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

AH-4WRE and AH-4WREE...type

Size 6, 10
Max. Working Pressure: 315 bar
Max. Flow: 80 L/min (size 6)
180 L/min (size 10)

Contents

Features

- Direct operated proportional directional valve with electrical position feedback
- Closed loop control of the direction and size of a flow
- Operation is by proportional solenoids with a central thread and removable coil
- For subplate mounting: Porting pattern conforms to ISO 4401
- Spring centred control spool
- Integrated electronics (OBE) with voltage input or current input (A1 resp. F1)
- AH-4WRE separate order: analogue module amplifier

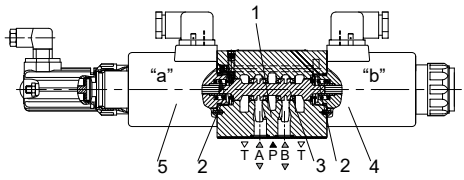
Function and configurations

AH-4WRE(E) type proportional valve is designed as direct operated devices in plate design. Operation is effected by proportional solenoids with cenrtal thread and detachable coil. The solenoids are optionally controlled by either external electronics (type AH-4WRE) or by the integrated electronics (type AH-4WREE). The valve consists of Housing (1), Compression springs (2), Control spool (3), and Solenoid (4 and 5) with central thread, Solenoid(5) with position transducer and optional integrated control electronics (6).

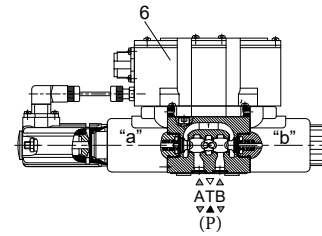
In the de-energised condition the spool (3) is held in a mechanical centre position by the solenoid return springs (2).

– 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, 5) 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.

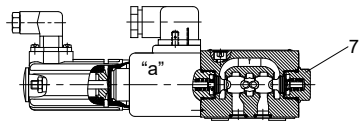


Type AH-4WRE 10...-20S/...

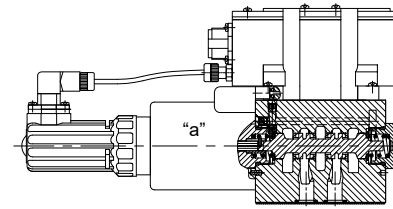


Type AH-4WREE 6...-20S/...

AH-4WRE(E)...A-20S the 2 switched position valves are however only fitted with solenoid "a". A plug (7) is fitted in place on the "b" proportional solenoid.



Type AH-4WRE 6...A-20S/...

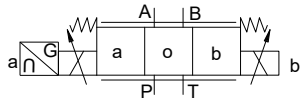


Type AH-4WREE 10...A-20S/...

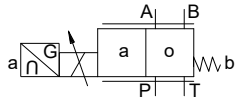
Symbols

Without integrated electronics

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

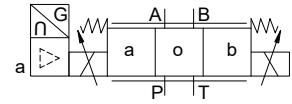


Type AH-4WRE...A-20S/...

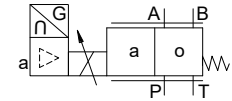


With integrated electronics

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



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



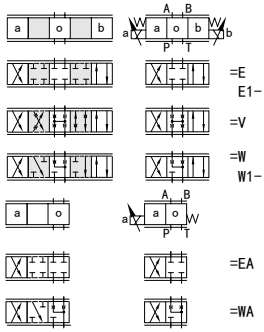
Ordering code

AH-4WRE | | | | – 20S / G24 | / | | *

Without integrated =No code
With integrate = E

Nominal size 6 =6
Nominal size 10 =10

Spool symbols



☐ Transitional symbols

With symbols E1 -and W1-: P → A: $q_{v\,max}$ B → T: $q_v/2$
P → B: $q_v/2$ A → T: $q_{v\,max}$

Further information in plain text

V = FKM
No code = NBR

No code = For AH-4WRE:
Interface A1 or F1 for AH-4WREE:
A1= Command value input ±10V
F1= Command value input 4 to 20mA

AH-4WRE: Z4= With plug-in connector
K4= Without plug-in connector
AH-4WREE: K31= Without plug-in connector
Z31= With plug-in connector

