



6.7

## 2-and 3-way high-response flow valve

Type WRCE...L2X

NG 32~50  
Up to 420 bar  
Up to 4000 L/min



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### Features

- Pilot operated 2- and 3-way high-response valve in block installation design
- Suitable for closed-loop controlling of position, pressure, force and velocity
- Pilot control valve (pilot):  
Directly actuated controlled directional valve, with control spool and sleeve in servo quality
- Main stage: closed-loop position controlled
- Integrated open and closed-loop control electronics (OBE)
- Typical applications:
  - Plastic injection machines
  - Die-casting machines
  - Ceramics machines

## Ordering code

	2	WRCE		S		-L2X/P	G24	K31/	/	Q	*
2/2 directional valve	= 2										
Electrically operated high-response valve for block installation with integrated electronics (OBE)	= WRCE										
Size 32	= 32										
Size 40	= 40										
Size 50	= 50										
Seat piston	= S										
Rated flow in l/min at 5 bar valve pressure drop											
Size 32: 800 l/min linear only ...S800L...	= 800										
600 l/min with fine control range only ...S600R...	= 600										
Size 40: 1200 l/min linear only ...S1200L...	= 1200										
850 l/min with fine control range only ...S850R...	= 850										
Size 50: 2000 l/min linear only ...S2000L...	= 2000										
1400 l/min with fine control range only ...S1400R...	= 1400										
Characteristic curve form											
Linear	= L										
Linear with progressive fine control range	= R										
Series L20 to L29 (L20 to L29: Unchanged installation and connection dimensions)	= L2X										
Pilot control valve (pilot)											
Servo performance proportional valve	= P										
Supply voltage 24 VDC	= G24										
Electrical connection											
Without mating connector with connector according to DIN EN 175201-804	= K31										
With mating connector with connector according to DIN EN 175201-804	= Z31										
Electronics interfaces											
Command value 0...+10 V, actual value +0.5...+10 V	= A1										
Command value 4...20 mA	= F1										
Seal material											
FKM seals	= V										
NBR seals	= No code										
When applying pilot pressure, 2WRCE closes actively	= No code										
When applying pilot pressure, 2WRCE opens actively	= L										
Without band enable	= No code										
Band enable	= Q										
Further details in the plain text											

## Ordering code

	3	WRCE					-L2X/	P	G24	K31/	/	Q	*
3/2 directional valve	= 3												
Electrically operated high-response valve for block installation with integrated electronics (OBE)		= WRCE											
Size 32	= 32												
Size 40	= 40												
Size 50	= 50												
Control spool, zero overlap (+0.5...+1.5%)												= V	
Control spool, with 10...13% positive overlap												= E	
Rated flow in l/min at 5 bar valve pressure drop													
Size32: 330l/min linear only...V330L...												= 330	
280 l/min with fine control range only ...E280P...												= 280	
Size 40: 420 l/min linear only ...V420L...												= 420	
360 l/min with fine control range only ...E360P...												= 360	
Size 50: 780 l/min linear only ...V780L...												= 780	
670 l/min with fine control range only ...E670P...												= 670	
Characteristic curve form													
Linear												= L	
Linear with linear fine control range												= P	
Series L20 to L29												= L2X	
(L20 to L29:Unchanged installation and connection dimensions)													
Pilot control valve (pilot)													
Servo performance proportional valve												= P	
Supply voltage 24 VDC												= G24	
Electrical connection													
Without mating connector with connector according to DIN EN 175201-804												= K31	
With mating connector with connector according to DIN EN 175201-804												= Z31	
Electronics interfaces													
Command value ±10 V, actual value ±10 V												= A1	
Command value 4...20mA, actual value 4...20 mA												= F1	
Seal material													
FKM seals												= V	
NBR seals												= No code	
When applying pilot pressure, 3WRCE closes actively (from A to T)												= No code	
When applying pilot pressure, 3WRCE opens actively (from P to A)												= L	
Without band enable												= No code	
Band enable												= Q	
Further details in the plain text													

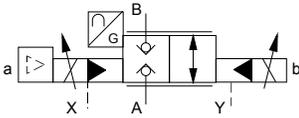
# Symbols:

# 2WRCE

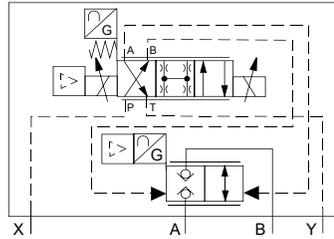
Simplified:

Detailed:

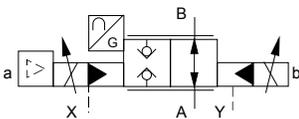
2WRCE...L2X/P...



