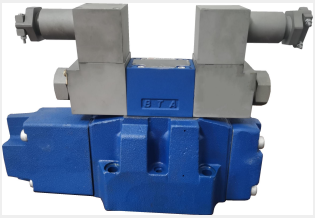
Explosion proof Pilot operated proportional directional valves

HD-Type 4WRZ... / FB

NG 10 to 32
Up to 350 bar
Up to 1600 L/min



Contents

Features

- Pilot operated proportional directional valve to control the direction and magnitude of a flow
- Operation is by proportional solenoids with central thread and detachable coil
- For subplate mounting:
  Porting pattern to ISO 4401 and DIN 2430
- Spring centered control spool
- 4WRZE: Integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
- 4WRZ: associated control electronics (separate order)

Function and configuration

· Pilot valve type 3DREP 6...

The pilot valve is a proportional solenoid operated 3-way pressure reducing valve. It is used to convert an electrical input signal into a proportional pressure output signal and is used on all 4WRZ...valves.

The proportional solenoids are controllable DC wet pin solenoids with central thread and detachable coil. The solenoid is optionally controlled by external electronics

Design:

The valve basically consists of:

– Housing (1)

– Control spool (2) with pressure measuring spools (3 and 4)

– Solenoids (5 and 6) with central thread

Work principle

– When the solenoids (5 and 6) are in the de-energized condition, the control spool (2) is held by compression springs in the central position

– Direct operation of the control spool (2) by energizing a proportional solenoid, e.g. energization of solenoid "a" (5). Pressure measuring spool (3) and control spool (2) are shifted to the left in proportion to the electrical input signal; Connection from P to B and A to T through the orifice-like cross sections with progressive flow characteristics; De-energization of the solenoid (5), control spool (2) is returned to the central position by the compression spring, In the central position, ports A and B are open to T, i.e. the hydraulic fluid can flow to the tank without any restrictions.

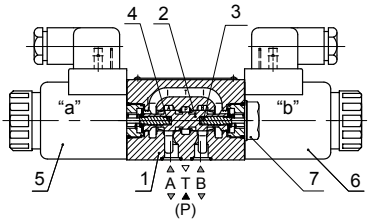
– Manual override, optional, with the help of it, the control spool (2) can be moved without requiring the energization of the solenoid.

Notes:

Type 3DREP 6: Draining of the tank line must be prevented. In the case of a corresponding installation situation, a pre-load valve is to be installed (pre-load pressure approx. 2 bar).

Pilot valve with two spool positions (Type 3DREP 6...B...)

In principle, the function of this valve version corresponds to that of the valve with three spool positions. However, this 2-position valve is provided with solenoid "a" (5) only. Instead of the 2nd proportional solenoid, a plug screw (7) is fitted.



Type 3DREP6...

Function and configuration

· Pilot operated proportional directional valves Type 4WRZ...

Valves of type 4WRZ... are pilot operated 4-way directional valves with operation by proportional solenoids. They control the direction and magnitude of a flow.

Design:

The valves basically consist of:

– A pilot valve (9) with proportional solenoids (5 and 6), control spool (2) and orifice plugs (15)

– A main valve (10) with main spool (11) and centering spring (12)

Work principle

– When the solenoids (5 and 6) are de-energised, the main spool (11) is held by centering springs (12) in the central position.

– Operation of the main spool (11) through the pilot valve (9), the main spool is moved proportionally, depending on the spool position, flow from P to A and B to T(R) or P to B and A to T(R).

e.g. by energising solenoid "b" (6), the control spool (2) is shifted to the right, pilot oil is fed through the pilot valve (9) into the pressure chamber (13) and moves the main spool (11) in proportion to the electrical input signal; Connection from P to A and B to T through orifice-like cross-sections with progressive flow characteristics.

