

Directional high-response cartridge valve, pilot-operated

Type WRC...S



- ▶ Size 63 ... 160
- ▶ Component series 1X
- ▶ Maximum operating pressure 420 bar
- ▶ Maximum flow 50,000 l/min

Features

- ▶ 2- or 3-way directional cartridge valve
- ▶ Pilot control valve: 2-stage directional servo valve
- ▶ Position sensing of the control spool by means of an inductive position transducer
- ▶ Normalized:
 - Installation dimensions according to ISO 7368 ("2WRCE")
- ▶ Control spool in seat or spool design
- ▶ External control electronics or integrated electronics (OBE), optional
- ▶ Typical applications:
 - Forging manipulators
 - Press cylinders
 - Die casting machines

Contents

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Ordering code: "2WRC"

01	02	03	04	05	06	07	08	09	10	
2	WRC				-	1X	/	S	/	*

01	2 main ports	2
02	Directional high-response cartridge valve, pilot-operated	WRC
03	For external control electronics	no code
	Integrated electronics (OBE)	E
04	Size 63	63
	Size 80	80
	Size 100	100
	Size 125	125
	Size 160	160

Control spool, flow characteristic

05	Standard cone seat (linear)	K001
	Double cone (linear fine control range)	D001
	Control window (progressive fine control range)	S001
06	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

Pilot control valve

07	Directional servo valve	S
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Supply voltage

08	External control electronics	no code
	Integrated electronics (OBE)	
	Direct voltage +24 V	G24
	Direct voltage +15 V	G15

Seal material (observe compatibility of seals with hydraulic fluid used, see page 9)

09	NBR seals	M
	FKM seals	V
10	Further details in the plain text	

Ordering code: "3WRC"

01	02	03	04	05	06	07	08	09	10
3	WRC			-	1X	/	S	/	*

01	3 main ports	3
02	Directional high-response cartridge valve, pilot-operated	WRC
03	For external control electronics	no code
	Integrated electronics (OBE)	E
04	Size 63	63
	Size 80	80
	Size 100	100

Control spool, flow characteristic

05	0 ... 0.5% positive overlap (linear)	L006
	0 ... 0.5% negative overlap (linear fine control range)	V001
	10% positive overlap (linear fine control range)	I001
06	Component series 10 ... 19 (10 ... 19: unchanged installation and connection dimensions)	1X

Pilot control valve

07	Directional servo valve	S
----	-------------------------	----------

Supply voltage

08	External control electronics	no code
	Integrated electronics (OBE)	
	Direct voltage +24 V	G24
	Direct voltage +15 V	G15

Seal material (observe compatibility of seals with hydraulic fluid used, see page 9)

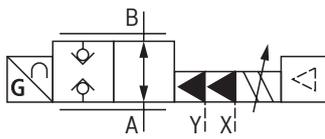
09	NBR seals	M
	FKM seals	V
10	Further details in the plain text	

 **Notice:** Version "3WRC" is not recommended for new applications, see page 6.

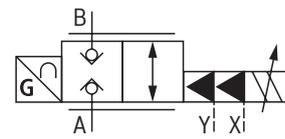
Symbols: "2WRC"

Simplified

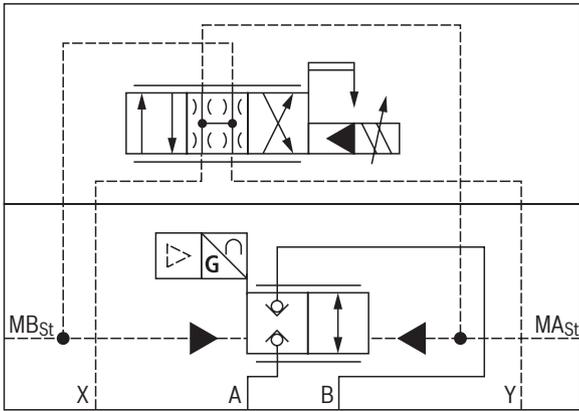
Integrated electronics (OBE)



External control electronics



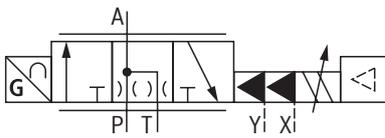
Detailed



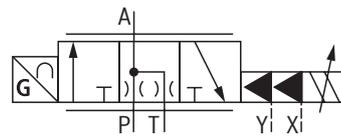
Symbols: "3WRC"

Simplified

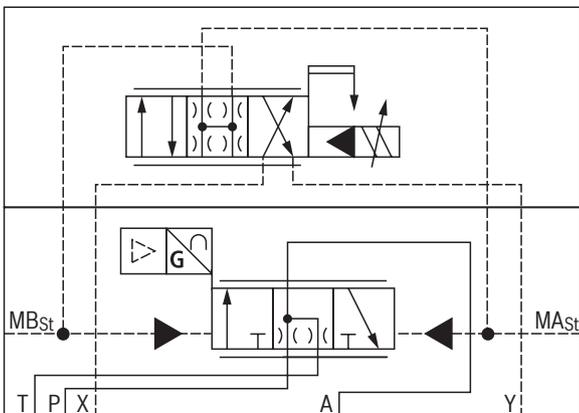
Integrated electronics (OBE)



External control electronics



Detailed



Notice: Representation according to DIN ISO 1219-1.

Function, section: "2WRC(E)"

Valves of type 2WRC(E) are pilot-operated, 3-stage directional high-response cartridge valves. They control the quantity and direction of a flow and are mainly used in control loops.

Set-up

The valves consist of the following assemblies:

- ▶ 2-stage pilot control valve (1)
 - with dry torque motor
 - low-friction nozzle flapper plate amplifier
 - mechanical feedback of the control spool position
- ▶ Main control spool (2) for flow control
- ▶ An inductive position transducer (3) the core (4) of which is attached to the main control spool (2) of the third stage
- ▶ External control electronics or integrated electronics (OBE) (5).

Function

In the control electronics, command and actual values are compared and the torque motor of the pilot control valve is actuated with a proportional current according to the control deviation.

The pilot control valve (1) takes a proportionally controlled position and controls the flows in and out of the control chambers A (6) and B (7), which actuate the main control spool (2) through the closed valve control loop up to 0 control deviation.

This means that the stroke of the main control spool (2) is regulated proportionally to the command value. It must be noted that the flow also depends on the valve pressure drop.

Valve features

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

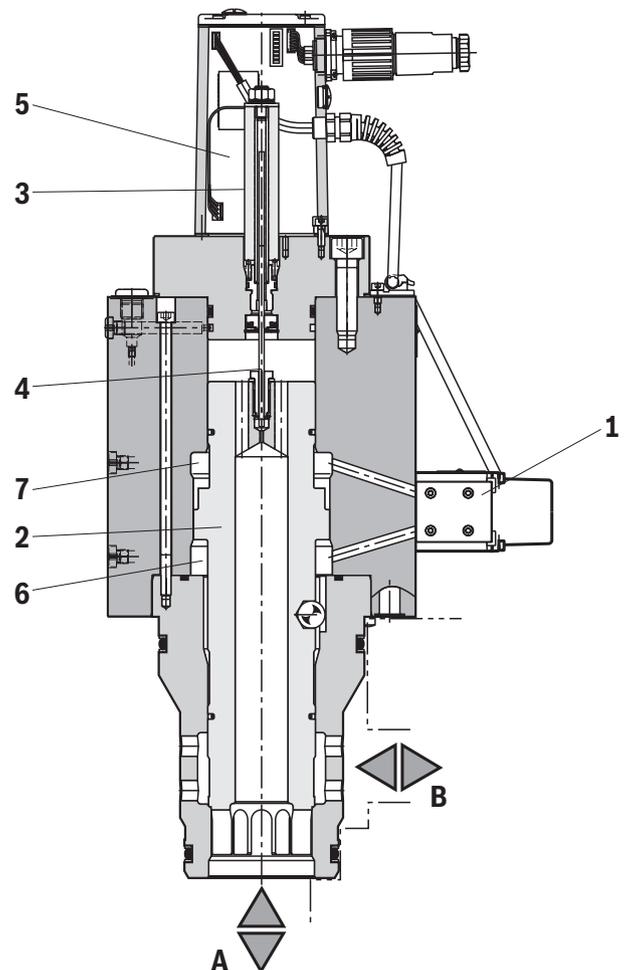
The control spool (seat design) closes or opens at 2% of the command value. At lower command values, the valve control loop attempts to guide the control spool, thus presses it onto the seat at full pilot pressure and blocks the connection in a leakage-free way.

