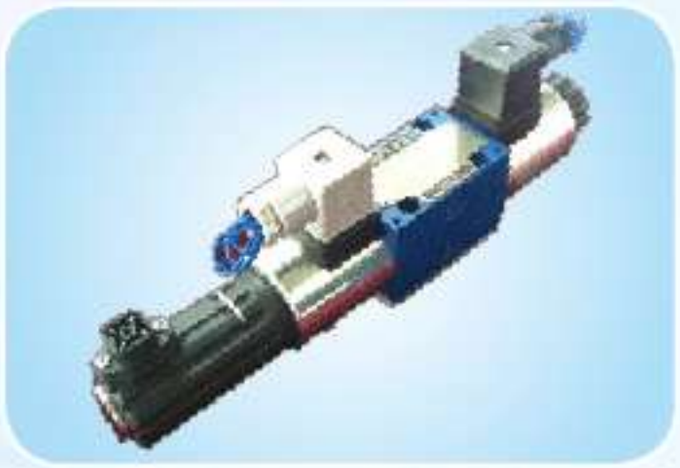




Huade

Hydraulic valves



New Series Proportional Valves
New Series Electronics







Catalogue

BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.

contents

Proportional Directional Valves

No.	Name	Type	Size	Pressure max(MPa)	page
1	Proportional directional valve	HD-4WRA(E)...-2X	6, 10	31.5	1
2	Proportional directional valve	HD-4WRE(E)...-2X	6, 10	31.5	16
3	Proportional directional valve	HD-4WRZ(E)-7X/	10, 16, 25, 32	35	30
4	Proportional directional valve	HD-4WRKE-3X/	10, 16, 25, 32, 35	35	47

Proportional Pressure Valves

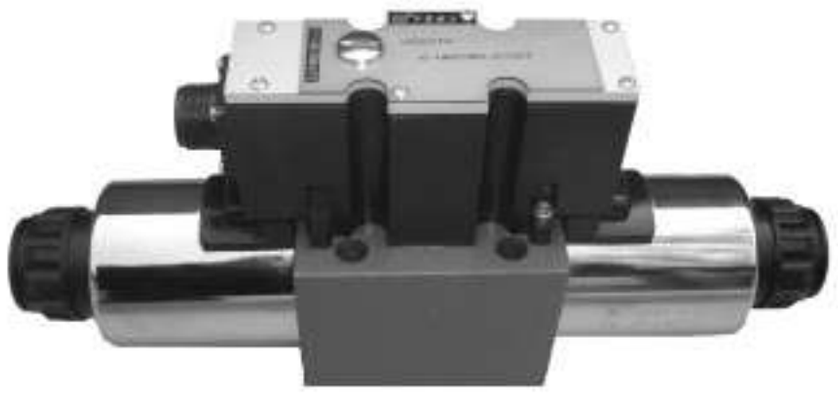
No.	Name	Type	Size	Pressure max(MPa)	page
1	Proportional pressure reducing valve of 3-way design	HD-3DREP and HD-3DREPE	6	10	67
2	Proportional pressure relief valve	HD-(Z)DBE and HD-(Z)DBEE	6	31.5	76

Amplifier for Proportional Valves

No.	Name	Type	Suitable for	page
1	Electrical amplifier	HD-VT-VRPA2-.-1X	HD-4WRE6, HD-4WRE10	87
2	Electrical amplifier	HD-VT-VSPA2-1-1X	HD-4WRA6, HD-4WRA10	96
3	Electrical amplifier	HD-VT-VSPA2-50-1X	HD-3DREP6	103
4	Electrical amplifier	HD-VT-VSPA1-1 and HD-VT-VSPA1K-1	Proportional Pressure Valves	110

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	HD-4WRA(E)...-2X/proportional directional valve		
	Nominal sizes 6,10	Maximum operating pressure:31.5MPa	Maximum flow 75L/min

- For subplate mounting
- Direct actuated proportional valve for controlling the direction and volume of a flow
- Spring centred control spool
- Integrated control electronics, interface A1 or F1 for type 4WRAE
- Actuation by means of proportional solenoids with central thread and removable coil
- Control electronics for type 4WRA

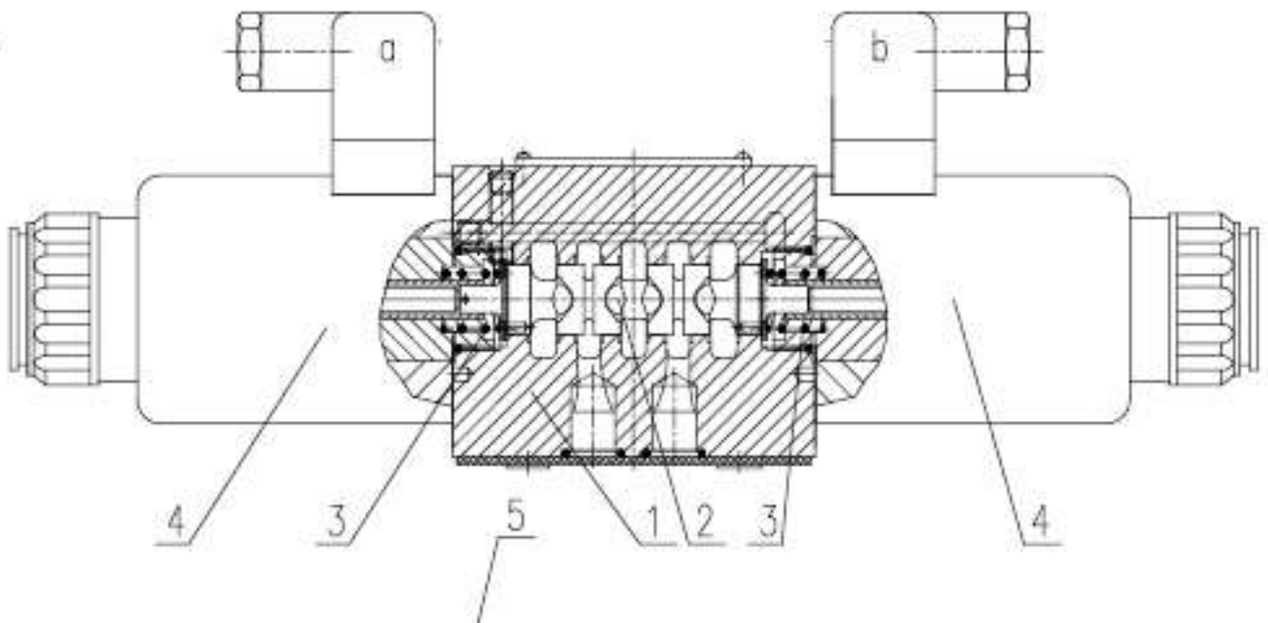


Function, section

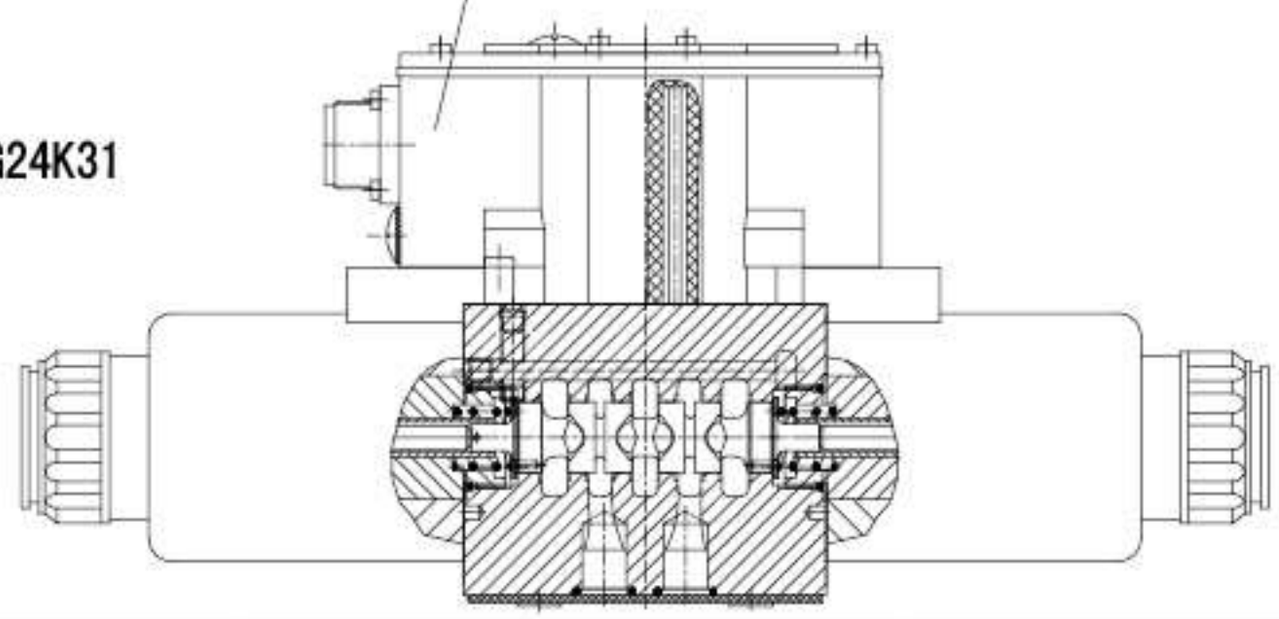
The 4/2- and 4/3-way proportional directional valves are designed as direct operated components for subplate mounting. They are actuated by means of proportional solenoids with central thread and removable coil. The solenoids are controlled either by external control electronics (type WRA) or by integrated control electronics (type WRAE). The valves basically consist of: Housing (1) with mounting surface ,Control spool (2) with compression springs (3),Solenoids (4) with central thread,Optional integrated valve electronics (5).

HD-4WRA(E) ...2X/...
With the solenoids (4) de-energised, the control spool (2) is held in the central position by compression springs (3). Direct actuation of the control spool (2) by energising a proportional solenoid.E.g. controlling of solenoid "b" (4).The control spool (2) is moved to the left in proportion to the electrical input signal.Connection form P to A and B to T via orifice-like cross sections with progressive flow characteristics. De-energisation of the solenoid (4).The control spool (2) is returned to the central position by compression spring (3).

HD-4WRA...-2X/G24K4



HD-4WRAE...-2X/G24K31



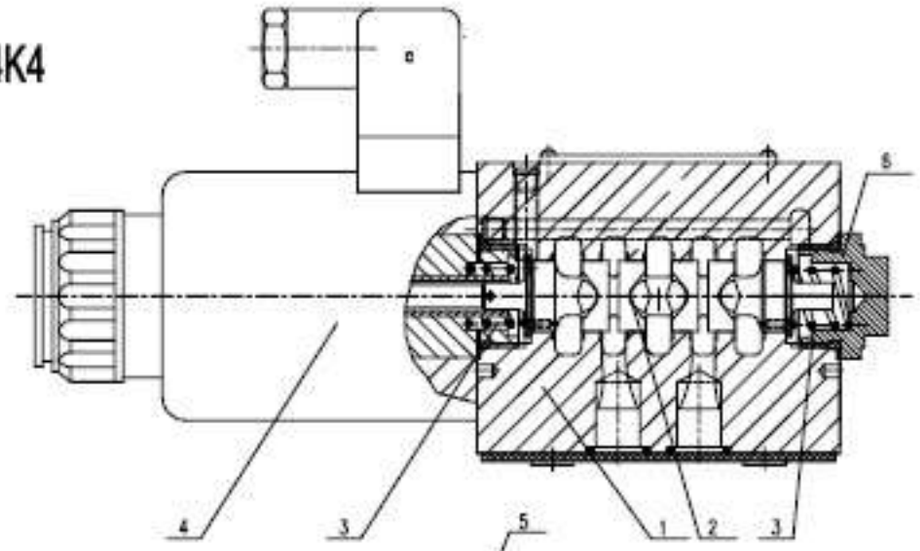
HD-4WRA(E)…A-2X/

In principle, the function of this valve version corresponds to that of the valve with 3 spool positions. However, the valves with 2 spool positions are only fitted with solenoid "a". Instead of the 2nd pro-portional solenoid a plug (5) is fitted for NS 6 or for NS 10 a cover (5).

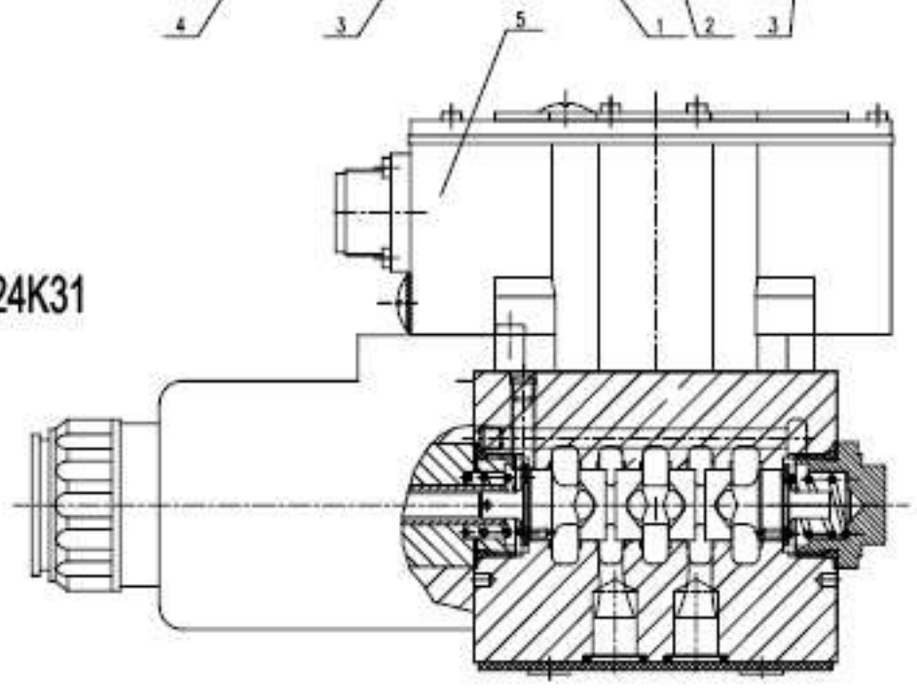
Note for type 4WRA 6…-2X/…:

Draining of the tank line is to be avoided. With the appropriate installation conditions, a back pressure valve is to be installed (back pressure approx. 0.2MPa).

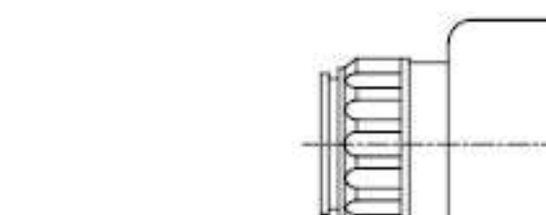
HD-4WRA...A-2X/G24K4



HD-4WRAE...A-2X/G24K31



Symbols

Proportional directional valve without integrated control electronics	Proportional directional valve with integrated control electronics
HD-4WRA····-2X/···	**HD-4WRAE····-2X/···**
	
HD-4WRA···A-2X/···	**HD-4WRAE···A-2X/···**
	

Ordering details

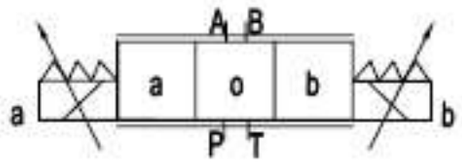
HD - 4WRA | | | | | - 2X / G24 | / | | *

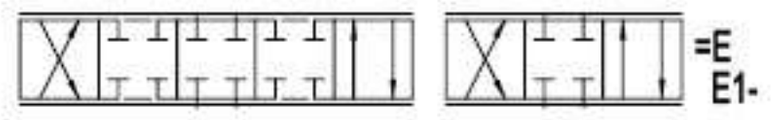
BEIJING HUADE HYDRAULIC=HD

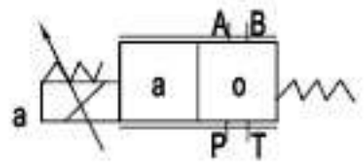
Without integrated control electronics	=No Code
With integrated control electronics	=E

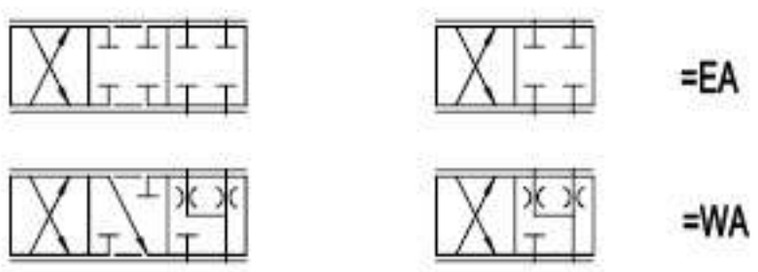
Nominal size 6	=6
Nominal size 10	=10

Symbols









With symbols E1- and W1-:

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

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

Note:

With spools W and WA in the neutral position there is a connection from A to T and B to T witn approx.3% of the relevant nominal cross-section.

Further details in clear text

No code =	NBR seals
V =	FKM seals

NO Code =	FOR WRA
	FOR WRAE:
A1 =	Command value input ± 10 V
F1 =	Command value input 4 to 20 mA

K4 =	With component plug(for WRA)
K31 =	With component plug(for WRAE)

G24 = Supply voltage 24 VDC

2X = Series 20 to 29

(20 to 29: unchanged installation and connection dimensions)

Nominal flow at a valve pressure differential Δp = 1Mpa	
NS6	
07=	7L/min
15=	15L/min
30=	26L/min
NS10	
30=	30L/min
60=	60L/min

Technical data

Hydraulic

Valve type		HD-WRA	HD-WRAE
Operating pressure :MPa	Port A、P、B	31.5	31.5
	Ports T	21	21
Nominal flow $q_{v\ nom}$ at ΔP=1MPa	NS6 （L/min）	7、15 and 26	
	NS10 （L/min）	30 and 60	
Degree of contamination （μm）		≤20	
Hysteresis （%）		≤5	
Reversal error（%）		≤1	
Response sensitivity（%）		≤0.5	
Pressure fluid		Mineral oil or Phospate ester	
Viscosity range（mm^2/s）		20~380	
Ambient temperature range （℃）		-20 to +80	-20 to +50
Weight （Kg）	NS6	2.0	2.2
	NS10	6.6	6.8

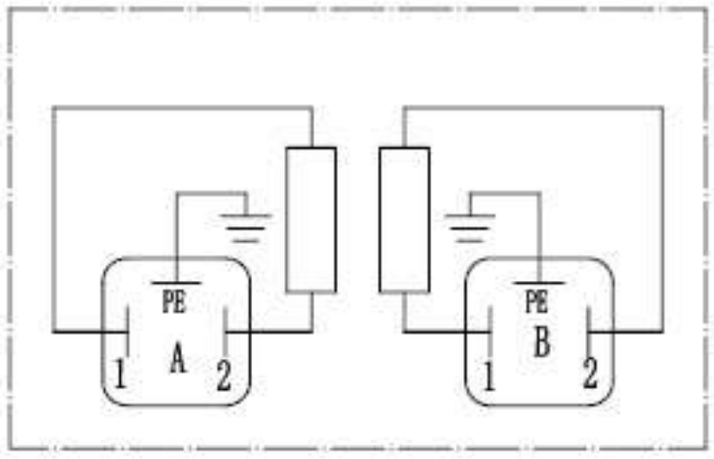
Electrical

Electrical,solenoid			
Valve type		HD-WRA	HD-WRAE
Voltage type		DC	
Voltage controlled（V）		±10	
Max. current per solenoid（A）		2.5	
Solenoid coil resistance（Ω）	Cold value at 20 ℃	2	
	Max. warm value	3	
Duty		100%	
Coil temperature（℃）		up to150	
Valve protection to DIN40050		IP65	
Electrical, control electronics			
control electronics		HD-VT-VSPA2-1-1X/	integrated in the valve
Supply voltage	Nominal voltage VDC	24	
	Lower limiting value V	21/22	19
	Upper limiting value V	35	
Power consumption of the amplifier	Imax A	1.8	
	Max. power impulse current A	3	

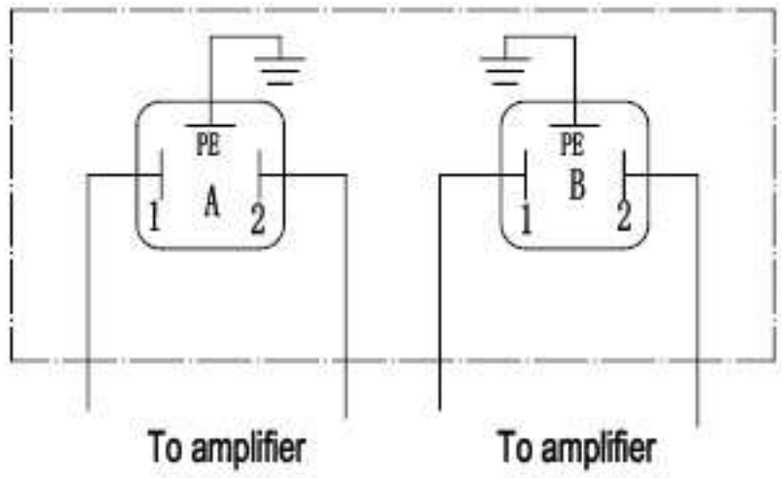
Electrical connection, plug-in connectors

For type 4WRA
(without integrated electronics)

Connection on component plug

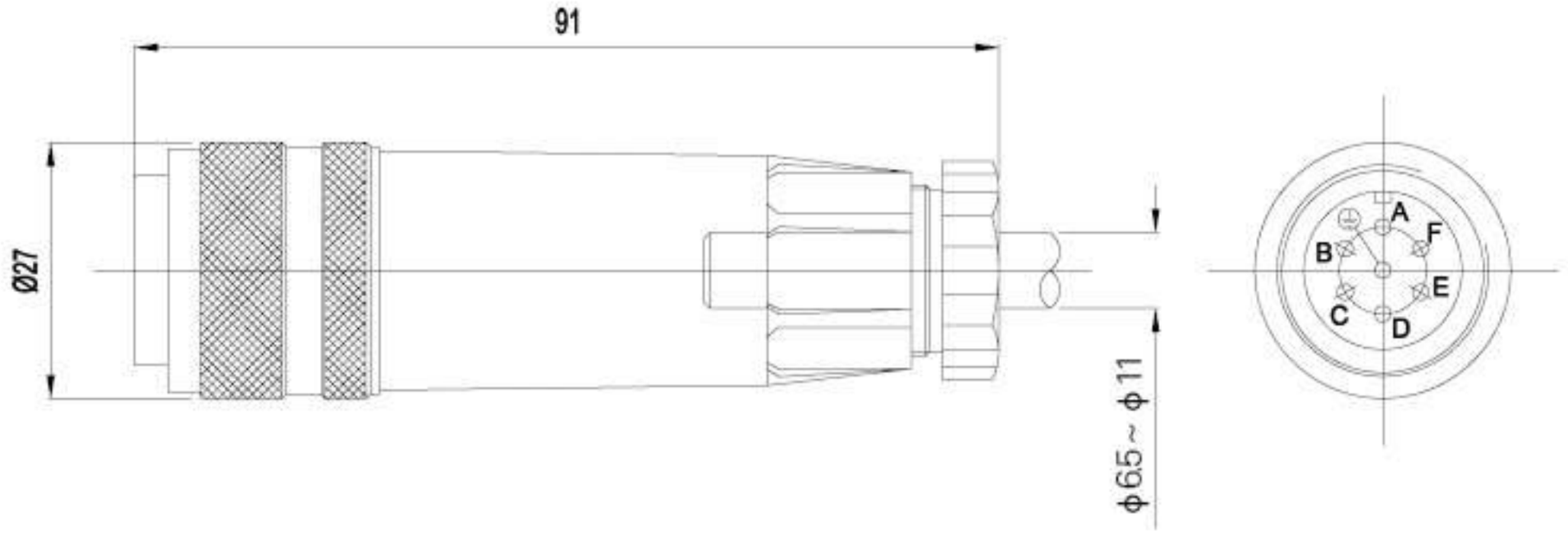


Connection on plug-in connector



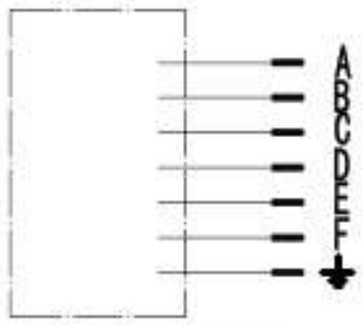
For type 4WRAE
(with integrated electronics)

Plug-in connector to E DIN 43 563-BF6-3/
Separate order, plastic version



Integrated control electronics for type 4WRAE

Pin allocation of the component plug



Integrated electronics
(see below)

	Slot	Signal
Supply voltage	A	24VDC (19–35VDC)
	B	GND
	C	n. c[1)]
Differential amplifier input	D	com. value (±10V/4–20mA)
	E	ref. potential
	F	n. c[1)]

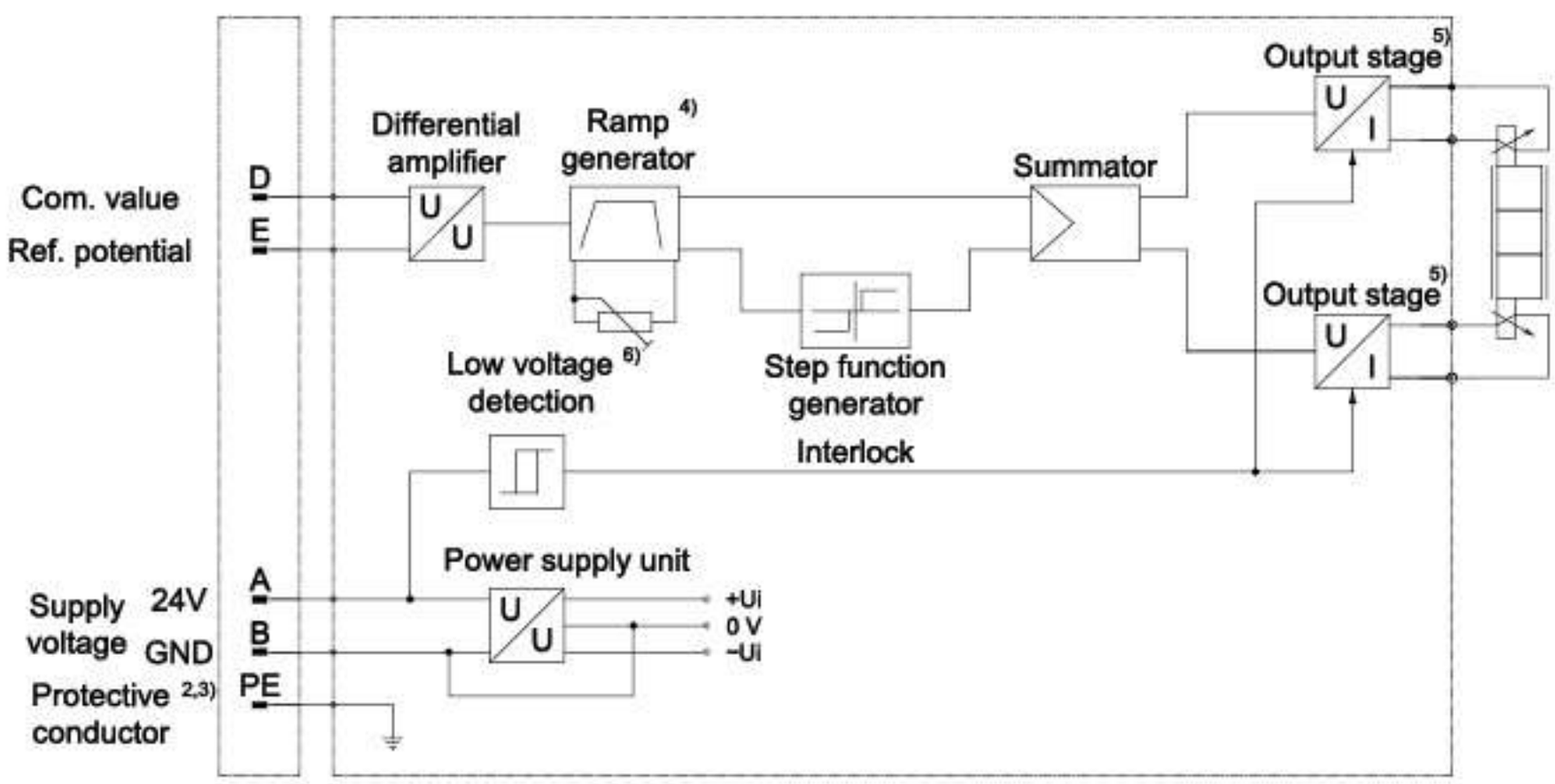
Com. value: Positive command value (0 to 10 V or 12 to 20 mA) at D and reference potential to E causes flow from P to A and B to T.Negative command value (0 to – 10 V or 12 to 4 mA) at D and reference potential to E causes flow from P to B and A to T.
For valves with a solenoid on side "a" (spool variant EA and WA) reference potential to E and positive command value at D (NS 6: 4 to 20 mA and NS 10: 12 to 20 mA) causes flow from P to B and A to T.

Connection cable: Recommendation: – up to 25 m cable length type LiYCY 5 x 0.75 mm^2
– up to 50 m cable length type LiYCY 5 x 1.0 mm^2
External diameter 6.5 to 11 mm
Connect screen to PE only on the supply side.

1) Slots C and F must not be connected!

Block circuit diagram/terminal allocation of the integrated controlel ectronics

Interface	Integrated control electronics	Valve



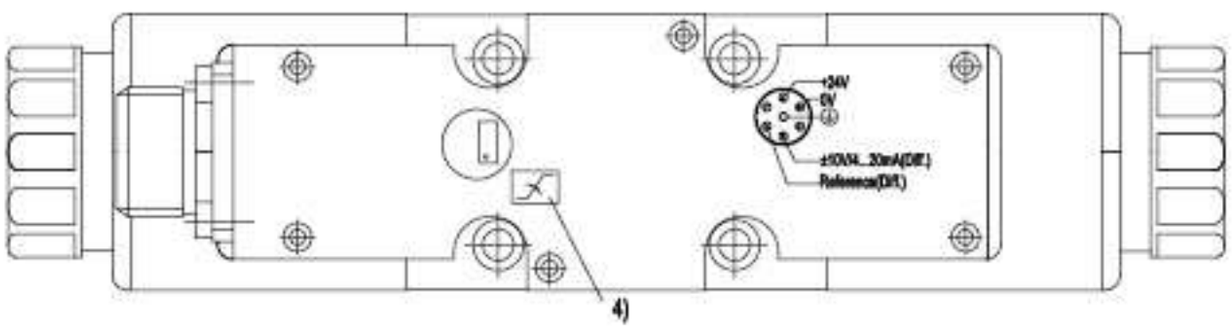
2) PE is connected to the cooling body and the valve housing

3) Protective conductor screwed to the valve housing and cover

4) Ramp can be externally adjusted from 0 to 2,5 s; the same applies for T_{up} and T_{down}

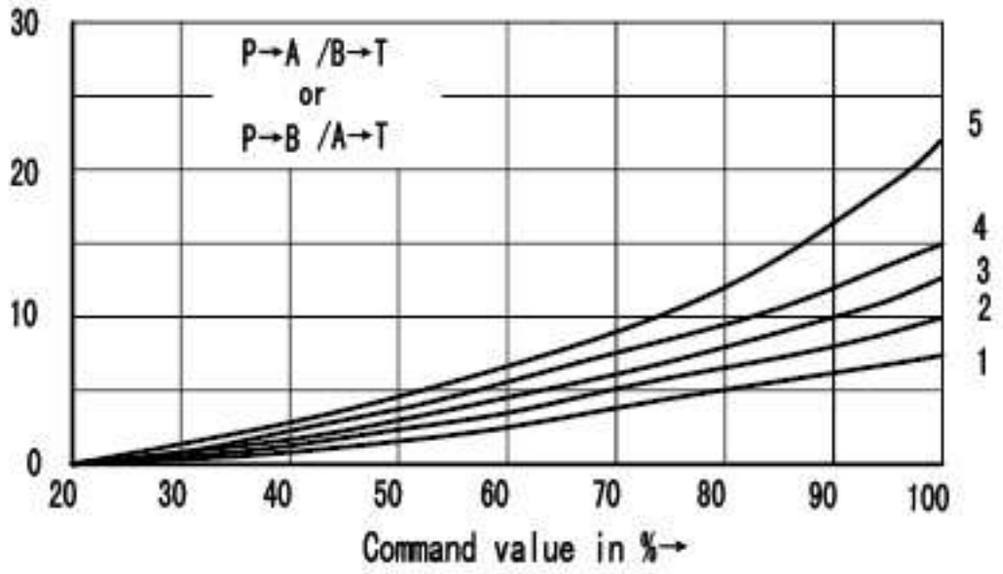
5) Output stages current regualted

6) Low voltage detection is not carried out for component type 4WRAE 10-2X.

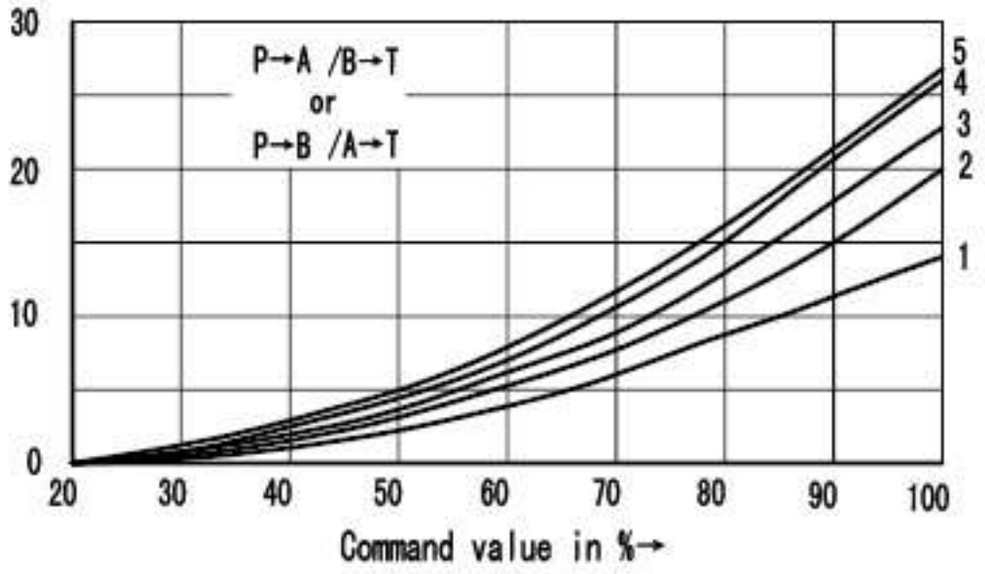


Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 6

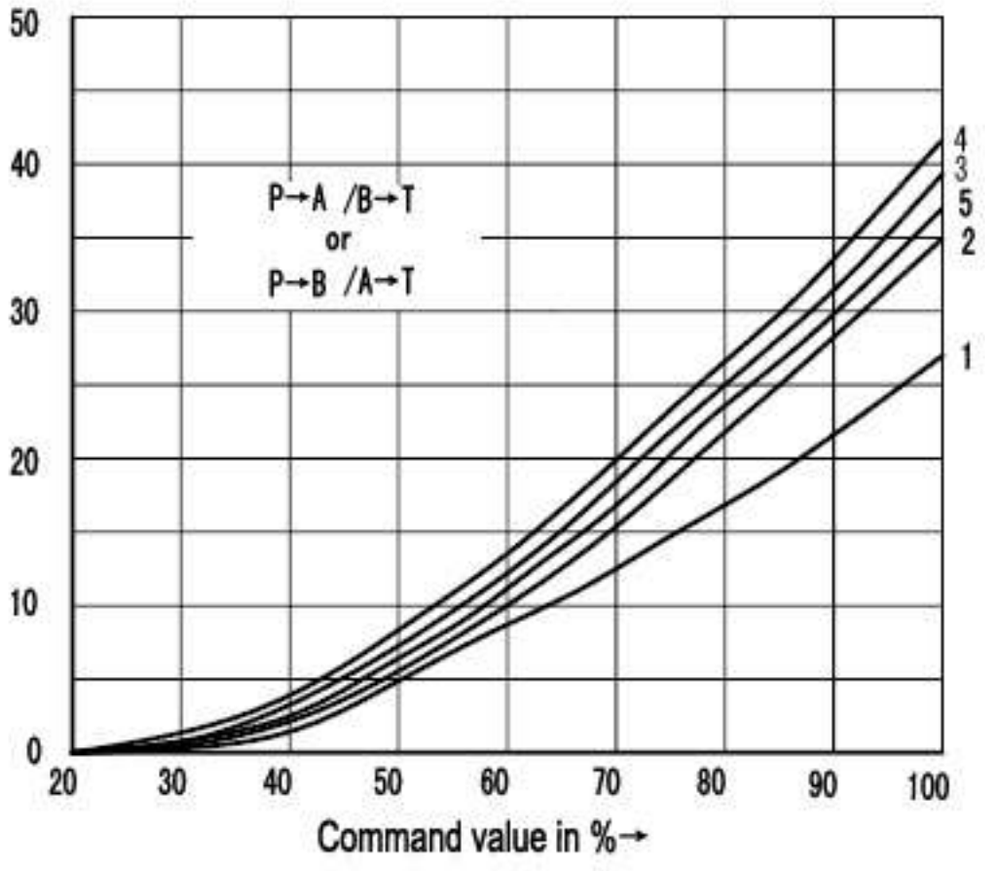
7 L/min nominal flow at 1 Mpa valve pressure differential



15 L/min nominal flow at 1Mpa valve pressure differential



30 L/min nominal flow at 1 Mpa valve pressure differential



1、ΔP = 1 MPa constant

2、ΔP = 2 MPa constant

3、ΔP = 3 MPa constant

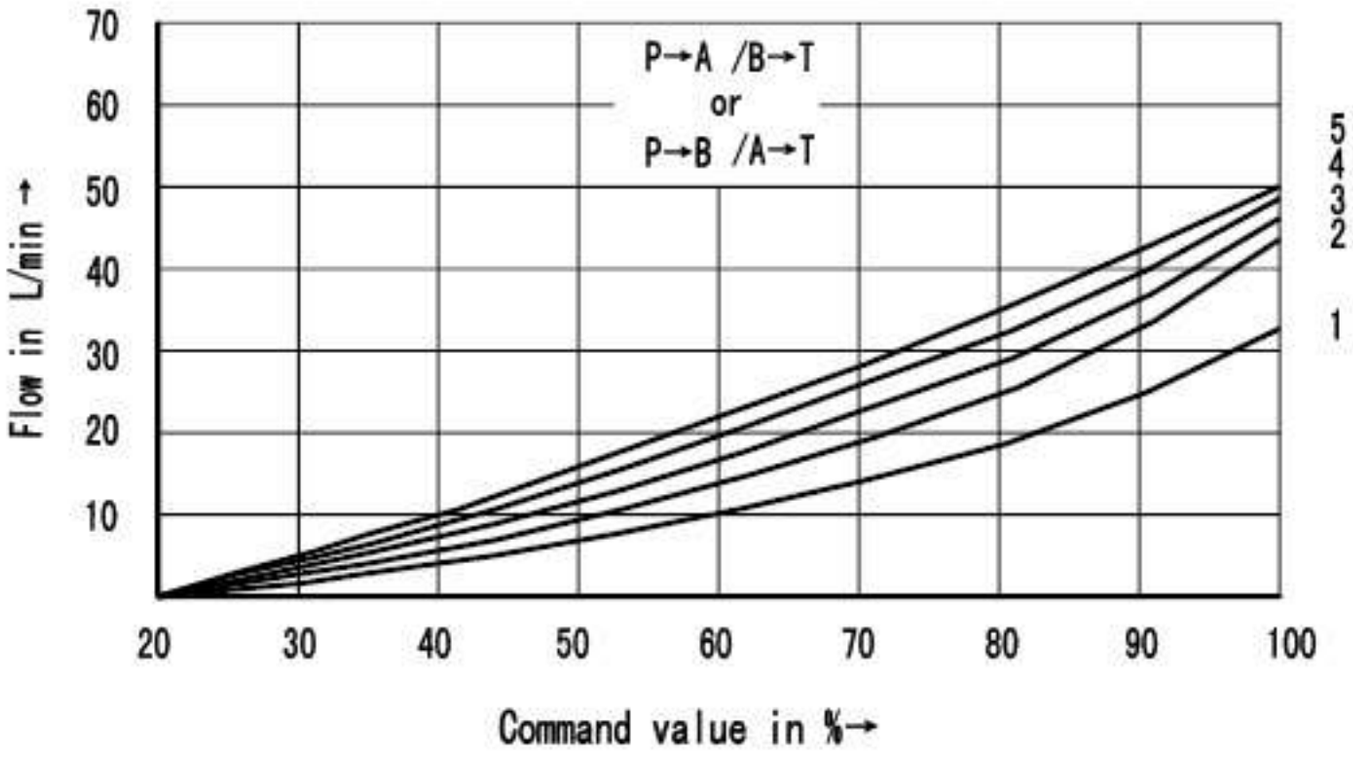
4、ΔP = 5 MPa constant

5、ΔP = 10 MPa constant

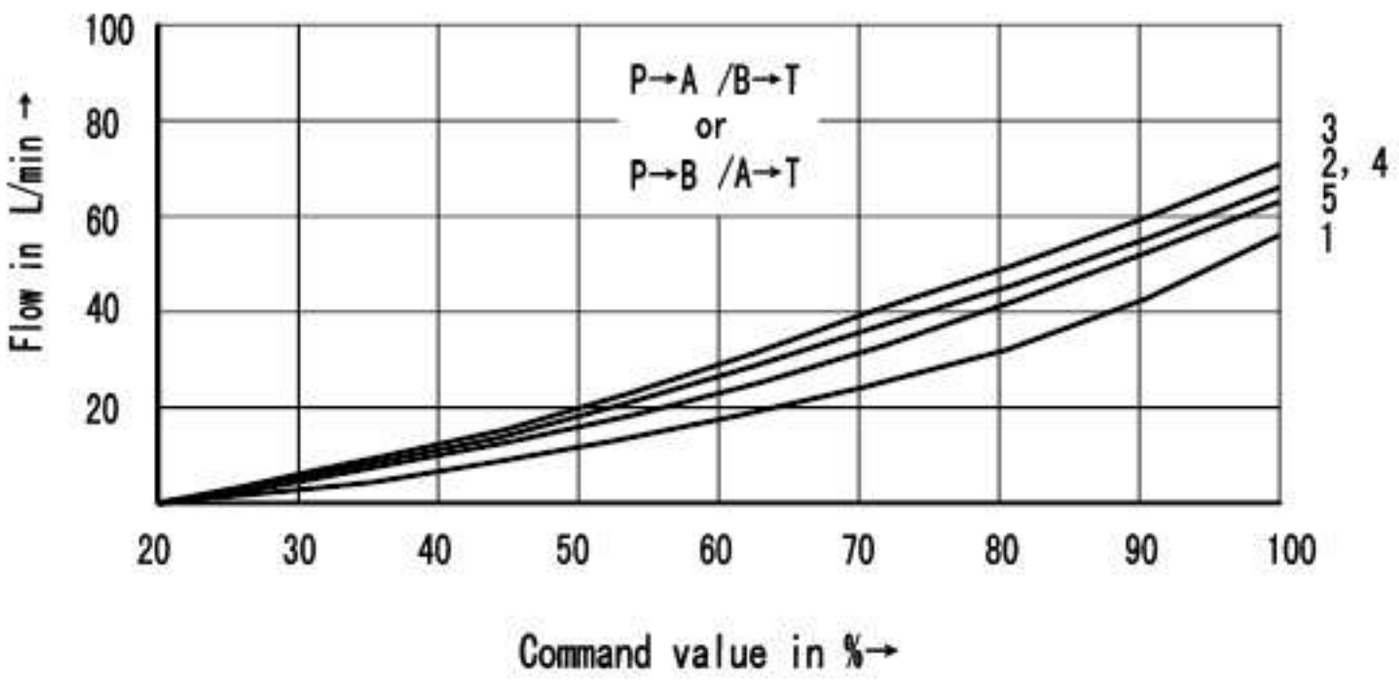
ΔP = Value pressure differential
(inlet pressure p_P minus load pressure p_L
and minus return pressure p_T)

Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 10

30 L/min nominal flow at 1 Mpa valve pressure differential



60 L/min nominal flow at 1 Mpa valve pressure differential



1、ΔP = 1 MPa constant

2、ΔP = 2 MPa constant

3、ΔP = 3 MPa constant

4、ΔP = 5 MPa constant

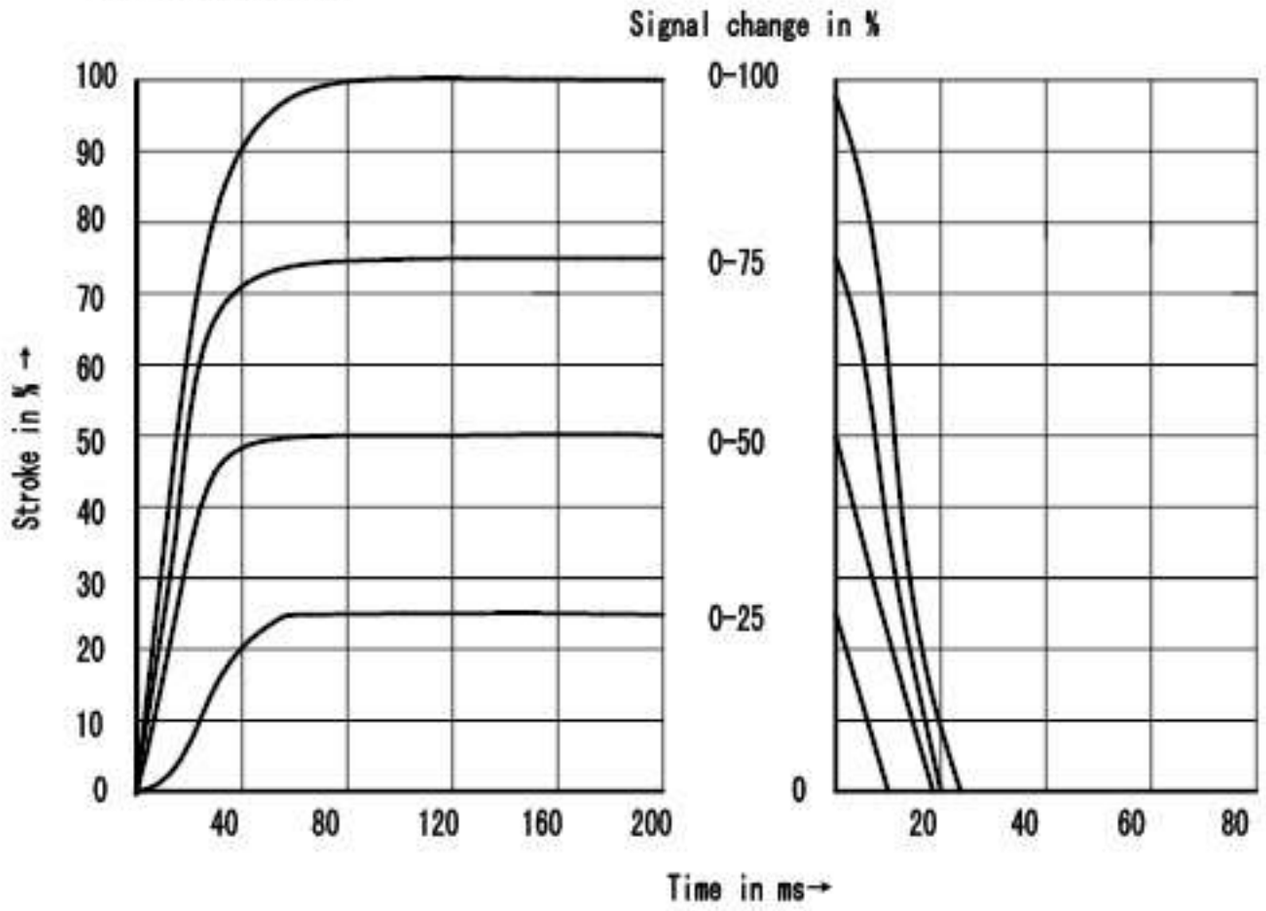
5、ΔP = 10 MPa constant

ΔP = Valve pressure differential (inlet pressure p_P minus load pressure p_L and minus return pressure p_T)

