

AH-4WRA(E)...type Proportional Directional Valve

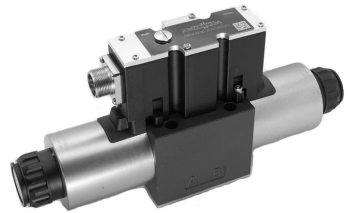
AH-4WRA and AH-4WRAE...type

Size 6, 10

Max. Working Pressure: 315 bar

Max. Flow: 42 L/min (size 6)

75 L/min (size 10)



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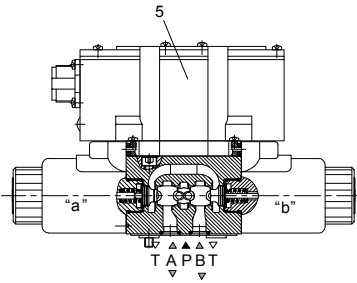
Features

- Direct operated proportional directional valve to control the direction and magnitude of a flow
- For subplate mounting: Porting pattern conforms to ISO4401
- Actuation by means of proportional solenoids with central thread and removable coil
- Spring centred control spool
- Control electronics AH-4WRAE...20S: integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
AH-4WRA...20S: available module amplifier

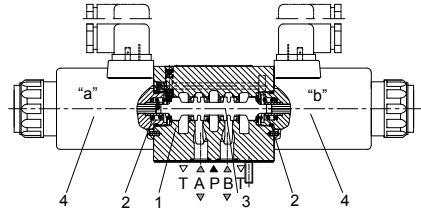
Function and configurations

AH-4WEA(E) type proportional valve in 4/2-way and 4/3-way is designed as a direct operated components for subplate mounting. It is actuated by proportional solenoids with central thread and removable coil. The solenoids are controlled either by external control electronics (type AH-4WRA...20S) or by integrated control electronics (type AH-4WRAE...20S).

The valve consists of Housing (1) with mounting surface, Control spool (3) with compression springs(2), Solenoids (4) with central thread, Optional integrated electronics (5) With the solenoids (4), de-energised, the control spool (3) is held in the central position by the compression springs (2). Direct operation of the control spool (3) by energising one of the proportional solenoids(4) e.g. control of solenoid right, then movement of the control spool (3) to the left in proportion to the electrical input signal, and connection from P to A and B to T via orifice-like crosssections with progressive flow characteristics.

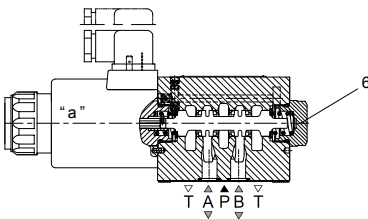


Type AH-4WRAE 6...-20S/...

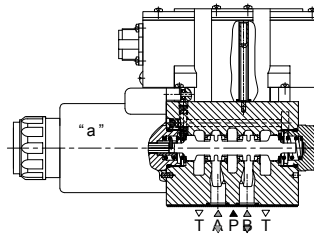


Type AH-4WRA 10...-20S/...

AH-4WRA(E)...A-20S the 2 switched position valves are however only fitted with solenoid "a". A plug (6) is fitted in place on the "b" proportional solenoid.



Type AH-4WRA 10...A-20S/...

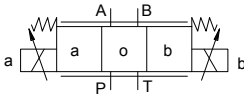


Type AH-4WRAE 10...A-20S/...

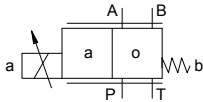
Symbols

Without integrated electronics

Type AH-4WRA...-20S/...

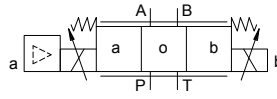


Type AH-4WRA...A-20S/...

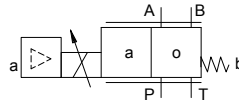


With integrated electronics

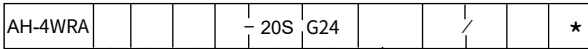
Type AH-4WRAE...-20S/...



Type AH-4WRAE...A-20S/...

