

Flow sharing (LUDV) control block in sandwich plate design RS14



- ▶ Applications: backhoe loaders, telehandler, mini and midi excavators, wheeled excavators, wheel loaders, dozers
- ▶ Nominal size 14
- ▶ Series 1X
- ▶ Maximum pressure
 - on the pump side 265 bar
 - on the consumer side 300 bar
- ▶ Inlet flow 175 l/min

Features

- ▶ Distributes the flow between the directional valve sections 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 required
- ▶ Limitation of system maximum pressure via LS pressure relief valve
- ▶ System protection via LS combine to flushing valve
- ▶ Equipments protection by secondary pressure valve

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Functional description

The RS14 control block basically consists of one inlet element, a number of directional valve sections and one end element.

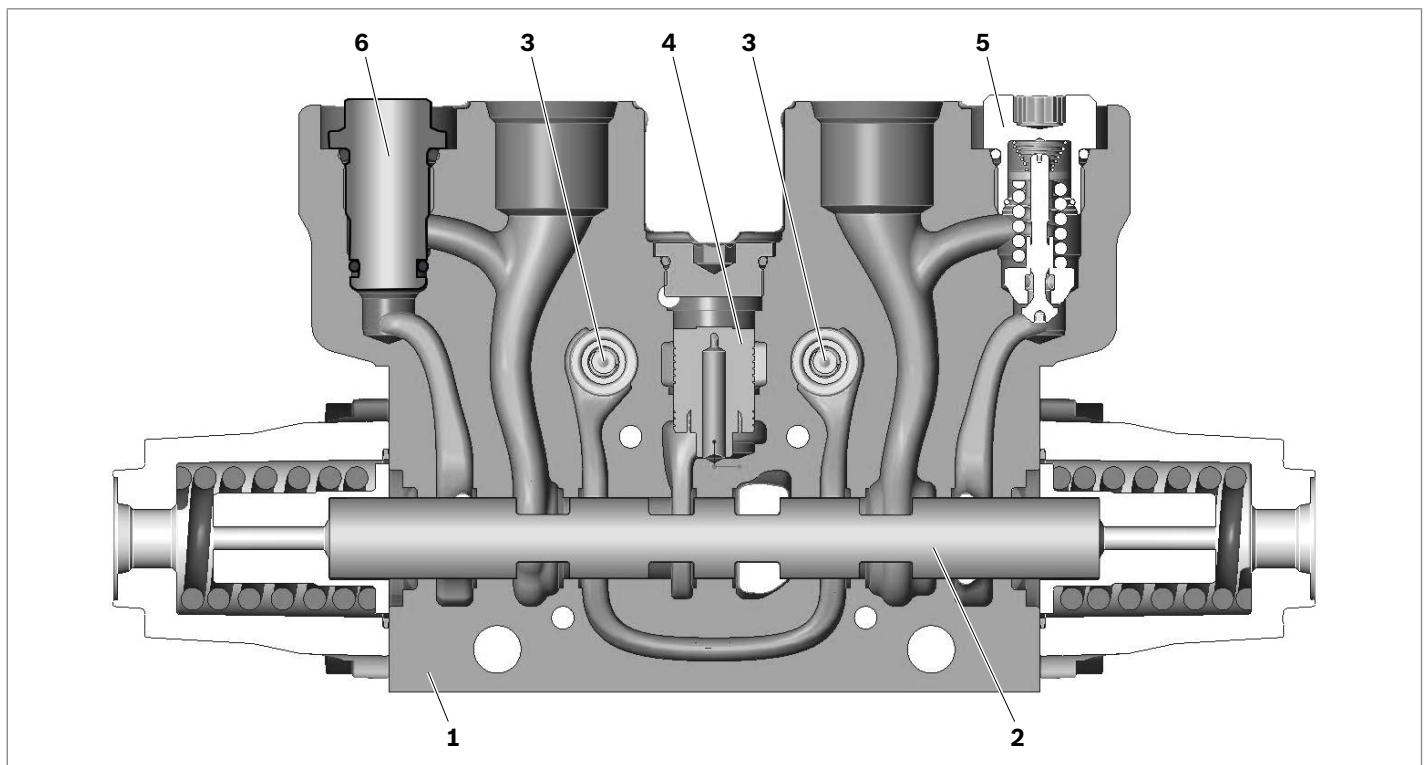
The inlet element contains 2 fixing points and the pipe connection ports **P**, **T**, **LS**, **M**.

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.

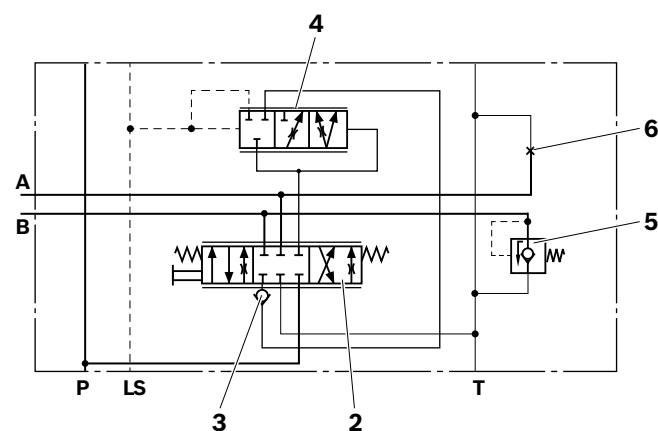
Each standard RS directional valve section comprises of a housing (1), a control spool (2), two load holding check valves (3), a pressure compensator (4), cavities (5) for secondary relief/anti-cavitation check valves, and anti-cavitation check valves or plugs (6).

The end element has one fixing point.

▼ Sectional view RS14



▼ Symbol RS14, hydraulic actuation



- 1 Housing
- 2 Control spool
- 3 Check valves
- 4 Pressure compensator
- 5 Secondary valve
- 6 Plug

Ports	
P	Pump port
A, B	Consumer port
T	Tank port
LS	Load sensing port

Technical data

General					
Design	Flangeable (up to 9 directional valve sections)				
Description	Flow distribution between the directional valve sections according to the requirements, independently of the pressure and available flow				
Type	RS14				
Nominal size	14				
Weight	Inlet element	kg	10		
	Directional valve section	kg	4.7		
	Blanking plate	kg	2		
	Electro-hydraulic end element	kg	7.2		
Installation position					Any
Connections					Threads
Ambient storage temperature range	ϑ	°C	-40 to +60		
Priming	Single-layer coat paint RAL 5010 (standard) Further colors and dual-layer coat paint on request				
Surface protection according to DIN EN 60068-2-11	Standard priming	h	96		
Hydraulic					
Maximum permissible flow at port	P	q_v	l/min	175	
Standard leakage oil flow on load holding (at 100 bar, 36 mm ² /s)	Standard section		cm ³ /min	20	
	Low leak section		cm ³ /min	3	
Maximum operating pressure at port				Medium pressure	High pressure
	P, M, LS, D, DLS	p	bar	265	350
	A, B	p	bar	300	400
	T	p	bar	20	20
Secondary valves setting pressure tolerances (at 5 l/min)	H..0 direct actuated		bar	Setting	Tolerance
				71 → 120	-4 / +8
				121 → 200	-6 / +12
				201 → 270	-8 / +12
				271 → 320	-10 / +14
				321 → 420	-12 / +18
Max. control pressure at port	a, b		bar	35	We recommend the use of control curve 6 to 25 bar, and inlet pressure (4TH6 curve no. 70)
Hydraulic fluid	Mineral oil (HL, HLP) according to DIN 51524, see data sheet 90220. Other hydraulic fluids on request, e.g. environmentally acceptable fluids per ISO 15380 as specified in data sheet 90221.				
Hydraulic fluid temperature range	ϑ	°C	-20 to +100		
Viscosity range	ν	mm ² /s	2.8 to 380		
Maximum admissible degree of contamination of the hydraulic fluid Cleanliness level per ISO 4406 (c)					Level 20/18/15, we recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$