The specified switching times 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 2% (= 0.2 V) is set at the factory. When the pilot control valve (1) or the control electronics is exchanged, the opening point can be readjusted by shifting the position transducer coil (3) by means of the nut (SW13).

Notes:

- ▶ Power failure at the pilot control valve leads to an undefined position of the main control spool (2).
- ▶ Preferably, port B should be connected to the actuator.



Function, section: "3WRC(E)"

Valves of type 3WRC(E) are pilot-operated, 3-stage directional high-response cartridge valves. They control the quantity and direction of a flow and are mainly used in control loops.

Set-up

The valves consist of the following assemblies:

- ▶ 2-stage pilot control valve (1)
 - with dry torque motor
 - low-friction nozzle flapper plate amplifier
 - mechanical feedback of the control spool position
- ▶ Main control spool (2) for flow control
- ▶ An inductive position transducer (3) the core (4) of which is attached to the main control spool (2) of the third stage
- ▶ External control electronics or integrated electronics (OBE) (5).

Function

In the control electronics, command and actual values are compared and the torque motor of the pilot control valve is actuated with a proportional current according to the control deviation.

The pilot control valve (1) takes a proportionally controlled position and controls the flows in and out of the control chambers A (6) and B (7), which actuate the main control spool (2) through the closed valve control loop up to 0 control deviation.

This means that the stroke of the main control spool (2) is regulated proportionally to the command value. It must be noted that the flow also depends on the valve pressure drop.

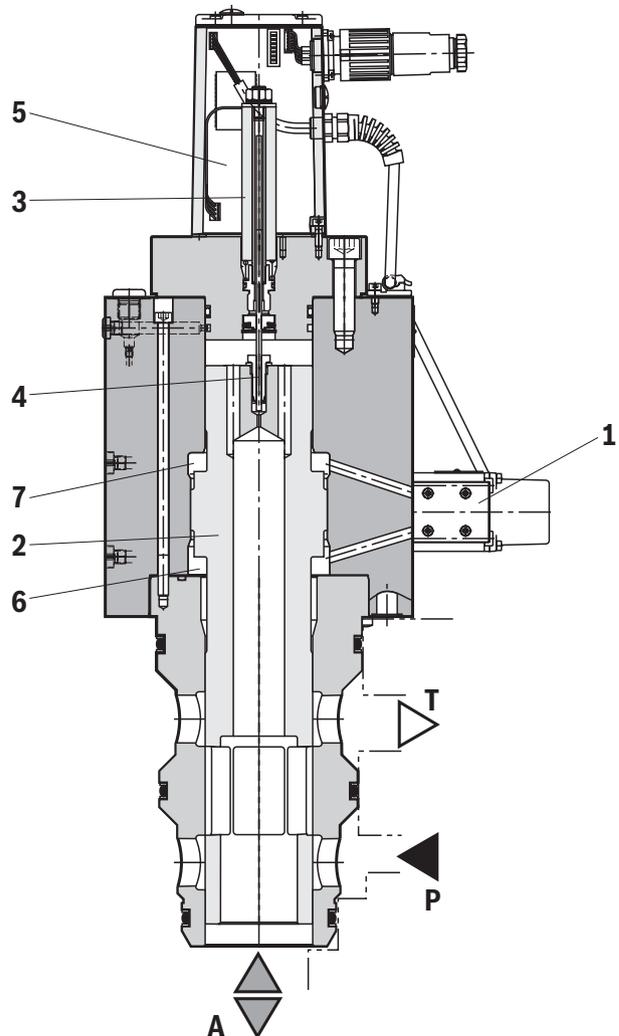
Valve features

The opening point of 0% (versions "L006" and "V001") is set at the factory. When the pilot control valve (1) or the control electronics is exchanged, the opening point can be readjusted by shifting the position transducer coil (3) by means of the nut (SW13).

No settings must be made at the control electronics (= controller or control electronics) and the pilot control valve (1) during exchange, except for the zero adjustment. At the pilot control valve, only the filter element may be exchanged.

Notes:

- ▶ Version "3WRCE" is not recommended for new applications.
If version "3WRCE" is used, ports A and P have to be exchanged. Upon request.
- ▶ Power failure at the pilot control valve leads to an undefined position of the main control spool (2).



Technical data: "2WRC(E)"

(For applications outside these parameters, please consult us!)

General						
Sizes	NG	63	80	100	125	160
Installation position; commissioning	Any, preferably horizontal					
Storage temperature range	°C	-20 ... +80				
Ambient temperature range	▶ Version "WRC"	°C	-20 ... +70			
	▶ Version "WRCE"	°C	-20 ... +60			
Weight	kg	56	114	198	357	635
Size of the pilot control valve	NG	6	10	10	16	16

Hydraulic							
Maximum operating pressure	▶ Main stage	bar	420				
	- Ports A, B						
	▶ Pilot control valve	bar	315				
- Port X							
	- Port Y	bar	Pressure peaks < 100, static < 10				
Minimum pilot pressure (in % of the system pressure)	▶ Version "K001"	%	15				
	▶ Version "D001"; "S001"	%	45				
Nominal flow ($q_{Vnom} -10\%$; $\Delta p = 5\text{ bar}$)	▶ Version "K001"	l/min	2600	4100	6300	10100	17000
	▶ Version "D001"	l/min	2300	3600	5800	9200	15000
	▶ Version "S001"	l/min	1800	3000	5200	7800	13300
Maximum flow	▶ Version "K001"; "D001"	l/min	5500	9000	14000	22000	35000
	▶ Version "S001"	l/min	8000	13000	20000	30000	50000
Pilot flow ¹⁾	l/min	42	135	165	320	430	
Zero flow (pre-stage)	See characteristic curves page 12						
Pilot oil volume	cm ³	36.3	67,9	132,5	313.4	565.5	
Switching time	▶ 200 bar	ms					
	- Stroke 50 %						
	- Stroke 100 %	ms	37	32	45	50	70
	▶ 315 bar	ms					
	- Stroke 50 %						
- Stroke 100 %	ms	70	50	75	90	120	
			30	25	35	40	60
			60	40	60	70	100
Hydraulic fluid	see table page 9						
Hydraulic fluid temperature range	▶ Recommended	°C	+40 ... +50				
	▶ Maximum admissible		-20 ... +80				
Viscosity range	▶ Recommended	mm ² /s	30 ... 45				
	▶ Maximum admissible		20 ... 380				
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)	▶ Pilot control valve	Class 18/16/13 ²⁾					
	▶ Main stage	Class 20/18/15 ²⁾					
Hysteresis	%	≤ 0.5					
Range of inversion	%	≤ 0.2					
Response sensitivity	%	≤ 0.2					

¹⁾ Input signal stepped (from 0 to 100%, pilot pressure 315 bar)

²⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

For the selection of filters, see www.boschrexroth.com/filter.

Technical data: "3WRC(E)"

(For applications outside these parameters, please consult us!)

General				
Sizes	NG	63	80	100
Installation position; commissioning	Any, preferably horizontal			
Storage temperature range	°C	-20 ... +80		
Ambient temperature range	▶ Version "WRC"	°C	-20 ... +70	
	▶ Version "WRCE"	°C	-20 ... +60	
Weight	kg	57	116	200
Size of the pilot control valve	NG	6	10	10

Hydraulic					
Maximum operating pressure	▶ Main stage - Ports P, A, T	bar	315		
	▶ Pilot control valve - Port X	bar	315		
	- Port Y	bar	Pressure peaks < 100, static < 10		
Nominal flow (q_{Vnom} -10 %; Δp = 5 bar)	▶ Version "L006"	l/min	1200	1850	2800
	▶ Version "V001"	l/min	1250	1900	2700
	▶ Version "E001"	l/min	1180	1820	2750
Maximum flow		l/min	3500	5600	8500
Pilot flow ¹⁾		l/min	42	130	170
Zero flow (pre-stage)	See characteristic curves page 12				
Pilot oil volume		cm ³	±18.1	±33.9	±66.2
Switching time	▶ 200 bar				
	- Stroke 50 %	ms	20	18	25
	- Stroke 100 %	ms	37	32	40
	▶ 315 bar				
	- Stroke 50 %	ms	17	13	20
	- Stroke 100 %	ms	30	25	35
Hydraulic fluid	see table page 9				
Hydraulic fluid temperature range	▶ Recommended	°C	+40 ... +50		
	▶ Maximum admissible		-20 ... +80		
Viscosity range	▶ Recommended	mm ² /s	30 ... 45		
	▶ Maximum admissible		20 ... 380		
Maximum admissible degree of contamination of the hydraulic fluid, cleanliness class according to ISO 4406 (c)	▶ Pilot control valve		Class 18/16/13 ²⁾		
	▶ Main stage		Class 20/18/15 ²⁾		
Hysteresis		%	≤ 0.5		
Range of inversion		%	≤ 0.2		
Response sensitivity		%	≤ 0.2		

¹⁾ Input signal stepped (from 0 to 100%, pilot pressure 315 bar)

²⁾ The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Available filters can be found at www.boschrexroth.com/filter.