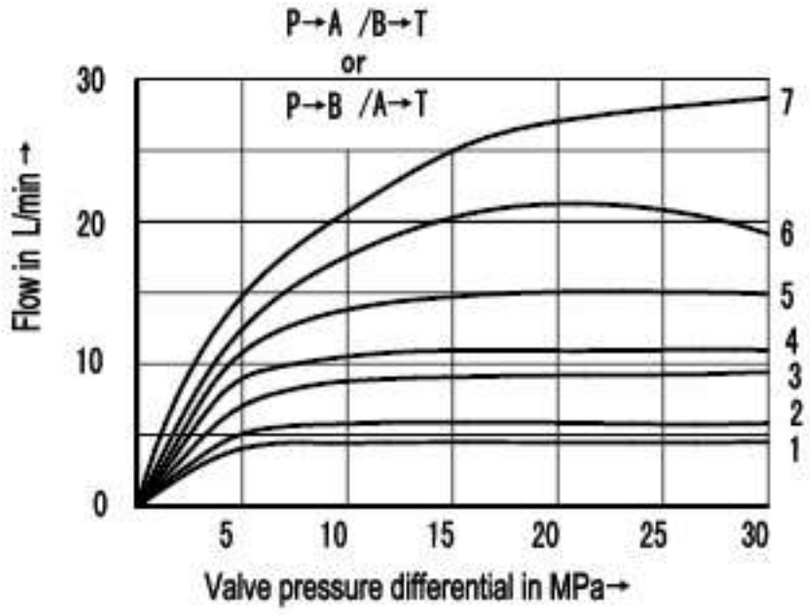
Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 6

Transient functions with stepped form of electrical input signals

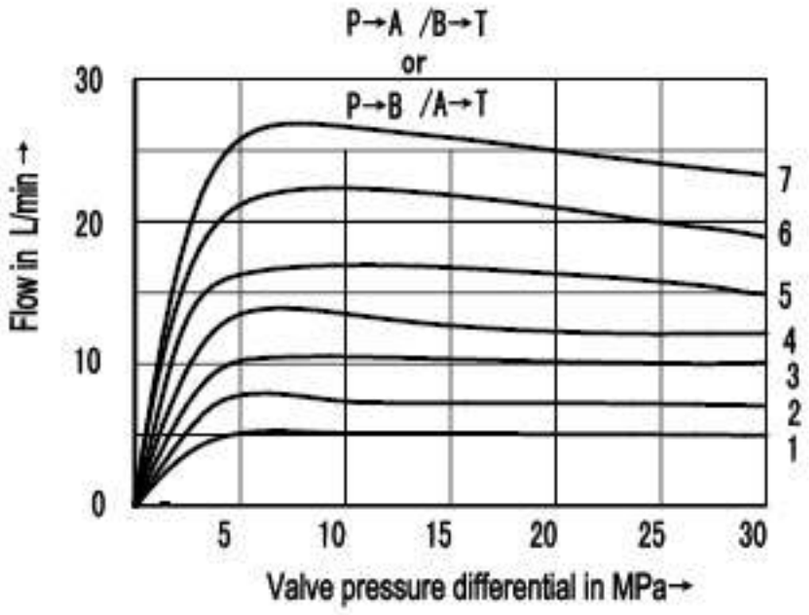
Types WRA and WRAE



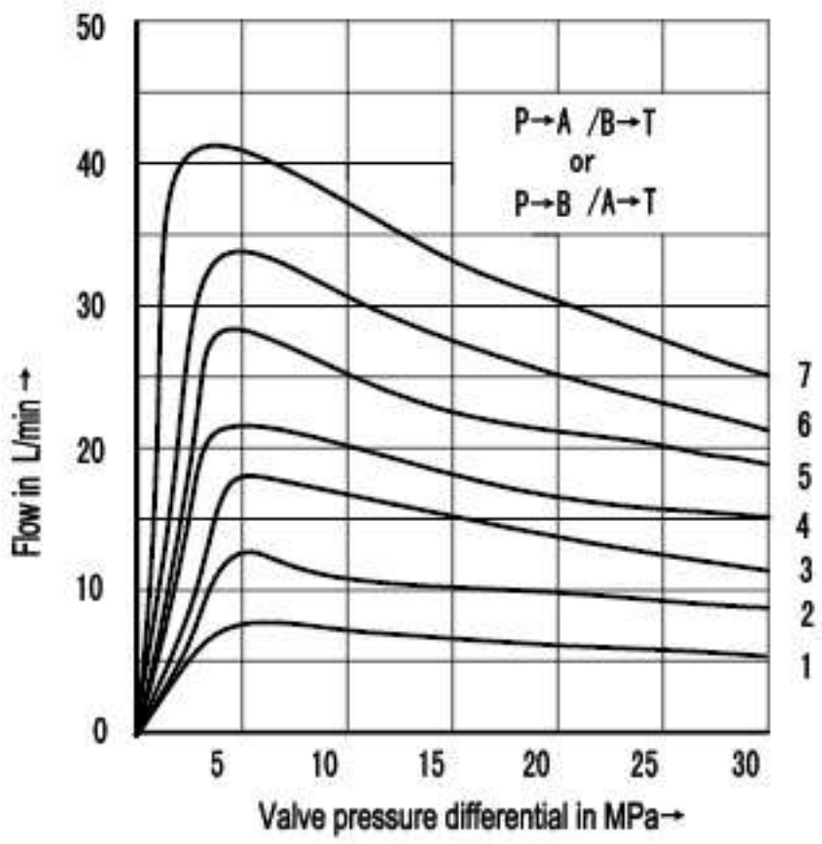
Performance limit, nominal flow 7 L/min



Performance limit, nominal flow 15 L/min



Performance limit, nominal flow 30 L/min

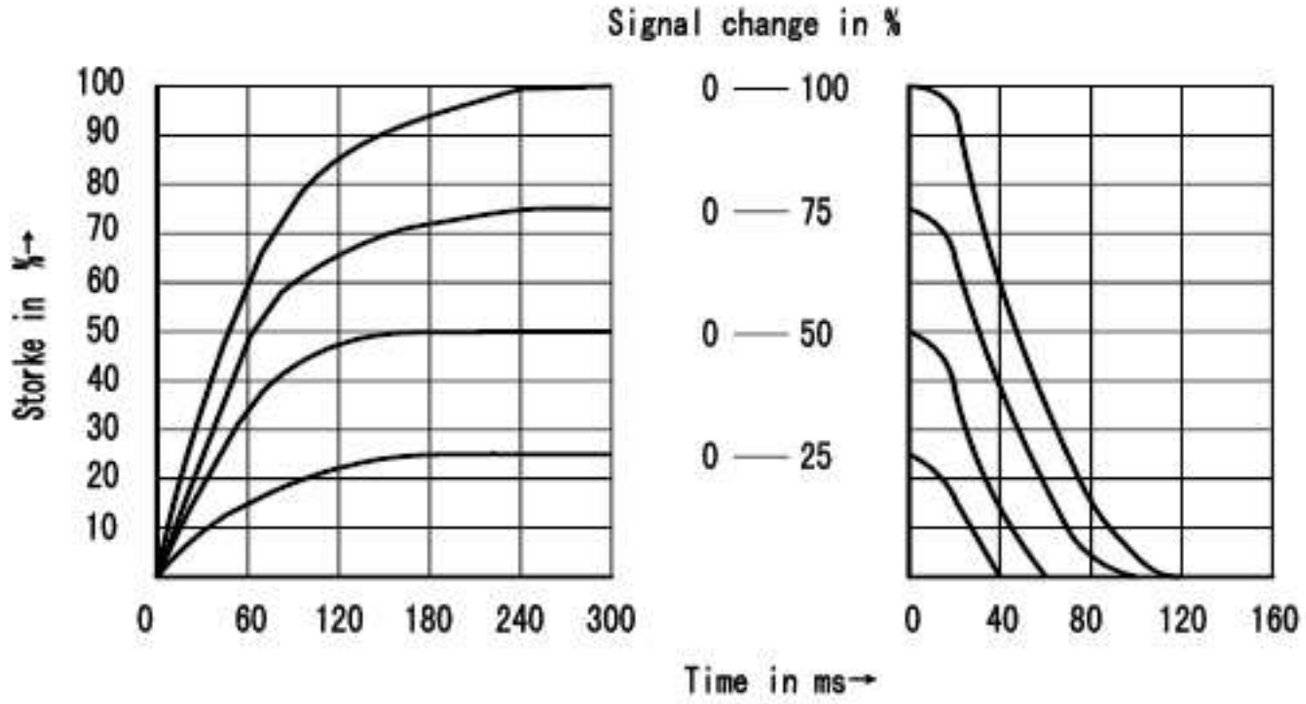


1、Command valve = 40%
2、Command valve = 50%
3、Command valve = 60%
4、Command valve = 70%
5、Command valve = 80%
6、Command valve = 90%
7、Command valve = 100%

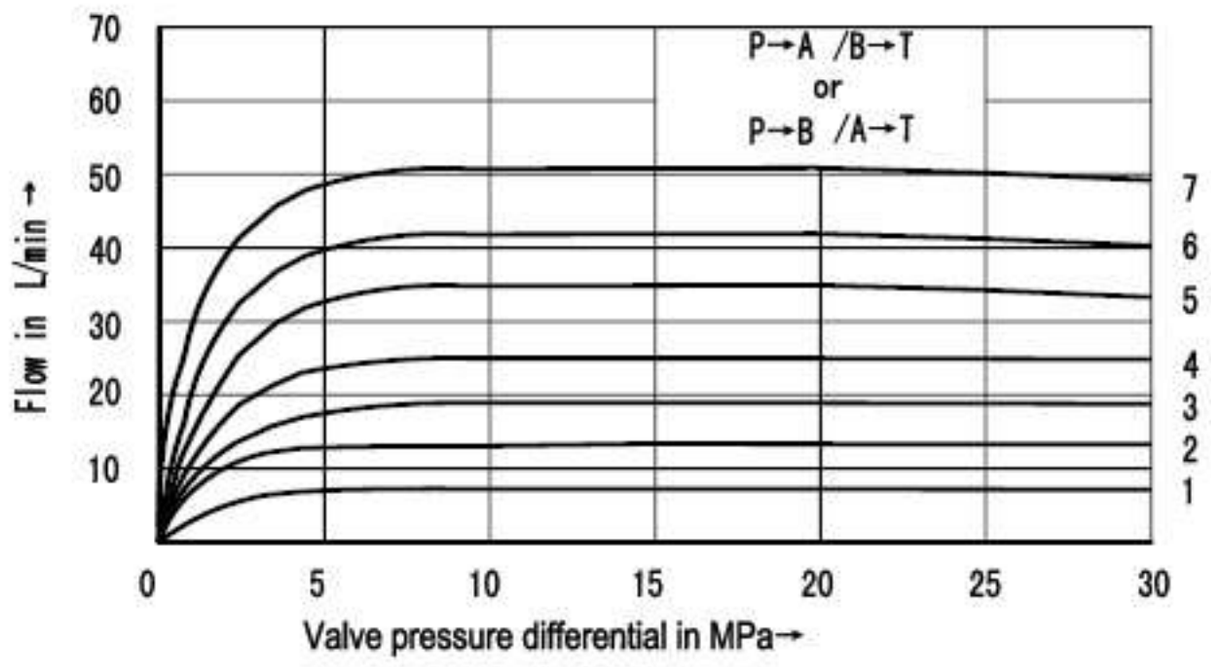
If the performance limits are exceeded then flow forces occur which lead to uncontrolled spool movements.

Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 10

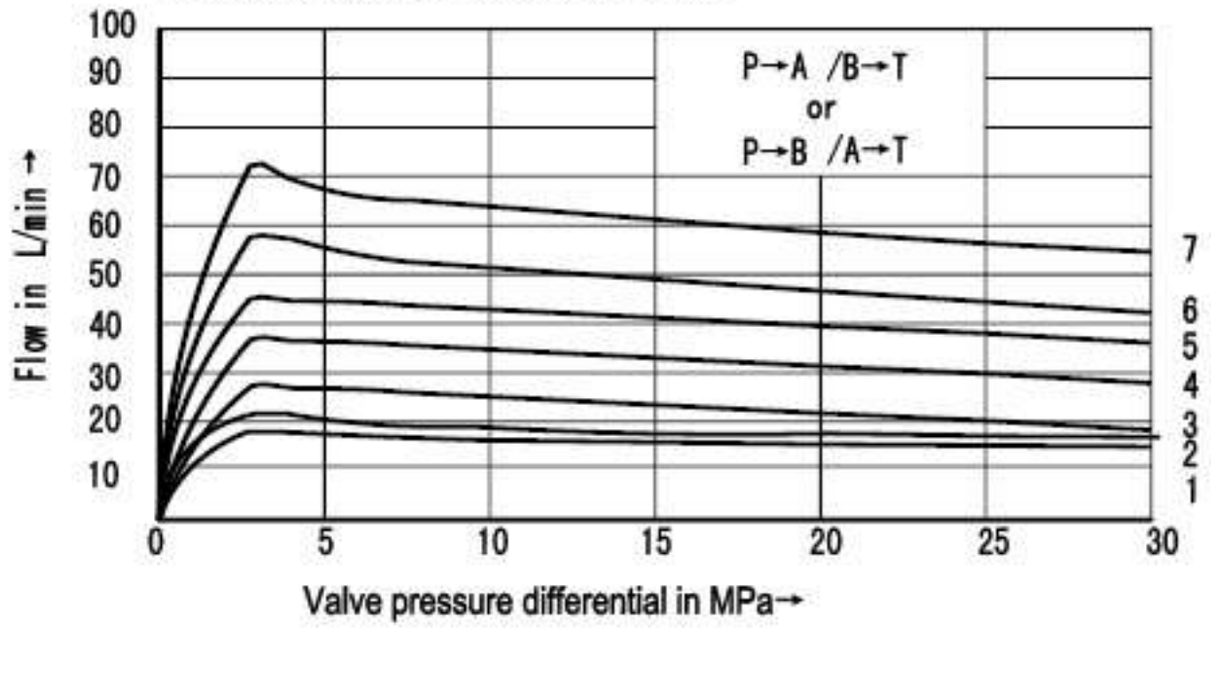
Transient functions with stepped form of electrical input signals



Performance limit, nominal flow 30 L/min



Performance limit, nominal flow 60 L/min



1、Command value = 40 %

2、Command value = 50 %

3、Command value = 60 %

4、Command value = 70 %

5、Command value = 80 %

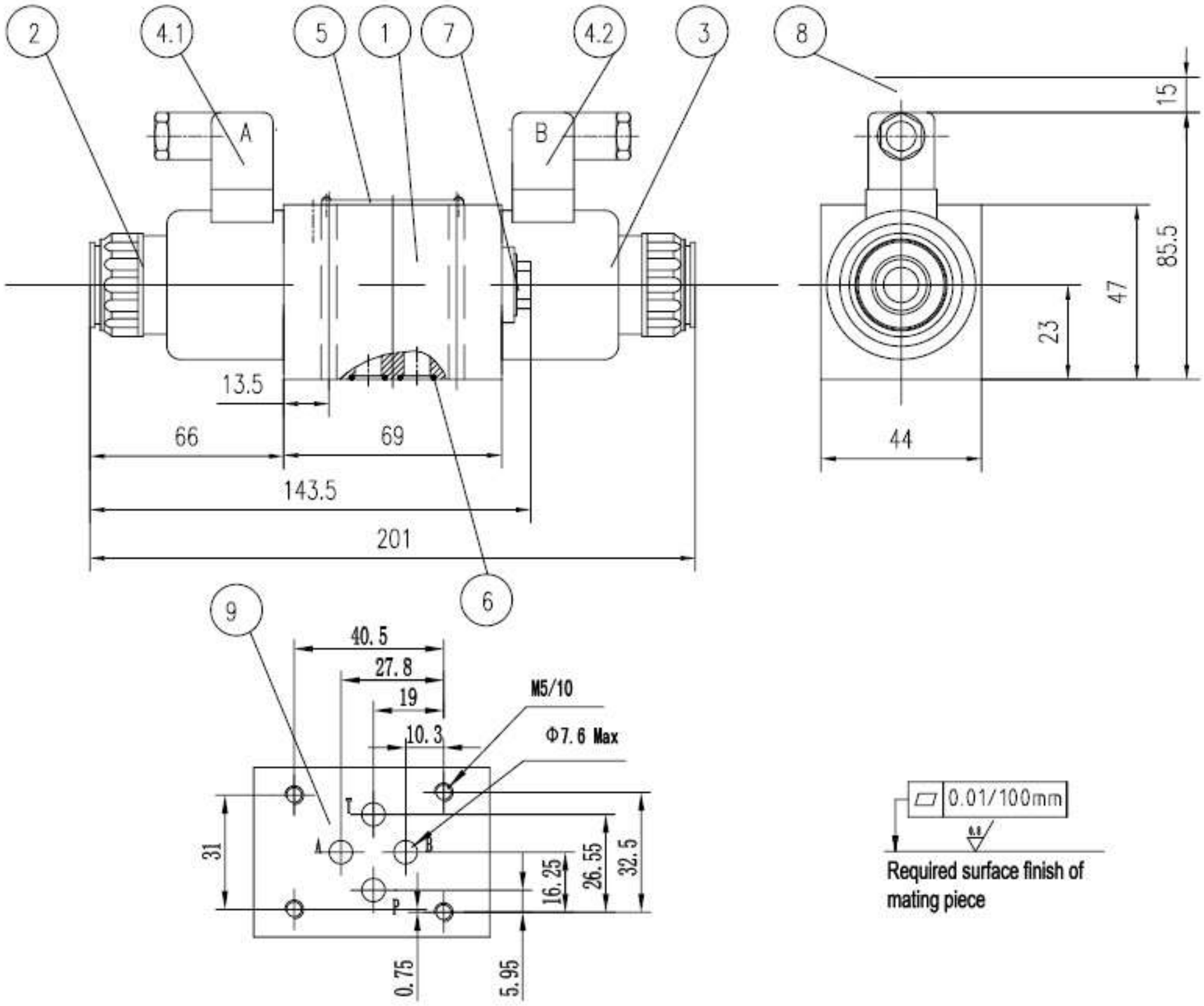
6、Command value = 90 %

7、Command value = 100 %

If the performance limits are exceeded then flow forces occur which lead to uncontrolled spool movements.

Unit dimensions: NS 6

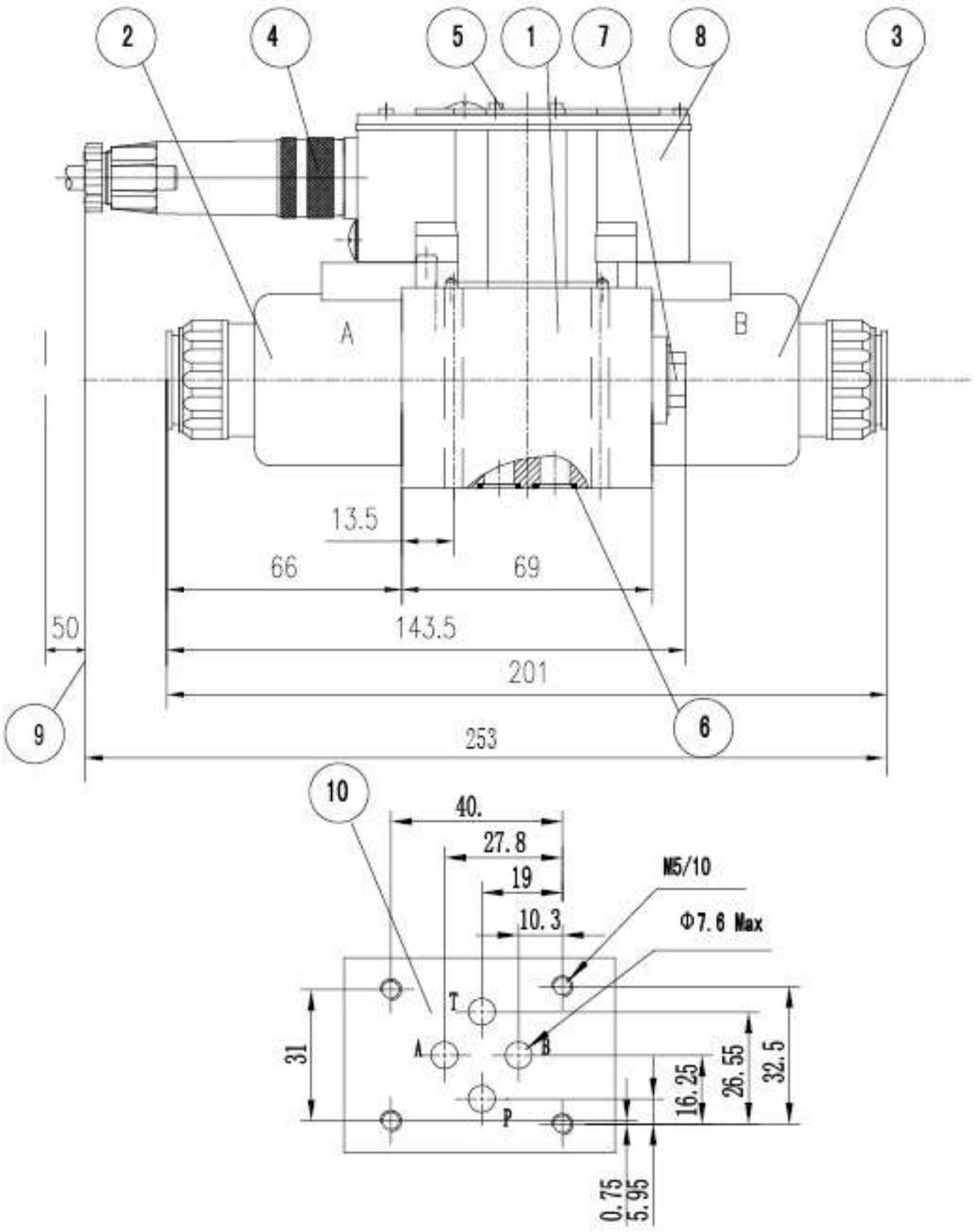
Dimensions in mm

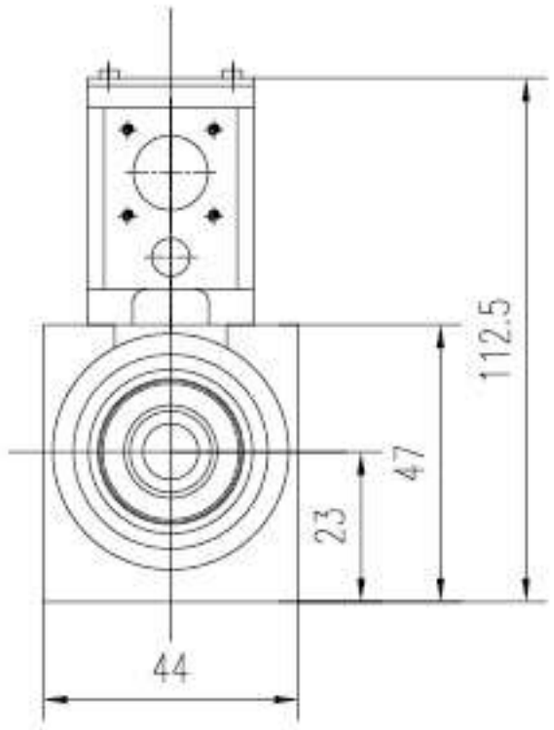


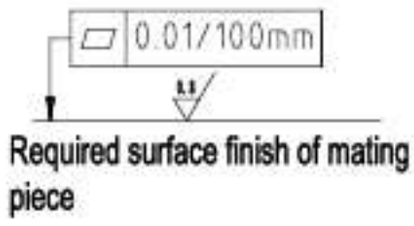
1	Valve housing	
2	Proportional solenoid "a"	Subplates: G341/01(G1/4")
3	Proportional solenoid "b"	G342/01(G3/8")
4.1	Plug-in connector "A"	G502/01(G1/2")
4.2	Plug-in connector "B"	Valve fixing screws: 4- M5 x 50(GB/T70.1); M_A = 8.9 Nm
5	Nameplate	
6	O-ring 9.25X1.78 (ports P,A,B,T)	
7	Plug for valves with one solenoid (2 switched positions, versions EA or WA)	
8	Space required to remove the plug-in connector	
9	Machined valve mounting surface	

Unit dimensions: NS 6

Dimensions in mm



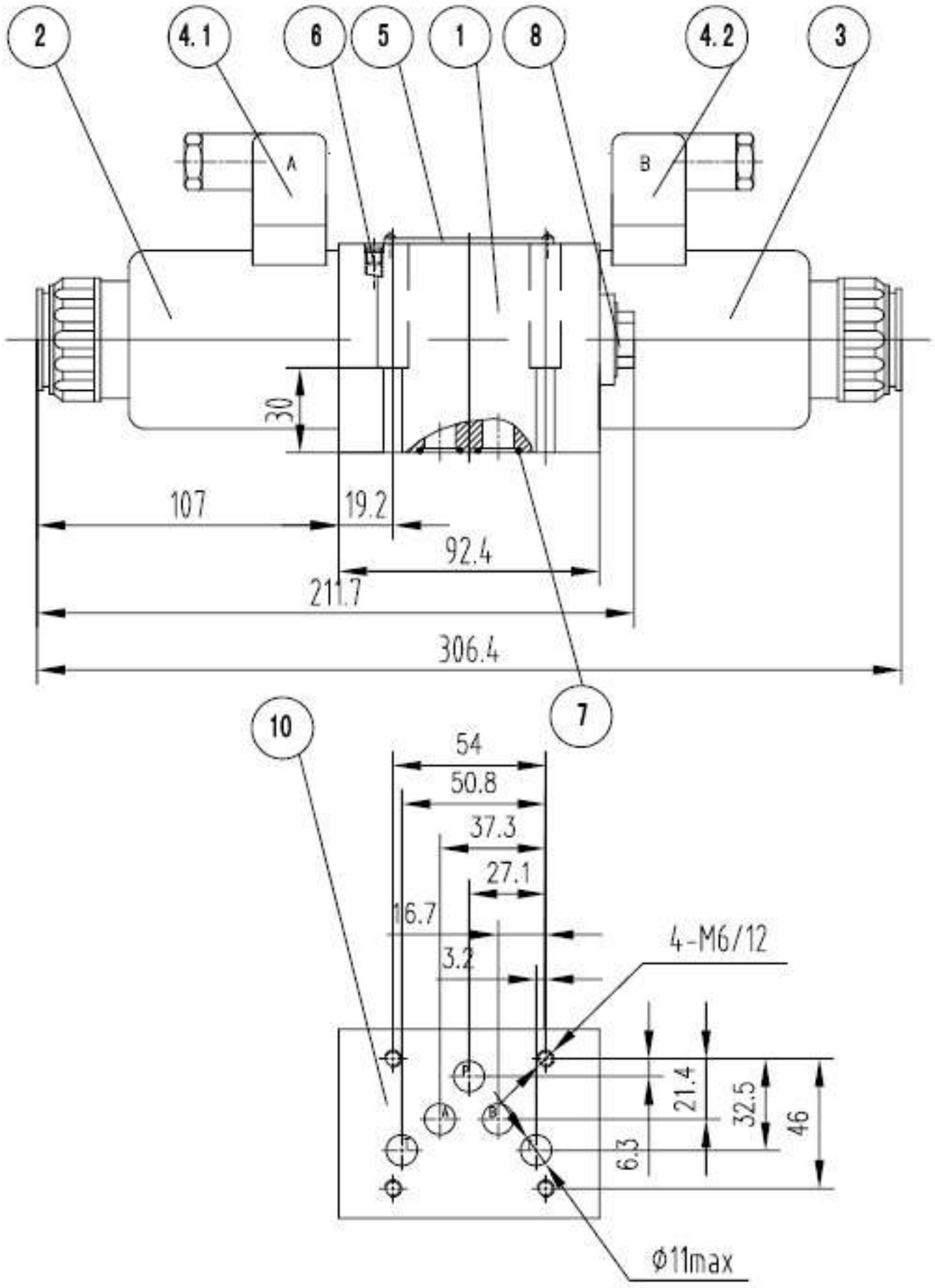


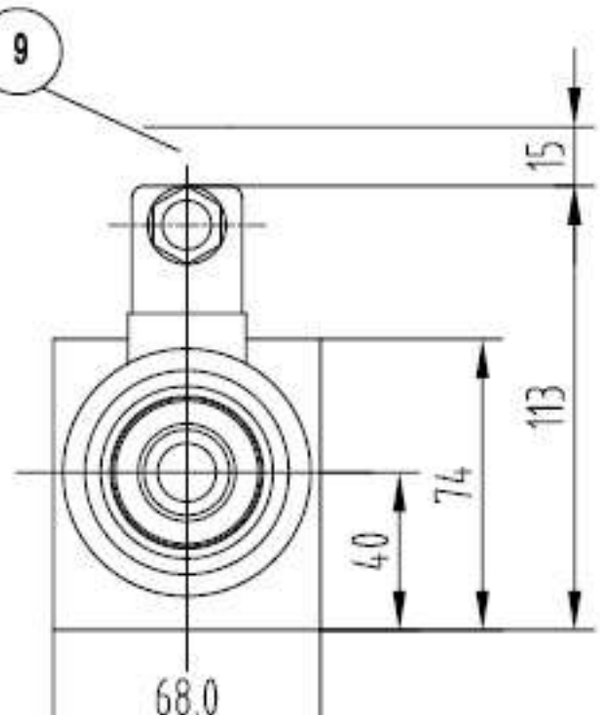


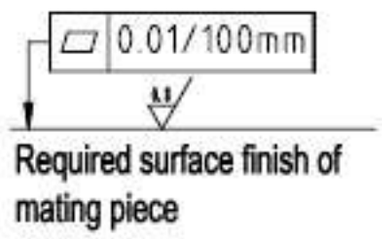
1	Valve housing	Subplates: G341/01(G1/4")
2	Proportional solenoid "a"	G342/01(G3/8")
3	Proportional solenoid "b"	G502/01(G1/2")
4	Plug-in connector, separate order	Valve fixing screws: 4 - M5 x 50(GB/T70.1); M_A = 8.9 Nm
5	Nameplate	
6	O-ring 9.25X1.78 (ports P, A, B, T)	
7	Plug for valves with one solenoid (2 switched positions, versions EA or WA)	
8	Integrated control electronics	
9	Space required for the connection cable and to remove the plug-in connector	
10	Machined valve mouting surface	

Unit dimensions: NS 10

Dimensions in mm







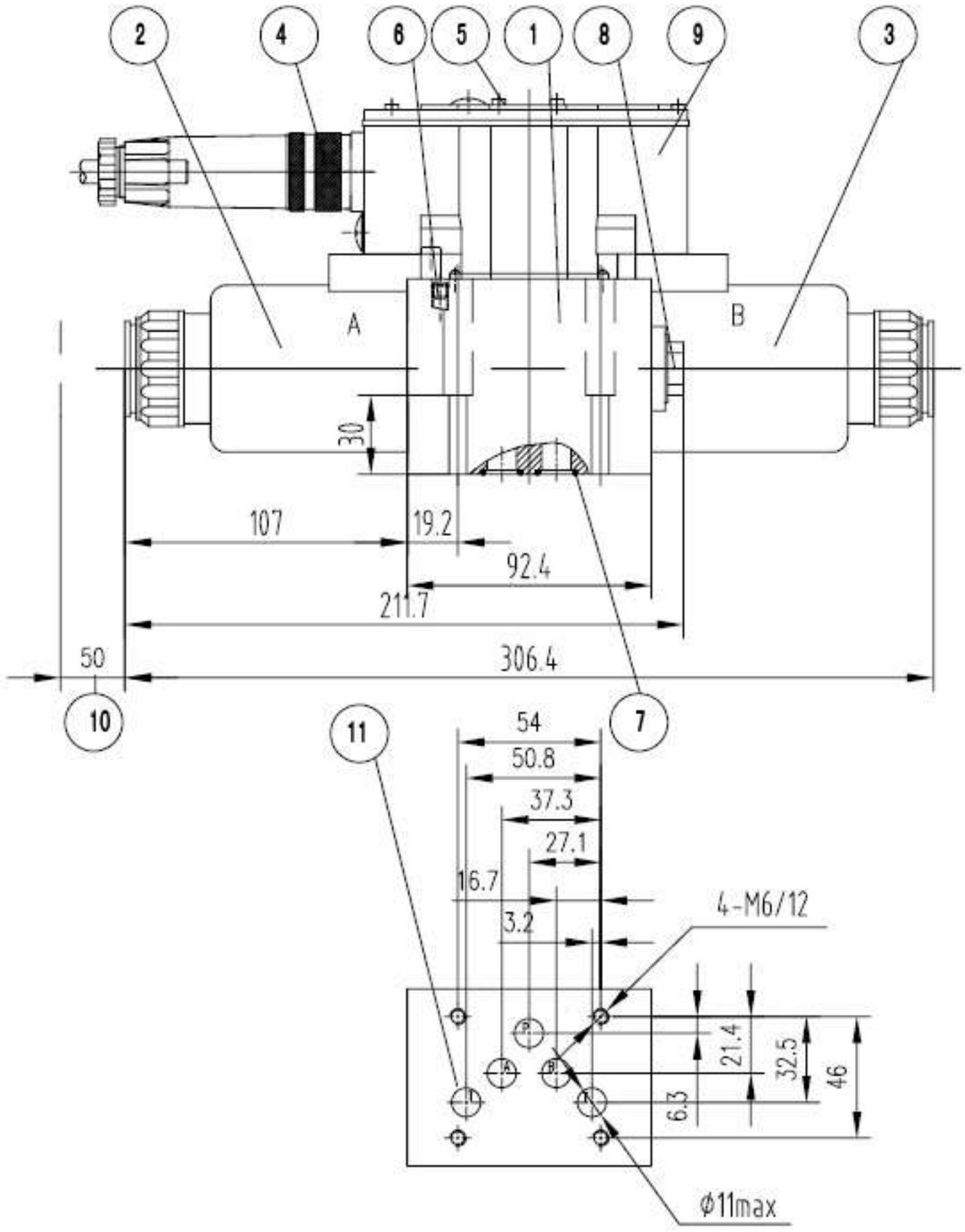
1 Valve housing
2 Proportional solenoid "a"
3 Proportional solenoid "b"
4.1 Plug-in connector "A"
4.2 Plug-in connector "B"
5 Nameplate
6 Valve bleed screw
Note: The valves are bled before delivery.
7 O-ring 12X2(ports P, A, B, T)
8 Plug for valves with one solenoid (2 switched positions, versions EA or WA)
9 Space required to remove the plug-in connector
10 Machined valve mounting surface

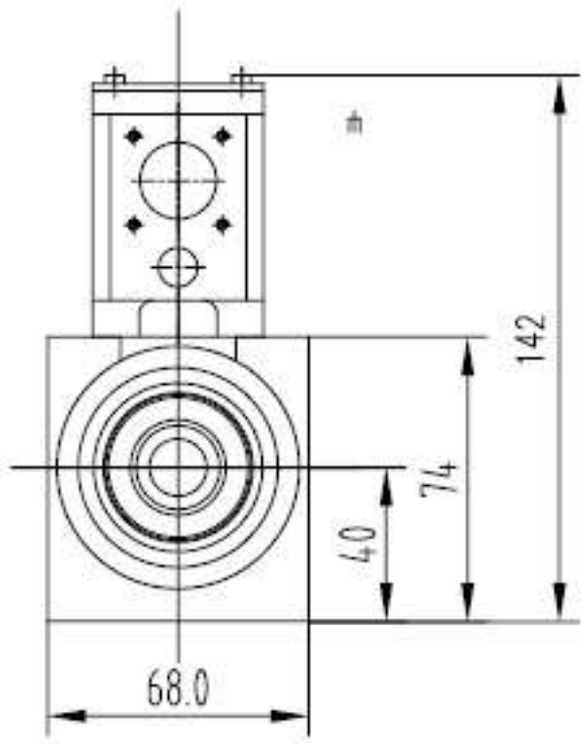
Subplates: G66/01(G3/8")
G67/01(G1/2")
G534/01(G3/4")

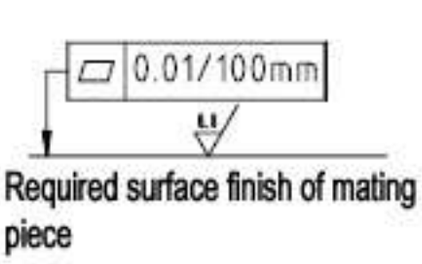
Valve fixing screws: 4 -M6 x 40(GB/T70.1); M_A= 15.5 Nm

Unit dimensions: NS 10

Dimensions in mm







1	Valve housing	Subplates: G66/01(G3/8")
2	Proportional solenoid "a"	G67/01(G1/2")
3	Proportional solenoid "b"	G534/01(G3/4")
4	Plug-in connector ,separate order	Valve fixing screws: 4 - M6 x 40 (GB/T70.1); M_A = 15.5 Nm
5	Nameplate	
6	Vavle bleed screw	
	Note: The valves are bled before delivery.	
7	O-ring 12X2	
	(ports P, A, B, T)	
8	Cover for valves with one solenoid	
	(2 switched positions, versions EA or WA)	
9	Integrated valve electronics	
10	Space required for the connection cable and to	
	remove the plug-in connector	
11	Machined valve mounting surface	

Notice

Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to $\frac{0.8}{\nabla}$.
6. Surface finish of mating piece is required to 0.01/100mm.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Proportional directional valves directly controlled, with electrical position feedback,type HD-4WRE(E)-2X			
	Size 6,10	Maximum operating pressure 31.5MPa	Maximum flow 180L/min	

- Directly controlled proportional directional valve for the control of the direction and magnitude of a flow
- For subplate mounting
- Electrical position feedback
- Spring centred control spool
- Type 4WREE, integrated valve electronics with interface A1 or F1
- Actuation is by proportional solenoids with central thread and removable coil
- Valve and electronic control from one source



Function, section

The 4/2 and 4/3 proportional directional valves are directly controlled components of subplate mounting design. They are operated by proportional solenoids with central thread and removable coil. The solenoids are optionally controlled by either external control electronics(type WRE) or by integrated control electronics (type WREE).

Functional description:

With the solenoids (5 and 6), de-energised, the control spool (2)is held in the central position by the compression springs(3 and 4)

Direct operation of the control spool (2) by energising one of the proportional solenoids, e.g. control of solenoid "b" (6)

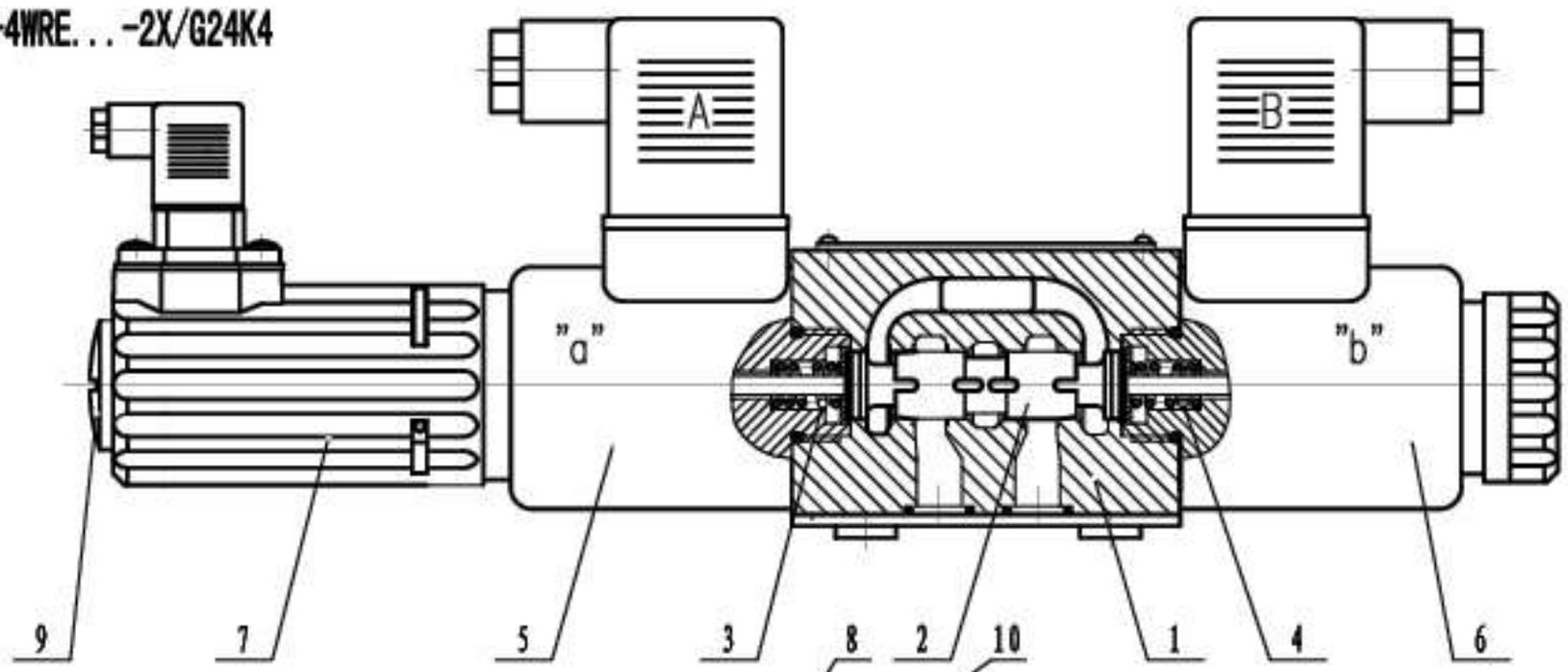
→ Movement of the control spool (2) to the left in proportion to the electrical input signal

→ Connection from P to A and B to T via orifice like cross-sections with progressive flow characteristics

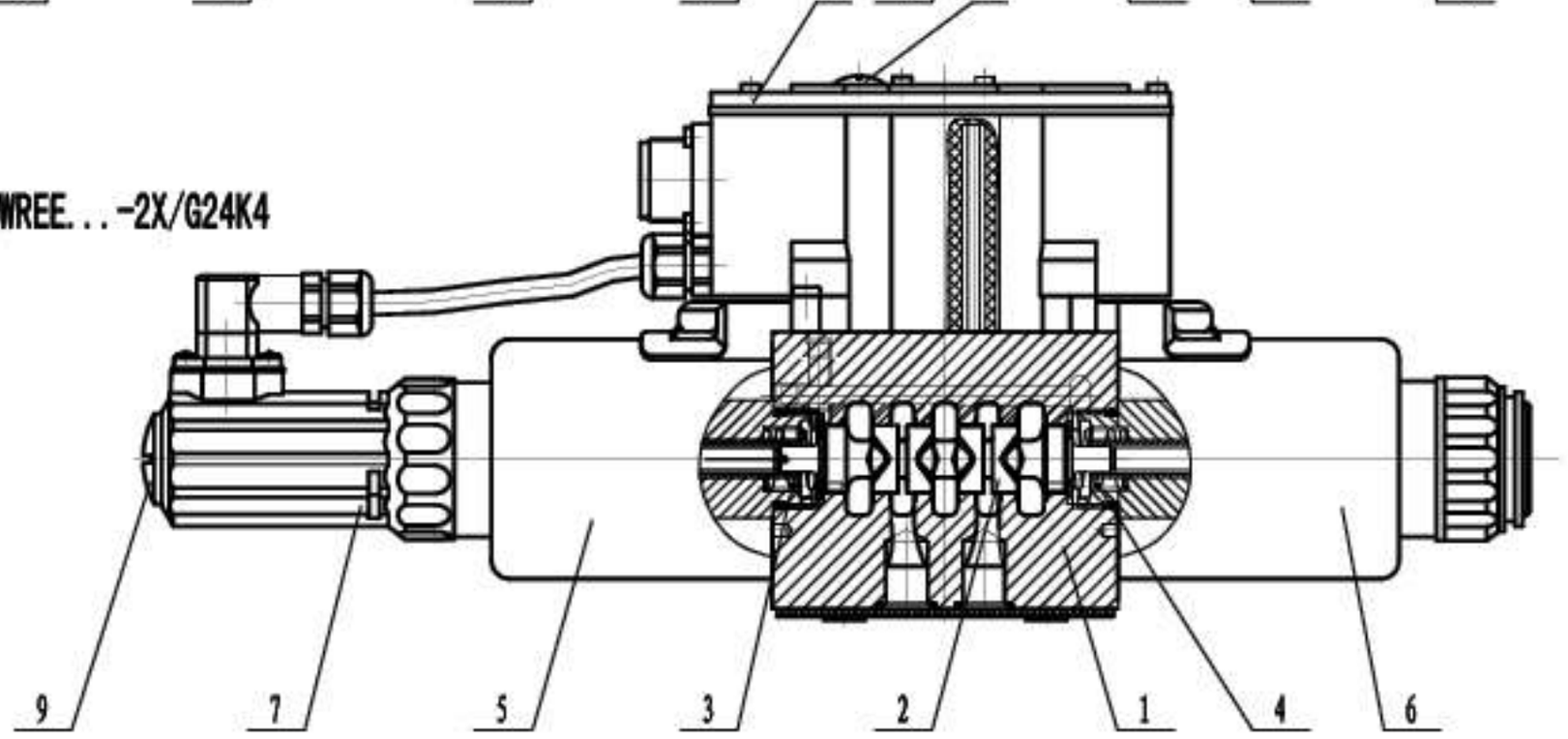
De-energising of solenoid (6)

→ The control spool (2) is returned to the central position via the compression spring (3)

HD-4WRE...-2X/G24K4



HD-4WREE...-2X/G24K4



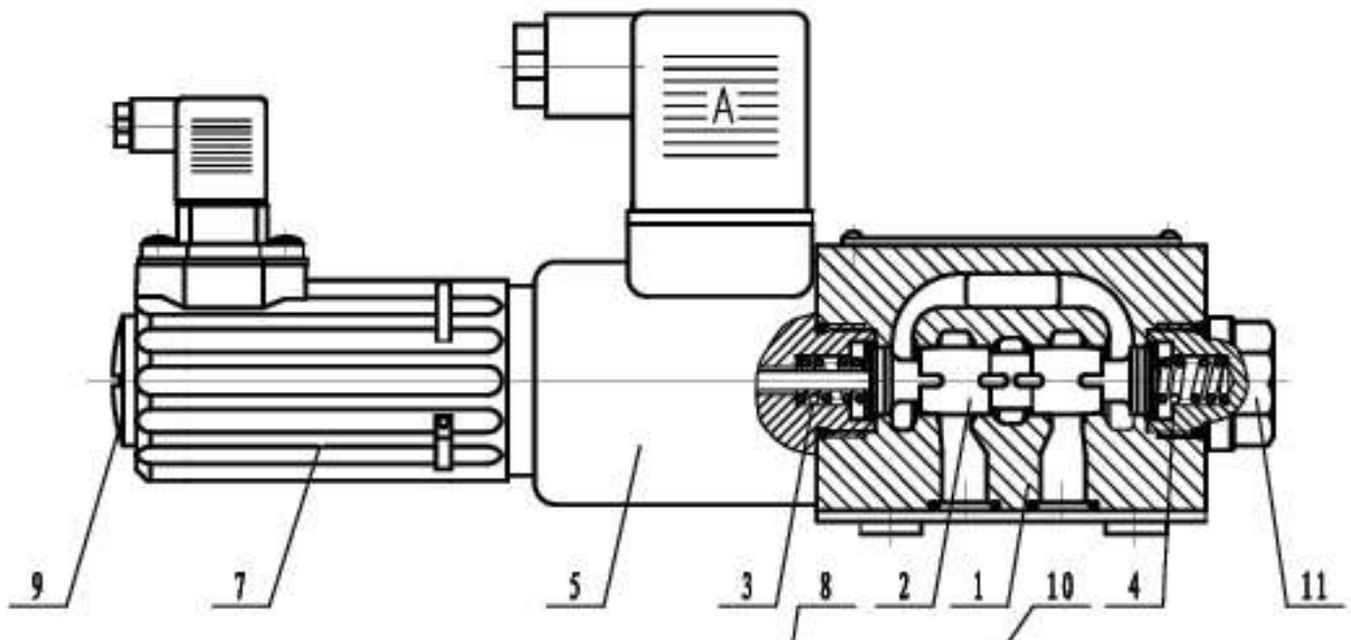
In the de-energised condition the spool (2) is held in a mechanical centre position by the solenoid return springs. This, for the spool symbol "V", does not relate to the hydraulic centre position! When the electrical valve closed loop control circuit is closed then the spool is positioned in the hydraulic centre position.

