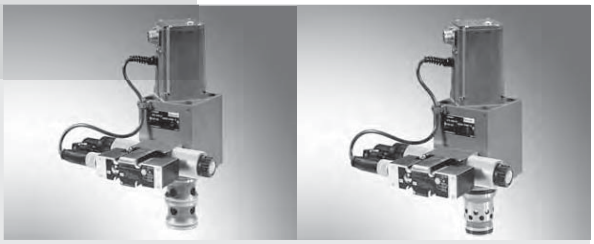
2- and 3-way high-response cartridge valve

RE 29137/08.13 1/24
Replaces: 10.05

Type .WRCE.../P



Type 3WRCE...-2X/P | Type 2WRCE...-2X/P

Size 32, 40, and 50
Component series 2X
Maximum operating pressure 420 bar
Maximum flow 4500 l/min

Table of contents

[1)] The three-port valves must not be used for new projects. See page 7.

Features

- Pilot operated 2-way high-response valve in block installation design
- Suitable for position, pressure, force and velocity control
- Pilot control valve (pilot):
  Directly operated, electrically returned proportional valve size 6, trimmed, closes the 2WRCE main stage in case of power failure and applied pilot pressure, opens the 3WRCE main stage from A to T
- Main stage: Position-controlled
- Integrated control electronics (OBE)
- Block installation:
  Installation dimensions according to DIN ISO 7368 for 2WRCE
- Typical applications:
  • Presses
  • Die casting machines
  • Punching axes

More information:
- Pilot control valve similar
  • Type 4WREE 6, see data sheet 29061

Notice
Further variant type .WRCE…/S with servo pilot control, see data sheet 29136

Ordering code: Type 2WRCE

2	WRCE		S		–2X/	P	G24	K31/			*

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: 650 l/min linear **= 650**
480 l/min with fine control range **only** ...S480R... **= 480**

Size 40: 1000 l/min linear **only** ...S1000L... **= 1000**
700 l/min with fine control range **only** ...S700R... **= 700**

Size 50: 1600 l/min linear **only** ...S1600L... **= 1600**
1100 l/min with fine control range **only** ...S1100R... **= 1100**

Characteristic curve form

Linear **= L**
Linear with progressive fine control range **= R**

Component series 20 to 29 **= 2X**
(20 to 29: Unchanged installation and connection dimensions)

Pilot control valve (pilot)

Proportional valve **= P**

Supply voltage 24 VDC **= G24**

Electrical connection

Without mating connector with connector according to DIN EN 175201-804 **= K31**
(separate order, see page 12)

Electronics interfaces

Command value 0...+10 V, actual value +0.5...+10 V **= A1**
Command value 0...+10 mA, actual value +0.5...+10 mA **= C1**

Sandwich plate shut-off valve

Without shut-off valve **= no code**
With shut-off valve:
Shut-off valve switched to de-energized actively closes 2WRCE with applied pilot pressure **= WK15**
Shut-off valve switched to de-energized actively opens 2WRCE with applied pilot pressure **= WL15**

Seal material

NBR seals **= M**
FKM seals **= V**

Further details in the plain text

Ordering code: Type 3WRCE – Not for new applications! (refer to page 7)

3	WRCE				–2X/	P	G24	K31/			*

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

Size 32: 290 l/min linear **only** ...V290L... = 290
250 l/min with fine control range **only** ...E250P... = 250

Size 40: 460 l/min linear **only** ...V460L... = 460
410 l/min with fine control range **only** ...E410P... = 410

Size 50: 720 l/min linear **only** ...V720L... = 720
620 l/min with fine control range **only** ...E620P... = 620

Characteristic curve form

Linear = L
Linear with linear fine control range = P

Component series 20 to 29 = 2X
(20 to 29: Unchanged installation and connection dimensions)

Pilot control valve (pilot)

Proportional valve = P

Supply voltage 24 VDC = G24

Electrical connection

Without mating connector with connector according to DIN EN 175201-804 = K31
(separate order, see page 12)

Electronics interfaces

Command value ±10 V, actual value ±10 V = A1
Command value ±10 mA, actual value ±10 mA = C1

Sandwich plate shut-off valve

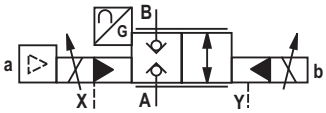
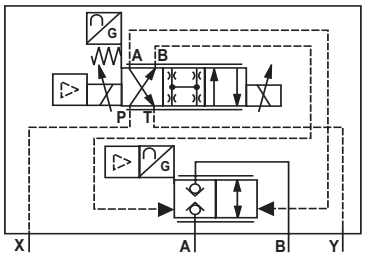
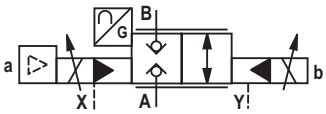
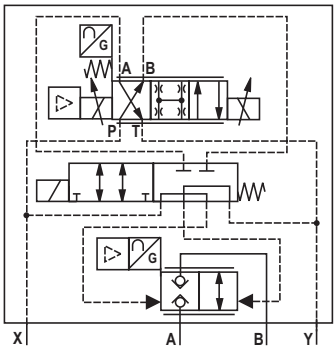
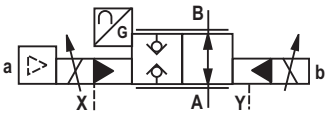
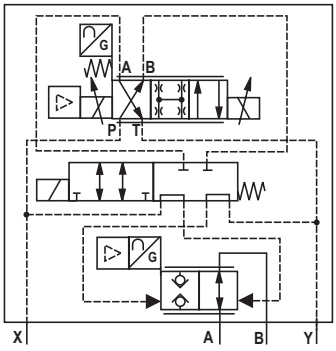
Without shut-off valve = no code
With shut-off valve:
Shut-off valve switched to de-energized actively opens 3WRCE with applied pilot pressure from A to T = WK15
Shut-off valve switched to de-energized actively opens 3WRCE with applied pilot pressure from P to A = WL15
Voltage supply 24 VDC, mating connector, separate order, refer to page 12 (without circuitry)

Seal material

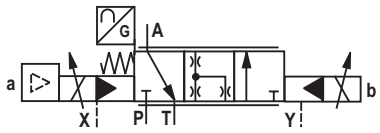
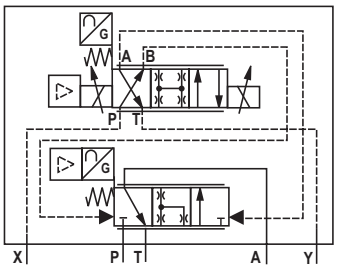
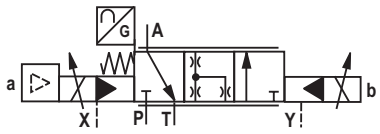
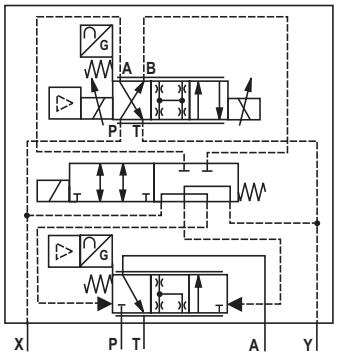
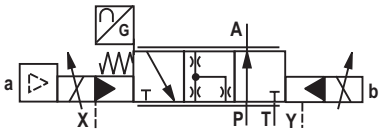
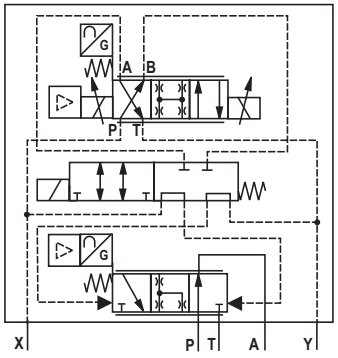
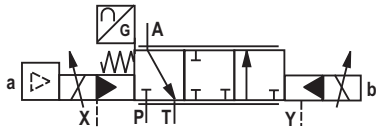
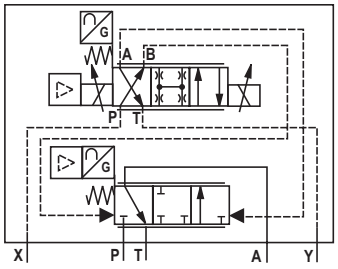
NBR seals = M
FKM seals = V

Further details in the plain text

Symbols: Type 2WRCE

Simplified	Detailed
2WRCE..-2X/P...	**2WRCE..-2X/P...**
	
2WRCE..-2X/P...WK15...	**2WRCE..-2X/P...WK15...**
	
2WRCE..-2X/P...WL15...	**2WRCE..-2X/P...WL15...**
	

Symbols: Type 3WRCE – Not for new applications! (refer to page 7)

Simplified	Detailed
3WRCE..V...-2X/P...	3WRCE..V...-2X/P...
	
3WRCE..V...-2X/P...WK15...	3WRCE..V...-2X/P...WK15...
	
3WRCE..V...-2X/P...WL15...	3WRCE..V...-2X/P...WL15...
	
3WRCE..E...-2X/P...	3WRCE..E...-2X/P...
	