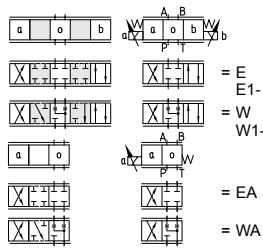


Ordering code



Without integrated = No code
 With integrate = E
 Nominal size 6 = 6
 Nominal size 10 = 10

Spool symbols



□ Transitional symbols

Further information in plain text

V = FKM
 No code = NBR

No code = for AH-4WRA
 Interface A1 or F1 for AH-4WRAE:
 A1= Command value input $\pm 10V$
 F1= Command value input 4 to 20mA

AH-4WRA: Z4= With plug-in connector
 K4= Without plug-in connector
 DT= Without plug-in Deutsch connector
 AH-4WRAE: K31= Without plug-in connector
 Z31= With plug-in connector

No code = Without hand override
 N9 = With protected hand override

Power supply voltage of electric control device:
 G24= Power supply voltage 24VDC

20S = 20S~29S Series
 (20S to 29S, unchanged installation and connection dimensions)

Nominal flow at a valve pressure differential $\Delta P=10\text{bar}$

NG6:	07=	7L/min
	15=	15L/min
	30=	26L/min
NG 10:	30=	30L/min
	60=	60L/min

Technical data

1. Hydraulic					
Installation			Optional, preferably horizontal		
Nominal size			6	10	
Weight	AH-4WRA...20S	Kg	2.0	6.6	
	AH-4WRAE...20S		2.2	6.8	
Nominal flow Q_{nom} at $\Delta p = 10$ bar			L/min	7,15,26	30,60
Hysteresis			%	≤ 5	
Reversal span			%	≤ 1	
Response sensitivity			%	≤ 0.5	
Max.operating pressure	Ports A, B, P	bar	315		
	Port T	bar	210		
Pressure fluid			Mineral oil (HL, HLP) to DIN 51524 Other pressure fluids on request!		
Ambient air temperature range	AH-4WRA...20S	°C	-20°C to 70°C (-4° F to 158° F)		
	AH-4WRAE...20S	°C	-20°C to 50°C (-4° F to 122° F)		
Viscosity range			mm ² /s	20 to 380 (preferably 30 to 46)	
Fluid Cleanliness Class			NAS1638 class9 or ISO 4406 class 20/18/15		

2. Electrical					
1) Solenoid data					
Voltage type			DC		
Command value signal for AH-4WRAE			±10V or 4 ~ 20mA		
Max.current per solenoid		A	2.5	1.5	0.8
Solenoid coil resistance	Cold value at 20°C	Ω	2	4.8	19.5
	Max.warm value		3	7.2	28.8
Duty		%	ED100%		
Max.coil temperature		°C	150		
Valve protection to EN 60529			IP 65		
2) Control electronics					
Amplifier	AH-4WRA...20S	AH-VT-VSPA2-...-20S			
	AH-4WRAE...20S	Integrated in the valve(OBE)			
Supply voltage	Nominal voltage	VDC	24		
	Lower limiting value	V	21/22(AH-4WRA), 19(AH-4WRAE)		
	Upper limiting value	V	35		
Amplifier power consumption	I_{max}	A	<1.8		
	Impulse current	A	3		

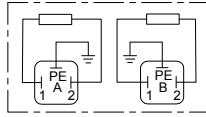
Electrical connections, plug-in connectors

nominal dimensions in mm

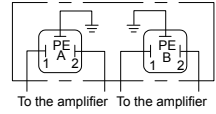
For type AH-4WRE...20S (without integrated electronics)

Connections on the component plug

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



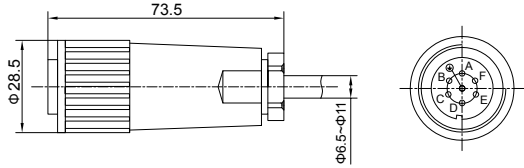
Connections on the plug-in connector



For type AH-4WRAE...20S (with integrated electronics (OBE))

For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804



Integrated control electronics for type AH-4WRAE

Component plug allocation

	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC (U(t)=19V to 35V)	
	B	GND	
	C	n.c. ¹⁾	
Differential amplifier input	D	$\pm 10V, R_e > 50K\Omega$	4 to 20mA, $R_e > 100\Omega$
	E	reference potential command value	
	F	n.c. ¹⁾	

Connection cable:

Recommended:
 - up to 25 m cable length type LiYCY 7x0.75 mm²;
 - up to 50 m cable length type LiYCY 7x1.0 mm².
 For outside diameter see plug-in connector sketch.
 Only connect screen to PE on the supply line.

