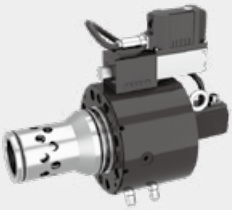
6.10

2-way high-response proportional servo cartridge valve, pilot operated

Type 2WRCVE...L1X

NG 25 to 100
Max. pressure 420 bar
Nominal flow 8000 L/min



Contents

Features

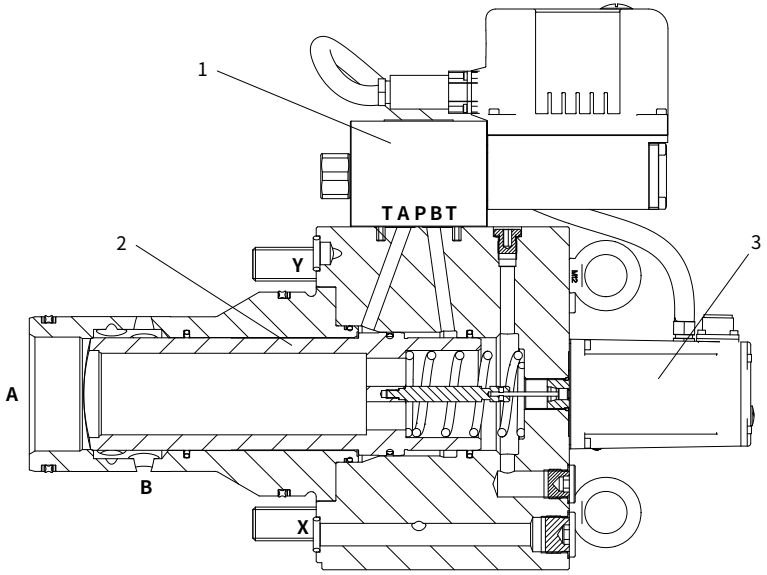
- Pilot operated two-way proportional servo directional valve, main valve core with electrical position feedback.
- The pilot valve adopts a servo level performance spool valve sleeve structure
- Voice coil motor
- Extremely fast step response
- Flow direction B to A and A to B
- With integrated electronics
- Cavity and mounting pattern according to ISO7368
- Typical applications:
  - Injection molding
  - Die-casting machines
  - General presses

Function and configuration

Valves of type 2WRCVE...L1X/V... is a pilot proportional servo cartridge valve with valve core position feedback and integrated amplifier

Set-up:
They consist of the following assemblies:
-Pilot servo valve with spool valve sleeve structure driven by voice coil valve (1).
-Main valve with reset spring and position feedback (2).
-Main valve displacement sensor and main valve integrated amplifier (3).

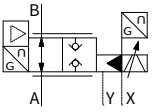
Function:
The 2-way servo proportional valves 2WRCVE have a 2-stage design consisting of a pilot valve and a main stage with poppet and LVDT.
Due to the use of a voice coil motor as the pilot valve, the 2WRCVE achieves extremely fast response times: from 10.5ms (NG25) up to 28ms (NG100) with an accuracy of <0.1% of the nominal flow.
The pilot valve actively controls the poppet - independent of the pressure conditions in the main ports. It is basically required that the pilot pressure is at the level of the system pressure. At low system pressure the pilot pressure should be min. 140bar, when high valve dynamics are desired.
The pilot servo valve and main valve of the valve are each equipped with an integrated amplifier with a closed-loop control circuit, which control the main valve and the pilot valve.



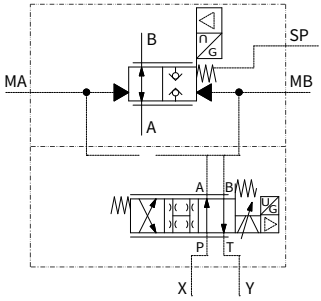
Symbols

2WRCVE..-L1X/VL...

Simplified:

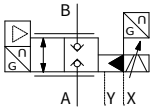


Detailed:

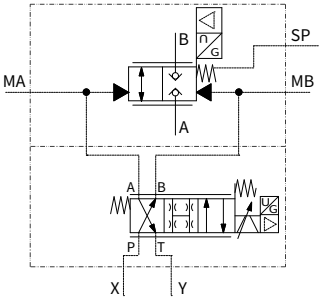


2WRCVE..-L1X/VK...

Simplified:



Detailed:



2WRCVE..-L1X/VWL...

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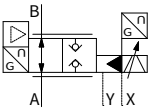
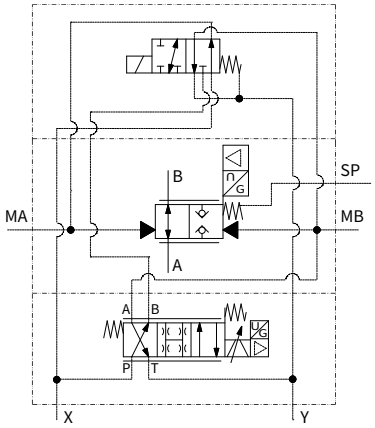
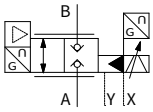


Detailed:

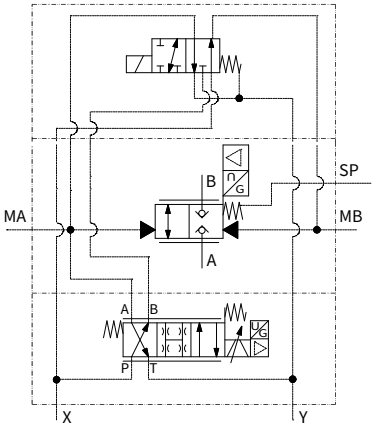


2WRCVE..-L1X/VWK...

