

Rexroth 伺服閥介紹



Rexroth 伺服閥介紹

目錄

伺服閥構造

伺服閥動作

伺服閥型號

伺服閥放大板

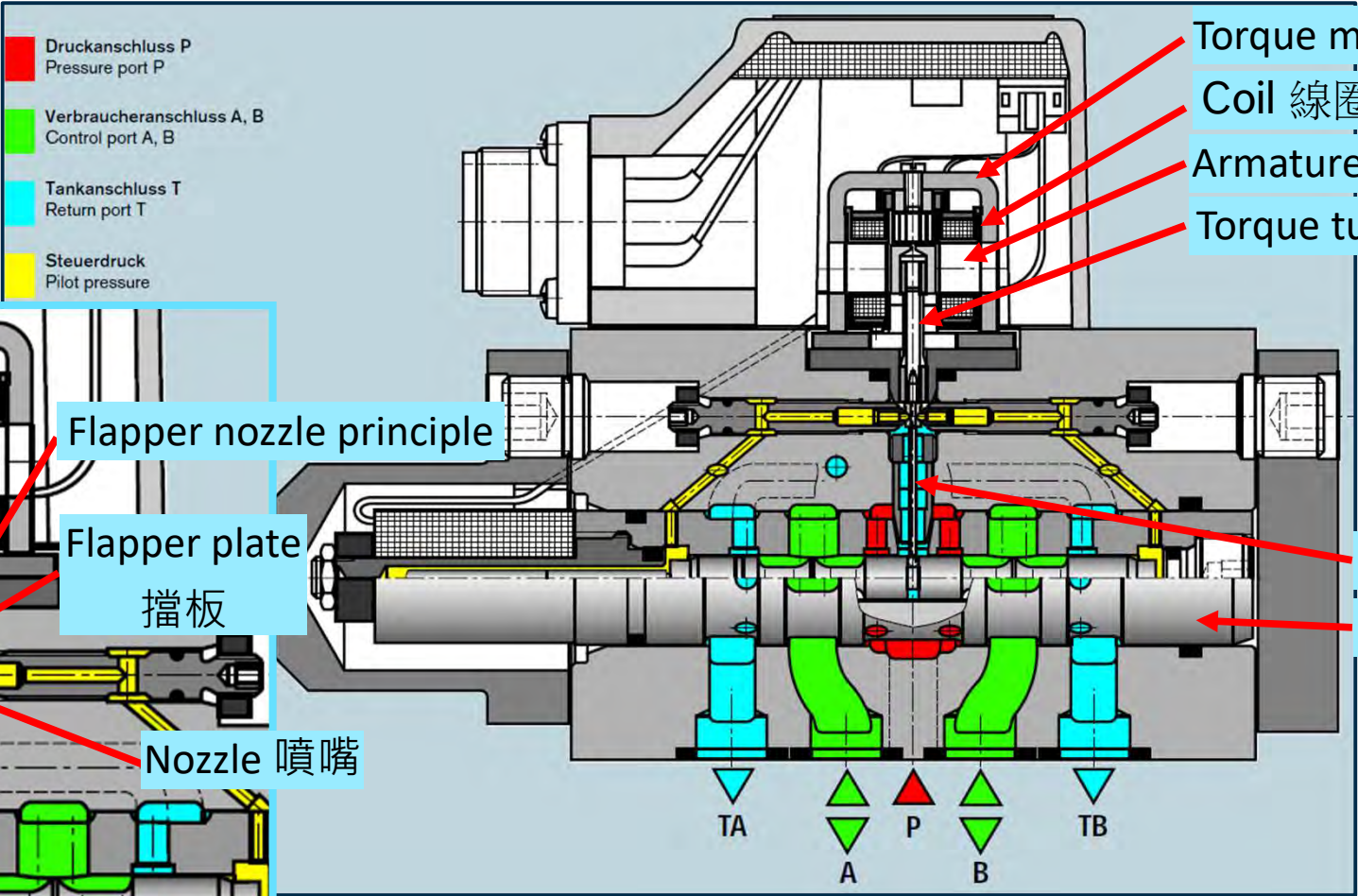
伺服閥測試箱

防爆伺服閥...XH,XD,XL

防爆伺服閥...VH1

Rexroth 伺服閥介紹

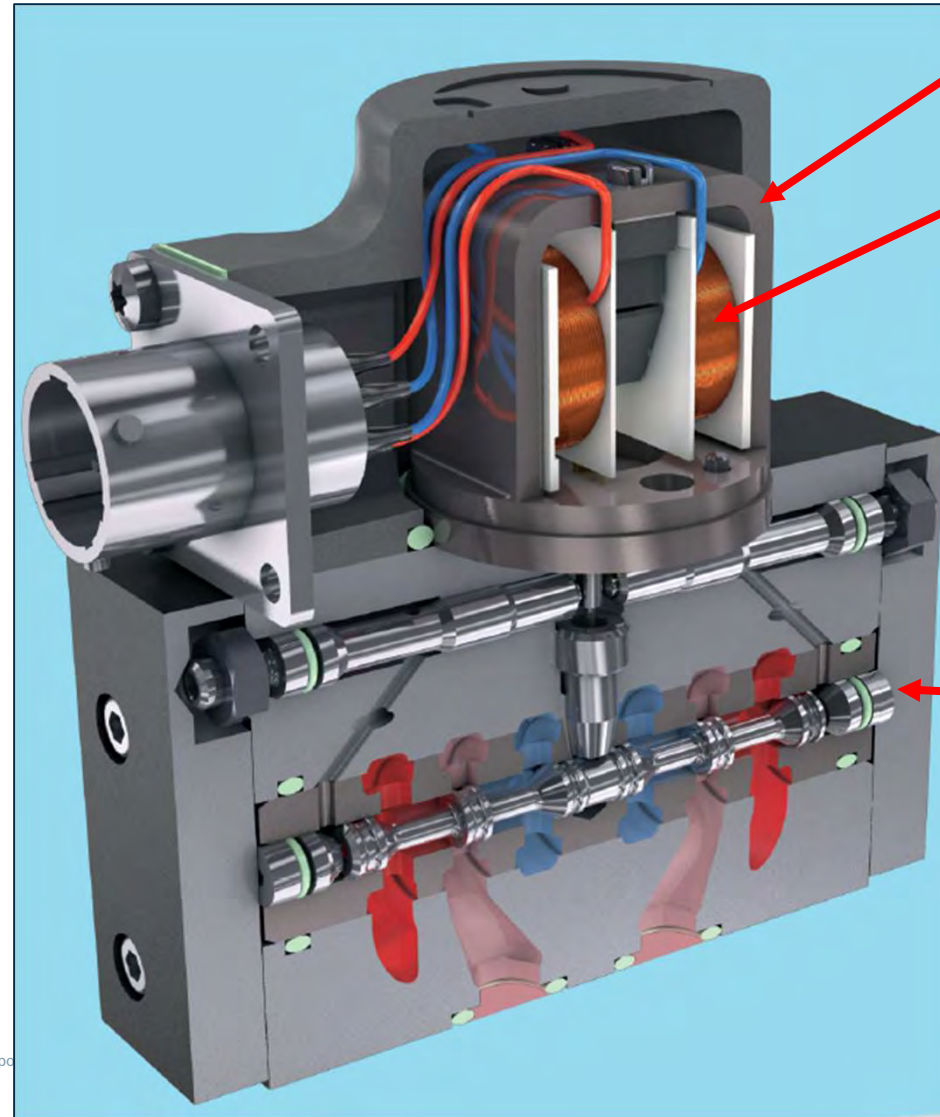
伺服閥結構



production, editing, distribution, as well as in the event of applications for industrial property rights.

Rexroth 伺服閥介紹

伺服閥結構



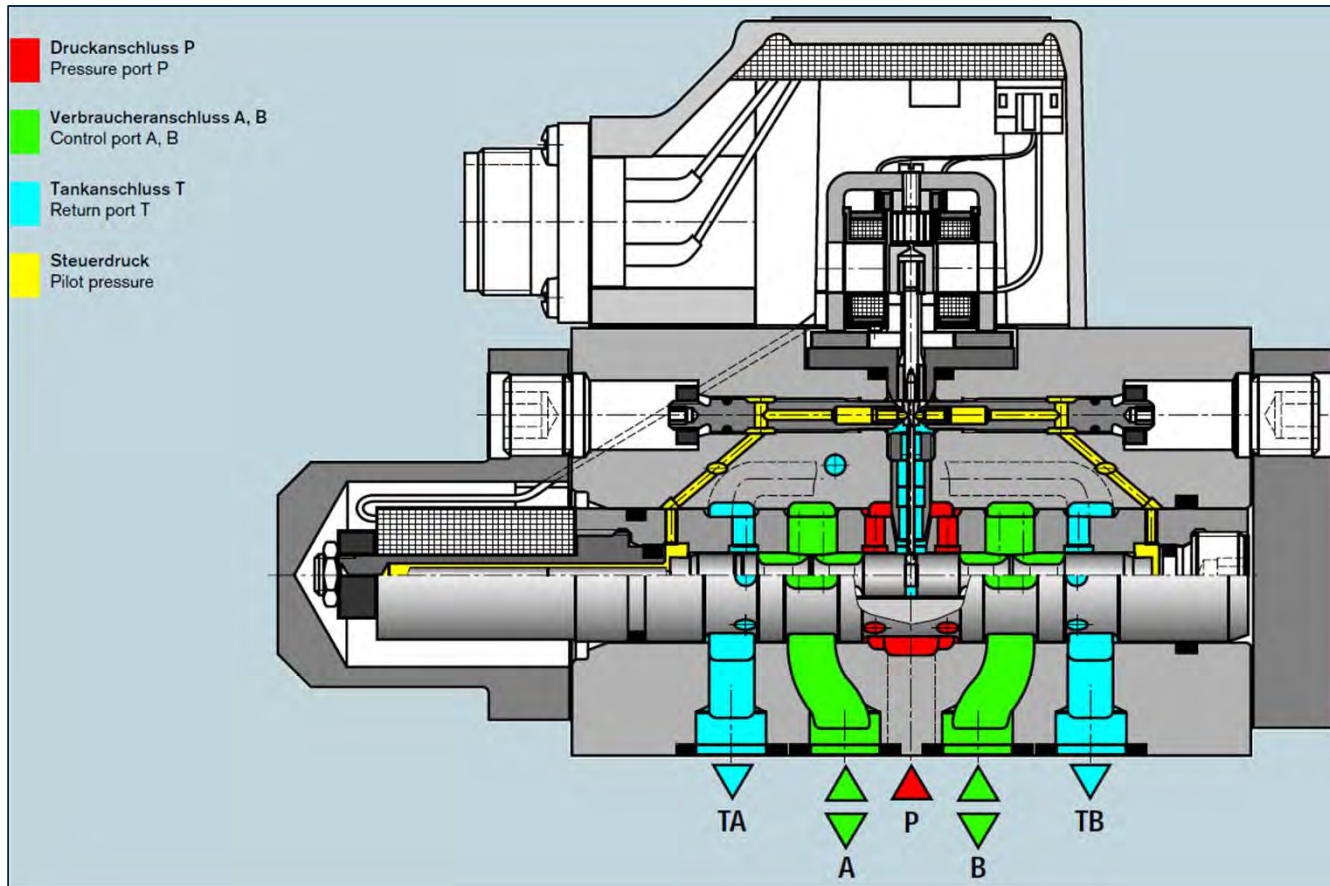
torque motor 扭力馬達

Coil 線圈

Spool 閥軸

Rexroth 伺服閥介紹

4WSE2ED NG10



Technical Data:

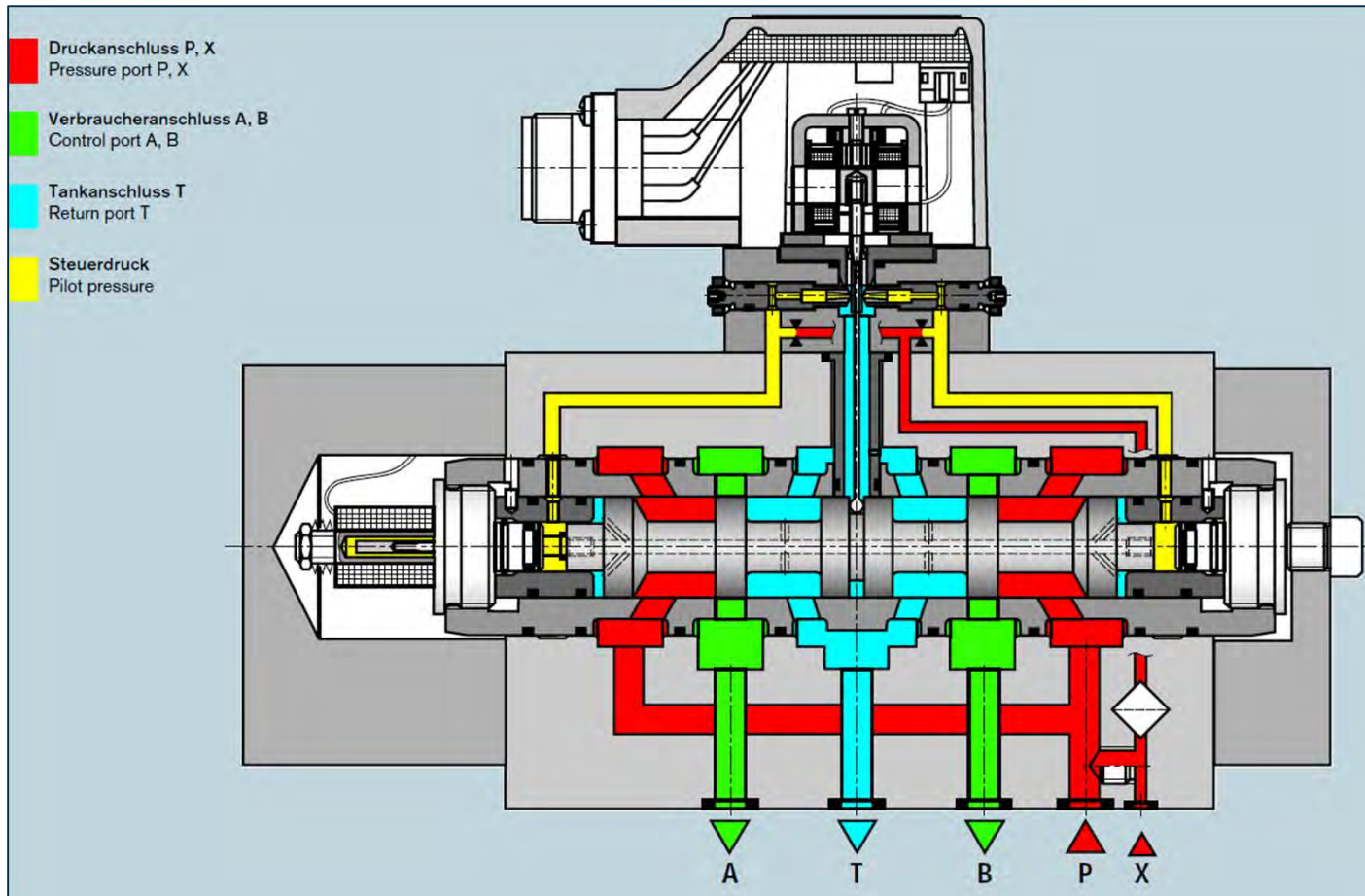
- Max. operating pressure 210/315 bar
- Nominal flow 20; 30; 45; 60; 75; 90 L/min ($\Delta p = 70$ bar)
- Max. hysteresis $\leq 0,8$ %

Features:

- 2-stage servo valve with mechanical and electrical feedback of the spool position
- Controls direction and volume of a flow
- Ideal for closed loop position-, velocity-, pressure- and force control
- 1st stage designed as nozzle flapper amplifier
- with integral control electronics available