Technical data

(For applications outside these parameters, please consult us!)

Hydraulic fluid	Classification	Suitable sealing materials	Standards	Data sheet
Mineral oils	HL, HLP, HLPD, HVLP, HVLPD	NBR, FKM	DIN 51524	90220
Bio-degradable	▶ Insoluble in water	HETG	ISO 15380	90221
		HEES		
	▶ Soluble in water	HEPG	ISO 15380	
Flame-resistant	▶ Water-free	HFDU (glycol base)	ISO 12922	90222
		HFDU (ester base)		
		HFDR		
	▶ Containing water	HFC (Fuchs: Hydrotherm 46M, Renosafe 500; Petrofer: Ultra Safe 620; Houghton: Safe 620; Union: Carbide HP5046)	ISO 12922	90223



Important information on hydraulic fluids:

- ▶ For further information and data on the use of other hydraulic fluids, please refer to the data sheets above or contact us.
- ▶ There may be limitations regarding the technical valve data (temperature, pressure range, life cycle, maintenance intervals, etc.).
- ▶ The ignition temperature of the hydraulic fluid used must be 50 K higher than the maximum surface temperature.
- ▶ **Bio-degradable and flame-resistant – containing water:**
If components with galvanic zinc coating (e.g. version "J3" or "J5") or parts containing zinc are used, small amounts of dissolved zinc may get into the hydraulic system and cause accelerated aging of the hydraulic fluid. Zinc soap may form as a chemical reaction product, which may clog filters, nozzles and solenoid valves – particularly in connection with local heat input.

▶ Flame-resistant – containing water:

- Due to the increased cavitation tendency with HFC hydraulic fluids, the life cycle of the component may be reduced by up to 30% as compared to the use with mineral oil HLP. In order to reduce the cavitation effect, it is recommended – if possible specific to the installation – backing up the return flow pressure in ports T to approx. 20% of the pressure differential at the component.
- Dependent on the hydraulic fluid used, the maximum environment and hydraulic fluid temperature must not exceed 50 °C. In order to reduce the heat input into the component, the command value profile is to be adjusted for proportional and high-response valves.

Electric	
Voltage type	Direct voltage
Type of signal	Analog
Zero compensation	% ≤ 1
Zero shift upon change of:	▶ Hydraulic fluid temperature %/10 K ≤ 0.3
	▶ Pilot pressure in X %/100 bar ≤ 0.7
	▶ Return flow pressure in Y %/bar ≤ 0.3 (0 ... 10 % of the pilot pressure)
Protection class of the valve according to EN 60529	IP65 (If suitable and correctly mounted mating connectors are used)

Electrical connections and assignment

Connector pin assignment

Pin	Signal	Interface assignment			
		"G24" "2WRCE"	"3WRCE"	"G15" "2WRCE"	"3WRCE"
A	Supply voltage	+24 VDC		+15 VDC	
B		0 V DC		-15 VDC	
C		Enable (+24 V) ¹⁾		Reference to pins A, B	
D	Differential command value input	0 TO +10 V; $R_e \geq 100 \text{ k}\Omega$	0 ... $\pm 10 \text{ V}$; $R_e \geq 100 \text{ k}\Omega$	0 TO +10 V; $R_e \geq 100 \text{ k}\Omega$	0 ... $\pm 10 \text{ V}$; $R_e \geq 100 \text{ k}\Omega$
E					
F	Actual value	+0.2 ... +10 V; Reference is pin B	0 ... $\pm 10 \text{ V}$; Reference is pin B	+0.2 ... +10 V; Reference is pin C	0 ... $\pm 10 \text{ V}$; Reference is pin C
PE	Protective ground	Functional ground (directly connected to the valve housing)			

1) Without enable = SO37 (add -37 to type designation)

Supply voltage:	<ul style="list-style-type: none"> ▶ +24 VDC $\pm 6 \text{ V}$; full bridge rectification with smoothing capacitor $2200 \mu\text{F} = I_{\text{max}} = 230 \text{ mA}$ ▶ $\pm 15 \text{ VDC} \pm 0.45 \text{ V}$; stabilized and smoothed; $I_{\text{max}} = 180 \text{ mA}$
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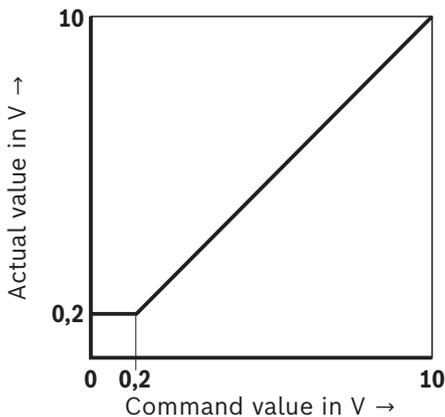
Notes:

- ▶ Do not connect PE if the valve has already been grounded via the system.
- ▶ Command value and actual value have the same polarity
- ▶ Electrical signals provided via control electronics (e. g. actual value) must not be used to switch off safety-relevant machine functions.
- ▶ Mating connectors, separate order, see page 22 and data sheet 08006.

Nominal command value range

Version "2WRCE"

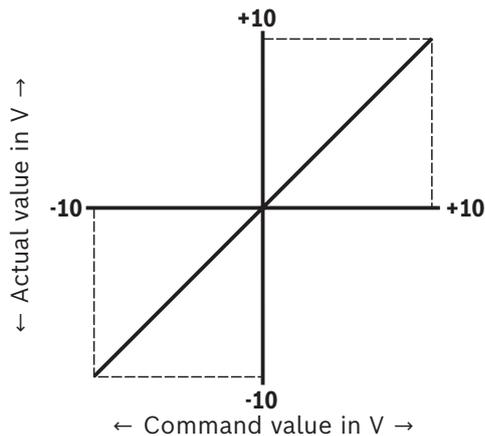
- ▶ 0 ... +10 V (0 ... 100 %)