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

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

Nominal flow at a valve pressure differential ΔP=10bar

NG 6:	08=	8L/min
	16=	16L/min
	32=	32L/min
NG 10:	25=	25L/min
	50=	50L/min
	75=	75L/min

Technical data

1. Hydraulic				
Installation			Optional, preferably horizontal	
Nominal size			6	10
Weight	AH-4WRE...20S	Kg	2.2	6.3
	AH-WREE...20S		2.4	6.5
Nominal flow q_{nom} at Δp = 10 bar		L/min	8, 16, 32	25, 50, 75
Hysteresis		%	⩽ 0.1	
Reversal span		%	⩽ 0.05	
Response sensitivity		%	⩽ 0.05	
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				
Nominal size			6	10
Voltage type			DC	
Command value signal for AH-4WREE			±10V or 4 ~ 20mA	
Max.current per solenoid		A	2.5	
Solenoid coil resistance	Cold value	Ω	2.7	3.7
	Max.warm value		4.05	5.55
Duty		%	ED100%	
Max.coil temperature		°C	150	
Valve protection to EN 60529			IP 65	
2) Control electronics				
Amplifier	AH-4WRE...20S		AH-VT-VSPA2-...-20S	
	AH-4WREE...20S		integrated in the valve(OBE)	
Supply voltage	Nominal voltage	VDC	24	
	Lower limiting value	V	19.4	
	Upper limiting value	V	35	
Amplifier power consumption	Imax	A	< 2	
	Impulse current	A	3	

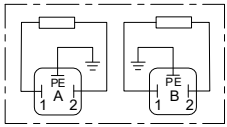
Electrical connections, plug-in connectors

nominal dimensions in mm

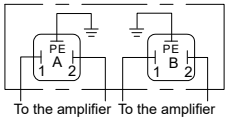
· **For type AH-4WRE...20S** (without integrated electronics)

Connections on the component plug

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



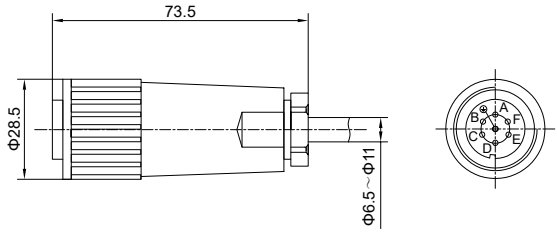
Connections on the plug-in connector



· **For type AH-4WREE...20S** (with integrated electronics (OBE))

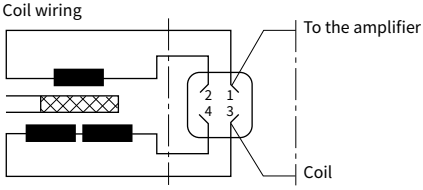
For pin allocation also see block circuit diagram.

Plug-in connector to DIN EN 175201-804

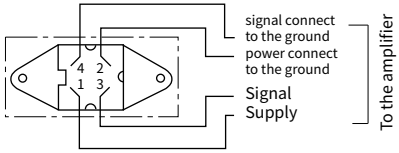


· **Inductive position sensor**

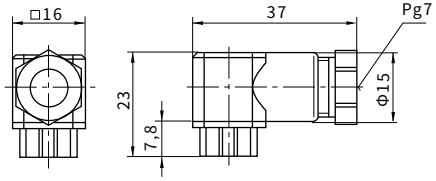
Coil wiring



connect to the plug



Plug connector 4 pin Pg7-G4W1F
Connecting cables:
Recommend: For cables up to 50 m in length,
Please use a cable of type LiYCY 4×0.25 mm²
Connect the shield to the PE only on the supply side.