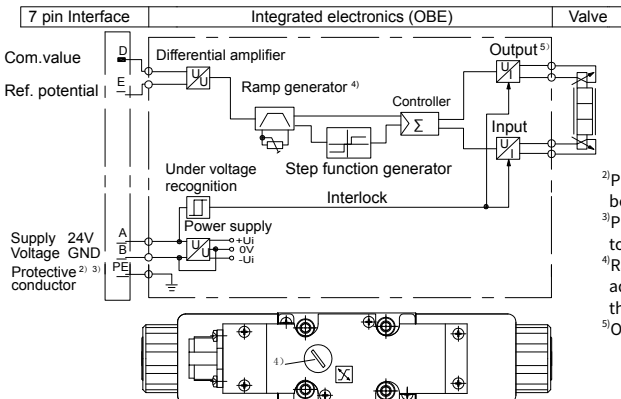
¹⁾ Contacts C and F must not be connected!

Command value:

A positive command value 0 to +10 V (or 12 to 20 mA) at D and the reference potential at E results in a flow from P to A and B to T. A negative command value 0 to -10 V (or 12 to 4 mA) at D and the reference potential at E results in a flow from P to B and A to T.

For a valve with 1 solenoid on side (e.g. spool variants EA and WA) a positive command value at D and the reference potential at E results in a flow from P to B and A to T.

Integrated electronics (OBE) for type AH-4WRAE...20S



²⁾ PE is connected to the cooling body and the valve housing!

³⁾ Protective conductor screwed to the valve housing and cover.

⁴⁾ Ramp can be externally adjusted from 0 to 2.5s, the same applies for T_{up} and T_{down}.

⁵⁾ Output stages current regulated.

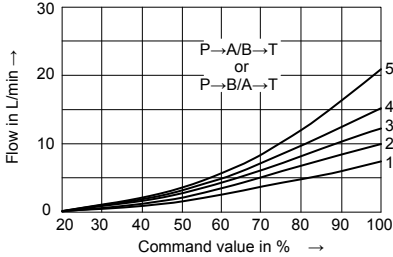
Characteristic curves

(measured with HLP46, $\vartheta_{oil}=40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

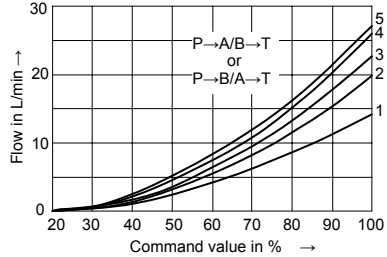
· Type AH-4WRAE (NG 6 and 10)

NG 6

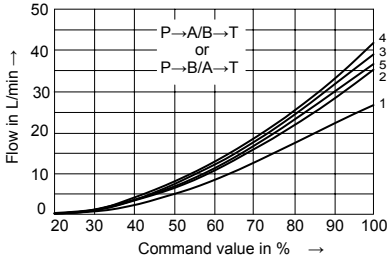
7 L/min nominal flow at a 10 bar valve pressure differential



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



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

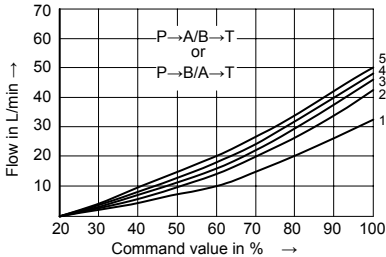


- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

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

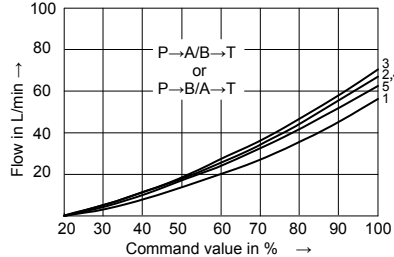
NG 10

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



- 1 $\Delta p=10\text{bar}$ constant
- 2 $\Delta p=20\text{bar}$ constant
- 3 $\Delta p=30\text{bar}$ constant
- 4 $\Delta p=50\text{bar}$ constant
- 5 $\Delta p=100\text{bar}$ constant

