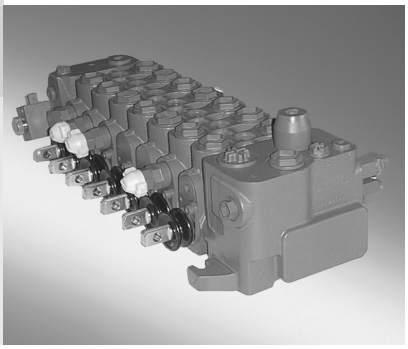
Rexroth
Bosch Group

LUDV control block of sandwich plate design

RE 64125/02.11 1/22
Replaces: 01.10

Type SX 14, SX 14 S



Nominal size 14
Series 2X
Maximum pressure, pump side 250 bar
Maximum pressure, actuator side 300 bar
Inlet flow 175 l/min

Table of contents

Special features

- Distributes the flow between the directional valve elements according to the requirements, independently of the pressure and available flow.
- Compact sandwich plate design, can be combined so that the control block can meet the requirements of several type of machines.
- No shuttle valves.
- Limitation of system maximum pressure via LS pressure relief valve.
- System protection via LS and secondary pressure relief valves.

About this datasheet

This manual describs functioning, technical datas and ordering details of control blocks SX 14 and SX 14 S. This manual is illustrated with hydraulic symbols, sections and unit dimensions drawings.

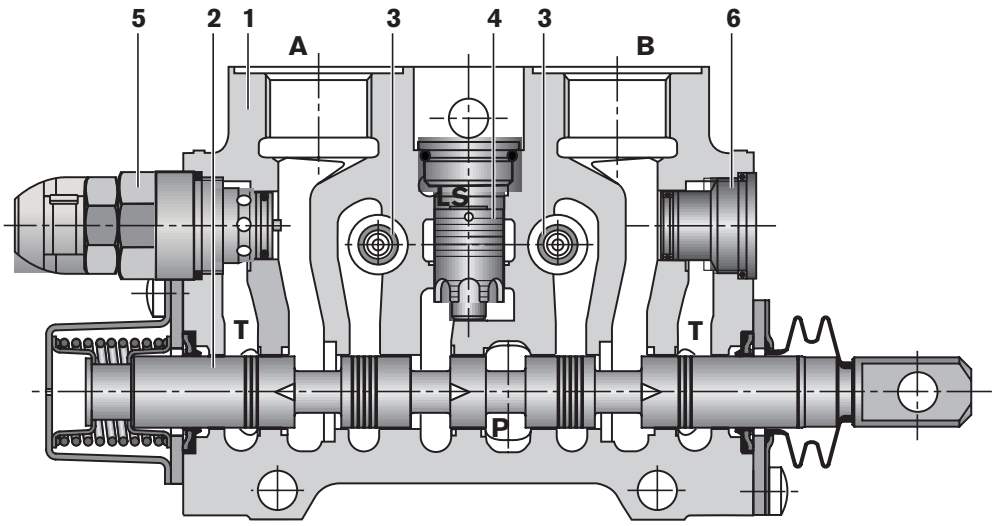
Related documents

SX 14 and SX 14 S are system components.

- Also follow the instructions for the other system components.
- Also follow the instructions in the following manuals:
  - System documentation from the system manufacturer
  - Service instruction manual RE64025
  - Spare parts manual RDEF64125-E
  - Assembly Instructions RE64125-S

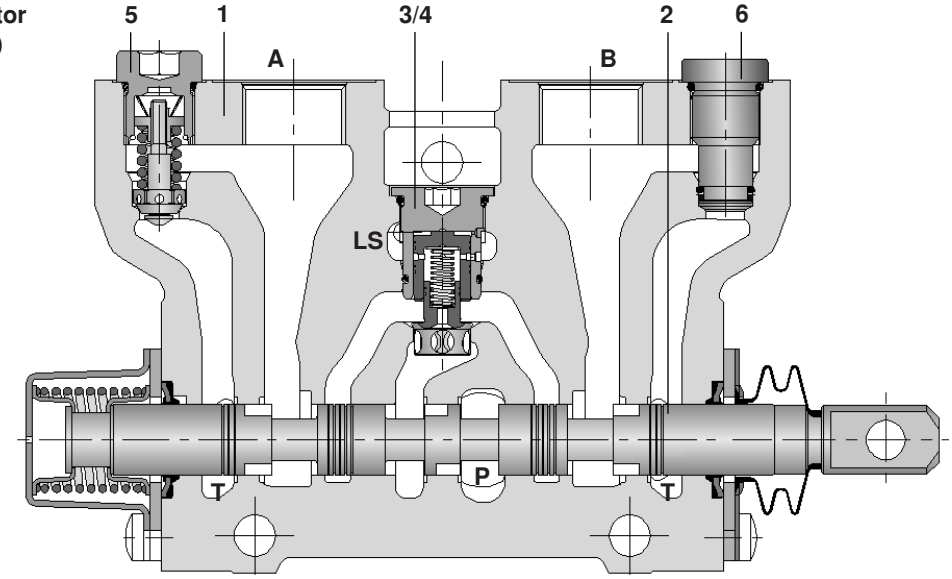
Sections

Standard SX 14 (SX 14)

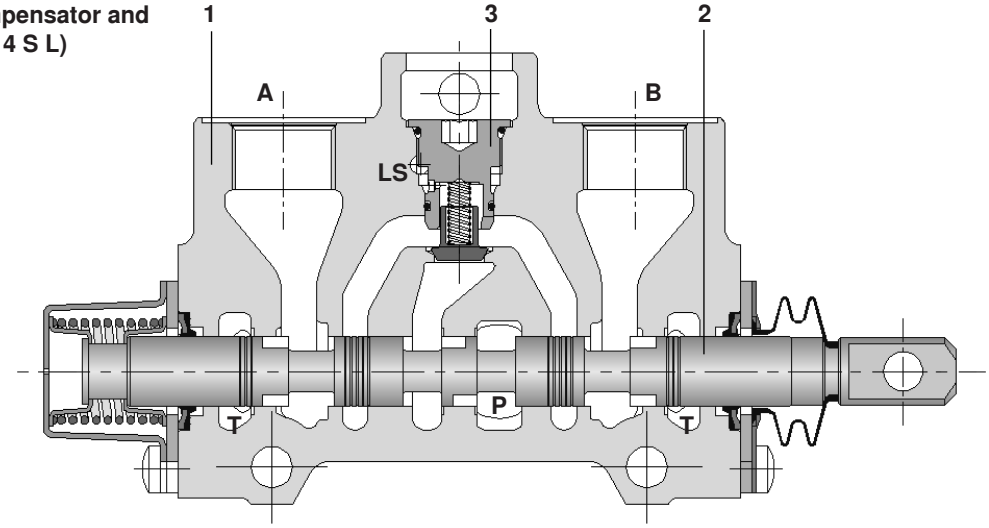


1 Housing
2 Spool
3 Check valves
4 Pressure compensator
5 Secondary valve
6 Plug

SX 14 S with pressure compensator and secondary valves (SX 14 S C)



SX 14 S without pressure compensator and without secondary valve (SX 14 S L)



Functional description

The SX 14 directional control block basically consists of one inlet element, a number of directional valve elements and one final element.

The inlet element contains 2 fixing points and the pipe connection ports P, T, LS, M.

This element also contains all the components required for the system function, namely: a flow control valve for the controlled unloading of the LS line and a LS relief valve for the limitation of the maximum pressure in the system.

Each standard SX 14 (SX 14) directional valve element is composed of a housing (1), a spool (2), two load holding check valves (3), a pressure compensator (4), cavities (5) for secondary relief/anti-cavitation check valves, and anti-cavitation check valves or plugs (6).

Each SX 14 S directional valve element is composed of a housing (1), a spool (2), one load holding check valve / compensator (3/4) or only a load hold check valve (3), and if needed of cavity for secondary valves (5) or for plugs (6).

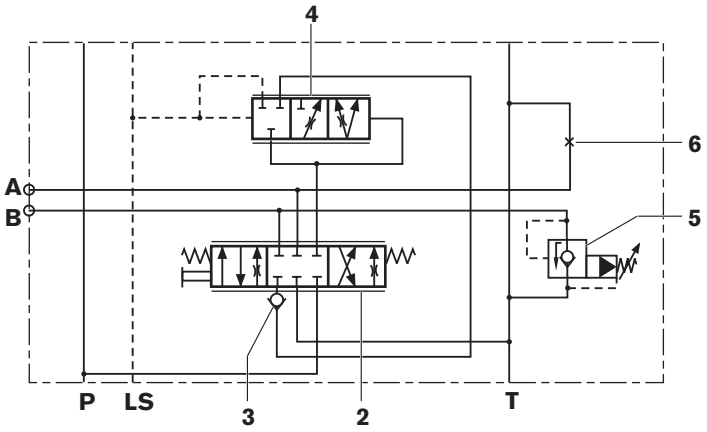
The final element has one fixing point.