Integrated control electronics for type AH-4WREE

Component plug allocation

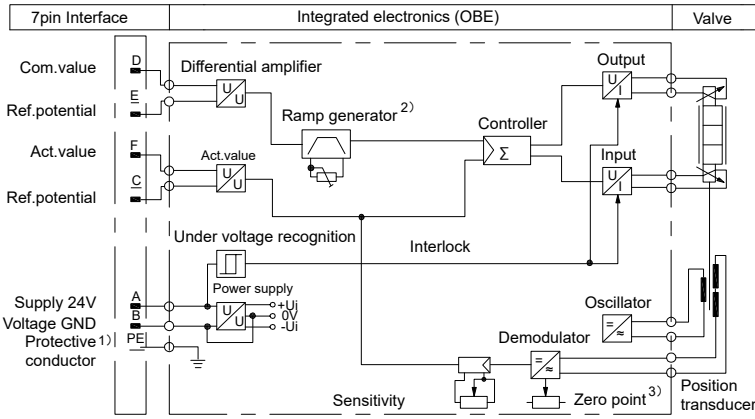
	Contact	Interface A1 signal	Interface F1 signal
Supply voltage	A	24 VDC(U(t)=19.4V to 35V), I_{max} =2A	
	B	0V	
Reference potential (actual value)	C	ref.contact F, Re>50KΩ	ref.contact F, Re<10Ω
Differential amplifier input	D	±10V, Re>50KΩ	4 to 20mA, Re>100Ω
	E	Reference potentional command value	
Measurement output (actual value)	F	±10 V actual value (limiting load 5 mA)	4 to 20 mA actual value, load resistance max.300Ω
	PE	Connected with cooling body and valve housing	

Command value: A positive command value 0 to +10V (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 –10V (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 a (e.g. spool variants EA and WA) a positive command value at D and the referencepotential at E results in a flow from P to B and A to T.

Actual value: A positive actual value 0 to +10V (or 12 to 20mA) at F and the reference potential at C results in flow from P to A and B to T,
A negative actual value 0 to –10V (or 4 to 12mA) at F and the reference potential at C results in flow from P to B and A to T.
With valves with 1 solenoid, a positive actual valueat F and referencepotential at C results in flow from P to B and A to T.

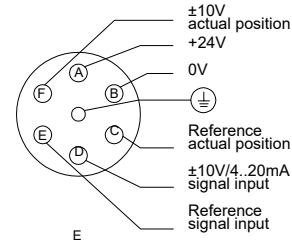
Connection cable: Recommended: – up to 25 m cable length type LiYCY 7×0.75 mm²
– up to 50 m cable length type LiYCY 7×1.0 mm²
For outside diameter see plug-in connector sketch
Only connect screen to PE on the supply line.

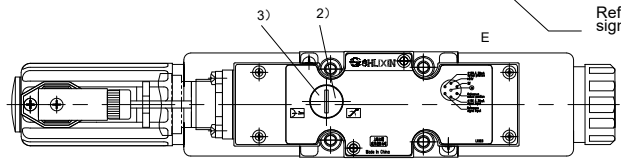
Integrated electronics (OBE) for type AH-4WREE...20S



Integrated control electronics for type AH-4WREE

1) The protective conductor (PE) is connected to the cooling body and the valve housing!
2) The ramp is externally adjustable from 0 to 2.5 s, the same applies for T_{up} and T_{down}.
3) Zero point is externally adjustable.



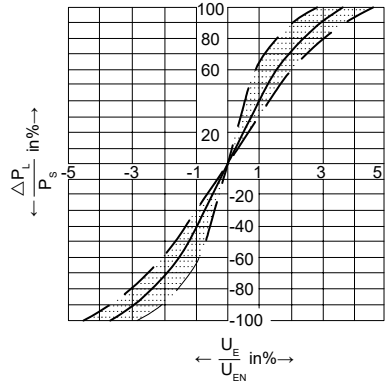


Characteristic curves (measured with HLP46, ϑ_{oil}=40°C ±5°C)

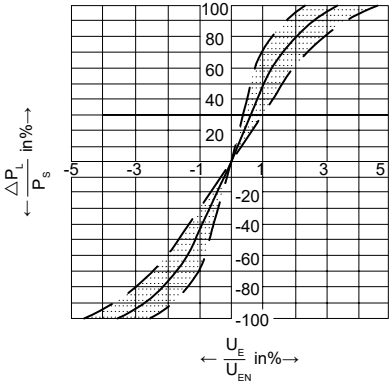
· Type AH-4WREE (NG 6 and 10)

Pressure-signal-characteristic curves (V spool, Ps = 100 bar)