Simplified:



Detailed:



Ordering code

2	WRCV			S		– L1X / V		/	/	★

Two-way directional valve = 2

High-response proportional servo cartridge valve = WRCV

With integrated electronics (OBE) = E

Size 25 = 25
Size 32 = 32
Size 40 = 40
Size 50 = 50
Size 63 = 63
Size 80 = 80
Size 100 = 100

Seat piston = S

Rated flow in L/min at 5 bar valve pressure drop		
Size	Type ...S...L (linear)	Type ...S...R (linear with progressive fine control range)
25	500 =500	-
32	800 =800	600 =600
40	1200 =1K2	850 =850
50	2000 =2K0	1400 =1K4
63	3600 =3K6	3200 =3K2
80	4500 =4K5	3900 =3K9
100	8000 =8K0	6800 =6K8

Characteristic curve form
Linear = L
Linear with progressive fine control range = R

Series L10 to L19 = L1X
(L10 to L19: Unchanged installation and connection dimensions)

The pilot valve is a voice coil motor (VCD) driven proportional servo valve =V

Sandwich plate shut-off valve:
Without shut-off valve, de-energized pilot control valve actively "closes"
WRCVE with applied pilot pressure =K
Without shut-off valve, de-energized pilot control valve actively "opens"
WRCVE with applied pilot pressure =L
With shut-off valve, de-energized shut-off valve actively "closes"
WRCVE with applied pilot pressure =WK
With shut-off valve, de-energized shut-off valve actively "opens"
WRCVE with applied pilot pressure =WL

Spool position monitoring:
Safety valve without position switch = No code
With safety valve and position switch = E

Electrical interface:
Command value 0~10V (only with integrated electronics (OBE) "E") = A1
Command value 4~20mA (only with integrated electronics (OBE) "E") = F1

Seal material: FKM seals = V NBR seals = No code

Enable signal control: Without band enable =No code Band enable =Q

Further details in the plain text

Technical data

General									
Size			25	32	40	50	63	80	100
Weight	Without shut-off valve .../...K or .../...L	kg	8.5	11.2	17.3	24.6	47	74	110
	With shut-off valve .../...WK or .../...WL		9.8	12.5	18.6	25.9	60	87	123
Installation position			Any, preferably horizontal						
Storage temperature range		°C	–20 to +80						
Ambient temperature range		°C	–20 to +50						
Sine test according to EN 60068-2-6			10 to 2000Hz/ max. of 10g/ 10 cycles/ 3 axes						
Noise test according to EN 60068-2-64	Size (NG) 25-40		20 to 2000Hz/ 10gRMS /30 g peak /30min /3 axes						
	Size (NG) 50-100		20 to 2000Hz/ 10gRMS /30 g peak /24h /3 axes						
Transport shock according to EN 60068-2-27			15g/ 11ms/ 3 axes						

Hydraulic (measured with HLP32, ϑ_{oil}=40°C ±5°C)									
Max. operating pressures	Ports A, B, SP	bar	420						
	Pilot control valve port X		350						
	Port Y		35						
Rated flow at Δp = 5bar	Design ...S...L (linear)	L/min	500	800	1200	2000	3600	4500	8000
	Design ...S...R (linear with progressive fine control range)		-	600	850	1400	3200	3900	6800
Pilot valve pressure		bar	＞ 140						
Max. pilot flow at 140bar pilot pressure		L/min	23	30	40	40	70	80	100
Leakage of pilot valve at P = 100bar		mL/min	⩽ 400						
Hydraulic fluid			Mineral oil (HL, HLP) to DIN 51524						
Hydraulic fluid temperature range		°C	–20 to +80; preferably +40 to +50						
Viscosity range		mm^2/s	20 to 380; preferably 30 to 45						
Max. permissible degree of contamination of the pressure fluid is to IS0 4006 (c).	Pilot control valve		Class 18/16/13						
	Main valve		Class 20/18/15						
Hysteresis		%	⩽ 0.1						
Response sensitivity		%	⩽ 0.05						
Response time 0~100% step signal		ms	10.5	12	14	20	17	23	28
Frequency response (Δp>140bar; ±5% signal)	Amplitude -3dB	Hz	95	80	74	66	52	46	41
	Phase -90°		68	63	59	52	56	51	47

Electric			
Duty ratio		%	100
Supply voltage / ripple		VDC	Direct voltage 22 to 30, electric shut-off at <19, ripple <5% effective, surge free
Current consumption max.		A	3.5
Pre-fusing		A	4.0, medium lag
Input signal: A1	Voltage	V	0 to +10, ripple ＜ 0.01%, effective, surge free
	Impedance	kΩ	100
Input signal: F1	Current	mA	+4 to 20, ripple ＜ 0.01% effective, surge free, ＜ 3.6mA=disable, >3.8mA=enable
	Impedance	Ω	＜ 250
Diagnostic signal	Voltage	V	0 to +10, rated max. 5mA
Enable signal		V	5 to 30, Ri = > 8kOhm
Electrical connection			6+PE，plug-in connector in accordance with DIN EN 175201-804 standard
Protection class of the valve according to EN60529			Ip65

Electrical connections, plug-in connectors

Installation recommendations

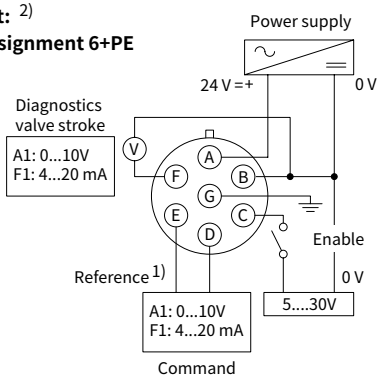
An insufficient pilot oil supply (e.g. due to long distances and/or small diameters) can negatively influence the dynamics of the valve.