Symbol, hydraulic

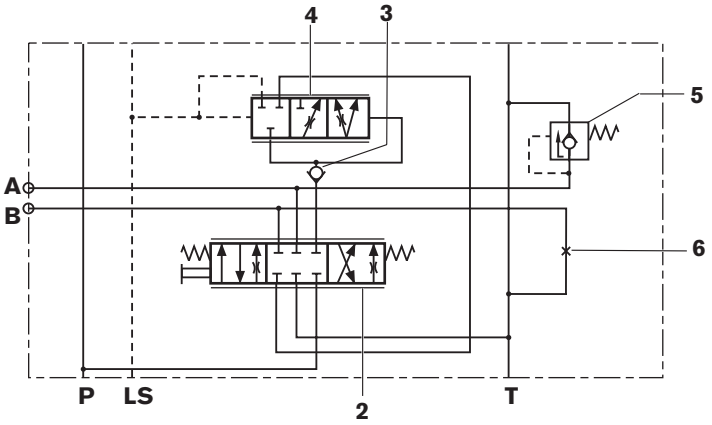
Standard SX 14 (SX 14)

Ports

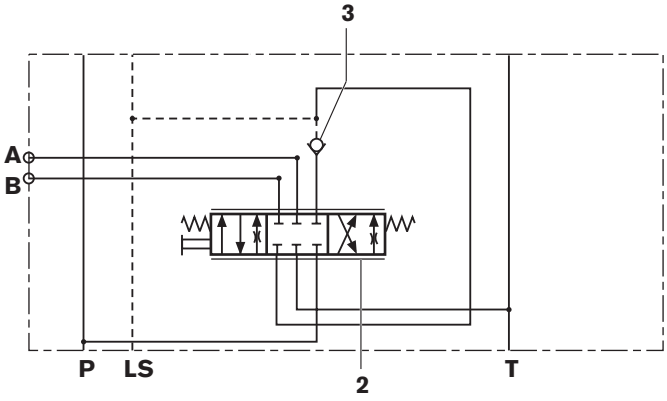
P	Pump
A, B	Actuator
T	Tank
LS	Load Sensing



SX 14 S with pressure compensator and secondary valves (SX 14 S C)



SX 14 S without pressure compensator and without secondary valve (SX 14 S L)



Technical data (for applications outside these parameters, please consult us!)

General

Design	Flangeable (up to 9 directional valve elements)
Description	Flow distribution between the directional valve elements according to the requirements, independently of the pressure and available flow
Type	SX 14
Assembly position	Any
Connections	Threads
Nominal size	14
Standard primer	Blue (RAL 5010)

Hydraulic

Max. permissible flow on port P	l/min	175
Standard leakage oil flow on load holding (at 100 bar, 36 mm^2/s)	cm^3/mn	20
Max. operating pressure per connection		
– P, M, LS, D, DLS	bar	250
– A, B	bar	300
– T	bar	20
Secondary valves setting pressure tolerances (at 5 l/min)		
– H..0 direct actuated (SX14 S)	bar	setting → tolerance: 71 → 120: -4 / +8; 121 → 200: -6 / +12; 201 → 270: -8 / +12; 271 → 320: -10 / +14; 321 → 420: -12 / +18
– H..0 pilot operated (standard SX 14)	bar	0 / +5
Max. control pressure per connection [1]		
– a, b	bar	35
		We recommend the use of control curve 6 to 25 bar, and inlet pressure (4TH6 curve no. 70)
Pressure fluid		Mineral oils (HL, HLP) according to DIN 51524 [2]. Other hydraulic fluids, such as HEES (synthetic esters) according to VDMA 24568, as well as hydraulic fluids as specified under RE 90221, at request.
Pressure fluid temperature range	°C	–20 to +100 (for higher temperatures, please consult us)
Viscosity range	mm^2/s	10 to 380
Max. admissible degree of contamination of the hydraulic fluid, cleanliness class according to NAS 1638		Class 9, we therefore recommend a filter with a minimum retention rate of $ß_{10} \geq 75$

[1] pilot pressure regulated by a pressure reducing valve and protected by a relief valve

[2] suitable for NBR seals

Technical data (for applications outside these parameters, please consult us!)

Mechanical

Weight	– Inlet element	kg	10
	– Directional valve element SX 14	kg	4.5
	– Directional valve element SX 14 S with secondary valves	kg	5
	– Directional valve element SX 14 S without secondary valve	kg	4
	– Blanking plate	kg	2
Spool return force		N	Minimum value 54, depending of operation (for more details please consult us)
Max. permissible actuation force on the spool (for 1 million cycles)			
	– axial	N	1000 during 20 % of total cycles then 500
	– radial	N	20
Storage temperature range, ambient		°C	-40 to +60

Electrical

Electrical detent when spool is pushed (operation S2) (datas for 25 °C)			
	– supply voltage	V	12 (min. 10; max. 16)
	– supply current	mA	780 (min. 670; max. 785)
	– power input	W	9.35 ±5 %
	– resistance	Ω	15.4 ±5 Ω
	– lifetime		1 million cycles at 90 °C, work factor 50 %
	– protection classification		IP65
	– maximum temperature reached by the electro-magnet	°C	110 at a room temperature of 90 °C
Solenoid On / Off (operation V212)			
	– supply voltage	V	12
	– supply current	A	4
	– power input	W	48
	– resistance	Ω	3

Application guidelines

		Pipe connections			
		A, B, P, T3	T	a, b, DLS, LS, M, T1	D
Tightening torque for the pipe connections	Nm	70	100	20	50
Recommended fixing		at 3 locations maximum			
Flatness of the mounting surface	mm	0.5			
Setting of system pressure		via the LS relief valve			

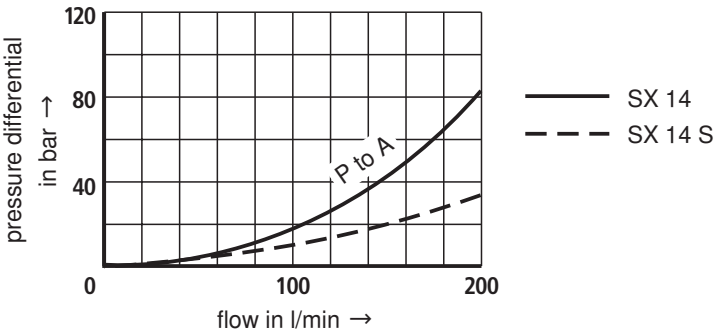
- Do not direct the jet of a pressure washing unit directly at the unit.

- No free-wheeling diode required for electical operations.

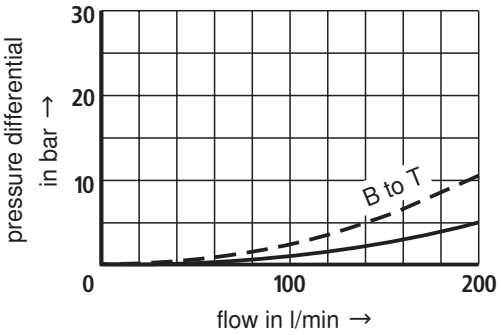
- Mechanical operation spool : a greasy appearance on the tongue side is normal (due to natural effect of seal lubrification). It could be neccessary to proceed to a regular cleaning of this area.

Characteristic curves (measured at ν = 36 mm²/s and θ = 50 °C)

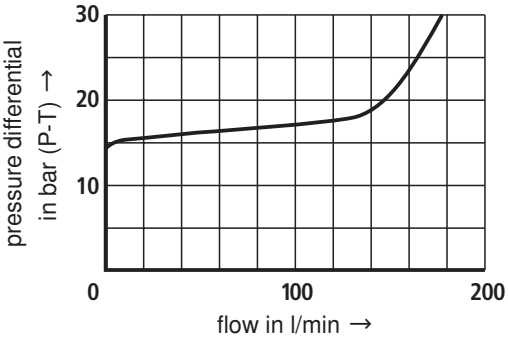
Pressure differential with P switched to A/B with spool 200 l/min



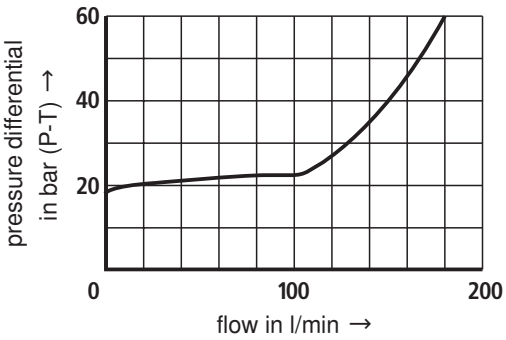
Pressure differential with A/B switched to T with spool 200 l/min