Set-up, function and section: Type 2WRCE

Valves of type 2WRCE...-2X/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 two solenoids 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.
- And integrated control electronics (6.1).

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.

Valve particularities

The flow can pass through the valve from A to B or from B to A.

The seat piston closes or opens at 5% of the command value. At lower command values, the valve control loop attempts to guide the piston and thus presses it onto the seat at full pilot pressure and blocks the connection in a leak-free way.

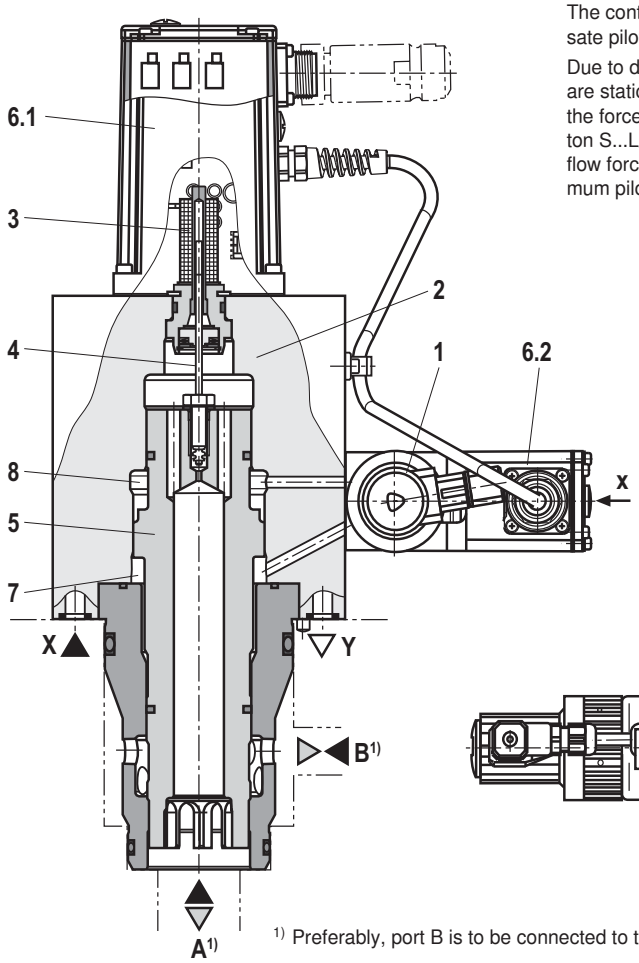
The specified valve dynamics only apply to the control area of the valve. At command value steps from the seat to lower opening values, additional delay times occur.

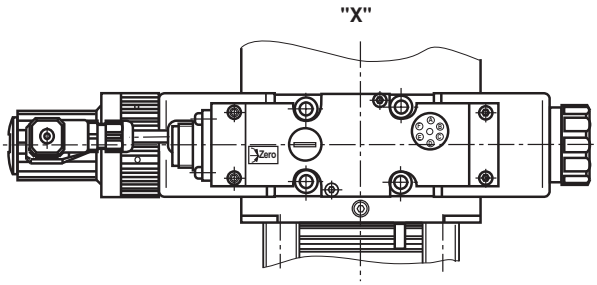
The opening point of 5% (= 0.5 V or 0.5 mA) is set at the factory.

Due to the internal setting of the pilot control valve, the pilot pressure is connected to control chamber B (8) in case of a power failure, i.e. the main stage is closed.

The control electronics feature an offset setting to compensate pilot trimming.

Due to differences in diameter in the seat range, the pistons are statically not pressure-compensated. To compensate the force differential, 6%/22% of the system pressure at piston S...L/S...R is required as pilot pressure. With reserves for flow force and dynamics, this defines the recommended minimum pilot pressure.





1) Preferably, port B is to be connected to the actuator.

Set-up, function and section: Type 3WRCE [1)]

Valves of type 3WRCE...-2X/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 two solenoids 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.
- And integrated control electronics (6.1).

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.

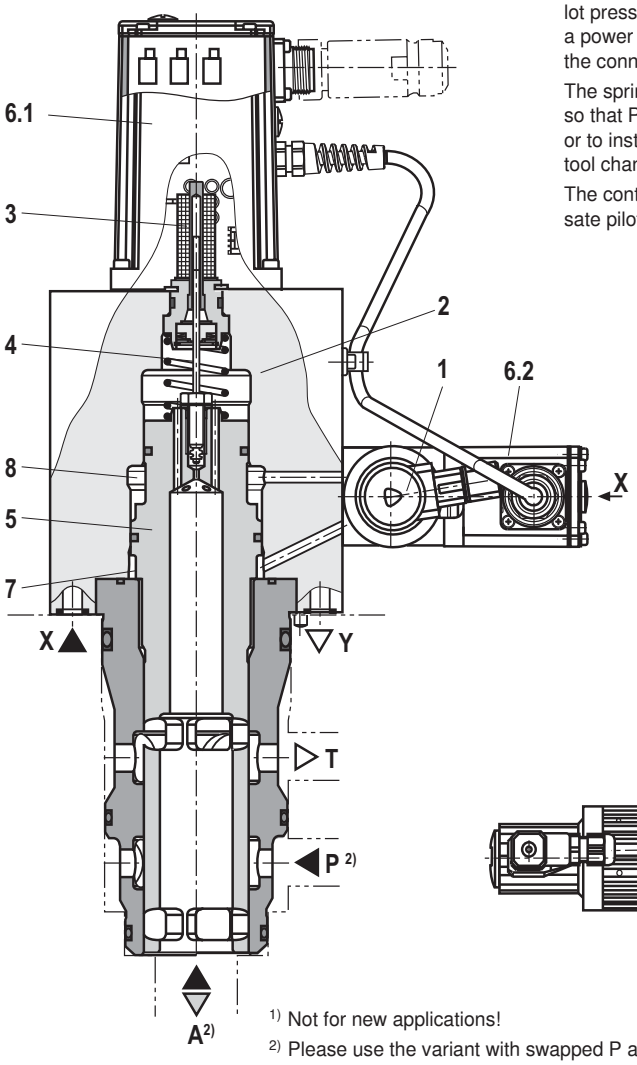
Valve particularities

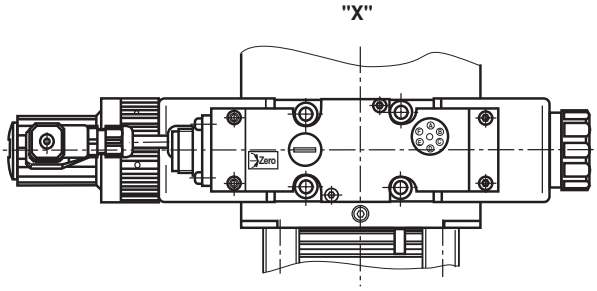
The opening point of 0% (V piston) is set at the factory.

Due to the internal setting of the pilot control valve, the pilot pressure is connected to control chamber B (8) in case of a power failure, i.e. the main stage is opened from A to T or the connection P to A is closed.

The spring behind the main spool moves it into position so that P to A is closed if no pressure is applied (e.g. prior to installation, before the pressures are reapplied after tool change).

The control electronics feature an offset setting to compensate pilot trimming.





1) Not for new applications!

2) Please use the variant with swapped P and A. Upon request!

Technical data: Type 2WRCE (For applications outside these values, please contact us!)

general

Sizes	Size	**32**	**40**	**50**
Weight	kg	12.5	19.9	26.8
Weight with shut-off valve ...../...WK or .../...WL...	kg	13.7	21.1	28
Size of the pilot control valve (pilot)	Size	6	6	6
Installation position; commissioning		Any, preferably horizontal; according to data sheet 07700		
Storage temperature range	°C	–20 to +80		
Ambient temperature range	°C	–20 to +50		
Sine test according to prEN 60068-2-6:1995		5...2000 Hz / maximum of 10 g / 10 cycles		
Random test according to IEC68-2-36:1973		20…2000 Hz / 10 g_{RMS} / 30 min		
Shock test according to EN 60068-2-27:1993		15 g / 11 ms		

hydraulic (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

Maximum operating pressures				
– Main stage ports A, B	bar	420		
– Pilot control valve port X	bar	315		
– Pilot control valve port Y	bar	210		
Minimum pilot pressure in % of system pressure				
– For piston design S...L	%	15		
– For piston design S...R	%	45		
Rated flow Q_{Vrated} +10% at Δp = 5 bar				
– Design ...S...L (linear)	l/min	650	1000	1600
– Design ...S...R (linear with progressive fine control range)	l/min	480	700	1100
Maximum flow – For piston ...S...L	l/min	1500	2200	3500
– For piston ...S...R	l/min	2000	3000	4500
Pilot flow at X and Y with stepped input signal from 0 to 100% (315 bar)	l/min	37	45	60
Zero flow of the proportional preliminary step dependent on the pressure in line X	l/min	$Q_{Lmin} = 0.0026 \frac{L}{min\ bar} \cdot p_x\ [bar]$ $Q_{Lmax} = 0.0095 \frac{L}{min\ bar} \cdot p_x\ [bar]$		
Pilot oil volume	cm^3	4.52	8.48	17.3
Hydraulic fluid		See table on page 9		
Hydraulic fluid temperature range	°C	–20 to +80; preferably +40 to +50		
Viscosity range	mm^2/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 [1]		
Hysteresis	%	≤ 0.2		
Range of inversion	%	≤ 0.1		
Response sensitivity	%	≤ 0.1		
Closing time during use – Pilot control valve	ms	≤ 200		
(pilot pressures from 40 to 315 bar) – Sandwich plate shut-off valve	ms	≤ 200		

[1] The cleanliness classes stated for the components need to be maintained in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.
For the selection of the filters see www.boschrexroth.com/filter

Technical data: Type 2WRCE (for applications outside these values, please contact us!