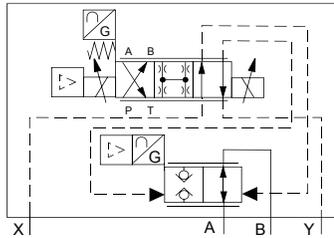
2WRCE...L2X/P...



2WRCE...L2X/P...L...



2WRCE...L2X/P...L...



## Function and configuration

## 2WRCE

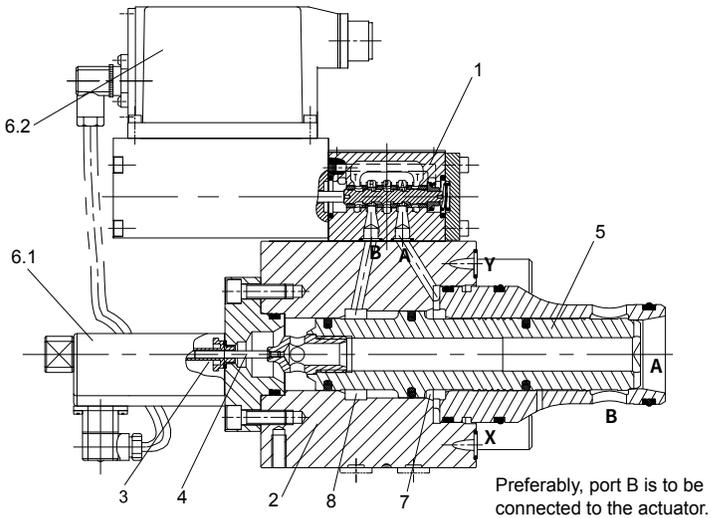
Valves of type 2WRCE...-L2X/P... are 2-stage high-response valves. They control the quantity and direction of a flow and are mainly used in control loops.

### Set-up:

They consist of the following assemblies:

- The pilot control valve (1) as 1-stage proportional valve (pilot), with a solenoid as electro-mechanical converters and a piston that is connected to the integrated pilot electronics via electrical feedback (6.2).
- The second stage (2) for flow control.
- An inductive position transducer (3) the core (4) of which is attached to the piston (5) of the second stage.
- Integrated LVDT electronics(6.1).

### Type 2WRCE40...-L2X/P...



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### Function

The integrated electronics (OBE) compares command and actual values and the solenoids of the pilot control valve are actuated with a proportional current according to the control deviation.

The pilot control valve takes a proportionally controlled position and controls the flow in and out of the control chambers A (7) and B (8) that actuate the main spool (5) through the closed valve control loop up to 0 control deviation.

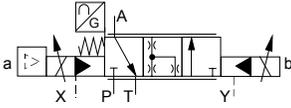
This means that the stroke of the main spool is regulated proportionally to the command value. It must be noted that the flow also depends on the valve pressure drop.

# Symbols:

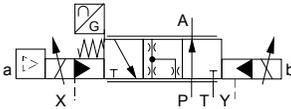
# 3WRCE

## Simplified

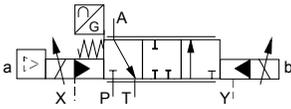
3WRCE..V...-L2X/P...



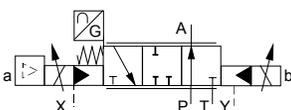
3WRCE..V...-L2X/P...L...



3WRCE..E...-L2X/P...

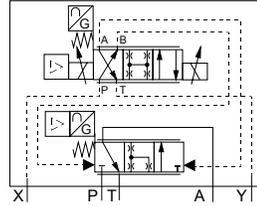


3WRCE..E...-L2X/P...L...