4 **RS14** | Control block
Technical data

Mechanical			
Spool return force		N	Minimum value 54, depending of actuation (for more details please consult us)
Maximum permissible actuation force on the spool (for 1 million cycles)	Axial	N	1000 during 20 % of total cycles then 500
	Radial	N	20

Electric			
Electrical detent when spool is pushed (actuation S2) (data 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
Electro-hydraulic actuation (actuation W200)			See data sheet 64658

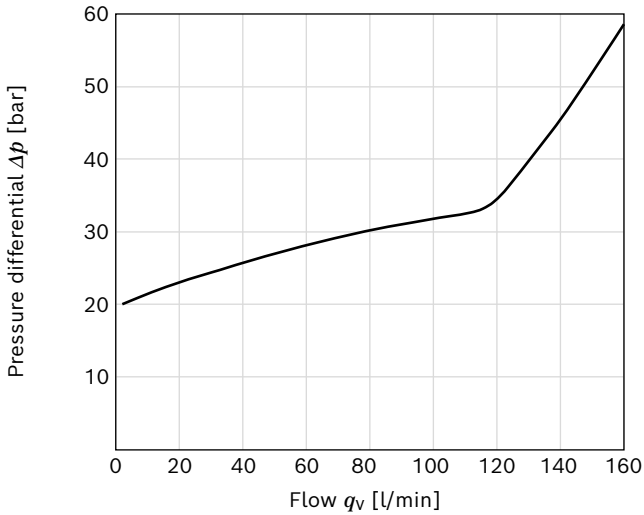
Application guidelines									
			Line connections						
			P, T	P2	M, LS	A, B	a, b	Pr, TPr, Accu	MPr
Tightening torque for the line connections		Nm	90	60	30	60	30	30	12
Recommended fixing			At 3 locations maximum						
Flatness of the mounting surface		mm	0.5						
Setting of system pressure			Via the LS relief valve						
Do not use high-pressure washers for cleaning. No free-wheeling diode required for electrical actuations. Mechanical actuation spool: a greasy appearance on the tongue side is normal (due to natural effect of seal lubrication). It could be necessary to proceed to a regular cleaning of this area.									

Notice

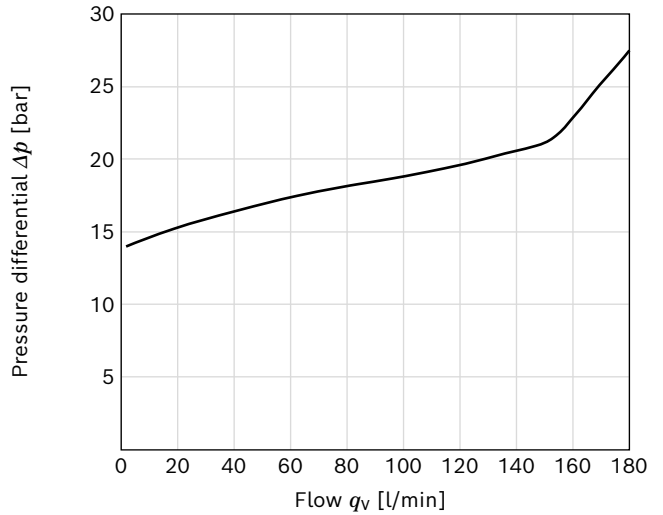
For applications outside these values, please consult us!

Characteristic curves

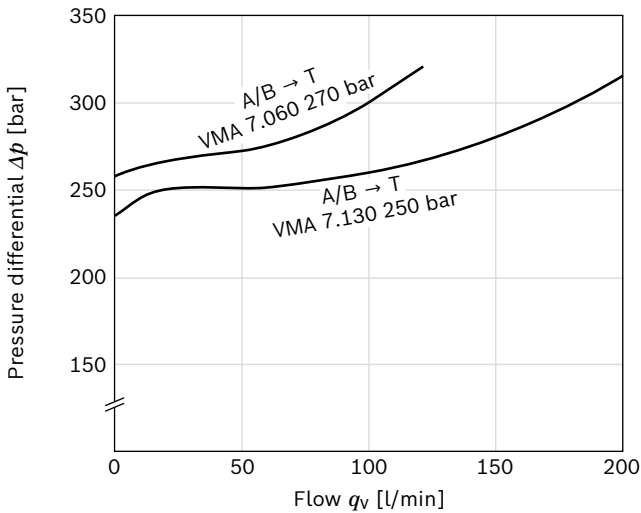
▼ Pressure differential in neutral position of the inlet element with flushing valve type S



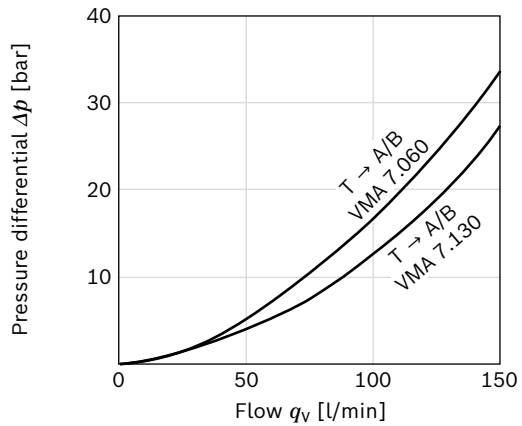
▼ Pressure differential in neutral position of open center inlet element type P



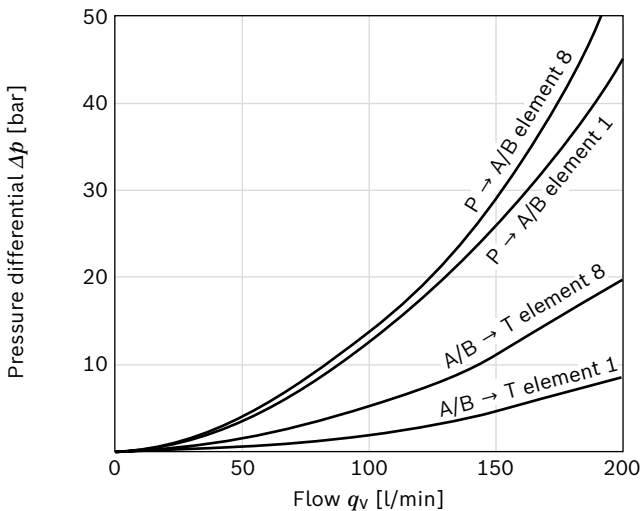
▼ Properties of secondary pressure relief valves A/B → T