Hydraulic fluid	Classification	Suitable sealing materials	Standards
Mineral oils and related hydrocarbons	HL, HLP	NBR, FKM	DIN 51524
Flame-resistant – containing water	HFC (Fuchs HYDROTHERM 46 M, Petrofer Ultra Safe 620)	NBR	ISO 12922

☞ **Important information on hydraulic fluids!**

- For more information and data on the use of other hydraulic fluids, refer to data sheet 90220 or contact us.
- There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.)!
- The flash point of the process and operating medium used must be 40 K over the maximum solenoid surface temperature.
- **Flame-resistant – containing water:** Maximum pressure differential per control edge is 175 bar. Pressure preloading at the tank port > 20% of the pressure differential; otherwise, increased cavitation.
- Life cycle as compared to operation with mineral oil HL, HLP 50% to 100%.

electric

Sizes	Size	32	40	50
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 EN 60529		IP65 with mating connector mounted and locked		
EMC compatibility		Tested according to EN61000-6-2:2001 / VDE 0839 part 6-2 and EN61000-6-3:2001 / VDE 0839 part 6-3		

Integrated electronics (OBE) type TV 13037

Block diagram, see page 11

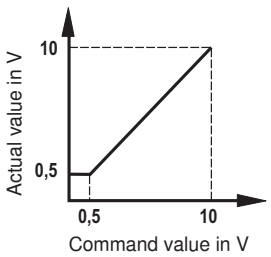
Nominal command value range for 2WRC:
0 to +10 V (mA) ≙ 0 to 100%

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 ±0.15 V.

For command values over +10 V, the actual value follows up to approx. +12 V.

At a command value step to +10 V, the actual value can temporarily reach values of up to approx. +10.5 V.



Technical data: Type 3WRCE [1] (For applications outside these values, please consult us!)

general

Sizes	Size	**32**	**40**	**50**
Weight	kg	12.8	20.2	28
Weight with shut-off valve ...../...WK or .../...WL...	kg	14	21.4	29,2
Size of the pilot control valve (pilot)	Size	6	6	6
Installation position; commissioning		Any, preferably horizontal; according to data sheet 07700		
Storage temperature range	°C	–20 to +80		
Ambient temperature range	°C	–20 to +50		
Sine test according to prEN 60068-2-6:1995		5...2000 Hz / maximum of 10 g / 10 cycles		
Random test according to IEC68-2-36:1973		20…2000 Hz / 10 g_{RMS} / 30 min		
Shock test according to EN 60068-2-27:1993		15 g / 11 ms		

hydraulic (measured with HLP32, ϑ_{oil} = 40 °C ± 5 °C)

Maximum operating pressures				
– Main stage ports A, B, T	bar	315		
– Pilot control valve port X	bar	315		
– Pilot control valve port Y	bar	210		
Rated flow Q_{Vrated} +10% at Δp = 5 bar				
– Design ...V...L (linear)	l/min	290	460	720
Maximum flow	l/min	900	1400	2200
Pilot flow at X and Y with stepped input signal from 0 to 100% (315 bar)	l/min	20	35	55
Maximum zero flow of the main stage at p_p = 300 bar	l/min	4	6	8
Zero flow of the proportional preliminary step dependent on the pressure in line X	l/min	$Q_{Lmin} = 0.0026 \frac{L}{min\ bar} \cdot p_x$ [bar] $Q_{Lmin} = 0.0095 \frac{L}{min\ bar} \cdot p_x$ [bar]		
Pilot oil volume	cm^3	±2.26	±4.24	±8.65
Hydraulic fluid		See page 9		
Hydraulic fluid temperature range	°C	–20 to +80; preferably +40 to +50		
Viscosity range	mm^2/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 [2]		
Hysteresis	%	≤ 0.2		
Range of inversion	%	≤ 0.1		
Response sensitivity	%	≤ 0.1		
Closing time when using – Pilot control valve	ms	≤ 200		
(pilot pressures from 40 to 315 bar) – Sandwich plate shut-off valve	ms	≤ 200		

[1] Not for new applications!

[2] The cleanliness classes stated for the components need to be maintained in hydraulic systems. Effective filtration prevents faults and at the same time increases the life cycle of the components.
For the selection of the filters see www.boschrexroth.com/filter

Technical data: Type 3WRC(E) [1] (For applications outside these values, please consult us!)

electric

Sizes	Size	32	40	50
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 EN 60529		IP65 with mating connector mounted and locked		
EMC compatibility		Tested according to EN61000-6-2:2001 / VDE 0839 part 6-2 and EN61000-6-3:2001 / VDE 0839 part 6-3		

[1] Not for new applications!

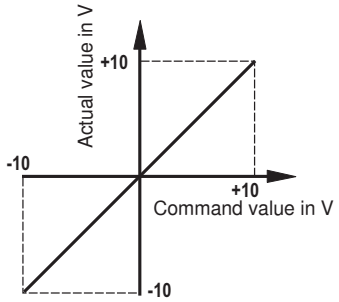
Integrated electronics (OBE) type TV 13037

Nominal command value range for 3WRCE:
0 to ±10 V (mA) ≙ 0 to ±100%

In case of a slow command value modification from 0 V to +10 V, the actual value follows the command value within ±0.15 V.

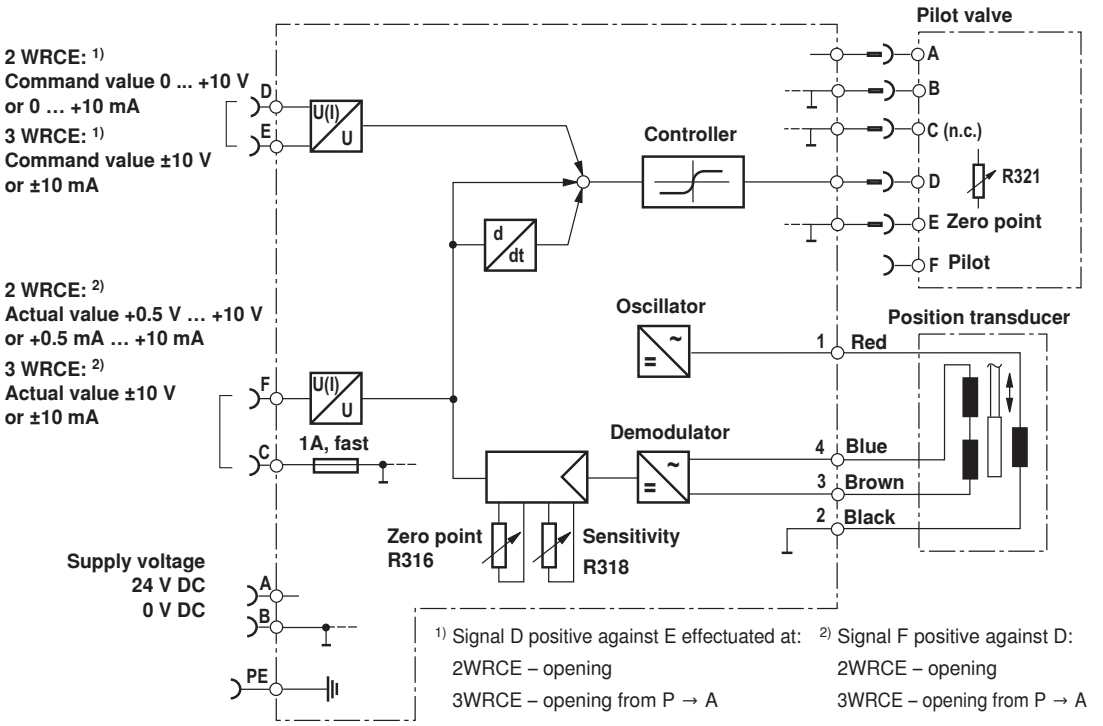
For command values over 10 V, the actual value follows up to approx. ±13 V.

At a command value step to ±10 V, the actual value can reach short-time values of up to approx. ±10.5 V.