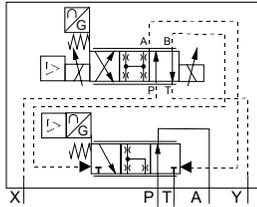


## Detailed

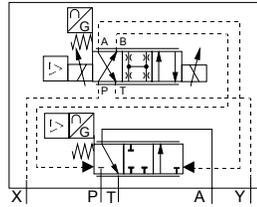
3WRCE..V...-L2X/P...



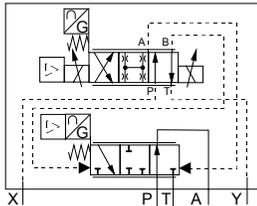
3WRCE..V...-L2X/P...L...



3WRCE..E...-L2X/P...



3WRCE..E...-L2X/P...L...



## Function and configuration

## 3WRCE

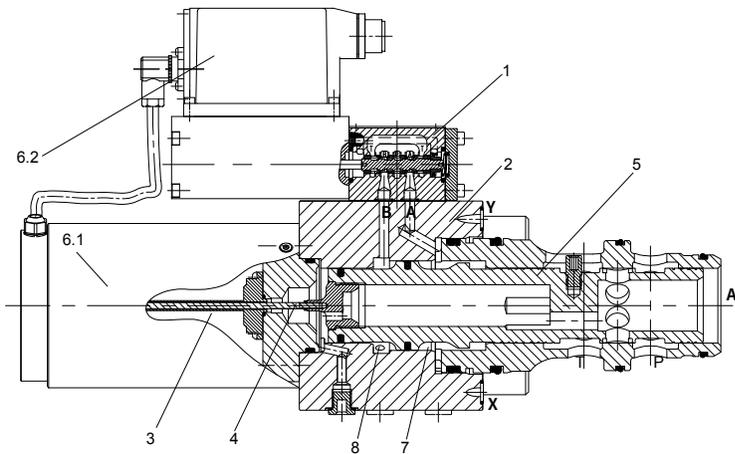
Valves of type 3WRCE...-L2X/P... are 2-stage high-response valves. They control the quantity and direction of a flow and are mainly used in control loops.

### Set-up

They consist of the following assemblies:

- The pilot control valve (1) as 1-stage proportional valve (pilot), with a solenoid as electro-mechanical converters and a piston that is connected to the integrated pilot electronics via electrical feedback (6.2).
- The second stage (2) for flow control.
- An inductive position transducer (3) the core (4) of which is attached to the piston (5) of the second stage.
- Integrated LVDT electronics (6.1).

### Type 3WRCE50...-L2X/P...



### Function

The integrated electronics (OBE) compares command and actual values and the solenoids of the pilot control valve are actuated with a proportional current according to the control deviation.

The pilot control valve takes a proportionally controlled position and controls the flow in and out of the control chambers A (7) and B (8) that actuate the main spool (5) through the closed valve control loop up to 0 control deviation.

This means that the stroke of the main spool is regulated proportionally to the command value. It must be noted that the flow also depends on the valve pressure drop.

## Technical data

## Type 2WRCE

General					
Sizes			32	40	50
Weight		kg	11.2	17.3	24.6
Weight with shut-off valve ...../...WK or .../...WL...		kg	12.5	18.6	25.9
Size of the pilot control valve (pilot)		Size	6	6	6
Installation position	Any, preferably horizontal				
Storage temperature range		°C	-20 to +80		
Ambient temperature range		°C	-20 to +50		
Hydraulic (measured with HLP32, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )					
Maximum operating pressures	- Main stage ports A, B	bar	350 for NG32~40,420 for NG50		
	- Pilot control valve port X	bar	315		
	- Pilot control valve port Y	bar	210		
Rated flow at $\Delta p = 5$ bar	- Design ...S...L (linear)	L/min	800	1200	2000
	- Design ...S...R (linear with progressive fine control range)		600	850	1400
Nominal flow of pilot valve at $\Delta p=70$ bar		L/min	12	40	40
Leakage of pilot valve at $P = 100$ bar		L/min	0.3	0.7	0.7
Hydraulic fluid	Mineral oil (HL,HLP) to DIN 51524				
Hydraulic fluid temperature range		°C	-20 to +80; preferably +40 to +50		
Viscosity range		mm <sup>2</sup> /s	20 to 380; preferably 30 to 45		
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 20/18/15		
Hysteresis		%	≤ 0.2		
Range of inversion		%	≤ 0.1		
Response sensitivity		%	≤ 0.1		
Response time 0 ~ 100% step signal		ms	≤ 20		