▼ Properties of secondary pressure relief valves T → A/B



▼ Block pressure drop with fully opened spool

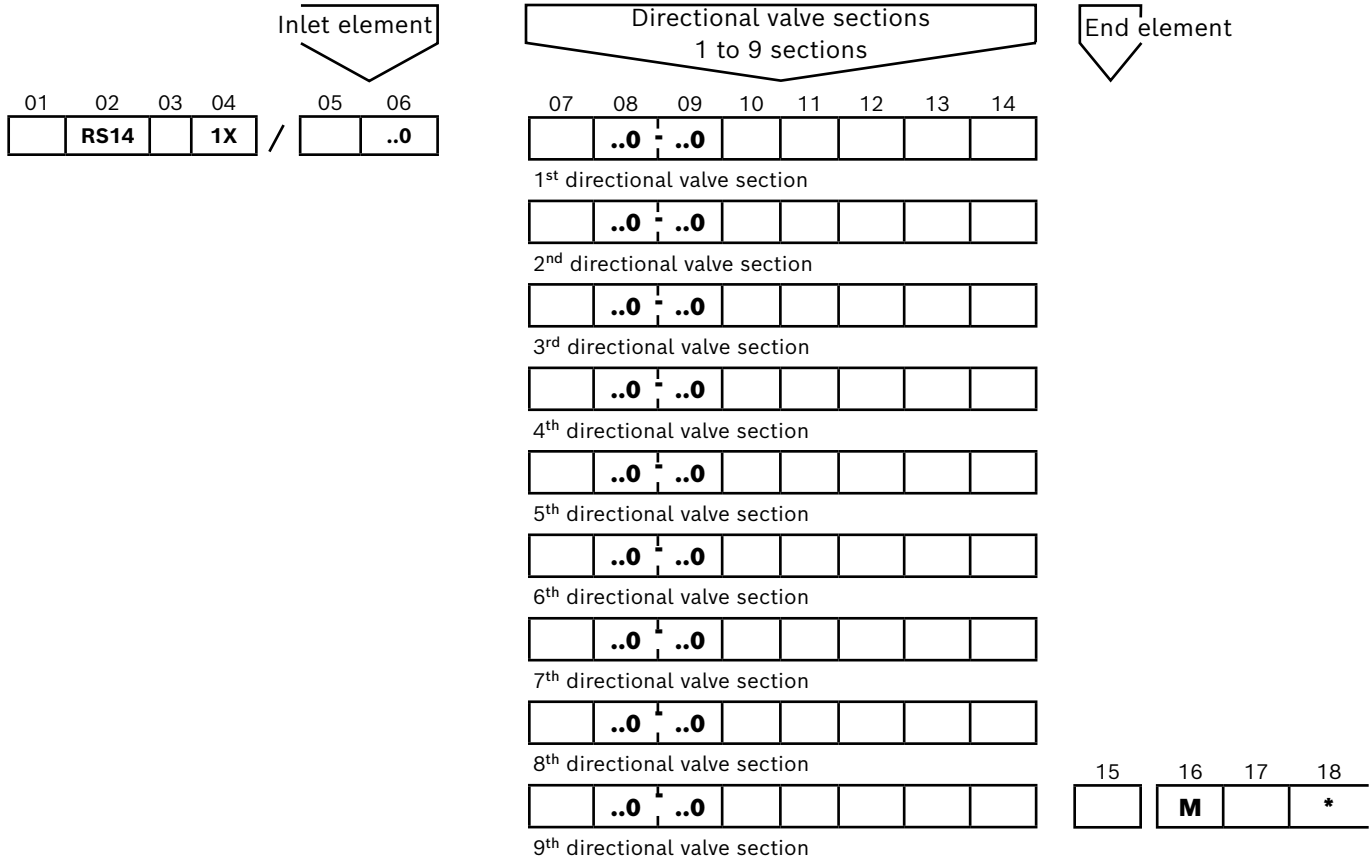


Notice

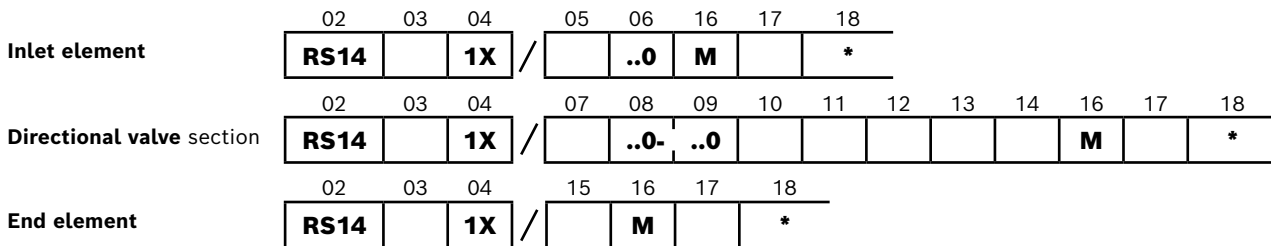
Characteristic curves measured at $v = 36 \text{ mm}^2/\text{s}$ and $\vartheta_{\text{oil}} = 50 \text{ }^\circ\text{C}$.

Ordering code

Ordering codes: RS14 control block



Ordering code: separate elements



Ordering code: meaning

Directional valve section

01	Number or directional valve sections 1 to 9	
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Product

02	RS14	RS14
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Pressure

03	Medium pressure	L
	High pressure	H

Series

04	Series 10 to 19: unchanged installation and connection dimensions	1X
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Inlet element

05	Open center	P
	Closed center	A
	With flushing valve (use with variable displacement pump)	S
	With priority flow divider for dynamic servo-steering (with flow in the LS line)	CD
	With priority flow divider for static servo-steering (without flow in the LS line)	CS

LS pressure

06	Max. pressure in bar, measured at M, adjustable via the LS pressure relief valve ¹⁾	..0
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Spool symbol

07		EA
		JA
		QA
		WA

Flow at consumer ports ³⁾ Other flow values (rated in 10 l/min ranges): please consult us

08	Flow at consumer port A in l/min	***
09	Flow at consumer port B in l/min	***

Type of section

10	Standard section (no designation)	
	Low leak side A	A
	Low leak side B	B

Type of actuation

11	Mechanical actuation, spool return via a spring	A2
	Mechanical actuation, spool return via a spring, mechanical detent in spool position 3 (4 th or float position) when spool is pulled	E2
	Mechanical actuation, spool return via a spring, electrical detent when spool is pushed (12 V)	S2
	Mechanical actuation with tongue (Ø 8 or Ø 10)	Z1
	Hydraulic actuation, spool return via a spring	H200
	Hydraulic actuation, spool return via a spring, stroke limitation on connection sides A and B	H230
	Electro-hydraulic actuation (12 V or 24 V), spool return via a spring	W200

Actuation position

12	Without mechanical actuation (no designation)	
	Mechanical actuation on connection side A	A
	Mechanical actuation on connection side B	B

Secondary valve, consumer port "A"

13	Pressure relief valve with anti-cavitation function ⁴⁾	H..0
	Plug	Q
	Without cavity for secondary valves ⁵⁾	Z

¹⁾ Set with a Δp of 15 bar between M and LS

²⁾ For hydraulic actuation, consult us

³⁾ Tolerance: consult us

⁴⁾ Pressure value in bar in multiples of 10


⁵⁾ Only if both sides are not machined

Secondary valve, consumer port "B"

14	Pressure relief valve with anti-cavitation function ⁴⁾	H..0
	Plug	Q
	Without cavity for secondary valves ⁵⁾	Z

End element

15	Blanking plate	L
	End element with tank bridge T	R
	End element with solenoid operated control valve (12 V)	C
	Flushing valve	F
	End element with P, T, LS ports	K
	Electro-hydraulic end element with flushing valve, solenoid operated control valve (12 V), pressure reducing valve (35 bar), pressure shut-off valve (12 V or 24 V) and accu ports	FCYS
	Electro-hydraulic end element with pressure reducing valve (35 bar) and pressure shut-off valve (12 V or 24 V) ⁶⁾	RYS

Sealing material  **Attention!** The compatibility of the seals and pressure fluid has to be taken into account!