Design:

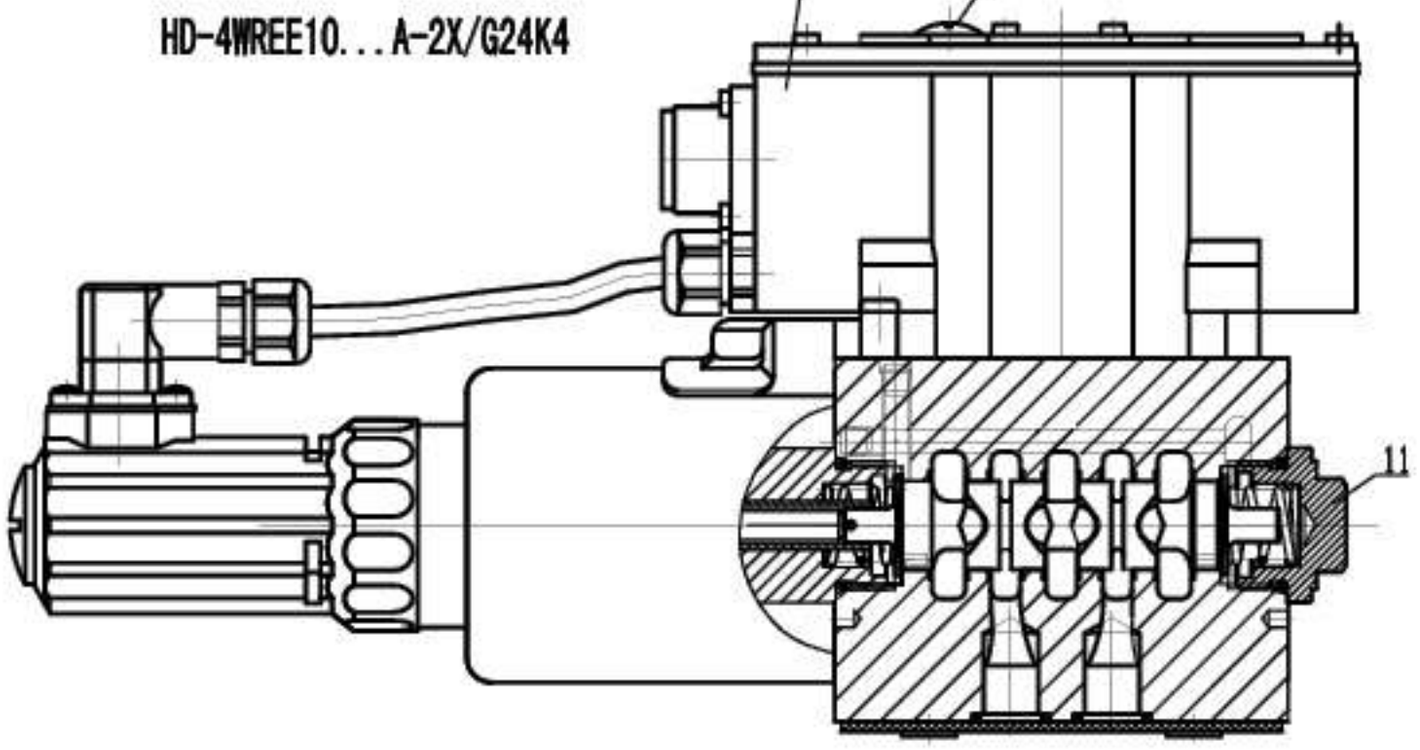
The valve basically consists of:

- Housing (1) with mounting face
- Control spool (2) with compression springs(3 and 4)
- Solenoids (5 and 6) with central thread
- Position transducer (7)
- Optional integrated control electronics (8)
- The mechanical zero point adjustment (9) is accessible via the Pg 13.5 and the electrical zero point is accessible via the Pg 7 (10) (type 4WREE)

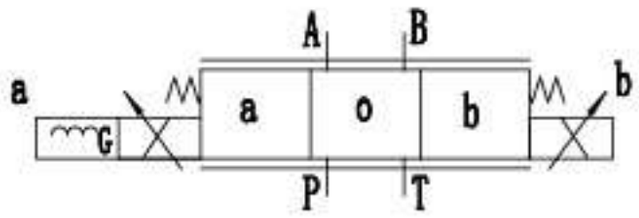
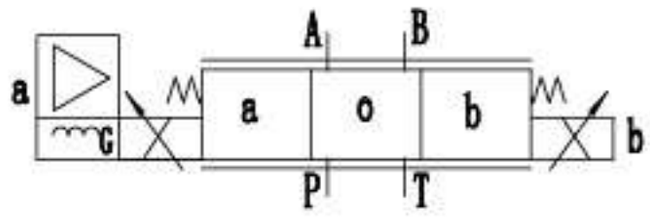
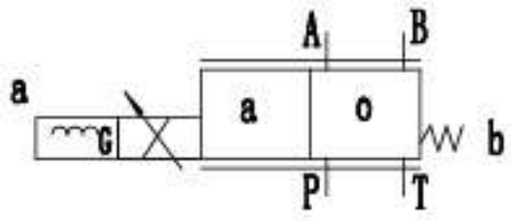
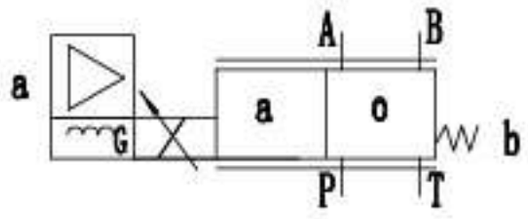
HD-4WRE6...A-2X/G24K4



HD-4WREE10...A-2X/G24K4



Symbols

Without integrated control electronics	With integrated control electronics
Type HD-4WRE···-2X/··· **4/3 proportional directional valve** 	**Type HD-4WREE···-2X/···** **4/3 proportional directional valve** 
Type HD-4WRE···A- 2X/··· **4/2 proportional directional valve** 	**Type HD-4WREE···A- 2X/···** **4/2 proportional directional valve** 

Order ing details

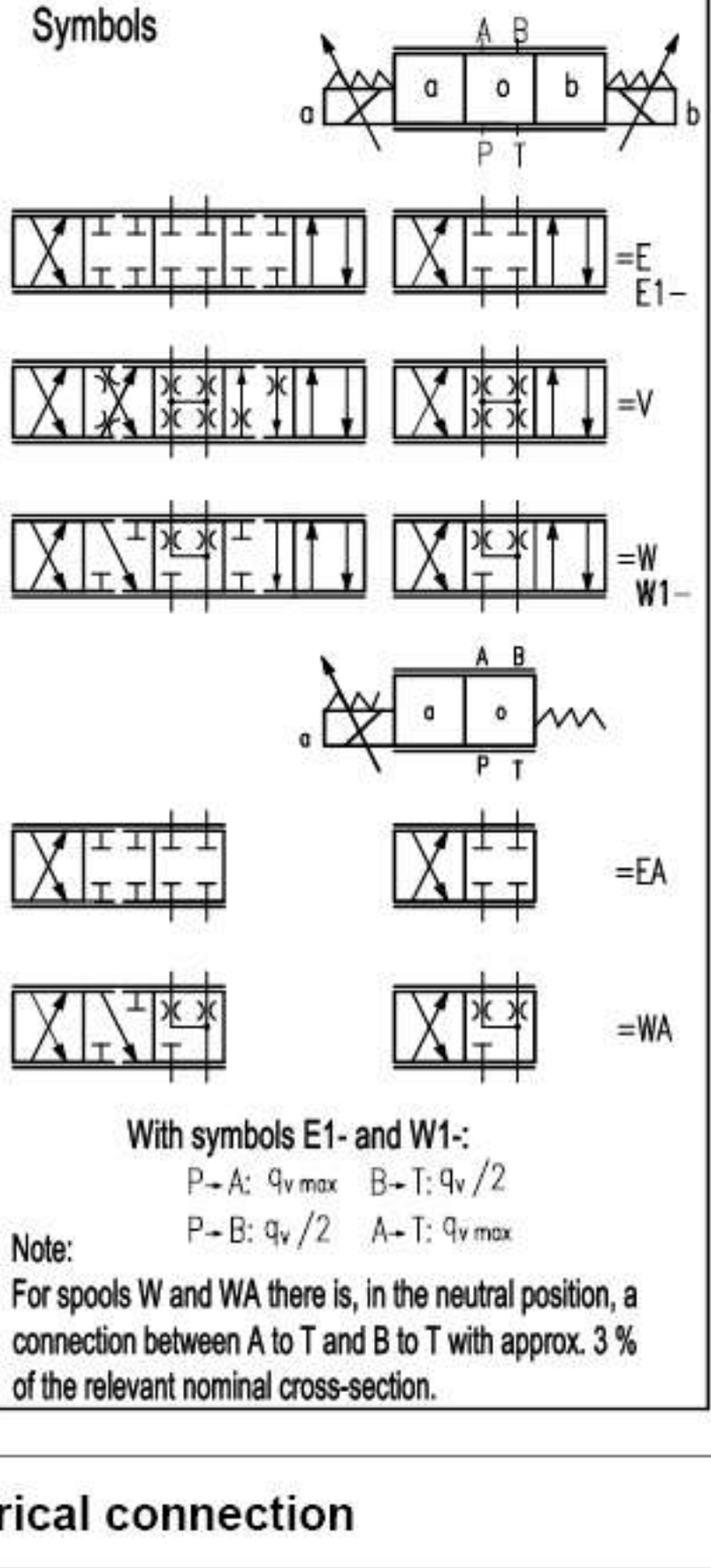
HD ÷ 4WRE ÷ 2X / G24 / *

Techology of beijing huade hydraulic = HD

Without integrated control electronics = No code
With integrated control electronics =E

Nominal size 6 =6
Nominal size 10 =10

Symbols



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

Note:
For spools W and WA there is, in the neutral position, a connection between A to T and B to T with approx. 3 % of the relevant nominal cross-section.

Further details in clear text

No code = NBR seals
V = FKM seals

Interface A1 or F1 for WREE
A1 = Command value input ± 10 VDC
F1 = Command value input 4 to 20 mA

Electrical connection for WRE
K4 = With component plug(for WRA)
K31 = With component plug(for WRAE)

G24 = Power supply voltage 24 VDC

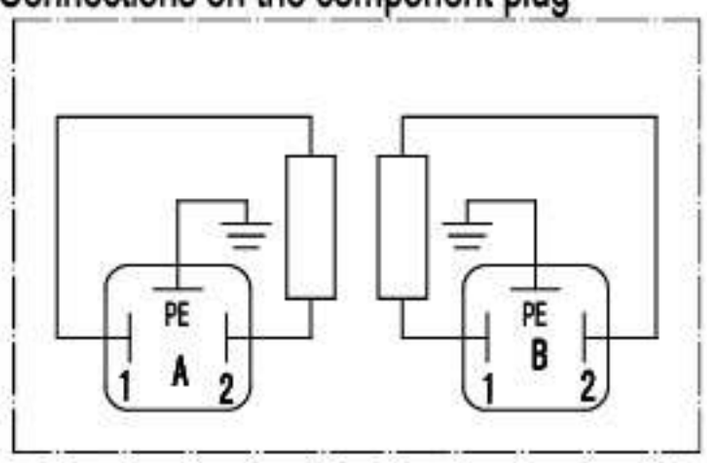
2X = Series 20 to 29
(20 to 29: unchanged installation and connection dimensions)

	Nominal flow at a valve pressure differential Δp = 1 MPa	
NS6	08=	8L/min
	16=	16L/min
	32=	32L/min
NS10	25=	25L/min
	50=	50L/min
	75=	75L/min

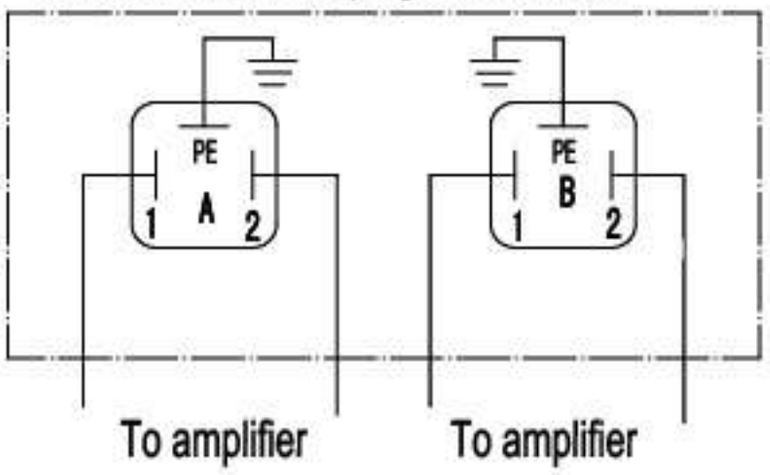
Electrical connection

Type 4WRE(for external control electronics）

Connections on the component plug



Connections on the plug-in connector



Technical data(for applications outside these parameters, please consult us!)

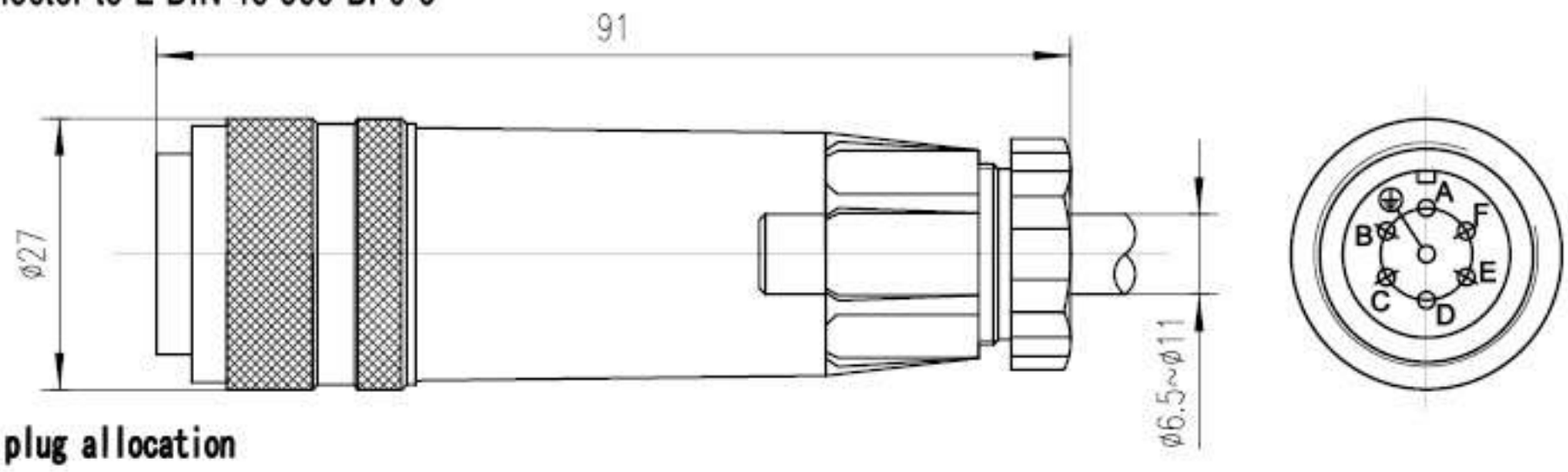
Hydraulic

Size		6	10
Operating pressure MPa	Ports A、P、B	31.5	31.5
	Port T	21	21
Nominal flow $Q_{v\,nom}$ at ΔP=1MPa (L/min)		8、16、32	25、50、75
Max. permissible flow (L/min)		80	180
Degree of contamination (μm)		≤20(recommend 10)	
Hysteresis(%)		≤0.1	
Reversal span (%)		≤0.05	
Response sensitivity (%)		≤0.05	
Pressure fluid		Mineral oils， phosphate ester	
Viscosity range	mm^2/S	20 to 380	
Ambient temperature range (C°)	4WRE	-20 to +70	
	4WREE	-20 to +50	
Weight (Kg)	4WRE	2.2	6.3
	4WREE	2.4	6.5

Electrical

Electrical (integrated electronics)			
Size		6	10
Type of supply		DC	DC
Nominal voltage (V)		24	
Norminal current of solenoid (A)		2.5	
Solenoid coil resistance (Ω)	Coil resistance at 20° C	2.7	3.7
		4.05	5.55
Duty		100%	
Max. coil temperature (C°)		to 150	
Insulation to DIN40050		IP65	
Technical data of associated amplifier			
Associated amplifier	4WRE	HD-VT-VRPA2-.-1X/	HD-VT-VRPA2-.-1X/
	4WREE	HD-VT-4WREE6-2X	HD-VT-4WREE10-2X
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	

Plug-in connector to E DIN 43 563-BF6-3



Component plug allocation

	Contact	Allocation interface A1	Allocation interface F1
Supply voltage	A	24 VDC(u (t) =19. 4Vto35V); I_{max} = 2A	
	B	0 V	
Ref. potential actual value	C	reference contact F; Re >50kΩ	reference contact F; R_e <10 Ω
Differential amplifier input	D	± 10 V com. value; Re > 50 kΩ;	4~20 mA com. value; Re > 100 Ω
	E	ref. potentional com. value	
Measurement output (act. value)	F	± 10 V act. value, (limiting load 5 mA)	4~20 mA act. value,load max. 300 Ω
	PE	Connected with cooling body and valve housing	

Command value: A positive command value (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 (or 4 to 12 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 (or 4 ... 20 mA) at D and the reference potential at E results in a flow from P to B and A to T.

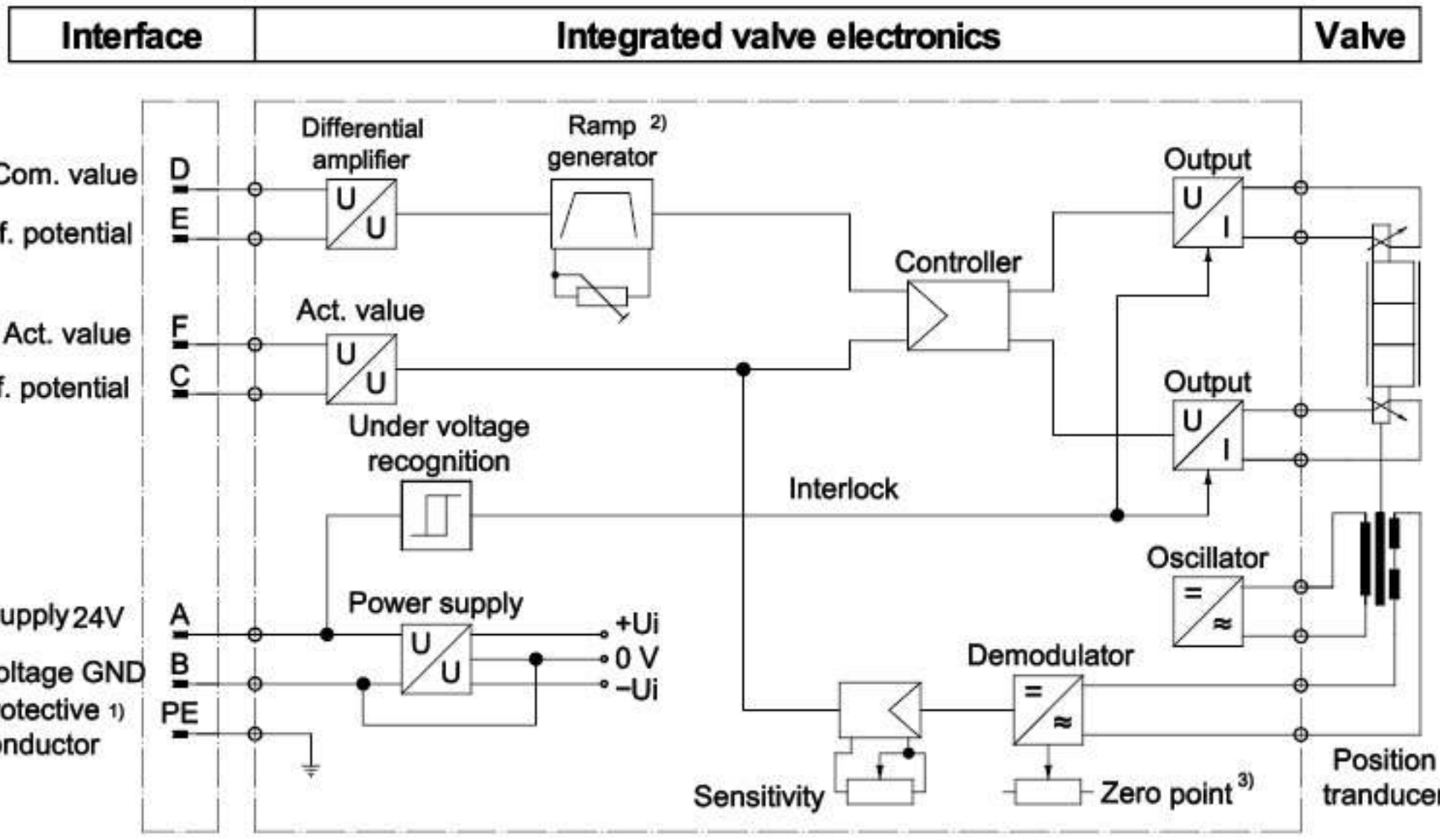
Actual value: A positive actual value (or 12 to 20 mA) at F and the reference potential at C results in a flow from P to A.

Connection cable: Recommended: - Up to 25 m cable length type LiYCY 7 × 0.75 mm^2
- Up to 50 m cable length type LiYCY 7 × 1.0 mm^2

Outside diameter 6.5 to 11 mm

Only connect screen to PE on the supply side.

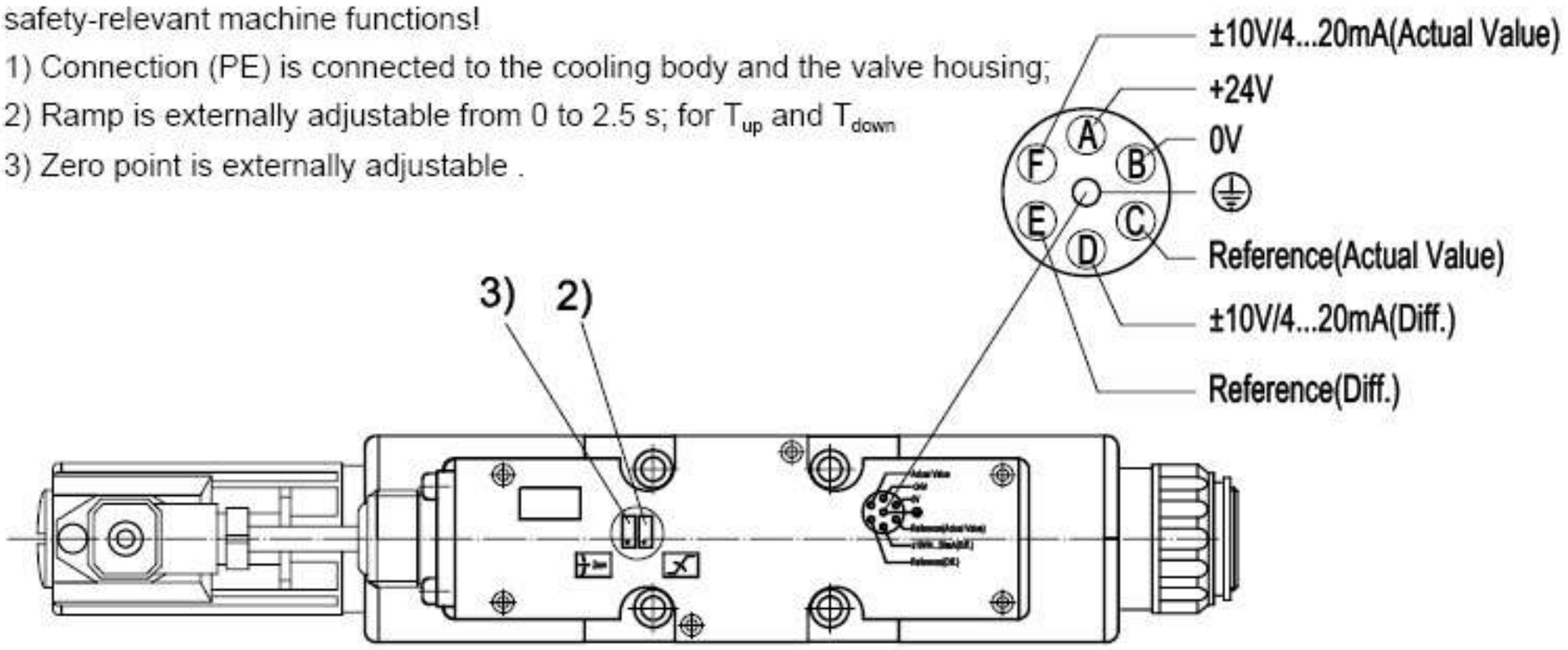
Block circuit diagram / connection allocation for the integrated valve electronics



Integrated control electronics for type 4WREE

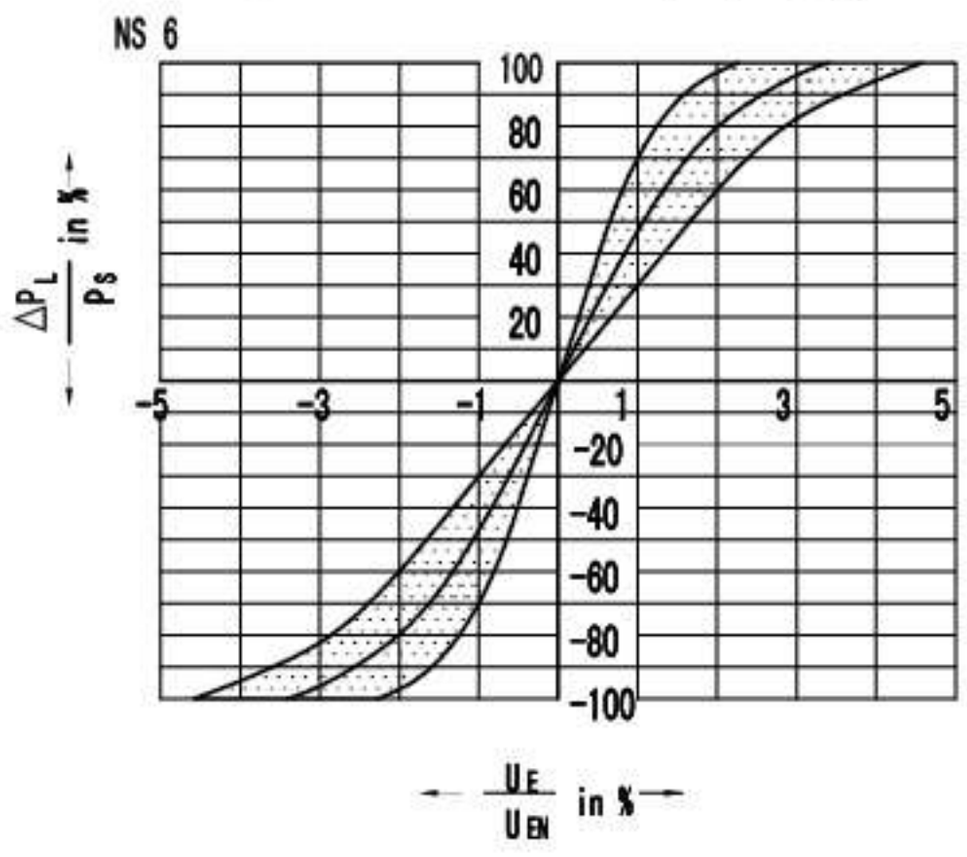
Note: Electrical signals processed by control electronics (e.g. actual value) must not be used for switching off safety-relevant machine functions!

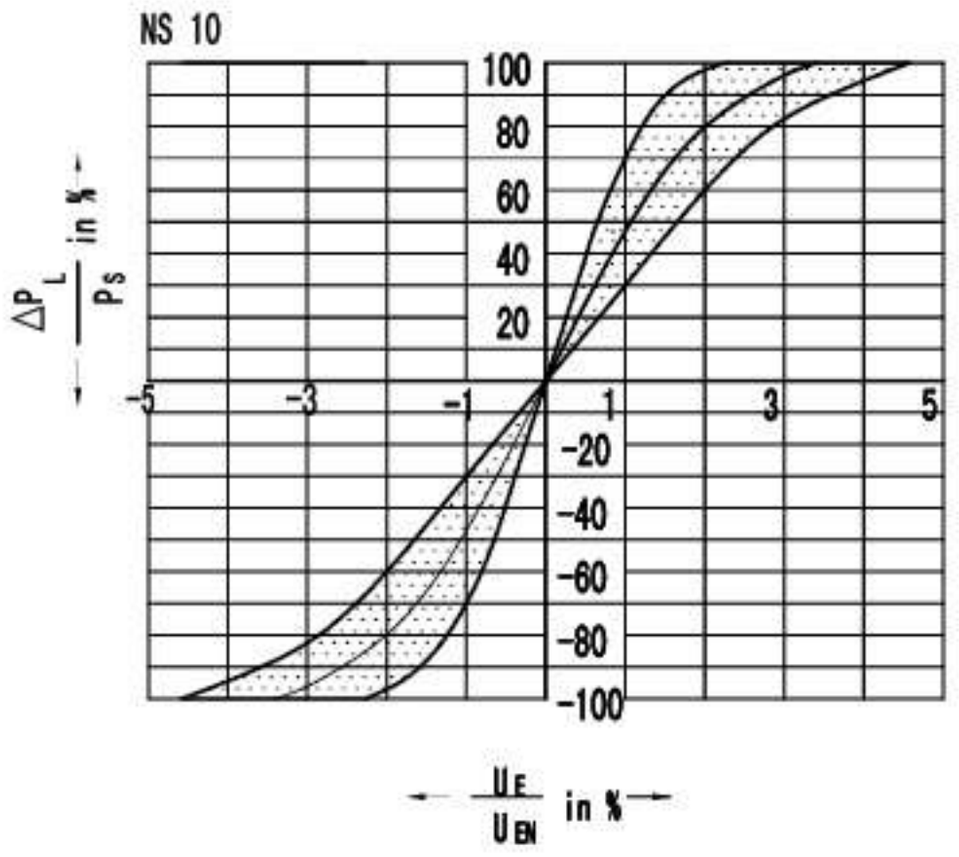
1) Connection (PE) is connected to the cooling body and the valve housing;
2) Ramp is externally adjustable from 0 to 2.5 s; for T_{up} and T_{down}
3) Zero point is externally adjustable .



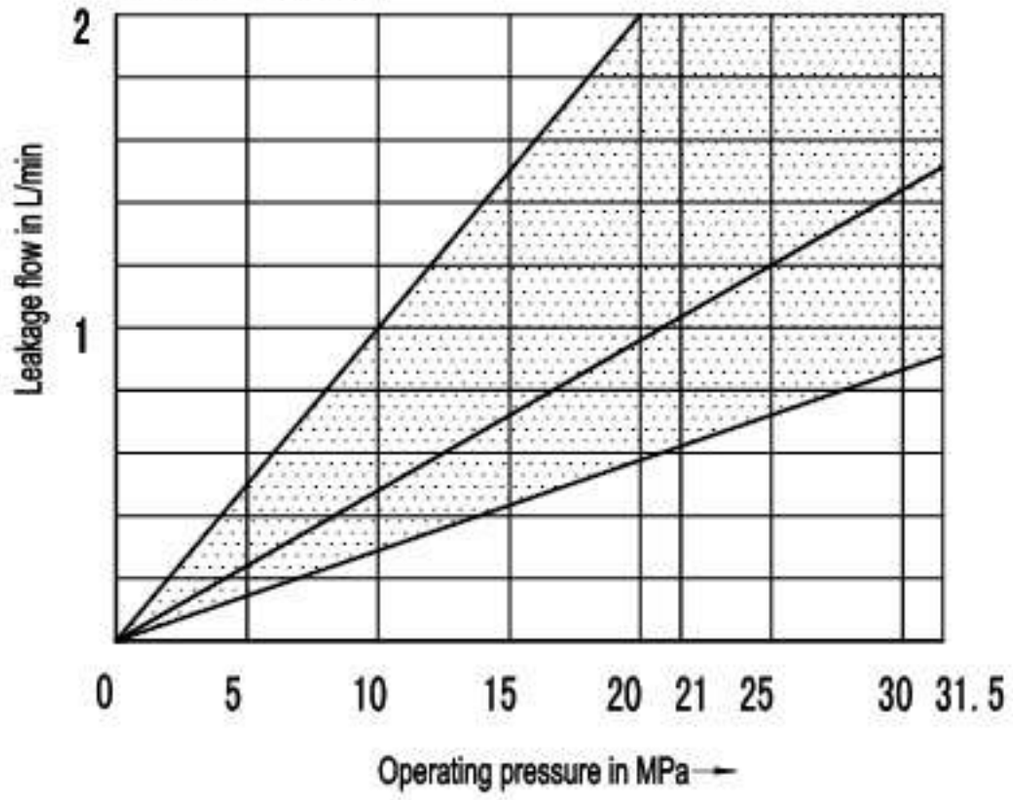
Characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 6 and 10

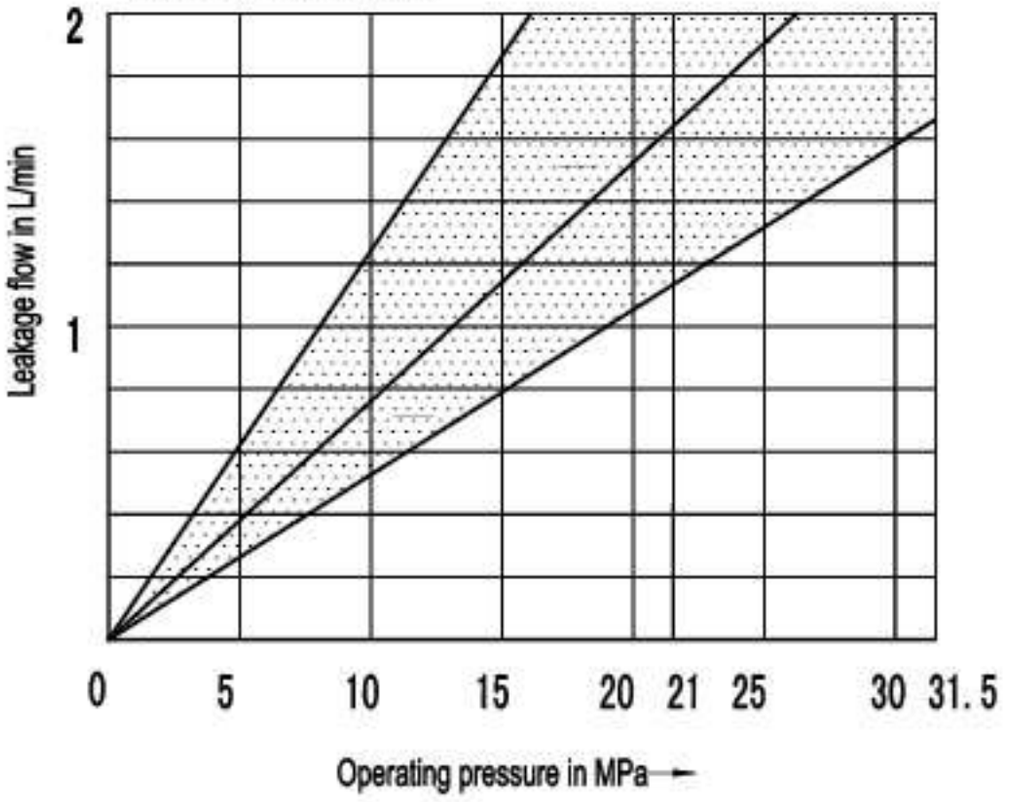
Pressure-signal-characteristic curves (V spool), p_s = 10MPa





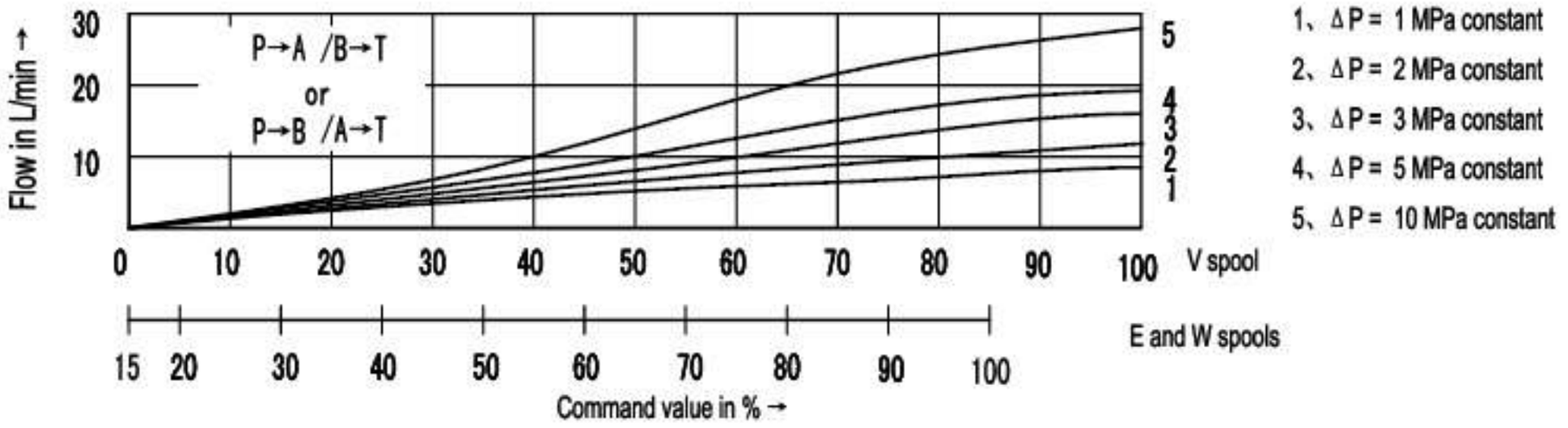
Leakage flow (with the spool in the central position)



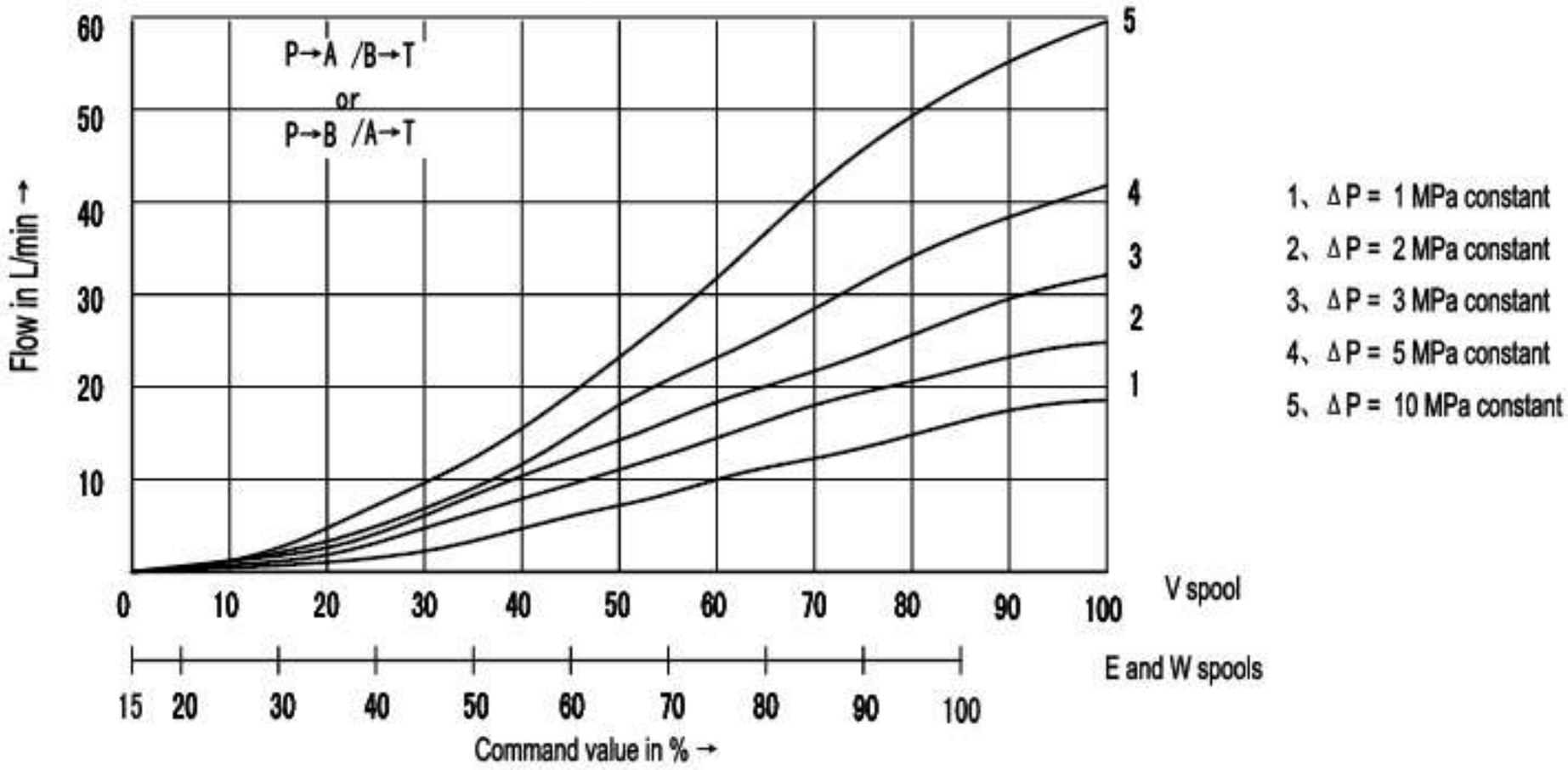


Characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 6

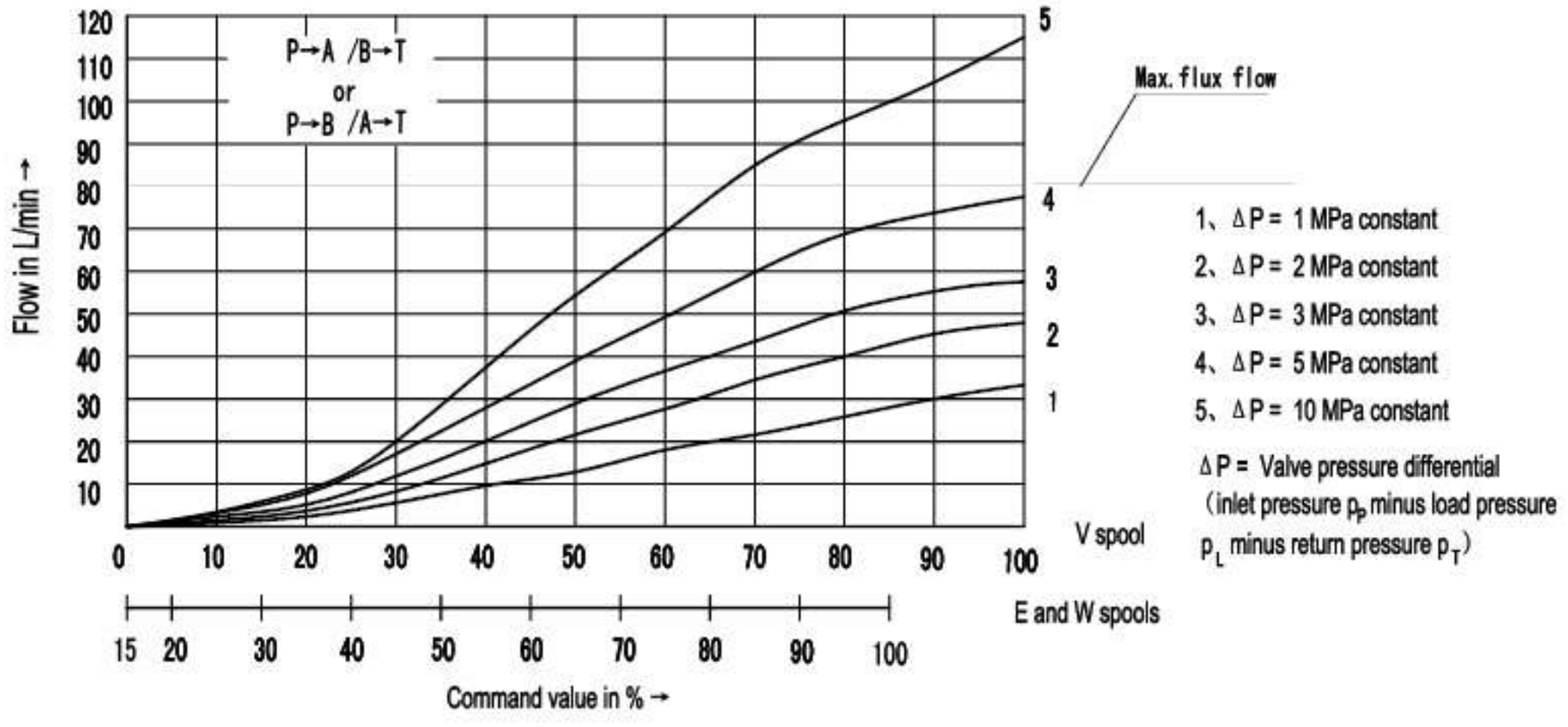
8 L/min nominal flow at a 1 MPa valve pressure differential