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



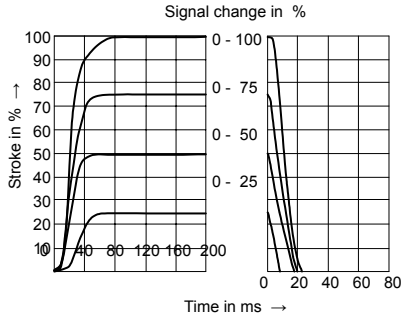
Δp =Valve pressure differential
(inlet pressure p_p minus load pressure p_L minus return pressure p_r)

Characteristic curves

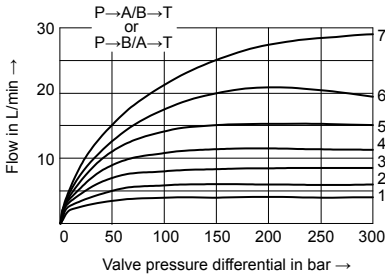
(measured with HLP46, $\vartheta_{oil} = 40^{\circ}\text{C} \pm 5^{\circ}\text{C}$)

NG 6

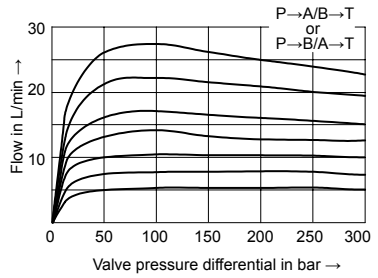
Transient function with a stepped form of electrical input sign



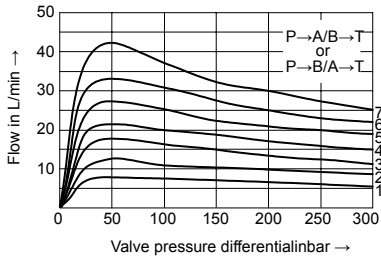
Performance limit, nominal flow 7 l/min



Performance limit, nominal flow 15 l/min



Performance limit, nominal flow 30 l/min



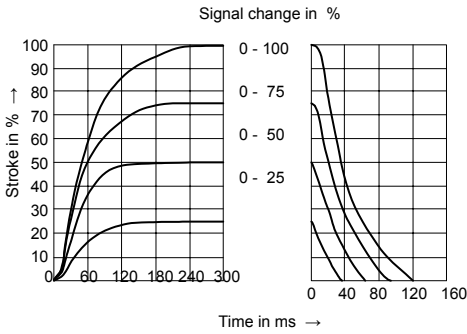
1. Com. value = 40 %
2. Com. value = 50 %
3. Com. value = 60 %
4. Com. value = 70 %
5. Com. value = 80 %
6. Com. value = 90 %
7. Com. value = 100 %

Characteristic curves

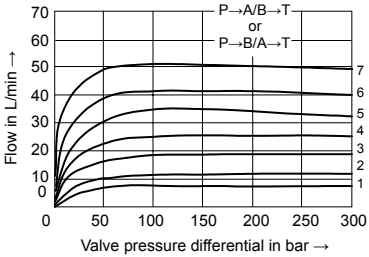
(measured with HLP46, $\vartheta_{oil} = 40^\circ\text{C} \pm 5^\circ\text{C}$)

NG 10

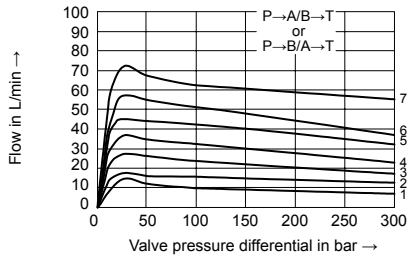
Transient function with a stepped form of electrical input sign



