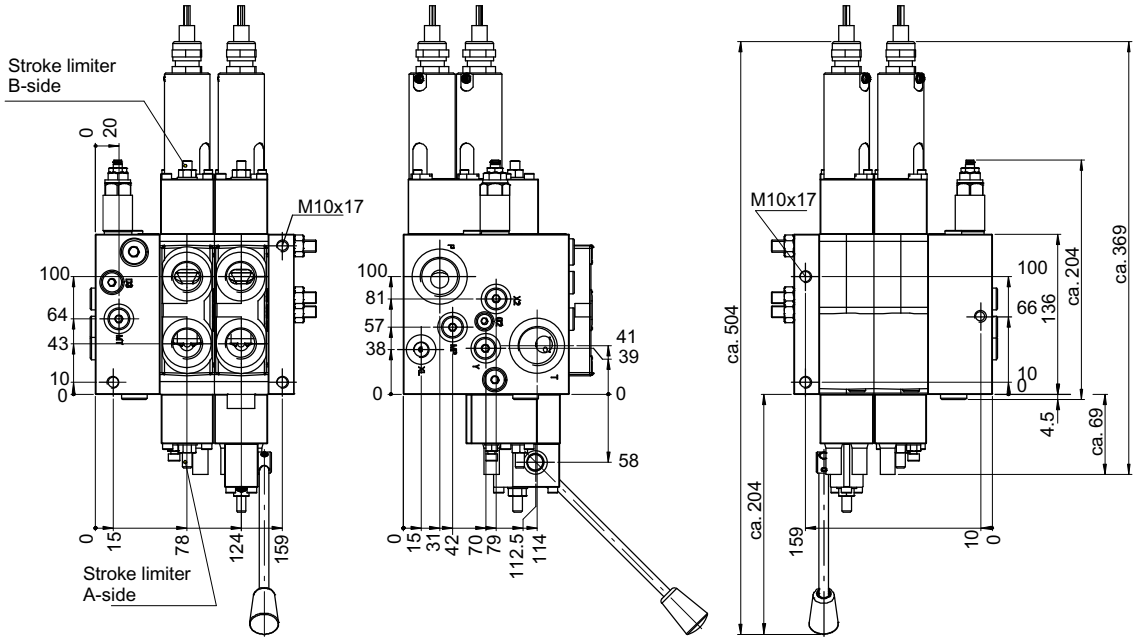
9.1 Valve system (ignition protection type m: encapsulation)

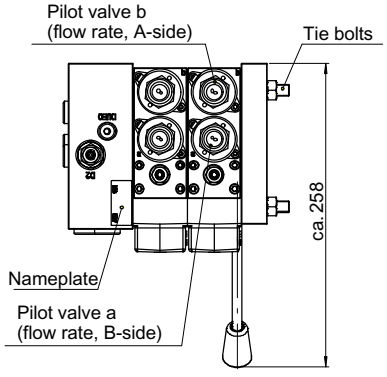
As per ordering example, Section 8.1.



Item	Module
1	Inlet module M
2	1st actuator module Y
3	2nd actuator module Y
4	End module