To avoid this, an accumulator can be connected to port SX at the valve body. A short-term undersupply with pilot oil can be compensated via this accumulator.

Sizing data: see operation manual.

Pinout: 2)

Pin assignment 6+PE



Notes:

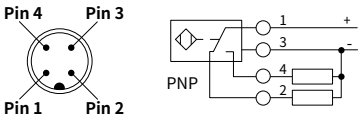
1) Cannot be connected to 0V of the power supply voltage.

2) This model of product can provide dedicated debugging cables, and can be ordered separately if needed.

Seven-pin plug

Pin	Interface type (voltage type)	Interface type (current type)	Remarks
A	24VDC	24VDC	Power supply
B	0V	0V	
C	0V (without enable)/ 24VDC (with enable)	0V (without enable)/ 24VDC (with enable)	Enable signal specification: 5-30V to activate, approximately 0V to deactivate, with reference potential at pin B
D	0-10V	4-20mA	Command input
E	Command voltage reference potential	Command voltage reference potential	
F	0.2-+10V	4.3-20mA	Main valve spool feedback output, reference potential at pin B
PE	Chassis ground	Chassis ground	

Safety valve wiring diagram 3)



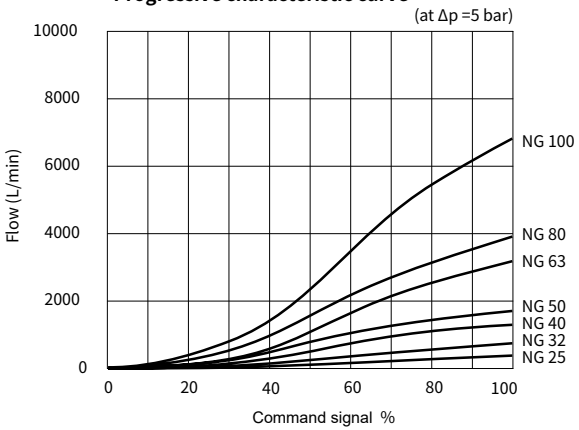
Pin	Function
Pin1	+24V
Pin2	Normal close (low impedance - high impedance)
Pin3	0V
Pin4	Normal open (high impedance - low impedance)

Note:

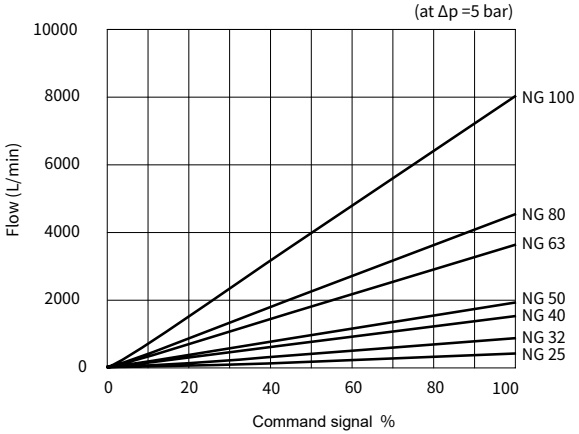
3) Refer to this wiring for safety valves with position detection.

Characteristic curves (measured with HLP46, ϑ_{oil}=50°C , ΔP=5bar)

Progressive characteristic curve



Linear characteristic curve



Opening point factory set to 3 %.

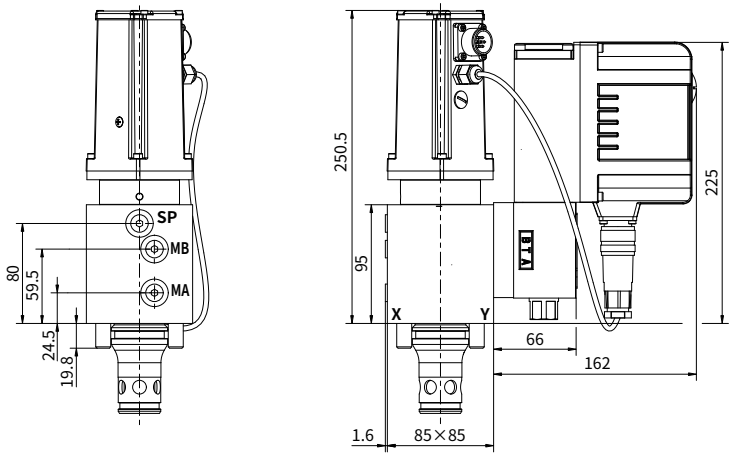
Flow at different Δp: $Q_{actual} = Q_{nominal} \cdot \sqrt{\frac{\Delta p_{actual}}{\Delta p_{nominal}}}$.