Rexroth 伺服閥介紹

4WSE2ED NG16



Technical Data:

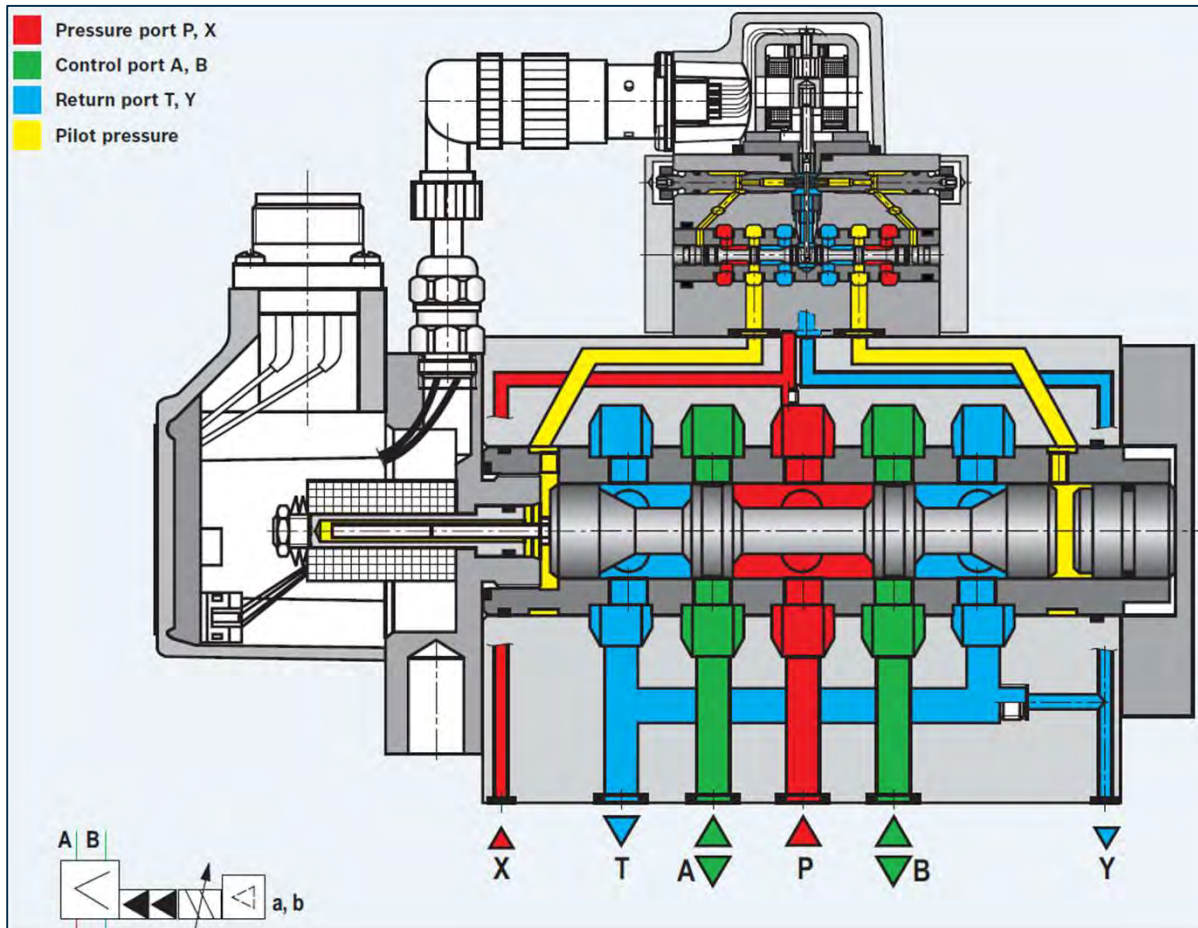
- Max. operating pressure 210/315 bar
- Nominal flow 100; 150; 200 L/min ($\Delta p = 70$ bar)
- Max. hysteresis $\leq 0,5$ %

Features:

- 2-stage servo valve with mechanical and electrical feedback of the spool position
- Controls direction and volume of a flow
- Ideal for closed loop position-, velocity-, pressure- and force control
- 1st stage designed as nozzle flapper amplifier
- with integral control electronics available

Rexroth 伺服閥介紹

4WSE3EE NG16



Features

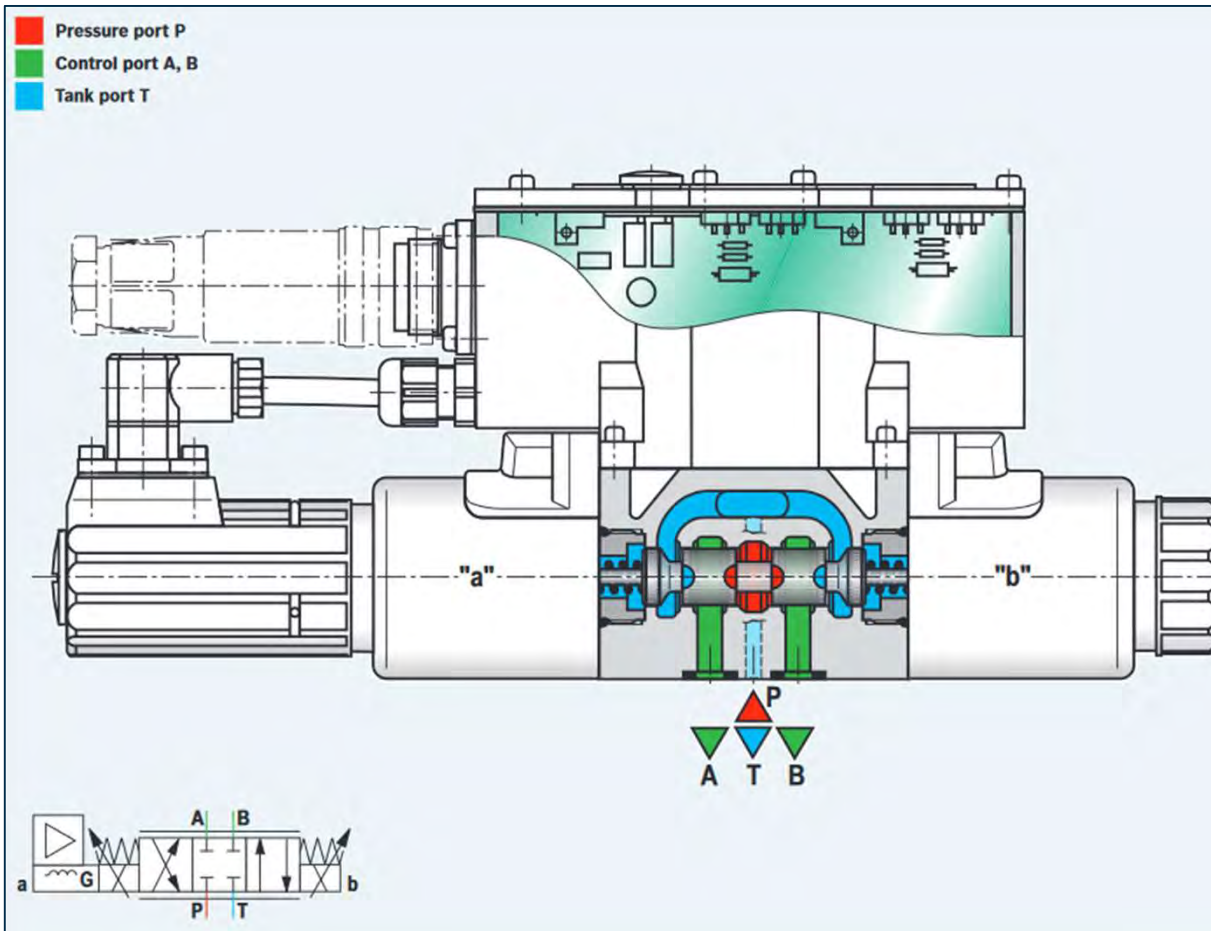
- ▶ 3-stage servo valve with electrical closed loop position control of the 3rd stage control spool
- ▶ Controls direction and volume of a flow
- ▶ Ideal for closed loop position-, velocity-, pressure- and force control
- ▶ 1st stage designed as nozzle flapper amplifier
- ▶ With integral control electronics available

Technical Data

- ▶ Max. operating pressure 210/315 bar
- ▶ Nominal flow 100; 150; 200; 300 l/min ($\Delta p = 70$ bar)
- ▶ Max. hysteresis $\leq 0,2$ %

Rexroth 伺服閥介紹

比例閥結構



Technical Data

- ▶ Max. pressure 315 bar
- ▶ Max. flow: 80 l/min – size 6
180 l/min – size 10
- ▶ Max. hysteresis $\leq 0,1 \%$

Features

- ▶ Proportional directional valve, direct operated with electrical feedback of the spool position
- ▶ Controls direction and volume of a flow
- ▶ Spool control by means of proportional solenoids
- ▶ Integrated control electronics for type 4WREE

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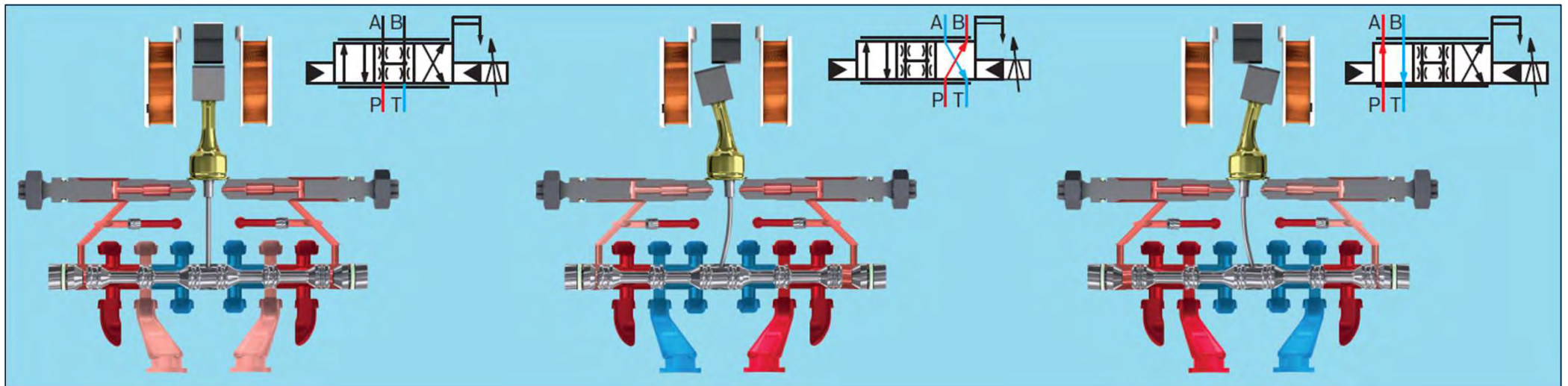
伺服閥測試箱

防爆伺服閥...XH,XD,XL

防爆伺服閥...VH1

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伺服閥作動



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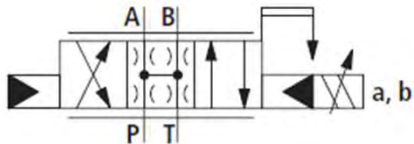
防爆伺服閥...XH,XD,XL

防爆伺服閥...VH1

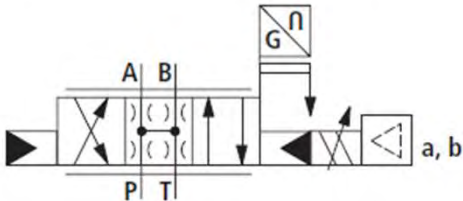
Rexroth 伺服閥介紹

伺服閥型號介紹

Valves with mechanical return, without OBE
(example: 4WS2EM 10-5X...ET...)



Valves with electric and mechanical return, with OBE
(example: 4WSE2ED 10-5X...ET...)



Directional servo-valve in 4-way design for **external** control electronics = **4WS2E**
with **integrated** control electronics = **4WSE2E**

Mechanical return = **M**
Mechanical and electric return = **D**
(only available with integrated electronics)

Size 10 = 10

Component series 50 to 59 = **5X**
(50 to 59: Unchanged installation and connection dimensions)

Rated flow ¹⁾
with valve pressure differential $\Delta p = 70 \text{ bar}$

5 l/min	= 5
10 l/min	= 10
20 l/min	= 20
30 l/min	= 30
45 l/min	= 45
60 l/min	= 60
75 l/min	= 75
90 l/min	= 90

Rexroth 伺服閥介紹

伺服閥型號介紹

B				K31	E	V	*
							Further details in the plain text ⁷⁾
						V =	FKM seals ⁶⁾ suitable for mineral oil (HL, HLP) according to DIN 51524
						E =	Spool overlap ⁵⁾ 0 to 0.5 % negative
							Electrical connection
						K31 =	Without mating connector with connector according to EN 175201-804 Mating connector - separate order see page 7
							Inlet pressure range ⁴⁾
						210 =	10 to 210 bar
						315 =	10 to 315 bar
							Pilot oil supply and return ³⁾
						- =	Supply external, return external
						E =	Supply internal, return external
						T =	Supply external, return internal
						ET =	Supply internal, return internal
							Valves for external control electronics: ²⁾
						11 =	Coil no. 11 (30 mA / 85 Ω per coil)
							Valves with integrated control electronics:
							Command value Actual value (only available with 4WSE2ED...)
						9 =	±10 V ±10 V
						13 =	±10 mA ±10 mA

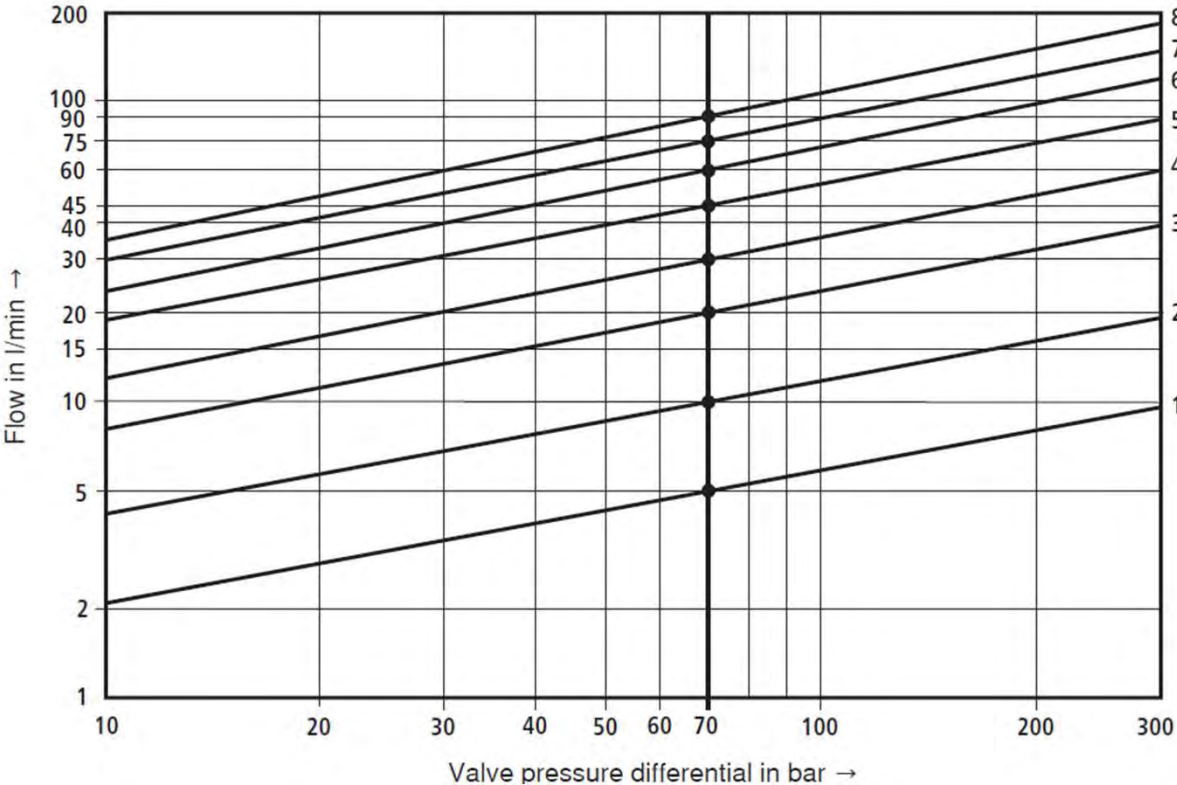
Rexroth 伺服閥介紹

伺服閥通過流量

Characteristic curves (measured with HLP 32, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$)