Performance limit, nominal flow 30l/min



Performance limit, nominal flow 60 l/min

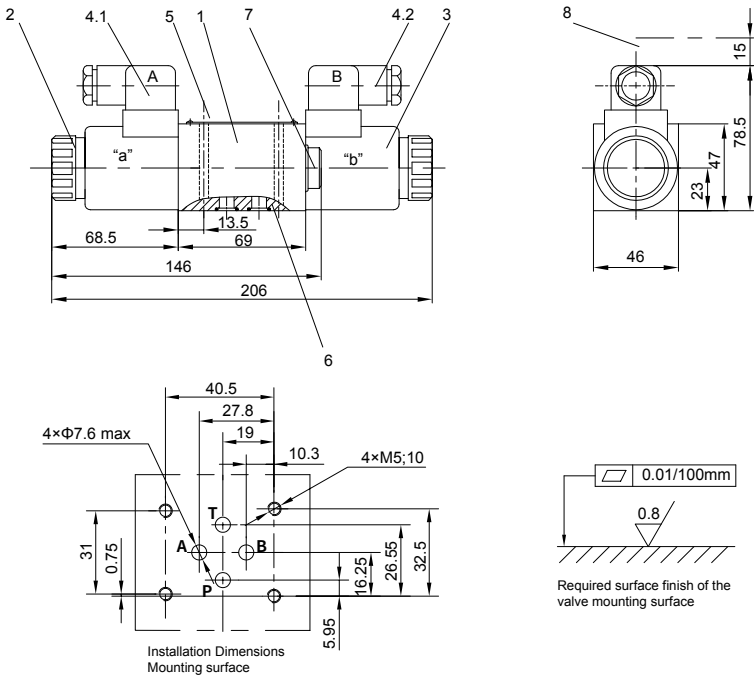


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- 2.Com. value = 50 %
- 3.Com. value = 60 %
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- 5.Com. value = 80 %
- 6.Com. value = 90 %
- 7.Com. value = 100 %

Unit dimensions Type

(nominal dimensions in mm)

AH-4WRA6...20S

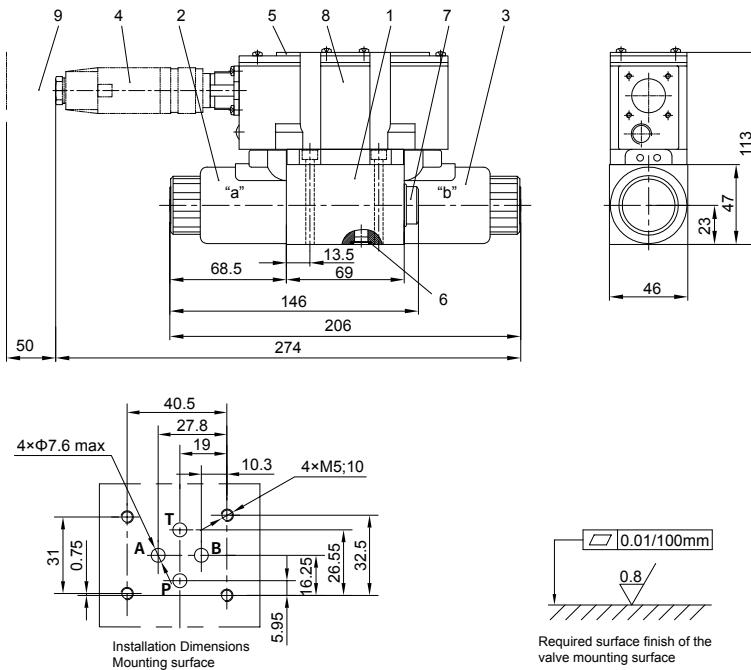


- 1 Valve housing
- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Identical seal rings for ports A, B, P and T
(R-ring 9.81 × 1.5 × 1.78 or O-ring 9.25 × 1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type AH-4WRAE6...20S