16	NBR (nitrile rubber)	M
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Connection threads

17	Pipe threads to standard ISO 228/1 P, A, B, T3 = G 3/4 T = G 1 LS, DLS, M = G 1/4 D = G 1/2 a, b, T1 = G 1/4	01
	UNF connection threads to standard ISO 11926 P, A, B, T3 = 1-1/16 UNF-2B T = 1-5/16 UNF-2B LS, DLS, M = 9/16 UNF-2B D = 3/4 UNF-2B a, b, T1 = 9/16 UNF-2B	19

18	Further details in plain text	*
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⁶⁾ For use with actuation W200

Order example

RS14 with 4 directional valve sections

Inlet element:

- Closed center
- Maximum pressure = 220 bar

1st directional valve section:

- Spool symbol = EA
- Flow in **A** = 120 l/min, flow in **B** = 80 l/min
- Mechanical actuation with tongue on connection side **A**, spool return via a spring
- Secondary valve in **A** = pressure relief valve with anti-cavitation function set at 300 bar
- Secondary valve in **B** = plug

2nd directional valve section:

- Spool symbol = EA
- Flow in **A** = 120 l/min, flow in **B** = 80 l/min
- Check valve + pressure compensator
- Mechanical actuation with tongue on connection side **A**, spool return via a spring
- Secondary valve in **A** = pressure relief valve with anti-cavitation function set at 300 bar
- Secondary valve in **B** = pressure relief valve with anti-cavitation function set at 250 bar

3rd directional valve section:

- Spool symbol = EA
- Flow in **A** = 100 l/min, flow in **B** = 100 l/min
- Check valve
- Mechanical actuation with tongue on connection side **A**, spool return via a spring
- Plugs in **A** and **B**

4th directional valve section:

- Spool symbol = JA
- Flow in **A** = 100 l/min, flow in **B** = 100 l/min
- Hydraulic actuation, spool return via a spring
- Without secondary valve holes

End element, additional information:

- Blanking plate
- NBR seals
- Pipe thread connections

Ordering code:

Short type, inlet

01	02	03	04	05	06
4	RS14	L	1X	A	220

1st directional valve section

07	08	09	10	11	12	13	14
EA	120	-	080		A2Z1	A	H300 Q

2nd directional valve section

07	08	09	10	11	12	13	14
EA	120	-	080		A2Z1	A	H300 A250

3rd directional valve section

07	08	09	10	11	12	13	14
EA	100	-	100		A2Z1	A	Q Q

4th directional valve section

07	08	09	10	11	12	13	14
JA	100	-	100		H200		Z Z

End element, additional information

15	16	17
L	M	01

Hydraulic symbols

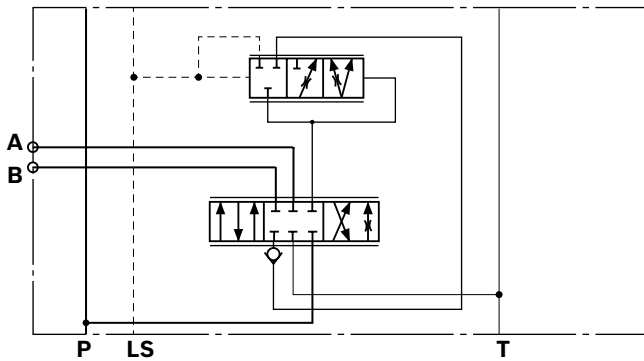
Inlet elements

Ordering code	Description	Symbol
P	Open center inlet	
A	Closed center inlet	
S	Closed center inlet with flushing valve for use with variable pump and q_{min}	
CD	Closed center inlet with priority flow divider for dynamic servo-steering	
CS	Closed center inlet with priority flow divider for static servo-steering	

Directional valve sections

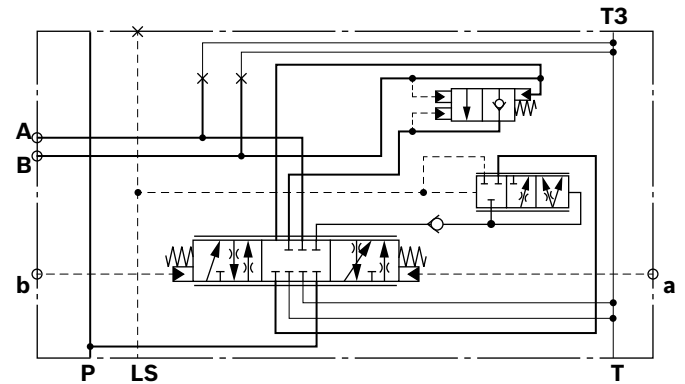
▼ RS14 directional valve standard section

Simplified symbol used to illustrate RS control circuits



▼ RS14 directional valve low leak section

Simplified symbol used to illustrate RS control circuits

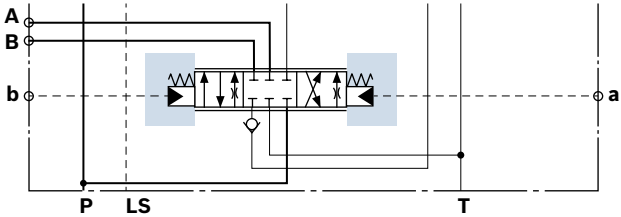
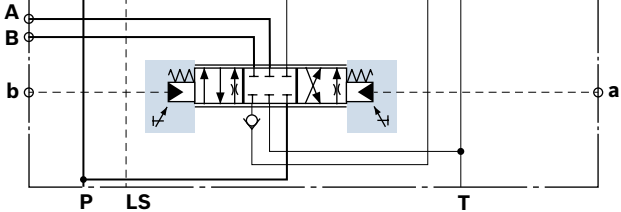
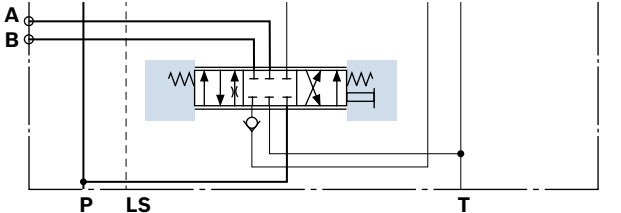
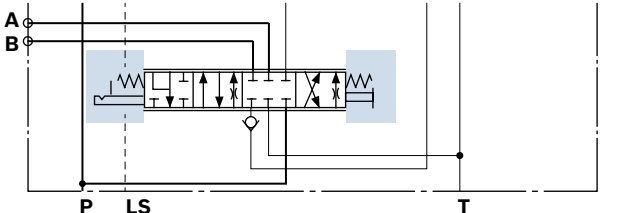
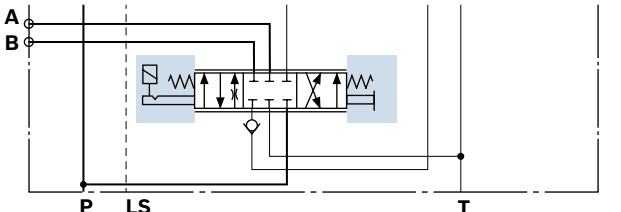
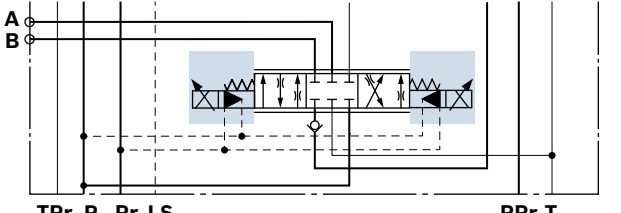


Spool types

Ordering code

EA ...-...	Symbol EA	
JA ...-...	Symbol JA	
QA ...-...	Symbol QA	
WA ...-...	Symbol WA	