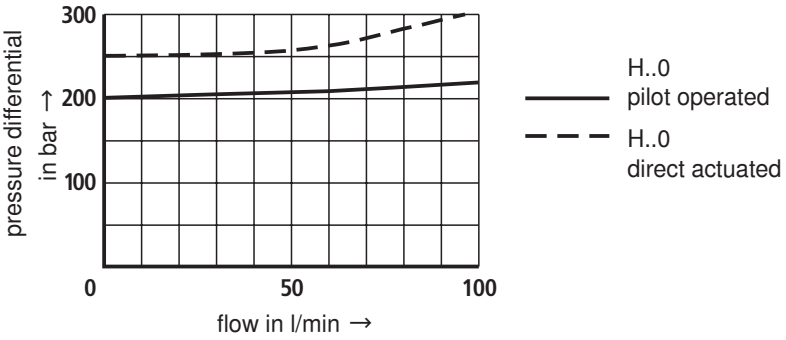
Pressure differential in the neutral position of inlet element type P (Open Center execution)



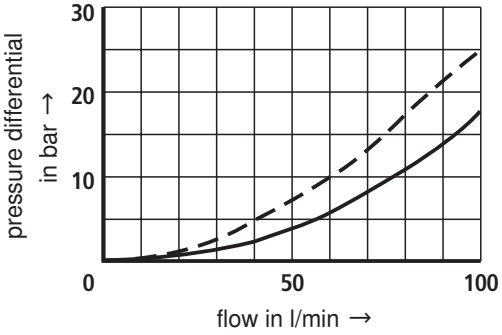
Pressure differential in the neutral position of the inlet element with flushing valve



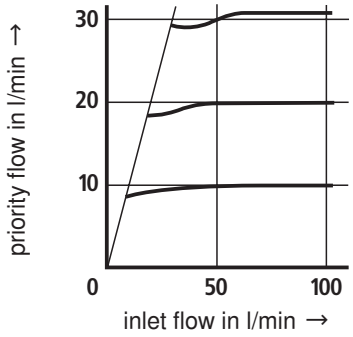
Secondaries valves characteristic A/B switched to T



Anti-cavitation check valves Characteristic T switched to A/B

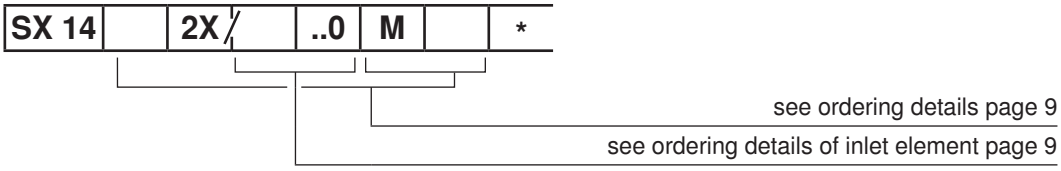


Priority flow in relationship to the inlet flow

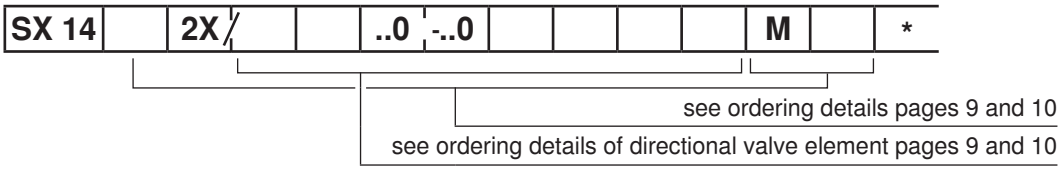


Ordering details: separate elements

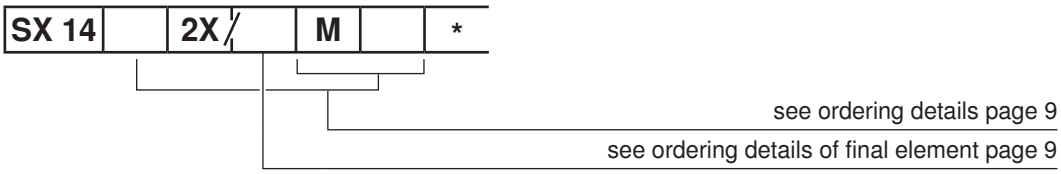
Inlet element



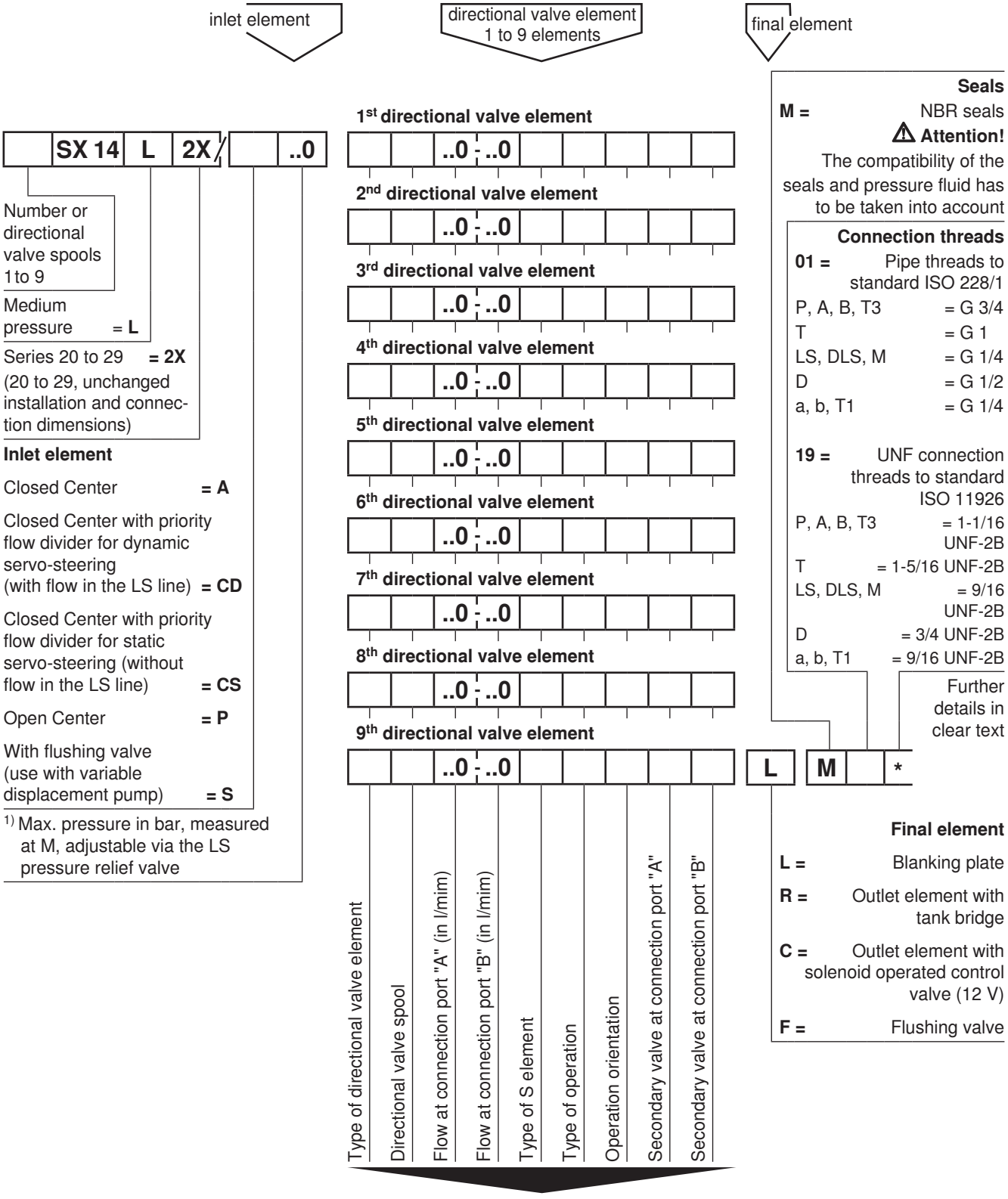
Directional valve element



Final element



Ordering details: SX 14 directional control block



ordering details : see page 10

1) set with a Δp of 15 bar between M and LS
(not for inlet element in Open Center execution)

Ordering details additional details for the directional valve element (page 9)

		..0 – ..0					

Secondary valves [6]

Connection port "A" / Connection port "B"

A..0*	=	direct actuated pressure relief valve without anti-cavitation
H..0*	=	relief / anti-cavitation check valve, pilot operated [7] or direct actuated [8]
*	=	pressure value in bar
E	=	anti-cavitation check valve
Q	=	plug
Z [7] [9]	=	without cavity for secondary valves

Operation orientation

No code	=	without mechanical operator
A	=	mechanical operator on connection side A
B	=	mechanical operator on connection side B