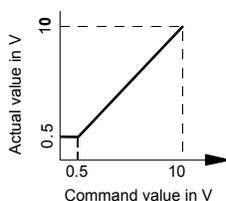
Electric					
Voltage type		Direct voltage			
Type of signal		Analog			
Opening point calibration		%	≤ 1		
Zero shift upon change of:	- Hydraulic fluid temperature	%/10 K	≤ 0.3	≤ 0.3	≤ 0.3
	- Pilot pressure in X	%/100 bar	≤ 0.7	≤ 0.7	≤ 0.7
	- Return flow pressure in Y	%/bar	≤ 0.3	≤ 0.3	≤ 0.3
Protection class of the valve according to EN60529		IP65 with mating connector mounted and locked			

Nominal command value range for 2WRC:

0 to +10 V  $\underline{\Delta}$  0 to 100%

In the command value range of 0 to 0.5 V, the actual value remains constant at 0.5 V.

In case of a slow command value modification from 0.5 V to +10 V, the actual value follows the command value within  $\pm 0.15$  V.



## Technical data

## Type 3WRCE

General					
Sizes			32	40	50
Weight	kg		12.6	18.3	25.6
Weight with shut-off valve ...../...WK or .../...WL...	kg		13.9	19.6	26.9
Size of the pilot control valve (pilot)	Size		6	6	6
Installation position			Any, preferably horizontal		
Storage temperature range	°C		-20 to +80		
Ambient temperature range	°C		-20 to +50		
Hydraulic (measured with HLP32, $\vartheta_{oil} = 40\text{ °C} \pm 5\text{ °C}$ )					
Maximum operating pressures	- Main stage ports A, B	bar	350 for NG32~40, 420 for NG50		
	- Pilot control valve port X	bar	315		
	- Pilot control valve port Y	bar	210		
Rated flow at $\Delta p = 5\text{ bar}$	- Design ...S...L (linear)	L/min	330	420	780
	- Design ...S...R (linear with progressive fine control range)	L/min	280	360	670
Nominal flow of pilot valve at $\Delta p = 70\text{ bar}$	L/min		12	24	40
Leakage of pilot valve at $P = 100\text{ bar}$	L/min		0.3	0.5	0.7
Hydraulic fluid			Mineral oil (HL,HLP) to DIN 51524		
Hydraulic fluid temperature range	°C		-20 to +80; preferably +40 to +50		
Viscosity range	mm <sup>2</sup> /s		20 to 380; preferably 30 to 45		
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)			Class 20/18/15		
Hysteresis	%		≤ 0.2		
Range of inversion	%		≤ 0.1		
Response sensitivity	%		≤ 0.1		
Response time 0 ~ 100% step signal	ms		≤ 28		

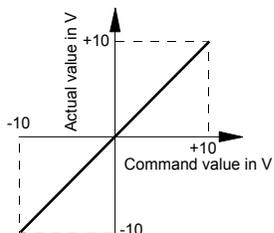
Electric					
Voltage type			Direct voltage		
Type of signal			Analog		
Opening point calibration	%		≤ 1		
Zero shift upon change of:	- Hydraulic fluid temperature	%/10 K	≤ 0.3	≤ 0.3	≤ 0.3
	- Pilot pressure in X	%/100 bar	≤ 0.7	≤ 0.7	≤ 0.7
	- Return flow pressure in Y	%/bar	≤ 0.3	≤ 0.3	≤ 0.3
Protection class of the valve according to EN60529			IP65 with mating connector mounted and locked		

Nominal command value range for 3WRC:

0 to +10 V  $\underline{\Delta}$  0 to 100%

In the command value range of 0 to 0.5V, the actual value remains constant at 0.5V.