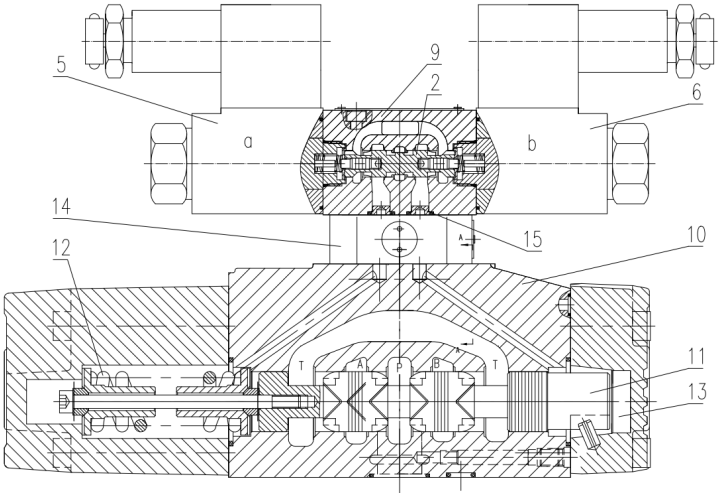
De-energization of the solenoid (6), the control spool (2) and main spool (11) are returned to the central position.

– Pilot oil supply to the pilot valve internally via port P or externally via port X.

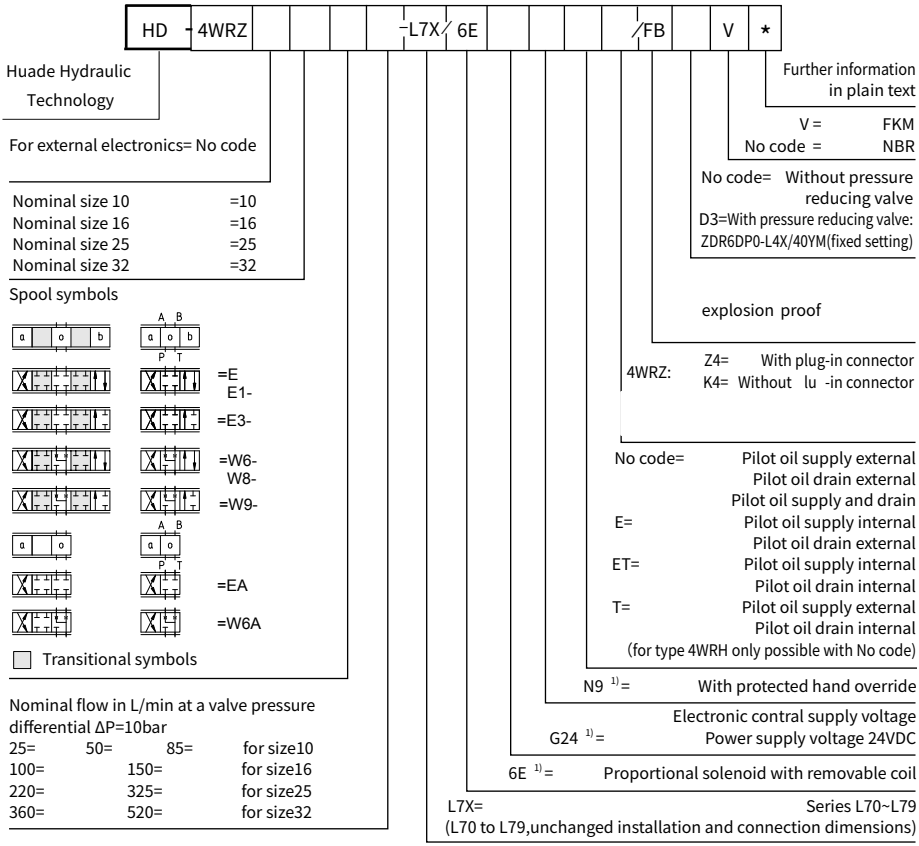
– With the help of an optional manual override the control spool (2) can be moved without requiring the energization of the solenoid.

Notes:

For system pressures above 100bar the type D3 pilot pressure reducing module(14) must be fitted between pilot valve (9) and main valve (10).



Ordering code



Note: With symbols E1- and W8-:

$P \rightarrow A: q_{v\,max}$ $B \rightarrow T: q_{v/2}$

$P \rightarrow B: q_{v/2}$ $A \rightarrow T: q_{v\,max}$

With symbols E3- and W9-:

$P \rightarrow A: q_{v\,max}$ $B \rightarrow T$: closed

$P \rightarrow B: q_{v/2}$ $A \rightarrow T: q_{v\,max}$

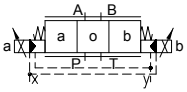
With spools W6-, W8-, W9- and W6A in the neutral position, there is a connection from A to T and B to T with approx. 2% of the relevant nominal cross-section.

1) Omitted for 4WRZ without pilot valve.