Type of operation

A2	=	spool return via a spring
E2 [4]	=	spool return via a spring, mechanical detent in spool position 3 (4th or float position) pull function only
S2	=	spool return via a spring, electrical detent when spool is pushed (12 V)
Z1	=	mechanical operator with tongue (Ø 8 or Ø 10)
H 200	=	hydraulic operator, spool return via a spring
H 230	=	hydraulic operator, spool return via a spring, stroke limitation on connection sides A and B
V 212 [5]	=	direct electrical operation (12 V)

Type of S element

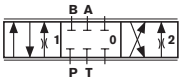
C	=	check valve and compensator
L	=	no compensator (check valve only)

[1] [2] **Flow at connection ports**

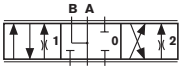
060	=	flow at connection port B in l/min
120	=	flow at connection port B in l/min
		Other flow values (rated in 10 l/min ranges): please consult us

060	=	flow at connection port A in l/min
120	=	flow at connection port A in l/min
		Other flow values (rated in 10 l/min ranges): please consult us

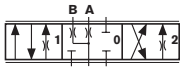
Directional valve spools



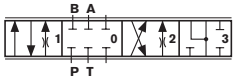
= EA



= JA



= QA



= WA [3]

Type of directional valve element

No code	=	standard element
S	=	S element

[2] accuracies: consult us

[3] for hydraulic operation, consult us

[4] on SX 14 S, only available on tongue side A

[5] if used, consult us

[6] except on SX 14 S without secondary valves

[7] only available on standard SX 14

[8] only available on SX 14 S

[9] only if both sides are not machined

Ordering example: complete block SX 14

Desired execution: 4 directional valve elements

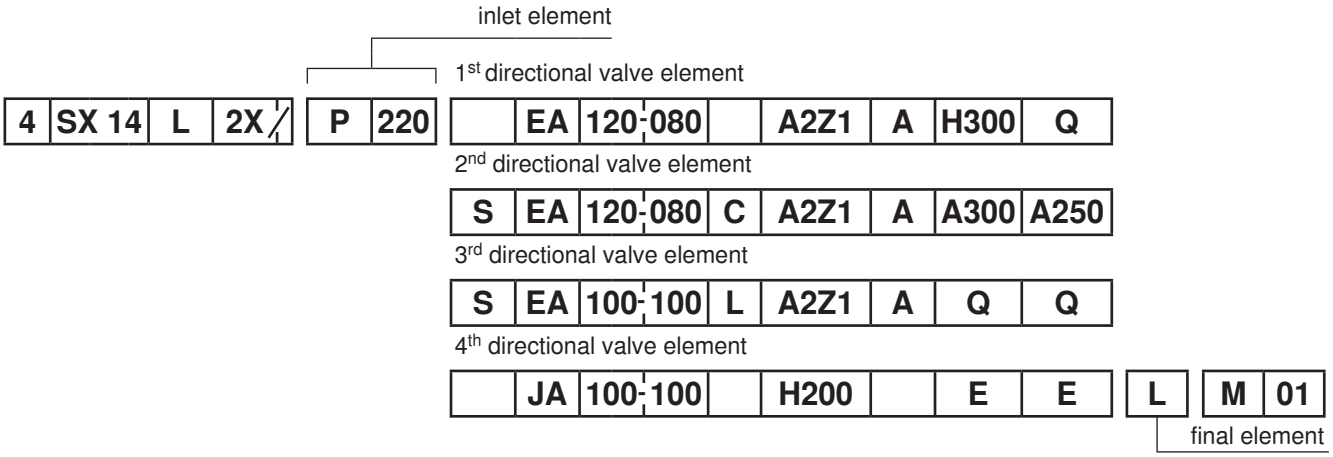
Inlet element: Open Center,
Max. pressure = 220 bar

4 directional valve elements:

- 1st element:
  - Standard element
  - Spool symbol = EA
  - Flow in A = 120 l/min, flow in B = 80 l/min
  - Mechanical operator with tongue on connection side A, spool return via a spring
  - Secondary valve in A = relief / anti-cavitation check valve set at 300 bar
  - Secondary valve in B = plug
- 2nd element:
  - S element
  - Spool symbol = EA
  - Flow in A = 120 l/min, flow in B = 80 l/min
  - Check valve + pressure compensator
  - Mechanical operator with tongue on connection side A, spool return via a spring
  - Secondary valve in A = direct actuated relief / anti-cavitation check valve set at 300 bar
  - Secondary valve in B = direct actuated relief / anti-cavitation check valve set at 250 bar
- 3rd element :
  - S element
  - Spool symbol = EA
  - Flow in A = 100 l/min, flow in B = 100 l/min
  - Check valve
  - Mechanical operator with tongue on connection side A, spool return via a spring
  - Plugs in A and B
- 4th element :
  - Standard element
  - Spool symbol = JA
  - Flow in A = 100 l/min, Flow in B = 100 l/min
  - Hydraulic operator, spool return via a spring
  - Secondary valves in A and B = anti-cavitation check valve

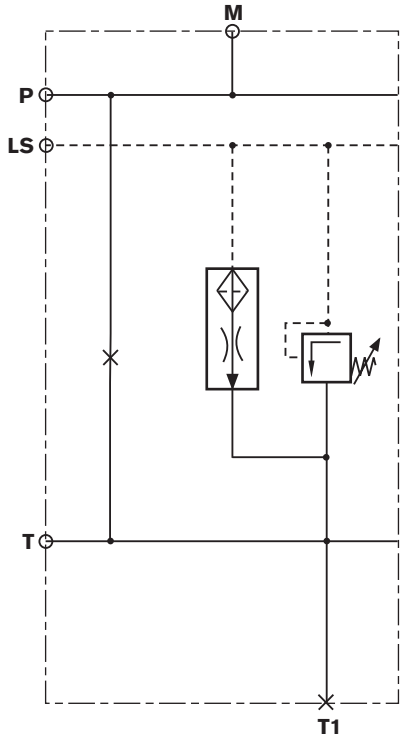
Final element : Blanking plate

Type code:

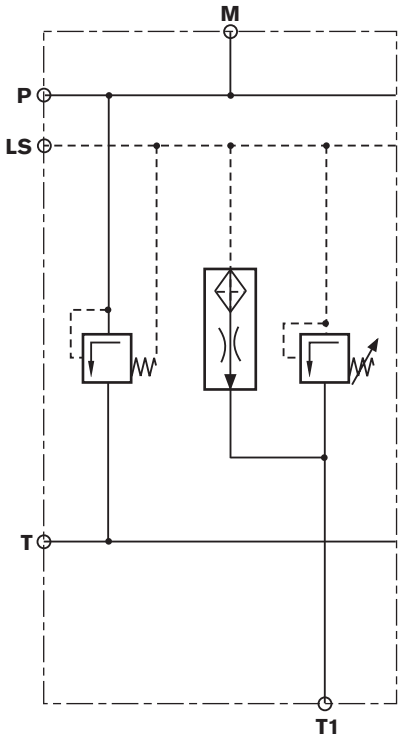


Inlet elements

Closed Center
Ordering detail
A

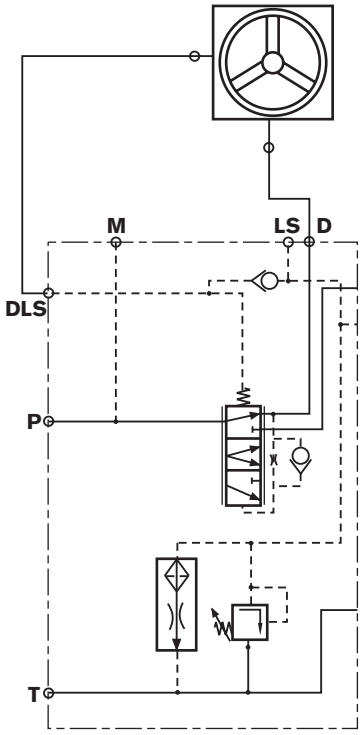


Open Center
Ordering detail
P

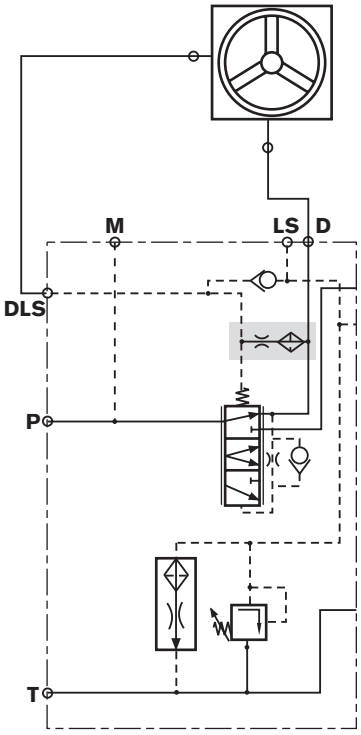


Closed Center with priority flow divider

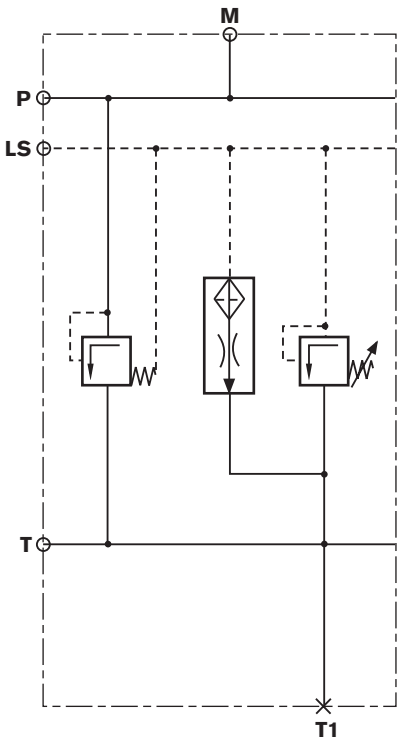
for static servo-steering
Ordering detail
CS