Flow/load function (tolerance $\pm 10\%$)
with 100 % command value signal

Rated flow			
5 l/min	=	Curve 1	45 l/min = Curve 5
10 l/min	=	Curve 2	60 l/min = Curve 6
20 l/min	=	Curve 3	75 l/min = Curve 7
30 l/min	=	Curve 4	90 l/min = Curve 8

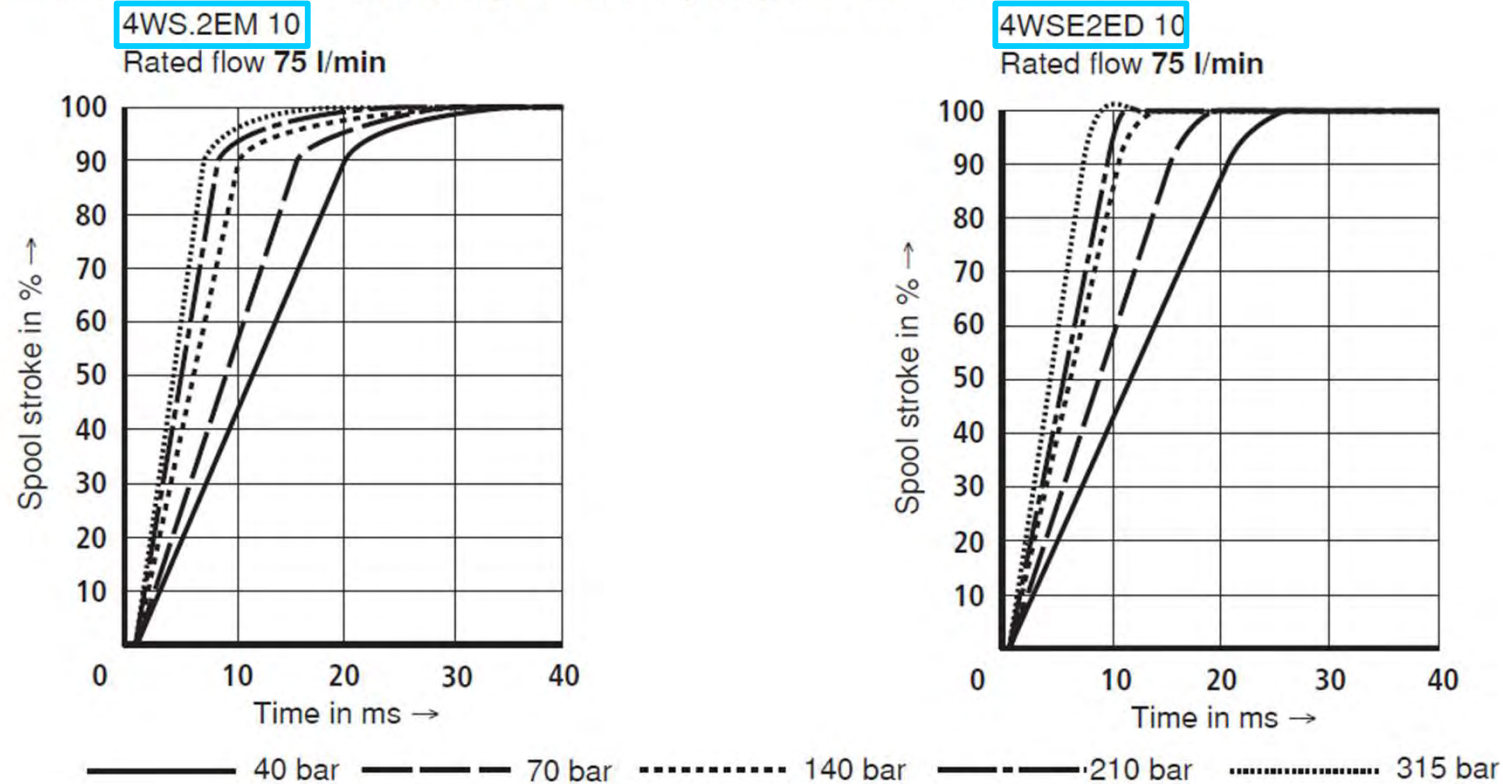


Rexroth 伺服閥介紹

伺服閥反應速度

Characteristic curves: Type 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$)

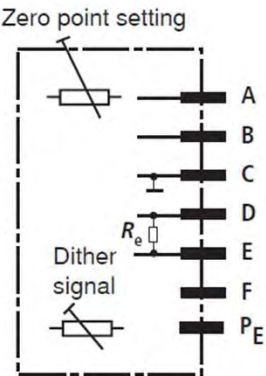
Transition function with pressure rating 315 bar, step response without flow



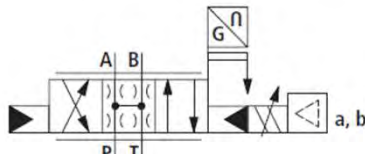
Rexroth 伺服閥介紹

伺服閥接線

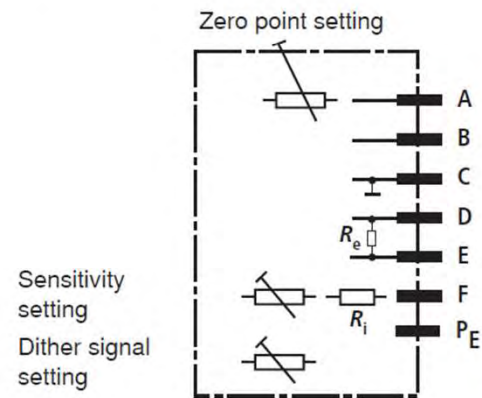
Type 4WSE2EM 10-5X...



Valves with electric and mechanical return, with OBE
(example: 4WSE2ED 10-5X...ET...)



Type 4WSE2ED 10-5X...



Supply voltage:
Command value:

Measuring output:

$\pm 15 \text{ V} \pm 3 \%$, residual ripple $< 1 \%$

Command value at the mating connector port D = positive against mating connector port E results in flow from P to A and B to T.

Measuring output F has positive signal against $\perp$.

Command value at the mating connector port D = negative against mating connector port E results in flow from P to B and A to T.

Measuring output F has negative signal against $\perp$.

The voltage or current signal is proportional to the control spool stroke.

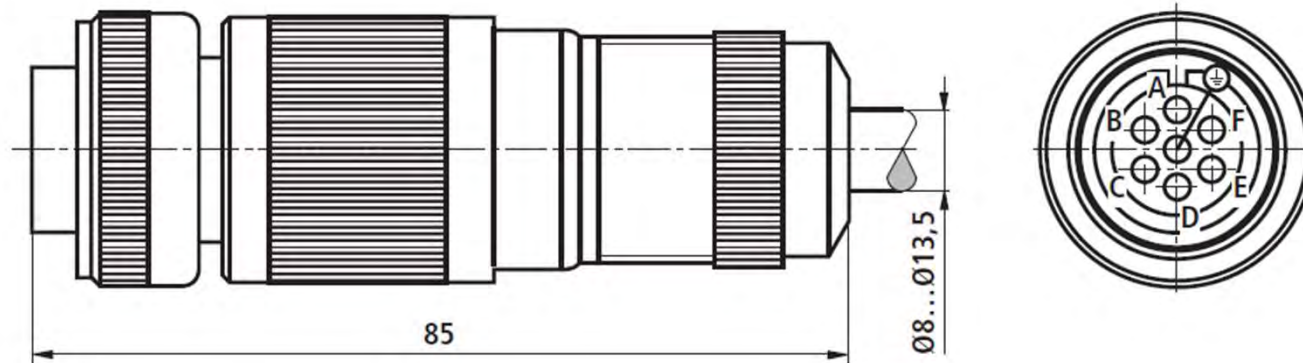
	Mating connector assignment	Current control	Voltage control
		Control "13"	Control "9"
Supply voltage	A	+15 V	+15 V
	B	-15 V	-15 V
	C	$\perp$	$\perp$
Command value	D	$\pm 10 \text{ mA}$	$\pm 10 \text{ V}$
	E	$R_e = 100 \Omega$	$R_e \geq 50 \text{ k}\Omega$
Measuring output for control spool	F ¹⁾	$\pm 10 \text{ mA}$ ²⁾ Load max. 1 k Ω	+10 V against $\perp$ ²⁾ $R_i \approx 4.7 \text{ k}\Omega$
Current consumption at the mating connector port	A	Max. 150 mA	Max. 150 mA
	B		
	D	0 to $\pm 10 \text{ mA}$	$\leq 0.2 \text{ mA}$
	E		

Rexroth 伺服閥介紹

伺服閥接線

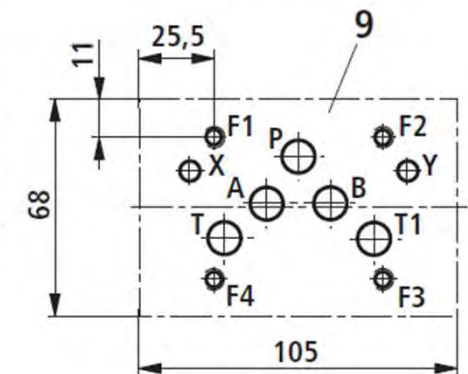
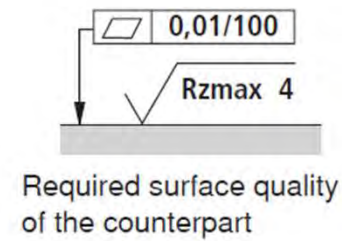
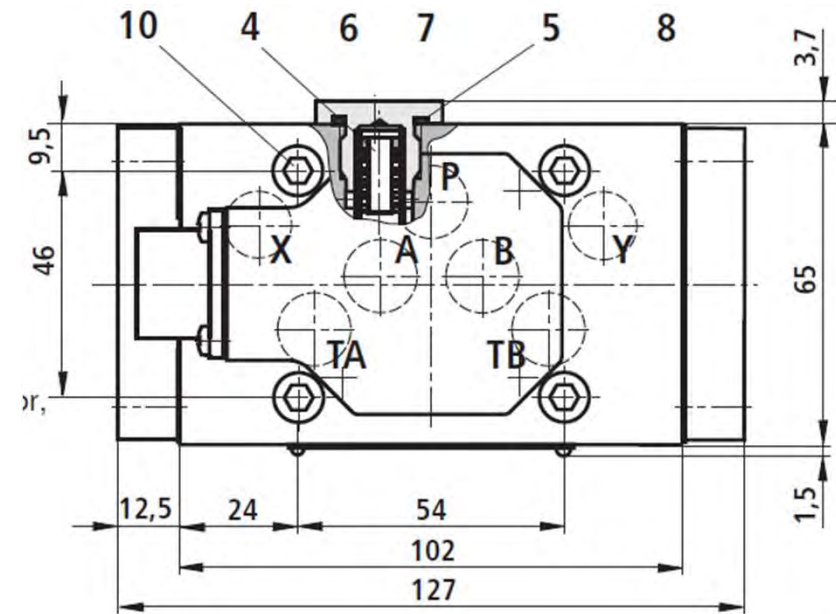
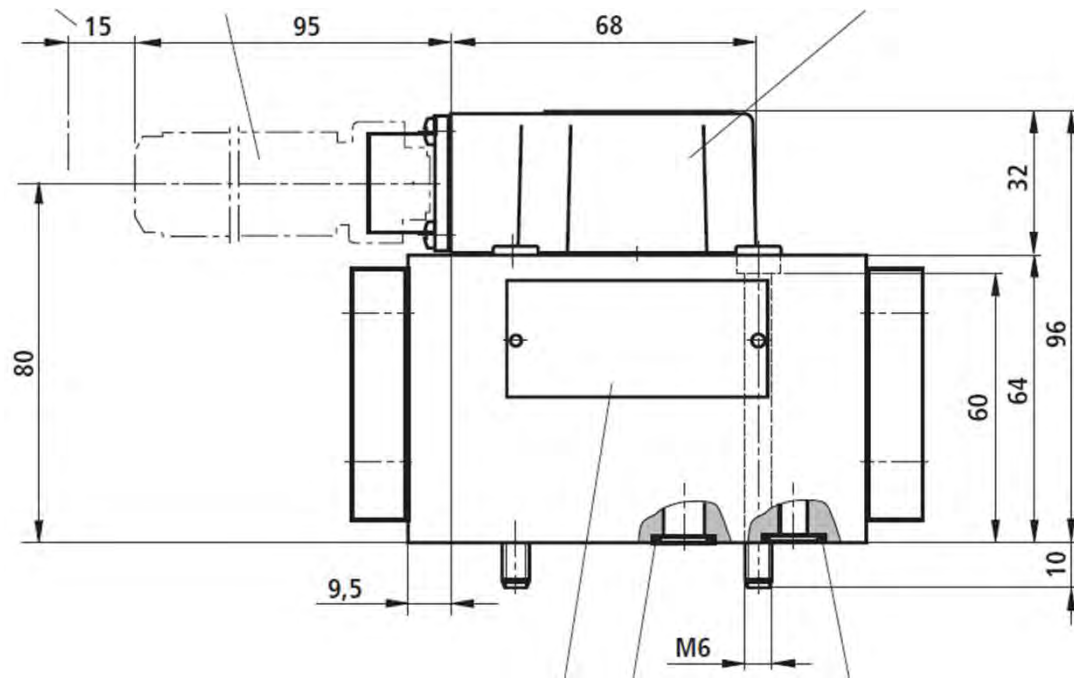
Electrical connection, mating connector

Mating connector according to DIN EN 175.201-804
separate order under Material no. **R900223890**
(metal version)