Types of actuation

Ordering code	Description	Symbol
H200	Hydraulic actuation, spool return via a spring	
H230	Hydraulic actuation with stroke limitation, spool return via a spring	
A2Z1A	Mechanical actuation with tongue on connection side A , spool return via a spring	
E2Z1A	Mechanical actuation with tongue on connection side A , spool return via a spring and mechanical detent when spool is pulled	
S2Z1A	Mechanical actuation with tongue on connection side A , spool return via a spring and electrical detent when spool is pushed	
W200	Electro-hydraulic actuation, spool return via a spring	

Secondary valves

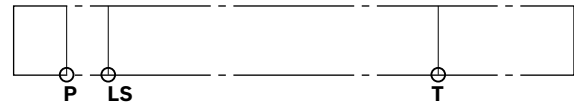
Ordering code	Description	Symbol
H...H...	Pressure relief valve with anti-cavitation function (sides A and B)	
QH...	Plug (side A); pressure relief valve with anti-cavitation function (side B)	

End elements

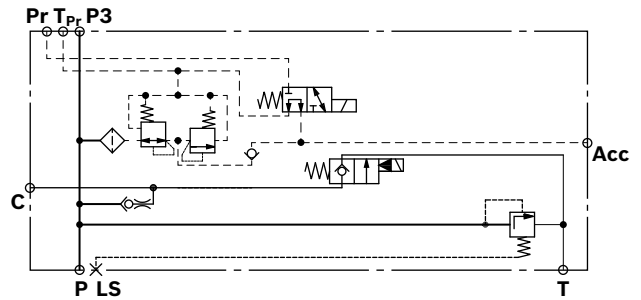
Ordering code	Description	Symbol
L	Blanking plate	
R	End element with tank bridge T	
C	End element with solenoid operated control valve	
F	End element with flushing valve (for use with inlet element CS or CD)	

Ordering code	Description	Symbol
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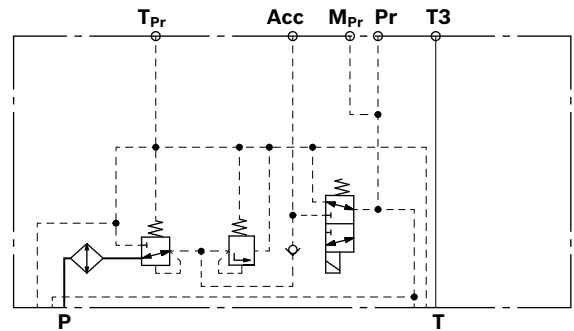
K End element with **P, T, LS** ports



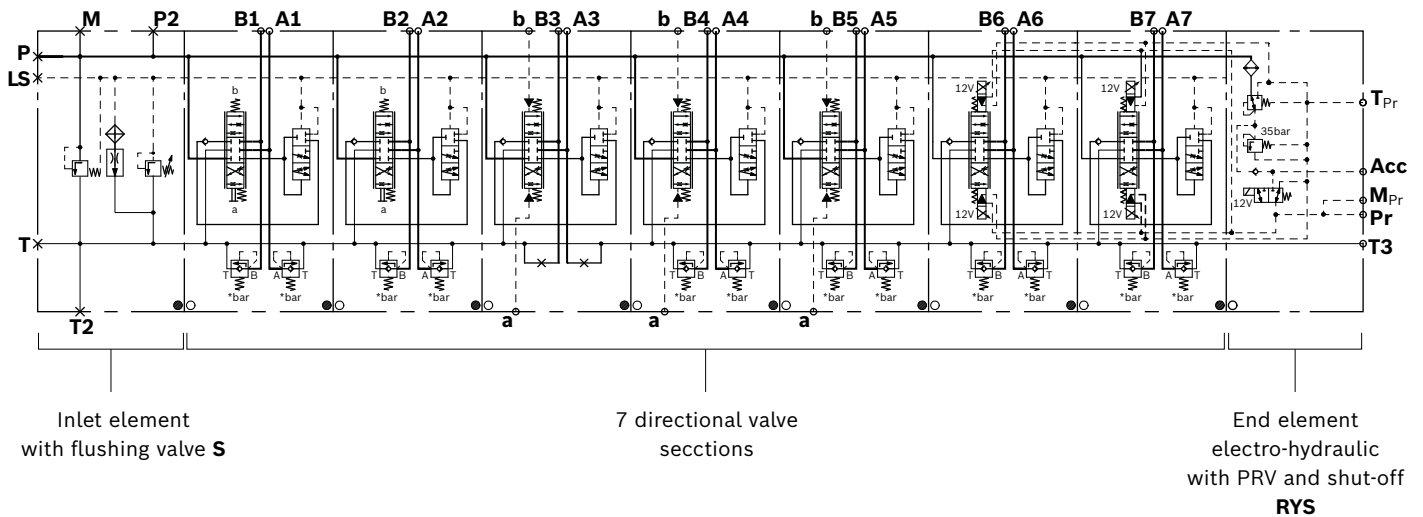
FCYS Electro-hydraulic end element with flushing valve, solenoid operated control valve (12 V), pressure reducing valve (35 bar), pressure shut-off valve (12 V or 24 V) and accu ports



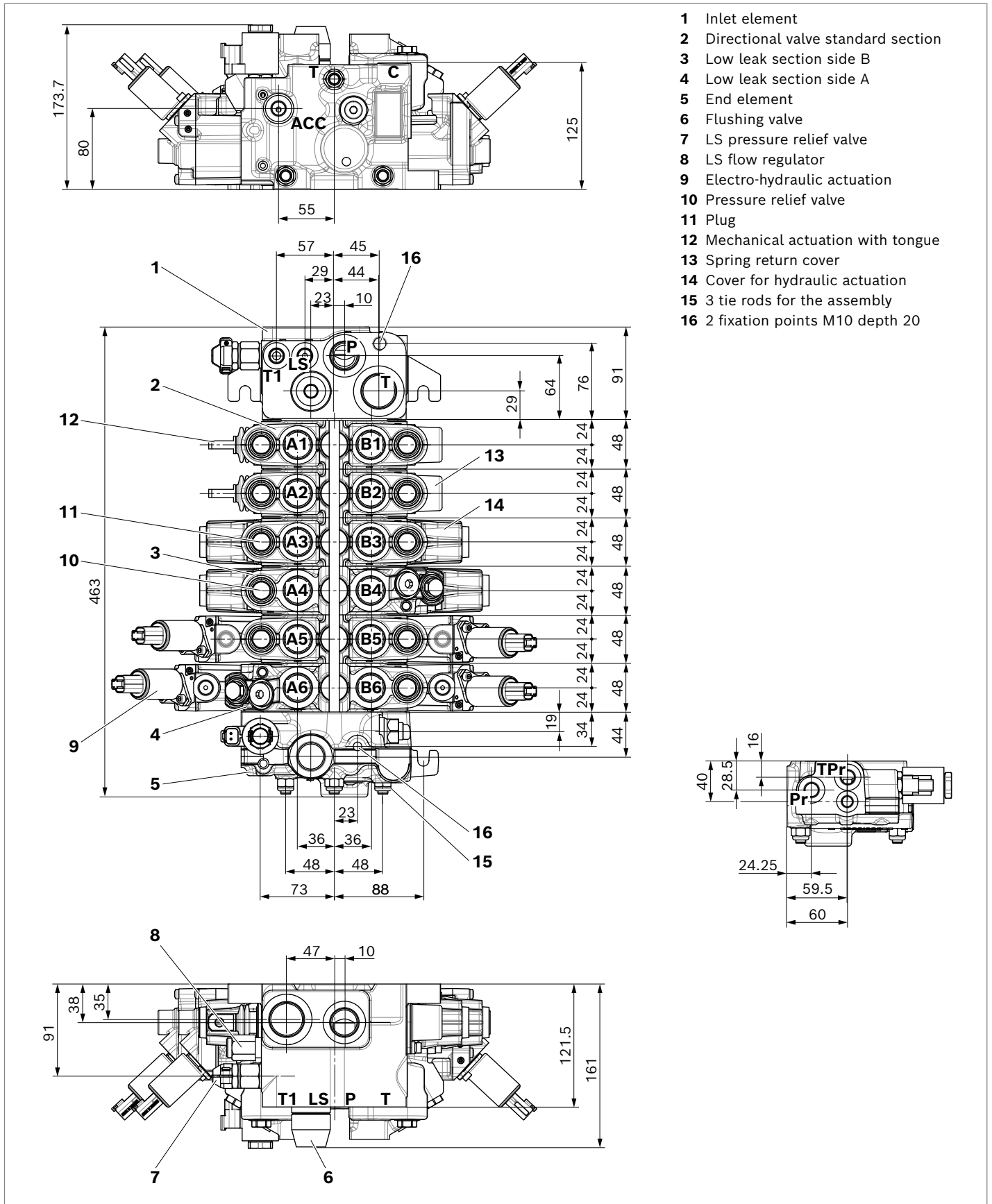
RYS Electro-hydraulic end element with pressure reducing valve (35 bar) and pressure shut-off valve (12 V or 24 V) (for use with actuation W200)