16 L/min nominal flow at a 1 MPa valve pressure differential

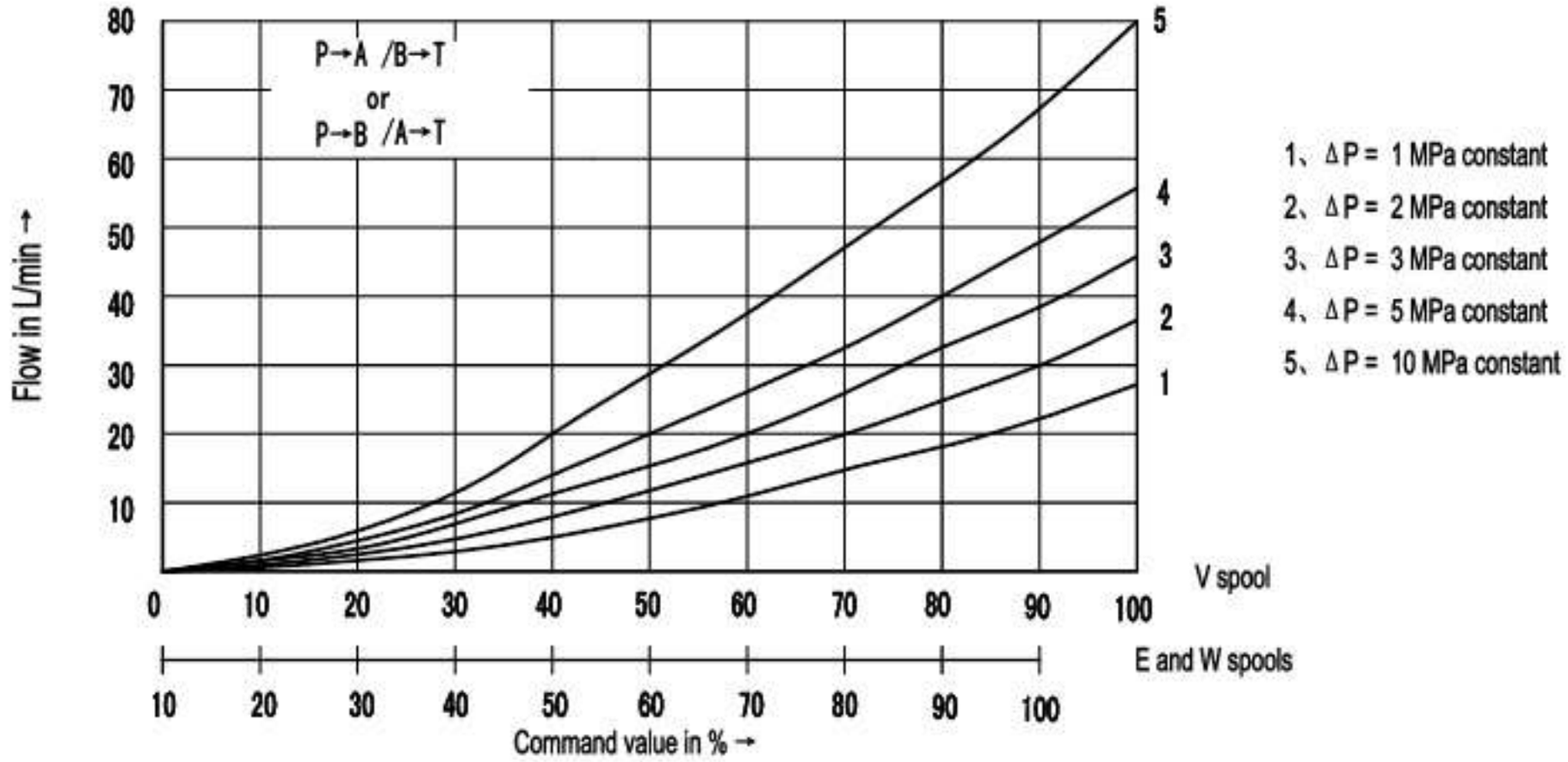


32 L/min nominal flow at a 1 MPa valve pressure differential

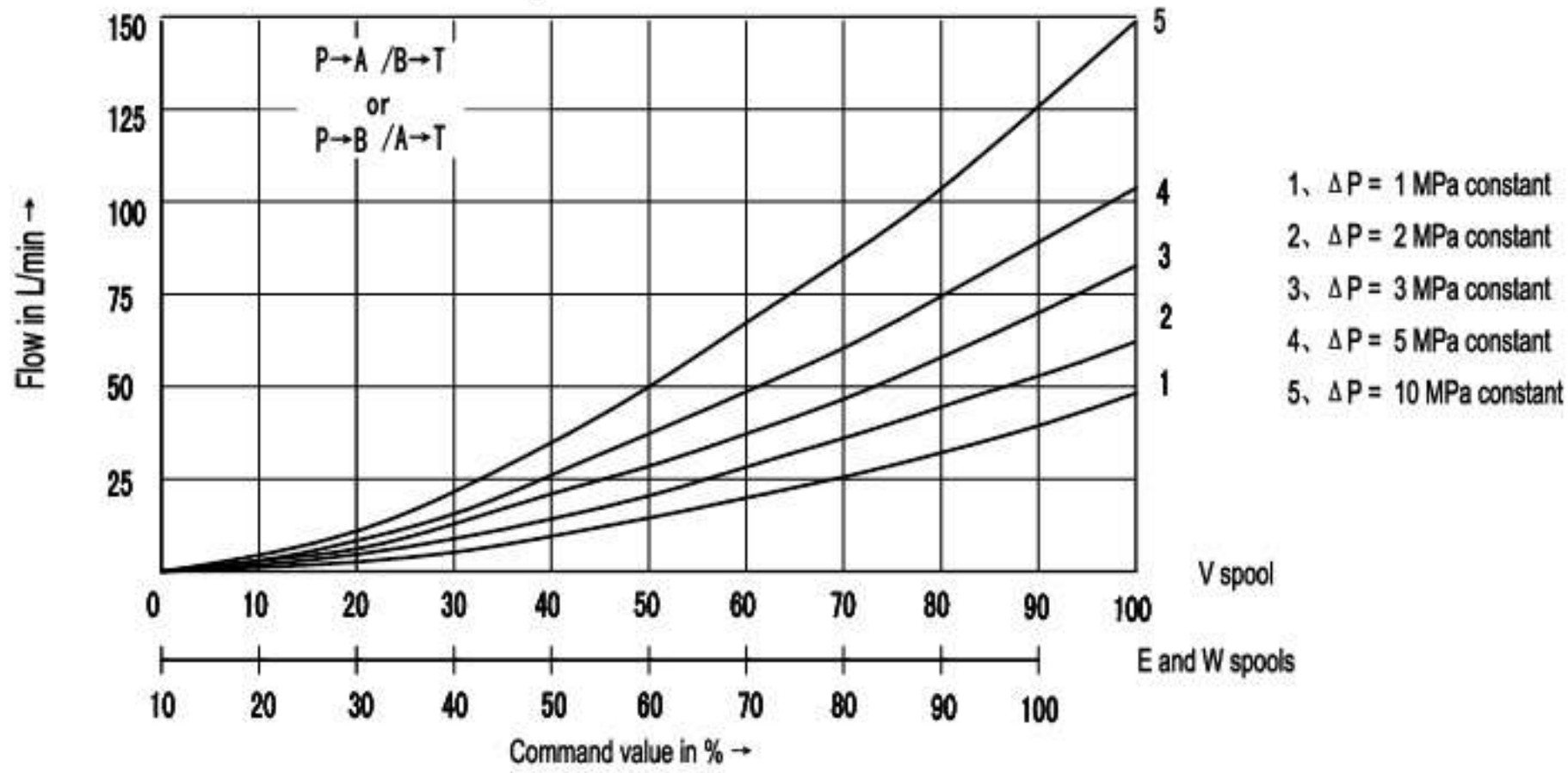


Characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 10

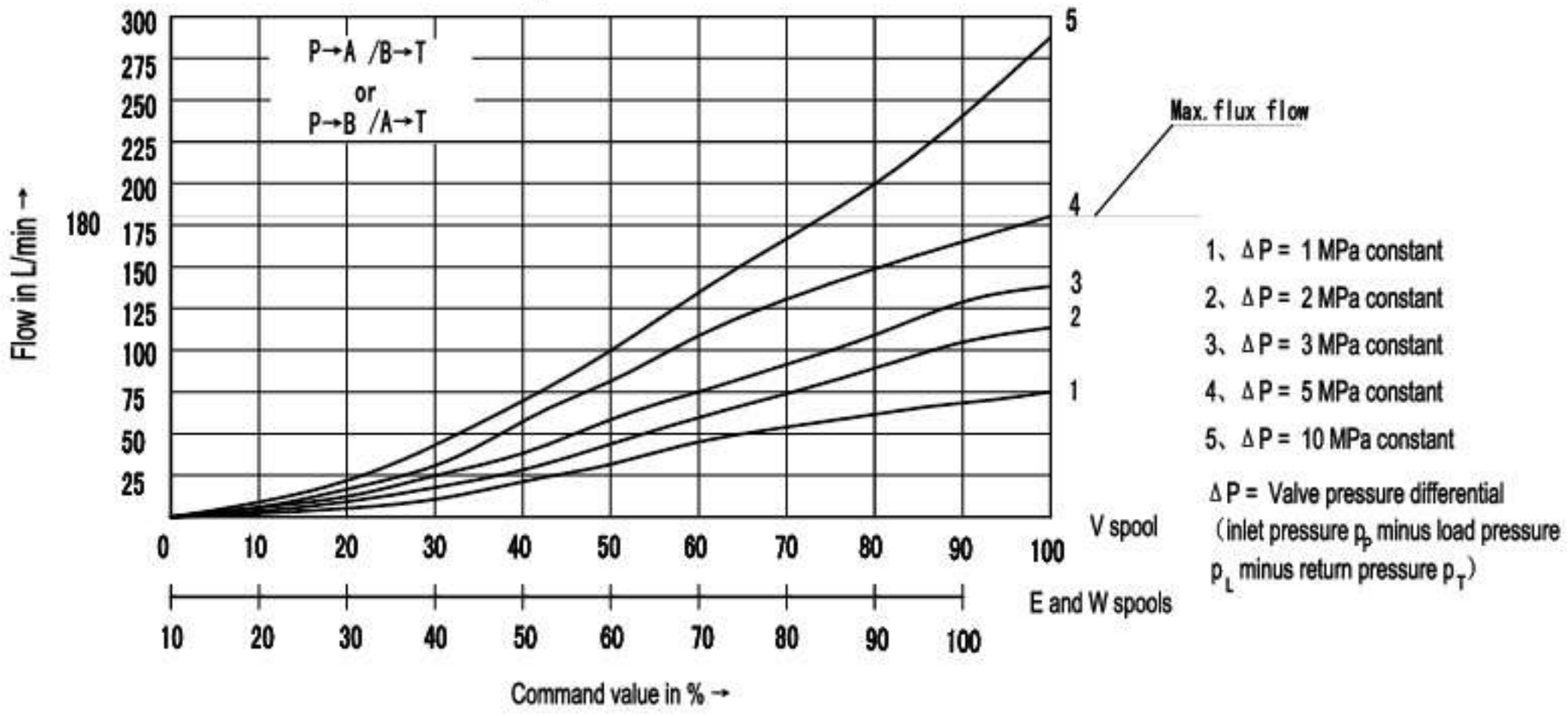
25 L/min nominal flow at a 1 MPa valve pressure differential



50 L/min nominal flow at a 1 MPa valve pressure differential

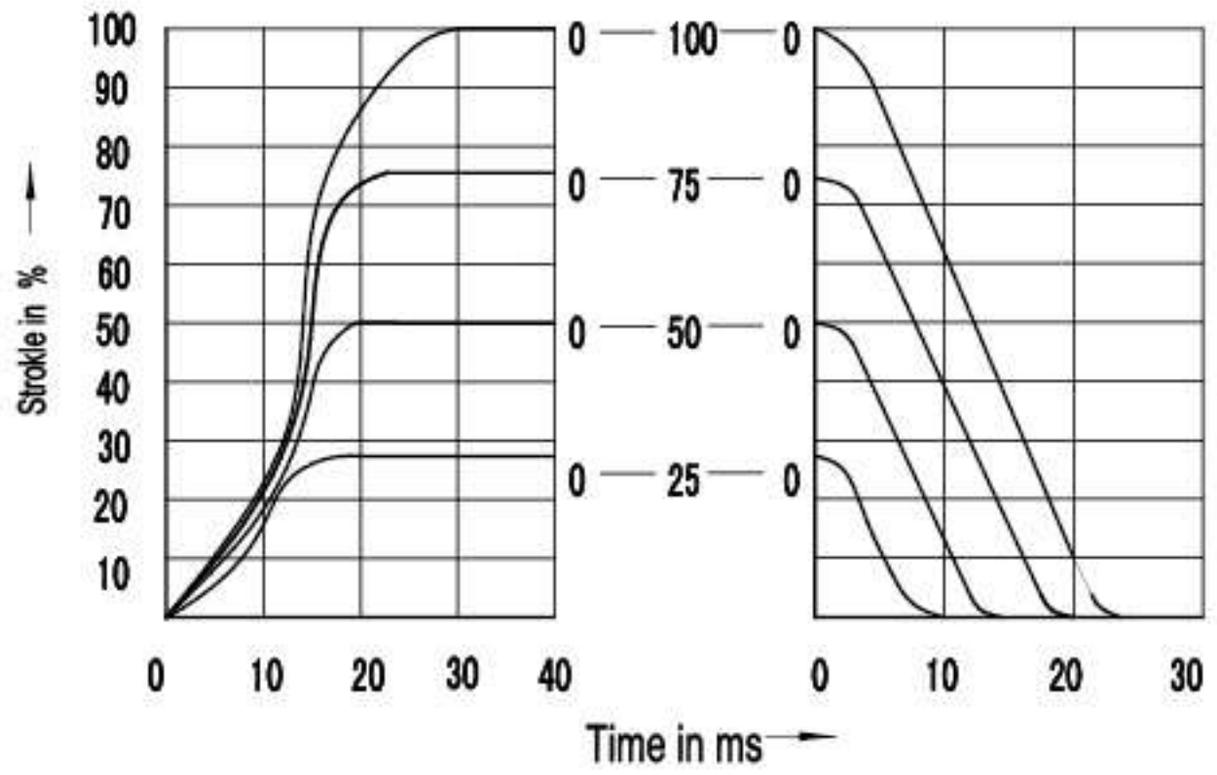


75 L/min nominal flow at a 1 MPa valve pressure differential



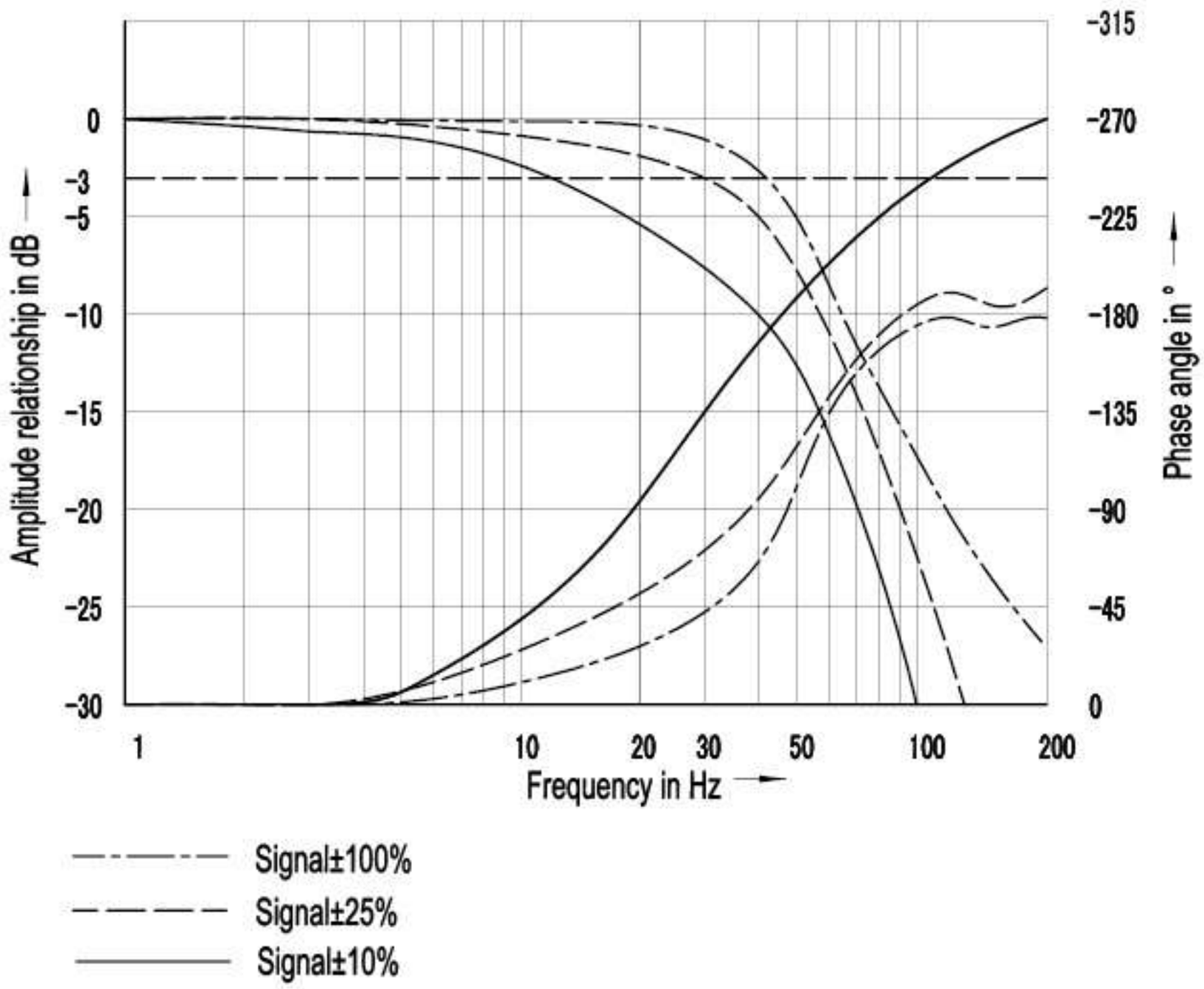
Transient function with a stepped form of electrical input signal for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 6

4/3 proportional directional valve
Symbols "E"



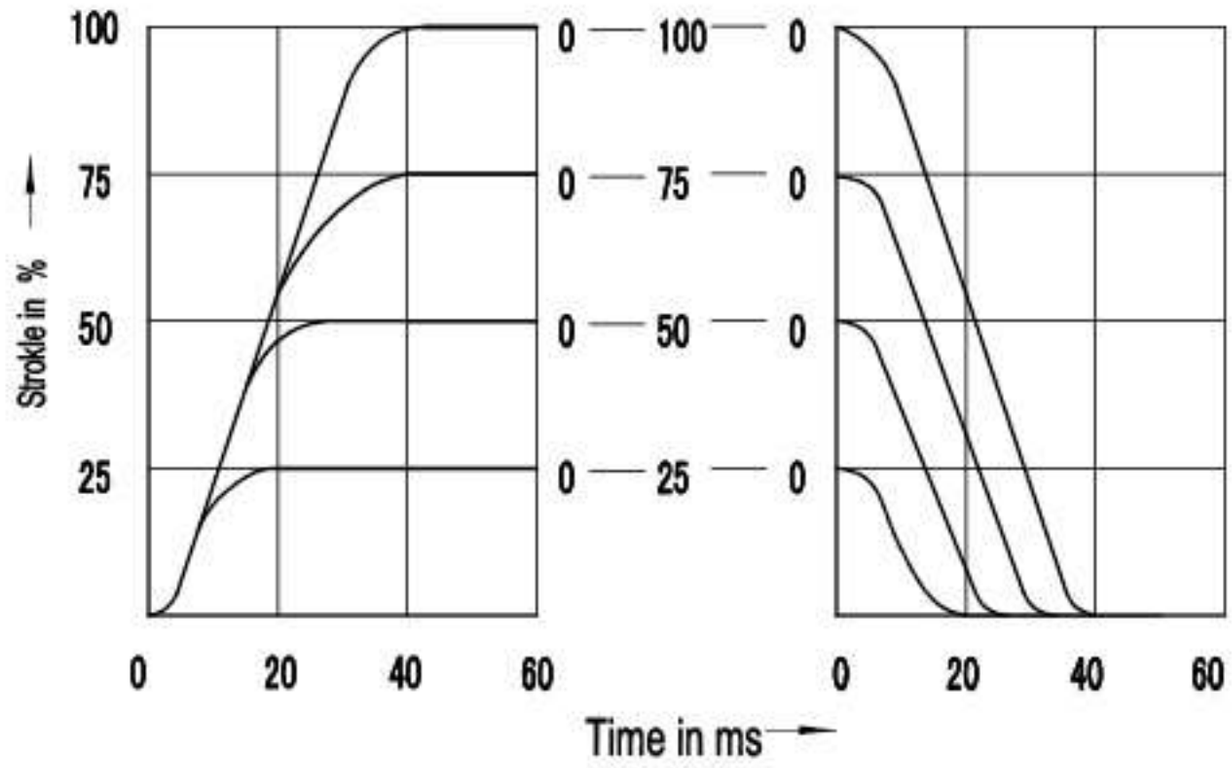
Frequency response characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6}m^2/ s, t=50°C) NS 6

4/3 proportional directional valve
Symbols "V"



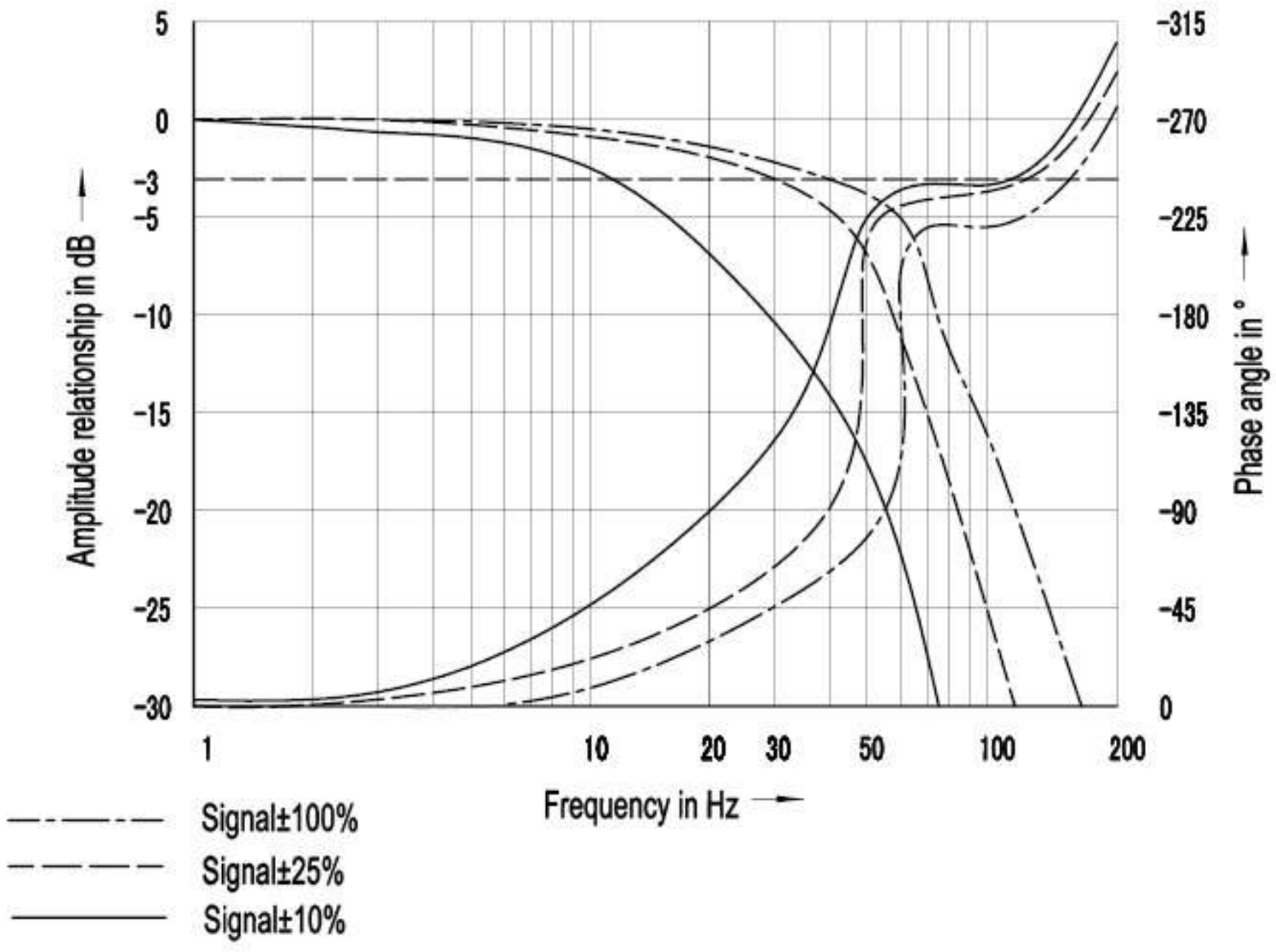
Transient function with a stepped form of electrical input signal for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 10

4/3 proportional directional valve
Symbols "E"



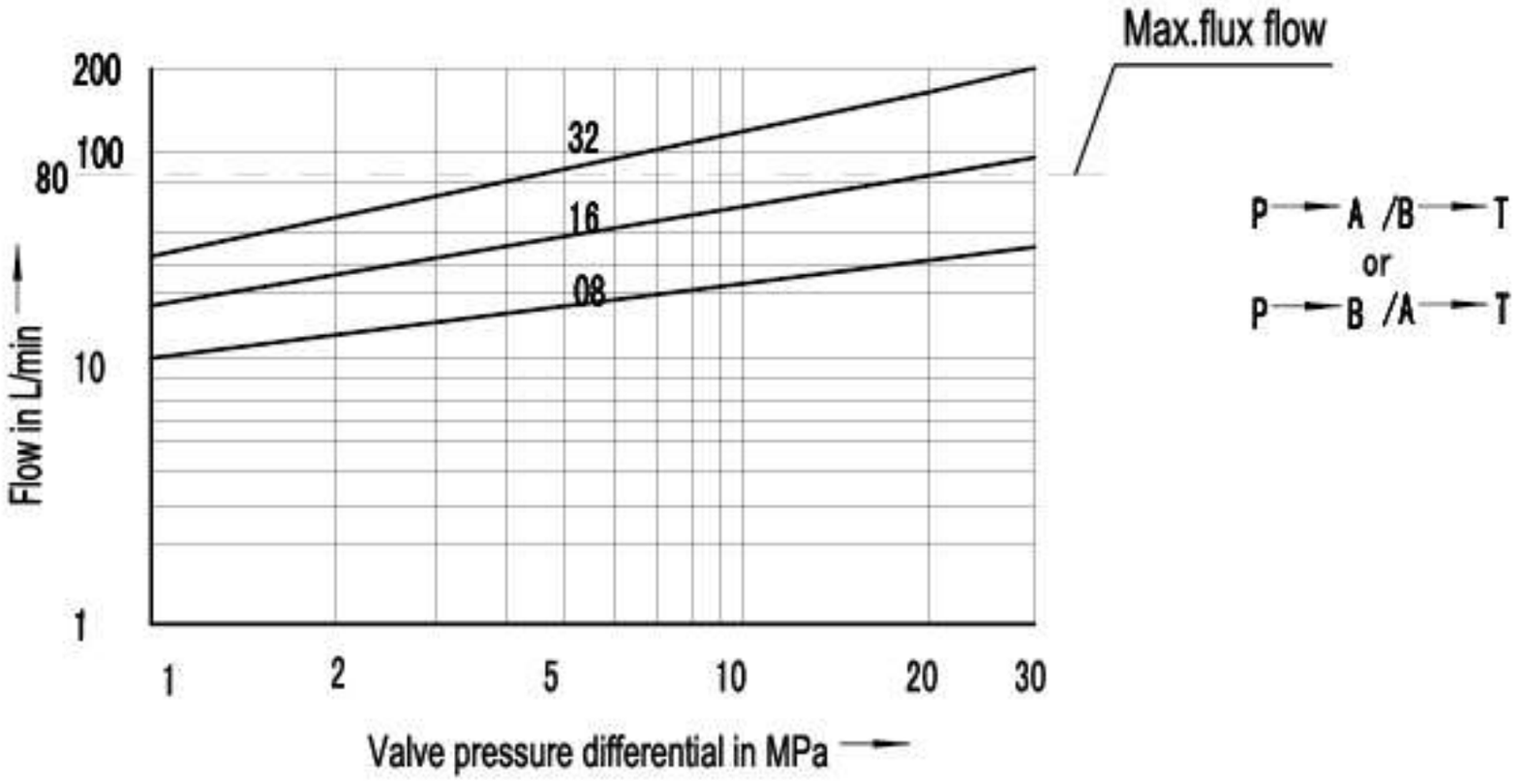
Frequency response characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6}m^2/ s, t=50°C) NS 10

4/3 proportional directional valve
Symbols "V"



Characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 6

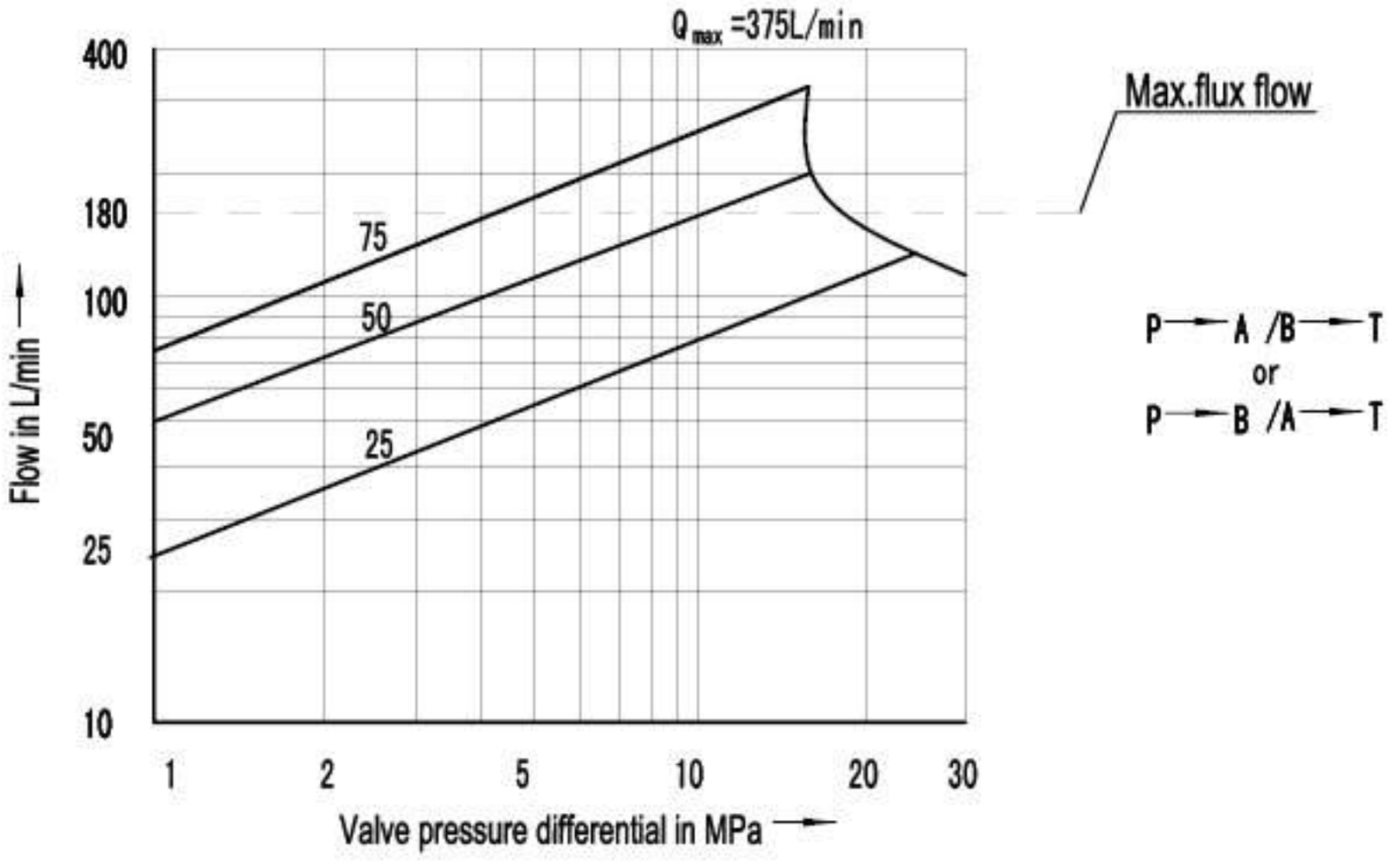
Flow load function at maximum valve opening
Nominal flow 8L/min、16L/min、32L/min
Symbols “V”



Warning : Please note the Max. flow 80L/min!

Characteristic curves for type 4WREE (P=10MPa,v=36×10^{-6} m^2/s, t=50°C) NS 10

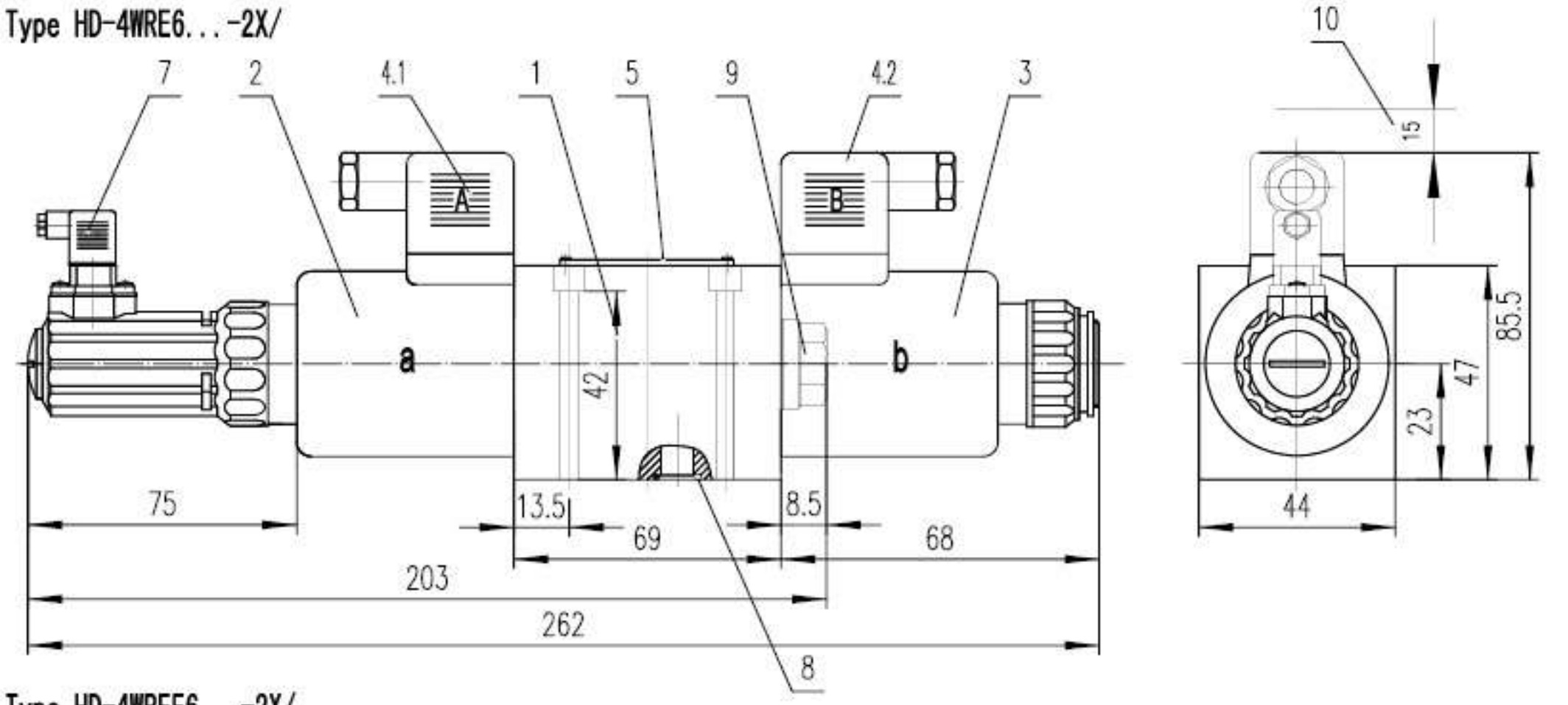
Flow load function at maximum valve opening
Nominal flow 25 L/min、50L/min、75L/min
Symbols “V”



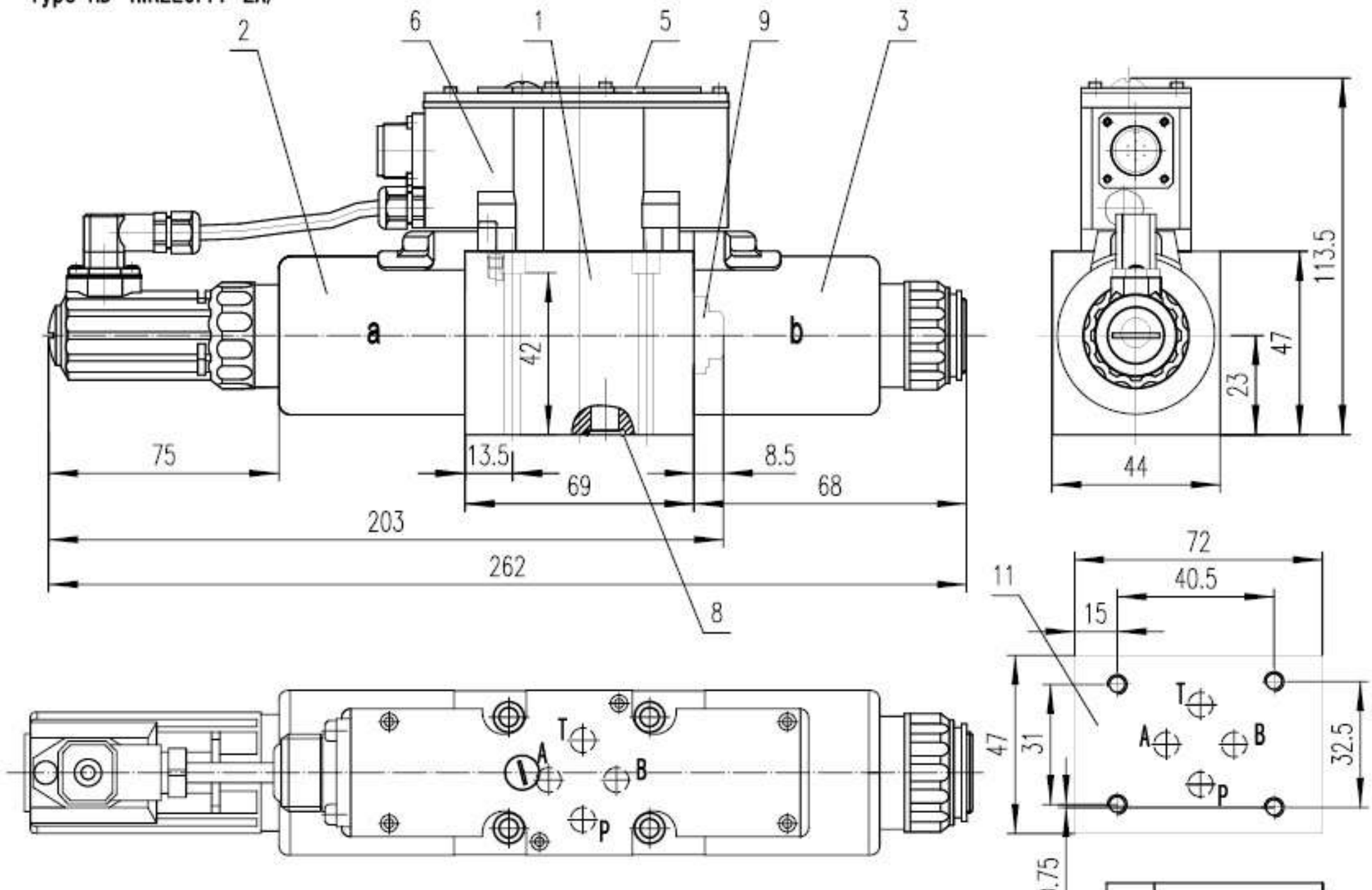
Warning : Please note the Max. flow 180L/min!

Unit dimensions: (Dimensions in mm) NS 6

Type HD-4WRE6...-2X/



Type HD-4WREE6...-2X/



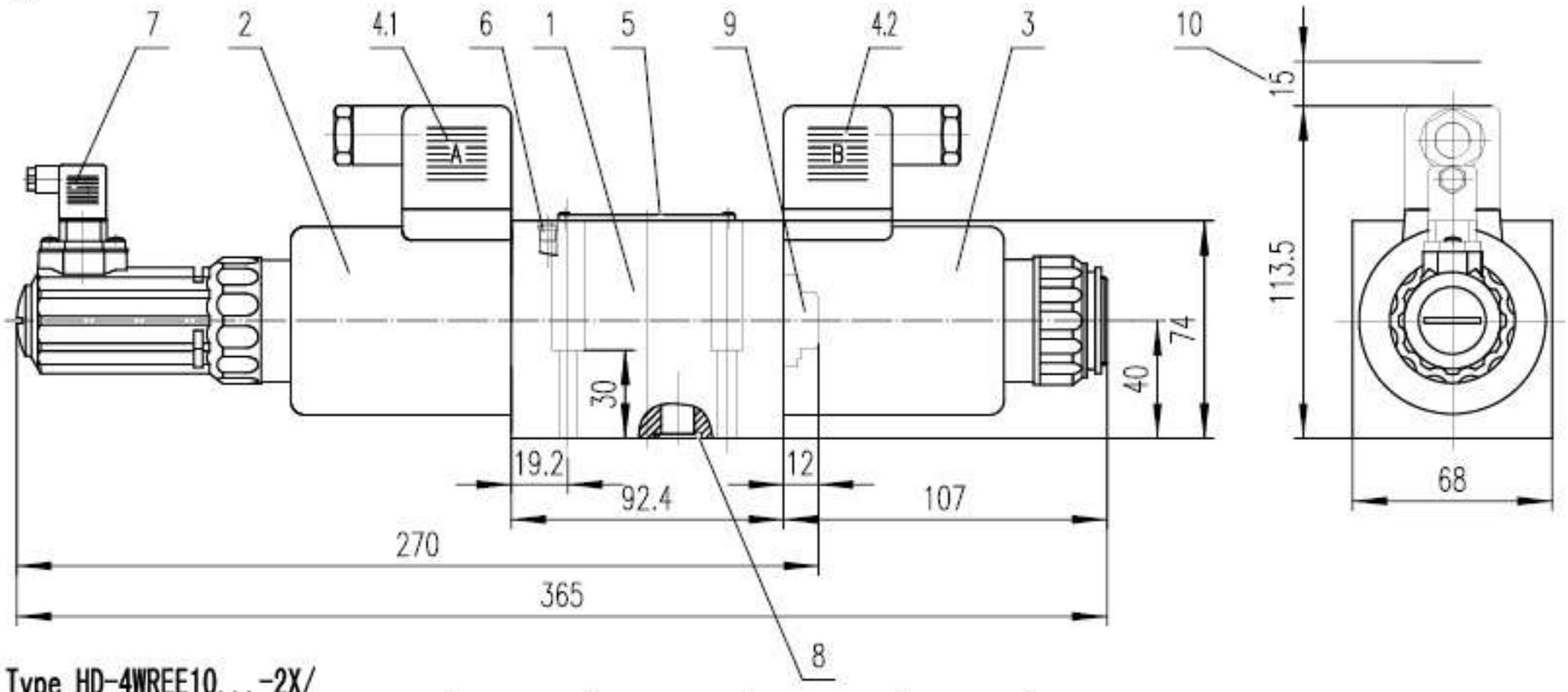
1	Valve housing	7	Plug-in connector for inductive position transducer;
2	Proportional solenoid "a" with inductive position transducer	8	O-ring 12X2 (for ports P, A, B, TA, TB)
3	Proportional solenoid "b"	9	Plug for valves with one solenoid (2-switching positions), versions EA or WA
4.1	Plug-in connector "A"	10	Space required to remove plug-in connector
4.2	Plug-in connector "B"	11	Machined valve mounting surface and location of the connections
5	Nameplate		
6	Integrated control electronics		

Subplates: G341/01(G 1/4")
G342/01(G 3/8")
G502/01(G 1/2")

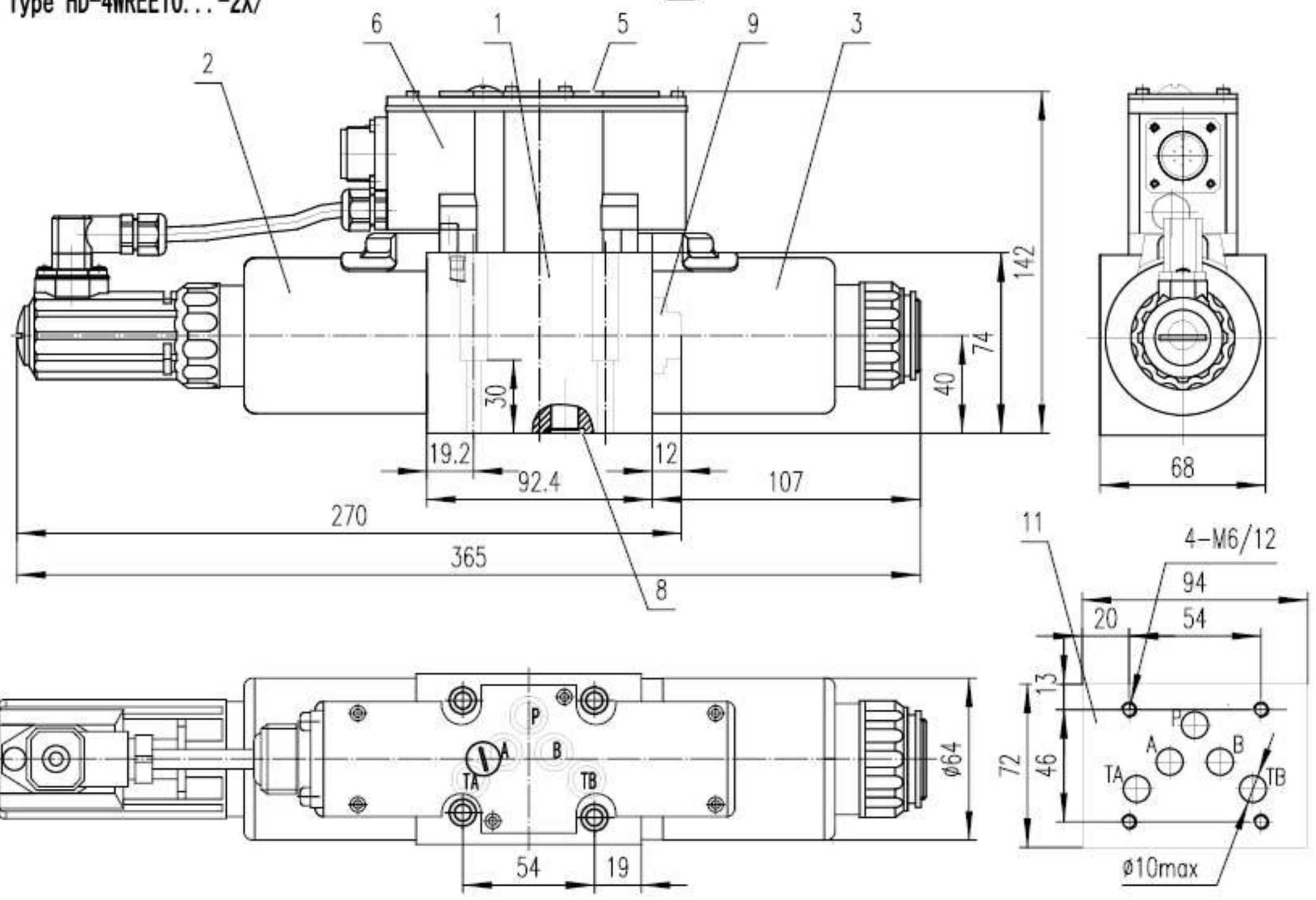
Valve fixing screws:
4-M5X50 (GB/T70.1) M_A =8.9Nm

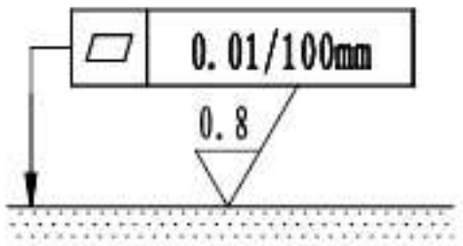
Unit dimensions: (Dimensions in mm) NS 10

Type HD-4WRE10...-2X/



Type HD-4WREE10...-2X/





1	Valve housing	7	Plug-in connector for inductive position transducer;
2	Proportional solenoid "a" with inductive position transducer	8	O-ring 12X2(for ports P, A, B, TA, TB)
3	Proportional solenoid "b"	9	Plug for valves with one solenoid (2-switching positions), versions EA or WA
4.1	Plug-in connector "A"	10	Space required to remove plug-in connector
4.2	Plug-in connector "B"	11	Machined valve mounting surface and location of the connections
5	Nameplate		
6	Integrated control electronics		

Subplates: G66/01(G 3/8")
G67/01(G 1/2")
G534/01(G 3/4")

Valve fixing screws:
4-M6X40 (GB/T70.1) M_A =15.5Nm

Notice

Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to $\sqrt{0.8}$.
6. Surface finish of mating piece is required to 0.01/100mm.