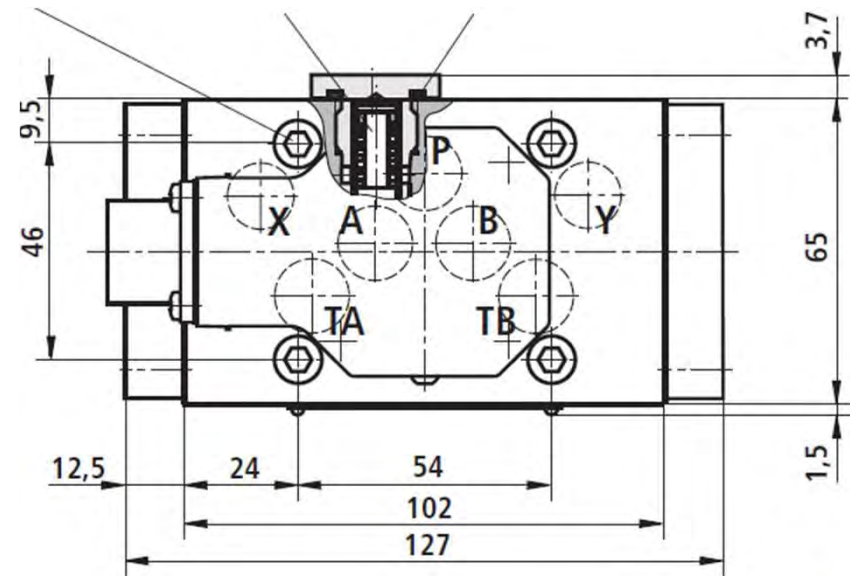
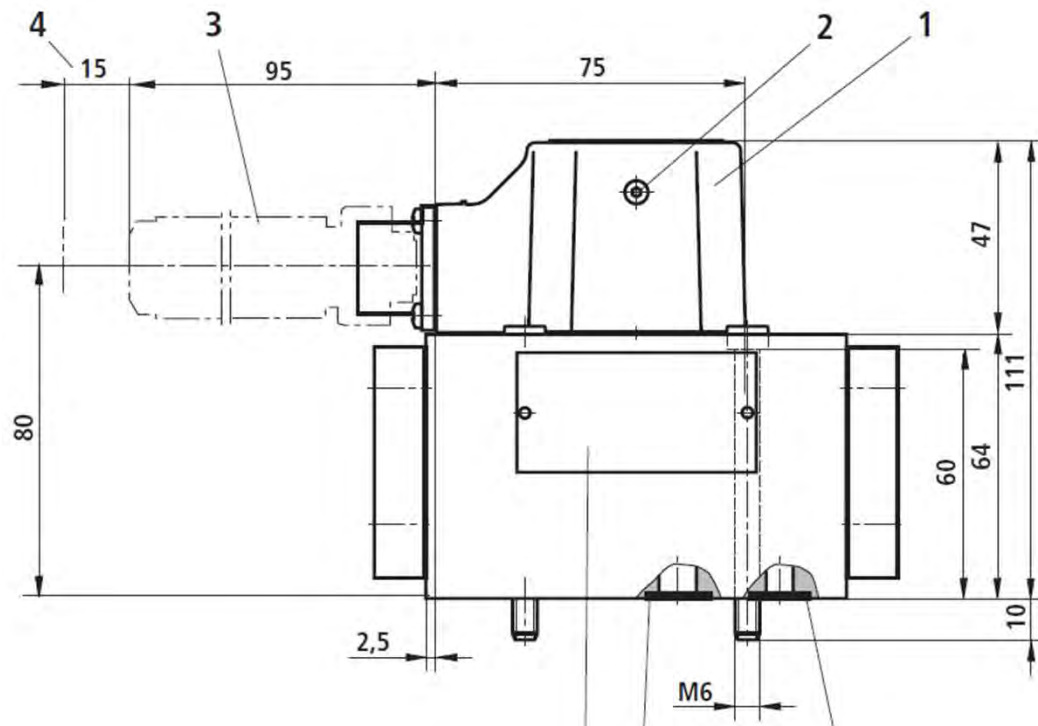
Rexroth 伺服閥介紹

4WS2EM 10-5X 尺寸

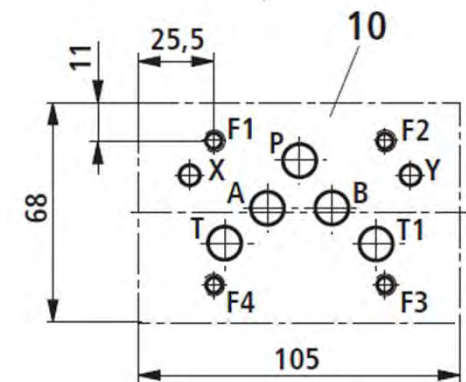


Rexroth 伺服閥介紹

4WSE2EM 10-5X 尺寸

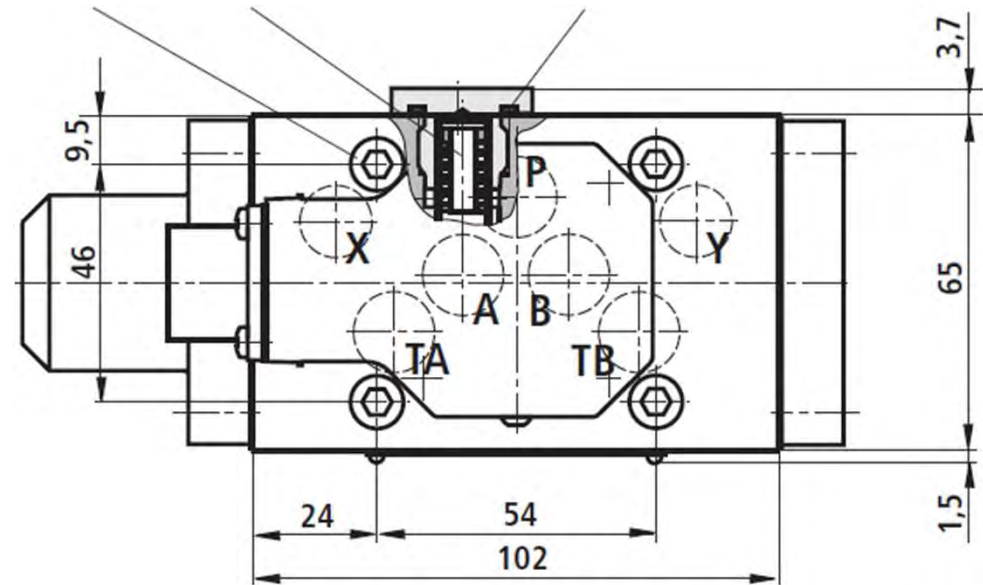
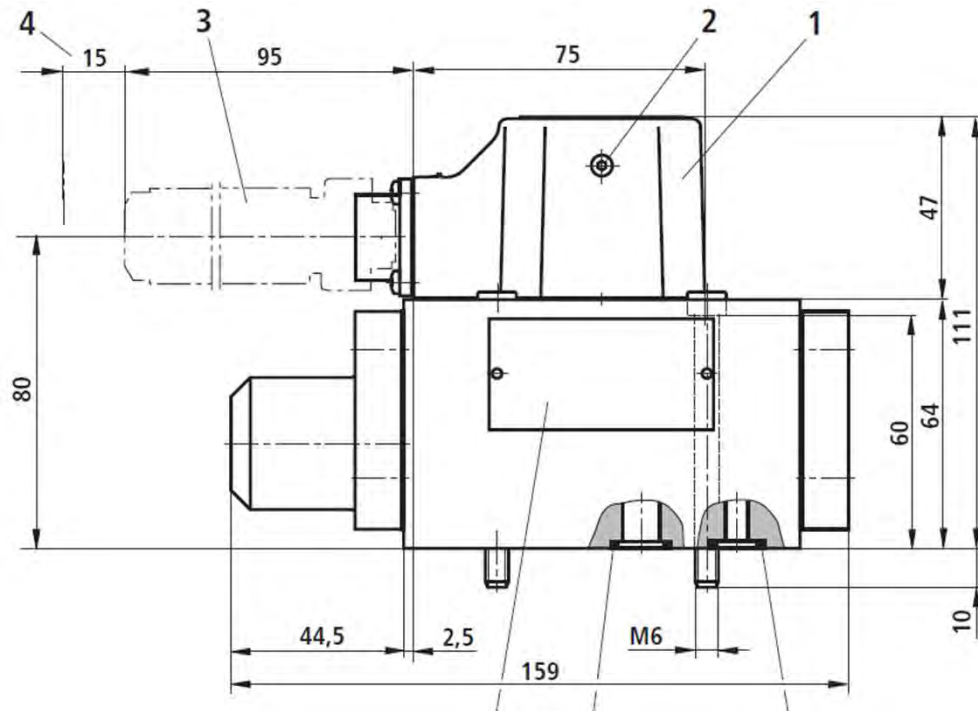


0,01/100
Rzmax 4
Required surface quality
of the counterpart



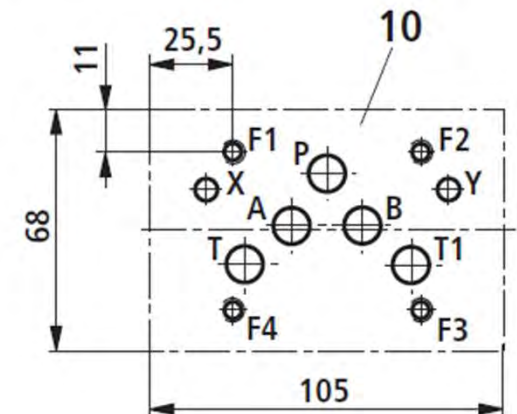
Rexroth 伺服閥介紹

4WSE2ED 10-5X 尺寸



0,01/100
Rzmax 4

Required surface quality of the counterpart



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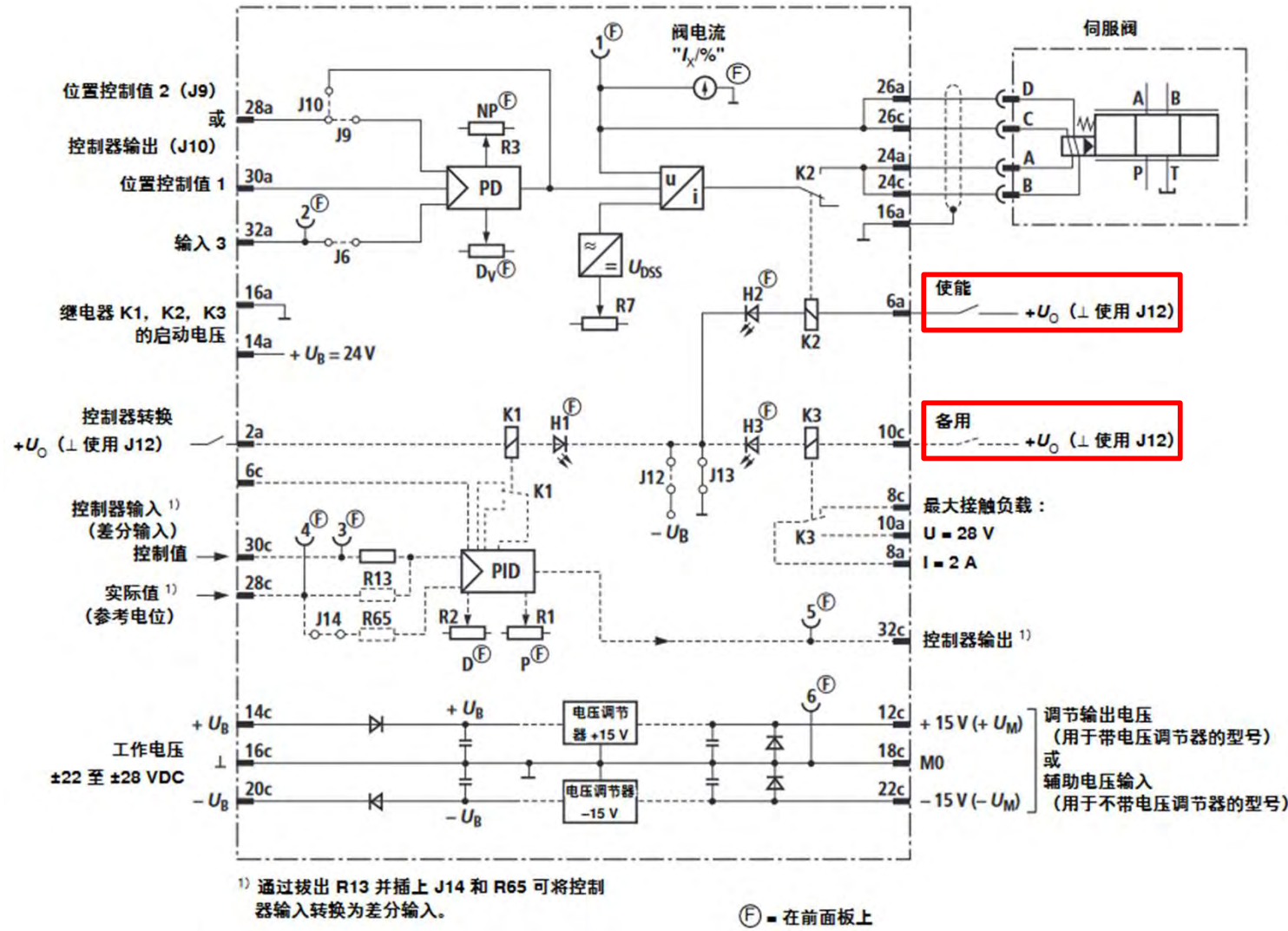
伺服閥測試箱

防爆伺服閥...XH,XD,XL

防爆伺服閥...VH1

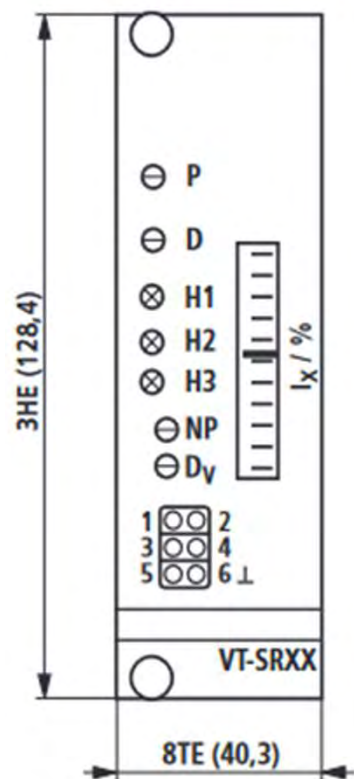
Rexroth 伺服閥介紹

VT-SR2 放大板功能



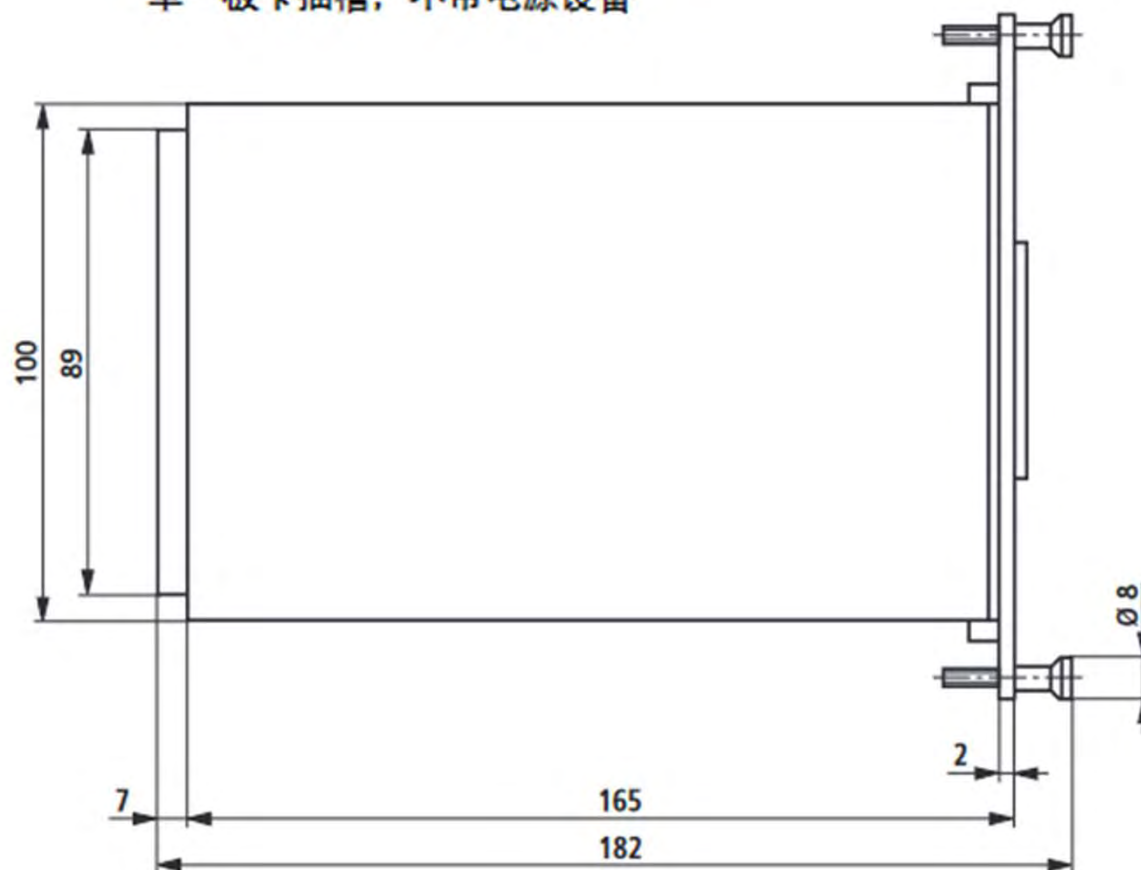
Rexroth 伺服閥介紹

VT-SR2 放大板尺寸



配套的板卡插槽：

- 类型 VT 3002-2X/32, 请参阅 RC 29928
- 单一板卡插槽, 不带电源设备



Rexroth 伺服閥介紹

VT11021-1X/ 放大板型號與接腳

VT 11021 -1X/ *

适用于 4WS2EM 6 和 4WS2EM 10 类型不带电气位移反馈伺服阀的放大器模块

组件系列 10 至 19

(10 至 19：技术数据和插针分布不变)