▼ **Circuit example: complete control block**



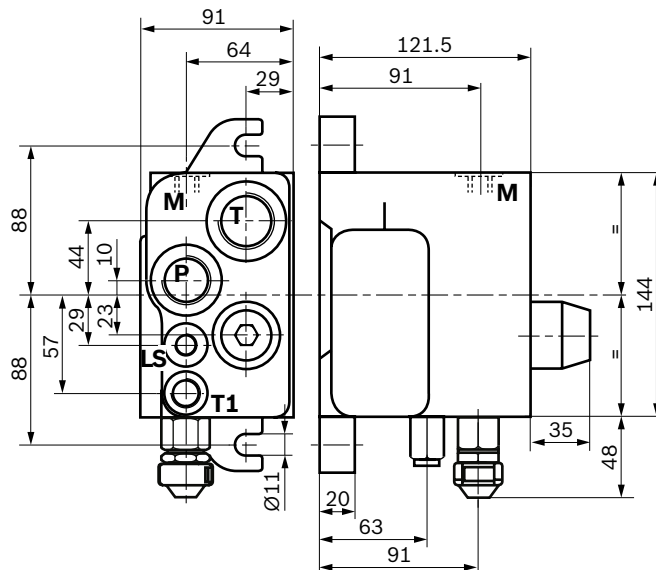
Dimensions



Inlet elements

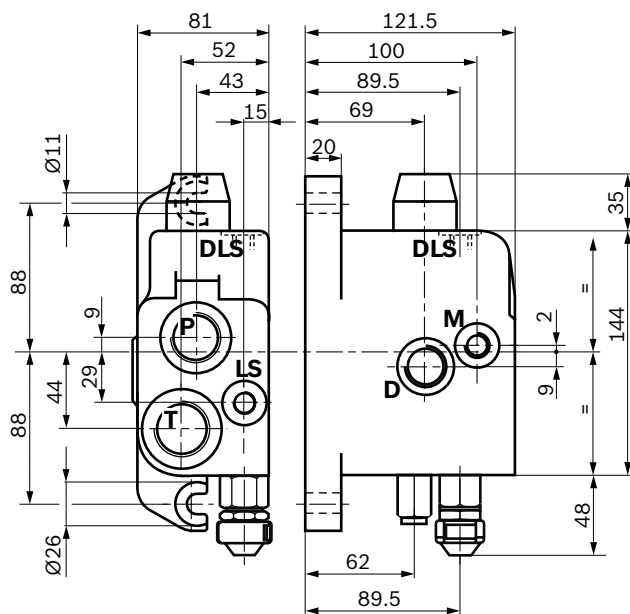
▼ **Closed center inlet (with/without flushing valve) or open center inlet**

Ordering code
A, S or P



▼ **Closed center inlet with priority flow divider**

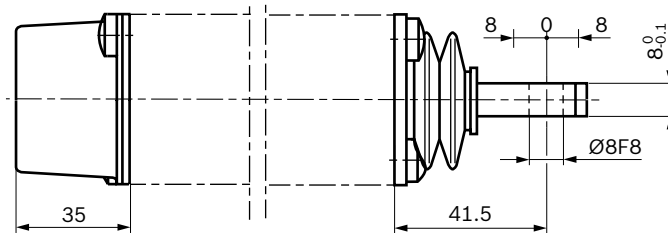
Ordering code
CD or CS



Actuation

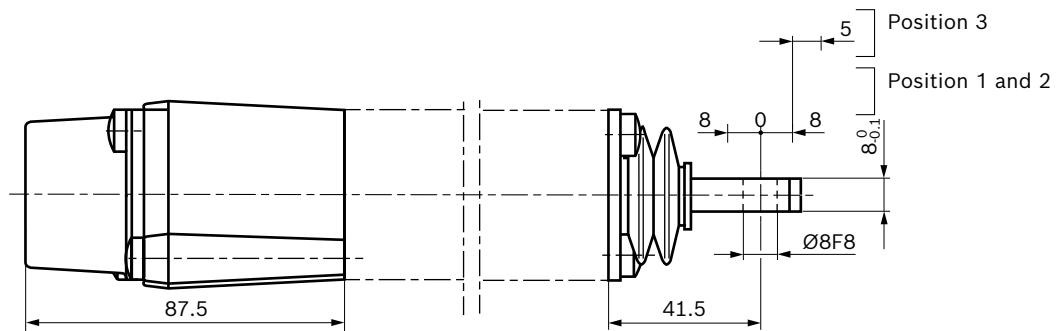
▼ **Mechanical actuation with tongue, spool return via a spring**

Ordering code
A2Z1



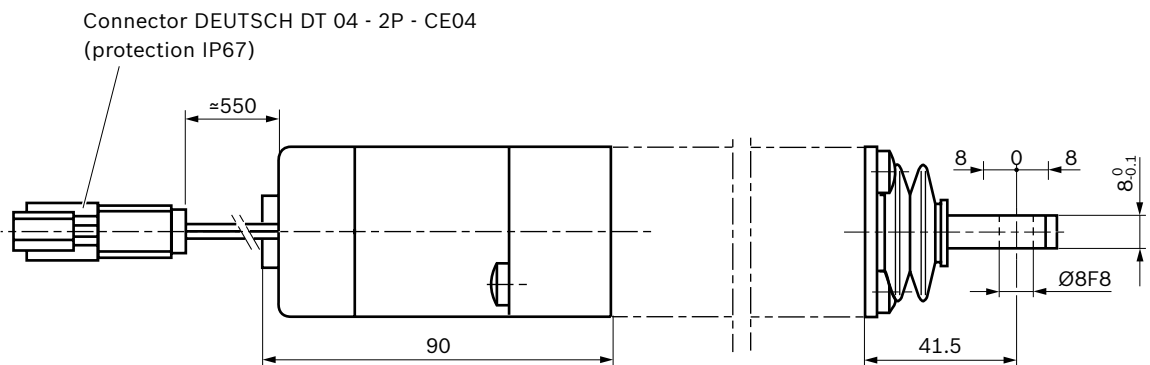
▼ **Mechanical actuation with tongue, spool return via a spring and mechanical detent in position 3**