Symbols(simplified)

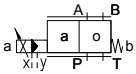
With electrohydraulic operation and for external electronics

Type 4WRZ...-L7X/...

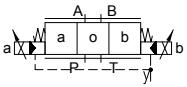


X=external
Y=external

Type 4WRZ...A-L7X/...

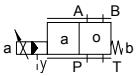


Type 4WRZ...-L7X/...E...

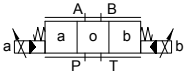


X=external
Y=external

Type 4WRZ...A-L7X/...E...

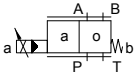


Type 4WRZ...-L7X/...ET...

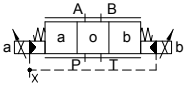


X=external
Y=external

Type 4WRZ...A-L7X/...ET...

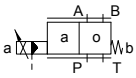


Type 4WRZ...-L7X/...T...



X=external
Y=external

Type 4WRZ...A-L7X/...T...



Technical data

General				
Valve type				WRZ
Installation				optional, preferably horizontal
Storage temperature range			°C	-20 to +80
Ambient temperature range			°C	-20 to +70
Weight	NG10		kg	7.8
	NG16		kg	13.4
	NG25		kg	18.2
	NG32		kg	42.2

Hydraulic (measured with HLPAG.p=100bar : 40 °C ± 5 °C)							
Nominal size				10	16	25	32
Operating pressure	-Pilot valve	External pilot oil supply	bar	30 to 100 bar			
		Internal pilot oil supply	bar	100 to 350 with "D3" only			
	-Main valve		bar	up to 315	up to 350	up to 350	up to 350
Return flow pressure	-Port T (port R) (external pilot oil drain)		bar	up to 315	up to 250	up to 250	up to 150
	-Port T(internal pilot oil drain)		bar	up to 30	up to 30	up to 30	up to 30
	-Port Y		bar	up to 30	up to 30	up to 30	up to 30
Pilot oil volume input signal 0- 100 %			cm^3	1.7	4.6	1 0	26.5
Pilot oil flow in port X and Y with a stepped input signal 0- 100 %			L/min	3.5	5.5	7	15.9
Flow of the main valve			L/min	up to 170	up to 460	up to 870	up to 1600
Hydraulic fluid				Mineral oil (HL, HLP) to DIN 51524 Further fluids on enquiry!			
Hydraulic fluid temperature range			°C	-20 to +80 (preferably +40 to +50)			
Viscosity range			mm^2/s	20 to 380 (preferably 30 to 46)			
Degree of contamination	Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 or ISO 4406(c)			A filter with a minimum retention rate of βx ⩾ 75 is recommended			
	- Pilot valve	NAS 1638 class 7		x=5			
	- Main valve	NAS 1638 class 9		x=15			
Hysteresis			%	⩽ 6			

Electrical			
Valve type			WRZ
Type of protection of the valve to EN 60529			IP65 with cable socket mounted and locked
Voltage type			DC
Command value overlap		%	15
Max. current		A	1.5
Solenoid coil resisance	Cold value at 20°C	Ω	4.8
	Max. warm value	Ω	7.2
Duty		%	100
Coil temperature		°C	up to 150
Valve protection to EN 60529			IP65 with mounted and fixed plug-in connector

Control electronics			
External amplifier for type WRZ			VT-VSPA2-1-L2X/...
Command value signal	-Voltage input "A1"	V	±10
	-Current input "F1"	mA	4 to 20

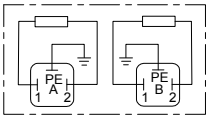
Electrical connections, plug-in connectors

nominal dimensions in mm

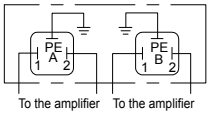
· For type 4WRZ...L7X

Connections on the component plug

Plug-in connector to DIN EN 175301-803 or ISO 4400



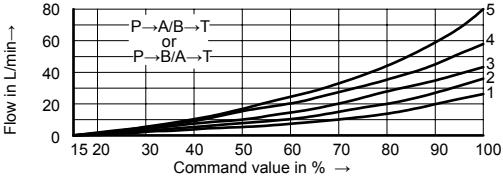
Connections on the plug-in connector



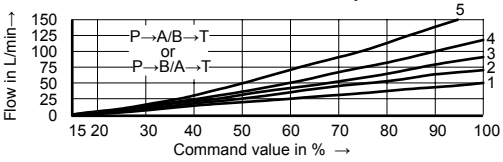
Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, ϑ_{oil}=40°C ±5°C , P=100bar)