Block diagram

Interface	Integrated electronics (OBE)	Valve



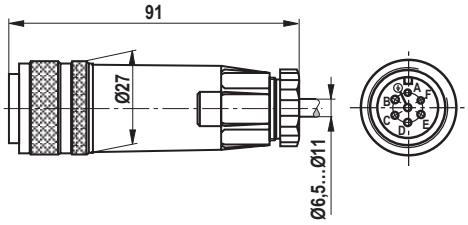
[1] Signal D positive against E effectuated at:
2WRCE – opening
3WRCE – opening from P → A

[2] Signal F positive against D:
2WRCE – opening
3WRCE – opening from P → A

Electrical connection, mating connectors

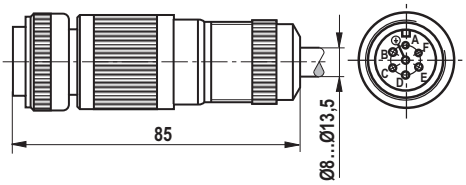
Mating connector

Mating connector according to DIN EN 175201-804
separate order under the material no. **R900021267**
(plastic version)



Mating connector

Mating connector according to DIN EN 175201-804
separate order under the material no. **R9000223890**
(metal version)



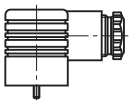
Connector pin assignment	Pin	Assignment of electronics interface A1		Assignment of electronics interface C1	
		2WRCE	3WRCE	2 WRCE	3WRCE
Supply voltage	A	24 VDC nominal (18 ... 30 V; $I_{average}$ = 1 A, I_{peak} = 3 A)			
	B	0 VDC			
Measurement zero	C	Reference to pin F			
Differential command value input	D	0 to +10 V	0 to ±10 V	0 to +10 mA	0 to ±10 mA
	E	Input resistance > 100 kΩ	Input resistance > 100 kΩ	Load 100 Ω	Load 100 Ω
Actual value reference is contact C [1]	F	+0.5 to +10 V Max. 10 mA	0 to ±10 V Max. 10 mA	+0.5 to +10 mA Max. load 1 kΩ	0 to ±10 mA Max. load 1 kΩ
Protective earth	PE	Connected to valve housing Do not connect if the valve has already been grounded via the system			

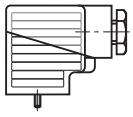
[1] Command and actual value have the same polarity. In case of failure of the fuse "1A fast", the actual value may temporarily also be measured between F and B.

Notice: Do not use electrical signals provided via control electronics (e.g. actual value) for switching safety-relevant machine functions (see also EN ISO 13849 "Safety of machinery – safety-related parts of control systems").

Mating connectors for shut-off valve according to DIN EN 175301-803 for connector "K4"

For more mating connectors, refer to RE 08006

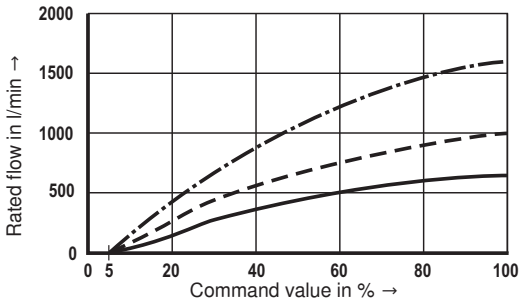




Valve side	Color	Material no. without circuitry	with indicator light 12 … 240 V	with rectifier 12 … 240 V	with indicator light and Zener diode suppression circuit 24 V
a	Gray	**R901017010**	–	–	–
a/b	Black	–	**R901017022**	**R901017025**	**R901017026**

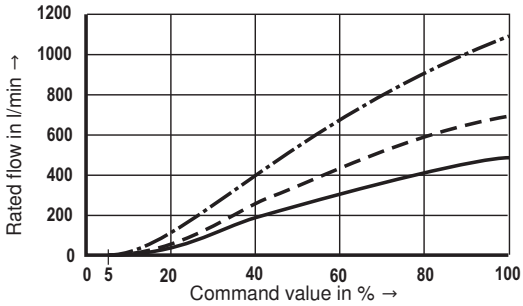
Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

Rated flow at 5 bar valve pressure differential A → B = B → A



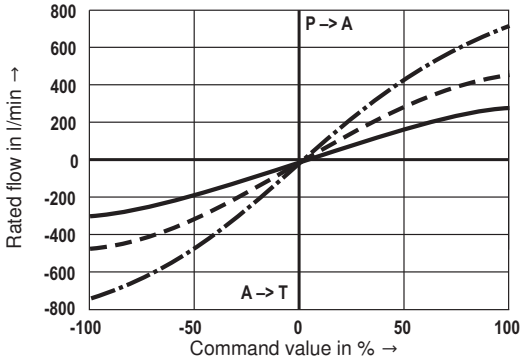
2WRCE 50 S1600L
2WRCE 40 S1000L
2WRCE 32 S650L

Rated flow at 5 bar valve pressure differential A → B = B → A



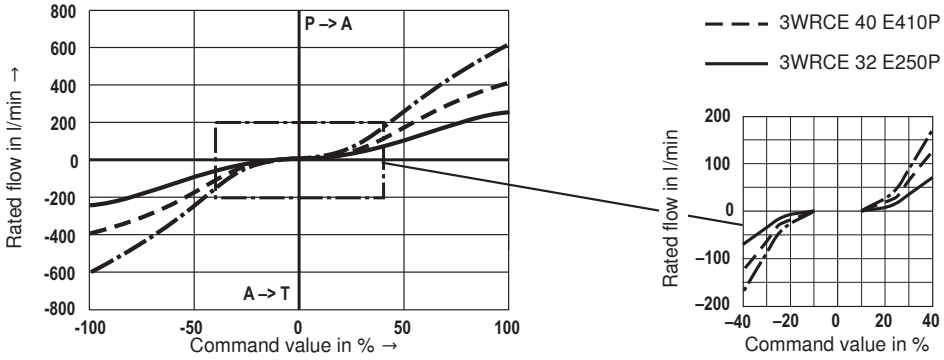
2WRCE 50 S1100R
2WRCE 40 S700R
2WRCE 32 S480R

Rated flow at 5 bar valve pressure differential



3WRCE 50 V720L
3WRCE 40 V460L
3WRCE 32 V290L
(overlap +0.5...+1.5%)

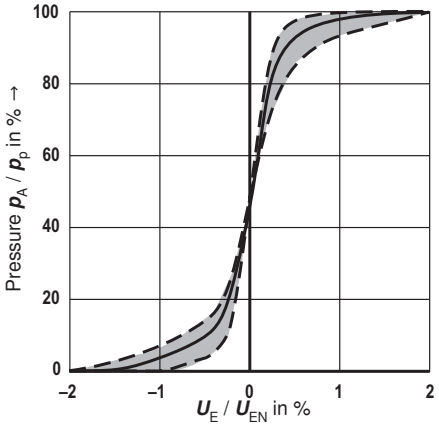
Rated flow at 5 bar valve pressure differential with 10% overlap



3WRCE 50 E620P
3WRCE 40 E410P
3WRCE 32 E250P

Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

Pressure signal function at 3WRCE...V... limit and average value characteristic curves

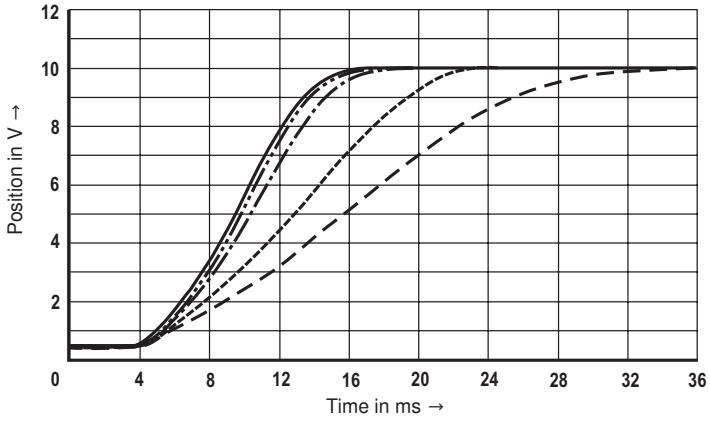


Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

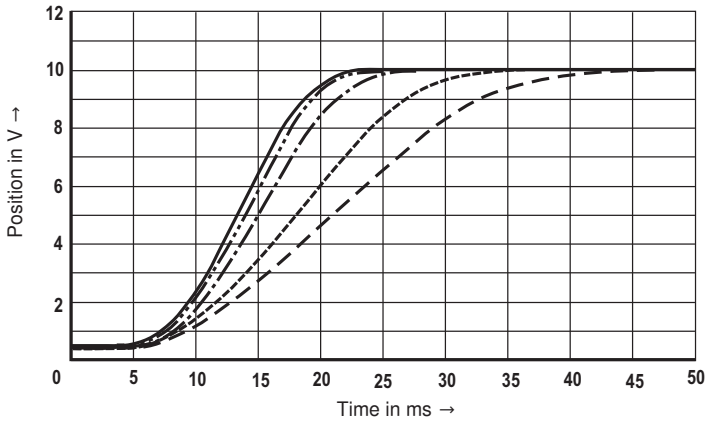
Transition function

— — — 40 bar, ------ 70 bar, —·— 140 bar, —··— 210 bar, ——— 315 bar

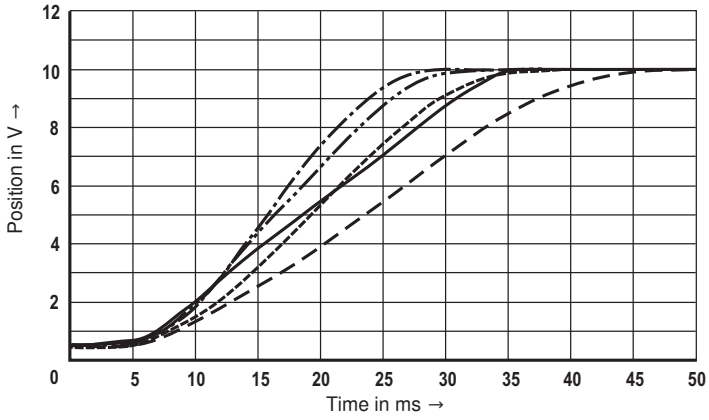
2WRCE 32...