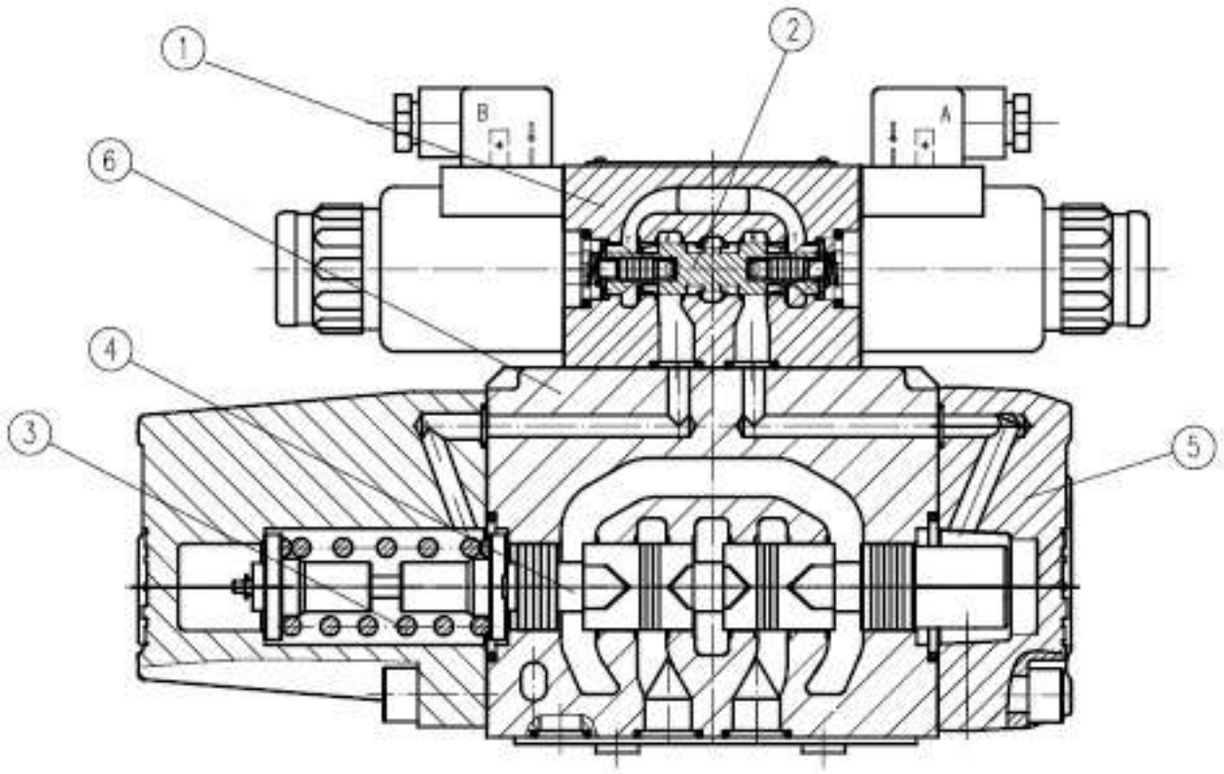
BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	4/2,and 4/3 proportional directional valves, pilot operated, without electrical position feedback, Type HD-4WRZ(E)-7X		
	Size 10,16,25,32	Up to 35MPa	Up to 1600L/min

- Pilot operated proportional directional valve
- For subplate mounting
- The control of direction and rate of flow
- Spring centered control spool
- Valve and proportional control electronics from a single source

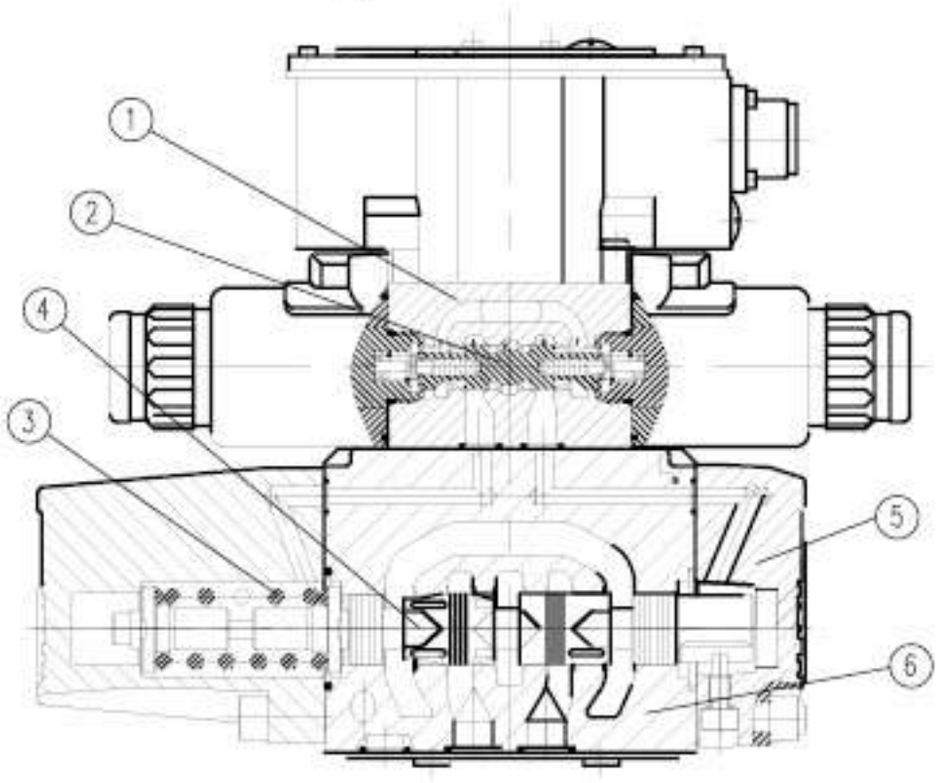


Function, section

The type HD-4WRZ(E)valves are pilot operated 4-way valves that are actuated via proportional solenoids, they control the direction and rate of flow.The valve basically comprises of: pilot valve ①, main spool ④, main valve ⑥, and centering spring ③. With the solenoid B in the de-enegised condition the control spool ② move to the right.The pilot oil supply to the pilot valve is internal via port P or external via port X. Pilot oil flows via the pilot valve ① into the pressure chamber and moves the main spool ④ in proportion to the electrical input signal.The connection from P to A and from B to T is via orifice type cross-sections with progressive flow characteristics.
With the solenoid A in the de-enegised condition the main spool move to the left.The connection from P to B and from A to T. De-energisation of the solenoid, the control spool and pilot spool ④ are moved back into their centre positions.



Type HD-4WRZ...-7X/...



Type HD-4WRZE...-7X/...

Ordering details

HD | 4WR_ | | | | | 7X | / | | | | / | | | *

Technology of Beijing Huade Hydraulic =HD

Hydraulic operation =H

Electro-hydraulic operation =Z

Only for WRZ:

For external electronics =No code

With integrated electronics =E

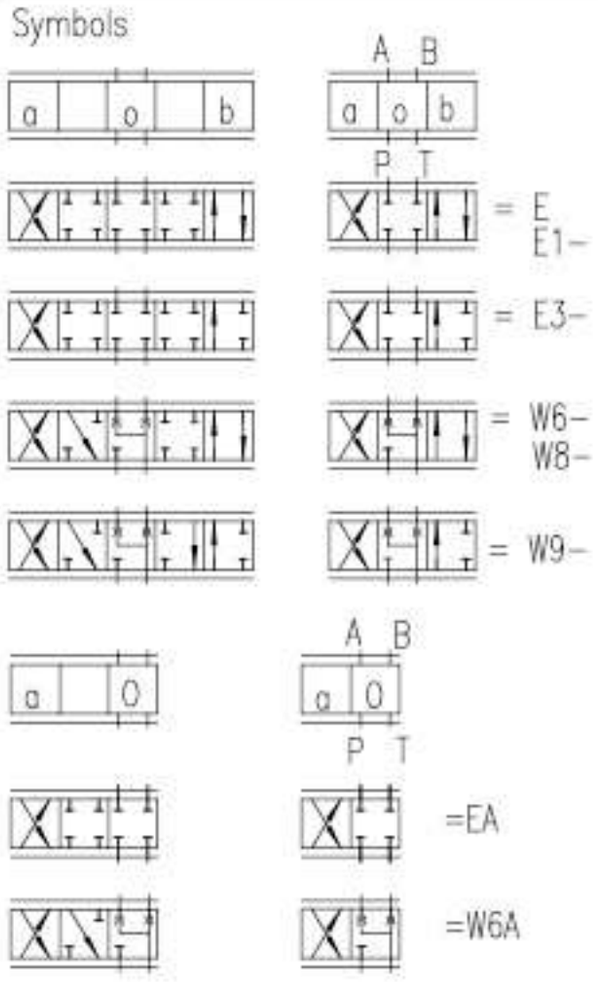
Nominal size 10 = 10

Nominal size 16 = 16

Nominal size 25 = 25

Nominal size 32 = 32

Symbols



With symbols E1- and W8-:

P→A=q_{vmax} B→T=q_v/2

P→B=q_v/2 A→T=q_{vmax}

With symbols E3- and W9-:

P→A=q_{vmax} B→T=closed

P→B=q_v/2 A→T=q_{vmax}

(Regenerative circuit, base of spool at port A)

Note: With spools W6-, W8-, W9-, W6A in their switched position "0", there is a connection fromA to T and B to T with an opening of less than 2% of the relevant cross-section.

Further details in clear text

M= NBR seals

V= FKM seals

No code= Without pressure reducing value

D3= With pressure reducing value

ZDR6DP0-4X/40YM(fixed setting)

No code = for WEH and WRZ

for 4WRZE

A1 = Com. value input ±10V

F1 = Com. value input 4 to 20mA

Electrical connection only for WRZ:

K4= With component plug

For WRZE:

K31= With component plug
Without plug-in connector

No code = Pilot oil supply external, Pilot oil drain external

E = Pilot oil supply internal, Pilot oil drain external

ET = Pilot oil supply internal, Pilot oil drain internal

T = Pilot oil supply external, Pilot oil drain internal

(type 4WRH only possible without code)

No code = Without hand override

N9 = With protected hand override

G24 = 24V DC (standard version)

6E = Proportional solenoid with removable coil

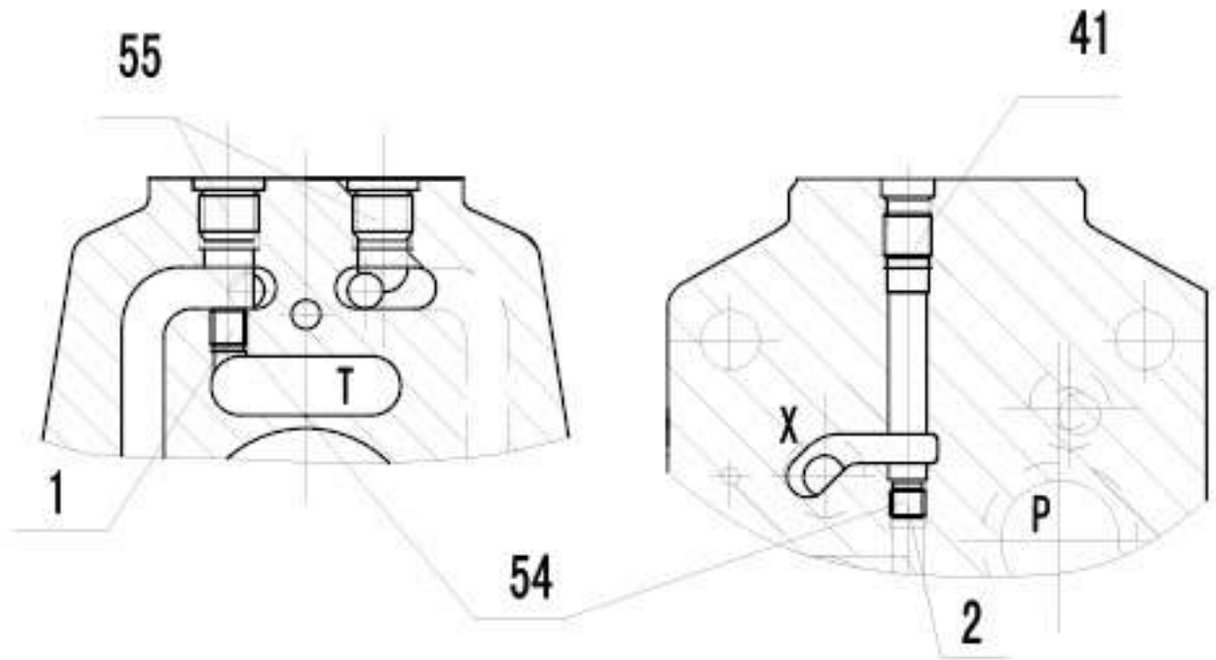
7X = Series 70 to 79(70 to 79: unchanged installation and connection dimensions)

Nominal flow in L/min with a valve pressure drop Δp=1MPa

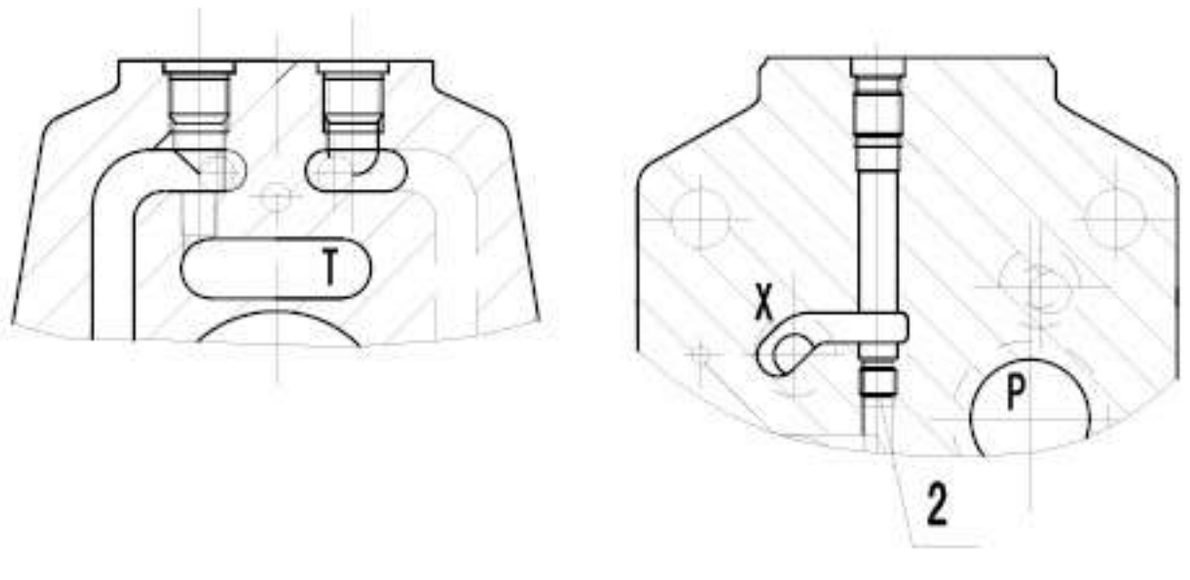
25 =25L/min	50 =50L/min	85 =85L/min	for nominal size 10
	100 =100L/min	150 =150L/min	for nominal size 16
	220 =220L/min	325 =325L/min	for nominal size 25
	360 =360L/min	520 =520L/min	for nominal size 32

Pilot oil supply

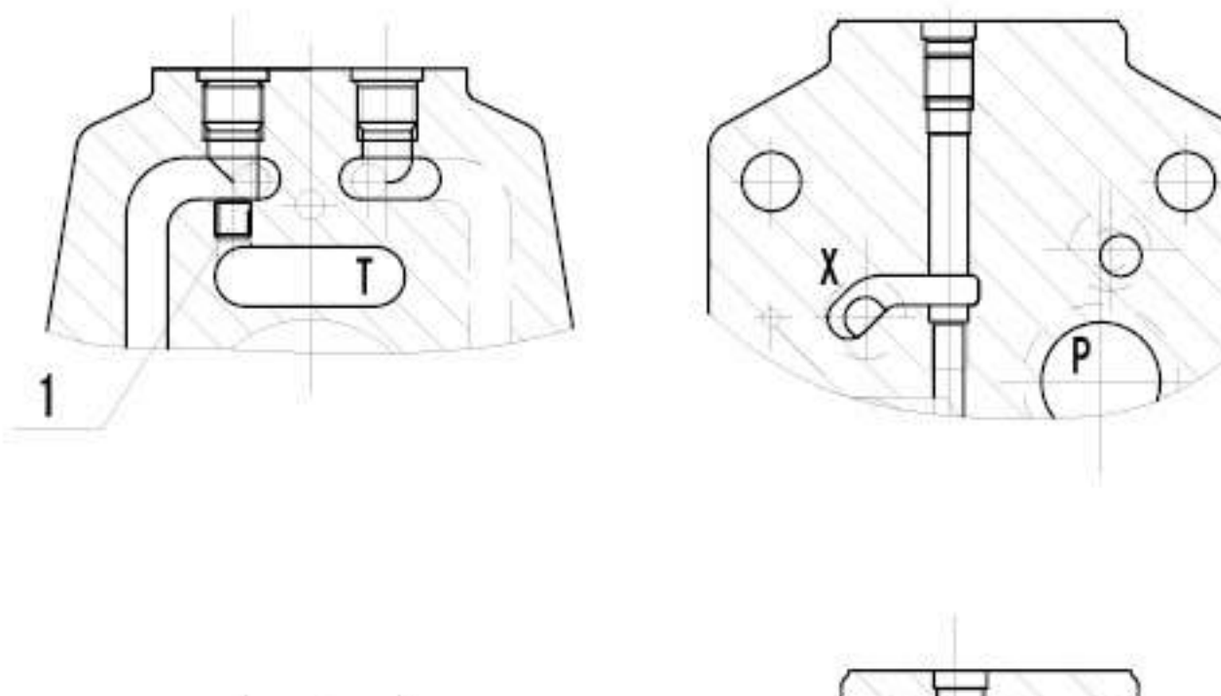
Pilot oil supply, throttle insert
(example:NS16)



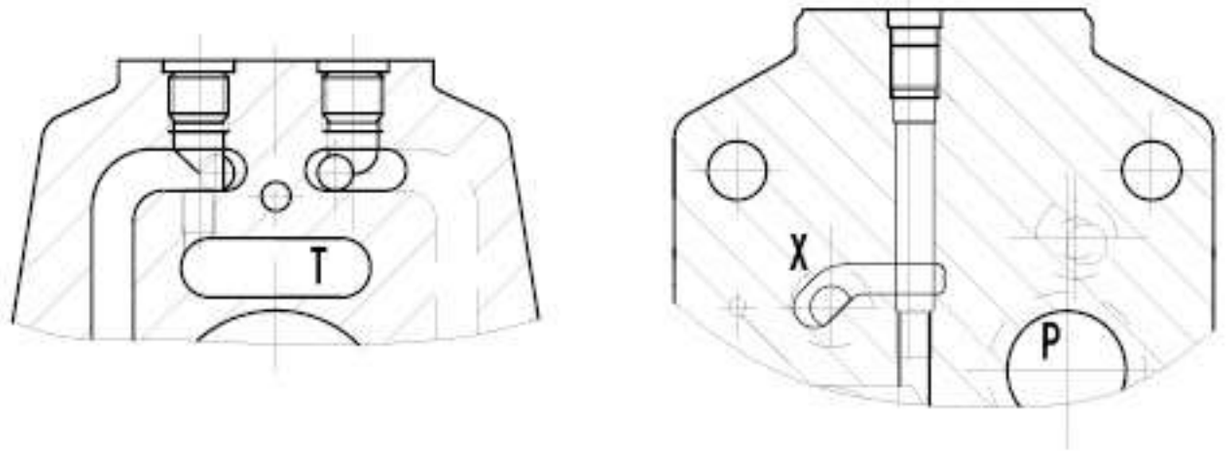
pilot oil supply external
pilot oil drain external
Ports 1 and 2 have to be plugged.
（Items 55:ZM12X1.5　　items 41:ZM8X1
items 54:ZM6X1）



pilot oil supply external
pilot oil drain internal
Port 2 has to be plugged.



pilot oil supply internal
pilot oil drain external
Port 1 has to be plugged.



pilot oil supply internal
pilot oil drain internal

Technical data

Hydraulic

Nominal size			10	16	25	32
Operating pressure -Pilot valve （MPa）		pilot oil supply external	3~10			
		pilot oil supply internal	10~31.5	10~35		
-Main valve （MPa）			31.5	35		
Return line pressure （MPa）	Port T (pilot oil drain external)		31.5	25	25	15
	Port T (pilot oil drain internal)		3			
	Port Y		3			
Pilot oil volume for spool movement 0~100%		cm^3	1.7	4.6	10	26.5
Pilot oil flow at port X and Y for stepped form of input signal 0~100%		L/min	3.5	5.5	7	15.9
Flow through main valve		L/min	170	460	870	1600
Hysteresis		%	≤6			
Pressure fluid			Mineral oil to DIN 51 524			
Pressure fluid temperature range		℃	-20 ~ 80			
Viscosity range		mm/S^2	20~380			
Installation			optional, preferably horizontal			
Weight for version WRZ··· (for WRZE···additionally 0.2kg)			7.8	13.4	18.2	42.2

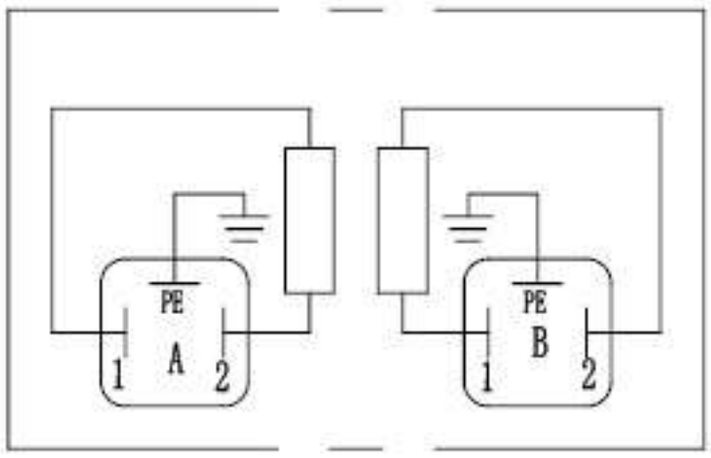
Electrical

Valve type		WRZ	WRZE
Voltage type		DC	
Max.current	A	1.5	2.5
Solenoid coil resistance （Ω）	Cold value at 20℃	4.8	2
	Max.warm value	7.2	3
Protection		IP65	
Coil temperature	℃	up to 150	
Duty	%	100	
Control electronics		HD-VT-VSPA2-50-1X/...	integrated control electronics

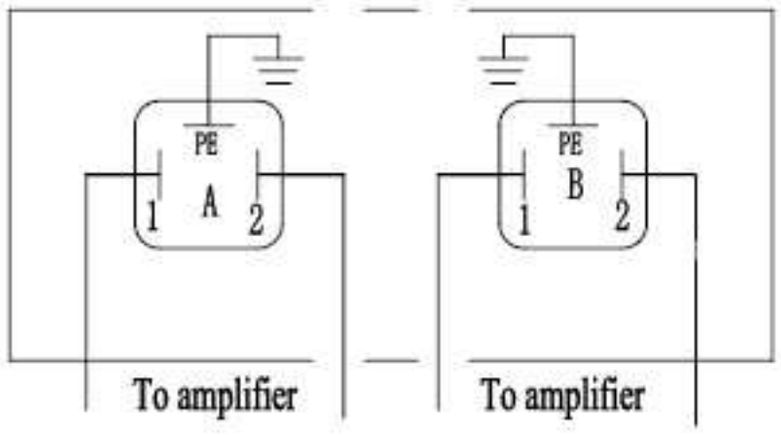
Electrical connections, plug-in connectors

For type 4WRZ...(without integrated electronics)

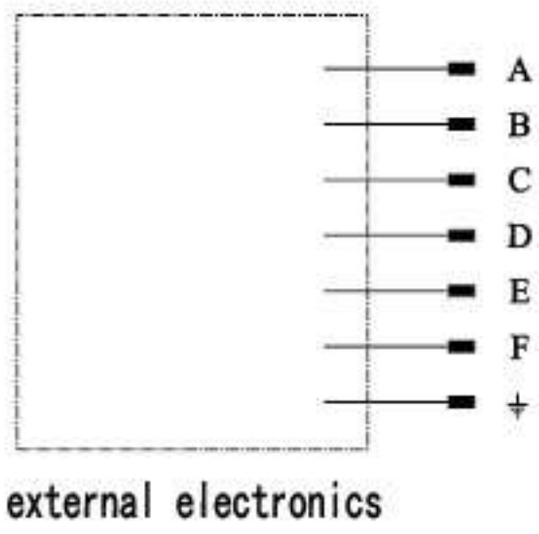
Connection at component plug



Connection at plug-in connector



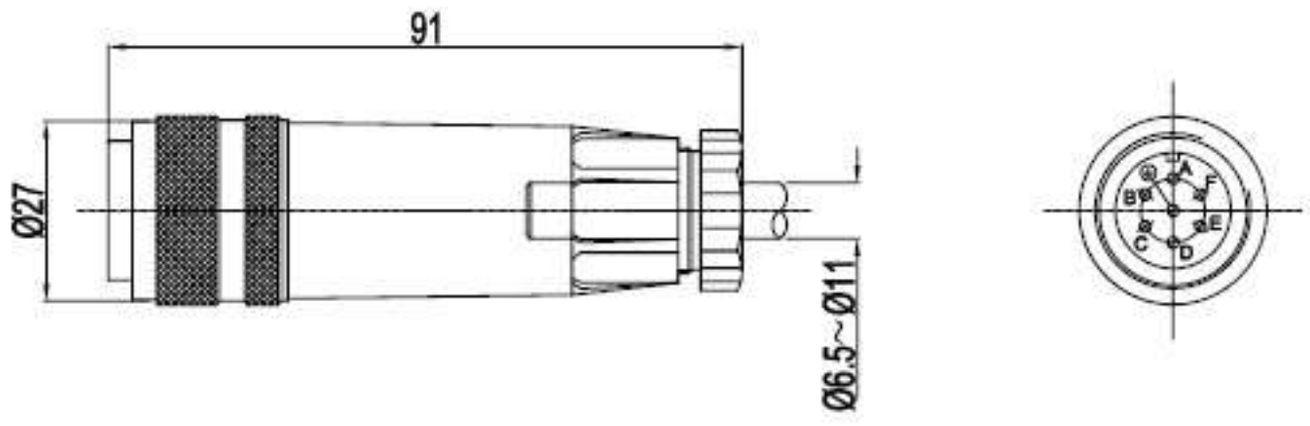
Component plug pin allocation



Slot alloc.	Connect with
A	solenoid A
B	solenoid B
C	solenoid A
D	solenoid B
E	n.a.
F	n.a.
PE	valve housing

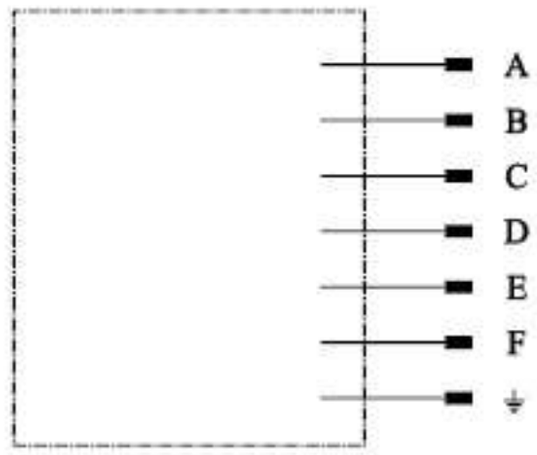
For type 4WRZE...(with integrated electronics)

Plug-in connector to E DIN 43 563-BF6-3 (plastic version)



Integrated control electronics for type HD-4WRZE

Component plug pin allocation



	Slot alloc.	Signal
Power supply	A	24VDC（19 to 35VDC）
	B	GND
	C	n.c.[1]
Differential amplifier input	D	com.value(±10V/4 to 20mA)
	E	ref.potential
	F	n.c.[1]

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

For valves with 1 solenoid on side a(spool variant EA and W6A)with the reference potential at E and a positive command value at D(0 to 10V or 4 to 20mA)results in a flow from P to B and A to T.

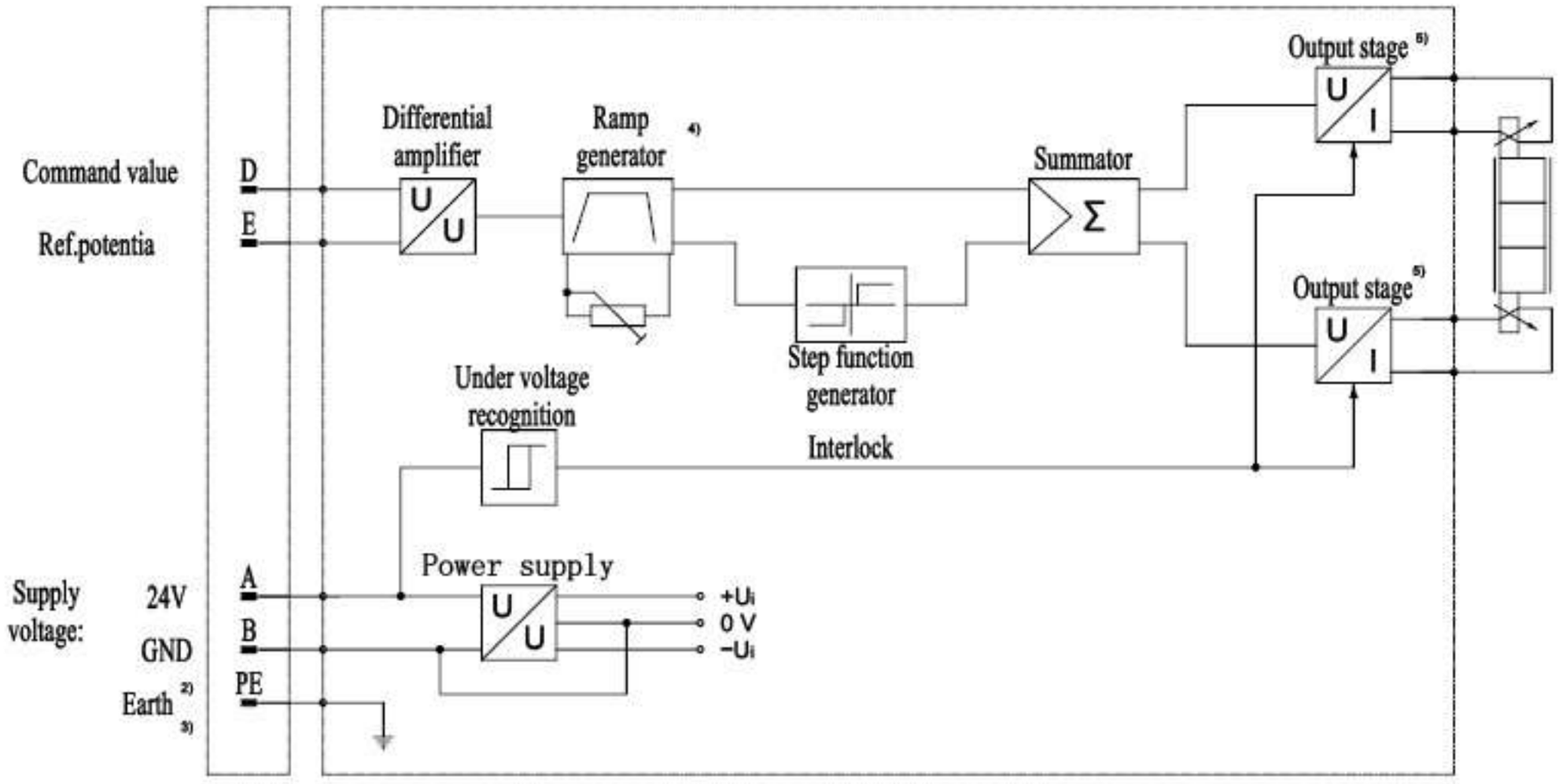
Connection cable: Recommended: - up to 25m cable length LiYCY 5×0.75mm^2;

- up to 50m cable length LiYCY 5×1.0mm^2;

Outside diameter 6.5 to 11mm or 8 to 13.5mm

Only attach screen to PE on the supply side.

Interface	Integrated control electronics	Valve



1) Slots C and F must not be connected

2) Port PE is connected to cooling body and valve housing

3) Earth is screwed to valve housing and cover

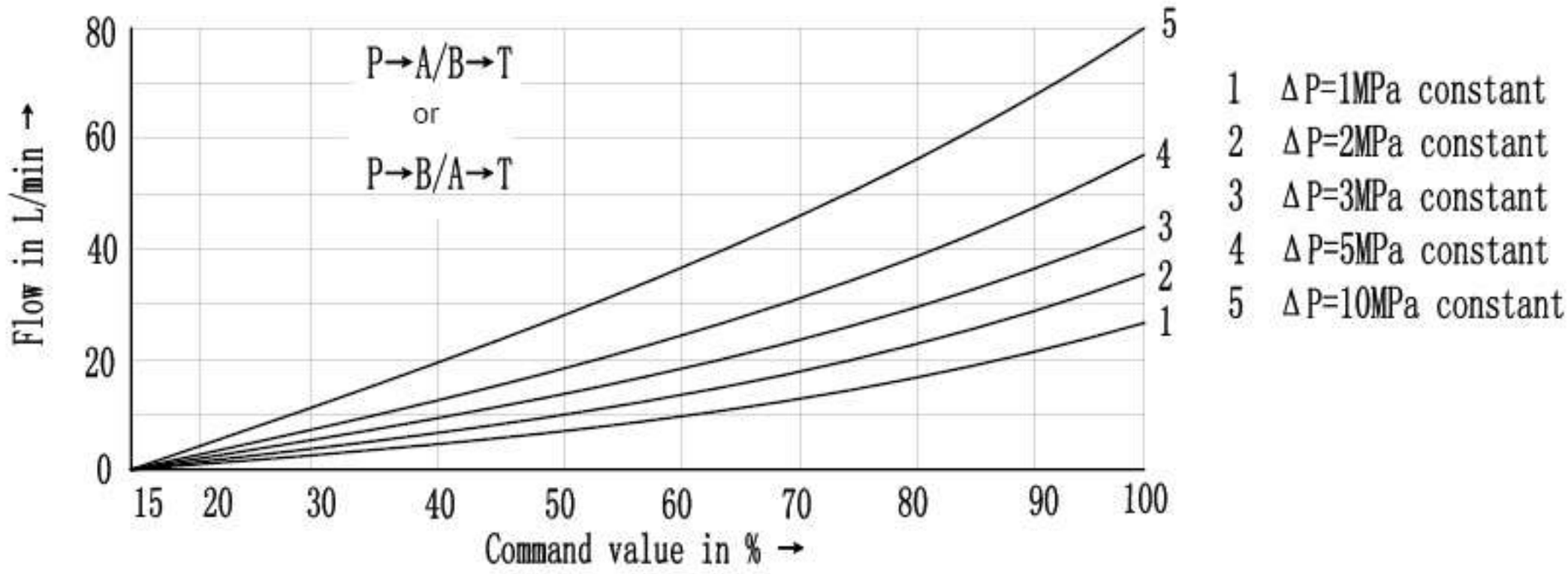
4) Ramp can be externally adjusted from 0 to 2.5 s; the same applies for Tup and Tdown

5) Output stage current regulated

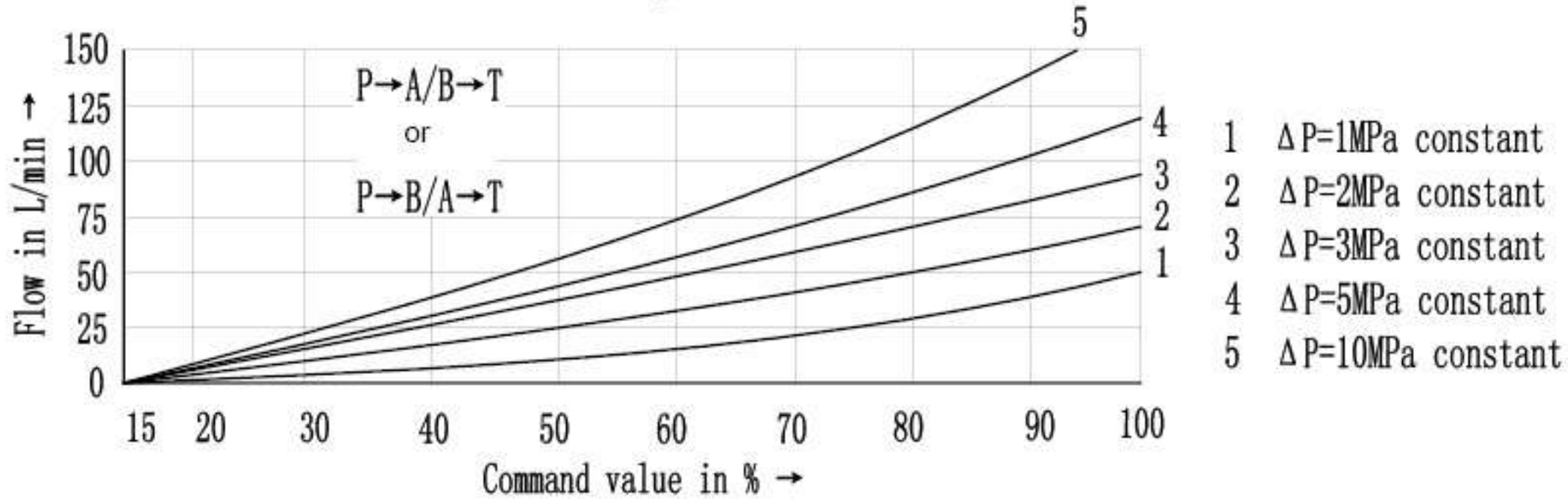
Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C)

NS 10

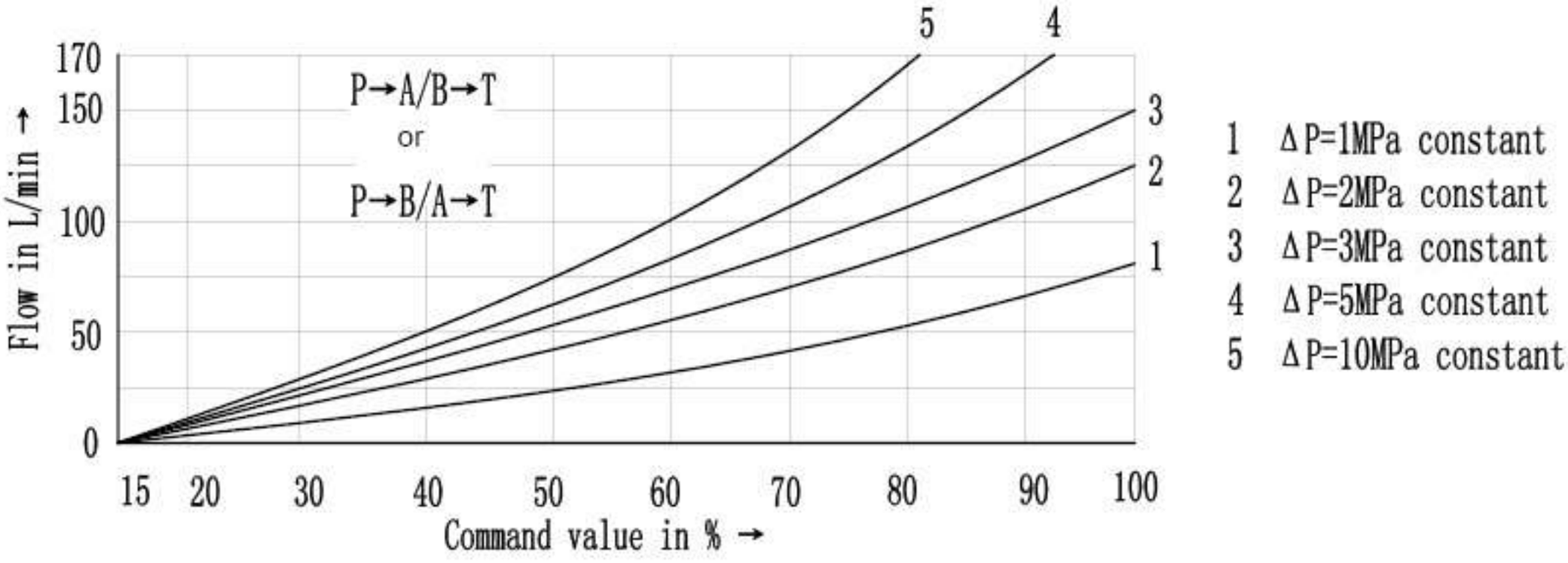
25L/min nominal flow with a 1MPa valve pressure differential



50L/min nominal flow with a 1MPa valve pressure differential



85L/min nominal flow with a 1MPa valve pressure differential

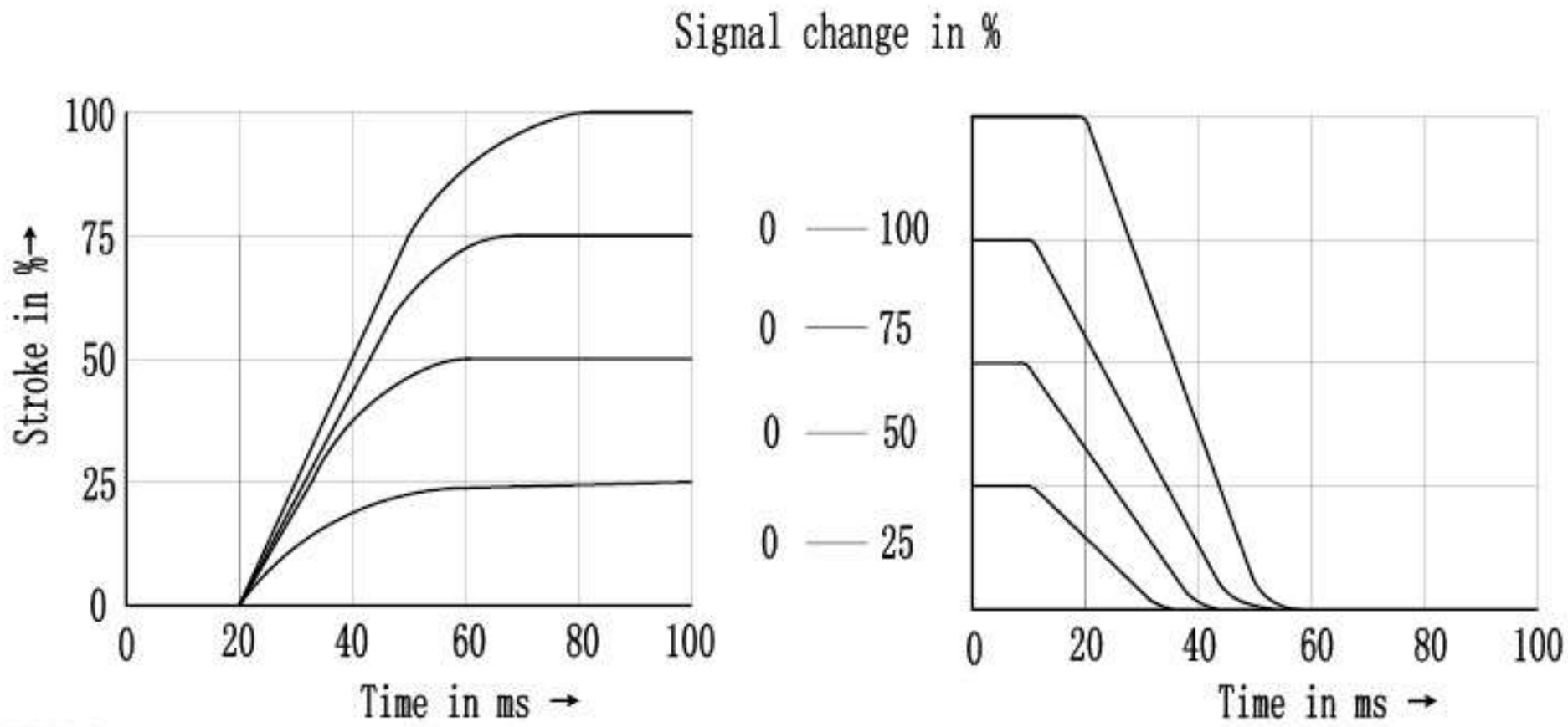


ΔP=value pressure differential(input pressure p_P minus load pressure p_L minus return line pressure p_T)

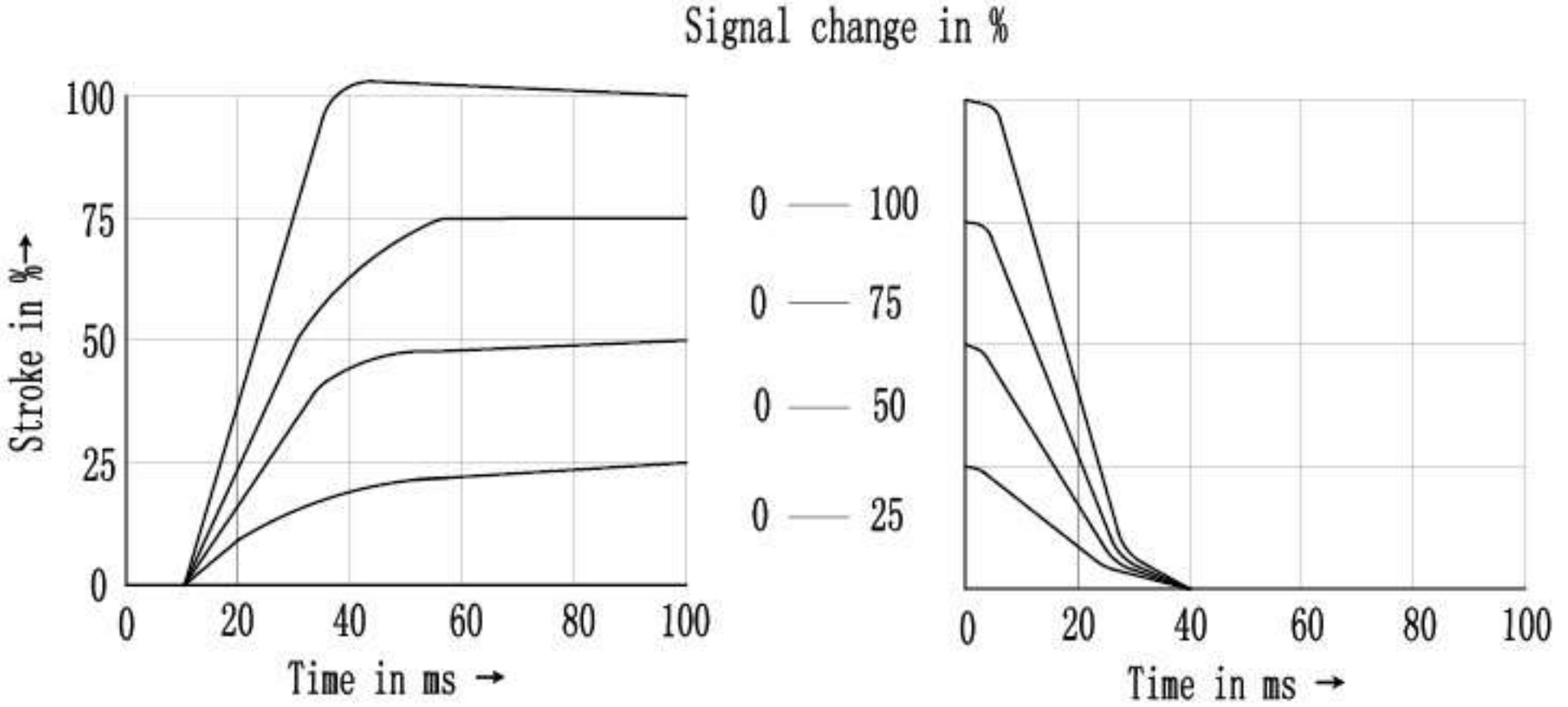
Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C)

Transient function with a stepped form of electrical input signal, measured at Pst=5MPa

Type HD-4WRZ10...