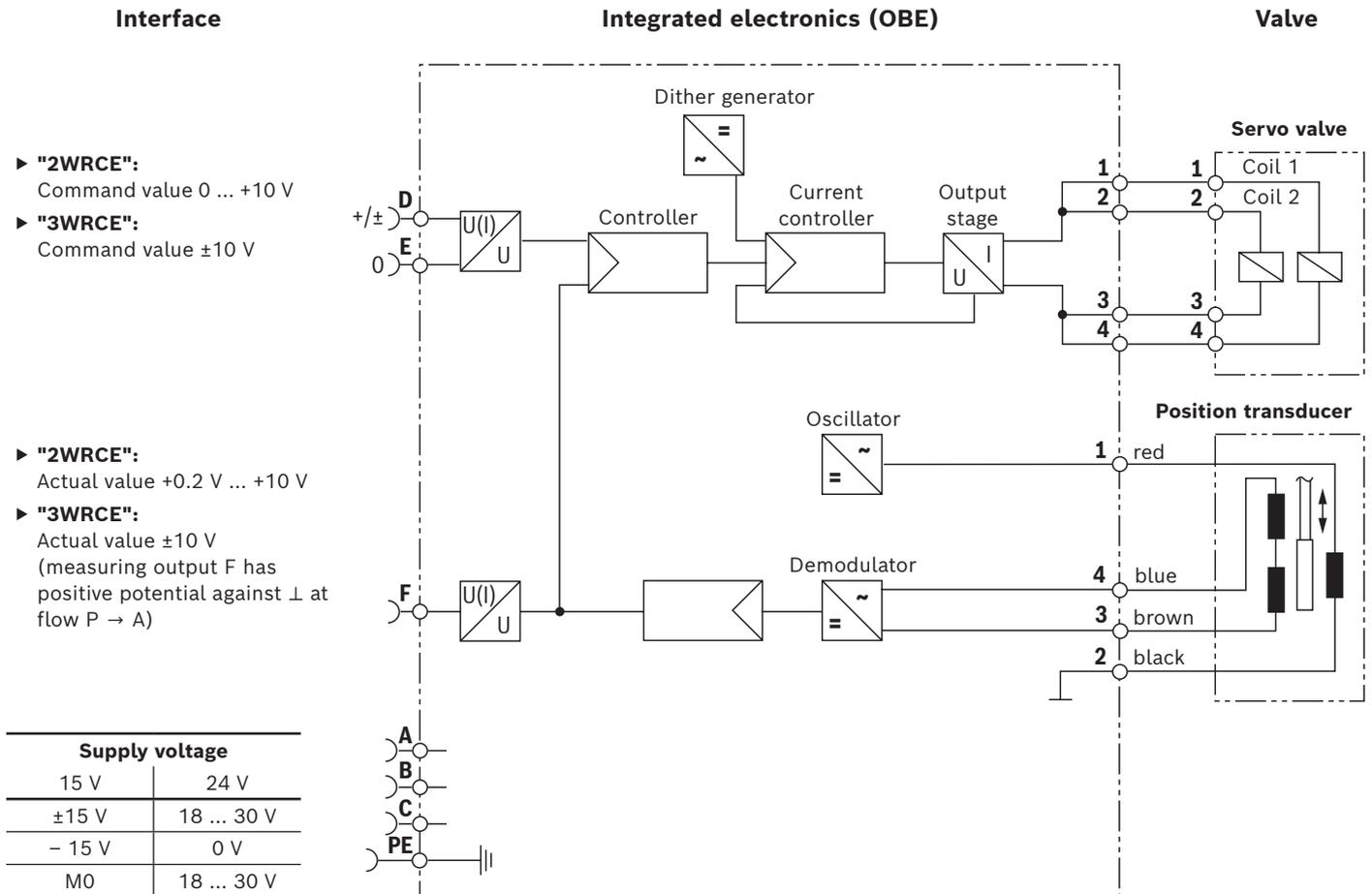
- ▶ In case of a slow command value modification from +0.2 V to +10 V, the actual value follows the command value within $\pm 0.1 \text{ V}$.
- ▶ In the command value range of 0 ... +0.2 V, the actual value remains constant at 0.2 V.
- ▶ At a command value step to +10 V, the actual value can temporarily reach values of up to approx. +10.5 V.

Version "3WRCE"

- ▶ 0 ... $\pm 10 \text{ V}$ (0 ... $\pm 100\%$)



- ▶ In case of a slow command value modification from +0 V ... $\pm 10 \text{ V}$, the actual value follows the command value within $\pm 0.1 \text{ V}$.
- ▶ At a command value step to +10 V, the actual value can temporarily reach values of up to approx. +10.5 V.

Block diagram/controller function block: Integrated electronics (OBE)

Effect of the control:

A positive signal at pin D and a reference potential at pin E results in

- ▶ **"2WRCE":** Flow A → B or B → A
- ▶ **"3WRCE":** Flow P → A

Notice:

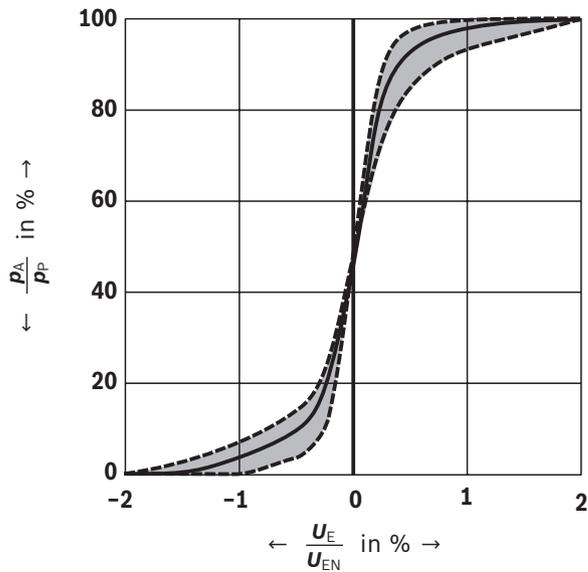
External control electronics, see data sheet 29931.

Characteristic curves

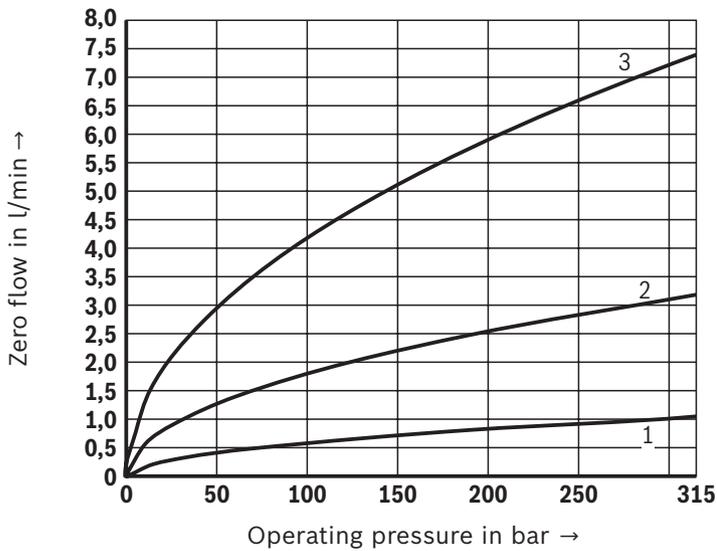
(measured with HLP32, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Pressure-signal function

("3WRC(E)", versioszn "L006" and "V001"; limit and average value characteristic curves)



Zero flow at the pilot control valve



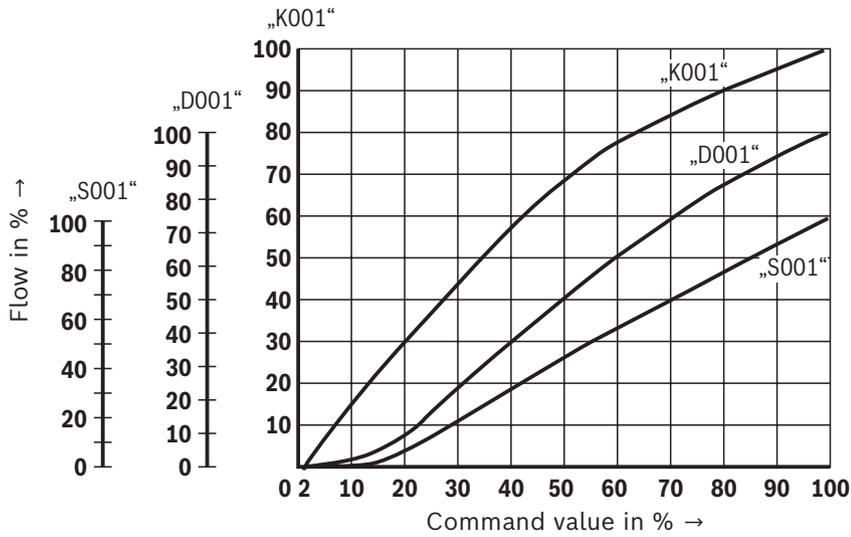
- 1 Size 63
- 2 Size 80 and 100
- 3 Size 125 and 160 ("2WRC(E)")