Ordering code
E2Z1

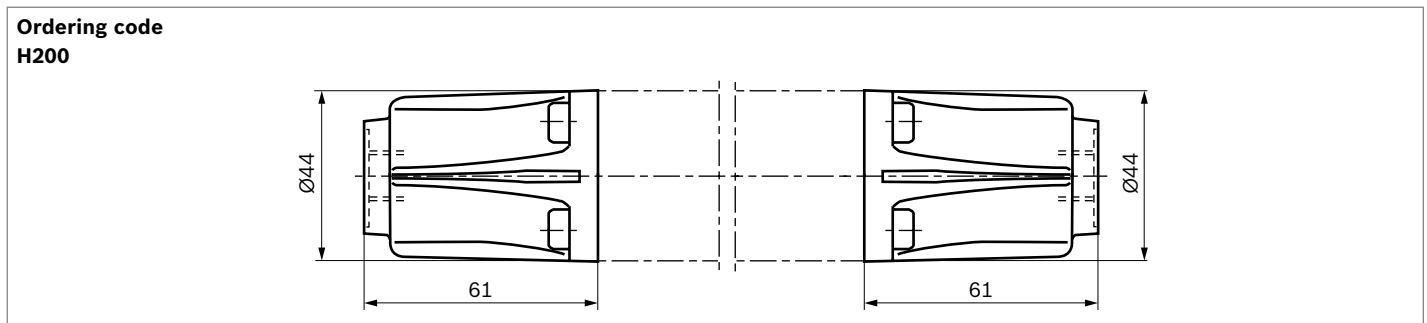


▼ **Mechanical actuation with tongue, spool return via a spring and electrical detent when spool is pushed**

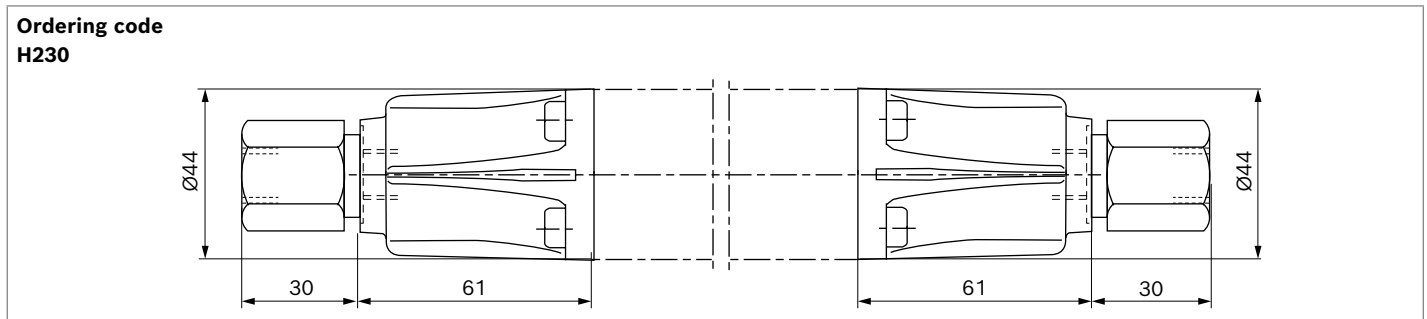
Ordering code
S2Z1



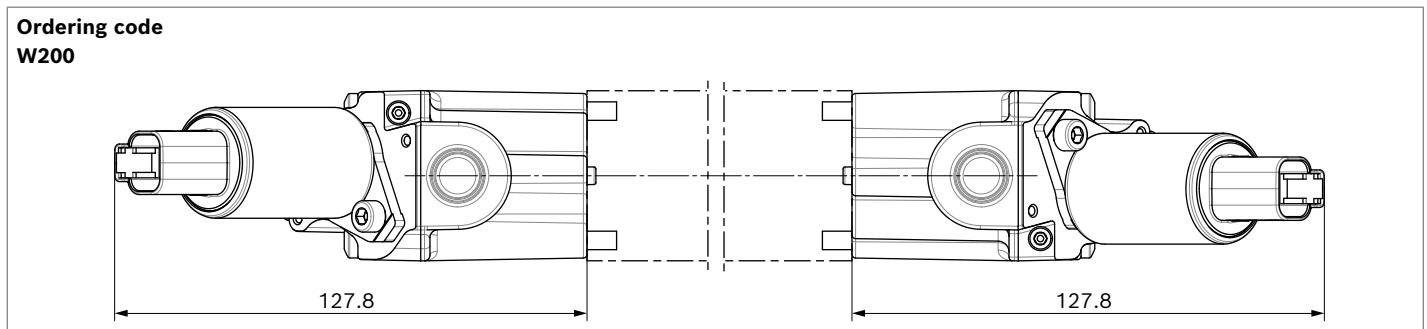
▼ **Hydraulic actuation, spool return via a spring**



▼ **Hydraulic actuation with stroke limitation, spool return via a spring**



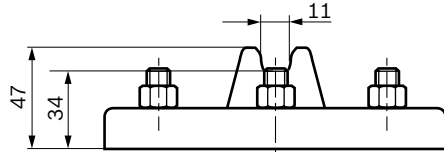
▼ **Electro-hydraulic actuation, spool return via a spring**



End elements

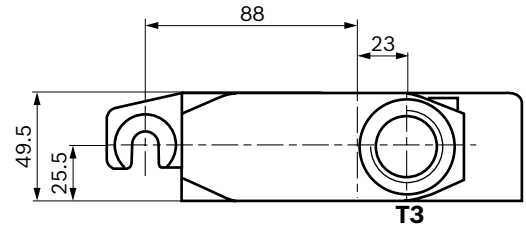
▼ **Blanking plate**

Ordering code
L



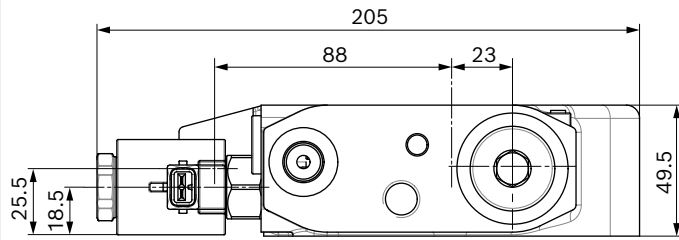
▼ **End element with tank port T**

Ordering code
R



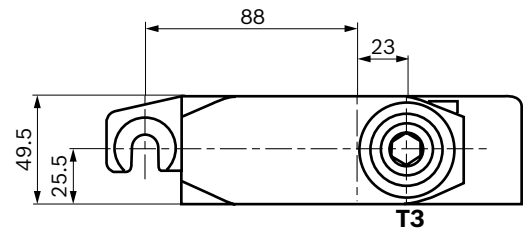
▼ **End element with solenoid operated control valve**