Unit dimensions

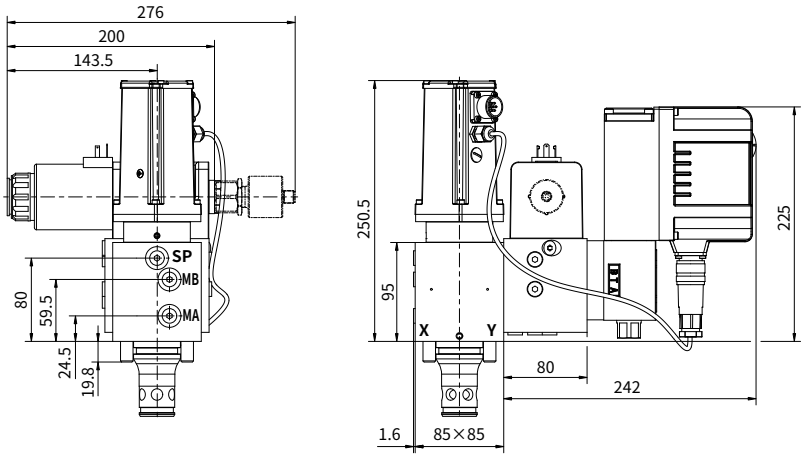
(nominal dimensions in mm)

NG 25

· 2WRCVE...VK..., without safety valve



· 2WRCVE...VWKE..., with safety valve and position switch



Suction port: SP = G1/4"
Pressure measurement ports:
MA and MB = G1/4"

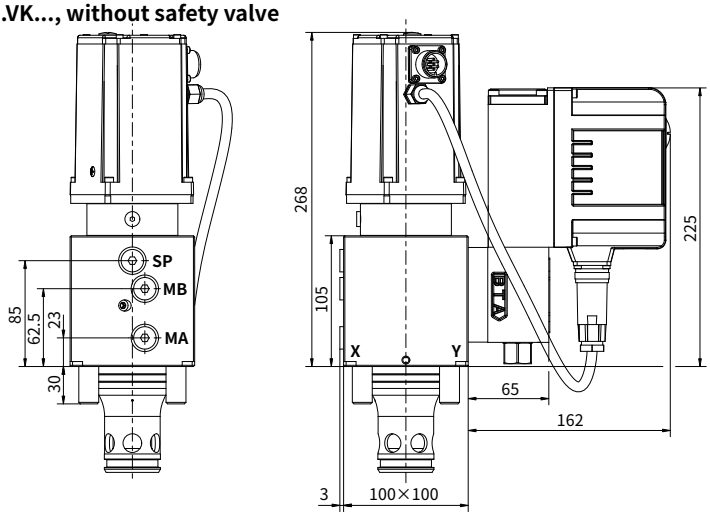
Size	Fastening bolts DIN912 12.9	Tightening torque
25	4 - M12×100	125Nm

Unit dimensions

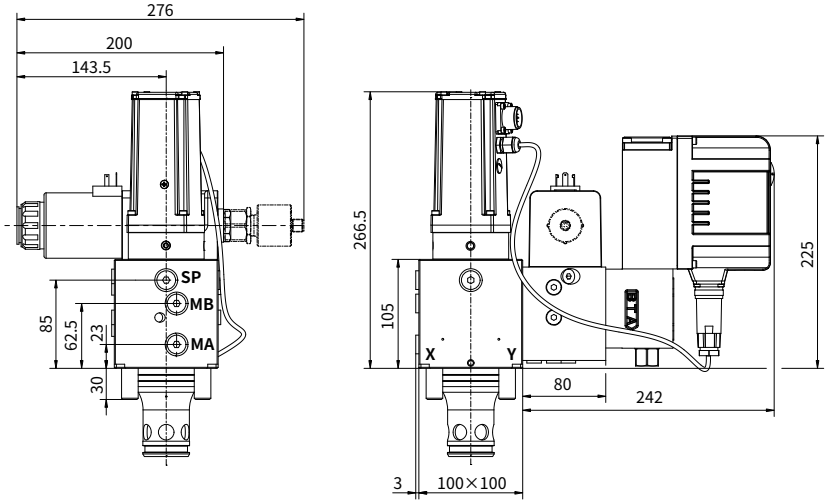
(nominal dimensions in mm)

NG 32

· 2WRCVE...VK..., without safety valve



· 2WRCVE...VWKE..., with safety valve and position switch



Suction port: SP = G1/4"
Pressure measurement ports:
MA and MB = G1/4"

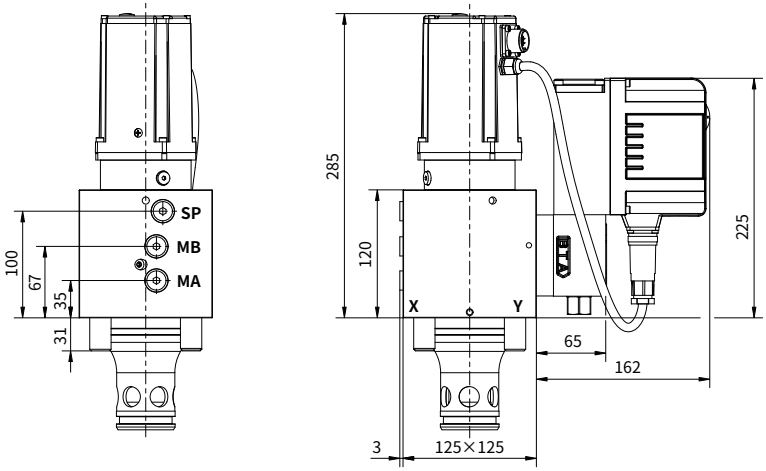
Size	Fastening bolts DIN912 12.9	Tightening torque
32	4 - M16×60	300Nm