Characteristic curves

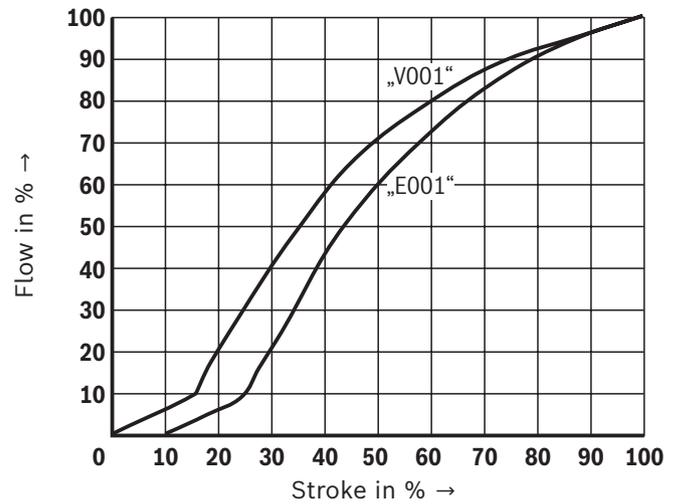
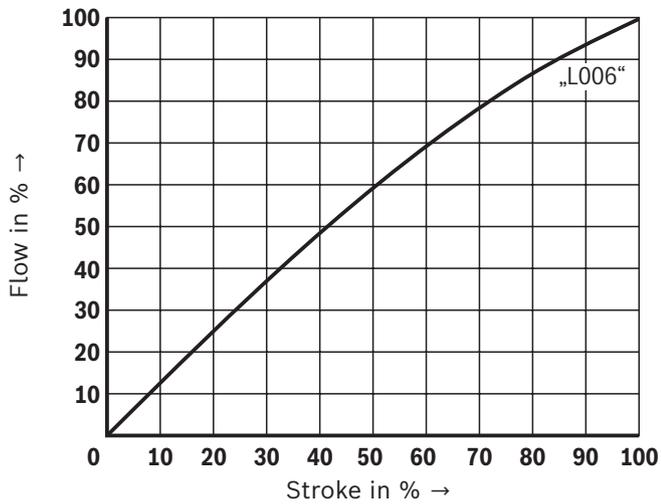
(measured with HLP32, $\vartheta_{oil} = 40 \pm 5 \text{ }^\circ\text{C}$)

Nominal flow

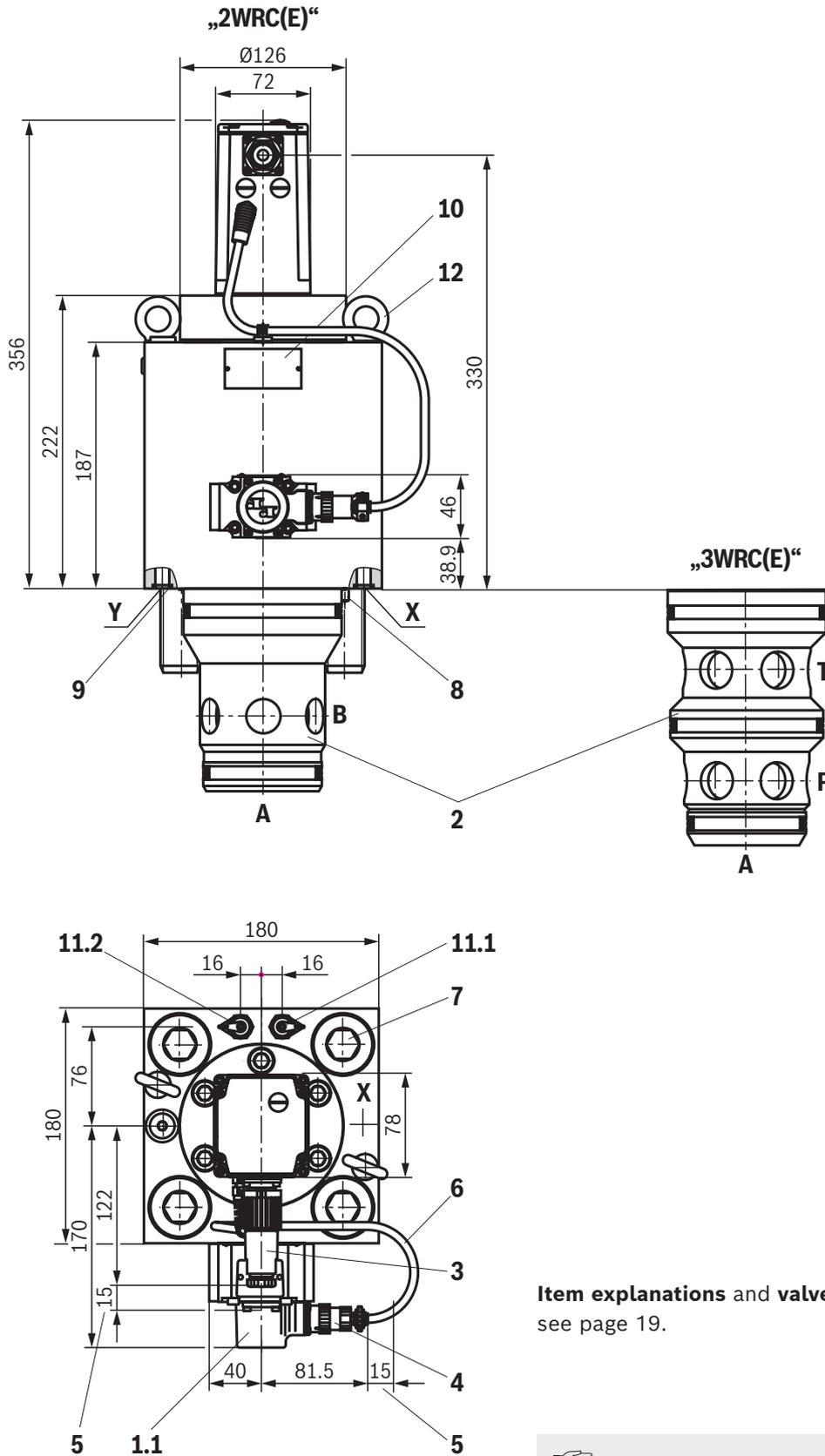
"2WRC(E)" ($\Delta p = 5 \text{ bar}$)



"3WRCE" ($\Delta p = 5 \text{ bar}$)



Dimensions: Size 63
(dimensions in mm)



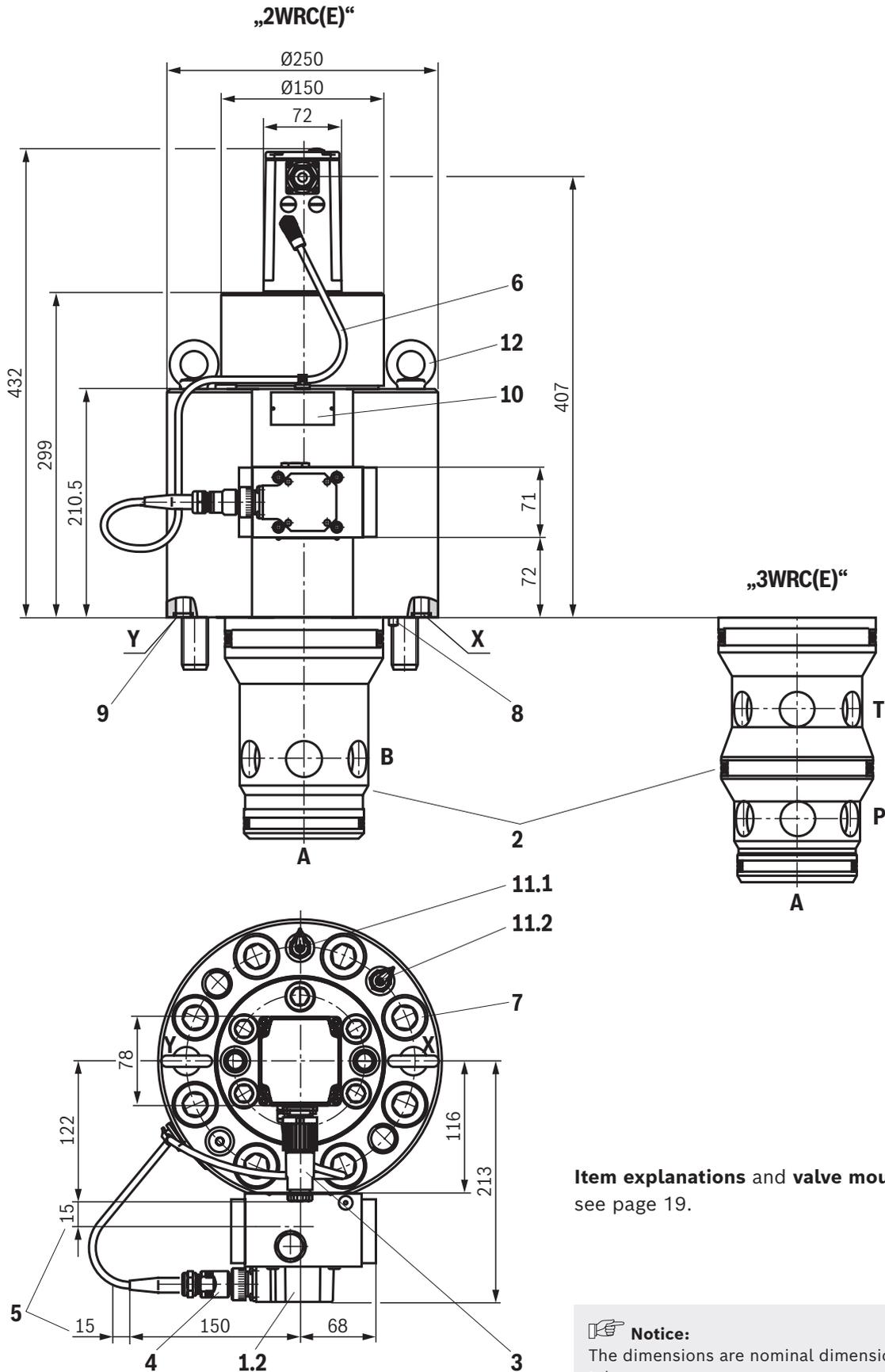
Item explanations and valve mounting screws
see page 19.