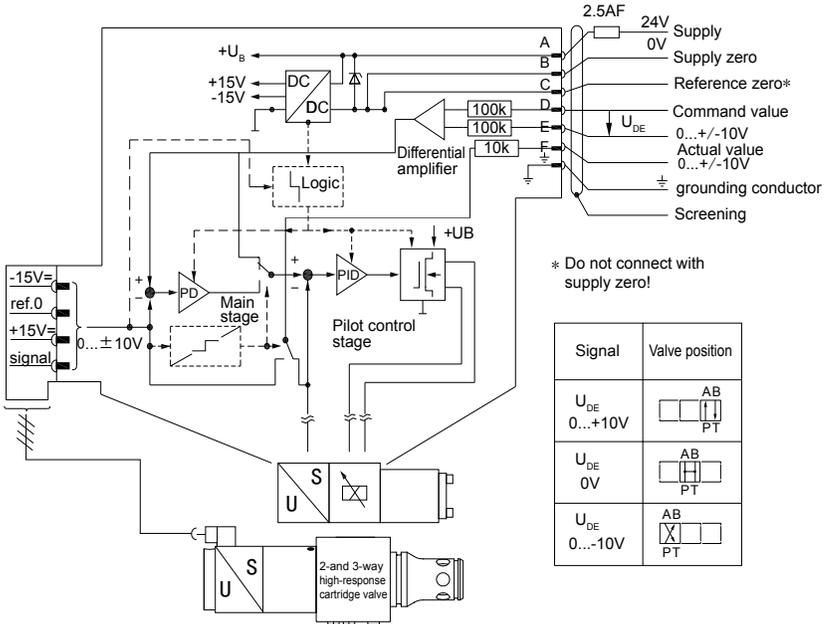
In case of a slow command value modification from 0.5 V to +10 V, the actual value follows the command value within  $\pm 0.15\text{ V}$ .