= 1X

明文形式的更多详细信息

符合 EN 60715 标准的
礼帽式导轨 TH 35-7.5

79

85,5

4 5 6

REXROTH
VT 11021

⊗

⊖ Gw

⊖ Zw

⊖ G_D

⊗ w |

⊗ ⊥ |

1 2 3

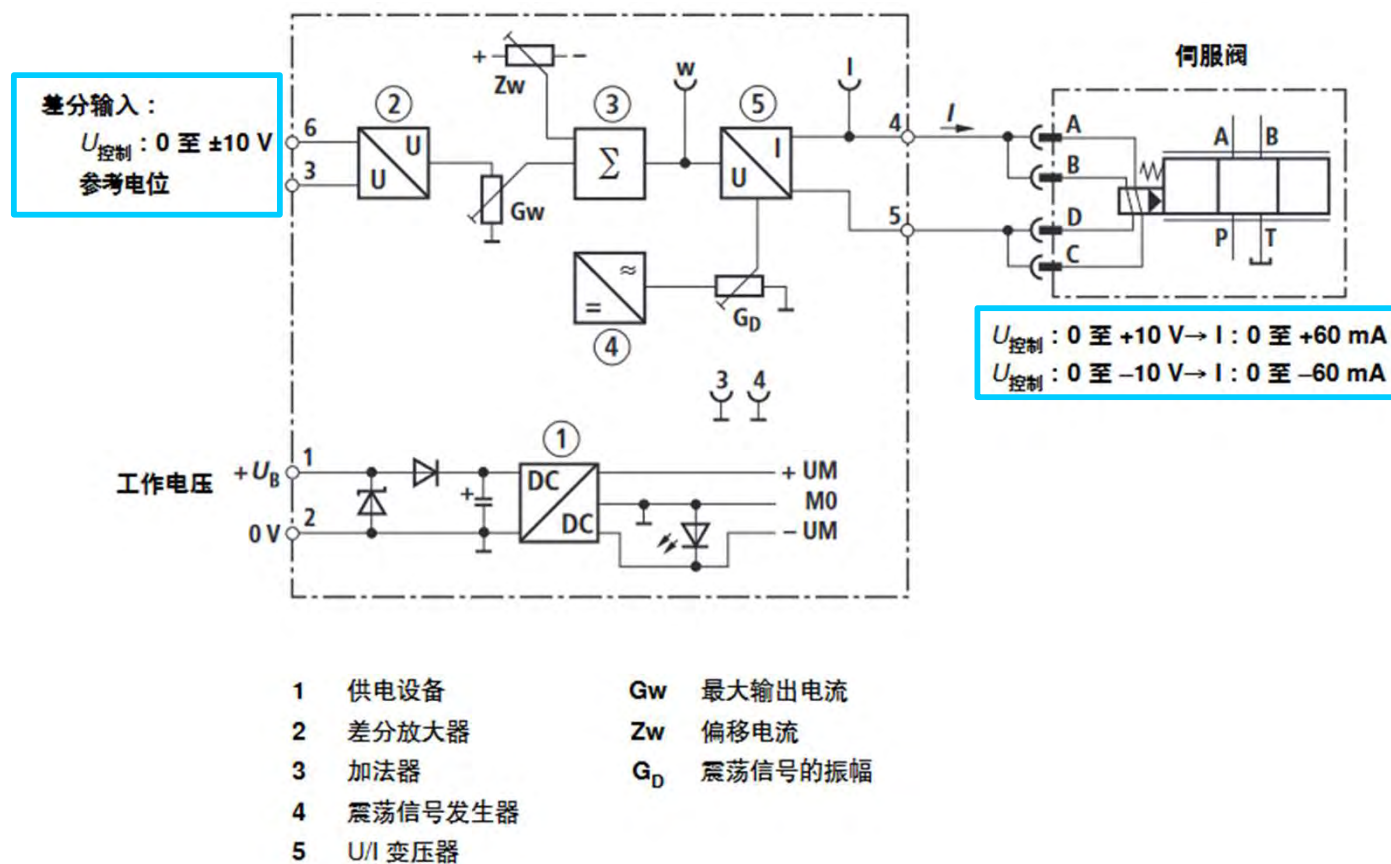
25

调节/指示元件	出厂设置
电位计：	
Gw → 最大输出电流	60 mA (100 %)
Zw → 偏移电流	0 mA
G _D → 震荡信号的振幅	3 mA
LED 指示灯：	
绿色 → 内部电源电压	
测量插口：	
w → 电流控制值 (10 V ± 100 %)	
I → 实际电流值 (10 mV ± 1 mA)	
⊥ → 测量零电位	



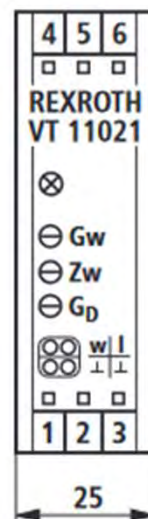
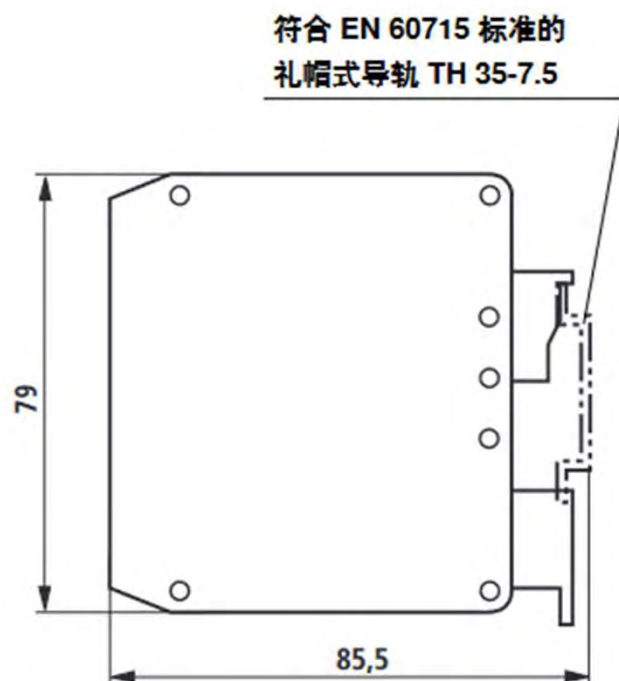
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VT11021-1X/ 放大板功能



Rexroth 伺服閥介紹

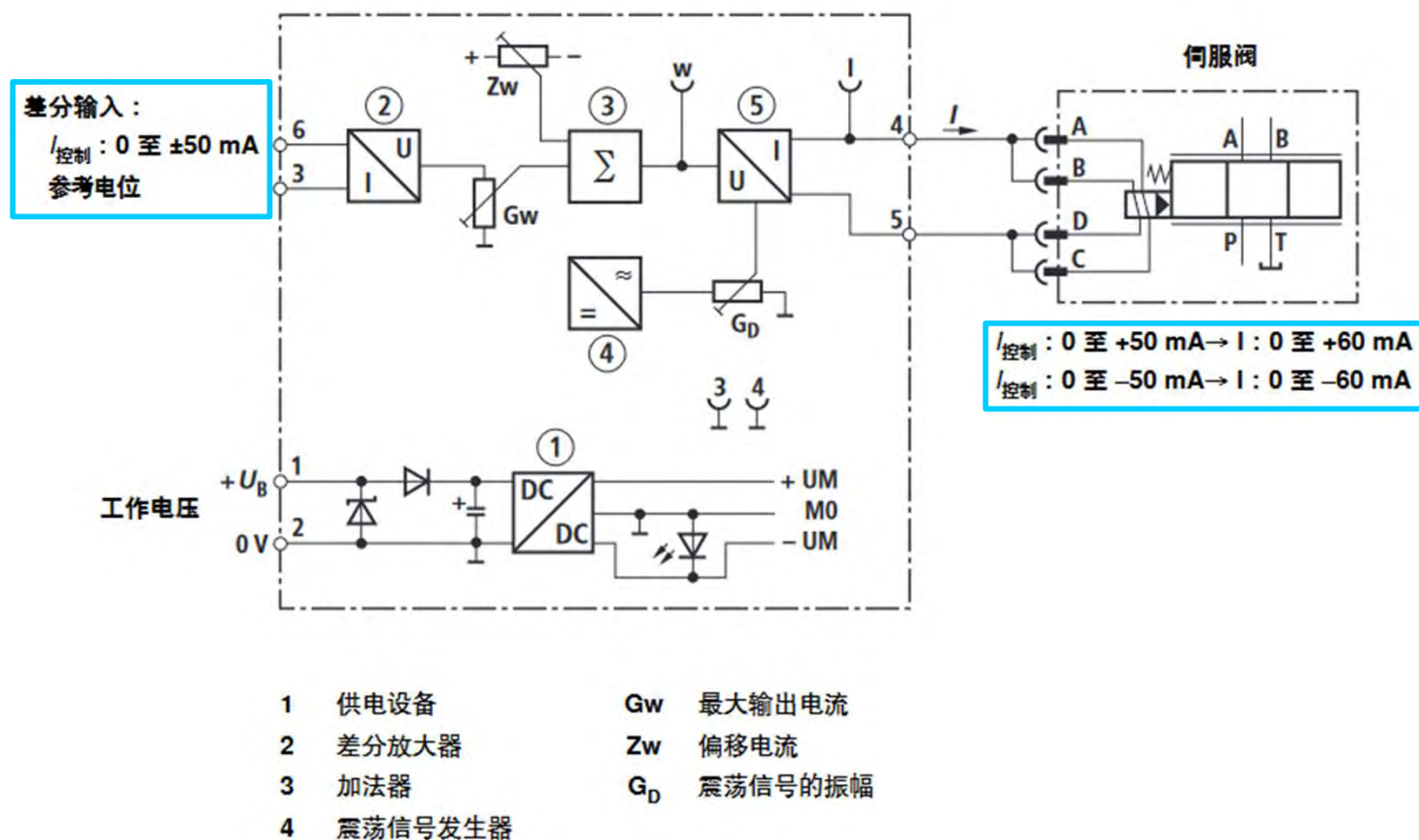
VT11021-1X/V002 放大板接腳



调节/指示元件	出厂设置
电位计：	
Gw → 最大输出电流	60 mA (100 %)
Zw → 偏移电流	0 mA
G_D → 震荡信号的振幅	3 mA
LED 指示灯：	
绿色 → 内部电源电压	
测量插口：	
w → 电流控制值 (10 V $\triangleq$ 100 %)	
I → 实际电流值 (10 mV $\triangleq$ 1 mA)	
⊥ → 测量零电位	

Rexroth 伺服閥介紹

VT11021-1X/V002 放大板功能



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防爆伺服閥...VH1

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伺服閥測試箱 VT-SVTSY-1

Ordering code

01	02	03	04	05	06	07	08
VT-SVTSY-1	-	1X	/	1	-	-	-
							/
							*

01	Service case with test device for servo valves without integrated electronics	VT-SVTSY-1
02	Component series 10 ... 19 (10 to 19: unchanged technical data and pin assignment)	1X
03	Test device type VT-SVT-1-1X	1

Connection cable for valves with electrical connection "K31"

04	Without connection cable	0
	With connection cable type VT-SVTK-1-1X	1

Connection cable for valves with electrical connection "K17"

05	Without connection cable	0
	With connection cable type VT-SVTK-2-1X	1

Connection cable for valves with electrical connection "K8"

06	Without connection cable	0
	With connection cable type VT-SVTK-3-1X	1

Power supply unit

07	Without power supply unit	0
	With power supply unit type VT-SVTNT-2-2X/G12	1

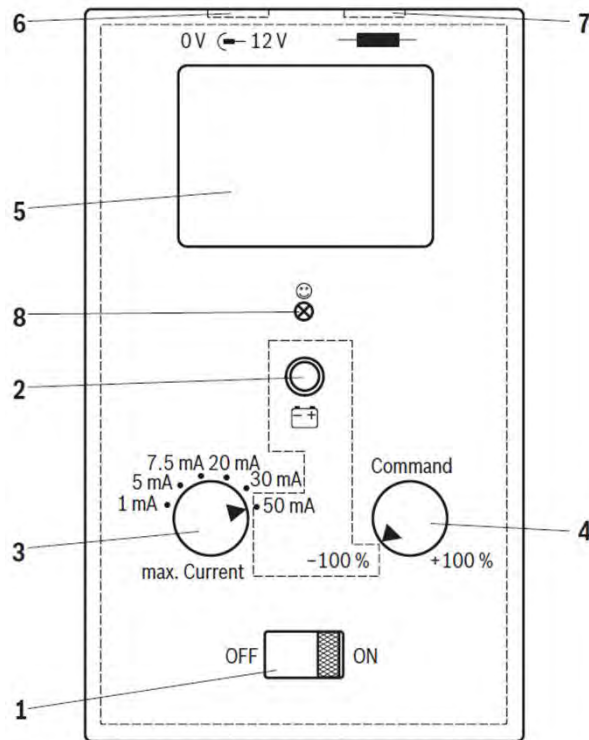
08	Further details in the plain text	*
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Valve type	Electrical connection	Connection cable type
4WS2EM6-1X	K17	VT-SVTK-2-1X
4WS2EM6-2X	K17	VT-SVTK-2-1X
4WS2EM10-5X	K31	VT-SVTK-1-1X
4WS2EM10-4X ¹⁾	K8	VT-SVTK-3-1X
4WS2EB10-4X ¹⁾	K8	VT-SVTK-3-1X
4WS2EM10A-4X ¹⁾	K8	VT-SVTK-3-1X
4WS2EB10A-4X ¹⁾	K8	VT-SVTK-3-1X
4WS2EM16-2X	K8	VT-SVTK-3-1X
4DS1E02-1X ¹⁾	K8	VT-SVTK-3-1X
3DS2EH10-2X ¹⁾	K8	VT-SVTK-3-1X