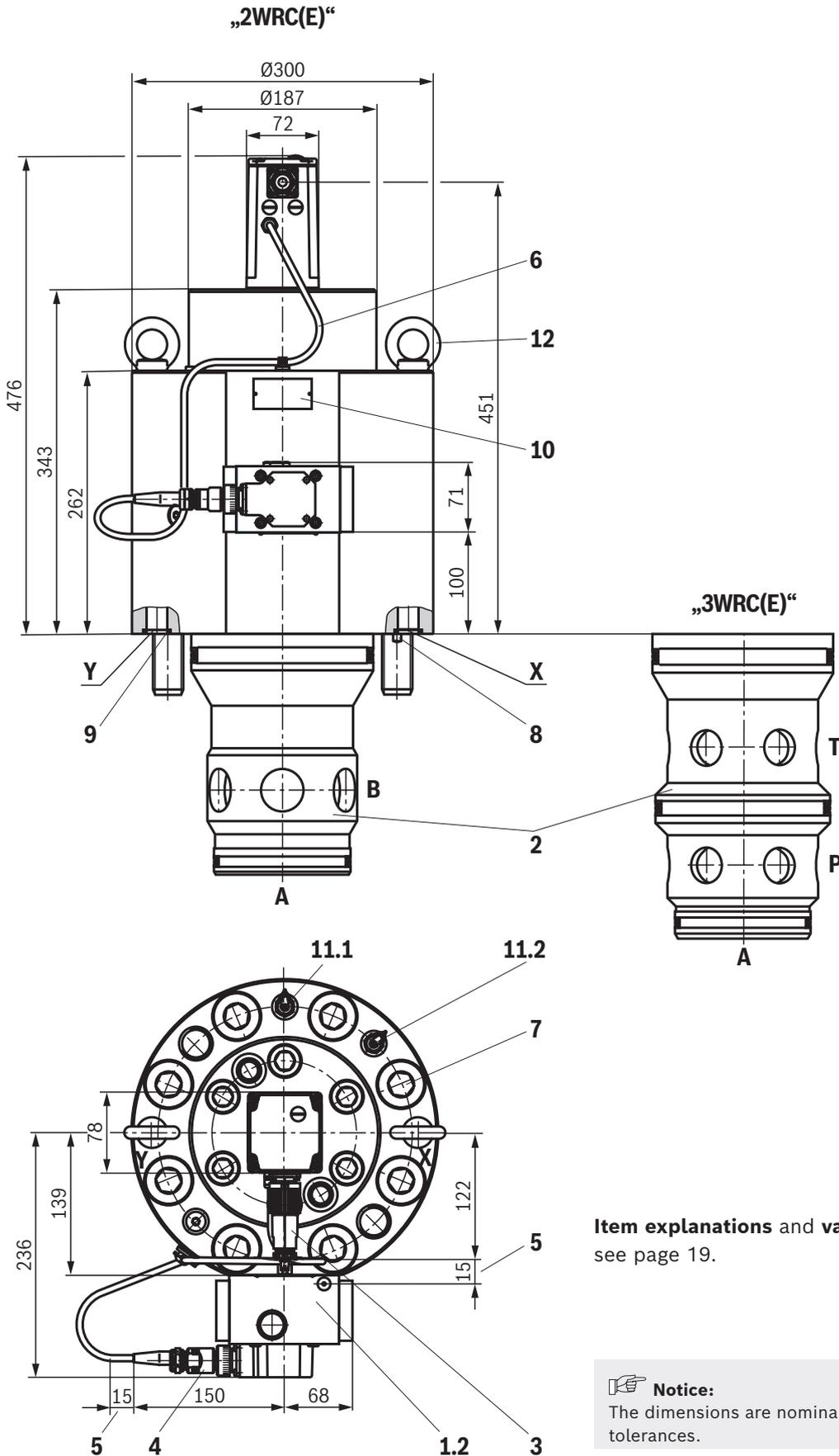
Notice:

The dimensions are nominal dimensions which are subject to tolerances.

Dimensions: Size 80
(dimensions in mm)



Dimensions: Size 100
(dimensions in mm)



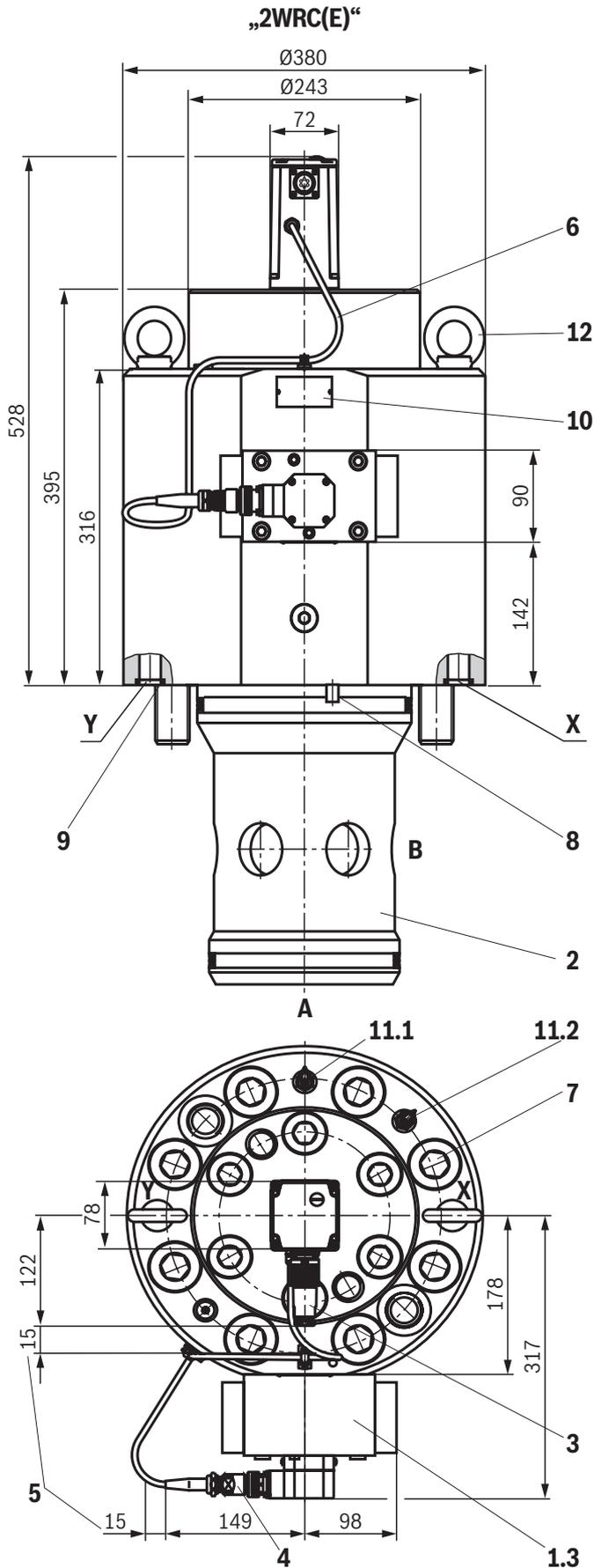
Item explanations and valve mounting screws
see page 19.