Unit dimensions

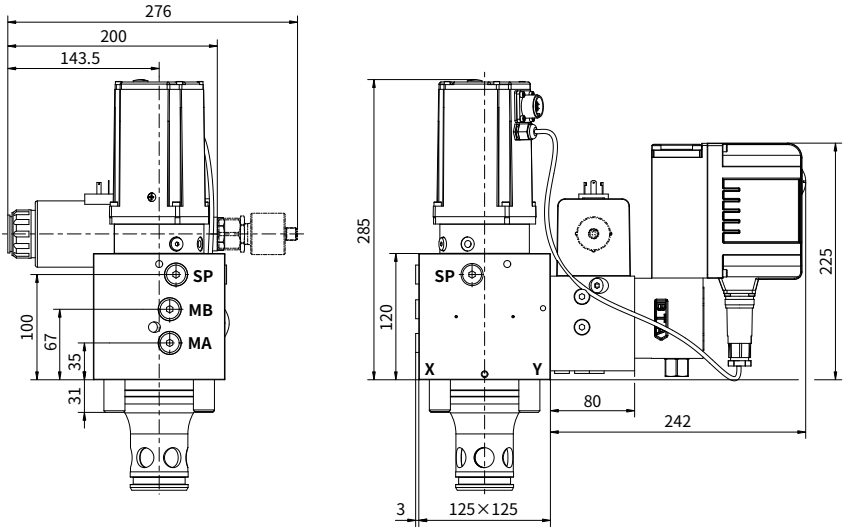
(nominal dimensions in mm)

NG 40

· 2WRCVE...VK..., without safety valve



· 2WRCVE...VWKE..., with safety valve and position switch



Suction port: SP = G1/4"
Pressure measurement ports:
MA and MB = G1/4"

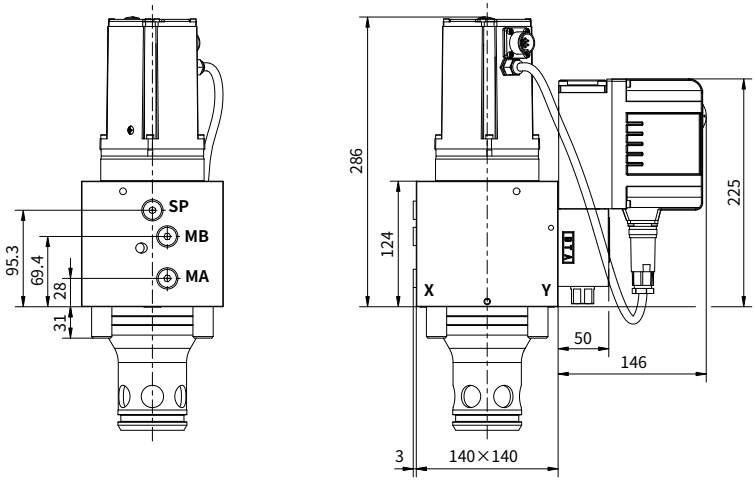
Size	Fastening bolts DIN912 12.9	Tightening torque
40	4 - M20×70	600Nm

Unit dimensions

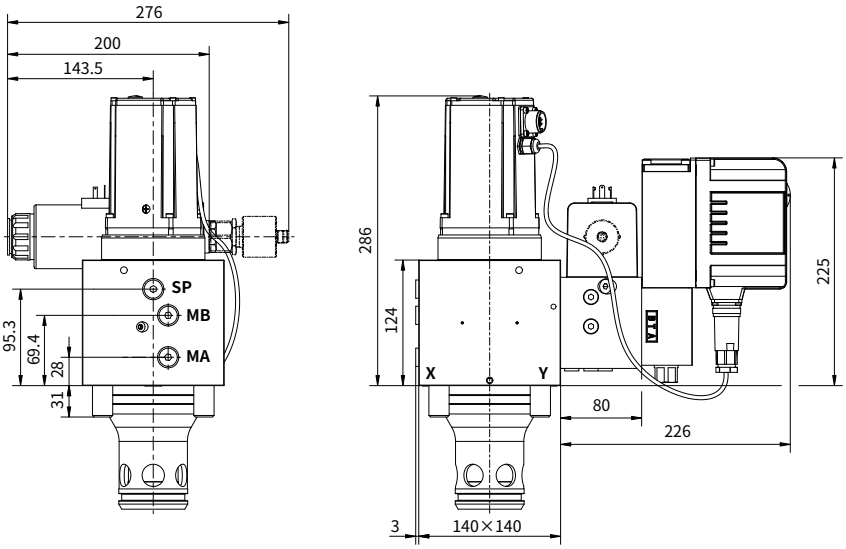
(nominal dimensions in mm)

NG 40

· 2WRCVE...VK..., without safety valve



· 2WRCVE...VWKE..., with safety valve and position switch



Suction port: SP = G1/4"
Pressure measurement ports:
MA and MB = G1/4"