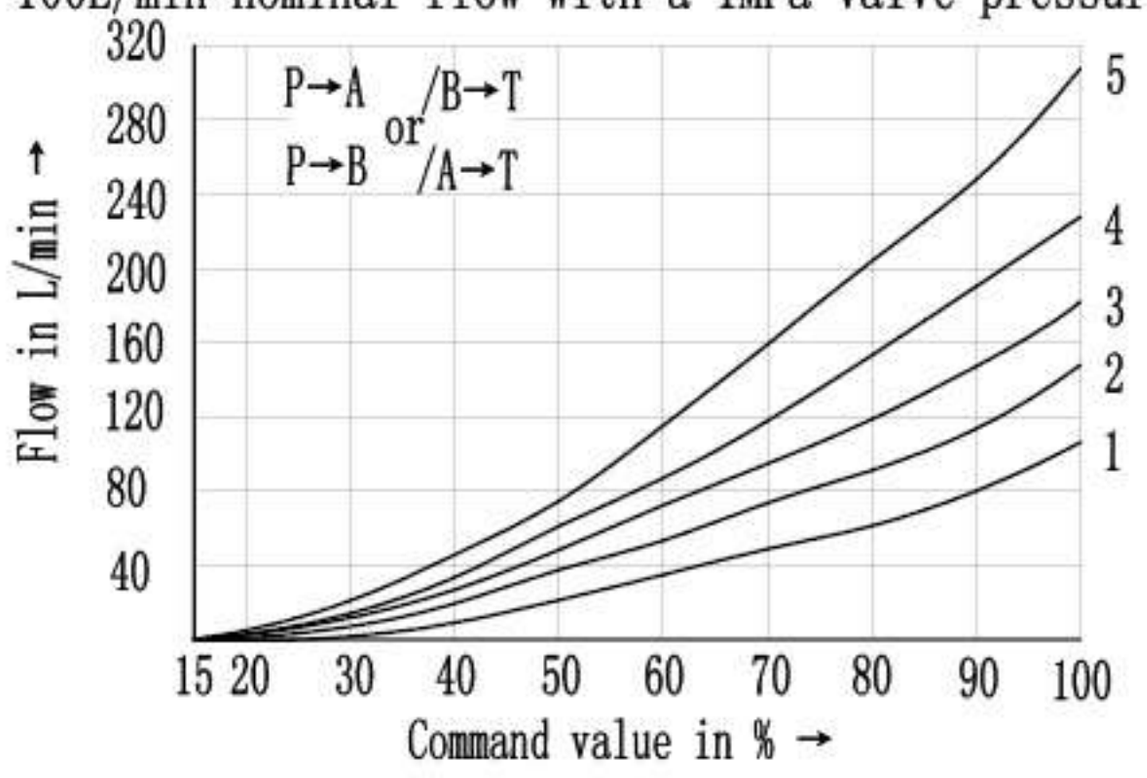


Type HD-4WRZE10...



NS 16

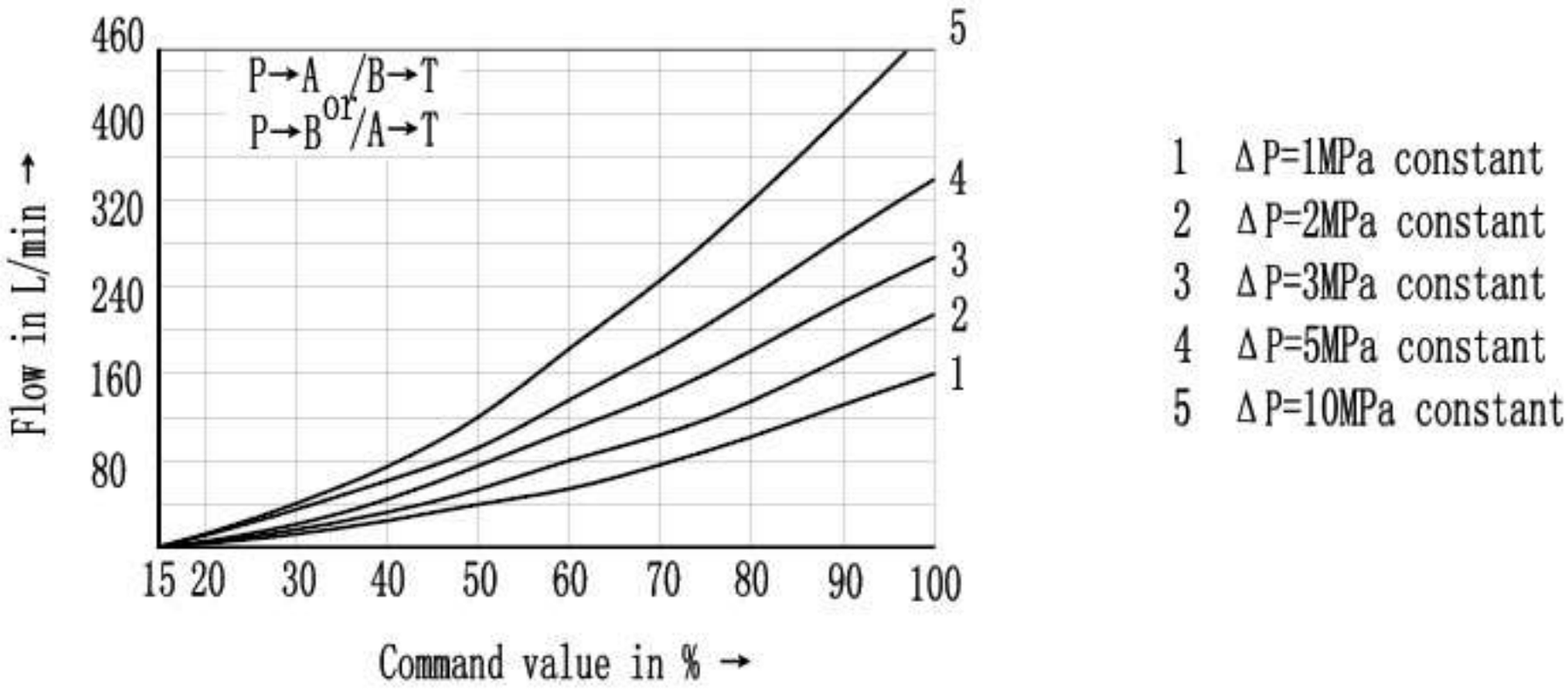
100L/min nominal flow with a 1MPa valve pressure differential



1 ΔP=1MPa constant
2 ΔP=2MPa constant
3 ΔP=3MPa constant
4 ΔP=5MPa constant
5 ΔP=10MPa constant

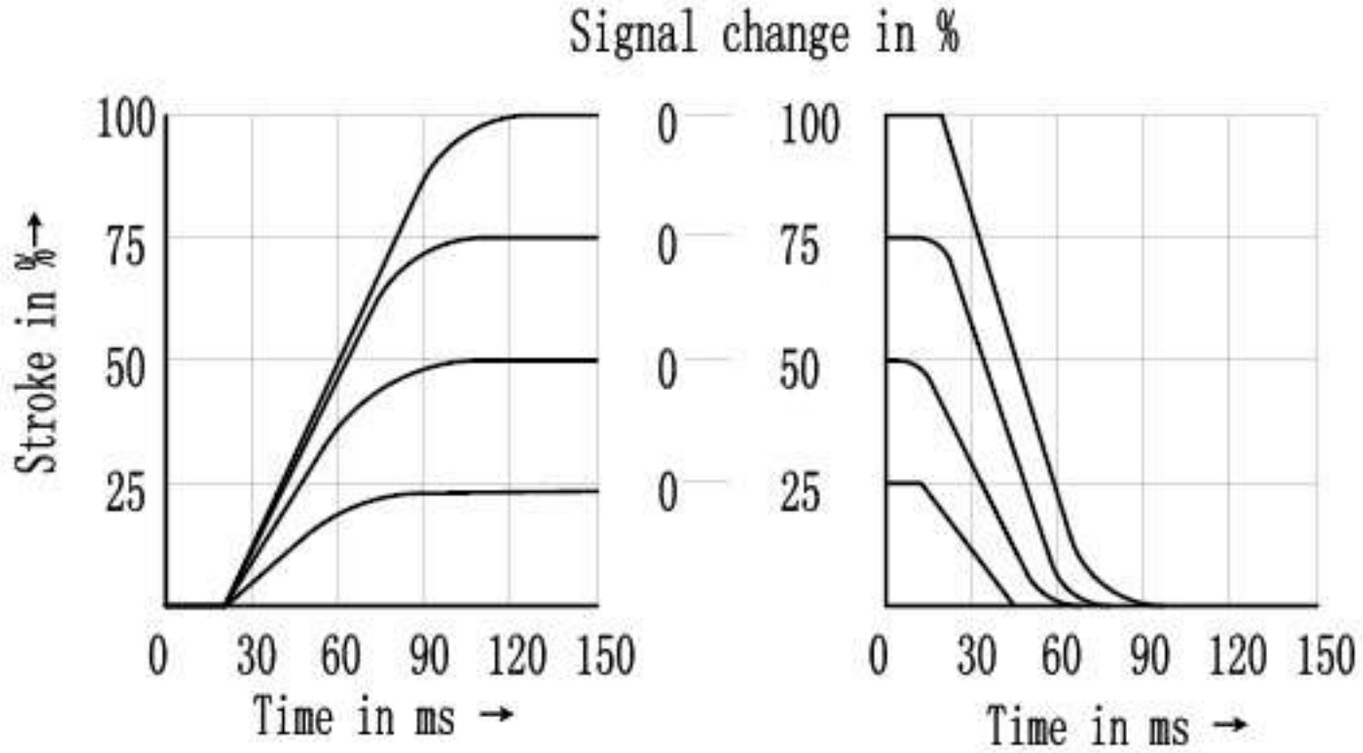
Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C)

150L/min nominal flow with a 1MPa valve pressure differential

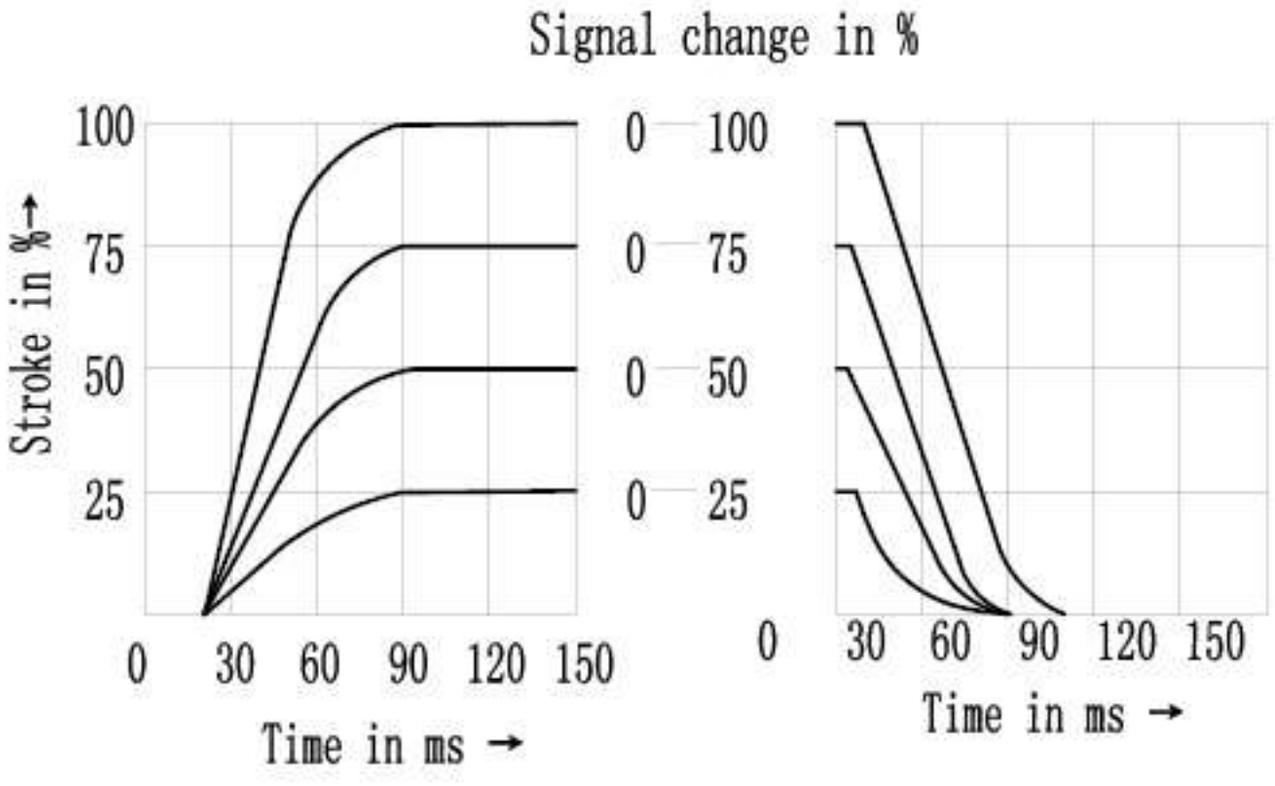


Transient function with a stepped form of electrical input signal, measured at Pst=5MPa

Type HD-4WRZ16...



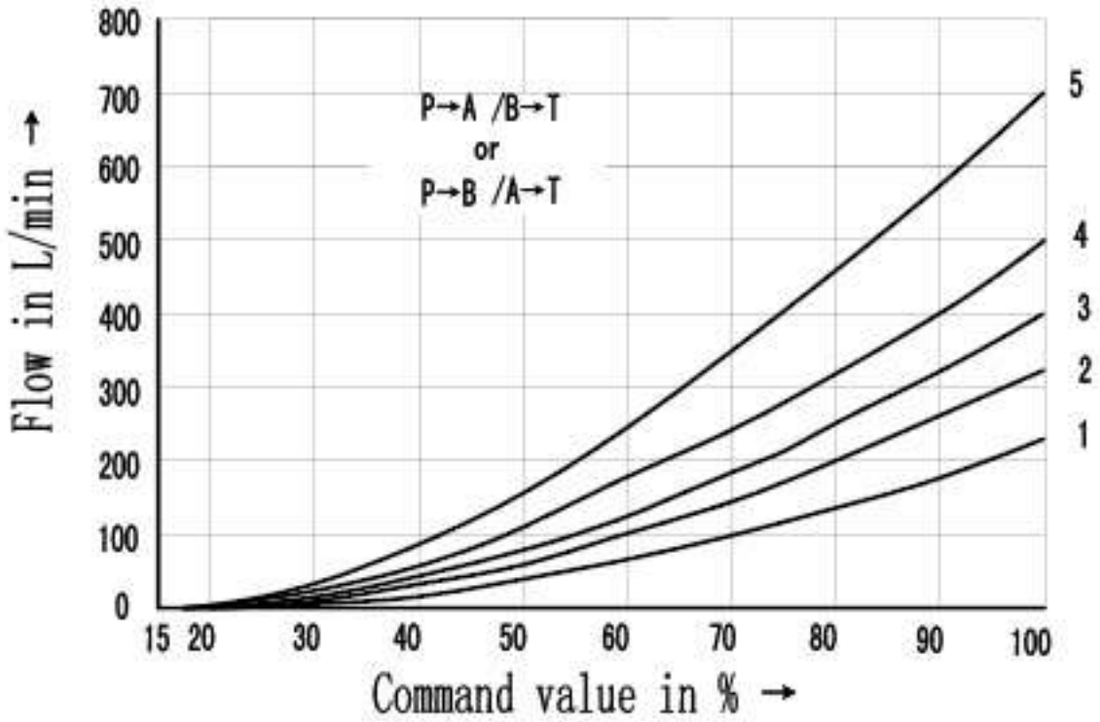
Type HD-4WRZE16...



Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C)

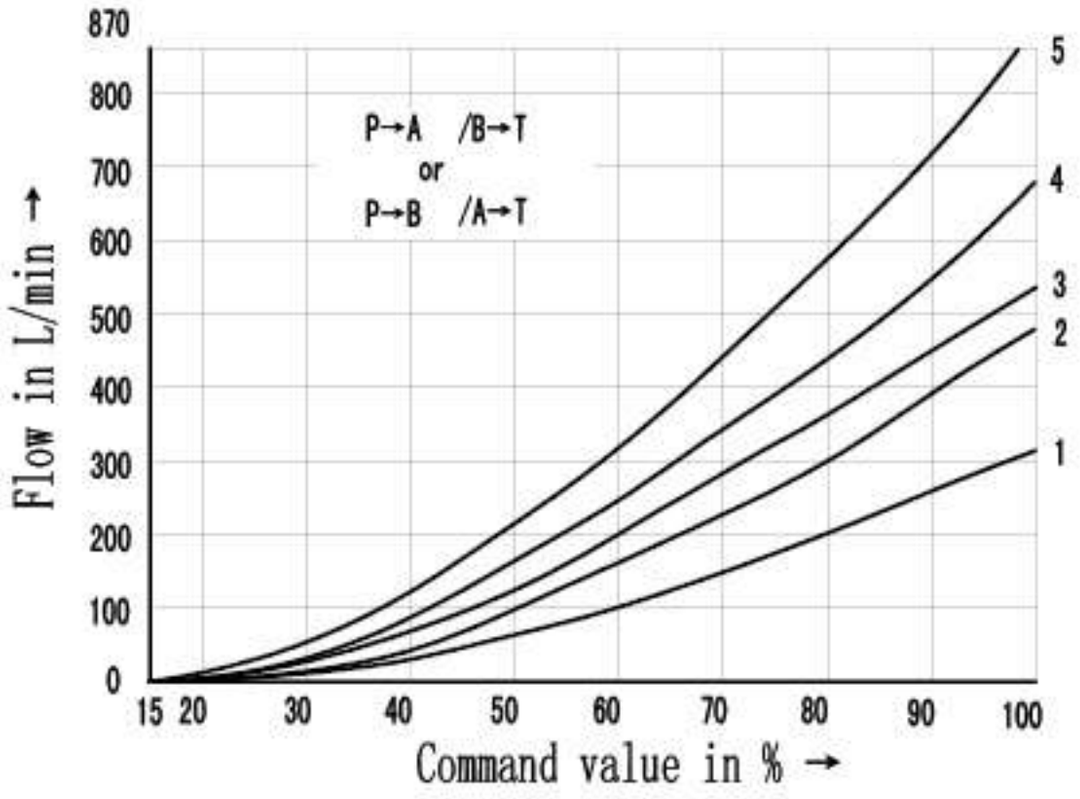
NS 25

220L/min nominal flow with a 1MPa valve pressure differential



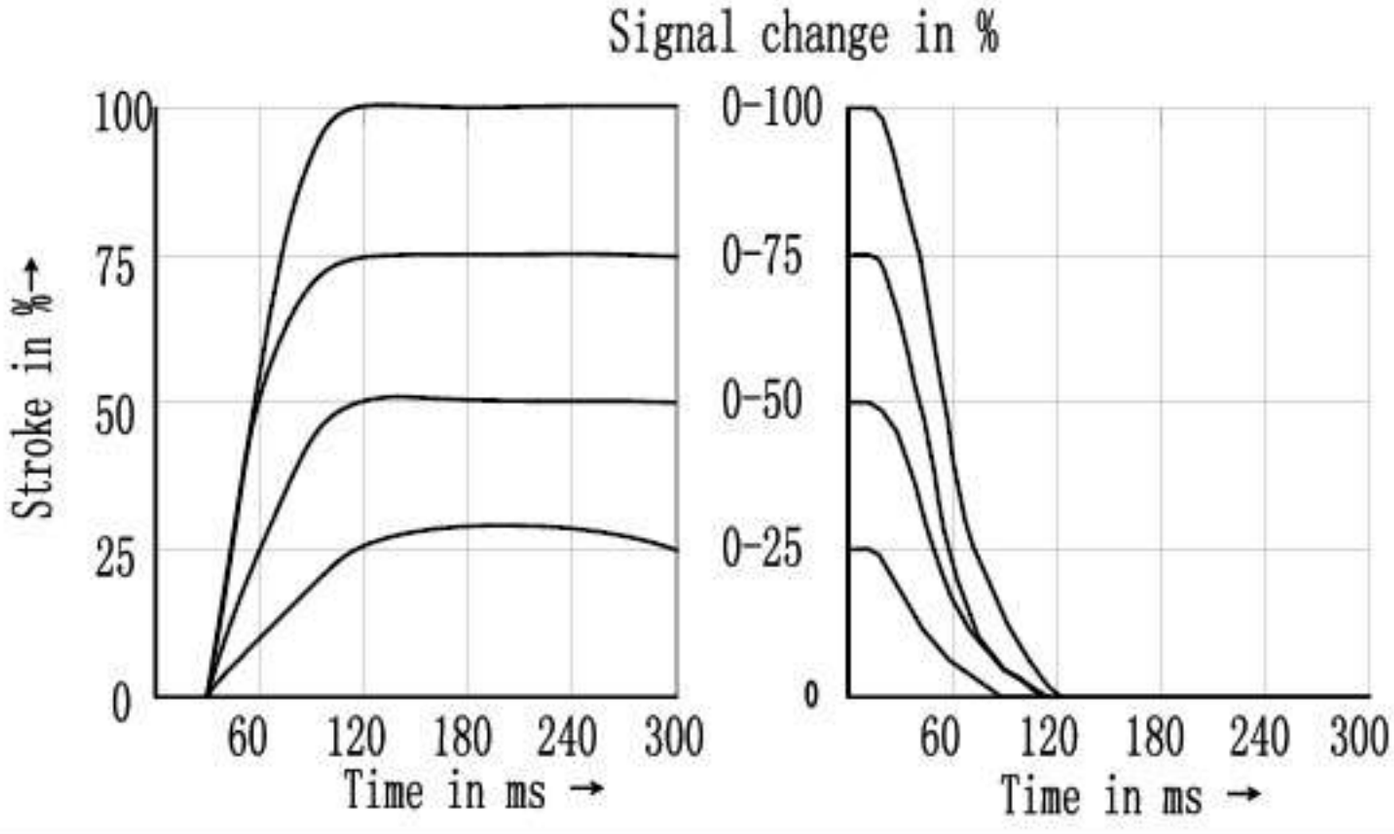
1 ΔP=1MPa constant
2 ΔP=2MPa constant
3 ΔP=3MPa constant
4 ΔP=5MPa constant
5 ΔP=10MPa constant

325L/min nominal flow with a 1MPa valve pressure differential



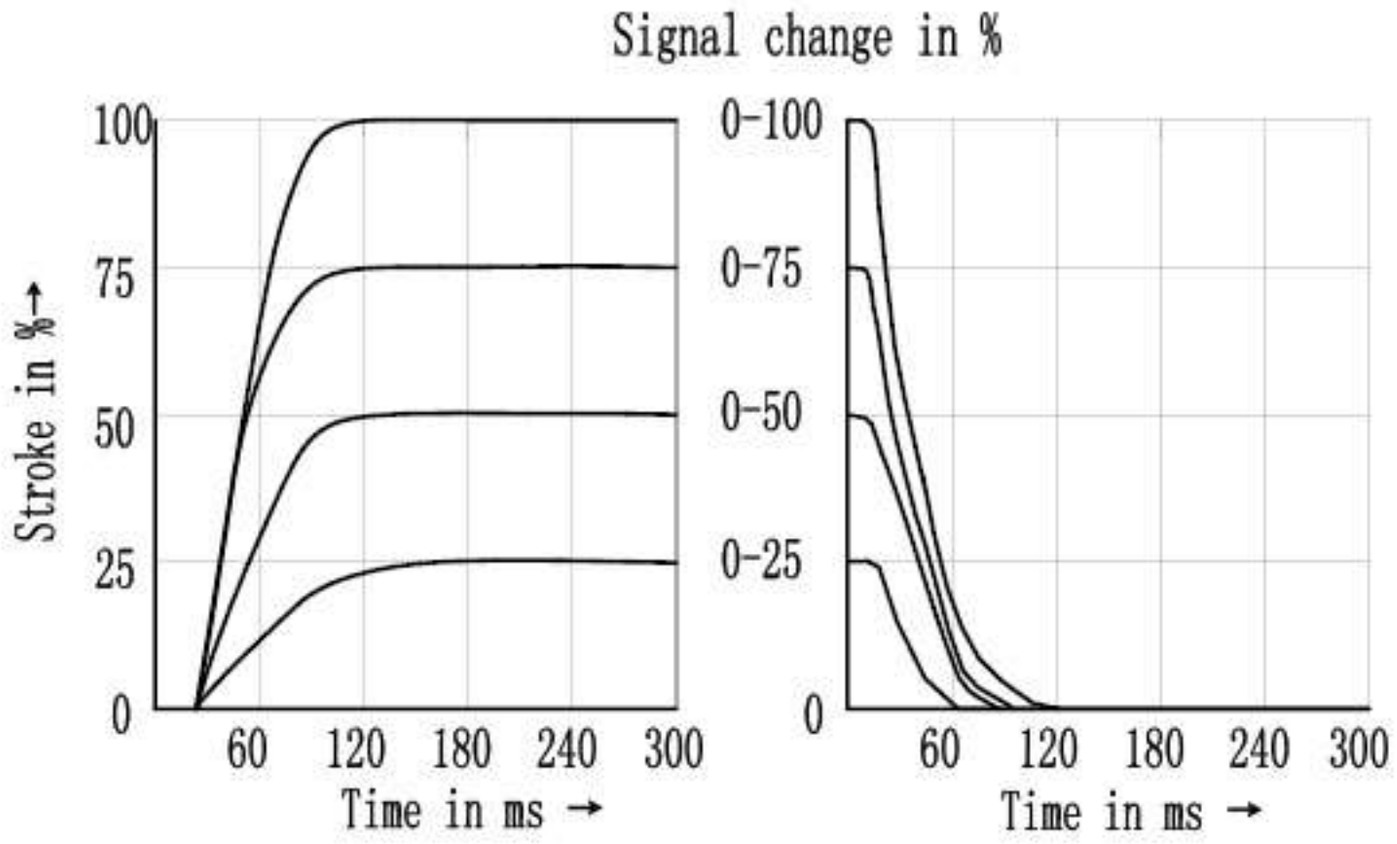
1 ΔP=1MPa constant
2 ΔP=2MPa constant
3 ΔP=3MPa constant
4 ΔP=5MPa constant
5 ΔP=10MPa constant

Transient function with a stepped form of electrical input signal, measured at Pst=5MPa
Type HD-4WRZ25...



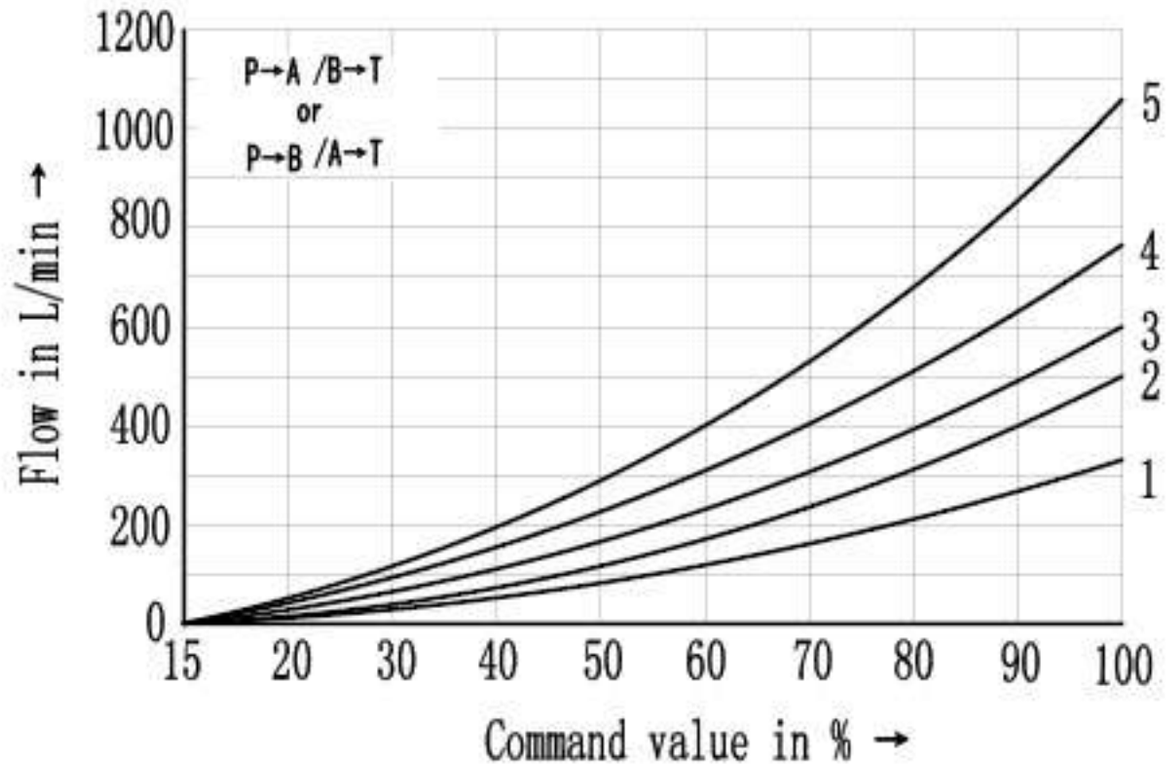
Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C)

Type HD-4WRZE25...



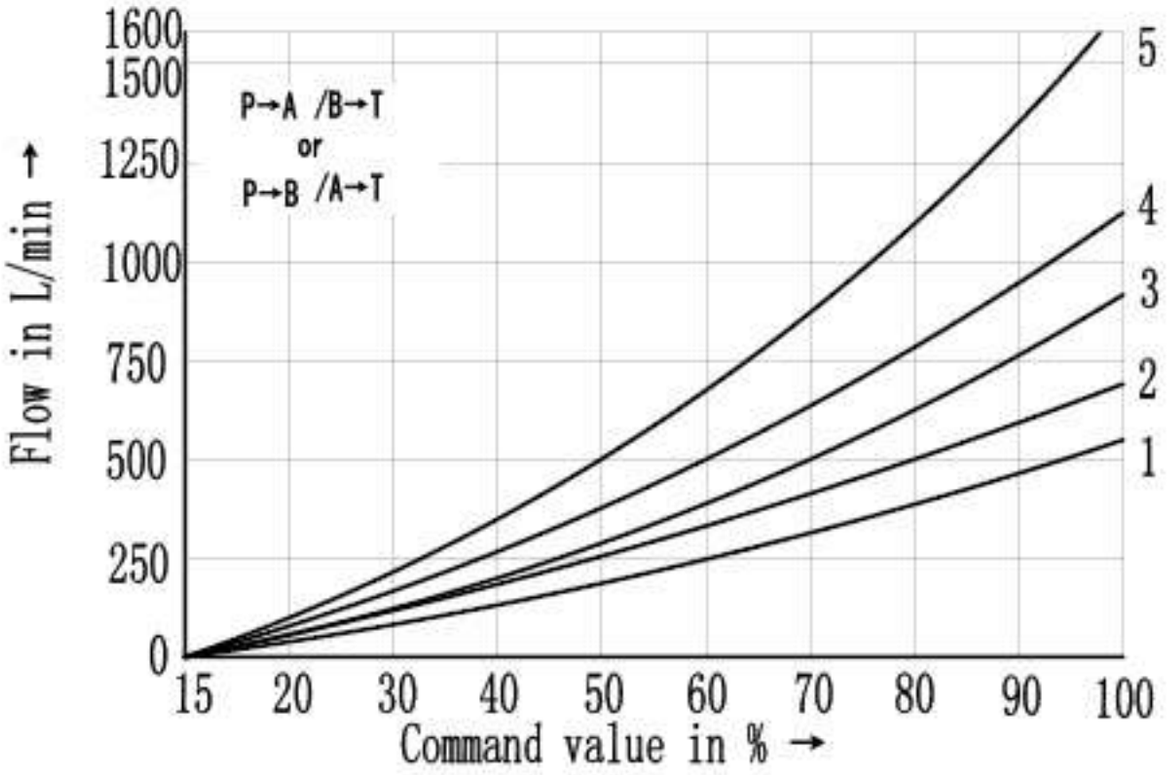
NS 32

360L/min nominal flow with a 1MPa valve pressure differential



1 ΔP=1MPa constant
2 ΔP=2MPa constant
3 ΔP=3MPa constant
4 ΔP=5MPa constant
5 ΔP=10MPa constant

520L/min nominal flow with a 1MPa valve pressure differential

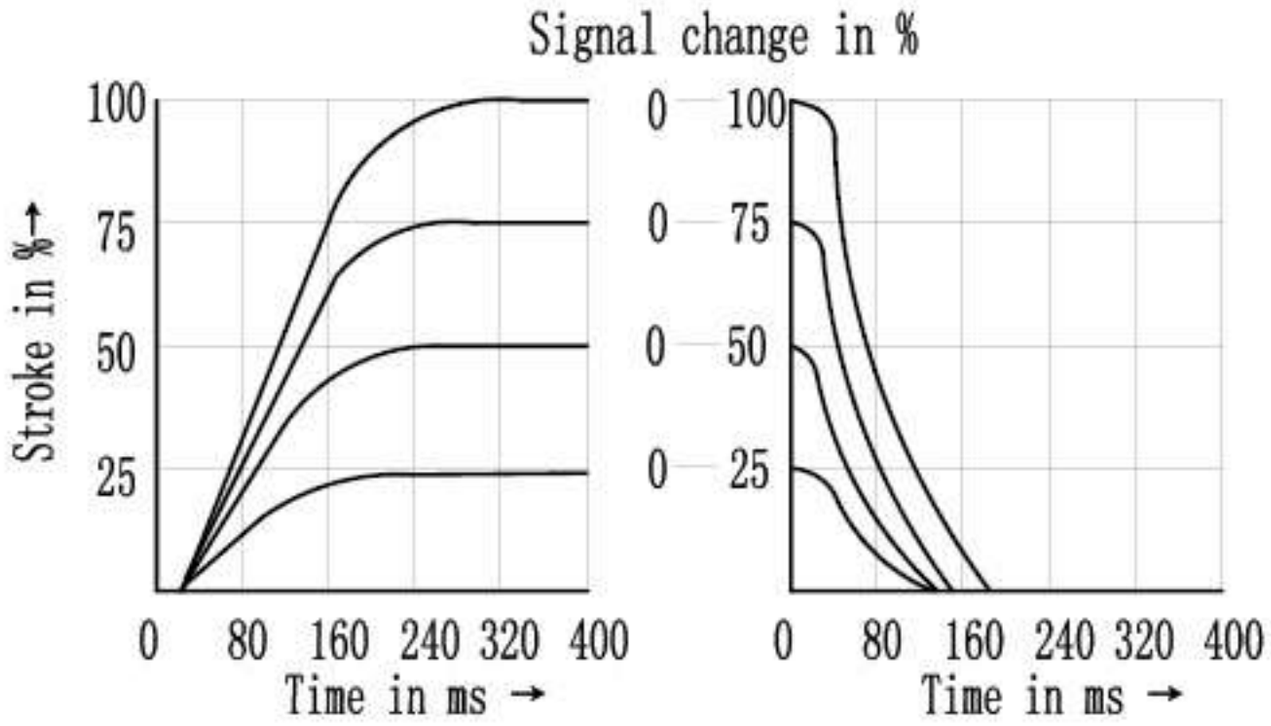


1 ΔP=1MPa constant
2 ΔP=2MPa constant
3 ΔP=3MPa constant
4 ΔP=5MPa constant
5 ΔP=10MPa constant

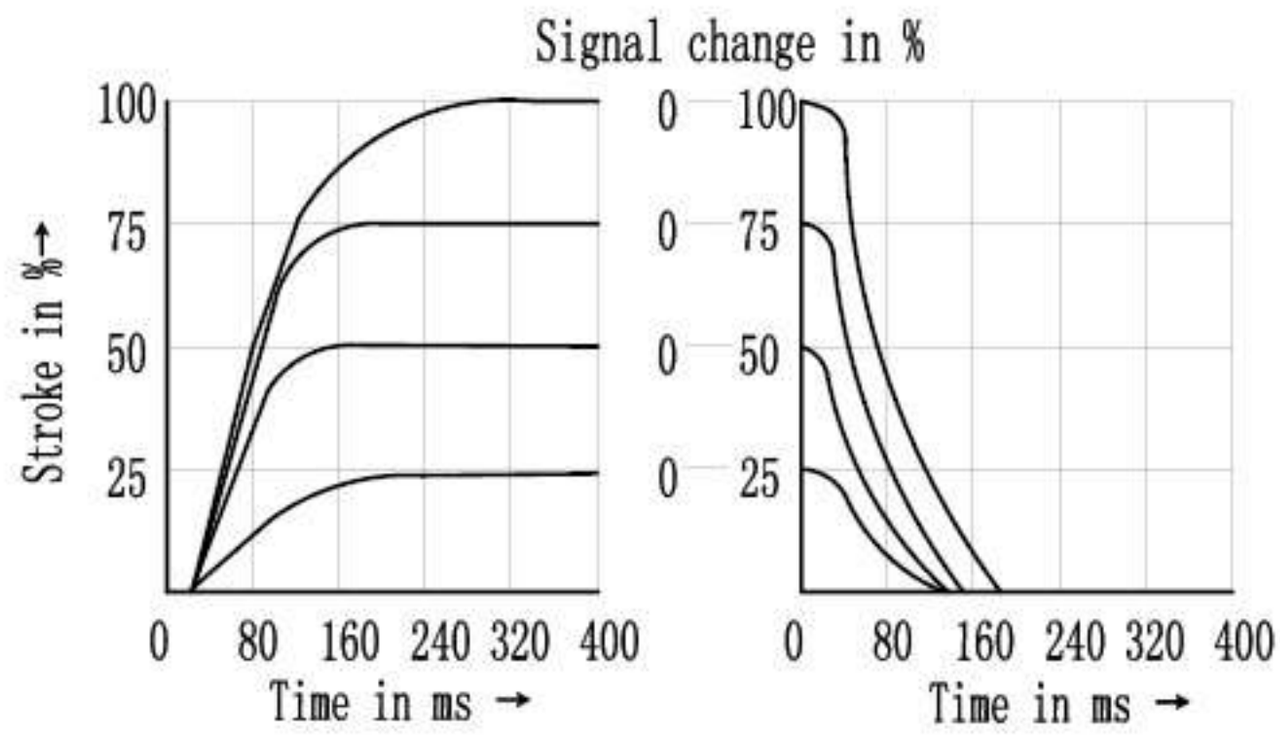
Characteristic curves (P=10MPa,v=36×10^{-6} m^2/s, t=50°C)

Transient function with a stepped form of electrical input signal, measured at Pst=5MPa

Type HD-4WRZ32...

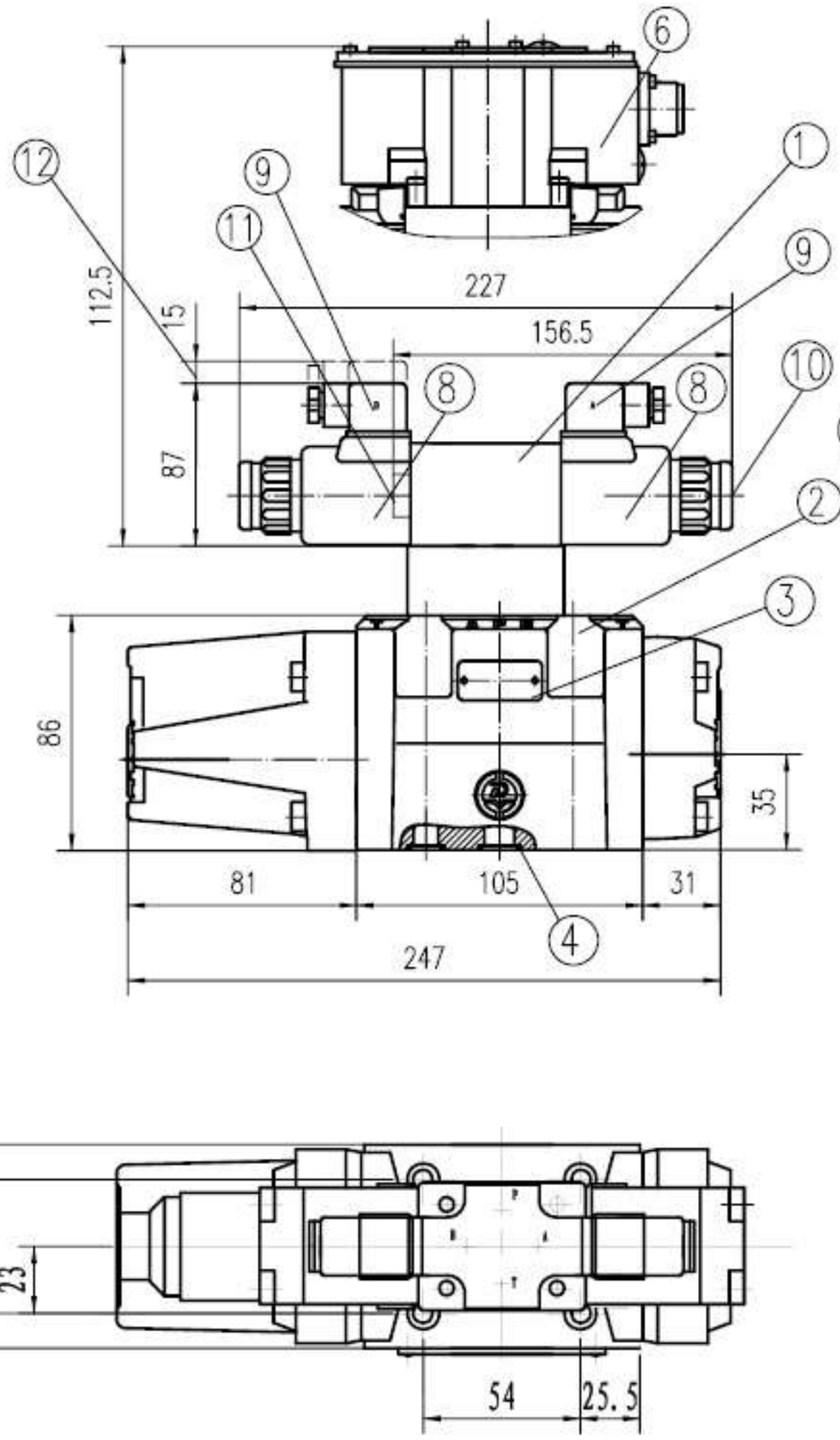


Type HD-4WRZE32...