for dynamic servo-steering
Ordering detail
CD



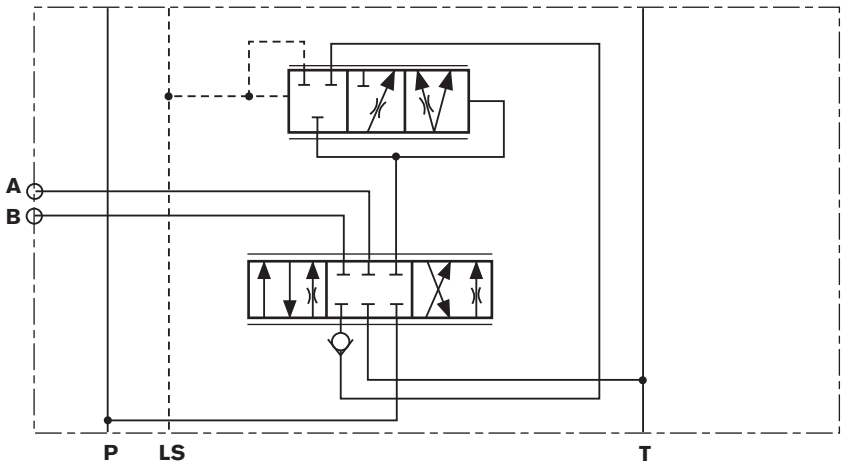
Flushing valve
(use with variable displacement pump and q_{min})
Ordering detail
S



Directional valve elements

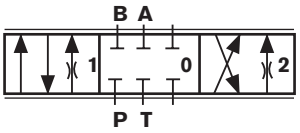
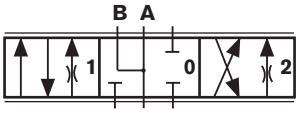
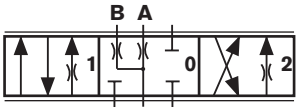
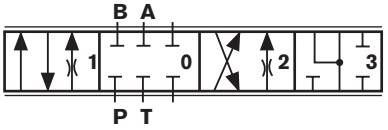
Representation of the SX directional valve element

Simplified symbol used to illustrate SX directional control circuits



Spool variations

Ordering detail

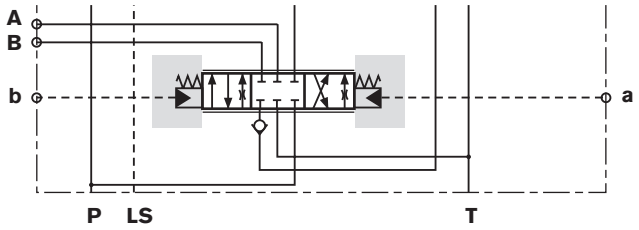
EA...-... :	symbol **EA**	
JA...-... :	symbol **JA**	
QA...-... :	symbol **QA**	
WA...-... :	symbol **WA**	

Directional valve elements

Type of operation

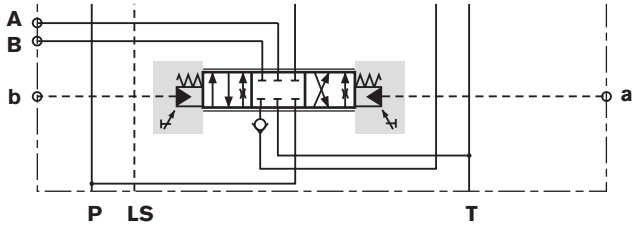
Hydraulic operator, spool return via a spring

Ordering detail
H200



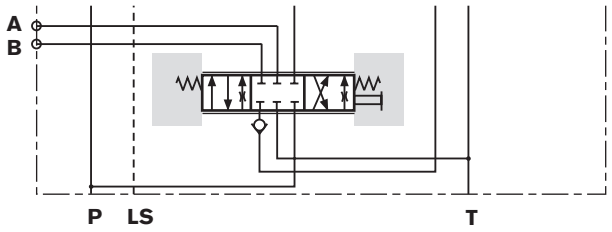
Hydraulic operator with stroke limitation, spool return via a spring

Ordering detail
H230



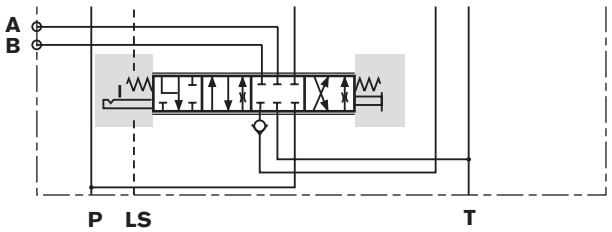
Mechanical operator with tongue on connection side A, spool return via a spring

Ordering detail
A2Z1A



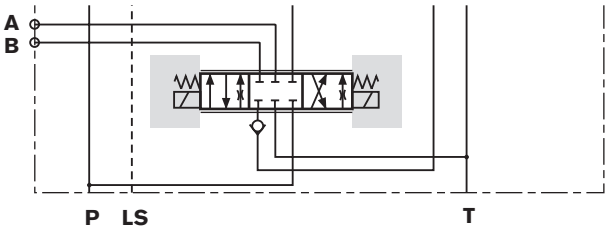
Mechanical operator with tongue on connection side A, spool return via a spring and mechanical detent when spool is pulled

Ordering detail
E2Z1A



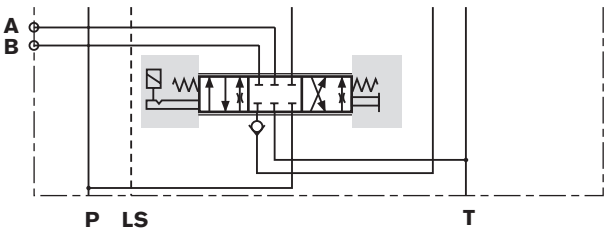
Direct electrical operation

Ordering detail
V212



Mechanical operator with tongue on connection side A, spool return via a spring and electrical detent when spool is pushed

Ordering detail
S2Z1A



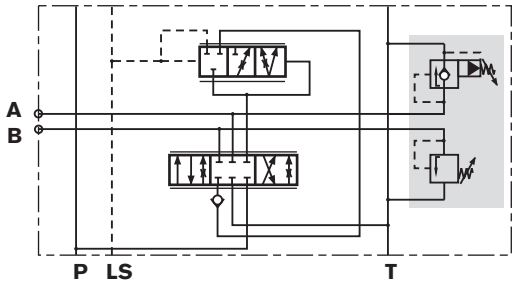
Directional valve elements

Secondary valves

Relief / anti-cavitation check valve, pilot operated (connection side A); direct actuated pressure relief valve (connection side B) on standard SX 14

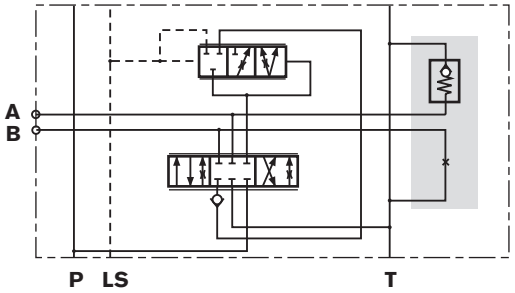
(the setting of the given pressure values is carried out at a flow of 5 l/min)

Ordering detail
H...A...



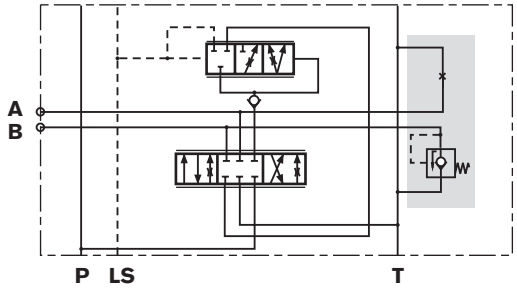
Anti-cavitation check valve (connection side A); plug (connection side B) on standard SX 14

Ordering detail
EQ



Plug (connection side A); direct actuated pressure relief valve (connection side B) on SX 14 S

Ordering detail
QH...