NG 10

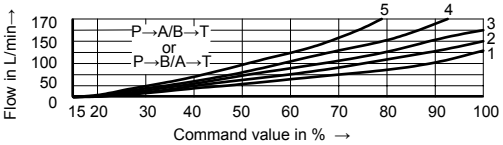
25L/min nominal flow at a 10 bar valve pressure differential



50L/min nominal flow at a 10 bar valve pressure differential



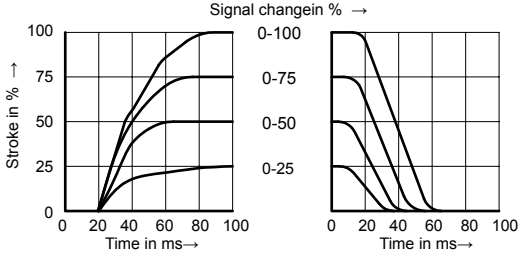
85L/min nominal flow at a 10 bar valve pressure differential



1 Δp=10bar constant
2 Δp=20bar constant
3 Δp=30bar constant
4 Δp=50bar constant
5 Δp=100bar constant

Δp=Valve pressure differential (inlet pressure p_p minus load pressure p_L minus return pressure p_T)

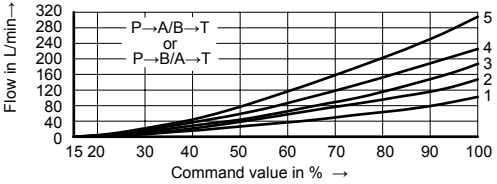
Transient function with a stepped form of electrical input signal P_{st}= 50bar



Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, ϑ_{oil} =40°C ±5°C , P=100bar)

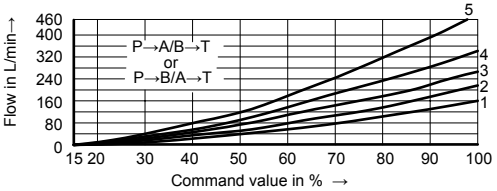
NG 16

100L/min nominal flow at a 10 bar valve pressure differential



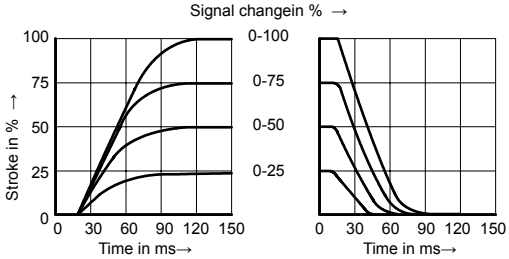
1 Δp=10bar constant
2 Δp=20bar constant
3 Δp=30bar constant
4 Δp=50bar constant
5 Δp=100bar constant

150L/min nominal flow at a 10 bar valve pressure differential



Δp=Valve pressure differential (inlet pressure p_p minus load pressure p_L minus return pressure p_T)

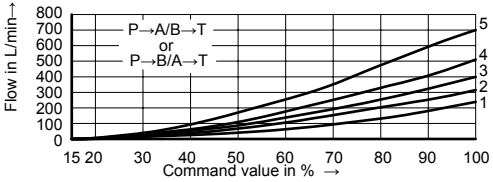
Transient function with a stepped form of electrical input signal P_{st}= 50bar



Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, ϑ_{oil}=40°C ±5°C , P=100bar)

NG 25

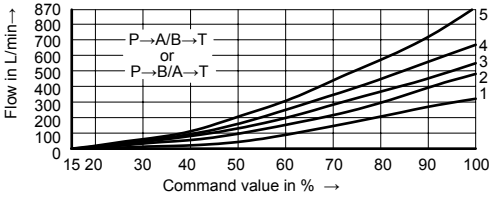
220L/min nominal flow at a 10 bar valve pressure differential



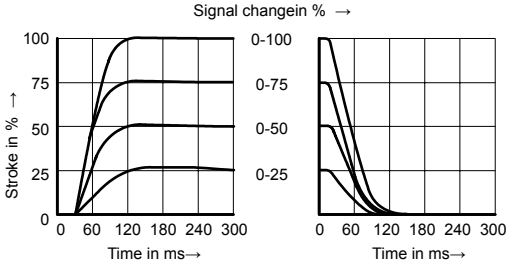
1 Δp=10bar constant
2 Δp=20bar constant
3 Δp=30bar constant
4 Δp=50bar constant
5 Δp=100bar constant