Unit dimensions, NS10

Dimensions in mm



1 Pilot valve
2 Main valve
3 Nameplate for valve
4 O-ring 12X2(for ports A,B,P,T)
O-ring 10.82X1.78(for ports X,Y)
5 Machined valve mounting face
6 Integrated control electronics
7 Pressure reducing valve D3
8 Proportional solenoid "a", "b"
9 Plug-in connector "A", "B"

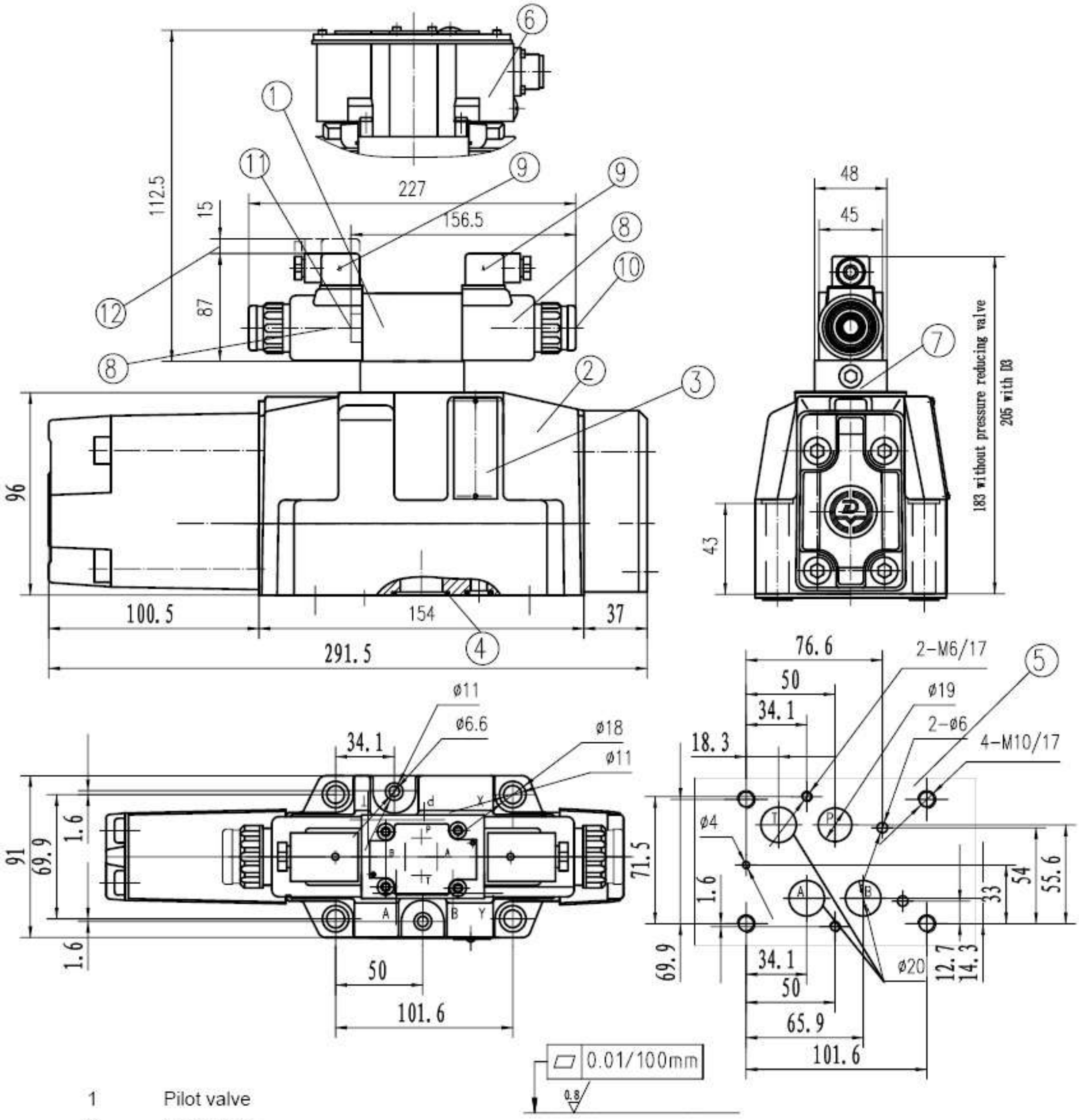
Required surface finish of mating piece

10 Protected hand override "N9"
11 Cover for valve with one solenoid
12 Space required to remove plug-in connector

Valve fixing screws:
4-M6x45 (GB/T70.1) M_A =15.5Nm

Unit dimensions, NS16

Dimensions in mm



1 Pilot valve
2 Main valve
3 Nameplate for valve
4 O-ring 22X2.5(for ports A,B,P,T)
O-ring 12X2(for ports X,Y)
5 Machined valve mounting face
6 Integrated control electronics
7 Pressure reducing valve D3
8 Proportional solenoid "a", "b"
9 Plug-in connector "A", "B"
10 Protected hand override "N9"

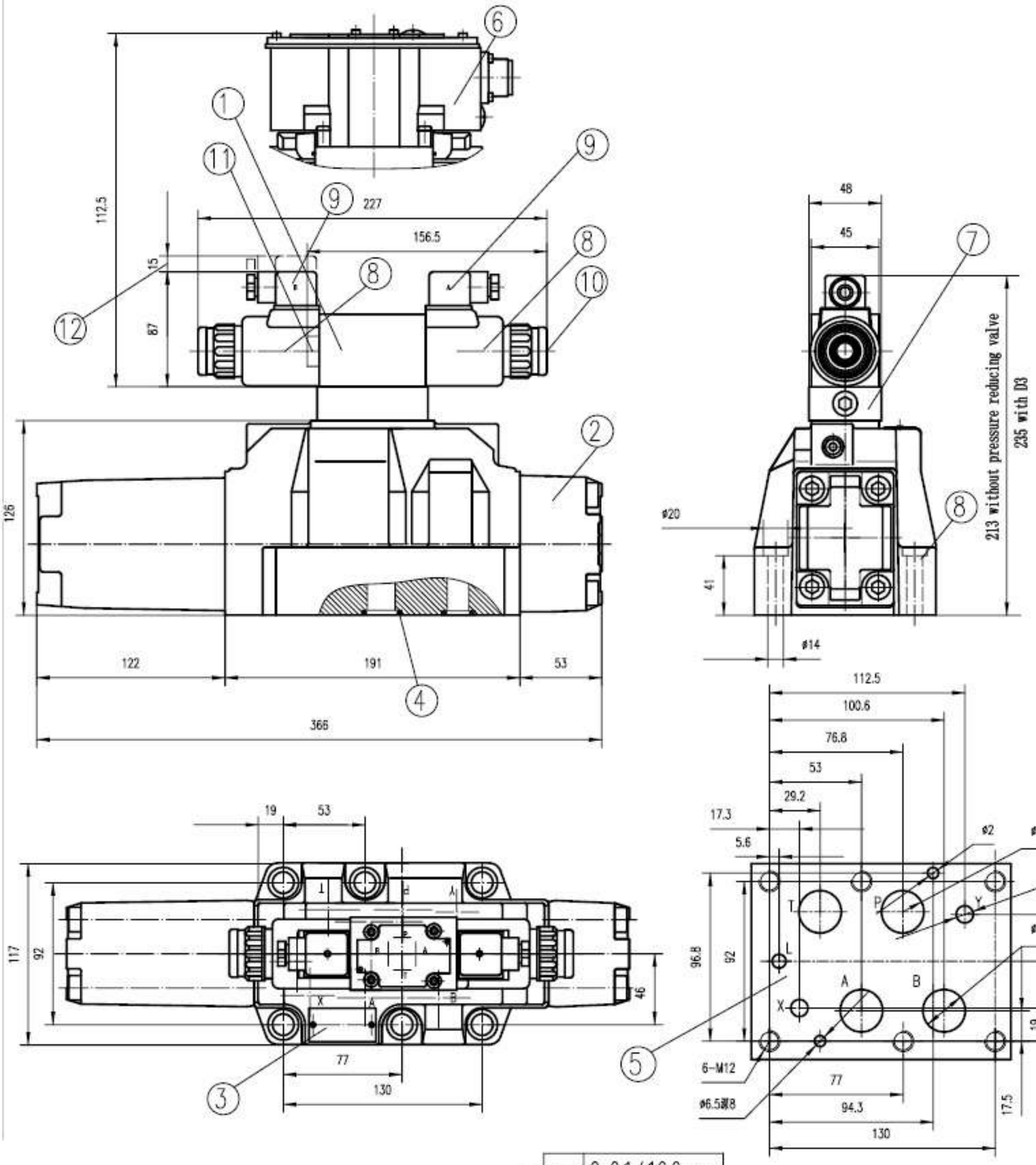
Required surface finish of mating piece

11 Cover for valve with one solenoid
12 Space required to remove plug-in connector

Valve fixing screws:
4-M10x60 (GB/T70.1) M_A=75Nm
2-M6x60 (GB/T70.1) M_A= 15.5Nm

Unit dimensions, NS25

Dimensions in mm



1 Pilot valve
2 Main valve
3 Nameplate for valve
4 O-ring 27X3(for ports A,B,P,T)
O-ring 19X3(for ports X,Y)
5 Machined valve mounting face
6 Integrated control electronics
7 Pressure reducing valve D3
8 Proportional solenoid "a", "b"
9 Plug-in connector "A", "B"
10 Protected hand override "N9"

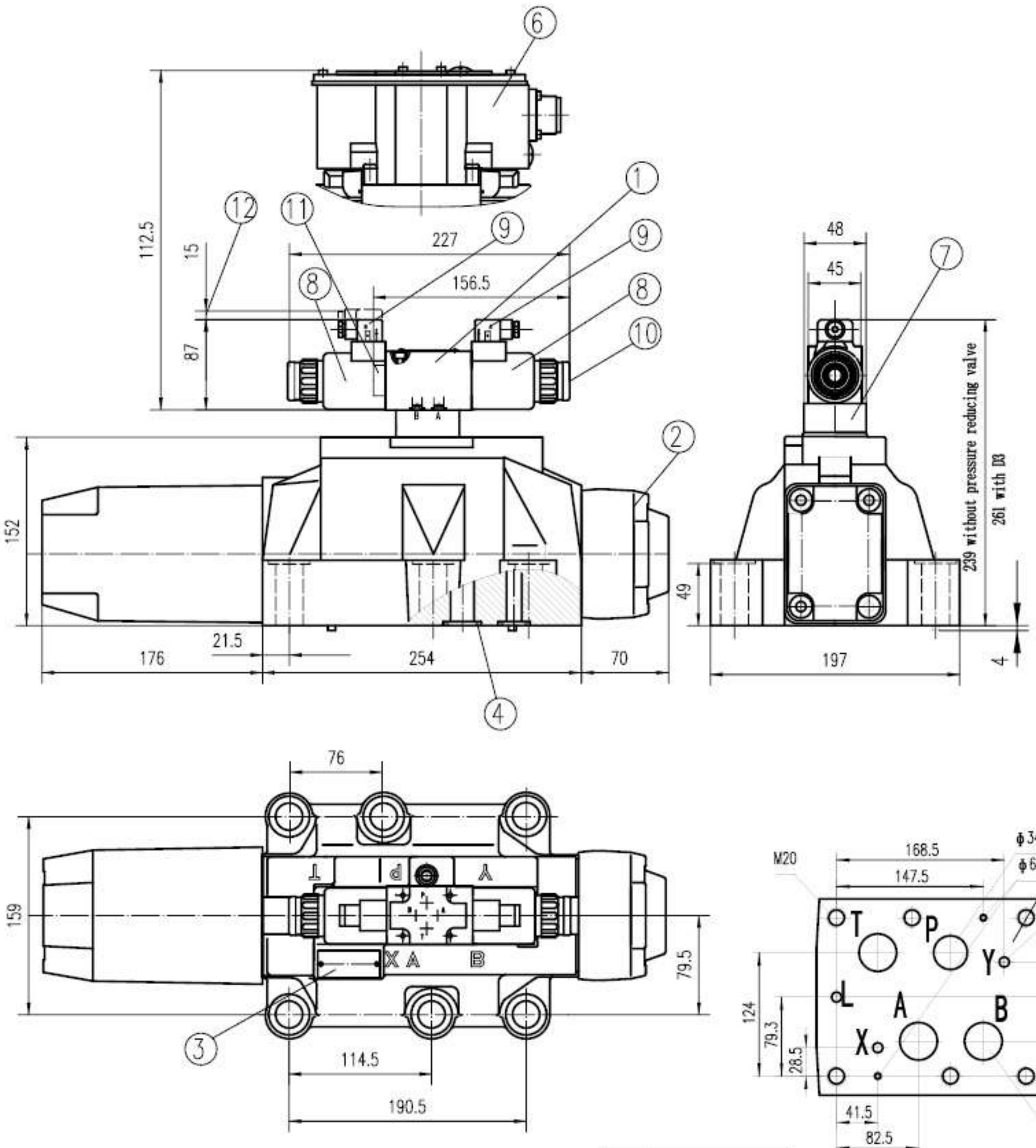
Required surface finish of mating piece

11 Cover for valve with one solenoid
12 Space required to remove plug-in connector

Valve fixing screws:
6-M12x60 (GB/T70.1) M_A=130Nm

Unit dimensions, NS32

Dimensions in mm



1 Pilot valve
2 Main valve
3 Nameplate for valve
4 O-ring 42X3(ports A,B,P,T)
O-ring 19X3(for ports X,Y)
5 Machined valve mounting face
6 Integrated control electronics
7 Pressure reducing valve D3
8 Proportional solenoid "a", "b"
9 Plug-in connector "A", "B"
10 Protected hand override "N9"

Required surface finish of mating piece

11 Cover for valve with one solenoid
12 Space required to remove plug-in connector

Valve fixing screws:
6-M20x80 (GB/T70.1) M_A=430N.m

Notice

Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to $\frac{0.8}{\vee}$.
6. Surface finish of mating piece is required to 0.01/100mm.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Proportional directional valve, pilot operated with electrical position feedback Type HD-4WRKE			
	Size 10,16,25,32,35	up to 35M Pa	up to 3000L/min	

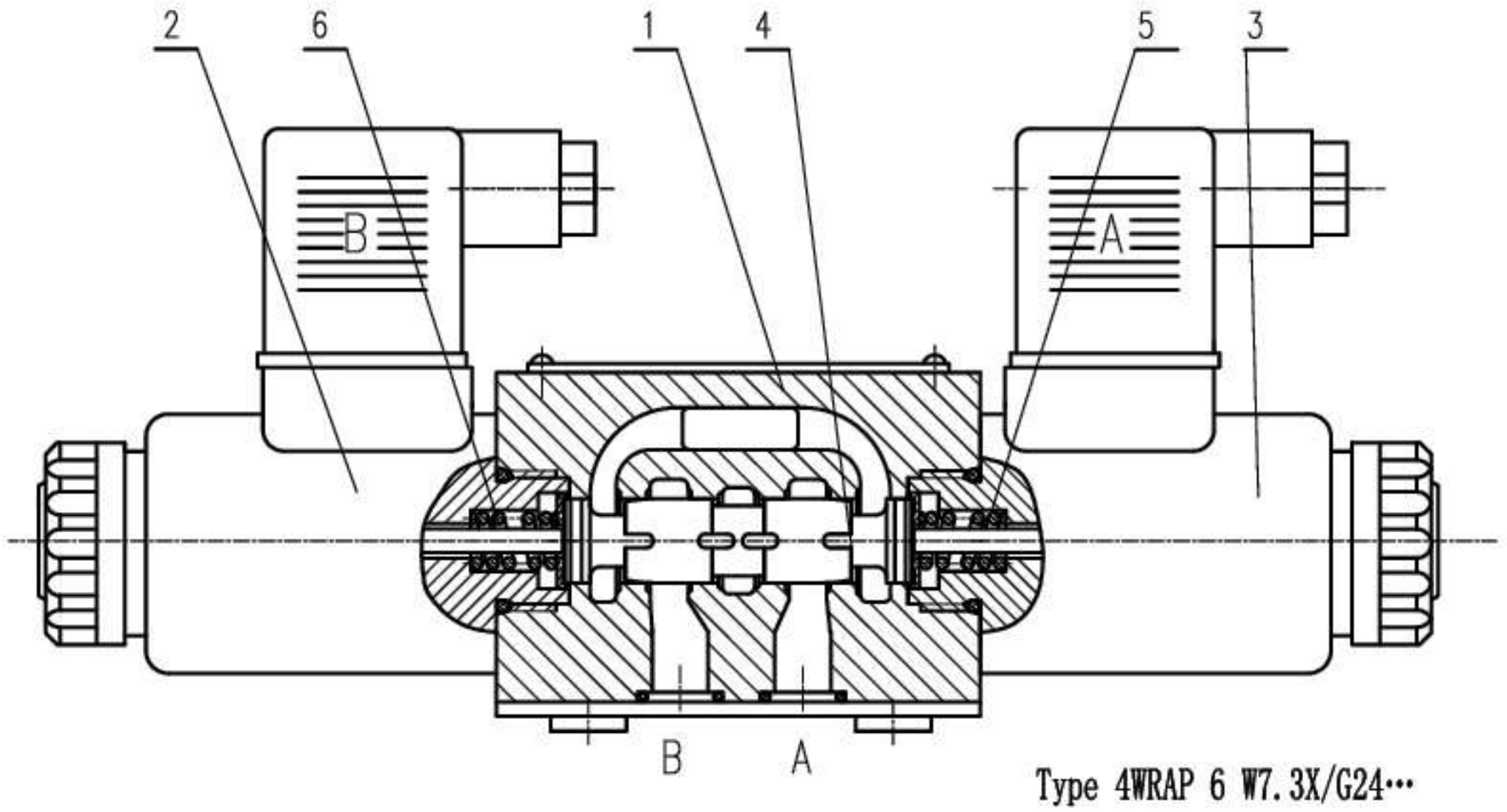
– Pilot operated 2-stage proportional directional valve
– For subplate mounting
– Valve for the control of the size and direction of a flow
– Actuation via proportional solenoids
– Spring centred main spool
– Electrical position feedback
– Single stage proportional directional valve pilot control
– Main stage with closed loop position control
– Integrated control electronics



Type H D-4WRKE 10 ...–3X/6EG24...K31/ … D3...
with integrated control electronics

Function, section

Pilot control valve type HD-4WRAP 6 W7.3X/G24… (1st stage)
The pilot control valve is a direct operated proportional valve. The control edge geometrics were designed and optimised for the use as a pilot control valve for the proportional directional valves type HD-4WRKE.
The proportional solenoids are pressure tight, oil-immersed DC solenoids with removable coil. They convert an electrical current proportionally into a mechanical force. An increase in the current strength causes an appropriately higher solenoid force. The set solenoid force remains constant over the entire control stroke.
The pilot control valve basically consists of the housing (1), proportional solenoids (2 and 3), valve spool (4) and springs (5 and 6).
In the de-energised condition both actuator ports are connected to tank. If one of the two solenoids (2 or 3) is energised, then the solenoid force moves the valve spool (4) against the spring (6 or 5).
Once the overlap area is overcome, the connection to tank of one of the two actuator ports is blocked and the connection to the pressure chamber is established. There is flow from P to the control chamber of the main stage.



Type 4WRAP 6 W7.3X/G24…

Function, sect ion

The type HD-4WRKE valves are 2-stage proportional directional control valves. They control the size and direction of a flow. The main stage is closed loop position controlled so that the spool position is also independent of flow forces at larger flows.

The valves basically consists of the pilot control valve (1), housing(8), main spool (7), covers (5 and 6), centering spring (4), inductive position transducer (9) and the pressure reducing valve (3).

If no input signal is being applied then the main spool (7) is held in the centre position by the centering spring (4). The two control chambers in the covers (5 and 6) are connected via the valve spool(2) to tank.

The main spool (7) is connected to suitable control electronics via the inductive position transducer (9). The positional change of the main spool (7) as well as the alteration of the command value at the summation point of the amplifier produces a differential voltage.

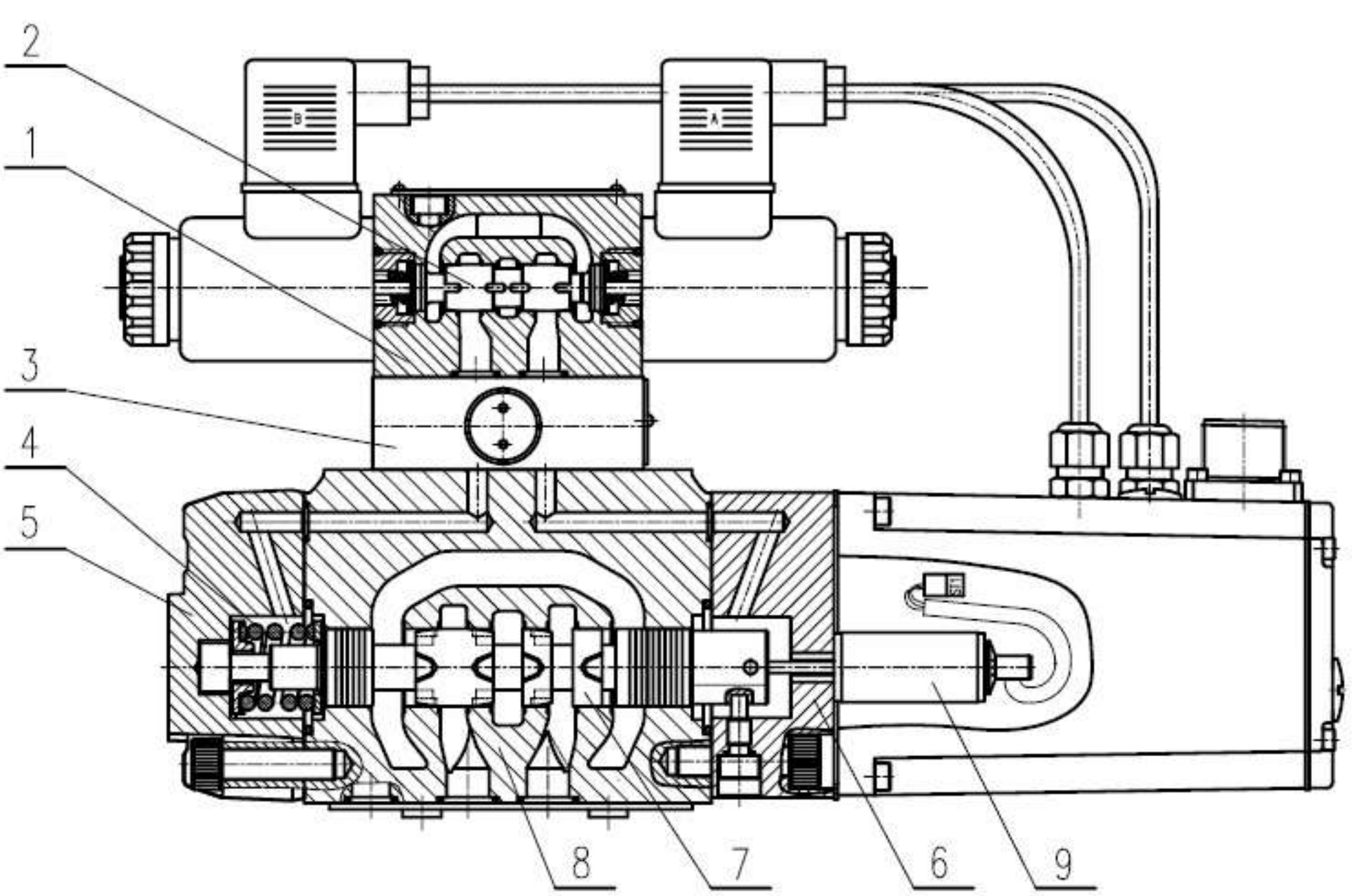
With the command value/actual value comparison a possible control deviation is recognised via the electronics and an electrical current is applied to the proportional solenoid of the pilot valve (1).

The current induces, within the solenoid, a force which is passed on to the solenoid pin which in turn actuates the control spool. The flow which is provided via the control cross sections causes the main spool to move.

The main spool (7) with the attached core of the inductive position transducer (9) is moved until the actual value is equal to the command value. In the controlled condition the main spool (7) is force balanced and is held in this controlled position.

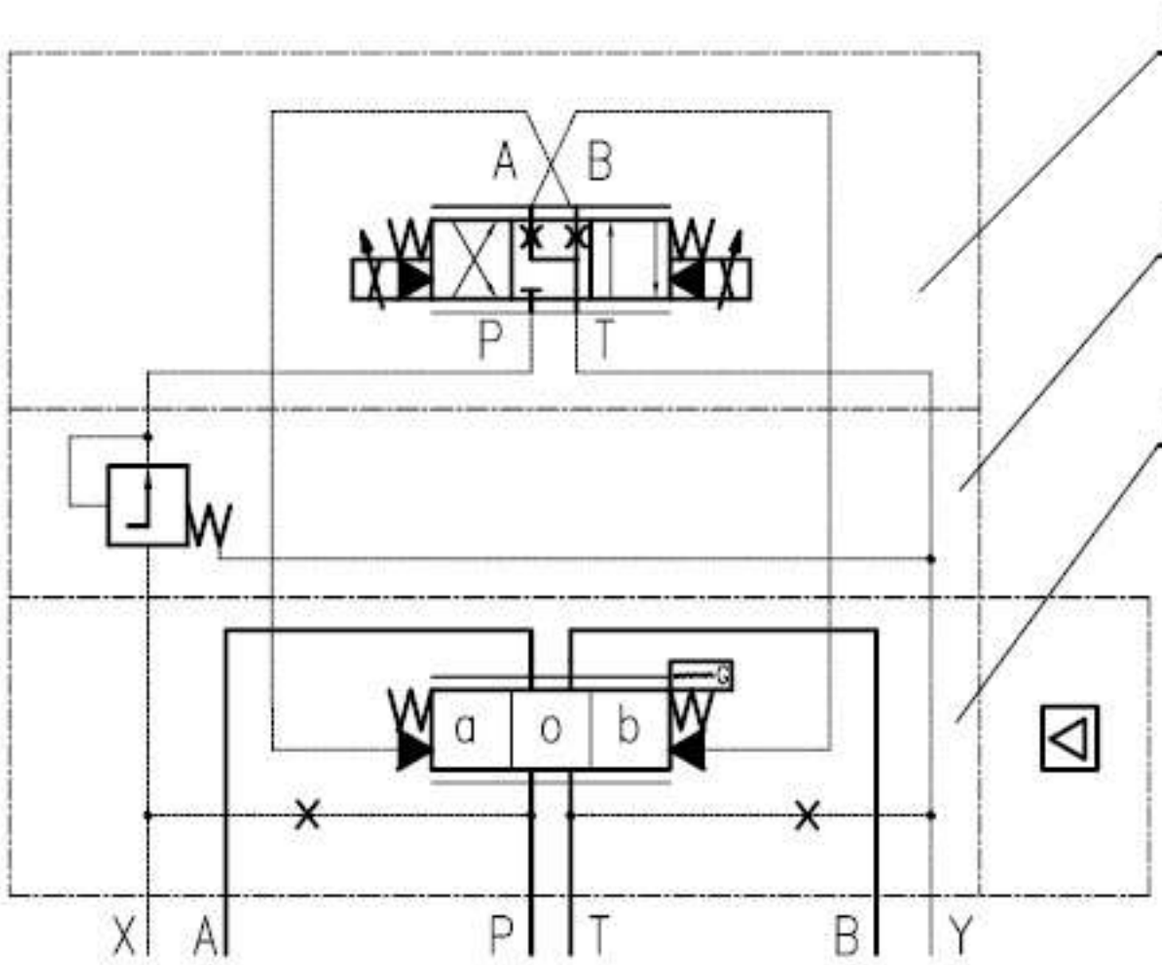
Spool stroke and control opening change in proportion to the command value.

The control electronics are integrated into the valve. By matching the valve and the electronics the model variation of the units is kept low.



Type HD-4WRKE 10 ··· - 3X···

S ymbol (detailed)



Example:

1 Pilot control valve type HD-4WRAP6...

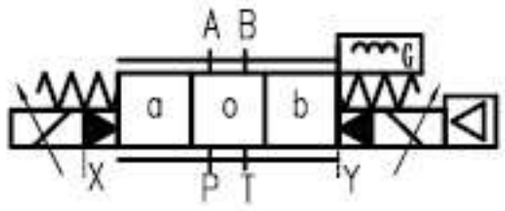
2 Main valve

3 Pressure reducing valve type

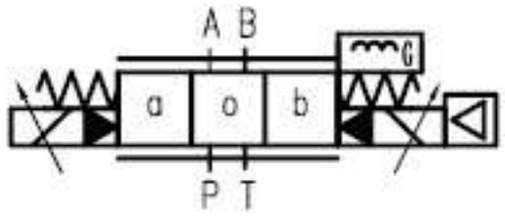
ZDR 6 DP0-4X/40YM

Symbols(simplified)

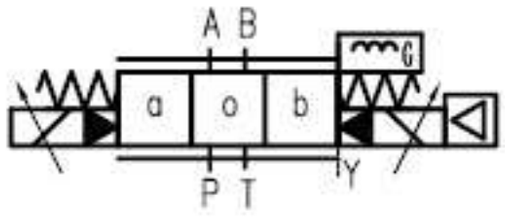
Type HD-4WRKE··· - 3X···



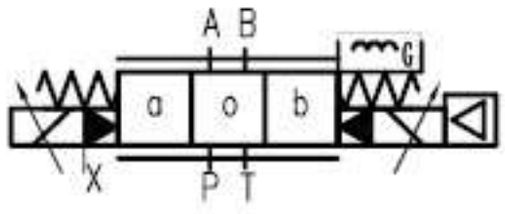
Type HD-4WRKE...-3X/...ET.



Type HD-4WRKE...-3X/...E.



Type HD-4WRKE...-3X/...T.



Ordering details

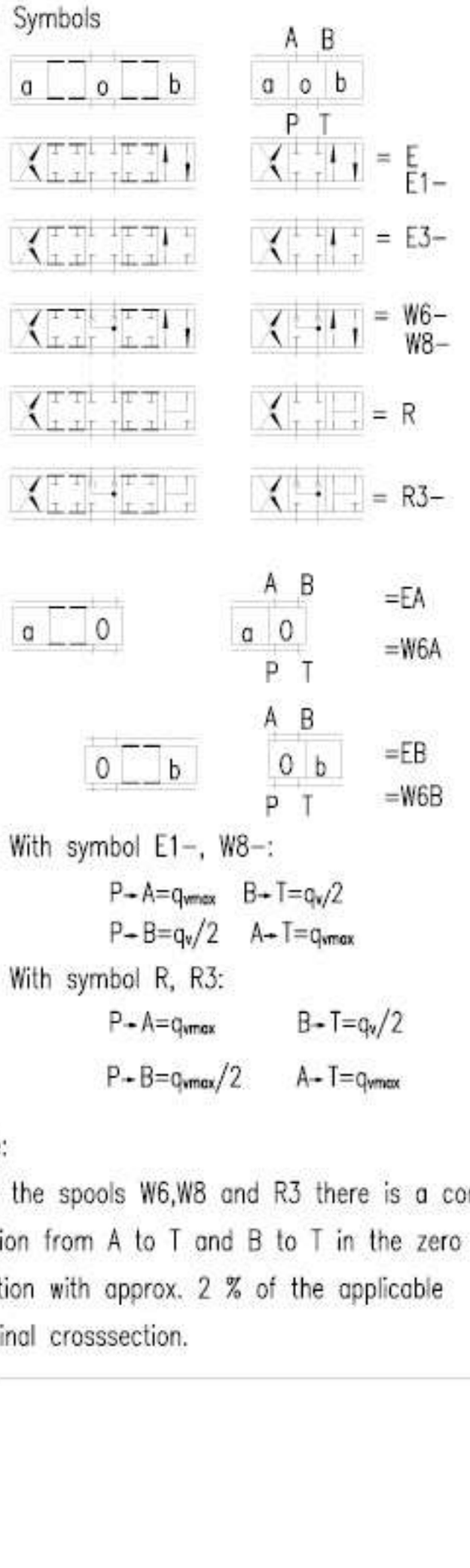
HD – 4WRKE – 3X / *

Technology of Beijing Huade Hydraulic =HD

Electrically operated 2-stage proportional directional valve of 4-way design with integrated electronics

size 10	=	10
size 16	=	16
size 25	=	25
size 32	=	32
size 35	=	35

Symbols



With symbol E1–, W8–:

$P \rightarrow A = q_{vmax}$ $B \rightarrow T = q_v/2$

$P \rightarrow B = q_v/2$ $A \rightarrow T = q_{vmax}$

With symbol R, R3:

$P \rightarrow A = q_{vmax}$ $B \rightarrow T = q_v/2$

$P \rightarrow B = q_{vmax}/2$ $A \rightarrow T = q_{vmax}$

Note:

With the spools W6,W8 and R3 there is a connection from A to T and B to T in the zero position with approx. 2 % of the applicable nominal crosssection.

Further details in clear text

No code = NRB seals
V = FKM seals

D3=With pressure reducing valve ZDR 6 DP0–4X/40YM (fixed setting)

A1=Command/actual value ± 10 V

F1=Command/actual value 4 to 20 mA

Electrical connections

K31= With component plug
Without plug-in connector

No code = Pilot oil supply external, Pilot oil drain external

E = Pilot oil supply internal, Pilot oil drain external

ET = Pilot oil supply internal, Pilot oil drain internal

T = Pilot oil supply external, Pilot oil drain internal

Supply voltage

G24 = 24 V DC

6E = Proportional solenoid with removable coil

3X = Series 30 to 39
(30 to 39: unchanged installation and connection dimensions)

3XH = high flow (only size 25)
Nominal flow500L/min

Characteristic curve form

L= Linear

P= Linear with fine control range

Nominal flow in L/min at 1MPa valve pressure differential

25 =	50 =	100 =	size10
125 =	200 =		size16
220 =	350 =	500 =	size25
400 =	600 =		size32
1000 =			size35

Technical data

Hydraulic

Size			10	16	25	32	35
Operating pressure	Pilot control valve Pilot oil supply (MPa)		2.5~31.5				
	Main valve, ports P, A, B (MPa)		31.5	35	35	35	35
Return pressure (MPa)		Pilot oil drain, external	31.5	25	25	25	25
		Pilot oil drain, internal	<1				
		Port Y	<1				
Nominal flow q_v ± 10 % at Δp = 1MP (L/min)			25 50 90	125 180	220 350	400 600	1000
Flow of main valve (max. permissible) (L/min)			170	460	870	1600	3000
Pilot oil flow at port X or Y with a step form of input signal from 0 to 100 % (L/min)			4.1	8.5	11.7	13.0	13.0
Hysteresis (%)			≤1				
Response sensitivity (%)			≤0.5				
Filtering precision (μm)			≤20				
Pressure fluid			Mineral oil Phosphate ester				
Medium viscosity (mm^2/s)			20~380				
Pressure fluid temperature range (℃)			-20~+70				
Weight (Kg)			8.7	11.2	16.8	31.5	34

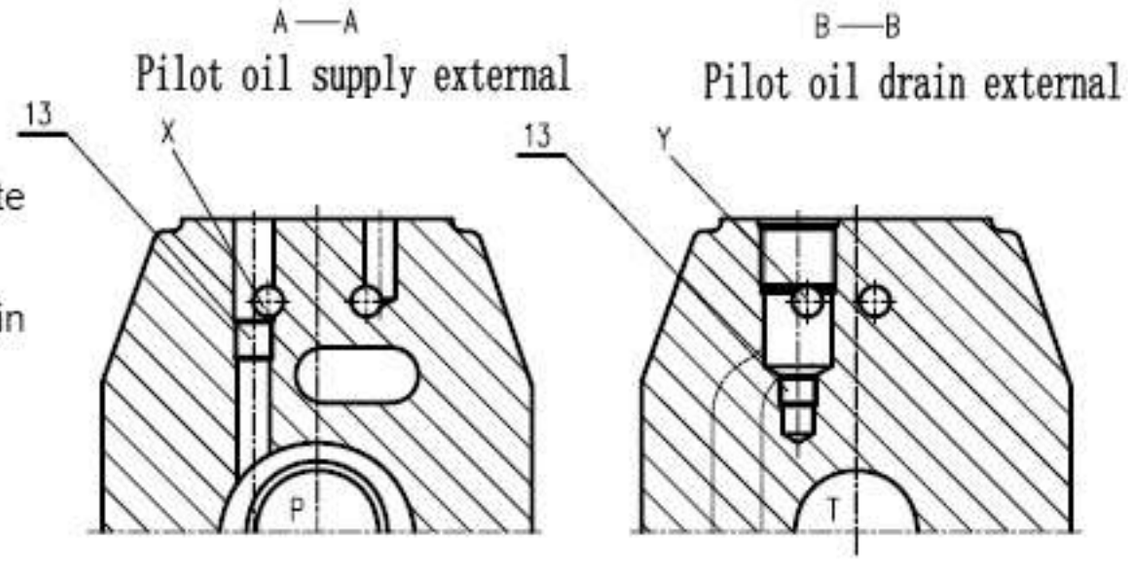
Electrical data

Valve protection to DIN 40 050	IP65
Voltage type	DC
Signal type	Analogue
Power, max. W	72 (average = 24 W)
Electrical connection	With component plug to E DIN 43 563-AM6
	Plug-in connector to E DIN 43 563-BF6-3
Control electronics	Integrated into the valve

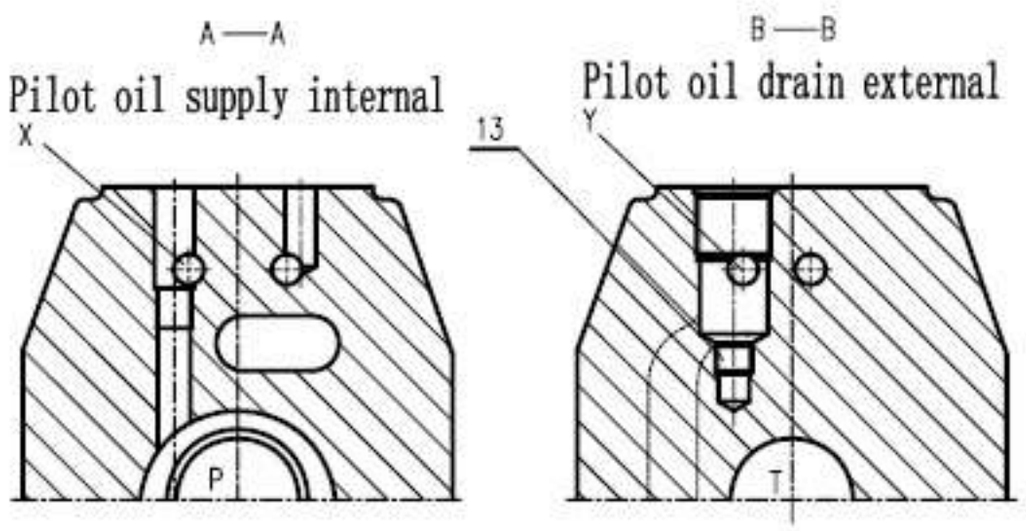
Pilot oil supply

Pilot oil supply, throttle insert (example:NS10)

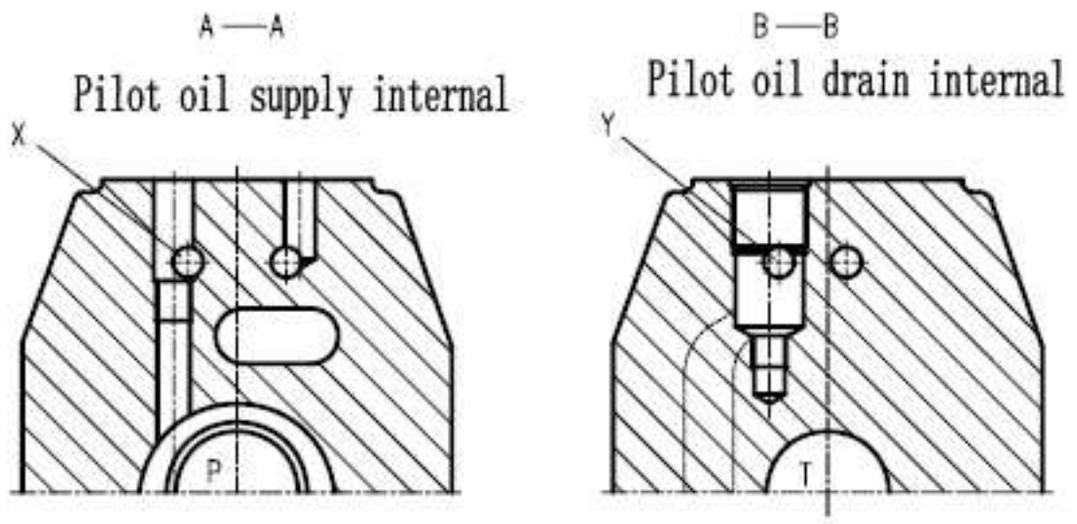
1. Pilot oil supply external
   Pilot oil drain external
   In this type the pilot oil supply is from a separate pilot pressure circuit(external).
The pilot oil drain is not into the T port of the main valve but separately into tank via port Y (external)



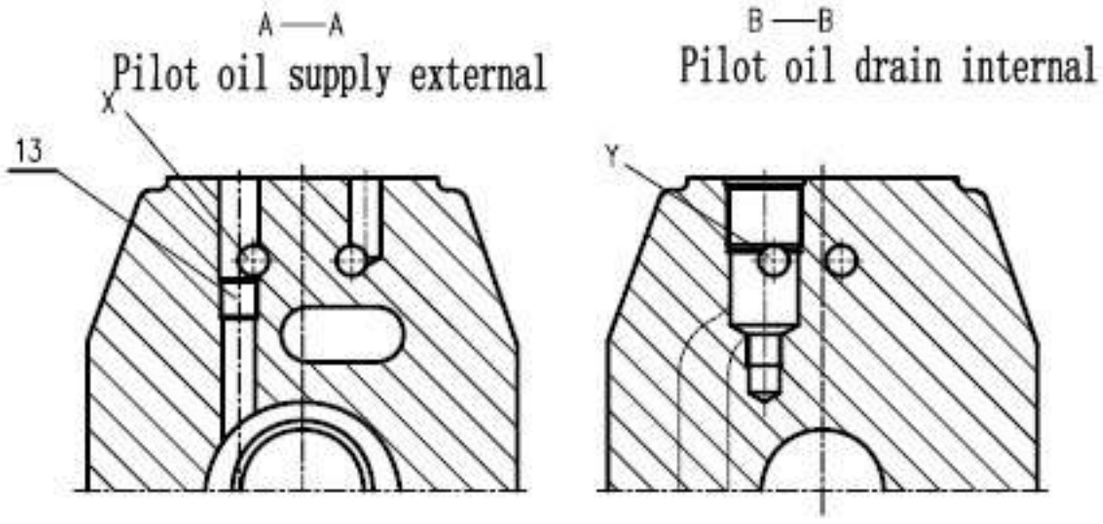
2. Pilot oil supply internal
   Pilot oil drain external
In this type the pilot oil supply is from the P port of the main valve (internal).
The pilot oil drain is not into the T port of the main valve but separately into tank via port Y (external).
Port X must be plugged in the subplate.



3. Pilot oil supply internal
   Pilot oil drain internal
In this type the pilot oil supply is from the P port of the main valve (internal).
The pilot oil drain is directly into the T port of the main valve (internal).
Port X and Y must be plugged in the subplate.



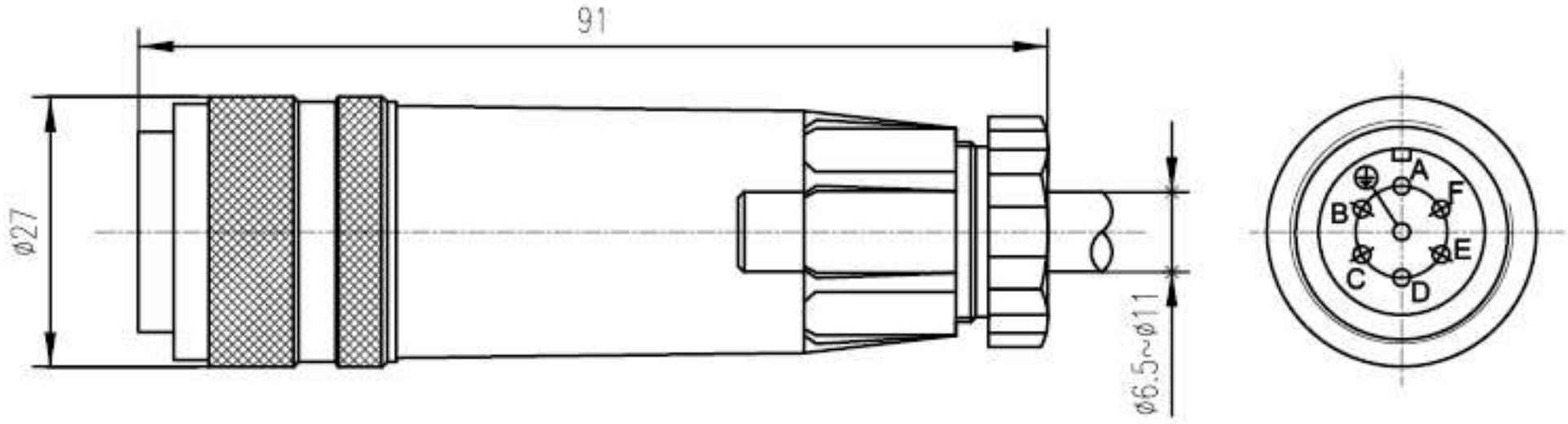
4. Pilot oil supply external
   Pilot oil drain internal
In this type the pilot oil supply is from a separate pilot pressure circuit (external).
The pilot oil drain is directly into the T port of the main valve (internal).
Port Y must be plugged in the subplate.



Electrical connections, plug-in connector

Plug-in connector

Plug-in connector to E DIN 43 563-BF6-3
Separate order, plastic version



Component plug allocation

	Contact	Signal
Supply voltage	A	24 VDC(18 to 35VDC); I_{max}=1.5A; impulse load≤3A
	B	0 V
Ref. (actual value)	C	Ref. potential for actual value (contact F)
Differential amplifier input (command value)	D	±10 V or 4-20 mA
	E	0 V ref. potentional
Measurement output (act. value)	F	±10 V or 4-20 mA
	PE	Connected with cooling body and valve housing

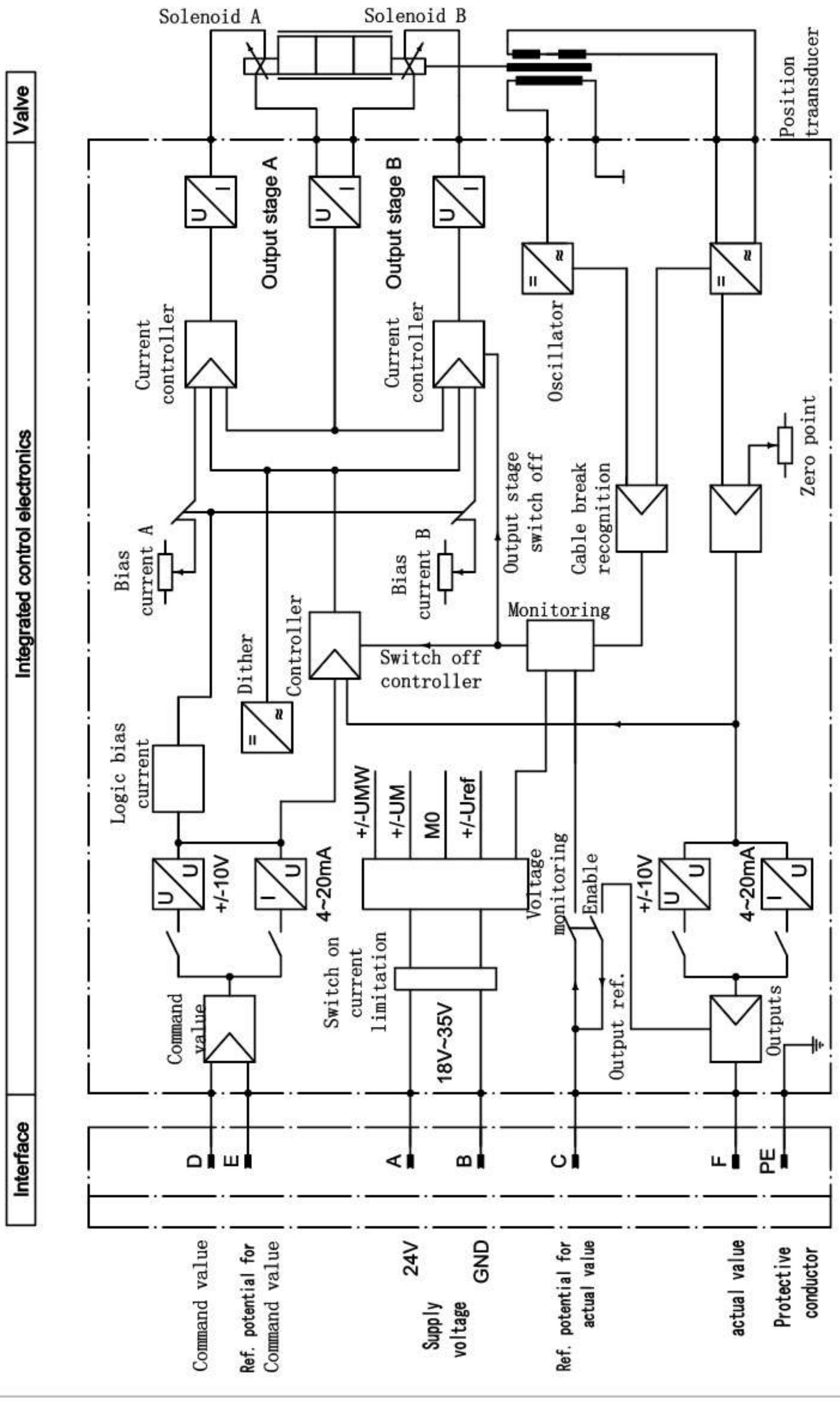
Command value: Reference potential at E and a positive command value at D results in a flow from P to A and B to T
Reference potential at E and a negative command value at D results in a flow from P to B and A to T
Connection cable: Recommendation: – Up to 25 m cable length type LiYCY 7 x 0.75 mm^2
– Up to 50 m cable length type LiYCY 7 x 1.0 mm^2

External diameter: – 6.5 to 11 mm (plastic plug-in connection)

Connect screen to ⊥ only on supply side.