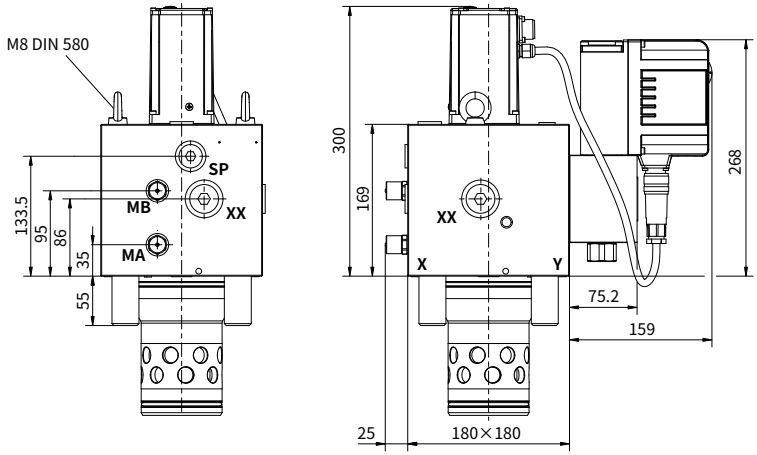
Size	Fastening bolts DIN912 12.9	Tightening torque
50	4 - M20×80	600Nm

Unit dimensions

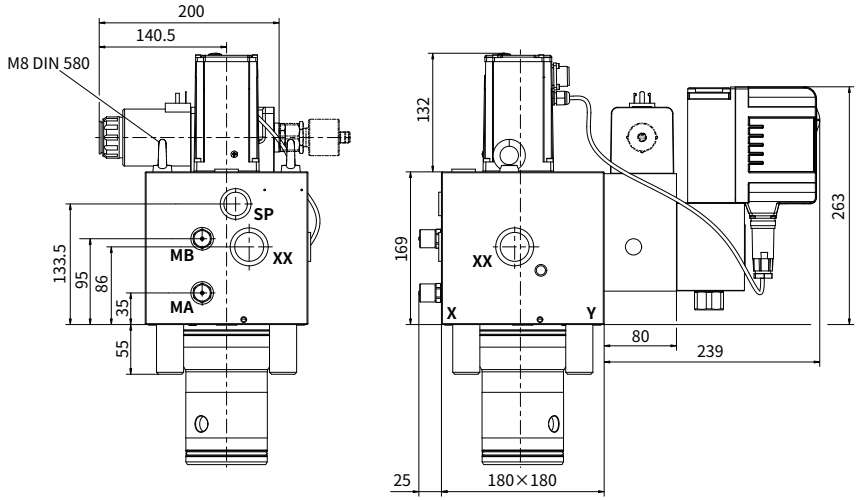
(nominal dimensions in mm)

NG 63

· 2WRCVE...VK..., without safety valve



· 2WRCVE...VWKE..., with safety valve and position switch



Suction port: SP = G1/2"
Accumulator port: XX = G3/4
Pressure measurement ports:
MA and MB = G1/4"; MY = G1/4"

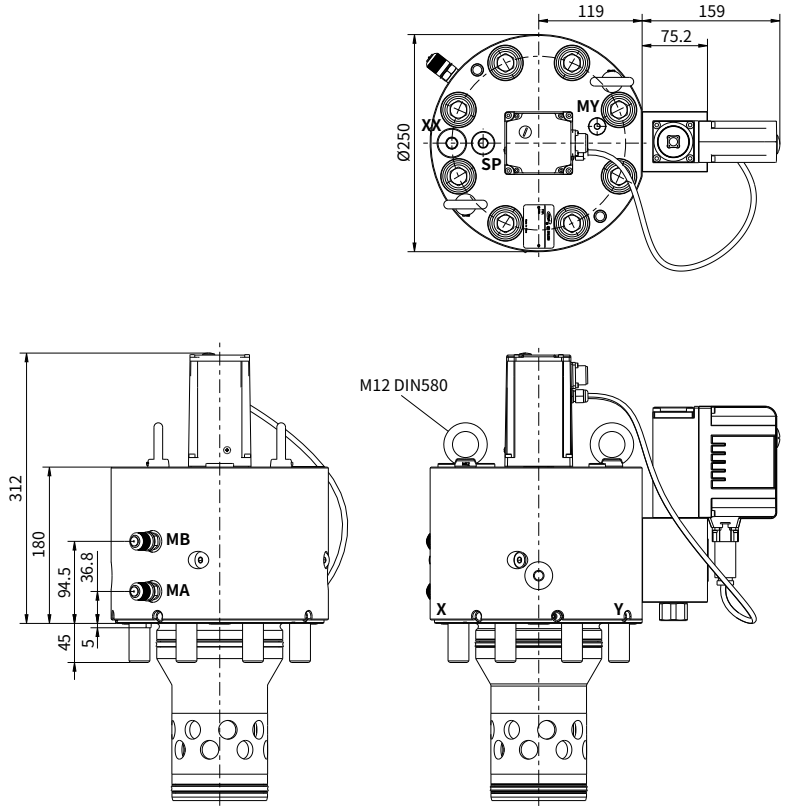
Size	Fastening bolts DIN912 12.9	Tightening torque
63	4 - M30×160	1775Nm

Unit dimensions

(nominal dimensions in mm)

NG 80

· 2WRCVE...VK..., without safety valve



Suction port: SP = G1/2"
Accumulator port: XX = G3/4
Pressure measurement ports:
MA and MB = G1/4"; MY = G1/4"