# Integrated electronics

## Block diagram/Pinout

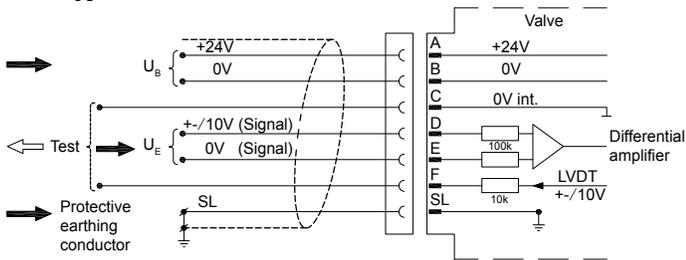
Version A1:  $U_{D-E} 0... \pm 10V$



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## Pin assignment 6P+PE

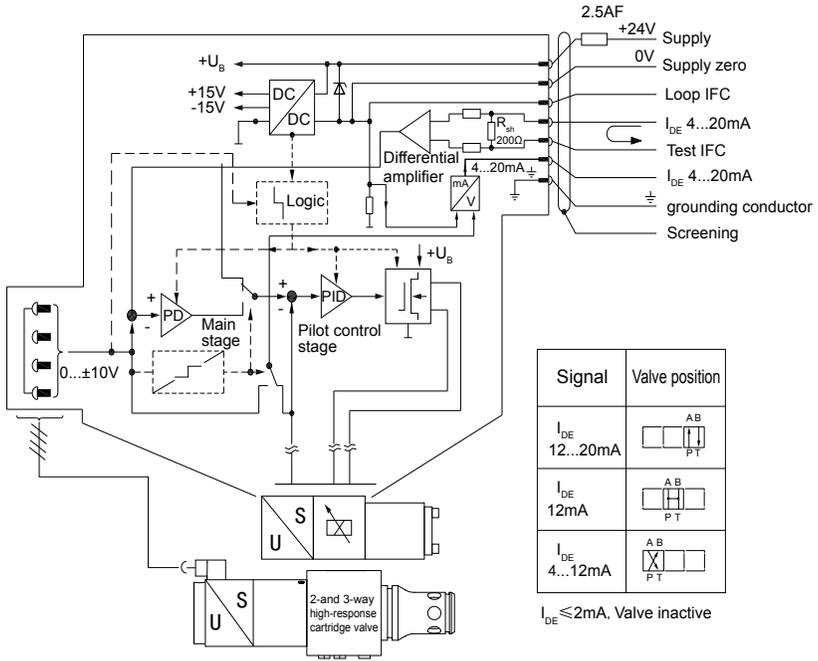
Version A1:  $U_{D-E} 0... \pm 10V$



# Integrated electronics

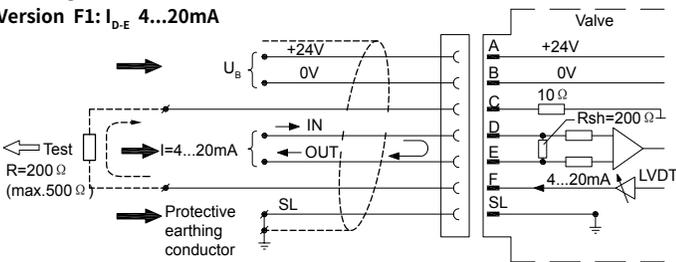
## Block diagram / Pinout

Version F1:  $I_{DE}$  4...20mA



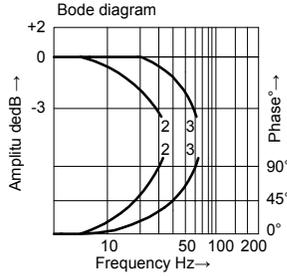
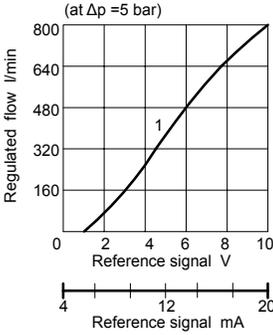
## Pin assignment 6P+PE

Version F1:  $I_{D-E}$  4...20mA



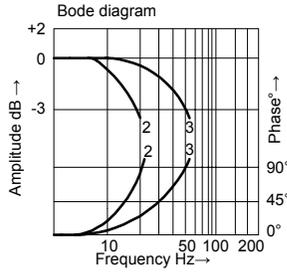
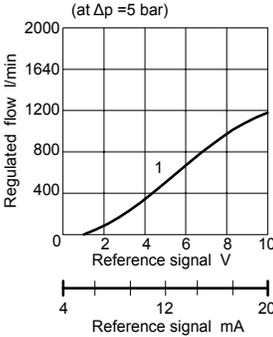
**Characteristic curves** (measured with HLP46,  $\vartheta_{oil}=50^{\circ}\text{C}$ ,  $P=100\text{bar}$ )

**Type: 2WRCE32S800L-L2X/P...**



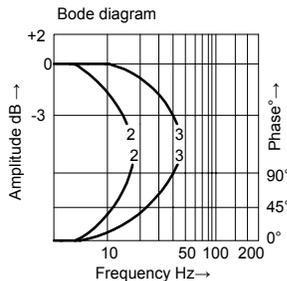
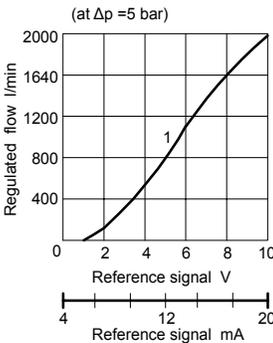
- 1= Ratedflow line
- 2= Command value:  
10%  $\leftrightarrow$  90°
- 3= Command value:  
50%  $\pm$  5%

**Type: 2WRCE40S1200L-L2X/P...**



- 1= Ratedflow line
- 2= Command value:  
10%  $\leftrightarrow$  90°
- 3= Command value:  
50%  $\pm$  5%

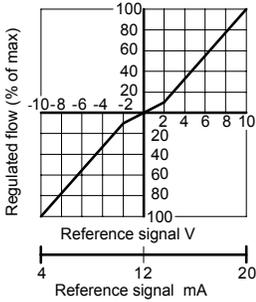
**Type: 2WRCE50S2000L-L2X/P...**



- 1= Ratedflow line
- 2= Command value:  
10%  $\leftrightarrow$  90°
- 3= Command value:  
50%  $\pm$  5%