Ordering code
C



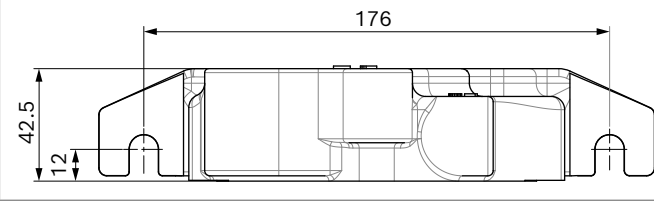
▼ **End element with flushing valve**

Ordering code
F



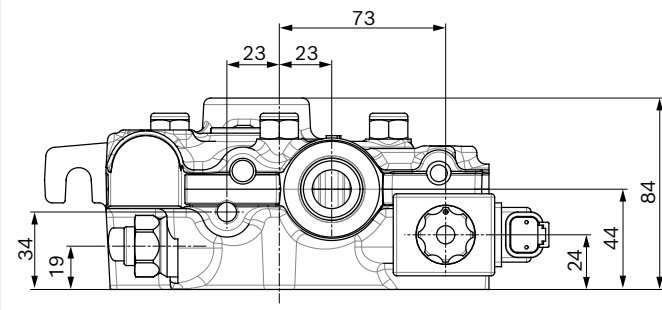
▼ **End element with P, T, LS ports**

Ordering code
K



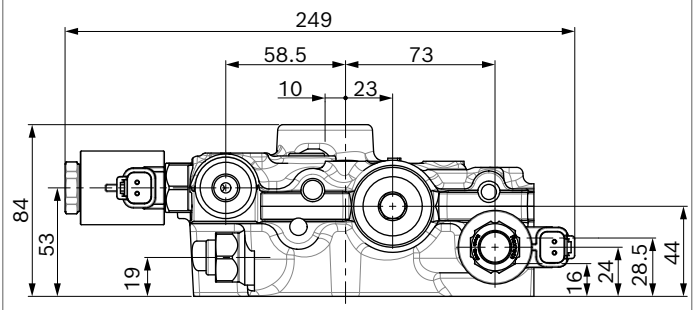
▼ **Electro-hydraulic end element with pressure reducing valve and pressure shut-off valve**

Ordering code
RYS

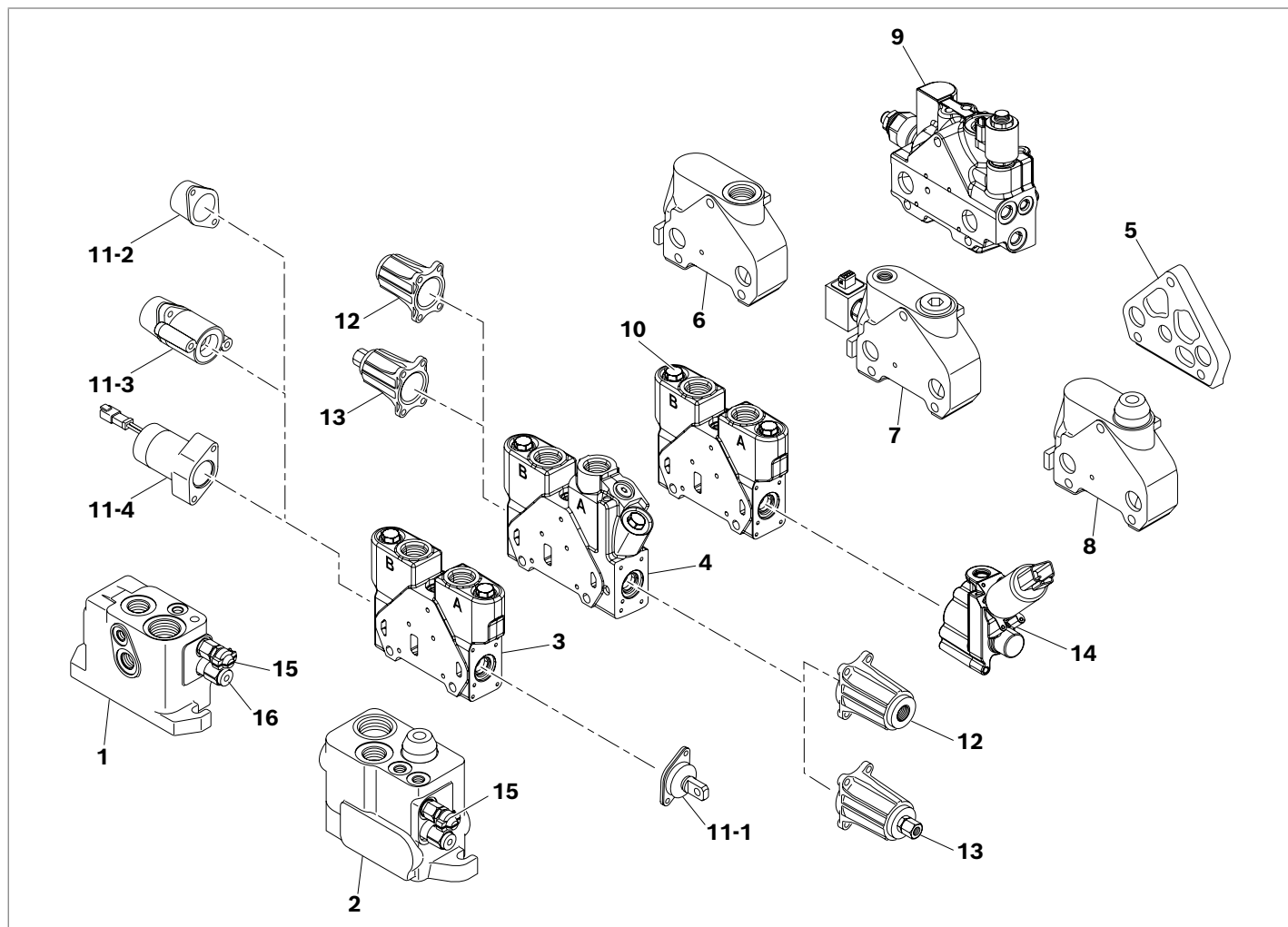


▼ **Electro-hydraulic end element with flushing valve, solenoid operated control valve, pressure reducing valve, pressure shut-off valve and accu ports**

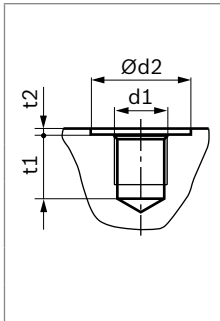
Ordering code
FCYS



Assembly possibilities



- | | | | |
|-------------|---|-----------|--|
| 1 | Inlet element with priority flow divider: CD or CS | 12 | Hydraulic actuation with spool return via a spring H200 |
| 2 | Inlet element - Closed center: A or with flushing valve: S | 13 | Hydraulic actuation with stroke limitation H230 |
| 3 | Directional valve standard section | 14 | Electro-hydraulic actuation W200 |
| 4 | Directional valve low leak section | 15 | LS relief valve |
| 5 | Blanking plate L | 16 | Flow control valve |
| 6 | End element with tank bridge: R | | |
| 7 | End element with solenoid operated control valve C | | |
| 8 | Flushing valve F | | |
| 9 | Electro-hydraulic end element with flushing valve, solenoid operated control valve, pressure reducing valve, pressure shut-off valve and accu ports FCYS | | |
| 10 | Secondary valve | | |
| 11-1 | Mechanical actuation with tongue Z1 | | |
| 11-2 | Spring return arrangement, type A2 | | |
| 11-3 | Spring return arrangement, mechanical detent in spool position 3, type E2 | | |
| 11-4 | Spring return arrangement, electrical detent when spool is pushed, type S2 | | |

Line connections

Port	01 According to ISO 228/1				19 According to ISO 11926			
	d1	$\varnothing d_2$	t1	t2	d1	$\varnothing d_2$	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, Pr, TPr, Accu	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
MPr	G 1/8	19	13	1	7/16 UNF-2B	21	14	1.6

Related documentation

Product-specific documentation

Document type	Title	Document number
Instruction manual	Control blocks for mobile applications	64025-B
Repair manual	Control block assembly RS14	64136-S
Spare parts list	Control block RS14	64136-E

Documentation for mounted components

Document type	Title	Document number
Data sheet	Proportional pressure reducing valve MHDRE 02 K (for electro-hydraulic actuation W200)	64658

Documentation for hydraulic fluids

Document type	Title	Document number
Data sheet	Hydraulic fluids based on mineral oils and related hydrocarbons	90220
	Environmentally Acceptable Hydraulic Fluids	90221

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