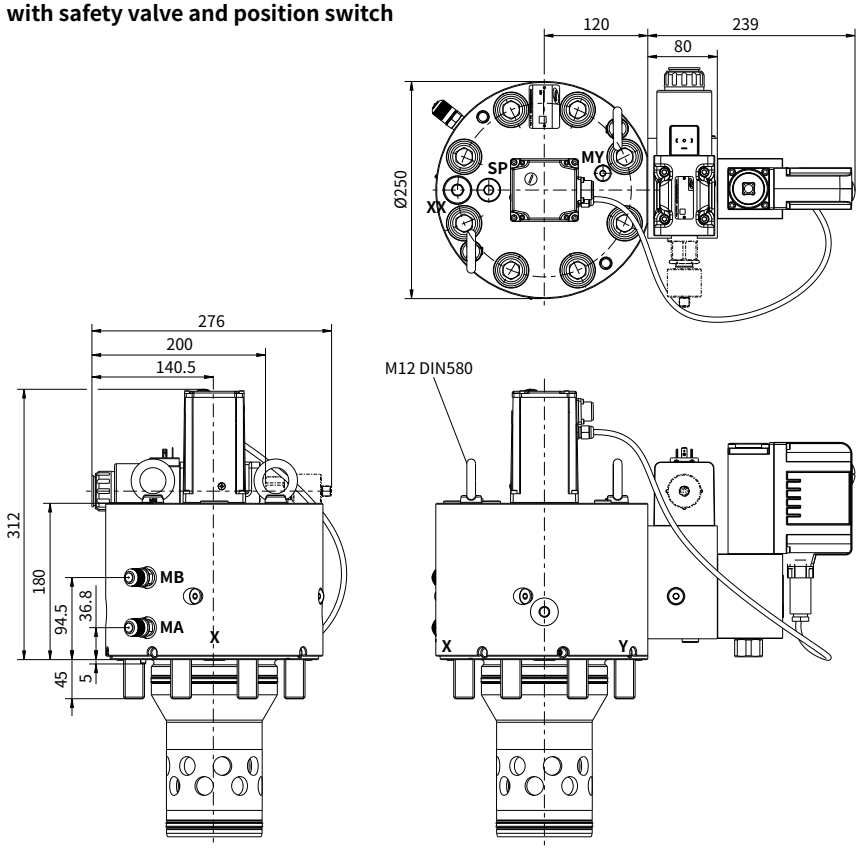
Size	Fastening bolts DIN912 12.9	Tightening torque
80	8 - M24×160	890Nm

Unit dimensions

(nominal dimensions in mm)

NG 80

· 2WRCVE...VWKE...,
with safety valve and position switch



Suction port: SP = G1/2"
Accumulator port: XX = G3/4
Pressure measurement ports:
MA and MB = G1/4"; MY = G1/4"

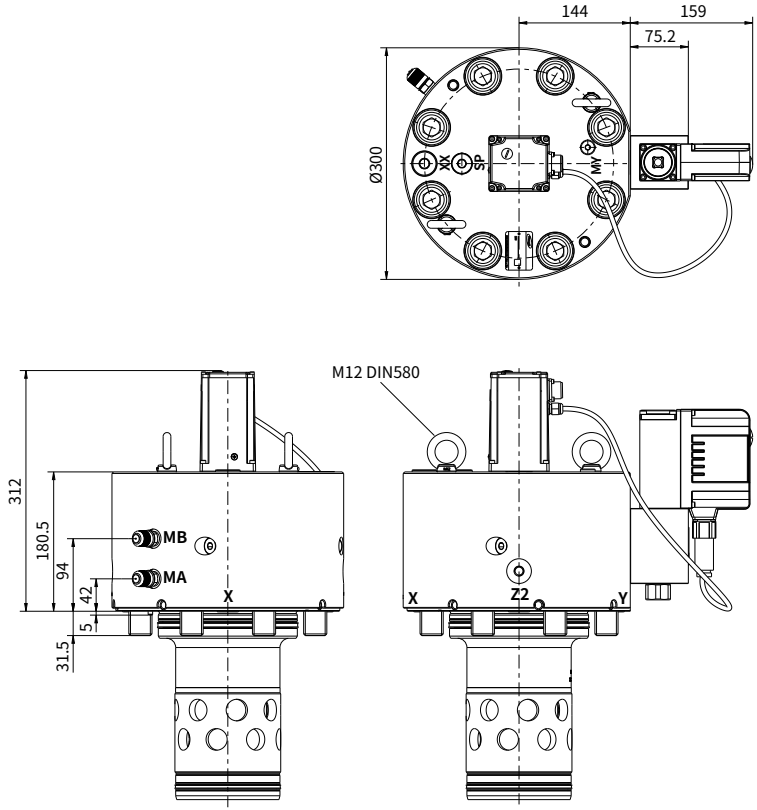
Size	Fastening bolts DIN912 12.9	Tightening torque
80	8 - M24×160	890Nm

Unit dimensions

(nominal dimensions in mm)

NG 100

· 2WRCVE...VK..., without safety valve



Suction port: SP = G1/2"
Accumulator port: XX = G3/4
Pressure measurement ports:
MA and MB = G1/4"; MY = G1/4"

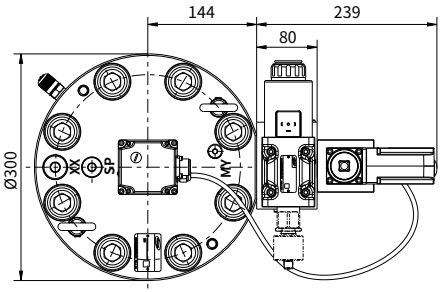
Size	Fastening bolts DIN912 12.9	Tightening torque
100	8 - M30×150	1775Nm