## Characteristic curves (measured with HLP46, $\vartheta_{oil} = 50^{\circ}\text{C}$ , $P = 100\text{bar}$ )

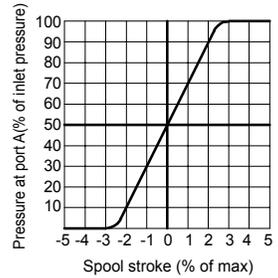
### Type:3WRCE...-L2X/P...(all sizes)



Hydraulic configuration vs. reference signal:

Reference signal: 0 → 10V P → A  
2 → 120mA

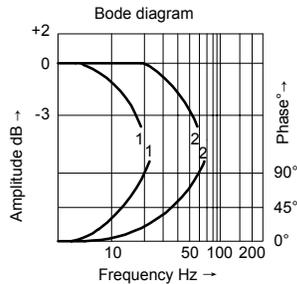
Reference signal: 0 → -10V A → T  
4 → 12mA



### Type:3WRCE30V330L2X/P...

1= Command value:  $\pm 90\%$

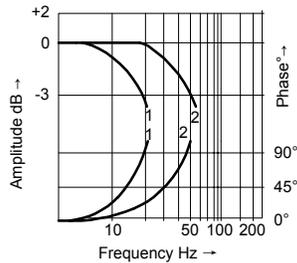
2= Command value:  $\pm 5\%$



### Type:3WRCE40V420L-L2X/P...

1= Command value:  $\pm 90\%$

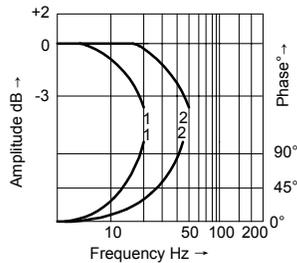
2= Command value:  $\pm 5\%$



### Type:3WRCE50V780L-L2X/P...

1= Command value:  $\pm 90\%$

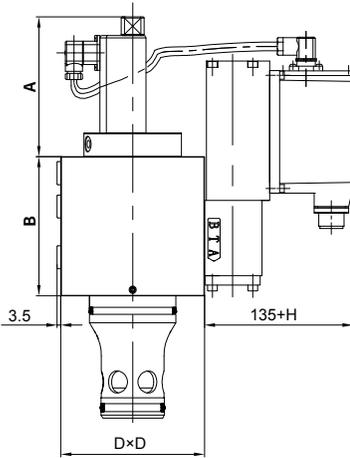
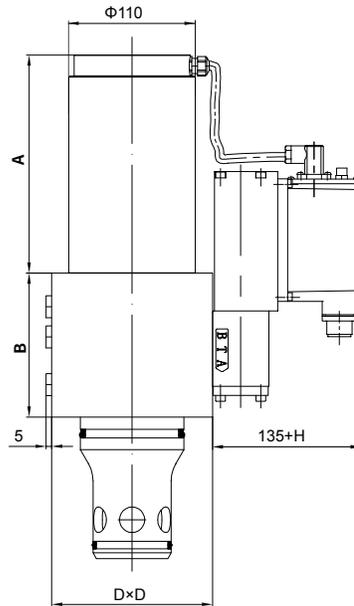
2= Command value:  $\pm 5\%$



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**Unit dimensions: Types 2WRCE**

(nominal dimensions in mm)

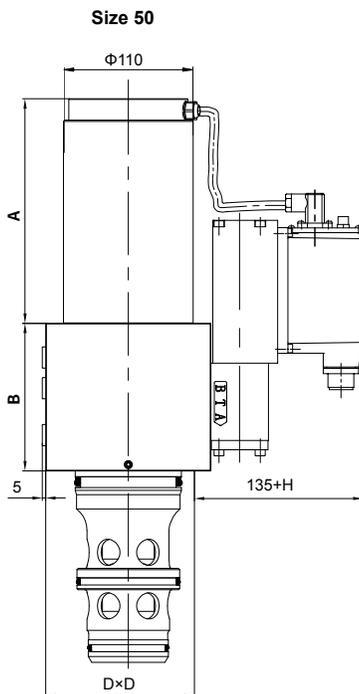
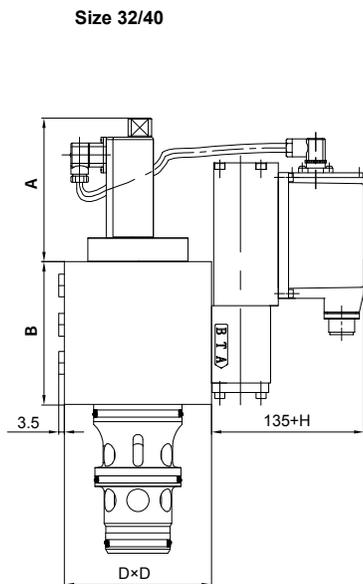
**Size 32/40****Size 50**