2WRCE 40...



2WRCE 50...

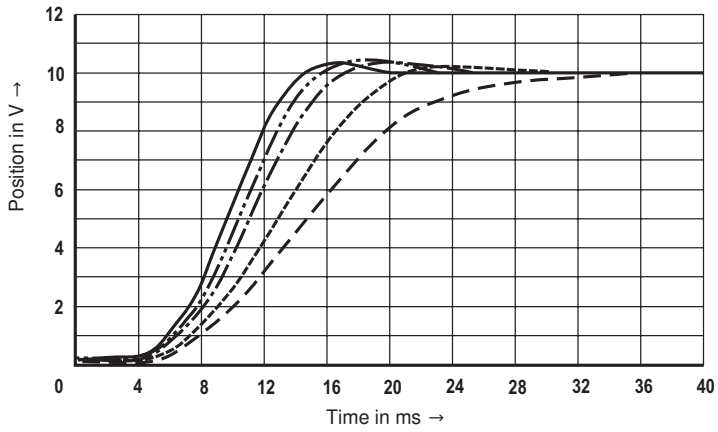


Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

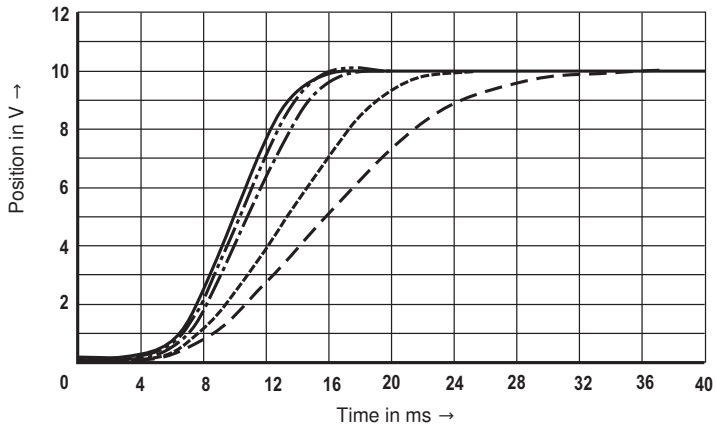
Transition function

— — — 40 bar, ------ 70 bar, —·— 140 bar, —··— 210 bar, ——— 315 bar

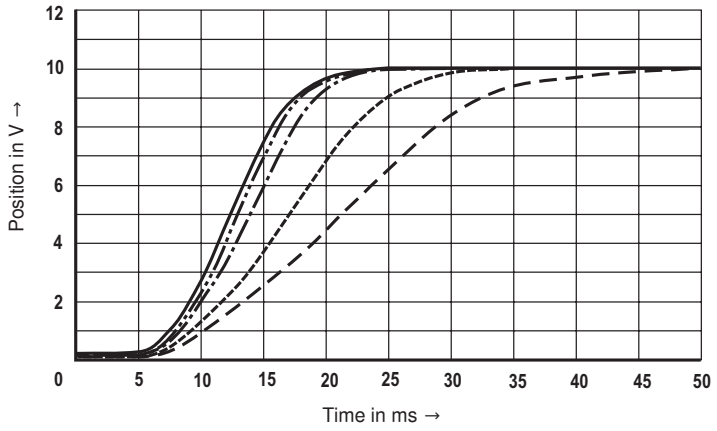
3WRCE 32...



3WRCE 40...



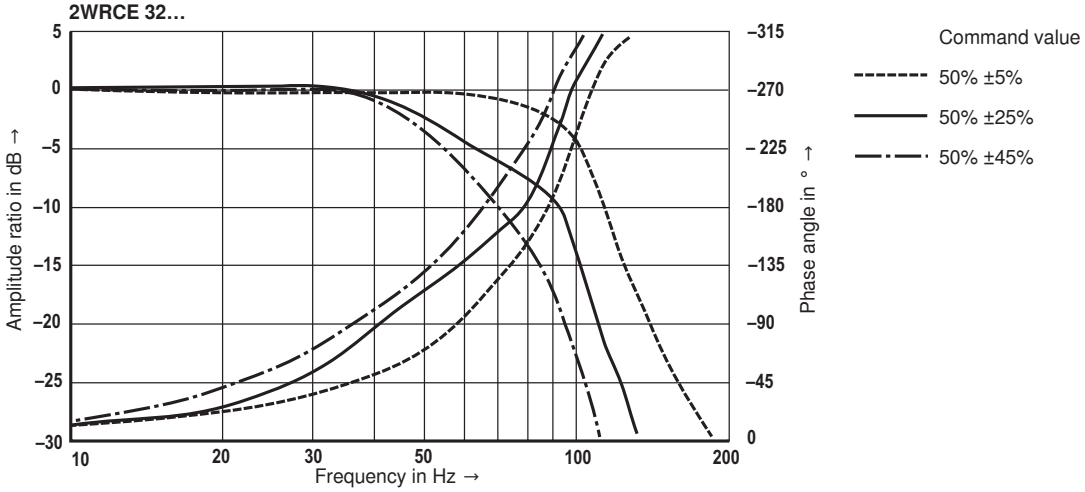
3WRCE 50...



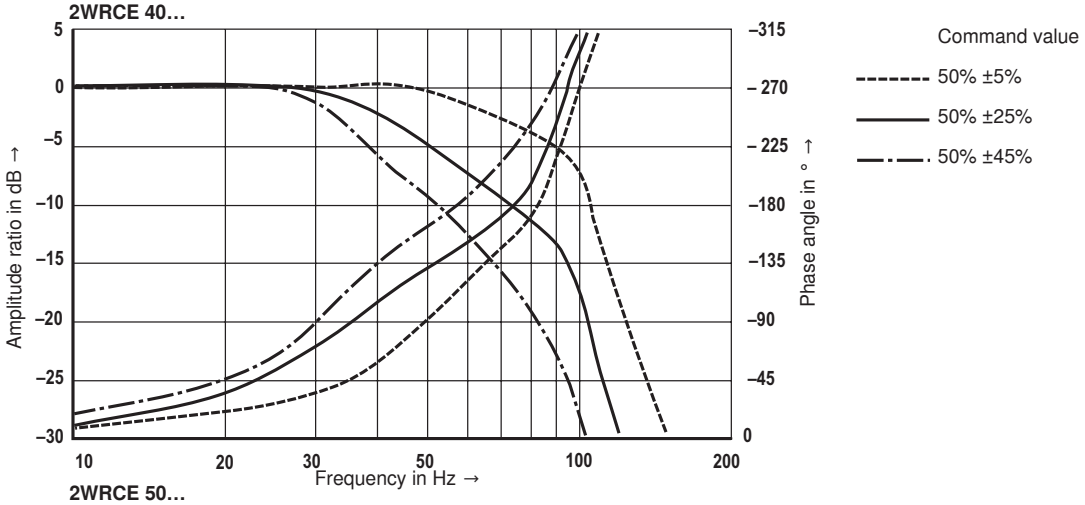
Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

Frequency response at p_{st} = 315 bar

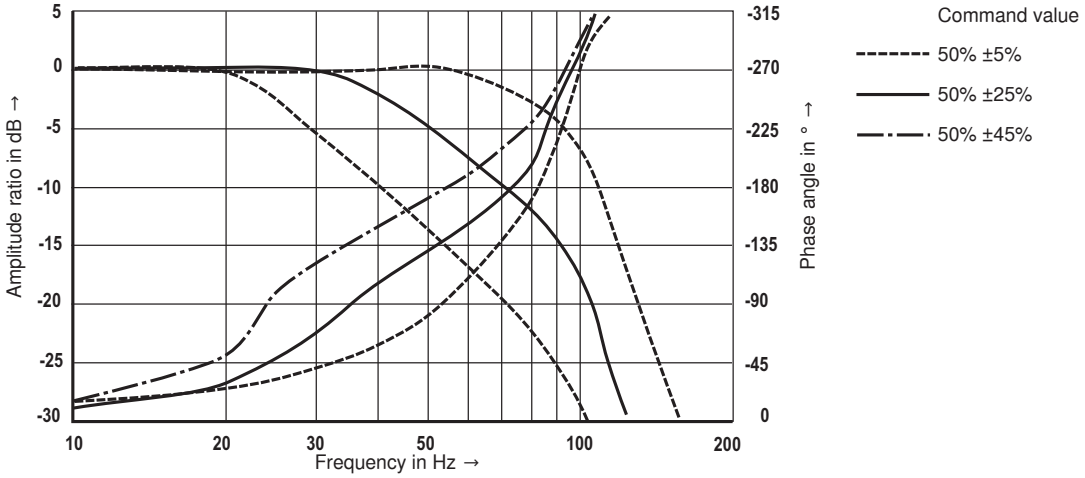
2WRCE 32...