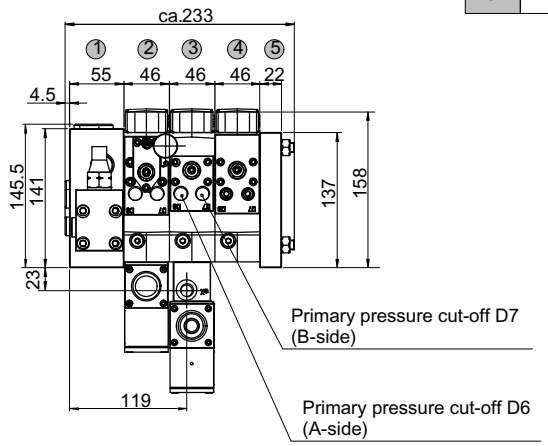


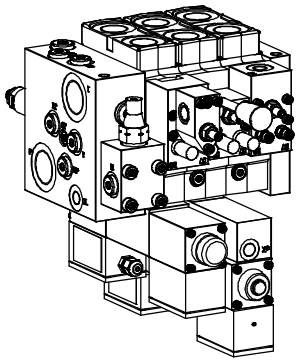


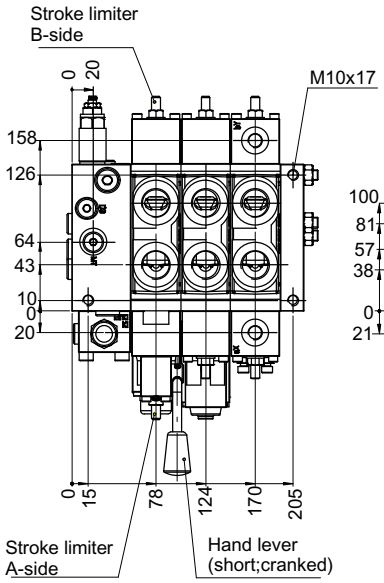
9.2 Valve system (ignition protection type i: intrinsic safety)

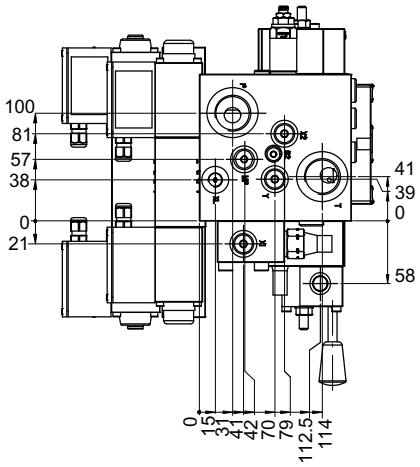
As per ordering example, Section 8.2

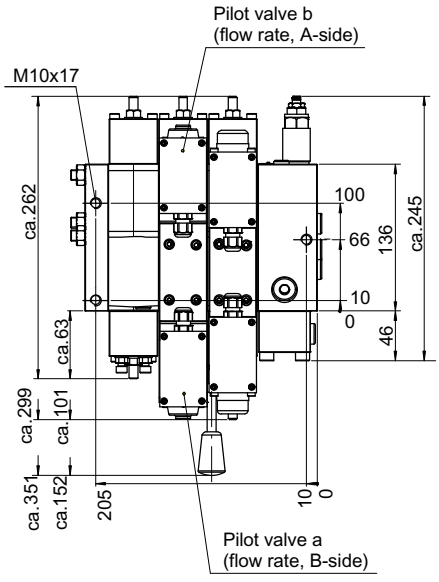
Pos	Modul
1	Inlet module M
2	1st actuator module Y
3	2nd actuator module Y
4	3rd actuator module Y
5	End module

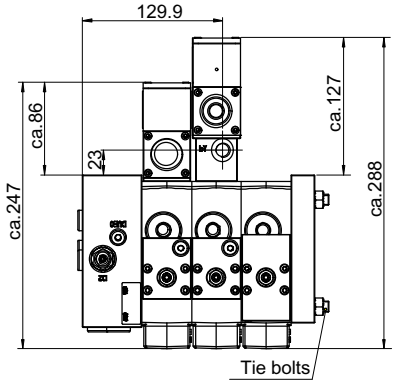












10 Fluid

The oil for the proportional valves must have a minimum cleanliness level of 20/18/15 to ISO 4406.

We recommend the use of fluids that contain anti-wear additives for operation with boundary lubrication. Fluids without appropriate additives reduce the service life of valves. The user is responsible for maintaining, and regularly checking, the fluid quality.

11 Note

This catalogue is intended for users with specialist knowledge. The user must check the suitability of the equipment described herein in order to ensure that all of the conditions necessary for the safety and proper functioning of the system are fulfilled. If you have any doubts or questions concerning the use of these valves, please contact Bucher Hydraulics.

info.rs@bucherhydraulics.com www.bucherhydraulics.com

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