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Size	A	B	C	H only for 2WRCE... WK15... 2WRCE... WL15...	Fastening bolts class 12.9	Tightening torque
32	135	105	100	50	4- M16×60	300 Nm
40	148	120	125	50	4- M20×70	600 Nm
50	188	124	140	50	4- M20×80	600 Nm

## Unit dimensions: Types 3WRCE

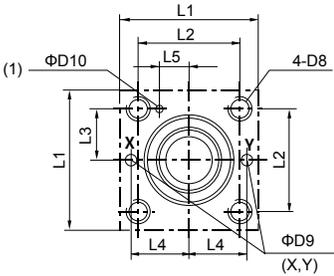
(nominal dimensions in mm)



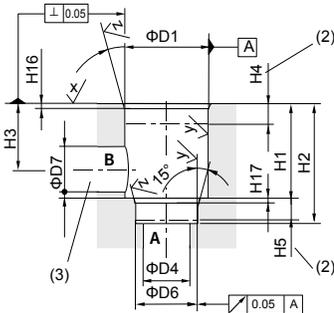
Size	A	B	C	H only for 3WRCE... WK15... 3WRCE... WL15...	Fastening bolts class 12.9	Tightening torque
32	123	105	100	50	4- M16×60	300 Nm
40	123	120	125	50	4- M20×70	600 Nm
50	188	124	140	50	4- M20×80	600 Nm

# Installation dimensions according to DIN ISO 7368

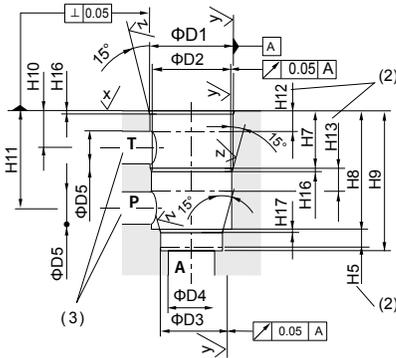
(dimensions in mm)



**Installation bore type 2WRCE**



**Installation bore type 3WRCE**



Size	32	40	50
L1	105	125	140
L2±0.2	70	85	100
L3±0.2	35	42.5	50
L4±0.2	41	50	58
L5	17	23	30
ΦD1 <sup>H7</sup>	60	75	90
ΦD2 <sup>H7</sup>	58	73	87
ΦD3 <sup>H7</sup>	55	55	68
ΦD4	32	40	50
ΦD5	24	30	35
ΦD6 <sup>H7</sup>	45	55	68
ΦD7	32	40	50
D8	M16	M20	M20
max.ΦD9	8	10	10
ΦD10	6	6	8
H1 <sup>+0.2 0</sup>	70	87	100
H2 <sup>+0.2 0</sup>	85	105	122
H3	52	64	72
H4	30	30	35
H5	13	15	17
H7	43.5	54	87
H8	85	105	143
H9	100	125	165
H10	30	36	66
H11	70.5	87	122
H12	18	21	48
H13	15	18	18
H16	2.5	3	4
H17	2.5	3	3
H18	35	45	45

$$x = \sqrt{R_{\max} 4}$$

$$y = \sqrt{R_{\max} 8}$$

$$z = \sqrt{R_z 10}$$

- (1) Locating hole for locking pin
- (2) Depth of fit minimum dimension
- (3) The ports P, T and B can be positioned around the central axis of port A.  
Sufficient distance from the mounting bores and control bores is to be observed.