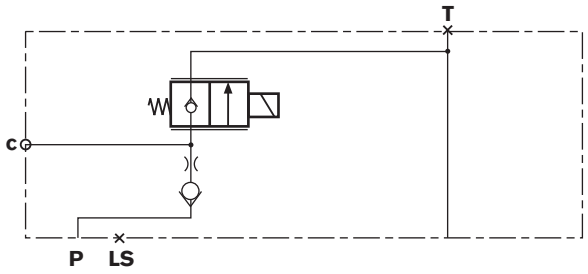


Final elements

Outlet element with solenoid operated control valve

Ordering detail

C

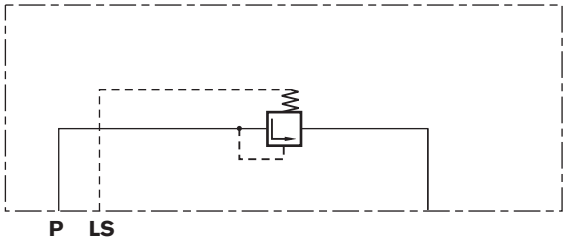


Outlet element with Flushing valve

(for use with inlet element CS or CD)

Ordering detail

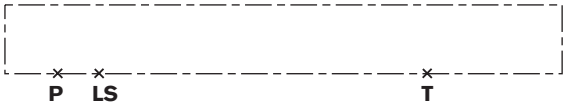
F



Blanking plate

Ordering detail

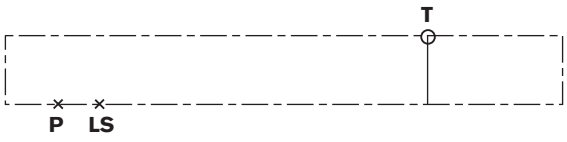
L



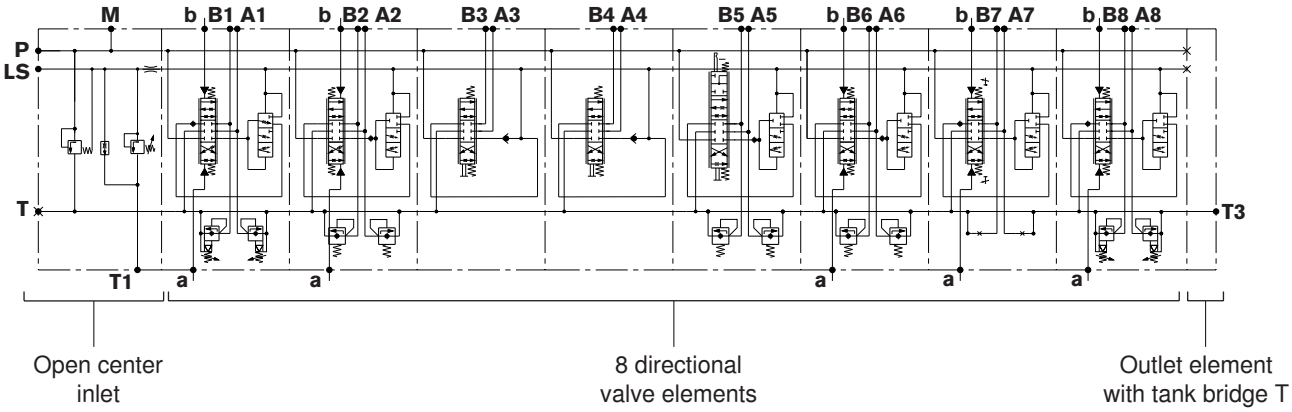
Outlet element with tank bridge T

Ordering detail

R

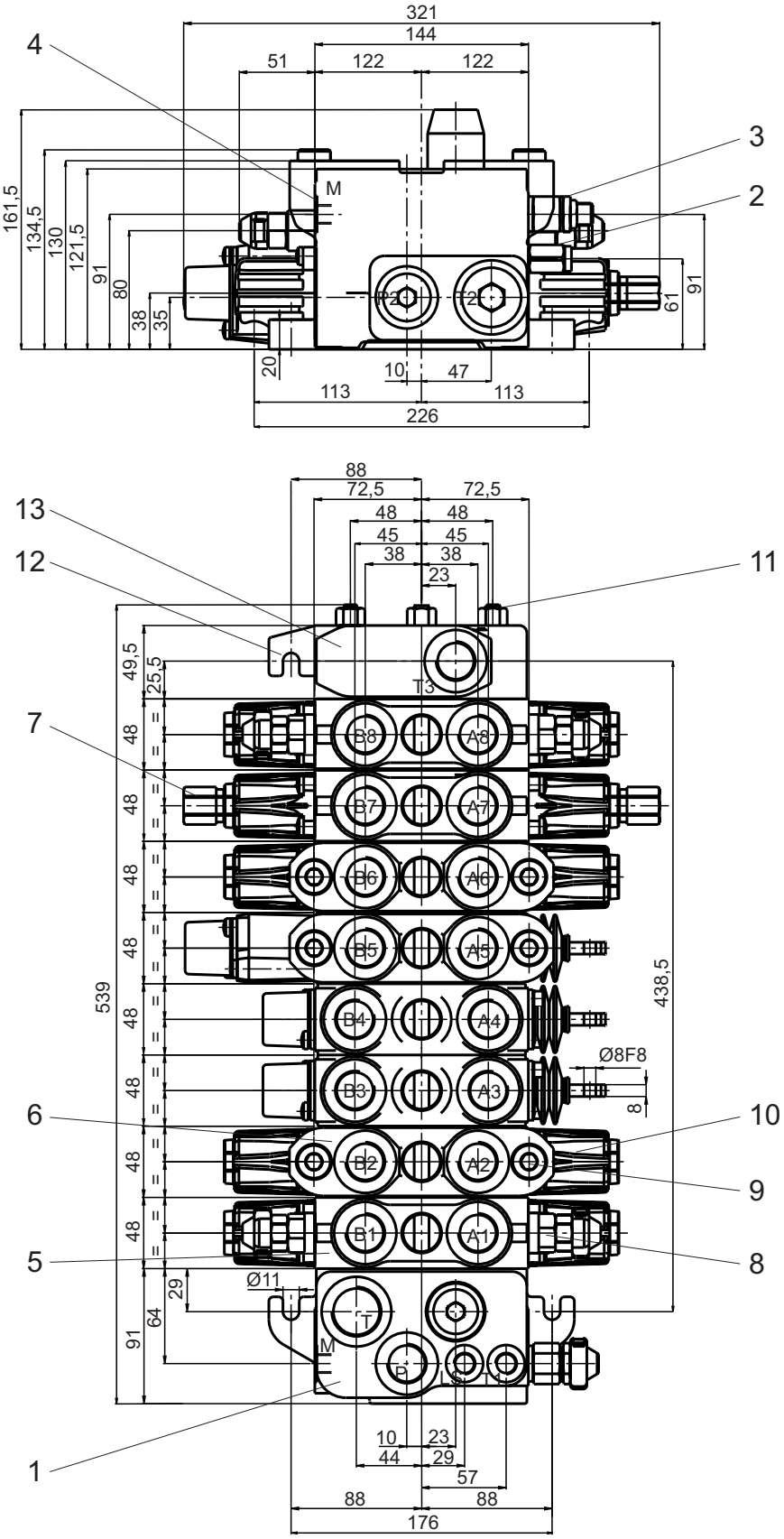


Circuit example: complete directional control block



Unit dimensions (in mm)

SX 14 directional control block with inlet element in open center execution



1 Open center inlet element P

2 Flow control valve
(tightening torque = 20 ±10 % Nm)

3 LS relief valve
(tightening torque = 45 ±10 % Nm)

4 Pressure gauge connection

5 Directional valve element
standard SX 14

6 Directional valve element SX 14 S

7 Hydraulic operation cover with stroke limitation, on connection side B

8 Secondary valve
(pressure relief valve)
(tightening torque = 70 ±10 % Nm)

9 Secondary valve for SX 14 S
(pressure relief valve)
(tightening torque = 32 ±10 % Nm)

10 Hydraulic operation cover,
on connection side A

11 3 tie rods
(tightening torque = 30 to 35 Nm)

12 3 fixation points Ø 11

13 Outlet element with tank bridge T.

Unit dimensions (in mm)