Notice:

The dimensions are nominal dimensions which are subject to tolerances.

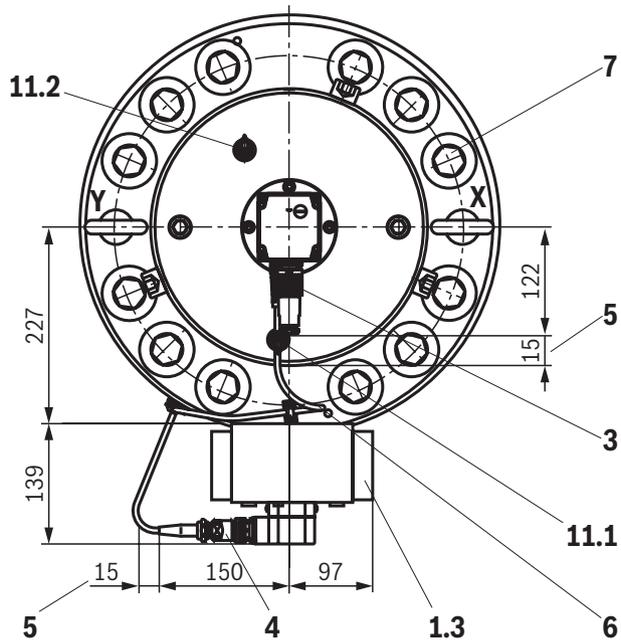
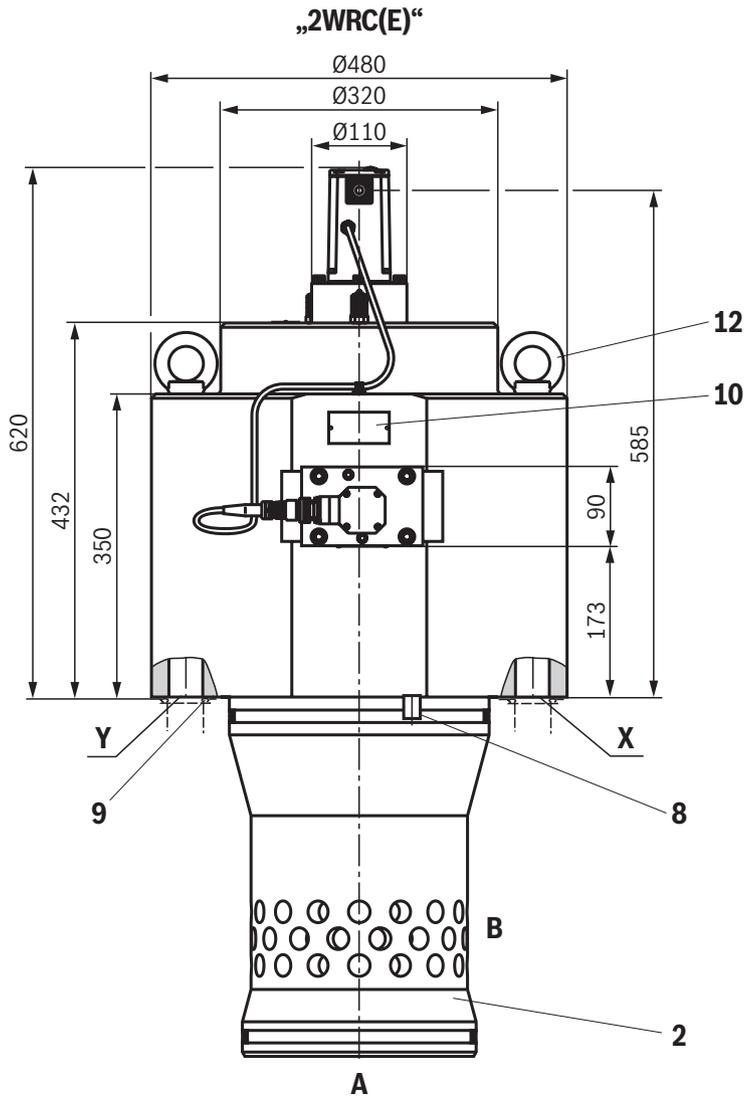
Dimensions: Size 125
(dimensions in mm)



Item explanations and valve mounting screws
see page 19.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Dimensions: Size 160
(dimensions in mm)



Item explanations and valve mounting screws
see page 19.

Notice:
The dimensions are nominal dimensions which are subject to tolerances.

Dimensions

- 1.1 Pilot control valve (servo valve NG6)
- 1.2 Pilot control valve (servo valve NG10)
- 1.3 Pilot control valve (servo valve NG16)
- 2 Bush
- 3 Mating connectors for valves with round connector, 6-pole + PE (separate order, see page 22 and data sheet 08006)
- 4 Mating connectors, separate order, see page 22.
- 5 Space required to remove the mating connector
- 6 Wiring ("WRCE")
- 7 Valve mounting screws (included in the scope of delivery), see below
- 8 Locking pin for locating hole
- 9 Identical seal rings for ports X and Y
- 10 Name plate
- 11.1 Measuring port MA_{St} for control pressures, threaded coupling G1/4
- 11.2 Measuring port MB_{St} for control pressures, threaded coupling G1/4
- 12 Transport aid

Valve mounting screws (included in the scope of delivery)

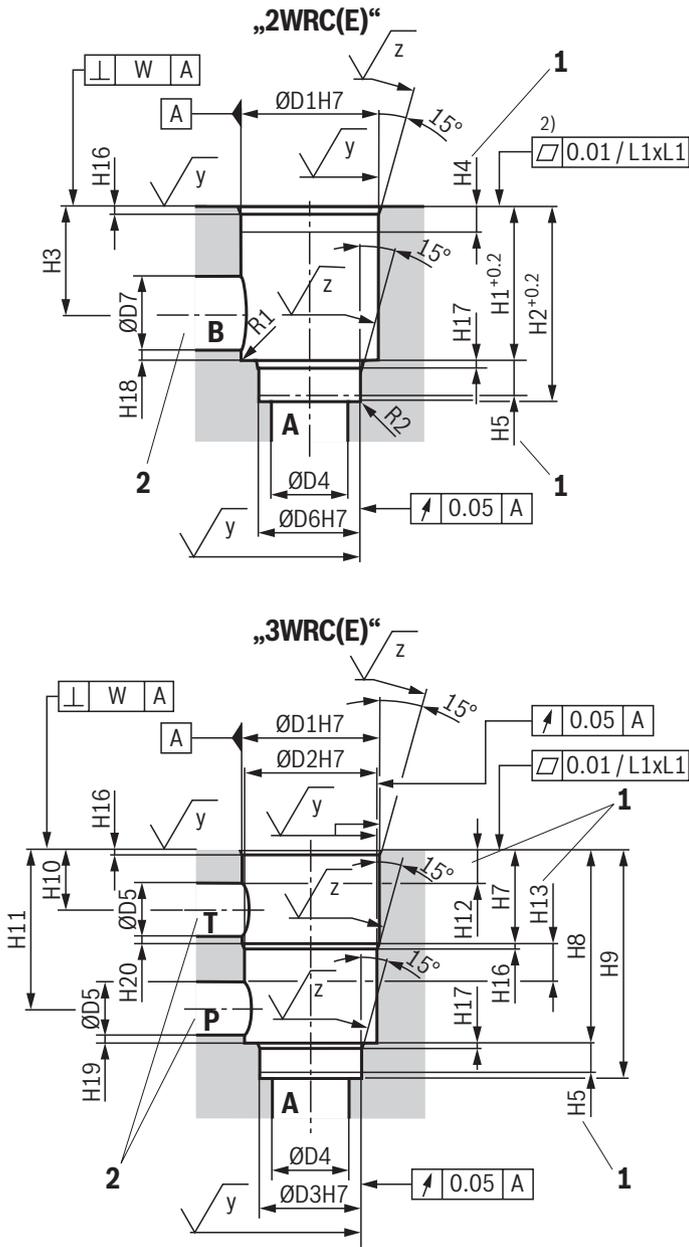
Size	Quantity	Hexagon socket head cap screws
63	4	ISO 4762 - M30 x 220 -10.9 Tightening torque $M_A = 2000 \text{ Nm} \pm 10 \%$
80	8	ISO 4762 - M24 x 220 -10.9 Tightening torque $M_A = 1000 \text{ Nm} \pm 10 \%$
100	8	ISO 4762 - M30 x 290 -10.9 Tightening torque $M_A = 2000 \text{ Nm} \pm 10 \%$
125	8	ISO 4762 - M36 x 300 -10.9-fLZn/nc/480h/C Tightening torque $M_A = 2800 \text{ Nm} \pm 10 \%$
160	12	ISO 4762 - M42 x 420 -10.9-fLZn/nc/480h/C Tightening torque $M_A = 4500 \text{ Nm} \pm 10\%$



Notice:

For tightening, a manual torque wrench with a tolerance of $\leq 10 \%$ is to be used.