Δp=Valve pressure differential (inlet pressure p_p minus load pressure p_L minus return pressure p_T)

325L/min nominal flow at a 10 bar valve pressure differential



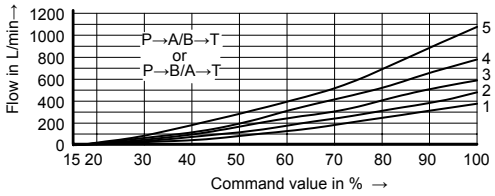
Transient function with a stepped form of electrical input signal P_{st}= 50bar



Characteristic curves (measured with spools "E, W6-, EA, W6A" and HLP46, ϑ_{oil}=40°C ±5°C , P=100bar)

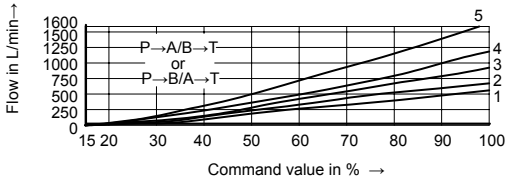
NG 32

360L/min nominal flow at a 10 bar valve pressure differential



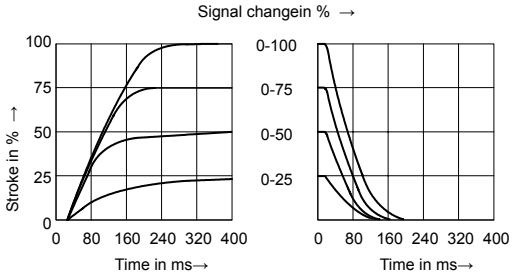
1 Δp=10bar constant
2 Δp=20bar constant
3 Δp=30bar constant
4 Δp=50bar constant
5 Δp=100bar constant

520L/min nominal flow at a 10 bar valve pressure differential



Δp=Valve pressure differential (inlet pressure p_p minus load pressure p_L minus return pressure p_T)

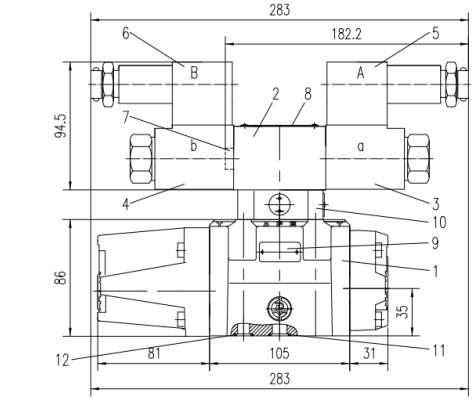
Transient function with a stepped form of electrical input signal P_{st}= 50bar

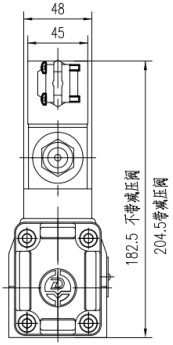


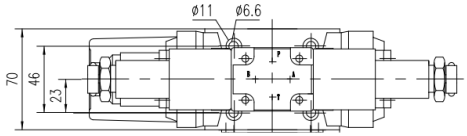
Unit dimensions

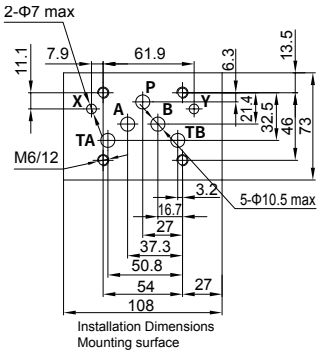
(Dimensions in mm)