2WRCE 40...



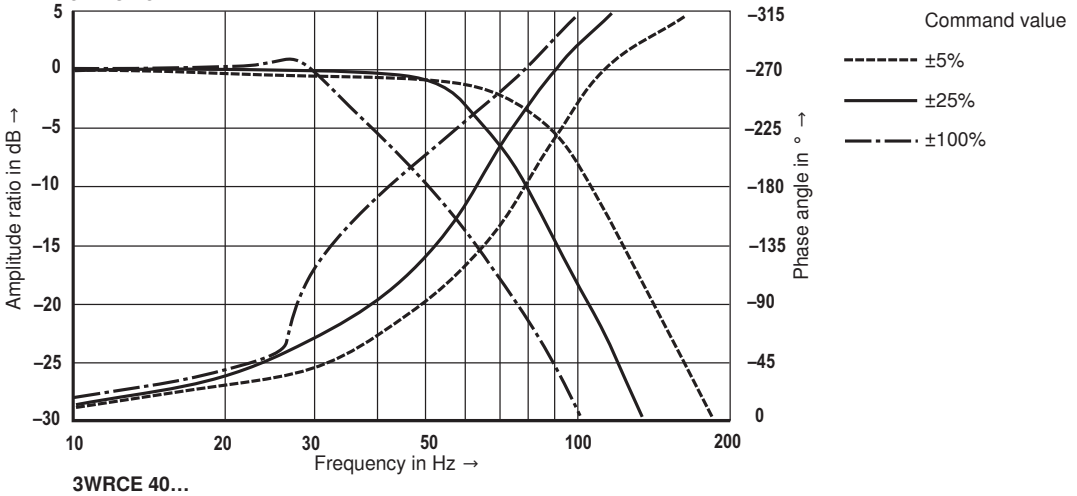
2WRCE 50...



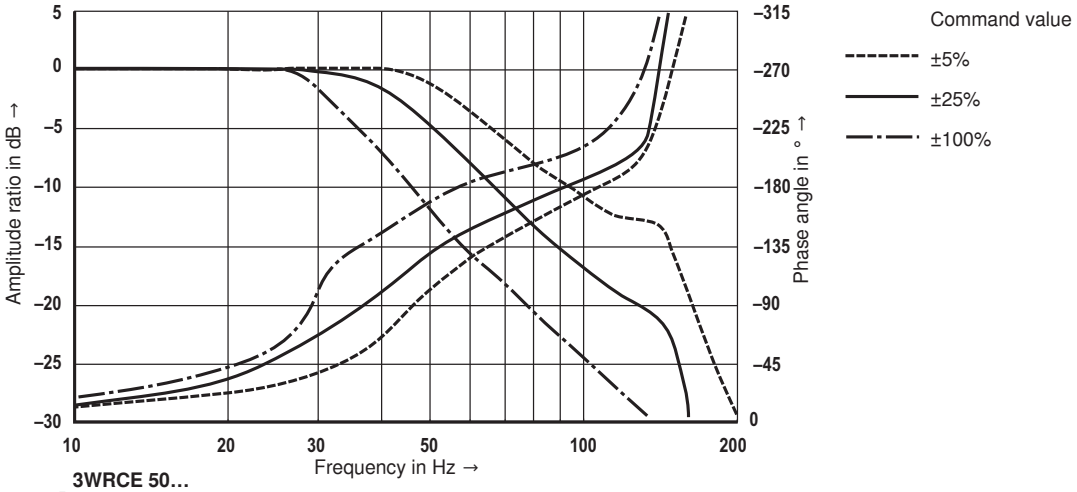
Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

Frequency response at p_{st} = 315 bar

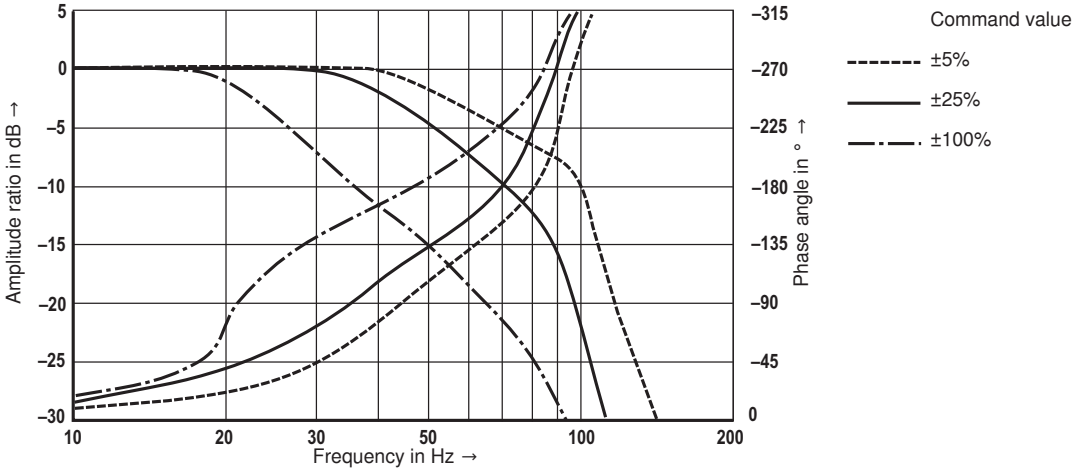
3WRCE 32...



3WRCE 40...



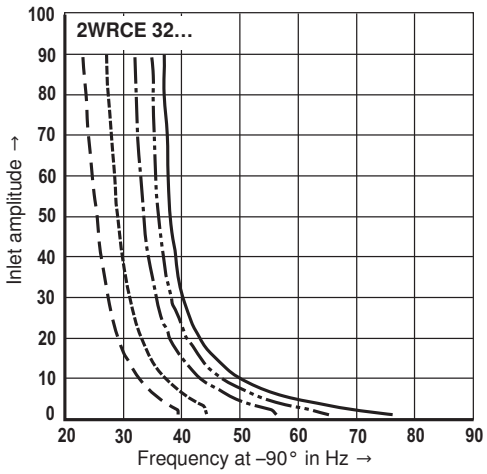
3WRCE 50...

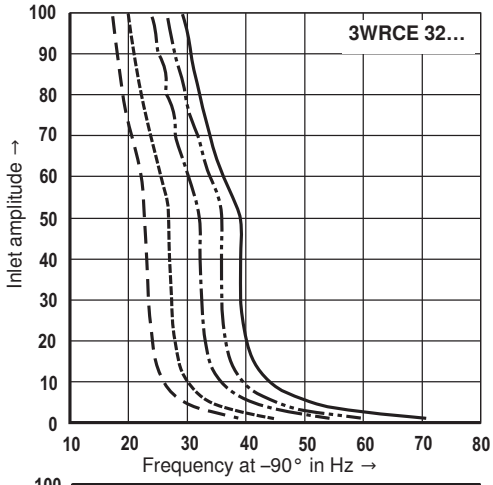


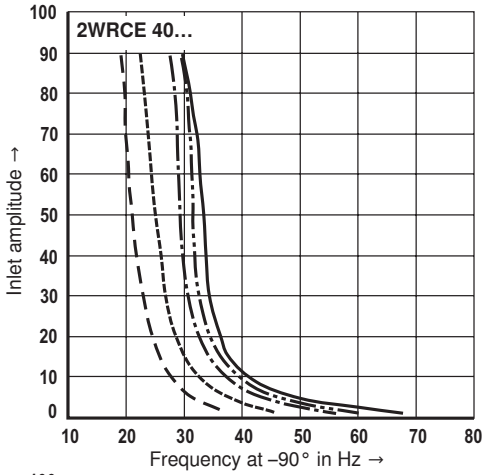
Characteristic curves (measured with HLP32, ϑ_{oil} = 40 °C ±5 °C)

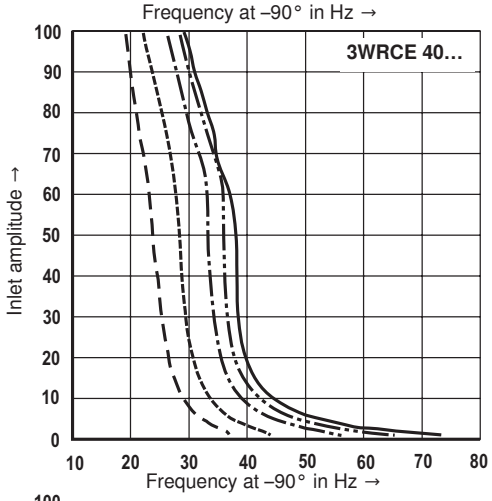
Dependency of the frequency f at –90° on the operating pressure p and the inlet amplitude