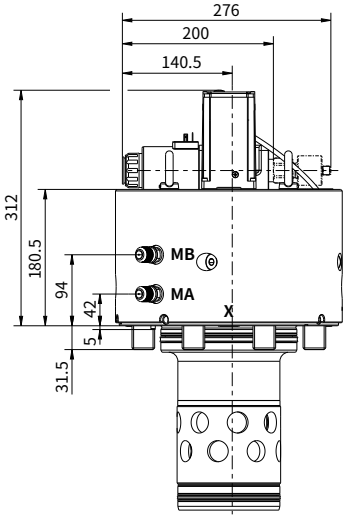
Unit dimensions

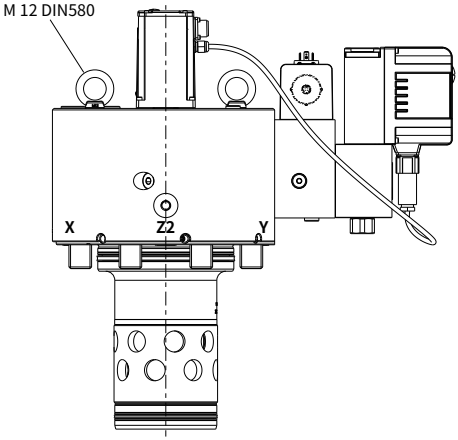
(nominal dimensions in mm)

NG 100

· 2WRCVE...VWKE...,
with safety valve and position switch





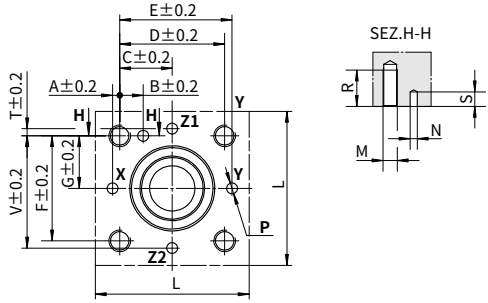


Suction port: SP = G1/2"
Accumulator port: XX = G3/4
Pressure measurement ports:
MA and MB = G1/4"; MY = G1/4"

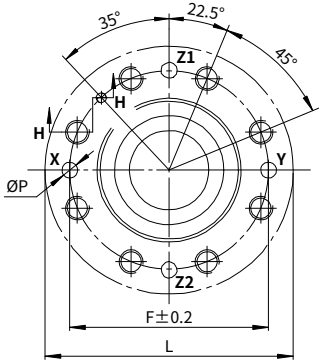
Size	Fastening bolts DIN912 12.9	Tightening torque
100	8 - M30×150	1775Nm

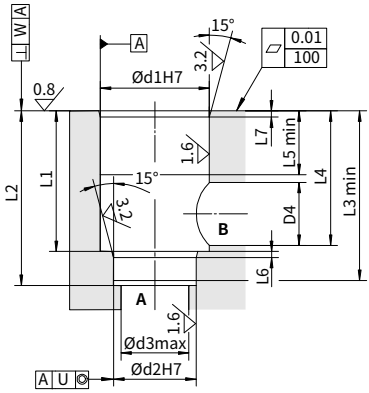
Installation dimensions according to DIN ISO 7368 (dimensions in mm)

Size 25-63:



Size 80, 100:





通径	25	32	40	50	63	80	100
A	4	6	7.5	8	12.5	-	-
B	13	18	19.5	20	24.5	-	-
C	29	35	42.5	50	62.5	-	-
D	58	70	85	100	125	-	-
E	62	76	92.5	108	137.5	-	-
F	58	70	85	100	125	200	245
G	29	35	42.5	50	62.5	-	-
L_{min}	85	102	125	140	180	250	300
M	M12	M16	M20	M20	M30	M24	M30
ØN	6	6	6	8	8	10	10
$ØP_{max}$	6	8	10	10	12	16	20
R	30	38	46	46	66	50	66
S_{max}	8	8	8	8	8	8	10
T	4	6	7.5	8	12.5	-	-
V	62	76	92.5	108	137.5	-	-
Ød1	45	60	75	90	120	145	180
Ød2	34	45	55	68	90	110	135
$Ød3_{max}$	25	32	40	50	63	80	100
$Ød4_{max}$	27	38.5	54.5	62.5	87	100	120
L1	$58^{+0.1}_{0}$	$70^{+0.1}_{0}$	$87^{+0.1}_{0}$	$100^{+0.1}_{0}$	$130^{+0.1}_{0}$	$175^{+0.2}_{0}$	$210^{+0.2}_{0}$
L2	$72^{+0.1}_{0}$	$85^{+0.1}_{0}$	$105^{+0.1}_{0}$	$122^{+0.1}_{0}$	$155^{+0.1}_{0}$	$205^{+0.2}_{0}$	$245^{+0.2}_{0}$
L3	70	83	102	117	150	200	239
L4	57	68.5	84.5	97.5	127	170.5	205.5
L5	30	30	30	35	40	40	50
L6	2.5	2.5	3	3	4	5	5
L7	2.5	2.5	3	3	4	5	5
U	0.03	0.03	0.05	0.05	0.05	0.05	0.05
W	0.05	0.1	0.1	0.1	0.2	0.2	0.2

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