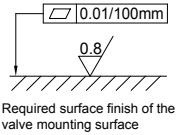
NG 10











1 Main valve
2 Pilot valve
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Cable socket "A"
6 Cable socket "B"

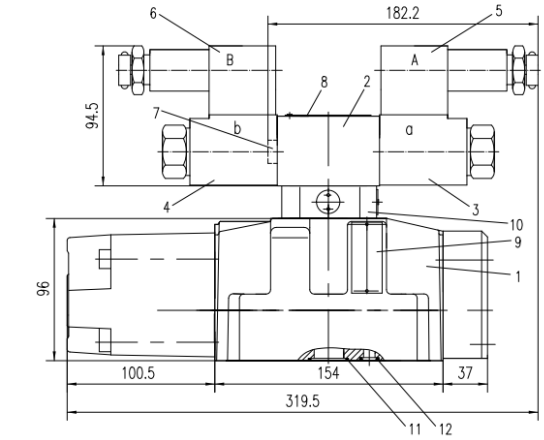
7 Cover for valves with one solenoid
8 Nameplate for pilot valve
9 Name plate for main valve
10 Pressure reducing valve "D3"
11 Identical seal rings for ports A, B, P and T)
(R-ring 13×1.6×2 or O-ring 12×2
12 Identical seal rings for ports X and Y)

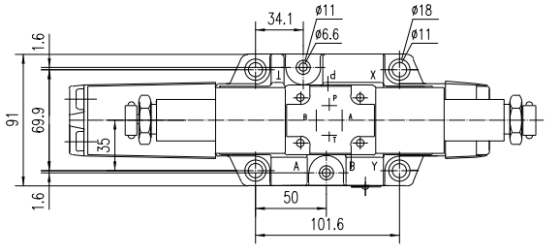
Valve fixing screws:
The following valve fixing screws are recommended:
- 4 GB/T 70.1-M6×40-10.9
- Tightening torque M_A=15.5Nm±10%

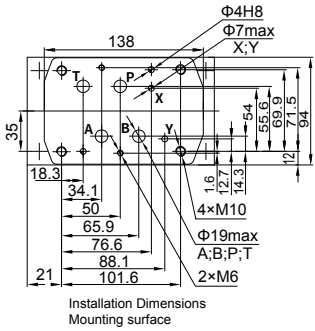
Unit dimensions

(Dimensions in mm)

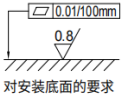
NG 16







1 Main valve
2 Pilot valve
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Cable socket "A"
6 Cable socket "B"
7 Cover for valves with one solenoid
8 Nameplate for pilot valve
9 Nameplate for main valve
10 Pressure reducing valve "D3"
11 Identical seal rings for ports A, B, P and T)
(R-ring 22.53×2.3×2.62 or O-ring 22×2.5)
12 Identical seal rings for ports X and Y)
(R-ring 12×2×2 or O-ring 10×2)



Valve fixing screws

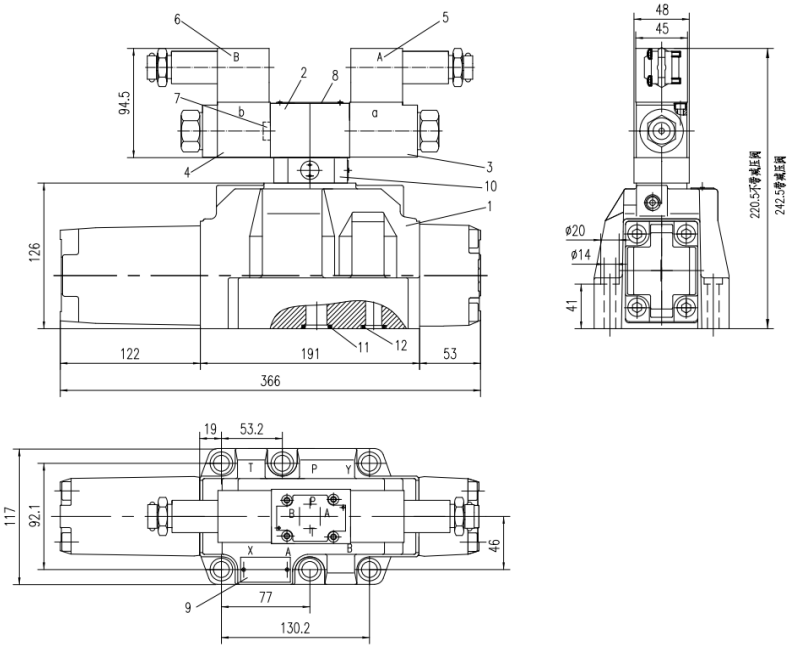
The following valve fixing screws are recommended:

- 4 GB/T 70.1-M10×60-10.9
- Tightening torque M_A=15.5Nm±10%
- 2 GB/T 70.1-M6×55-10.9
- Tightening torque M_A=15.5Nm±10%

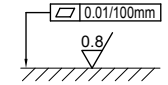
Unit dimensions

(Dimensions in mm)

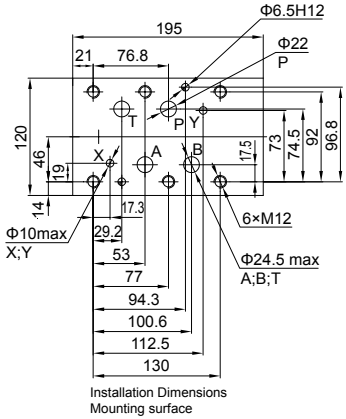
NG 25



1 Main valve
2 Pilot valve
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Cable socket "A"
6 Cable socket "B"
7 Cover for valves with one solenoid
8 Nameplate for pilot valve
9 Nameplate for main valve
10 Pressure reducing valve "D3"
11 Identical seal rings for ports A, B, P and T
(R-ring 27.8×2.6×3 or O-ring 27×3)
12 Identical seal rings for ports X and Y
R-rin 19×3×3 or O-ring 19×3)



Required surface finish of the valve mounting surface



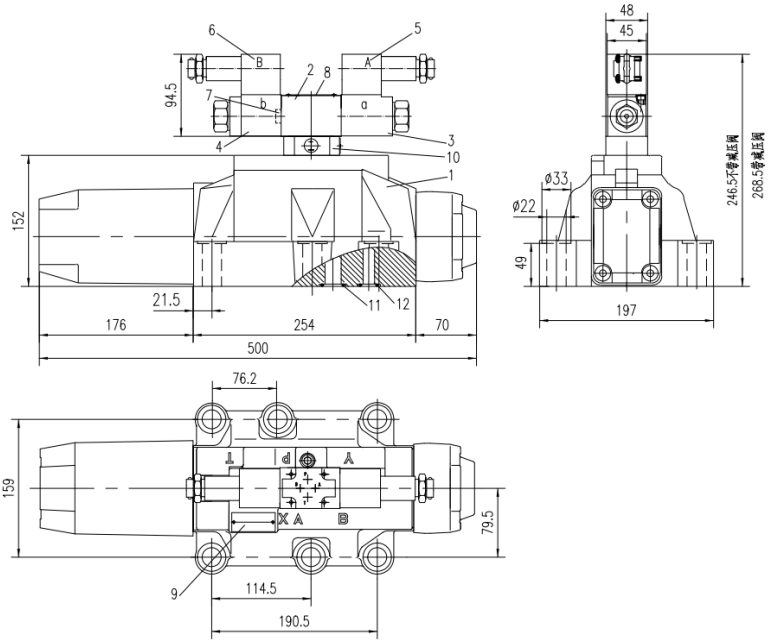
Installation Dimensions
Mounting surface

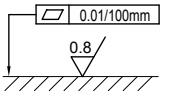
Valve fixing screws
The following valve fixing screws are recommended:
- 6 GB/T 70.1 - M12×60-10.9
- Tightening torque M_A=130Nm±20%

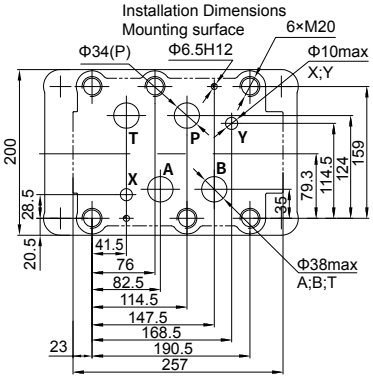
Unit dimensions

(Dimensions in mm)

NG 32







1 Main valve
2 Pilot valve
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Cable socket "A"
6 Cable socket "B"
7 Cover for valves with one solenoid
8 Nameplate for pilot valve
9 Nameplate for main valve
10 Pressure reducing valve "D3"
11 Identical seal rings for ports A, B, P and T (R-ring 42.5×3×3 or O-ring 42×3)
12 Identical seal rings for ports X and Y (R-ring 19×3×3 or O-ring 19×3)

Valve fixing screws

The following valve fixing screws are recommended:
- 6 GB / T 70.1 - M20×60 - 10.9
- Tightening torque M_A = 430Nm ± 20%