NG 6

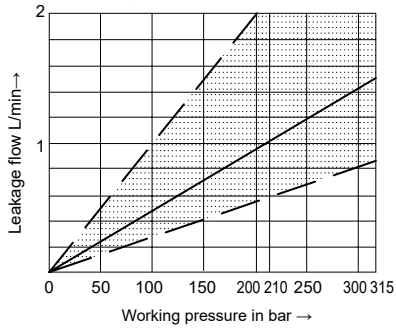


NG 10

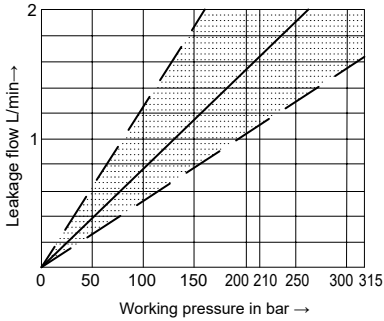


Leakage flow with the spool in the central position

Type AH-4WREE6 V32



Type AH-4WREE10 V75

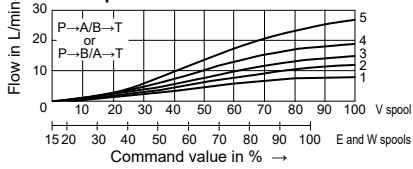


Characteristic curves (measured with HLP46, ϑ_{oil}=40°C ±5°C , P=100bar)

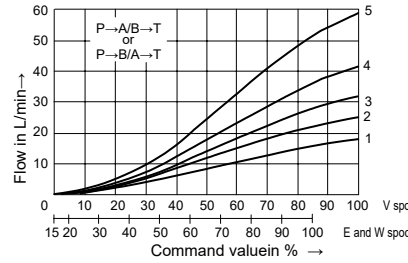
·Type AH-4WREE (NG 6 and 10)

NG 6

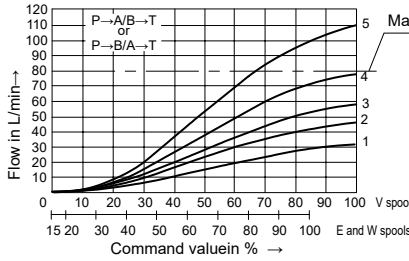
8L/min nominal flow at a 10 bar valve pressure differential



16L/min nominal flow at a 10 bar valve pressure differential



32L/min nominal flow at a 10 bar valve pressure differential

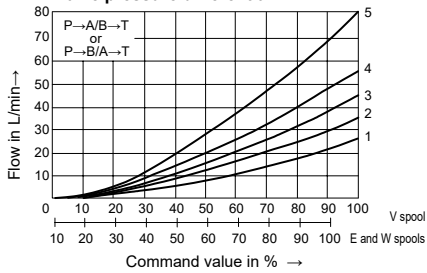


1 Δp=10bar constant
2 Δp=20bar constant
3 Δp=30bar constant
4 Δp=50bar constant
5 Δp=100bar constant

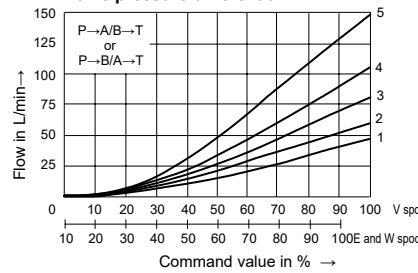
Δp=Valve pressure differential (inlet pressure p_p minus load pressure p_L minus return pressure p_T)

NG 10

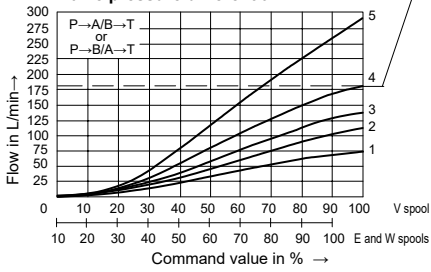
25L/min nominal flow at a 10 bar valve pressure differential