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伺服閥測試箱 VT-SVTSY-1

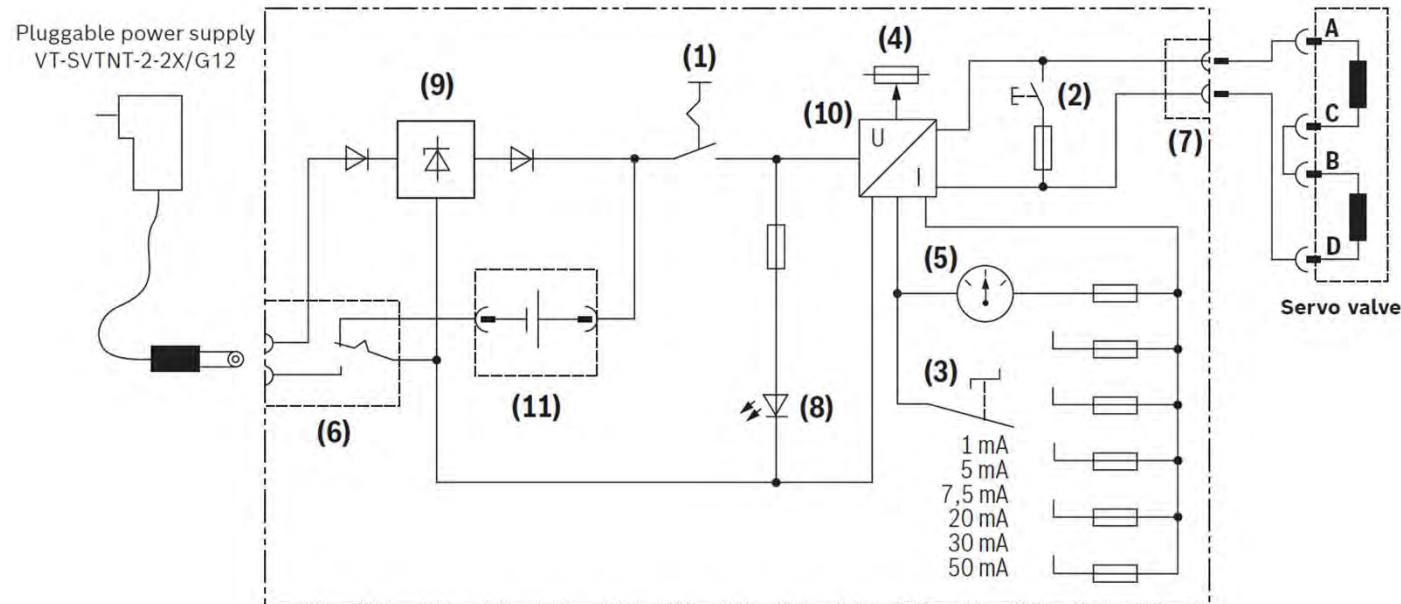


Assignment of coils / valve types	
5 mA / 500 Ω per coil	4WS2E.10-4X ¹⁾
7.5 mA / 200 Ω per coil	
20 mA / 80 Ω per coil	4WS2E.10A-4X ¹⁾
30 mA / 40 Ω per coil	4DS1EO2-1X ¹⁾
50 mA / 28 Ω per coil	3DS2EH10-2X ¹⁾
30 mA / 85 Ω per coil	4WS2EM6-2X/...
	4WS2EM10-5X/...
30 mA / 100 Ω per coil	4WS2EM6-1X
50 mA / 80 Ω per coil	
50 mA / 85 Ω per coil	4WS2EM6-2X
1) Not for new applications	

- 1 Functional switch
- 2 Push-button for battery test
- 3 Selector switch for coil type
- 4 Command value potentiometer
- 5 Coil current indication (in %)
- 6 Socket for power supply unit cable
- 7 Socket for valve connection cable
- 8 "Power" LED display

Rexroth 伺服閥介紹

伺服閥測試箱 VT-SVTSY-1



- | | |
|---|-------------------------------------|
| 1 Functional switch | 7 Socket for valve connection cable |
| 2 Push-button for battery test | 8 "Power" LED |
| 3 Selector switch for coil type | 9 Voltage regulator |
| 4 Command value potentiometer | 10 Output stage |
| 5 Coil current indication | 11 9V block battery |
| 6 Socket for power supply unit cable
(with change-over switch) | |



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Rexroth 伺服閥介紹

防爆規範

Agency	Description	Symbols
NFPA 70 - NEC	The National Electrical Code (NEC) is published by the National Fire Protection Agency (NFPA) as a regional standard for the safe and secure installation of electrical equipment and electrical wiring in the <u>United States</u> .	
ATEX	Derived from the word 'ATmosphere EXplosibles' and is a mandatory certification for all products sold across <u>Europe</u> . ATEX consists of two EU directives describing what equipment and workspace is allowed in an environment with explosive atmosphere.	
IECEx	International Electrotechnical Commission for Explosive Atmospheres is a standard for hazardous locations monitored by the IEC. Common set of safety standards for participating countries; majority of <u>Europe, Canada, Australia, Russia, China, US, and South Africa</u> .	

取自: <https://www.panduit.com/>

Rexroth 伺服閥介紹

伺服閥規格

伺 服 閥 規 格	Directive 2014/34/ EU	EN IEC 60079-0 / EN 60079-1 and IEC 60079-0 / IEC 60079-1	IECEX Certificate	EU type examination certificate	
4WS2EM ...XH	II 1G	Ex ia h IIC T4 Ga		PTB 11 ATEX 2025 X	
4WS2EM ...XD	II 2G	Ex db IIB T4 Gb	IECEX BVS 13.0120 X	BVS 09 ATEX E 116 X	
4WS2EM ...XL	II 3G	Ex ic IIC T4 Gc	IECEX BVS 18.0045X		

Rexroth 伺服閥介紹

Directive 2014/34/EU 規範

Potentially Explosive Atmosphere Consisting of Oxygen and	Duration of Presence of Combustible Mixture	Ex-Zones	Minimum Equipment Requirements				Protection Level
			ATEX Directive 2014/34/EU		EN 60079-0 Standard or EN ISO 80079-36 Standard		
			Device Group	Device Category	Explosion Protection Group(s)	Equipment Protection Level (EPL)	
Methane, coal dust		Mining	I	M1	I	Ma	Very high
		Mining	I	M2	I	Mb	High
Gases, mists, vapors	Continuous, long-term or frequent	0	II	1G	IIA, IIB, IIC	Ga	Very high
	Occasional	1	II	2G	IIA, IIB, IIC	Gb	High
	Rare or brief	2	II	3G	IIA, IIB, IIC	Gc	Enhanced
Dusts	Continuous, long-term or frequent	20	II	1D	IIIA, IIIB, IIIC	Da	Very high
	Occasional	21	II	2D	IIIA, IIIB, IIIC	Db	High
	Rare or brief	22	II	3D	IIIA, IIIB, IIIC	Dc	Enhanced

取自: <https://www.uraca.com/en/infocenter/know-how/explanation-explosion-protection/>

Rexroth 伺服閥介紹

EN 60079-0 標示說明

Flammable medium	Hazardous locations Probability of a potentially explosive atmosphere occurring	Classification of hazardous locations	Product classification		Equipment protection level (EPL)
			Product group	Product category	
Gases, mists, vapours	Continuously, for long periods or frequently	Zone 0	II		
	Likely to occur	Zone 1	II	1G	Ga
	Infrequently and for short periods only	Zone 2	II	2G 3G	Gb Gc
Dusts	Continuously, for long periods or frequently	Zone 20	II		
	Likely to occur	Zone 21	II	1D 2D	Da Db
	Infrequently and for short periods only	Zone 22	II	3D	Dc

II 1G Ex ia h IIC T4 Ga

Protection principle	Type of protection	Code	Sym- bol	To use in zone	CENELEC
Protection principle – Type of protection – EN 60079-0 General Requirements					
Prevents transmission of the explosion outside	flameproof enclosure	Ex d	da db dc		0, 1, 2 1, 2 2 EN 60079-1
Prevents high temperatures and sparks	increased safety	Ex e	eb ec		1, 2 2 EN 60079-7
Low current/voltage supply	intrinsic safety	Ex i	ia ib ic		0, 1, 2, 20, 21, 22 1, 2, 21, 22 2, 22 EN 60079-11
Positive pressure device	pressurised apparatus	Ex p	pxb pyb pzc		1, 2, 21, 22 1, 2, 21, 22 2, 22 EN 60079-2
Encapsulated	moulding	Ex m	ma mb mc		0, 1, 2, 20, 21, 22 1, 2, 21, 22 2, 22 EN 60079-18
Parts immersed in oil to isolate from explosive atmosphere	oil immersion	Ex o	ob oc		1, 2 2 EN 60079-6
Prevents transmission of explosion outside	powder filling	Ex q	qb		1, 2 EN 60079-5
As above, but for use in zone 2	protection “n”	Ex n	nC nR		2 2 EN 60079-15
Dust explosion proof	protection by enclosure	Ex t	ta tb tc		20, 21, 22 21, 22 22 EN 60079-31

Rexroth 伺服閥介紹

EN 60079-0 標示說明

IIIA	flamable fibres
IIIB	
IIC	
	non conductive dust
	conductive dust
Code	Dust classification

Explosion group	Examples depending on - explosion group - temperature class					
IIA	Ammonia Methane Ethane Propane	Ethanol Cyclohexene n-Butane	Petrol Diesel fuel Fuel oil n-Hexane	Acetaldehyde		
IIB	City gas Acrylic nitrile	Ethylene Ethylene oxide	Ethyl glycol Carbon hydrogen	Ethyl ether		
IIC	Hydrogen	Acetylene				Carbon disulphide
T1 < 450 °C Attention: this list is only an extract of possible flammable mediums and does not claim to be complete!						
T2 < 300 °C						
T3 < 200 °C						
T4 < 135 °C						
T5 < 100 °C						
T6 < 85 °C						
Product use depending on temperature class (T1 - T6). The temperature class indicates the max. temperature of the exposed surface of the product. For dust explosion proof, the max. surface temperature is directly shown (e.g. T80 °C).						
Temperature class						

II 1G Ex ia h IIC T4 Ga

Rexroth 伺服閥介紹

4WS2EM ...XH 型號

01	02	03	04	05	06	07	08	09	10
4WS2E	M	10	-	5X	/		B	11	XH

Explosion protection

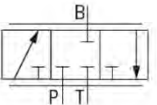
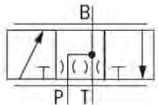
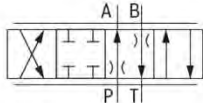
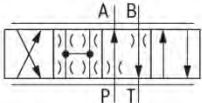
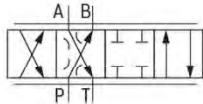
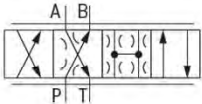
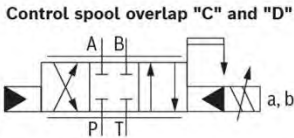
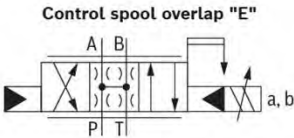
08	"Intrinsically safe" for device group II
	For details, see information on the explosion protection page 7

Control spool overlap ²⁾

12	0 ... 0.5% negative	E
	0 ... 0.5% positive	D
	3 ... 5% positive	C

Special versions

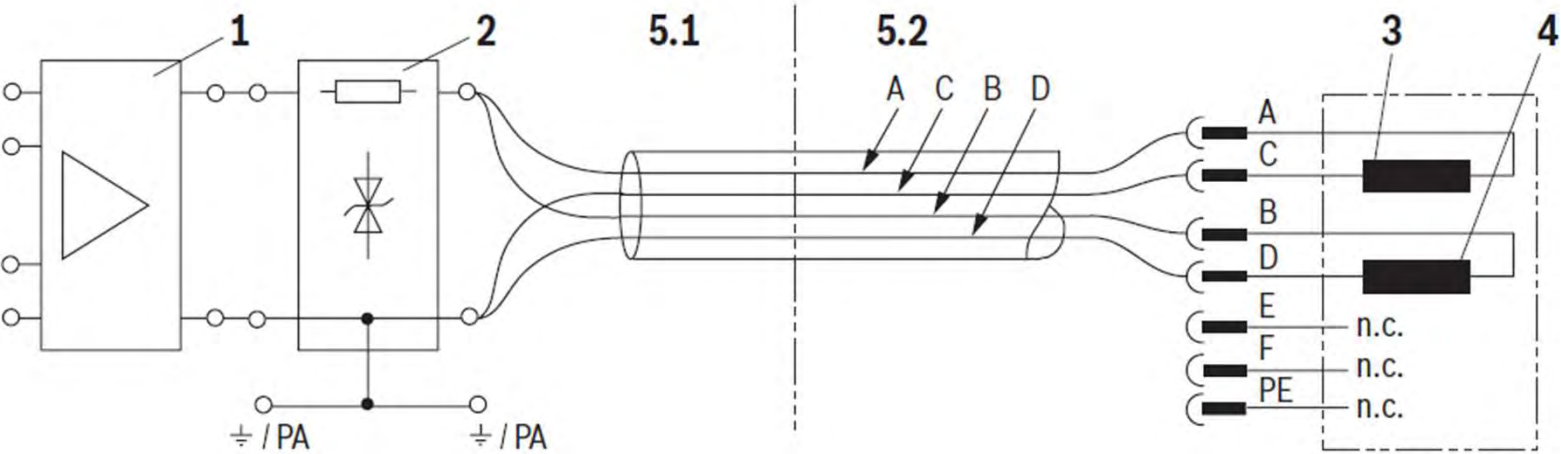
14	Without control (de-energized condition), channels P → B and A → T are open 10% of the nominal quantity.	-100
	Without control (de-energized condition), channels P → A and B → T are open 10% of the nominal quantity.	-102
	3-way version; Channel B is set to half the operating pressure without command value control (0 mA).	-104



Rexroth 伺服閥介紹

4WS2EM ...XH 接線

► Parallel connection



- 1 Servo amplifier
- 2 Safety barrier
- 3 Valve, coil A
- 4 Valve, coil B

- 5.1 Non-explosive area
- 5.2 Explosive area

Power supply of the valve only from intrinsically safe electric circuits with the following maximum values	► $U_{\max}$	V	9.3
	► $I_{\max}$	mA	390
	► $P_{\max}$	mW	907
	Recommended safety barrier		
			Type 9001/02-093-390-101 (company Stahl)

Rexroth 伺服閥介紹

4WS2EM ...XD 型號

01	02	03	04	05	06	07	08	09
4WS2E	M	10	-	5X	/		B	11 XD
Special version "-100"								

Explosion protection

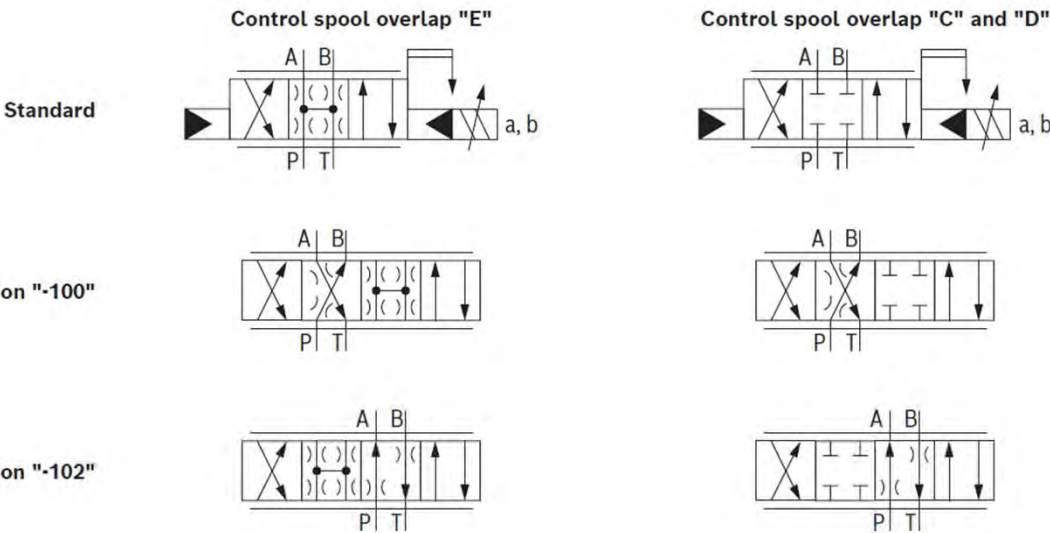
08	Type of protection "db"	Special version "-102"
	For details, see information on the explosion protection, page	