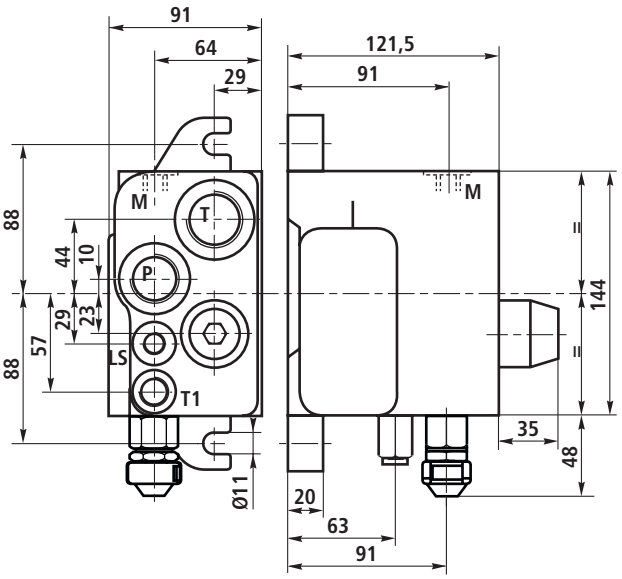
Inlet element in open center execution
Ordering detail
P

or

Inlet element in closed center execution
Ordering detail
A

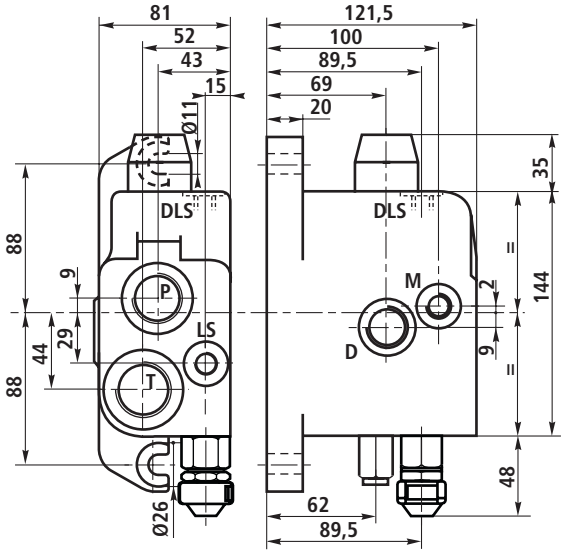
or

Inlet element with flushing valve
Ordering detail
S



Inlet element in closed center execution with priority flow divider

Ordering detail
CD or CS

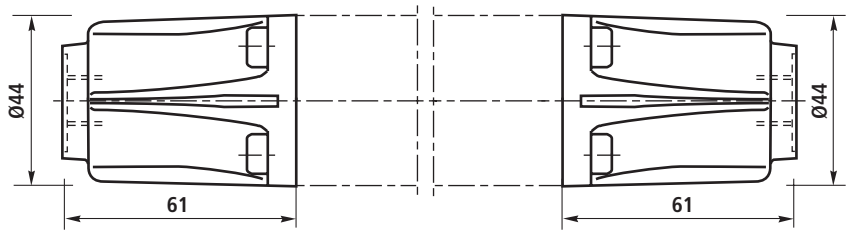


Unit dimensions (in mm)

Hydraulic operator, spool return via a spring

Ordering detail

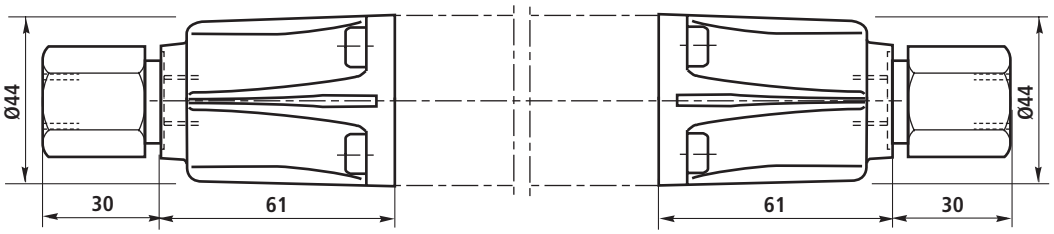
H200



Hydraulic operator with stroke limitation, spool return via a spring

Ordering detail

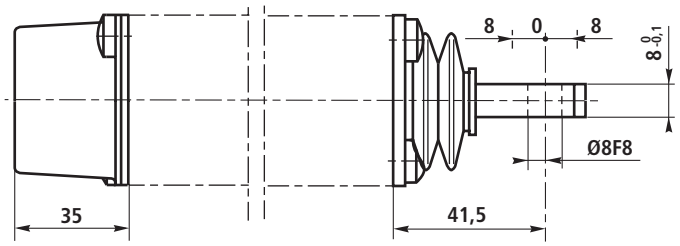
H230



Mechanical operator with tongue, spool return via a spring

Ordering detail

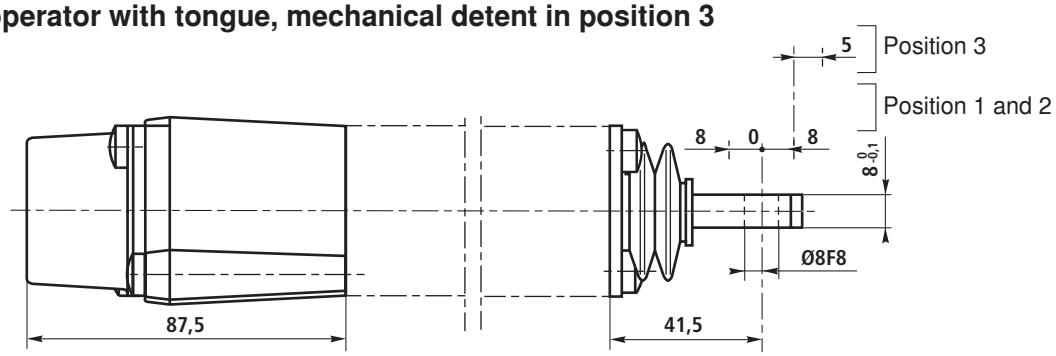
A2Z1



Mechanical operator with tongue, mechanical detent in position 3

Ordering detail

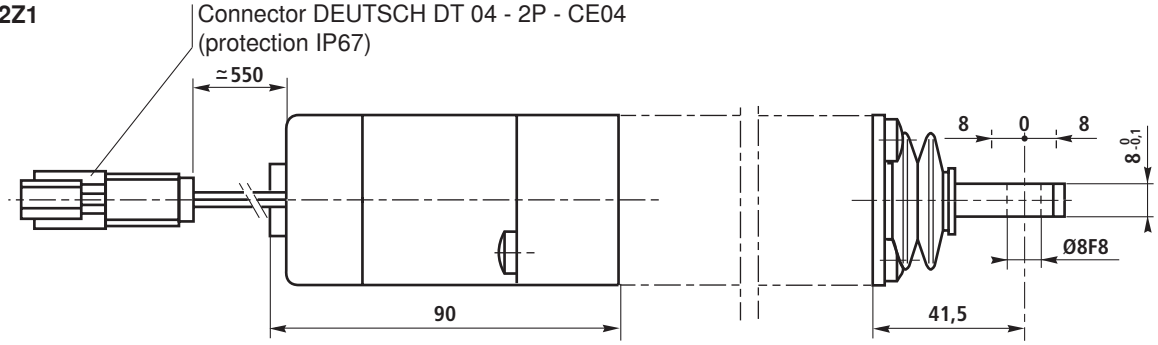
E2Z1



Mechanical operator with tongue, electrical detent when spool is pushed

Ordering detail

S2Z1

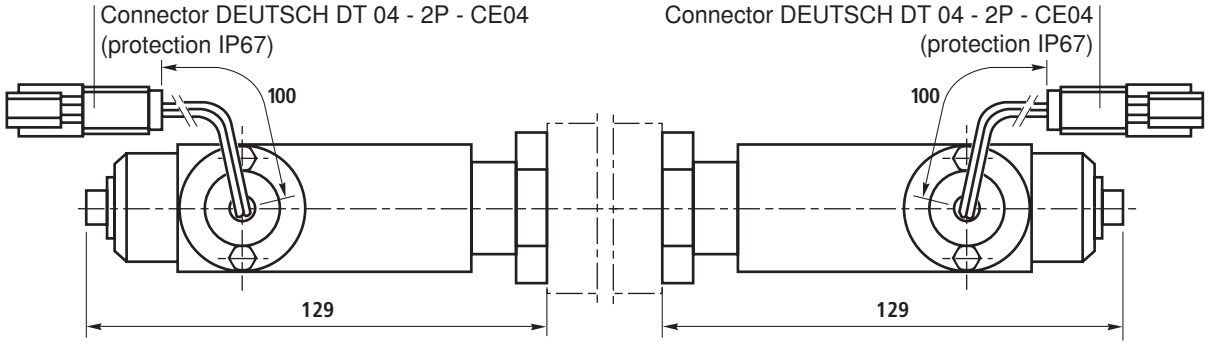


Unit dimensions (in mm)