Installation bore
(dimensions in mm)



Installation dimensions according to ISO 7368 ³⁾

NG	63	80	100	125	160
ØD1H7	120	145	180	225	300
ØD2H7	116	140	174	-	-
ØD3H7	90	110	135	-	-
ØD4	63	80	100	150 ¹⁾	200 ¹⁾
ØD5	48	60	75	-	-
ØD6H7	90	110	135	200	270
H1 ²⁾	130	175	210	257	370
H2 ²⁾	155	205	245	300	425
H3 ²⁾	95	130	155	192	268
H4	40 ²⁾	40	50	40 ²⁾	50
H5	20	25	29	31	45
H7	85	125	155	-	-
H8	165	215	270	-	-
H9	195	245	305	-	-
H10	57	90	112	-	-
H11	137	180	225	-	-
H12	33	60	75	-	-
H13	28	25	32	-	-
H16	4	5	5	5.5	5.5
H17	4	5	5	7	8
H18 ²⁾	3.5	5	5	2.5	2
H19	4	5	7.5	-	-
H20	4	5	5.5	-	-
W	0.05 ²⁾	0.1	0.2 ²⁾	0.2 ²⁾	0.2 ²⁾
R1 max	4	4	4	4	4
R2 max ²⁾	1	1	1	1	1

- 1) Maximum dimension
- 2) Deviating from ISO 7368
- 3) "3WRC(E)" not according to ISO 7368

- 1 Depth of fit, minimum dimension
- 2 The ports P, T and B can be positioned around the central axis of port A. However, it must be observed that the mounting bores and the control bores are not damaged.

Tolerances according to: General tolerances ISO 2768-mK

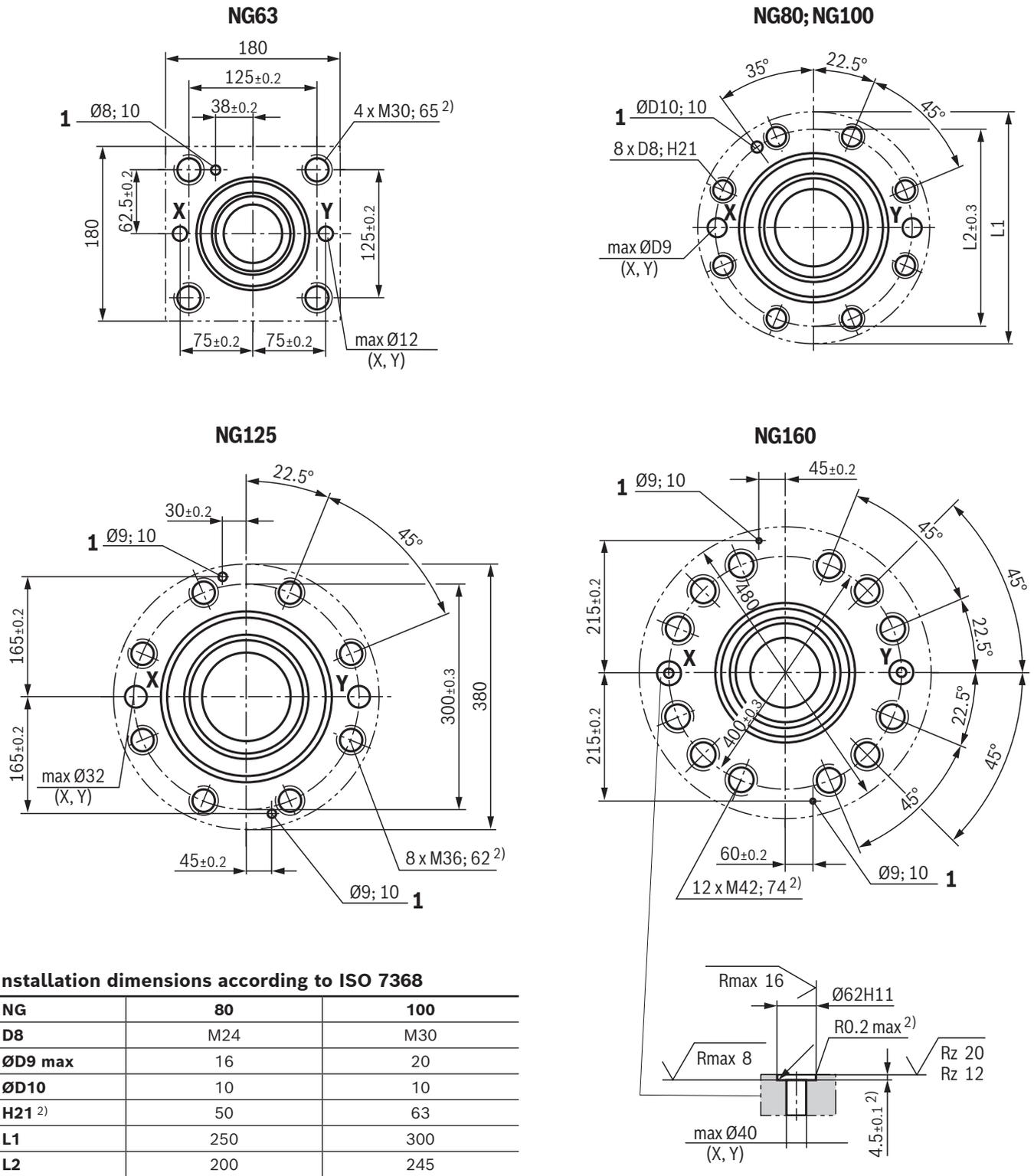
Valve mounting screws see page 19.

²⁾ $\sqrt{y} = \sqrt{Rz1max 8}$

²⁾ $\sqrt{z} = \sqrt{0.0025- / Ptmax 16}$

NG	Installation dimensions according to ISO 7368 ³⁾
63	7368-12-12-1-16
80	7368-13-13-1-16
100	7368-14-14-1-16
125	7368-15-15-1-16
160	7368-16-16-1-16

Installation bore (dimensions in mm)



Installation dimensions according to ISO 7368

NG	80	100
D8	M24	M30
ØD9 max	16	20
ØD10	10	10
H21 ²⁾	50	63
L1	250	300
L2	200	245

²⁾ Deviating from ISO 7368

1 Bore for locating pin

Tolerances according to: General tolerances ISO 2768-mK
Valve mounting screws see page 19.

Accessories (separate order)**Mating connectors and cable sets**

Item ¹⁾	Designation	Version	Short designation	Material number	Data sheet
3	Mating connector; for valves with round connector, 6-pole + PE	Straight, metal	7PZ31...M	R900223890	08006
		Straight, plastic	7PZ31...K	R900021267	
4	Mating connector for pilot control valve NG6	straight, metal	6P Z17	R900005414	-
	Mating connector for pilot control valve NG10 and 16	straight, metal	4P Z8	R900002460	

1) See dimensions page 14 ... 18.

Further information

- ▶ Directional servo valve in 4-way version, NG6 Data sheet 29564
- ▶ Directional servo valve in 4-way version, NG10 Data sheet 29583
- ▶ Directional servo valve in 4-way version, NG16 Data sheet 29591
- ▶ Valve amplifier for high-response valves with servo valve pilot control Data sheet 29931
- ▶ Hydraulic valves for industrial applications Operating instructions 07600-B
- ▶ Hydraulic fluids on mineral oil basis Data sheet 90220
- ▶ Environmentally compatible hydraulic fluids Data sheet 90221
- ▶ Flame-resistant, water-free hydraulic fluids Data sheet 90222
- ▶ Flame-resistant hydraulic fluids - containing water (HFAE, HFAS, HFB, HFC) Data sheet 90223
- ▶ Selection of filters www.boschrexroth.com/filter
- ▶ Information on available spare parts www.boschrexroth.com/spc

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