Control spool overlap ¹⁾

12	0 ... 0.5% negative	E
	0 ... 0.5% positive	D
	3 ... 5% positive	C

Special versions

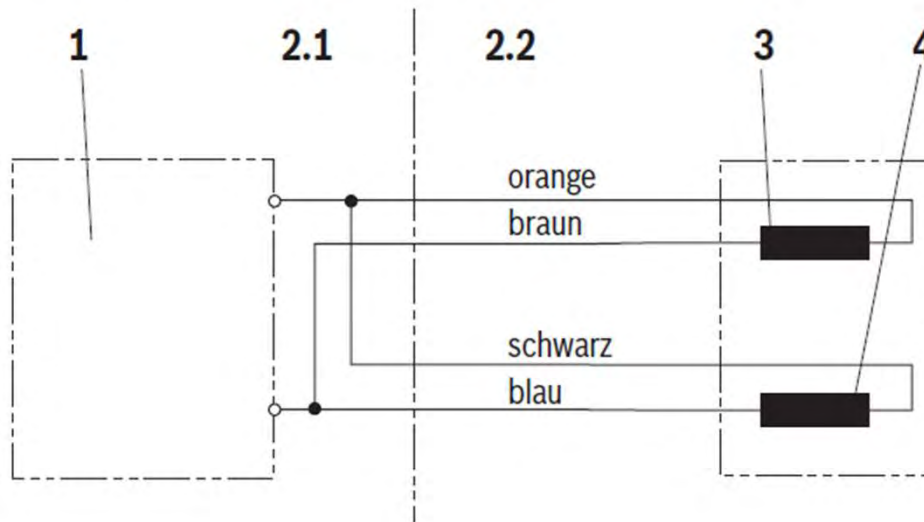
14	Standard	no code
	Without control (de-energized condition), channels P → B and A → T are open 10% of the nominal quantity.	-100
	Without control (de-energized condition), channels P → A and B → T are open 10% of the nominal quantity.	-102



Rexroth 伺服閥介紹

4WS2EM ...XD 接線

Example: Parallel connection



- 1 Control electronics
- 2.1 Non-explosive area
- 2.2 Explosive area
- 3 Valve, coil A
- 4 Valve, coil B

Connection line		
Line type		non-exchangeable, four-wire connection line
Line cross-section	mm ²	0.75 finely stranded
Line diameter	mm	5.9 ±0.3
Length	m	3

Rexroth 伺服閥介紹

4WS2EM ...XL 型號

01	02	03	04	05	06	07	0		
4WS2EM	10	-	5X	/		B	11	XL	Special version "-100"

Explosion protection

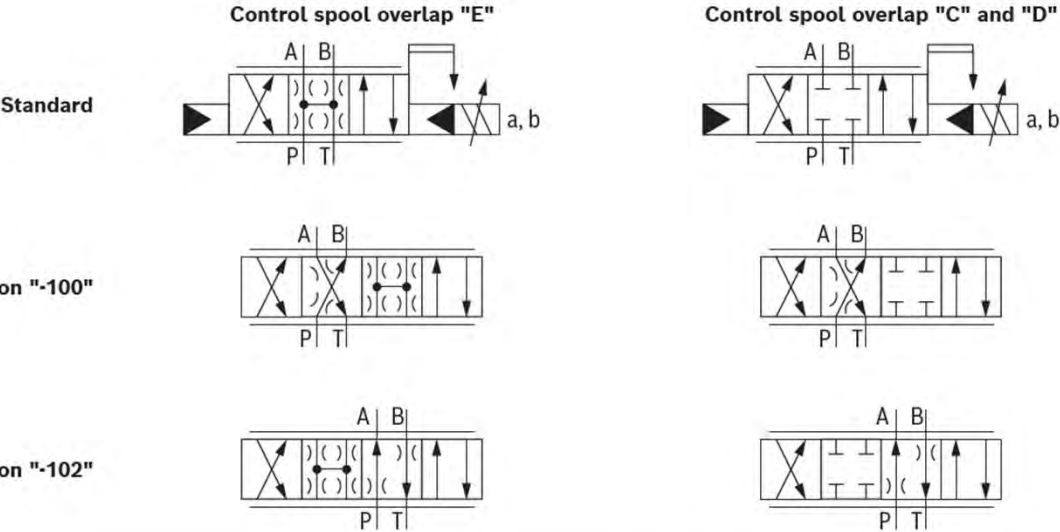
07	"Type of protection ic"
	For details, see information on explosion protection, page 6
Special version "-102"	

Control spool overlap (in % of the nominal stroke)

11	0 ... 0.5% negative	E
	0 ... 0.5% positive	D
	3 ... 5% positive	C

Special versions

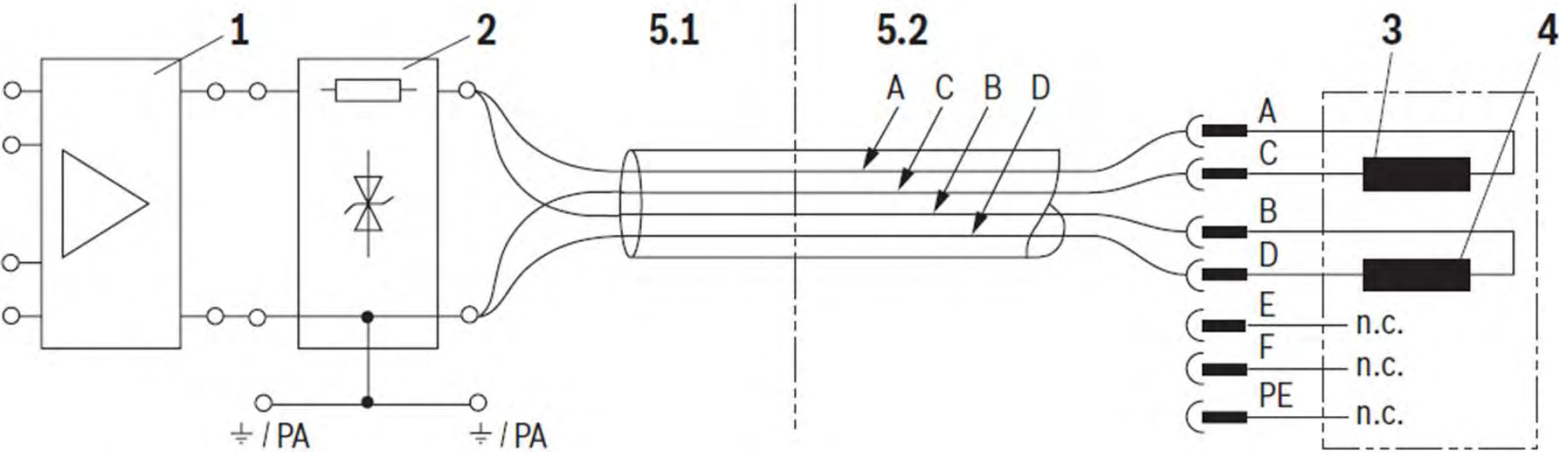
13	Standard version	no code
	The channels P → B and A → T are open 10% of the nominal quantity without control (de-energized state).	-100
	The channels P → A and B → T are open 10% of the nominal quantity without control (de-energized state).	-102



Rexroth 伺服閥介紹

4WS2EM ...XL 接線

► Parallel connection



- 1 Servo amplifier
- 2 Safety barrier
- 3 Valve, coil A
- 4 Valve, coil B

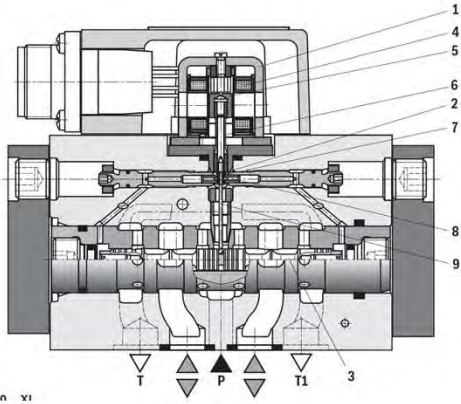
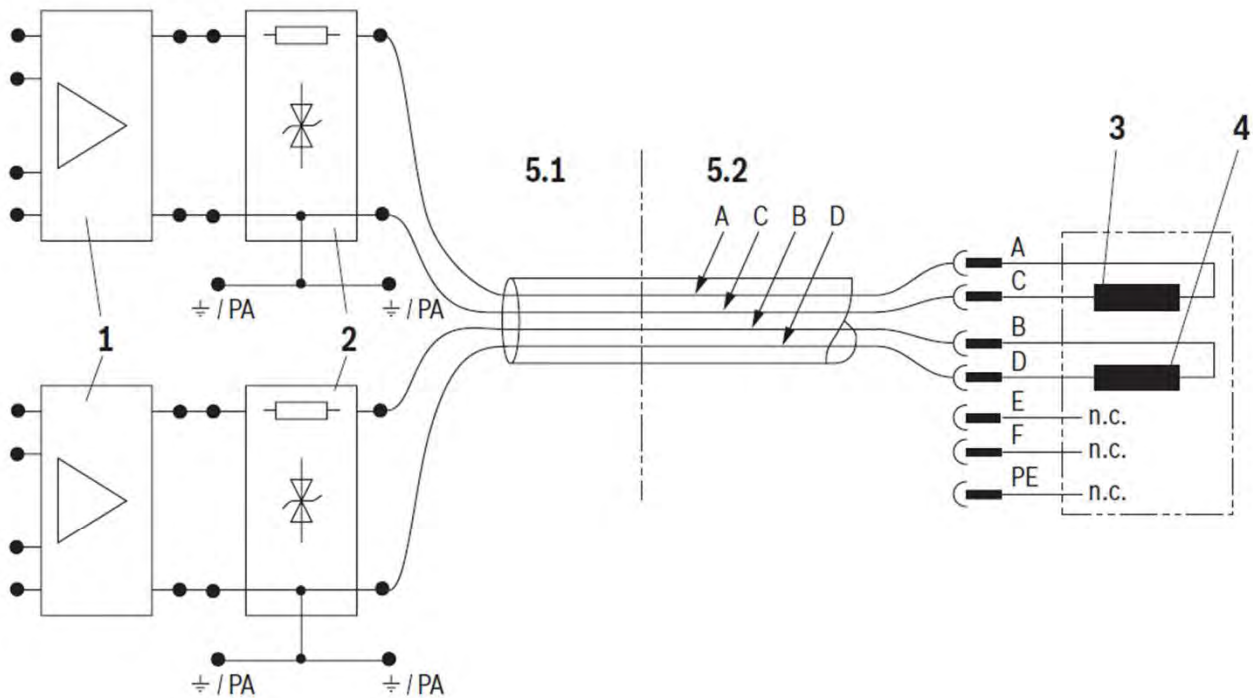
- 5.1 Non-explosive area
- 5.2 Explosive area

Power supply of the valve only from intrinsically safe electric circuits with the following maximum values	► $U_{\max}$	V	15
	► $I_{\max}$	mA	153
	► $P_{\max}$	mW	570
Recommended safety barrier			Type 9001/02-133-150-101 (company Stahl) or Z915 (company Pepperl+Fuchs)

Rexroth 伺服閥介紹

4WS2EM ...XL 接線

► Individual control



- 1 Servo amplifier
- 2 Safety barrier
- 3 Valve, coil A
- 4 Valve, coil B
- 5.1 Non-explosive area
- 5.2 Explosive area

Power supply of the valve only from intrinsically safe electric circuits with the following maximum values	► $U_{\max}$	V	9.3	12.5
	► $I_{\max}$	mA	205	90
	► $P_{\max}$	mW	476	282
Recommended safety barrier			9002/77-093-300-001 (company Stahl)	Z966 (company Pepperl+Fuchs)

Rexroth 伺服閥介紹

目錄

伺服閥構造

伺服閥動作

伺服閥型號

伺服閥放大板

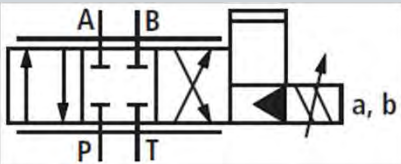
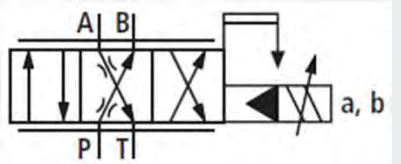
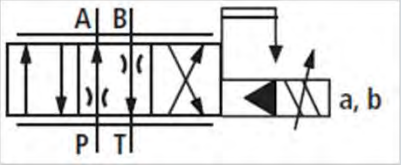
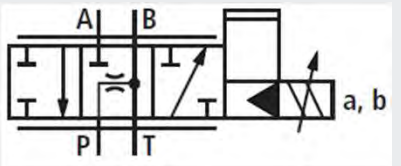
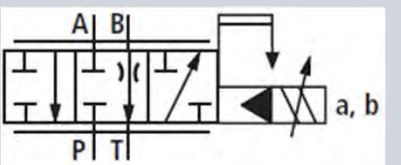
伺服閥測試箱

防爆伺服閥...XH,XD,XL

防爆伺服閥...VH1

Rexroth 伺服閥介紹

伺服閥規格

伺服閥規格	閥軸形式	備註
4WS2EM...VH1		Ranges of application in accordance with Article 505, NEC – IS Class I, Zone 0, AEx ia IIC T4 – NI Class I, Zone 2 – Ambient temperature range $-20^{\circ}\text{C} \leq T_a \leq +60^{\circ}\text{C}$
4WS2EM...VH1...-100		
4WS2EM...VH1...-102		
4WS2EM...VH1...-104		
4WS2EM...VH1...-114		

Rexroth 伺服閥介紹

NEC 規範

The National Electric Code (NEC) or NFPA 70 defines area classification and installation principles.

Article 500 describes the NEC Division classification system.

Articles 505 and 506 describe the NEC Zone classification system.