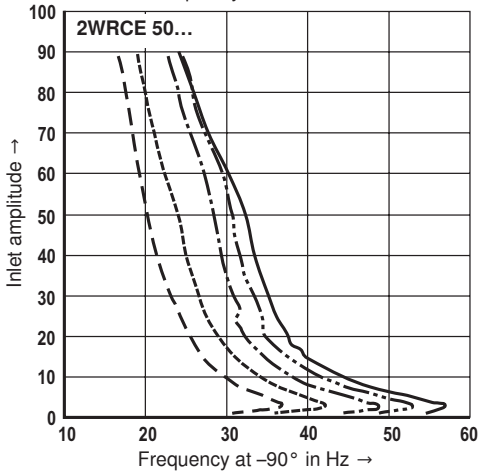
— — — p_{st} = 40 bar
- - - - p_{st} = 70 bar
—·— p_{st} = 140 bar
—··— p_{st} = 210 bar
——— p_{st} = 315 bar

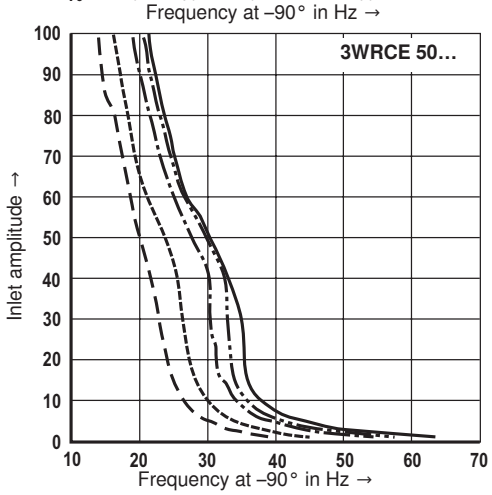






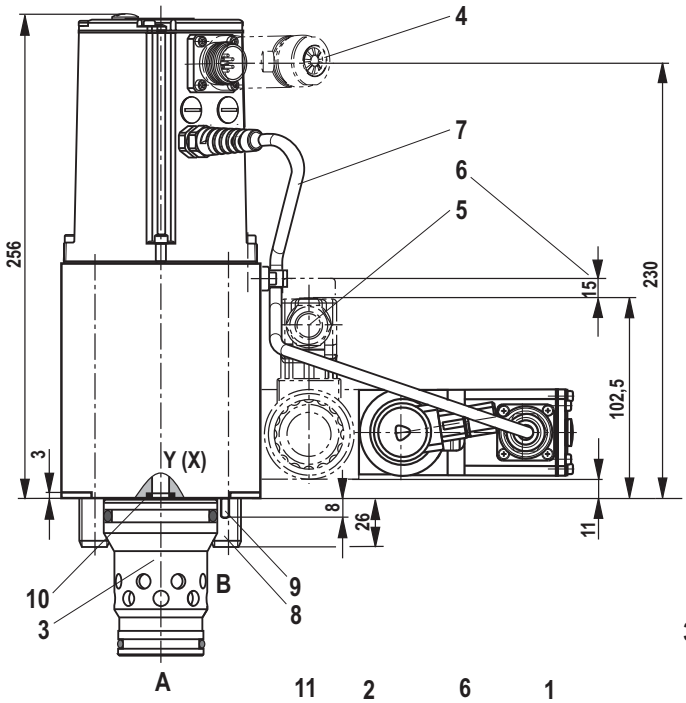


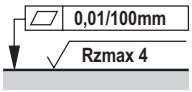




Dimensions: Types 2WRCE and 3WRCE [1], size 32 (dimensions in mm)

2WRCE 32

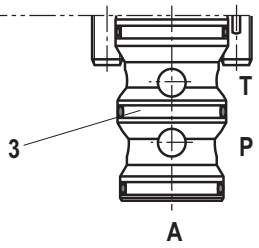


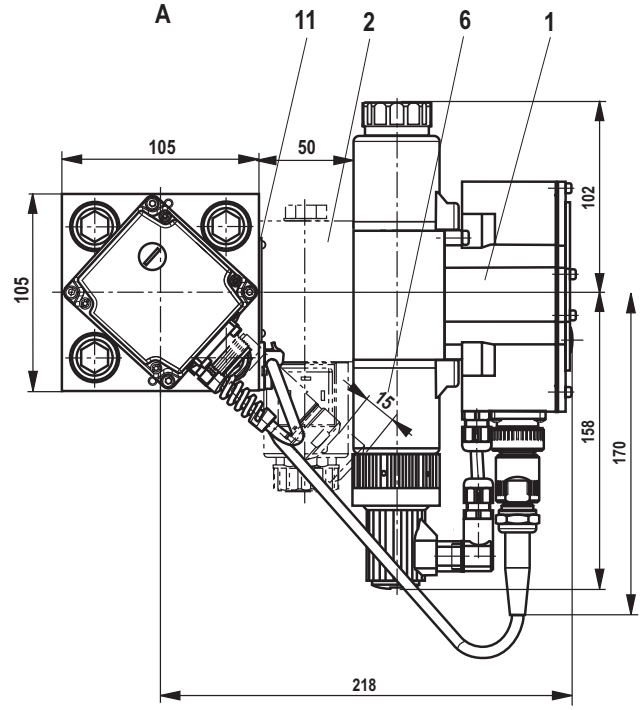


Required surface quality of the valve contact surface

3WRCE 32... [1]

(missing dimensions as 2WRCE 32...)



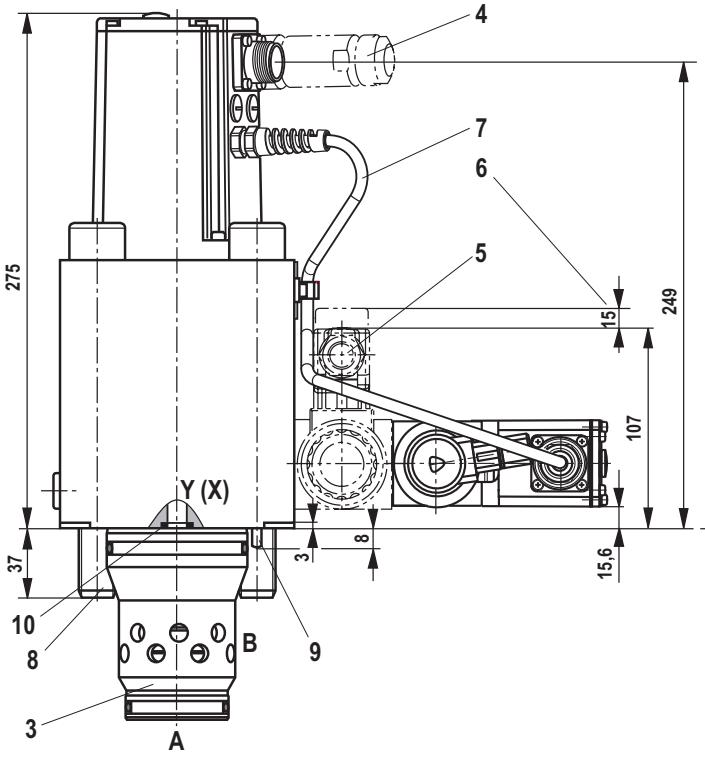


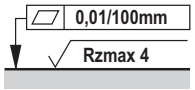
1 Pilot control valve (proportional valve size 6)
2 Sandwich plate shut-off valve (only with versions "WK15" and "WL15")
3 Bushing
4 Mating connector according to DIN EN 175201-804 (separate order, see page 12)
5 Mating connector according to DIN EN 175301-803 (separate order, see page 12)
6 Space required for removing the mating connector
7 Cabling
8 Valve mounting screws, see page 24
9 Locking pin for fixing
10 Identical seal rings for ports X and Y
11 Name plate

[1] Not for new applications!

Dimensions: Types 2WRCE and 3WRCE [1], size 40 (dimensions in mm)

2WRCE 40

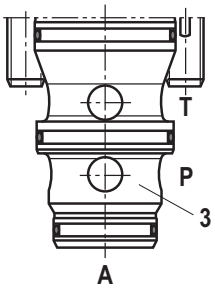


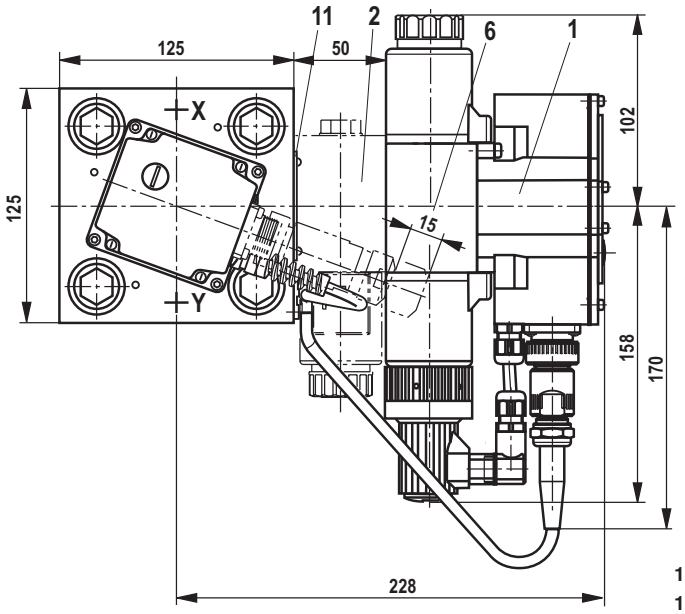


Required surface quality of the valve contact surface

3WRCE 40... [1]

(missing dimensions as 2WRCE 40...)