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



75L/min nominal flow at a 10 bar valve pressure differential

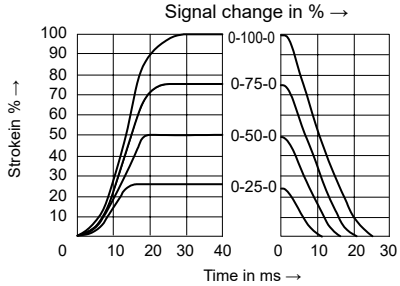


1 Δp=10bar constant
2 Δp=20bar constant
3 Δp=30bar constant
4 Δp=50bar constant
5 Δp=100bar constant

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

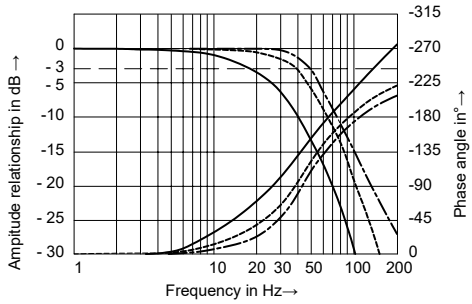
Characteristic curves (measured with HLP46, ϑ_{oil}=40°C ±5°C , P=100bar)

· Type AH-4WREE (NG 6)



Transient function with a stepped form of electrical input signal

4/3 valve version,
Spool symbol “E”



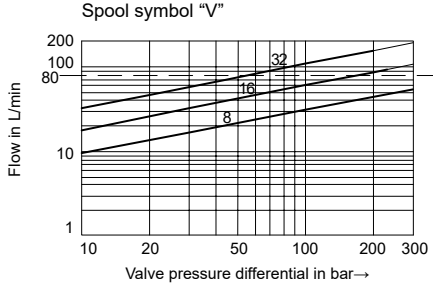
Frequency response characteristic curves

4/3 valve version,
Spool symbol “V”

—·— Signal±10%
------ Signal±25%
—— Signal±100%

Flow-pressure differential curve

Load function with maximum valve opening.
Nominal flows 8, 16 and 32 L/min.
Spool symbol “V”



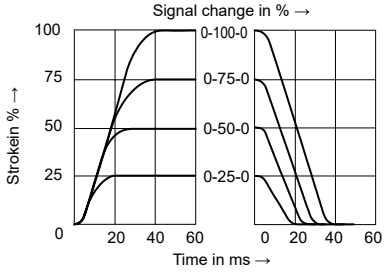
Max.permissible flow

P→A/B→T
or

Take the maximum permissible flow of 80 L/min into account!

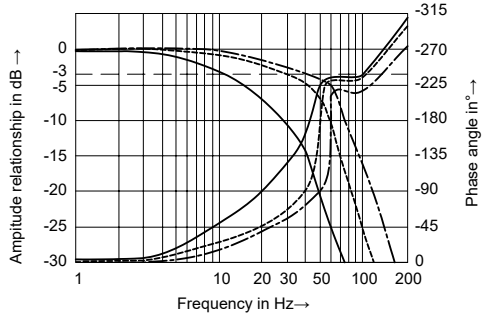
Characteristic curves (measured with HLP46, ϑ_{oil}=40°C ±5°C , P=100bar)

· Type AH-4WREE (NG 10)



Transient function with a stepped form of electrical input signal

4/3 valve version,
Spool symbol “E”



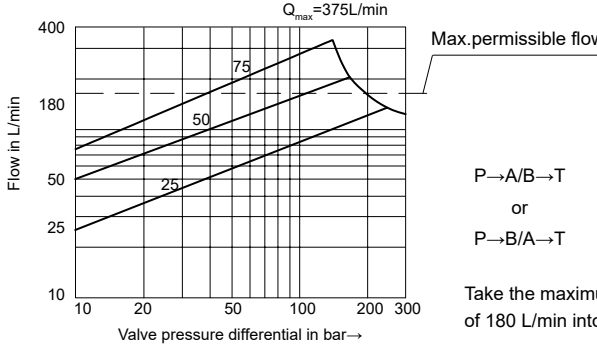
Frequency response characteristic curves

4/3 valve version,
Spool symbol “V”

—·— Signal±10%
---------- Signal±25%
—— Signal±100%

Flow-pressure differential curve

Load function with maximum valve opening.
Nominal flows 25, 50 and 75 L/min.
Spool symbol “V”