Rexroth 伺服閥介紹

NEC 規範

Class I, Zone 0, AEx ia IIC T4

Classes 根據是氣體還是蒸汽、可燃或導電粉塵、可燃纖維或飛行物來定義危險的類型。

Divisions 定義了在正常或異常條件下存在危險的概率。

Groups 對有害物質的確切類型和性質進行分類。

Classification of location NEC 500				NEC 505, 506	
Flammable material	Temporary behaviour of explosive atmosphere	Classification of hazardous area	Required marking (equipment)	Classification of hazardous area	Equipment protection level (EPL)
Gases, vapors, dust, fibers or flyings	... continuously or for long periods of time (continuous hazard)	Division 1	Division 1	Zone 0 (Gases, vapors)	Ga
				Zone 20 (Dust cloud)	Da
Gases, vapors, dust, fibers or flyings	... likely to occur in normal operation (intermittent hazard)	Division 1	Division 1	Zone 1 (Gases, vapors)	Gb, Ga
				Zone 21 (Dust cloud)	Db, Da
Gases, vapors, dust, fibers or flyings	... not likely to occur in normal operation and if, only infrequently and for a short period (hazard under abnormal conditions)	Division 2	Division 1 or Division 2	Zone 2 (Gases, vapors)	Gc, Gb, Ga
				Zone 22 (Dust cloud)	Dc, Db, Da

NEC 500			Classification of location, flammable material NEC 505, 506			
Class	Group	Required marking (equipment)	Flammable material	Flammable material (examples)	Group and Sub-Group	Required marking (equipment)
Class I	Group A	Class I, Group A	Gases, vapors	Acetylene 乙炔	IIC	IIC
Class I	Group B	Class I, Group B		Hydrogen 氫	IIC	IIC
Class I	Group B	Class I, Group B		乙烯 Ethylene, acrylonitrile, propylene oxide, ethyl oxide	IIB	IIB, IIC
Class I	Group C	Class I, Group C		環丙烷 Cyclopropane, ethyl ether	IIB	IIB, IIC
Class I	Group D	Class I, Group D		Acetone, methane, 丙酮 hexane, propane 甲烷	IIA	IIA, IIB, IIC
Class II	Group E	Class II, Group E	Dust, fibers, flyings	Conductive dust, metal dust	IIIC	IIIC
Class II	Group F	Class II, Group F		Coal dust	IIIC	IIIC
Class II	Group G	Class II, Group G		Non-conductive dust, grain dust	IIIB	IIIC, IIIB
Class III		Class III		Combustible flyings, paper or cotton processing	IIIA	IIIC, IIIB, IIIA

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Rexroth 伺服閥介紹

NEC 規範

Class I, Zone 0, AEx ia IIC T4

Applications	Flammable materials	Protection principle	Type of protection	Standards under NEC 500 Divisions	Standards under NEC 505, 506	Marking in accordance with the equipment protection level		
						very high level of protection	high level of protection	enhanced level of protection
All equipments	Gases, vapors, dust, fibers, flyings	–	General requirements	FM 3600	ANSI/UL-60079-0	–	–	–
Control stations, motors, fuses, switchgear, power electronics	Gases, vapors	Propagation of an explosion inside to the outside is excluded	Flameproof Explosionproof	UL 1203 (Div. 1+2) FM 3615	ANSI/UL-60079-1	Ex da	Ex db	Ex dc
Junction and connection boxes, enclosures, motors, lights, terminals	Gases, vapors	Avoidance of arcs, sparks and excessive temperature	Increased safety	–	ANSI/UL-60079-7	–	Ex eb	Ex ec
Junction and connection boxes, enclosures, motors, luminaires, switch and control cabinets, plugs	Dust, fibers, flyings	Explosive atmosphere kept at distance from the ignition source	Protection by enclosure	UL 1203 (Div. 1+2)	ANSI/UL-60079-31	Ex ta	Ex tb	Ex tc
			Ignition proof	FM 3616 (Class II, Div. 1) FM 3611 (Class III, Div. 1+2)	–			
Measurement and control technology, automation technology, sensors, actuators	Gases, vapors, dust, fibers, flyings	Limitation of energy of arcs and temperature	Intrinsic safety	UL 913 (Div.1+2) FM 3610 NEC 504 (Systems)	ANSI/UL-60079-11 ANSI/UL-60079-25	Ex ia	Ex ib	Ex ic
Switch and control	Gases, vapors,	Explosive	Pressurized	NFPA 496 (Div. 1+2)	ANSI/UL-60079-2	–	Ex pxb	Ex pzc
Measurement and control technology, automation technology, sensors, actuators	Gases, vapors, dust, fibers, flyings	Limitation of energy of arcs and temperature	Intrinsic safety	UL 913 (Div.1+2) FM 3610 NEC 504 (Systems)	ANSI/UL-60079-11 ANSI/UL-60079-25	Ex ia	Ex ib	Ex ic
Transformers, relays, control stations, magnetic contactors	Gases, vapors	Explosive atmosphere kept at distance from the ignition source	Oil immersion	UL 698	ANSI/UL-60079-6	–	Ex o	–
Capacitors, transformers, relays	Gases, vapors	Propagation of an explosion inside to the outside is excluded	Powder filling	–	ANSI/UL-60079-5	–	Ex q	–
Applications	Gases, vapors, bers,	Protection principles adapted for zone 2	Non sparking Enclosed construction Limited energy Restricted breathing	UL 1604 UL 12.12.01 FM 3611	UL 60079-15	–	–	Ex nA Ex nC Ex nL Ex nR

取自: <https://www.bartec.de/en/>

Rexroth 伺服閥介紹

NEC 規範

Class I, Zone 0, AEx ia IIC T4

Temperature (Gases or vapors)			
Temperature code NEC 500	Temperture class NEC 505	Maximum surface temperature (equipment)	Permissible temperature classes (equipment)
T1	T1	450 °C	T1 to T6
T2	T2	300 °C	T2 to T6
T2A	–	280 °C	T2A to T6
T2B	–	260 °C	T2B to T6
T2C	–	230 °C	T2C to T6
T2D	–	215 °C	T2D to T6
T3	T3	200 °C	T3 to T6
T3A	–	180 °C	T3A to T6
T3B	–	165 °C	T3B to T6
T3C	–	160 °C	T3C to T6
T4	T4	135 °C	T4 to T6
T4A	–	120 °C	T4A to T6
T5	T5	100 °C	T5 to T6
T6	T6	85 °C	T6

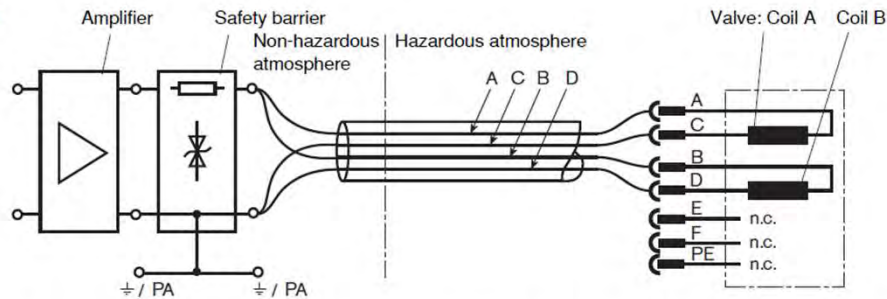
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Rexroth 伺服閥介紹

4WS2EM ...VH1 配線

Zone 0



Safety barrier required

Note

Only approved cables and leads may be used for intrinsically safe circuits.

The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus not specifically examined in combination as system when:

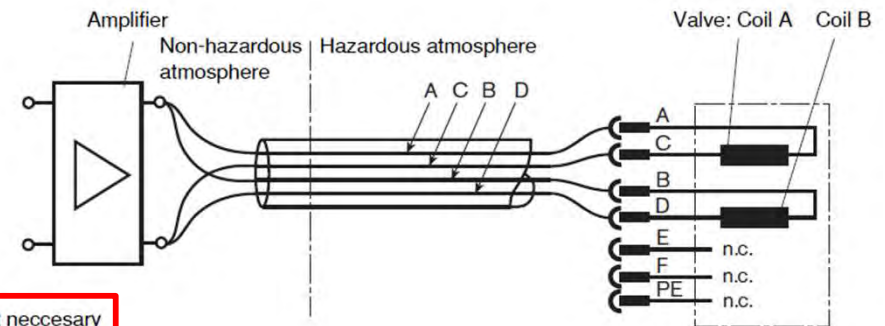
$$V_{max} > V_{oc} \text{ or } V_t; I_{max} > I_{sc} \text{ or } I_t; C_a > C_l + C_{cable};$$

$$L_a > L_l + L_{cabel}$$

Control equipment connected to barrier must not use or generate more than 250 Vrms or Vdc.

The configuration of associated apparatus must be FM Approved.

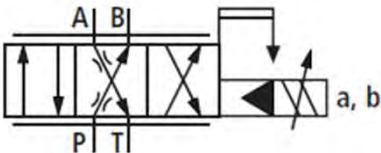
Zone 2



Safety barrier not necessary

Rexroth 伺服閥介紹

4WS2EM ...VH1-100 型號



4WS2E	M	10-5X/	B	11	VH1		K31	V-	100
-------	---	--------	---	----	-----	--	-----	----	-----

Electrically operated 2-stage servo valve, 4-way version for external trigger electronics	= 4WS2E
Mechanical feedback	= M
Nominal size 10	= 10
Unit series 50 to 59 (50 to 59: installation and connection dimensions unchanged)	= 5X
Nominal flow ¹⁾	
5 l/min	= 5
10 l/min	= 10
20 l/min	= 20
30 l/min	= 30
45 l/min	= 45
60 l/min	= 60
75 l/min	= 75
90 l/min	= 90
Valves for external trigger electronics: Coil No. 11 (30 mA/85 Ω per coil) ²⁾	= 11

- Included in scope of delivery:
- Valve operating instructions
 - Valve fastening screws

100 =	Special numbers ⁶⁾
V =	FKM seals ⁶⁾ suitable for mineral oil (HL, HLP) to DIN 51524
	Spool overlap ⁵⁾
C =	3 ... 5 % positive
D =	0 ... 0,5 % positive
E =	0 ... 0,5 % negative

Electrical connection
K31 = with plug
to EN175201-804
Plug-in connector – order separately
see Page 7

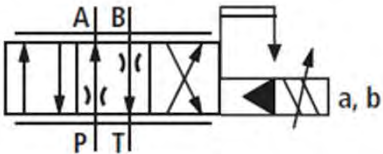
	Supply pressure range to 1st stage ⁴⁾
210 =	10 ... 210 bar
315 =	10 ... 315 bar

	Control oil supply and discharge ³⁾
- =	External supply, external return
E =	Internal supply, external return
T =	External supply, internal return
ET =	Internals supply, internal return (ET = Standard version)

VH1 = Valve in explosion-proof design
For details, see information on explosion protection,
Page 6

Rexroth 伺服閥介紹

4WS2EM ...VH1-102 型號



4WS2E	M	10-5X/	B	11	VH1			K31	V-	102
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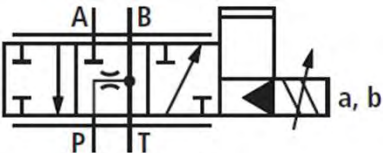
Electrically operated 2-stage servo valve, 4-way version	
for external trigger electronics	= 4WS2E
Mechanical feedback	= M
Nominal size 10	= 10
Unit series 50 to 59 (50 to 59: installation and connection dimensions unchanged)	= 5X
Nominal flow ¹⁾	
5 l/min	= 5
10 l/min	= 10
20 l/min	= 20
30 l/min	= 30
45 l/min	= 45
60 l/min	= 60
75 l/min	= 75
90 l/min	= 90
Valves for external trigger electronics: Coil No. 11 (30 mA/85 Ω per coil) ²⁾	= 11

- Included in scope of delivery:**
- Valve operating instructions
 - Valve fastening screws

102 =	Special numbers ⁶⁾
V =	FKM seals ⁶⁾ suitable for mineral oil (HL, HLP) to DIN 51524
	Spool overlap ⁵⁾
C =	3 ... 5 % positive
D =	0 ... 0,5 % positive
E =	0 ... 0,5 % negative
	Electrical connection
K31 =	with plug to EN175201-804 Plug-in connector – order separately see Page 7
	Supply pressure range to 1st stage ⁴⁾
210 =	10 ... 210 bar
315 =	10 ... 315 bar
	Control oil supply and discharge ³⁾
- =	External supply, external return
E =	Internal supply, external return
T =	External supply, internal return
ET =	Internals supply, internal return (ET = Standard version)
VH1 =	Valve in explosion-proof design For details, see information on explosion protection, Page 6

Rexroth 伺服閥介紹

4WS2EM ...VH1-104 型號



4WS2E	M	10-5X	B	11	VH1		K31	V	104
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Electrically operated 2-stage servo valve, 3-way version for external trigger electronics	= 4WS2E
Mechanical feedback	= M
Size 10	= 10
Unit series 50 to 59 (50 to 59: installation and connection dimensions unchanged)	= 5X
Nominal flow ¹⁾	
5 l/min	= 5
10 l/min	= 10
20 l/min	= 20
30 l/min	= 30
45 l/min	= 45
60 l/min	= 60
75 l/min	= 75
90 l/min	= 90
Valves for external trigger electronics: Coil No. 11 (30 mA/85 Ω per coil) ²⁾	= 11

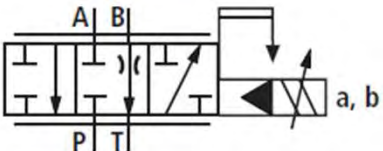
- Included in scope of delivery:**
- Valve operating instructions
 - Valve fastening screws

104 =	Special numbers ⁶⁾
V =	FKM seals ⁶⁾ suitable for mineral oil (HL, HLP) to DIN 51524
	Spool overlap ⁵⁾
C =	3 ... 5 % positive
D =	0 ... 0,5 % positive
E =	0 ... 0,5 % negative
	Electrical connection
K31 =	with plug to EN175201-804 Plug-in connector – order separately see Page 7
	Supply pressure range to 1st stage ⁴⁾
210 =	10 ... 210 bar
315 =	10 ... 315 bar
	Control oil supply and discharge ³⁾
- =	External supply, external return
E =	Internal supply, external return
T =	External supply, internal return
ET =	Internals supply, internal return (ET = Standard version)

VH1 = Valve in explosion-proof design
For details, see information on explosion protection,
Page 6

Rexroth 伺服閥介紹

4WS2EM ...VH1-114 型號



4WS2E	M	10-5X/	B	11	VH1		K31		V- 114
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Electrically operated
2-stage servo valve,
3-way version
for **external** = 4WS2E
trigger electronics

Mechanical feedback = M

Nominal size 10 = 10

Unit series 50 to 59 = 5X
(50 to 59: installation and connection
dimensions unchanged)

Nominal flow ¹⁾

5 l/min	= 5
10 l/min	= 10
20 l/min	= 20
30 l/min	= 30
45 l/min	= 45
60 l/min	= 60
75 l/min	= 75
90 l/min	= 90

Valves for **external** trigger electronics:
Coil No. 11 (30 mA/85 Ω per coil) ²⁾ = 11

- Included in scope of delivery:**
- Valve operating instructions
 - Valve fastening screws

114 = Special numbers ⁶⁾

V = FKM seals ⁶⁾
suitable for mineral oil
(HL, HLP) to DIN 51524

Spool overlap ⁵⁾

C =	3 ... 5 % positive
D =	0 ... 0,5 % positive
E =	0 ... 0,5 % negative

Electrical connection

K31 = with plug
to EN175201-804
Plug-in connector – order separately
see Page 7

Supply pressure range to 1st stage ⁴⁾

210 =	10 ... 210 bar
315 =	10 ... 315 bar

Control oil supply and discharge ³⁾

- =	External supply, external return
E =	Internal supply, external return
T =	External supply, internal return
ET =	Internals supply, internal return (ET = Standard version)

VH1 = Valve in explosion-proof design
For details, see information on explosion protection,
Page 6

Rexroth 伺服閥介紹

參考型錄

型 號	型 錄 編 號
4WS.2E	RE 29583
VT-SR2	RE 29980
VT 11021	RE 29743
VT11021-1X/V002	RE 29743-03
VT-SVTSY-1	RE 29681
4WS2EM ...XH	RE 29583-XH
4WS2EM ...XD	RE 29583-XD
4WS2EM ...XL	RE 29583-XL
4WS2EM...VH1...-100	RA 29583-VH1-100-B1
4WS2EM...VH1...-102	RA 29583-VH1-102-B1
4WS2EM...VH1...-104	RA 29583-VH1-104-B1
4WS2EM...VH1...-114	RA 29583-VH1-114-B1



www.woofwu.com.tw | sales@woofwu.com.tw



營業部 高雄市大寮區翁園路131-62號

TEL:(07)783-3668 FAX:(07)783-1368

新竹據點 BOSCH電動工具專賣店&體驗中心

新竹縣竹北市環北路五段298-3號

TEL:(03)560-0169 FAX:(03)560-0139

台南據點 台南市仁德區文華路3段428巷152弄29號

TEL:(06)270-1878 FAX:(06)270-1876