Direct electrical operation

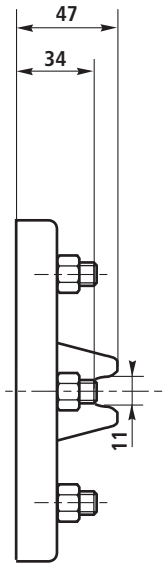
Ordering detail

V212



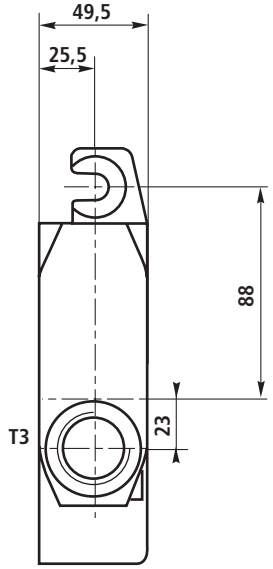
Blanking plate

Ordering detail
L



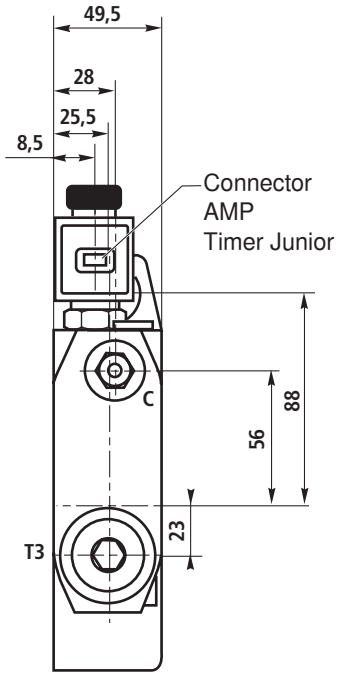
Outlet element with tank bridge

Ordering detail
R



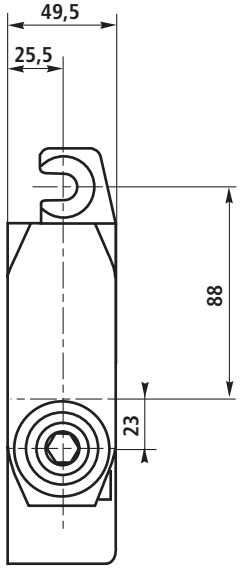
Outlet element with solenoid operated control valve

Ordering detail
C

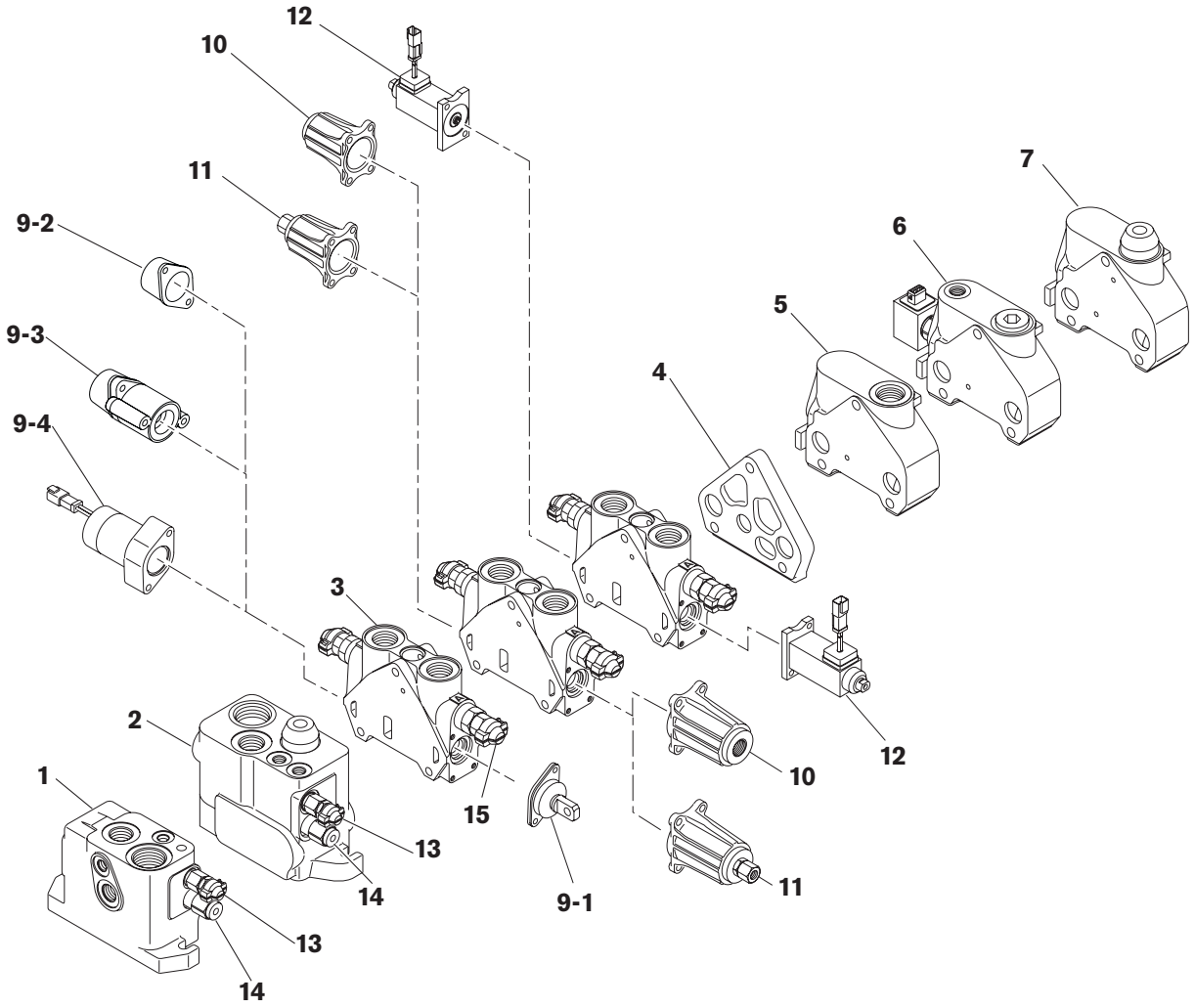


Flushing valve

Ordering detail
F



Assembly possibilities



1 Inlet element with priority flow divider **CD** or **CS**

2 Inlet element - Closed Center **A -** Open Center **P** or with flushing valve **S**

3 Directional valve element **SX14** or **SX14S**

4 Blanking plate **L**

5 Oulet element with tank bridge **R**

6 Oulet element with solenoid operated control valve **C**

7 Flushing valve **F**

9-1 Mechanical operator with tongue **Z1**

9-2 Spring return arrangement, type **A2**

9-3 Spring return arrangement, mechanical detent in spool position 3, type **E2**

9-4 Spring return arrangement, electrical detent when spool is pushed, type **S2**

10 Hydraulic operator with spool return via a spring **H200**

11 Hydraulic operator with stroke limitation **H230**

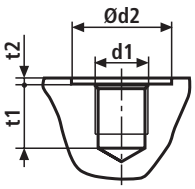
12 Direct electrical operation **V212**

13 **LS** relief valve

14 Flow control valve

15 Secondary valve

Pipe connections



	01				19			
connection	**d1**	**Ød2**	**t1**	**t2**	**d1**	**Ød2**	**t1**	**t2**
A, B, P, T3	G 3/4	42	25	2,5	1-1/16 UNF-2B	42	24	2,4
T	G 1	47	27	2,5	1-5/16 UNF-2B	50	24	3,2
M, LS, DLS, a, b, T1	G 1/4	25	16	1,5	9/16 UNF-2B	26	16	1,6
D	G 1/2	34	20	2,5	3/4 UNF-2B	32	18	2,4

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
Fax +49 (0) 93 52 / 18-23 58
info.brm-mc@boschrexroth.de
www.boschrexroth.com

Bosch Rexroth DSI S.A.S.
BP 101
91, bd Irène Joliot-Curie
69634 Vénissieux Cedex, France
Tél. +33 (0) 4 78 78 52 52
Fax. +33 (0) 4 78 78 52 26
www.boschrexroth.fr

Notes

Bosch Rexroth AG
Hydraulics
Zum Eisengießer 1
97816 Lohr am Main, Germany
Phone +49 (0) 93 52 / 18-0
Fax +49 (0) 93 52 / 18-23 58
info.brm-mc@boschrexroth.de
www.boschrexroth.com

Bosch Rexroth DSI S.A.S.
BP 101
91, bd Irène Joliot-Curie
69634 Vénissieux Cedex, France
Phone +33 (0) 4 78 78 52 52
Fax +33 (0) 4 78 78 52 26
www.boschrexroth.fr