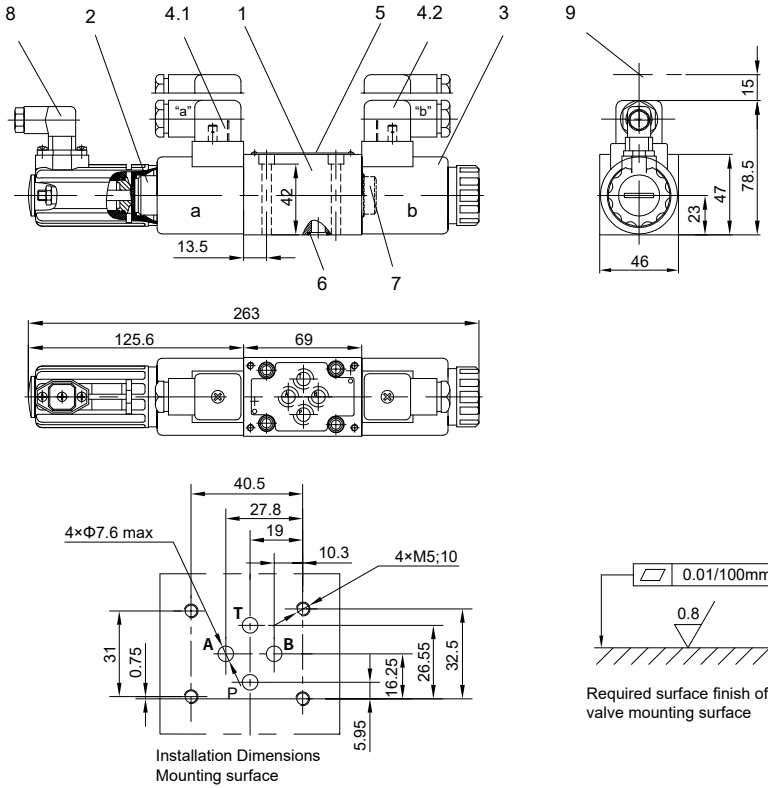
P→A/B→T
or
P→B/A→T

Take the maximum permissible flow of 180 L/min into account!

Unit dimensions

(nominal dimensions in mm)

Type AH-4WRE6...20S

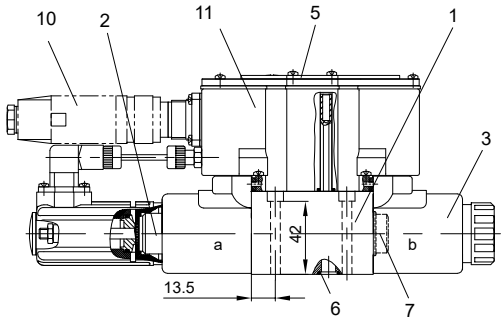


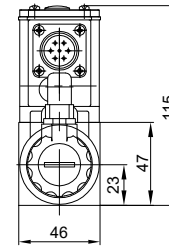
1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
4.1 Plug-in connector "A"
4.2 Plug-in connector "B"
5 Name plate
6 Identical seal rings for ports A, B, P and T (R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
7 Plug for valves with one solenoid (2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

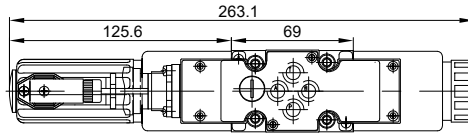
Unit dimensions

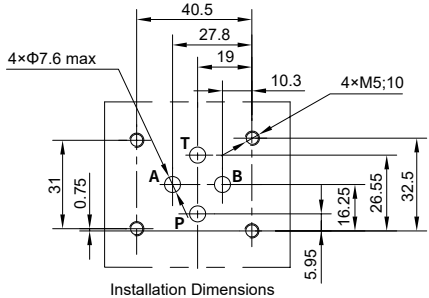
(nominal dimensions in mm)