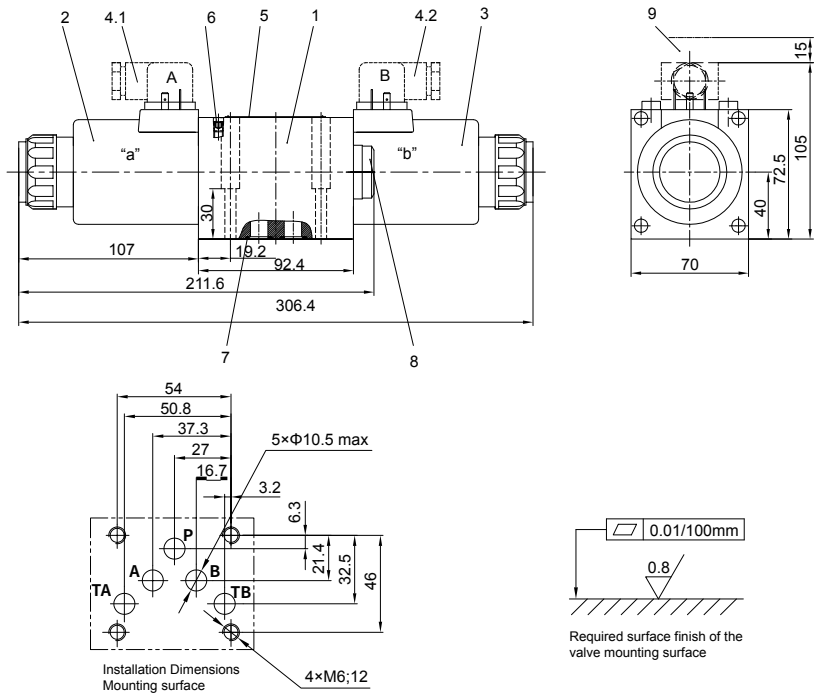


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(R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
- 7 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 8 Integrated electronics (OBE)
- 9 Space required to remove
the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type AH-4WRA10...20S

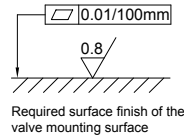
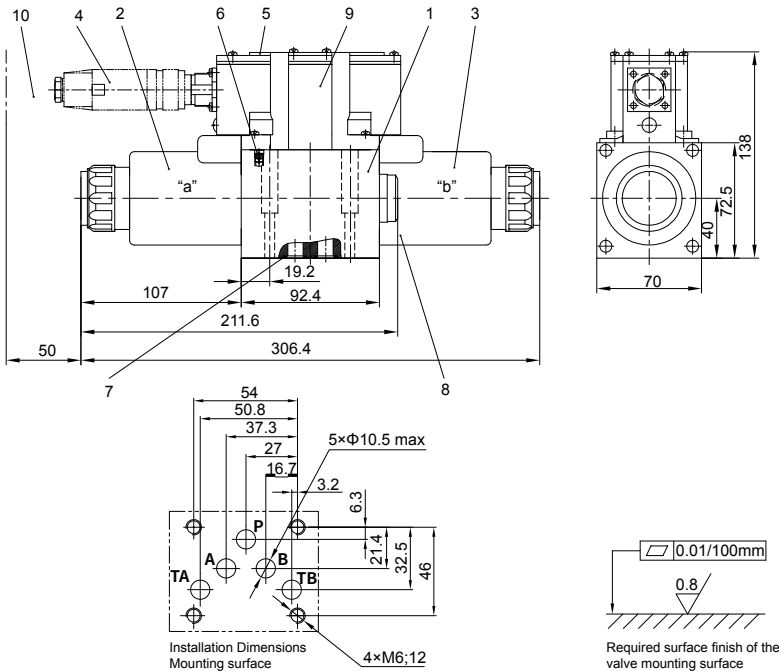


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- 2 Proportional solenoid "a"
- 3 Proportional solenoid "b"
- 4.1 Plug-in connector "A"
- 4.2 Plug-in connector "B"
- 5 Name plate
- 6 Valve bleed screw
- 7 Identical seal rings for ports A, B, P and T
(R-ring 13×1.6×2 or O-ring 12×2)
- 8 Plug for valves with one solenoid
(2 switching positions, versions EA or WA)
- 9 Space required to remove the plug-in connector

Unit dimensions

(nominal dimensions in mm)

Type AH-4WRAE10...20S



- 1 Valve housing
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