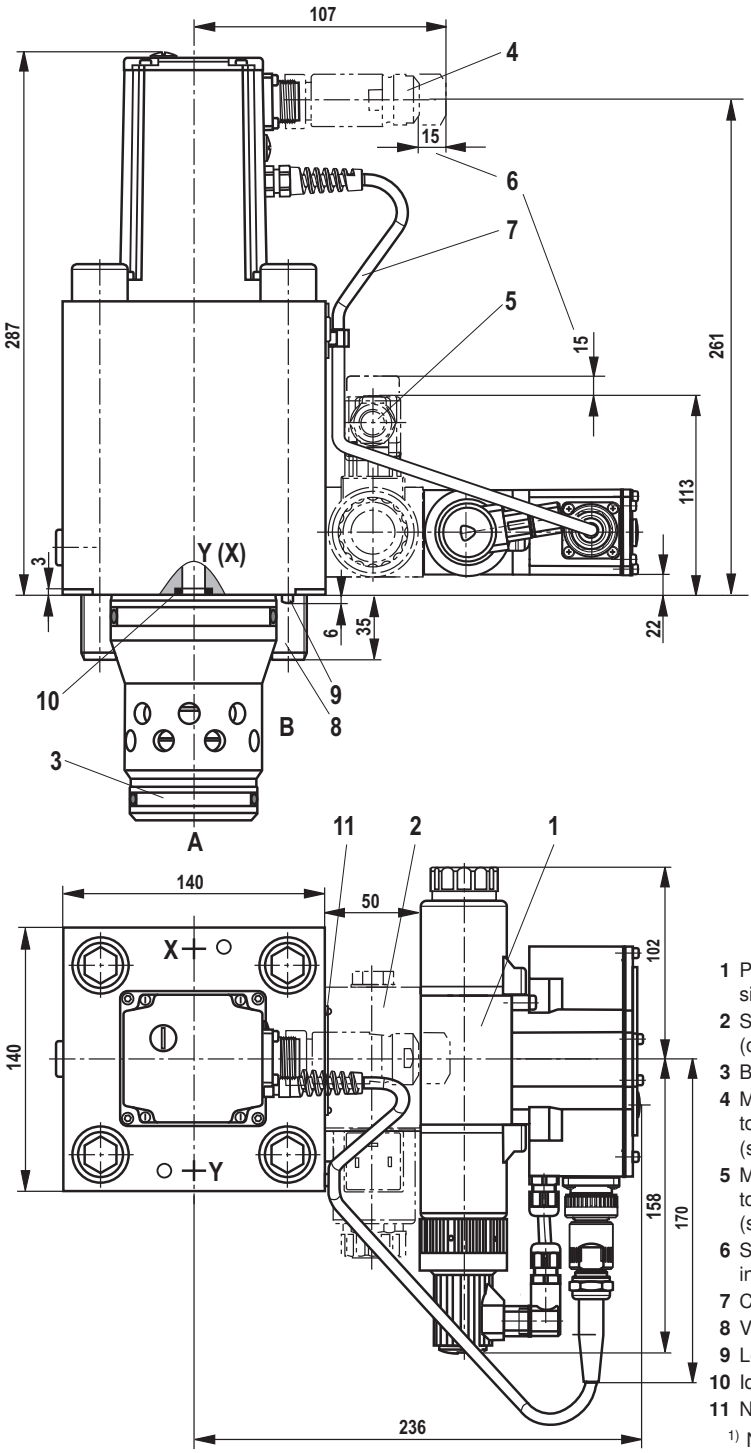


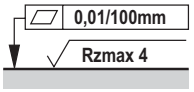
1 Pilot control valve (proportional valve size 6)
2 Sandwich plate shut-off valve (only with versions "WK15" and "WL15")
3 Bushing
4 Mating connector according to DIN EN 175201-804 (separate order, see page 12)
5 Mating connector according to DIN EN 175301-803 (separate order, see page 12)
6 Space required for removing the mating connector
7 Cabling
8 Valve mounting screws, see page 24
9 Locking pin for fixing
10 Identical seal rings for ports X and Y
11 Name plate

[1] Not for new applications!

Dimensions: Types 2WRCE and 3WRCE [1], size 50 (dimensions in mm)

2WRCE 50

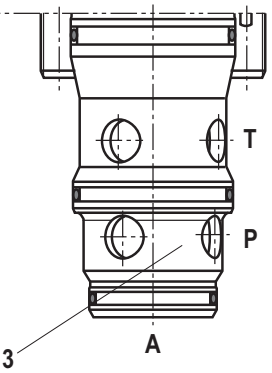




Required surface quality of the valve contact surface

3WRCE 50... [1]

(missing dimensions as 2WRCE 50...)

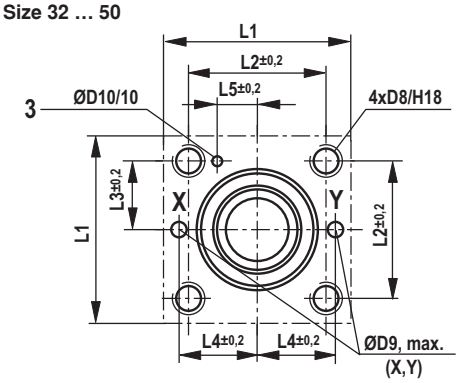


1 Pilot control valve (proportional valve size 6)
2 Sandwich plate shut-off valve (only with versions WK15 and WL15)
3 Bushing
4 Mating connector according to DIN EN 175201-804 (separate order, see page 12)
5 Mating connector according to DIN EN 175301-803 (separate order, see page 12)
6 Space required for removing the mating connector
7 Cabling
8 Valve mounting screws, see page 24
9 Locking pin for fixing
10 Identical seal rings for ports X and Y
11 Name plate

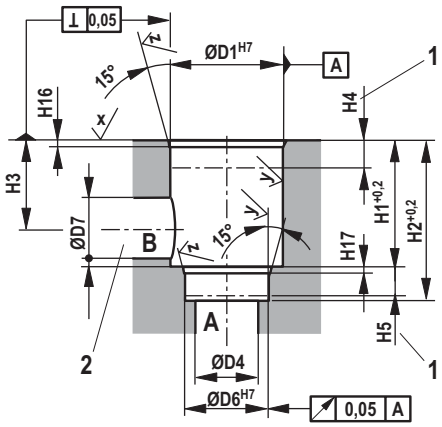
[1] Not for new applications!

Installation dimensions according to DIN ISO 7368 (dimensions in mm)

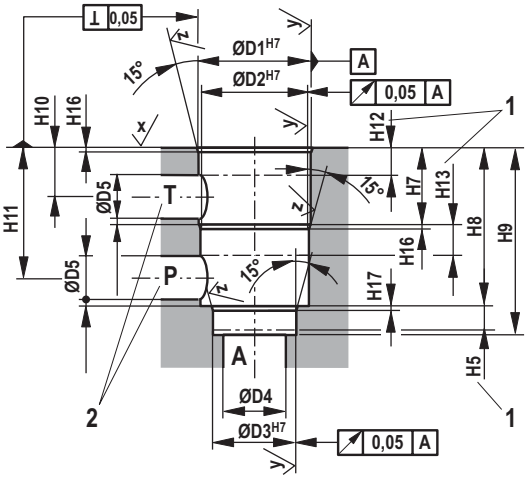
Size 32 ... 50



Installation bore type 2WRCE according to DIN ISO 7368



Installation bore type 3WRCE



Size	32	40	50
ØD1H7	60	75	90
ØD2H7	58	73	87
ØD3H7	55	55	68
ØD4	32	40	50
ØD5	24	30	35
ØD6H7	45	55	68
ØD7	32	40	50
D8	M16	M20	M20
max. ØD9	8	10	10
ØD10	6	6	8
H1	70	87	100
H2	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
L1	105	125	140
L2	70	85	100
L3	35	42.5	50
L4	41	50	58
L5	17	23	30

X = $\sqrt{}$ Rmax 4
Y = $\sqrt{}$ Rmax 8
Z = $\sqrt{}$ Rz 10

Tolerances according to: – General tolerances ISO 2768-mK

1 Depth of fit, minimum dimension
2 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.
3 Locating hole for locking pin

Accessories (not included in the scope of delivery)

Hexagon socket head cap screws	
Size 32	4x ISO 4762 - M16 x 100 - 10.9 Tightening torque M_A = 280 Nm ±10%
Size 40	4x ISO 4762 - M20 x 180 - 10.9 Tightening torque M_A = 560 Nm ±10%
Size 50	4x ISO 4762 - M20 x 190 - 10.9 Tightening torque M_A = 560 Nm ±10%

Notice: The tightening torque of the hexagon socket head cap screws refers to maximum operating pressure!

Project planning / maintenance instructions / additional information

- General operating instructions: Hydraulic valves for industrial applications, see data sheet 07600-B
- Assembly, commissioning and maintenance of hydraulic systems, see data sheet 07900
- Installation, commissioning and maintenance of servo valves and high-response valves, see data sheet 07700
- Assembly, commissioning and maintenance of proportional valves, see data sheet 07800