Type AH-4WREE6...20S

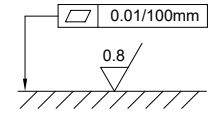








Installation Dimensions
Mounting surface



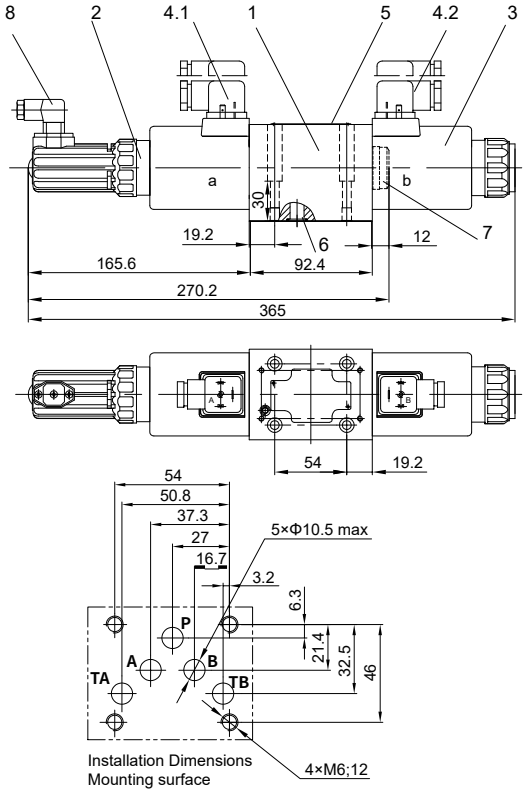
Required surface finish of the valve mounting surface

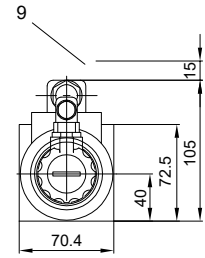
1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
5 Name plate
6 Identical seal rings for ports A, B, P and T (R-ring 9.81×1.5×1.78 or O-ring 9.25×1.78)
7 Plug for valves with one solenoid (2 switching positions, versions EA or WA)
10 Plug-in connector
11 Integrated electronics (OBE)

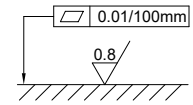
Unit dimensions

(nominal dimensions in mm)

Type AH-4WRE10...20S







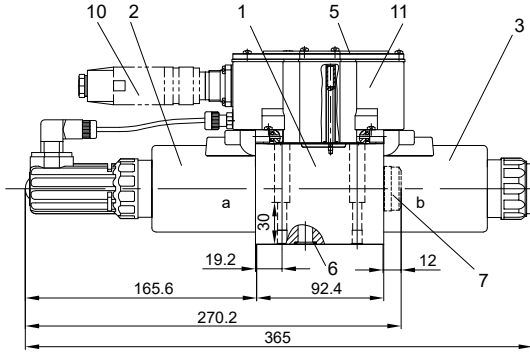
Required surface finish of the valve mounting surface

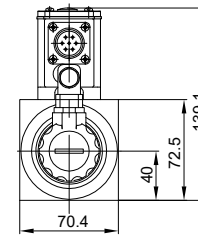
1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
4.1 Plug-in connector "A"
4.2 Plug-in connector "B"
5 Name plate
6 Identical seal rings for ports A, B, P and T (R-ring 13×1.6×2 or O-ring 12×2)
7 Plug for valves with one solenoid (2 switching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

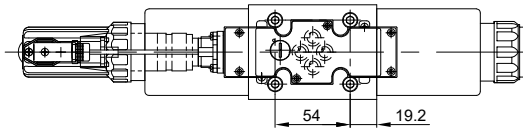
Unit dimensions

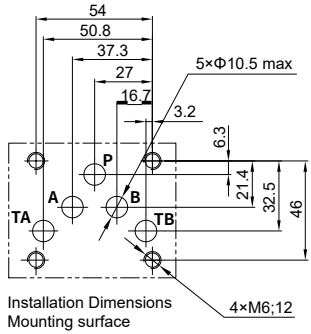
(nominal dimensions in mm)

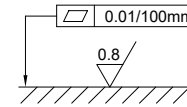
Type AH-4WREE10...20S











1 Valve housing
2 Proportional solenoid "a" with inductive position transducer
3 Proportional solenoid "b"
4 Name plate
5 Identical seal rings for ports A, B, P and T (R-ring 13×1.6×2 or O-ring 12×2)
6 Plug for valves with one solenoid (2 switching positions, versions EA or WA)
7 Plug-in connector
8 Integrated electronics (OBE)