Note: Electrical signals (e.g. actual value or feedback signals) taken via valve electronics must not be used to switch off the machine safety functions!

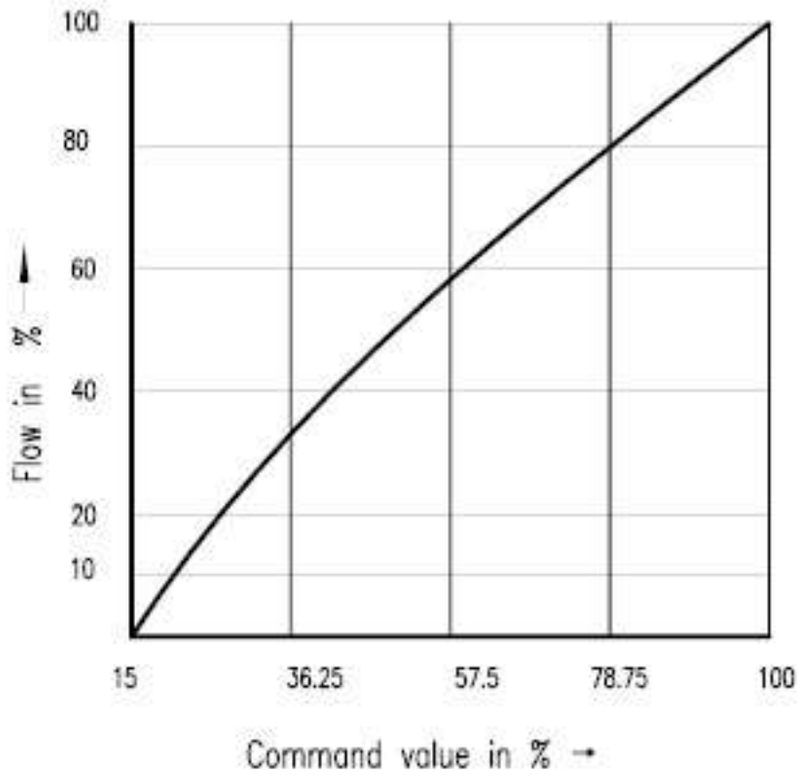
Blockcircuit diagram / connection allocation of the integrated control electronics for type HD-4WRKE



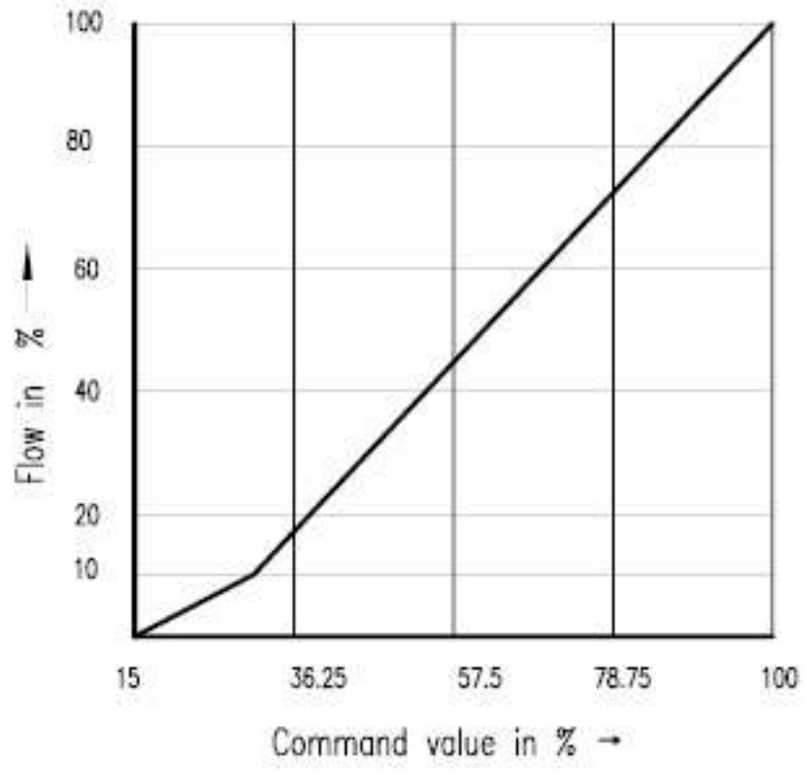
Characteristic curves (measured at 1MPa valve pressure differential or 0.5MPa per control land)

Spool symbols E, W or R

Spool with characteristic curve L

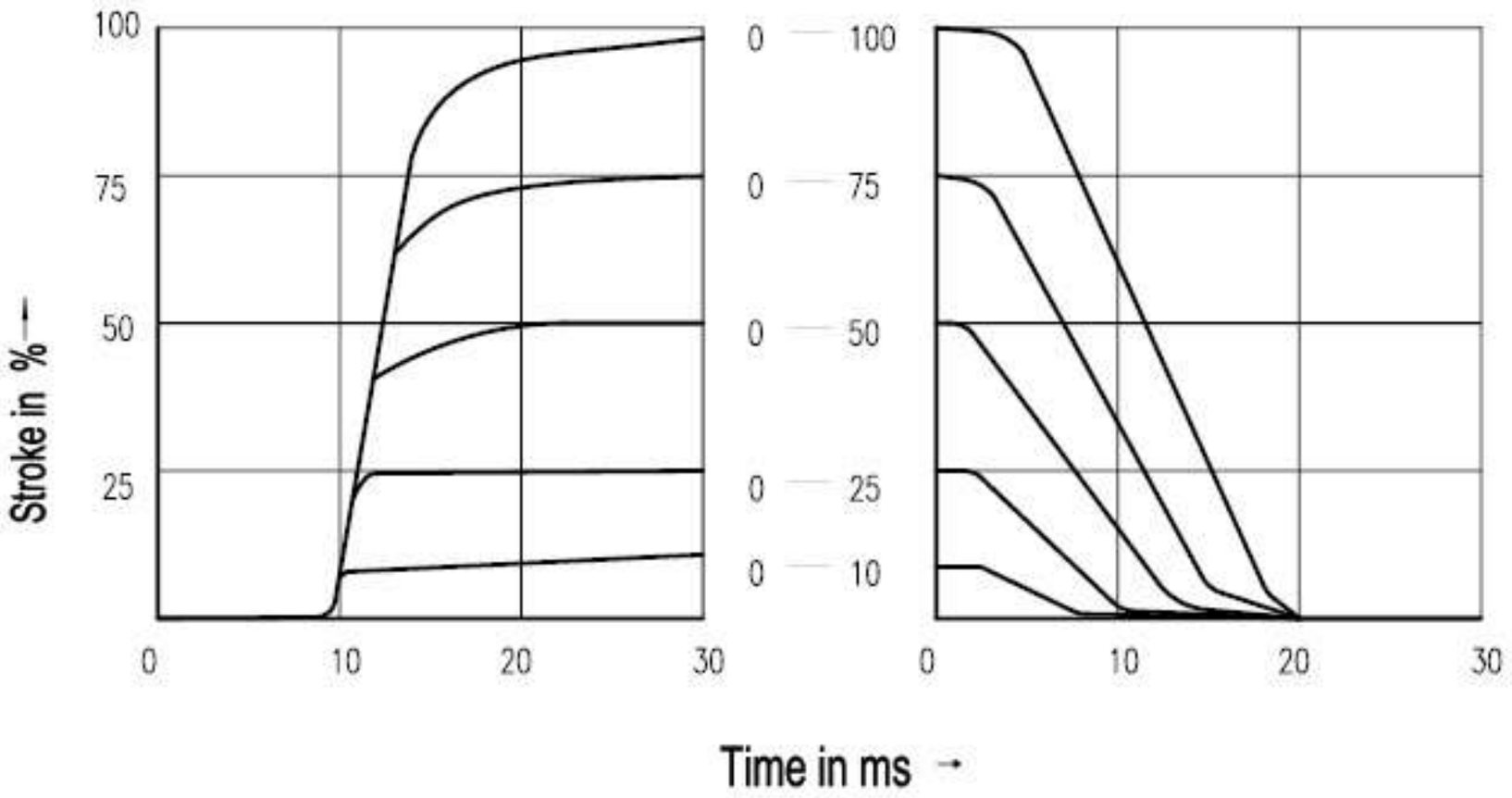


Spool with characteristic curve P

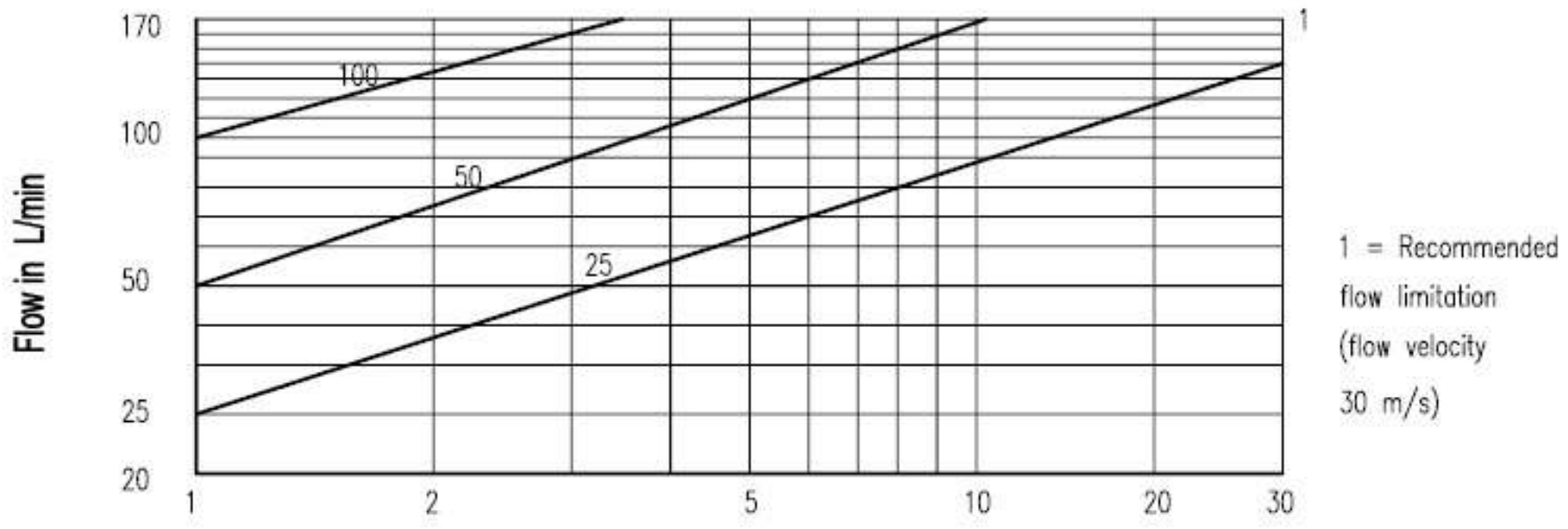


Characteristic curves (P=10 MPa, v=36×10^{-6}m^2 /s, t=40°C ± 5°C) NS10

Transient function with a step form of electrical input signal

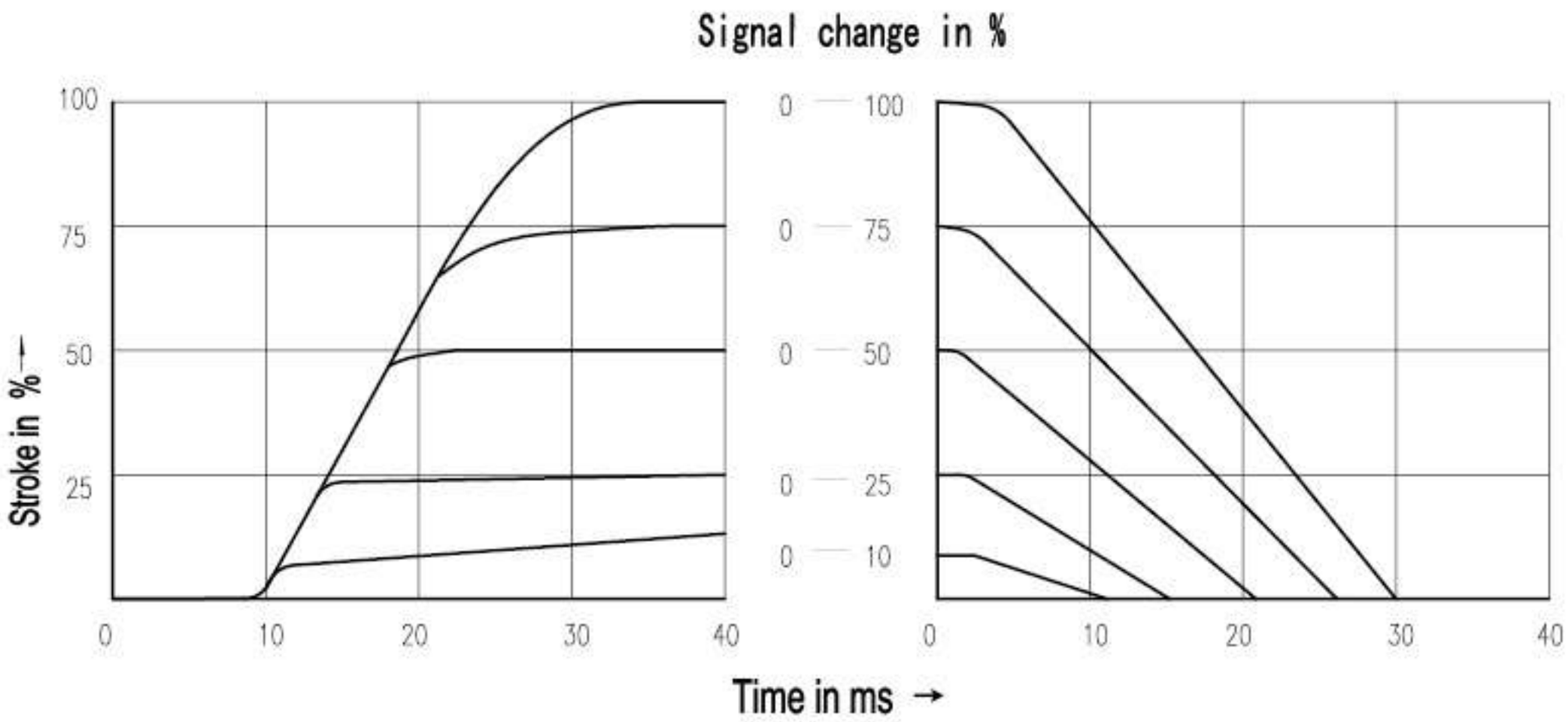


Flow load function at maximum valve opening (tolerance ± 10 %)

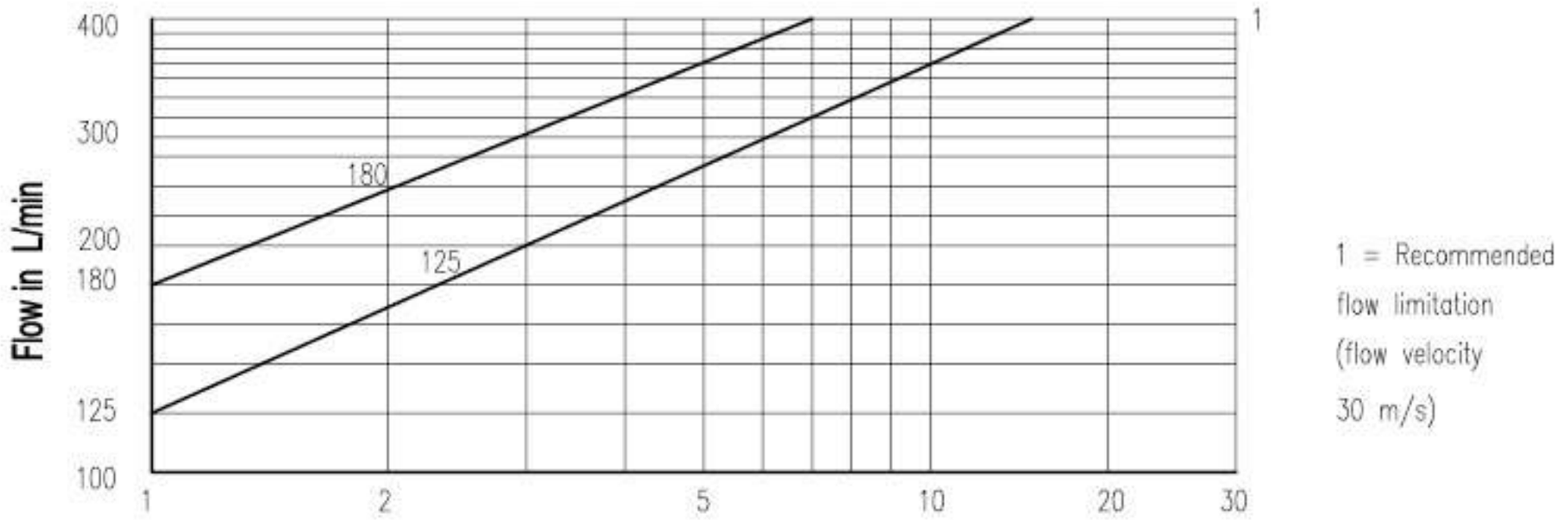


Characteristic curves (P=10 MPa, v=36×10^{-6}m^2 /s, t=40°C ± 5°C) NS16

Transient function with a step form of electrical input signal

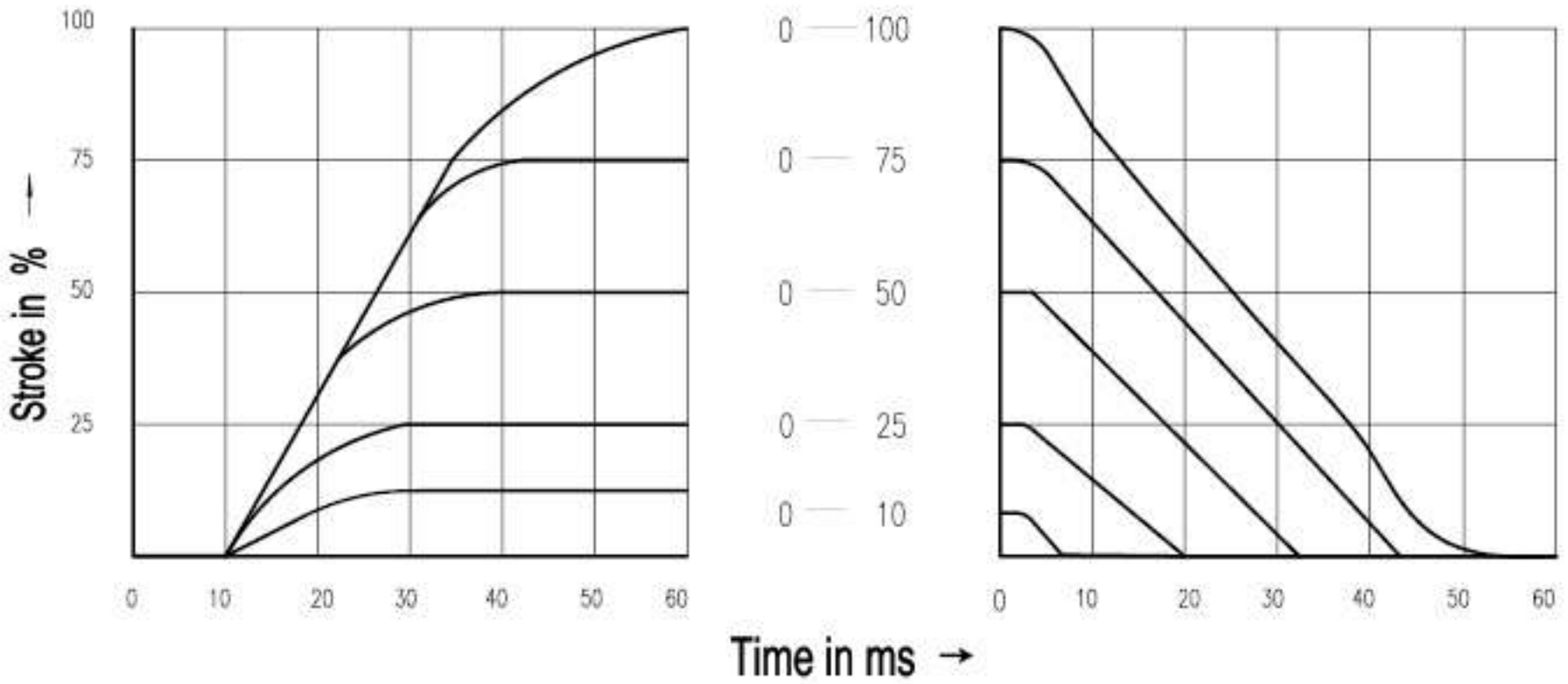


Flow load function at maximum valve opening
(tolerance ± 10 %)

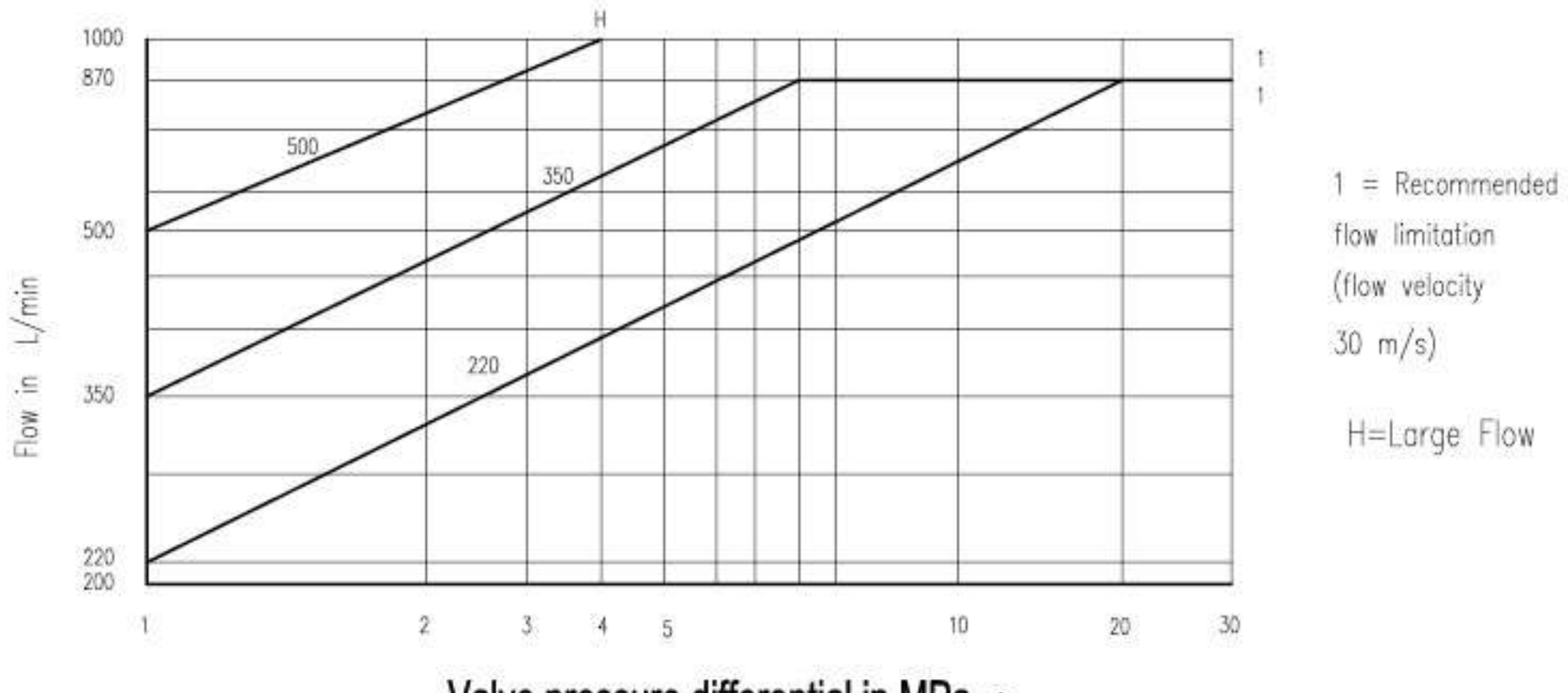


Characteristic curves (P=10 MPa, v=36×10^{-6}m^2 /s, t=40°C ± 5°C) NS25

Transient function with a step form of electrical input signal

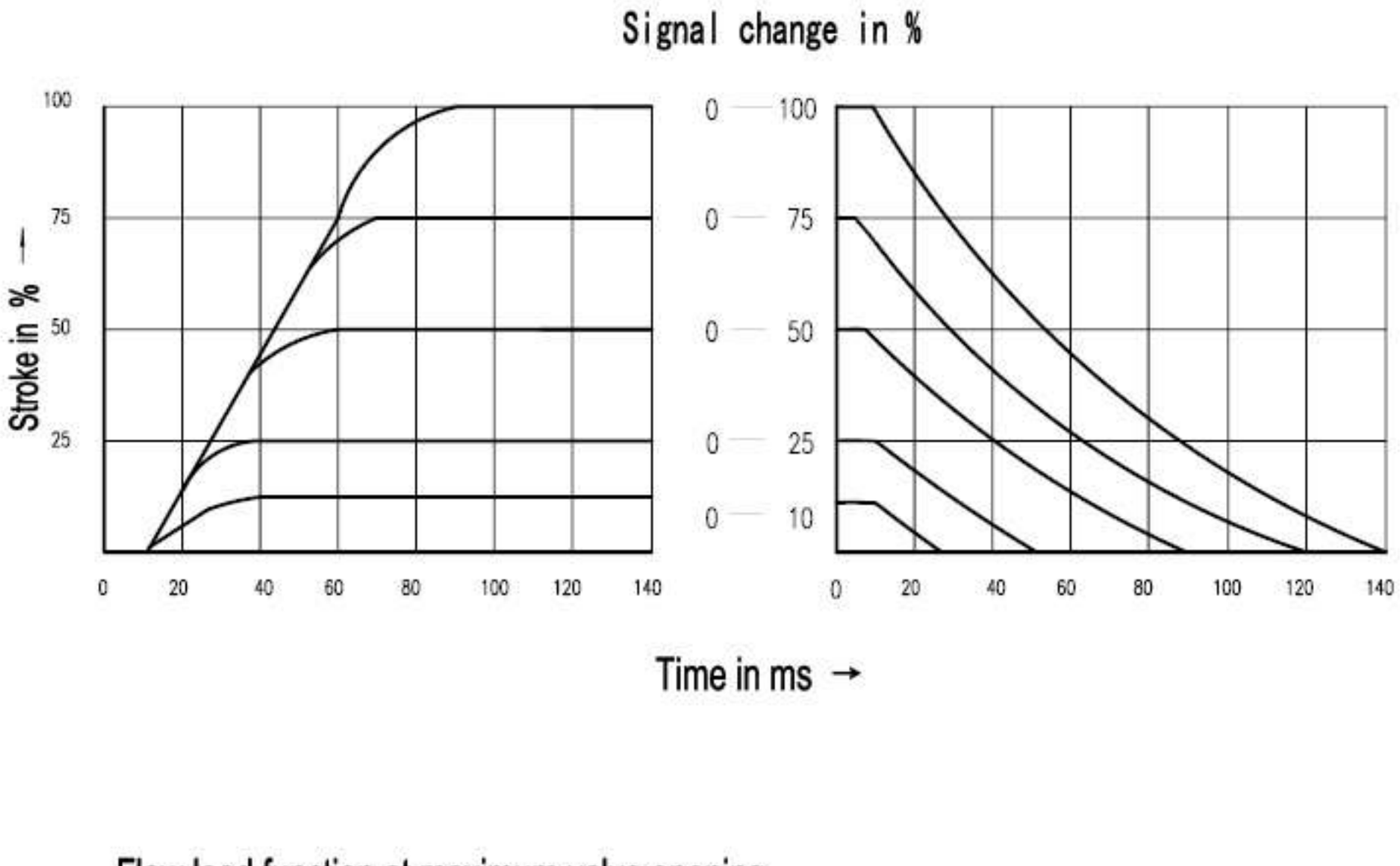


Flow load function at maximum valve opening (tolerance ± 10 %)

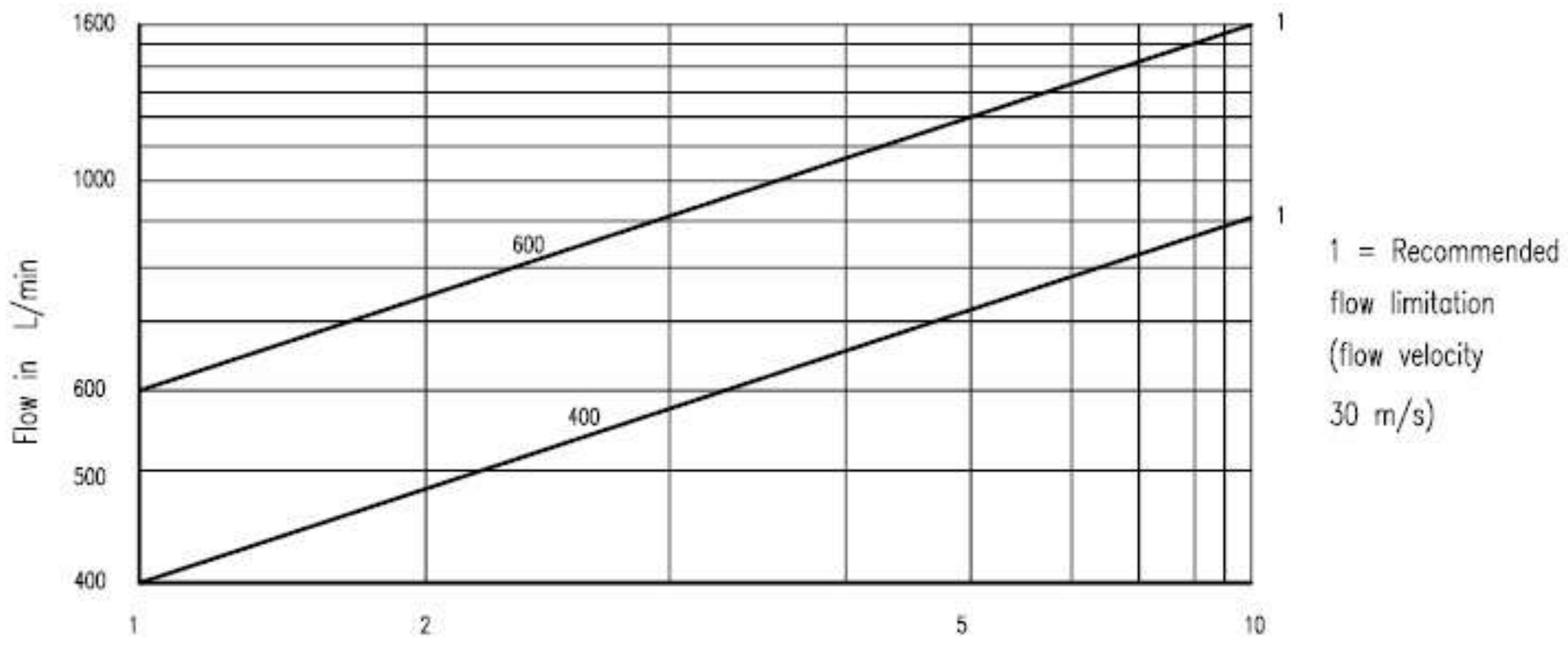


Characteristic curves (P=10 MPa, v=36×10^{-6}m^2 /s, t=40°C ± 5°C) NS32

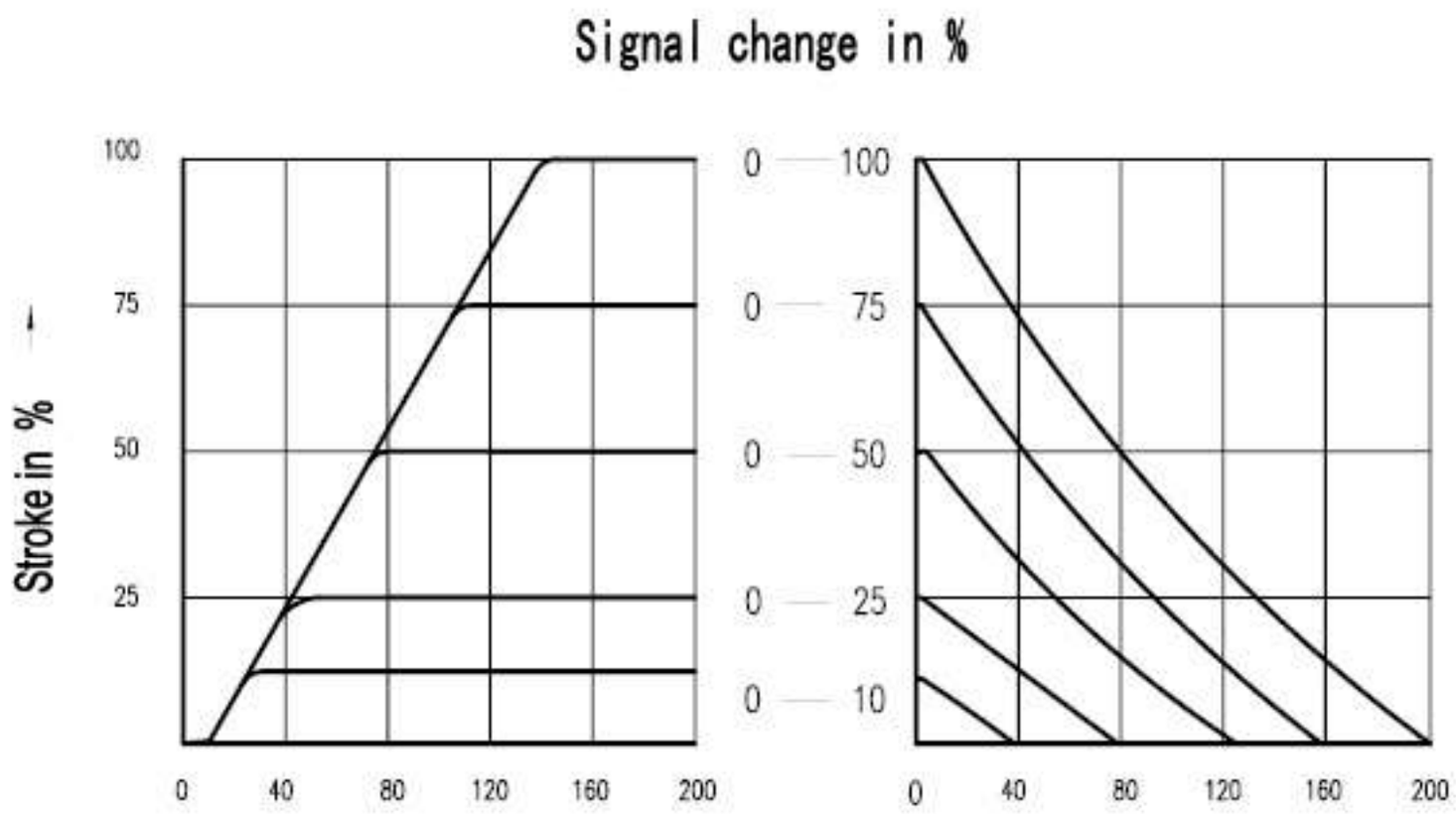
Transient function with a step form of electrical input signal



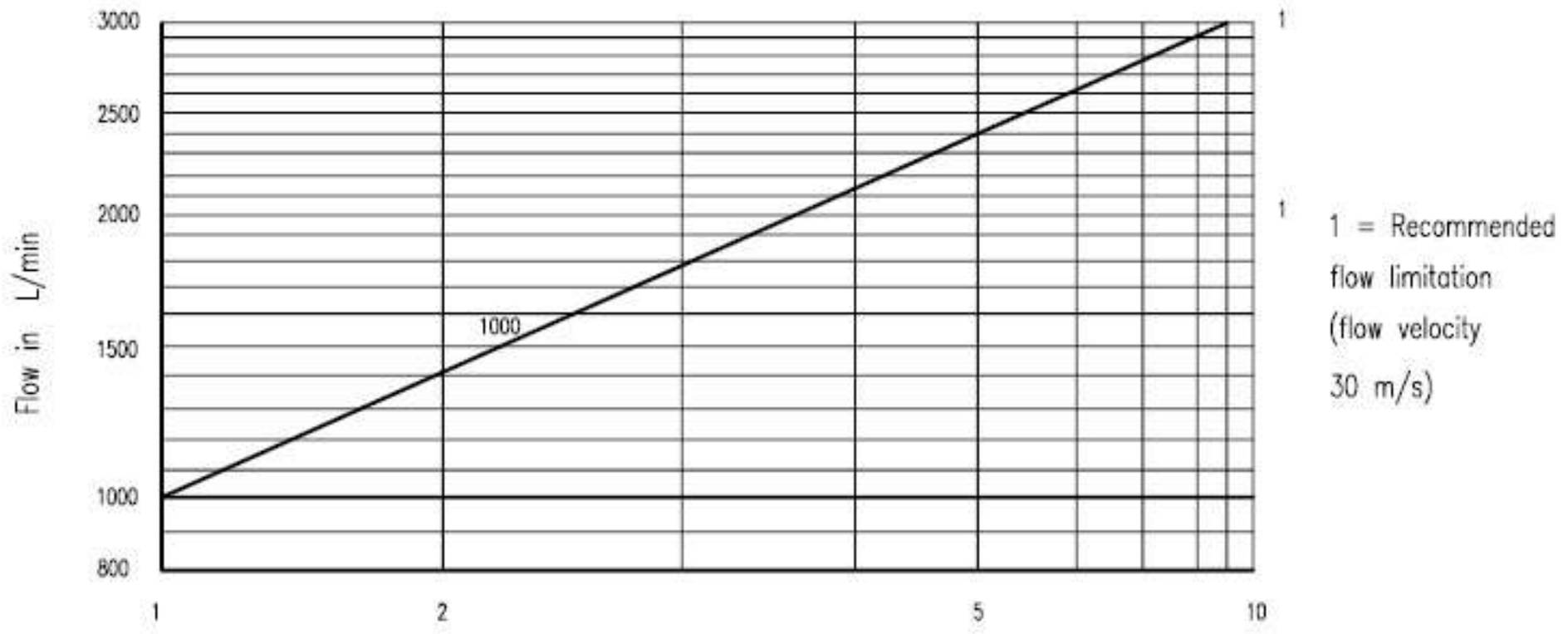
Flow load function at maximum valve opening (tolerance ± 10 %)



Transient function with a step form of electrical input signal

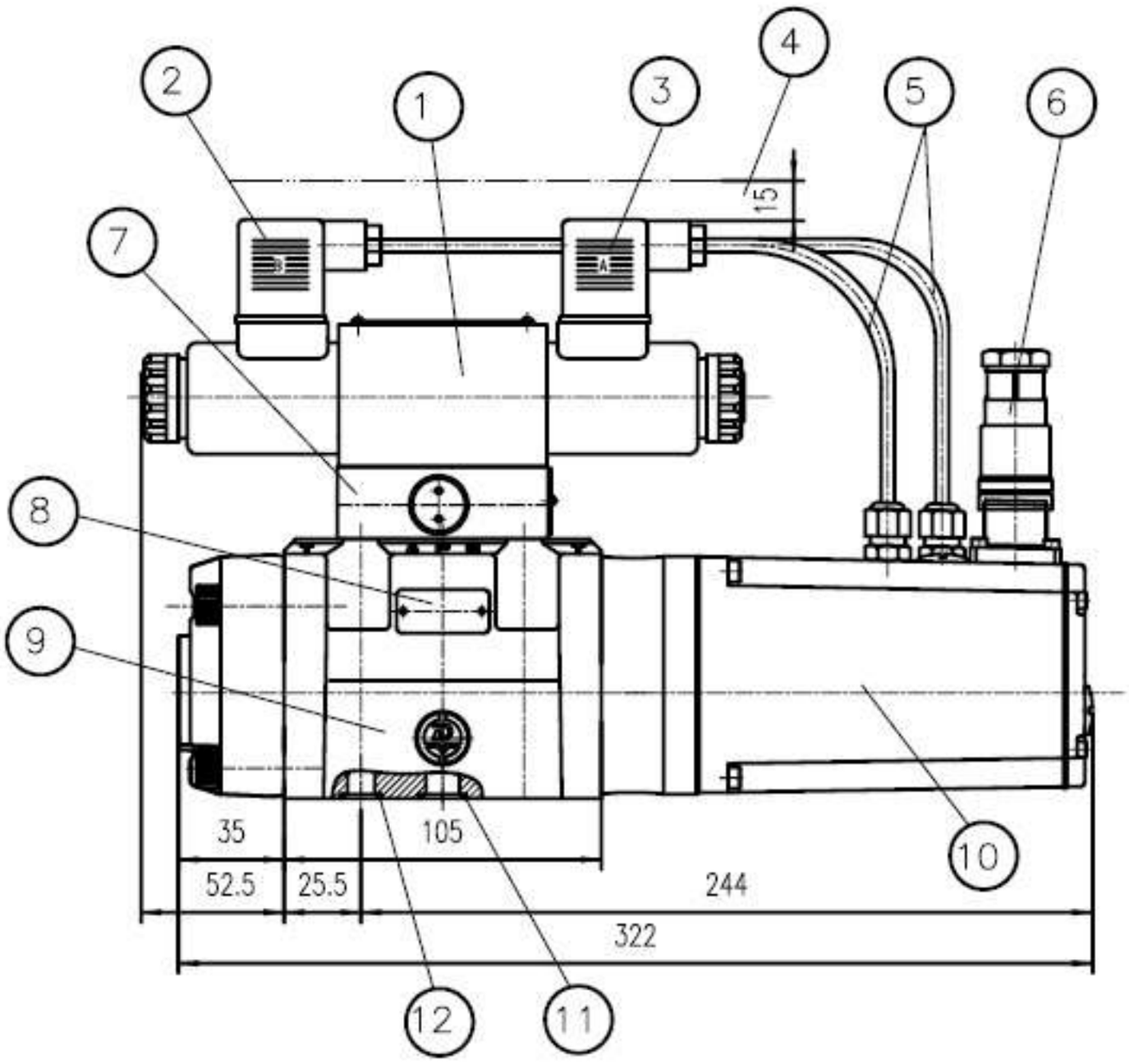


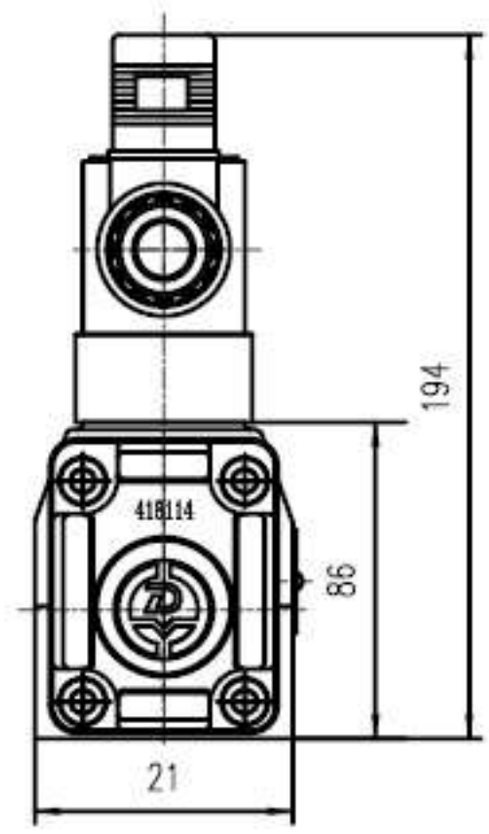
Flow load function at maximum valve opening (tolerance ± 10 %)

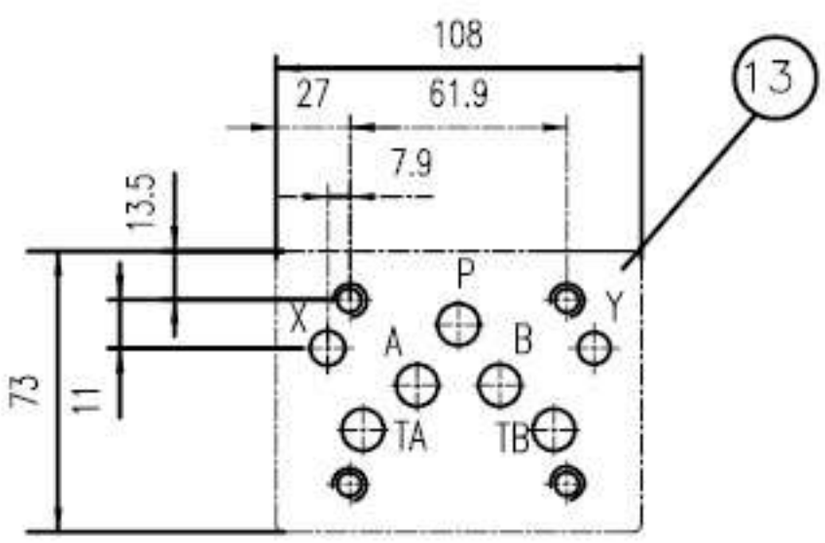


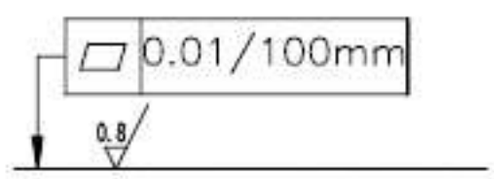
Unit dimensions: NS 10

(Dimensions in mm)









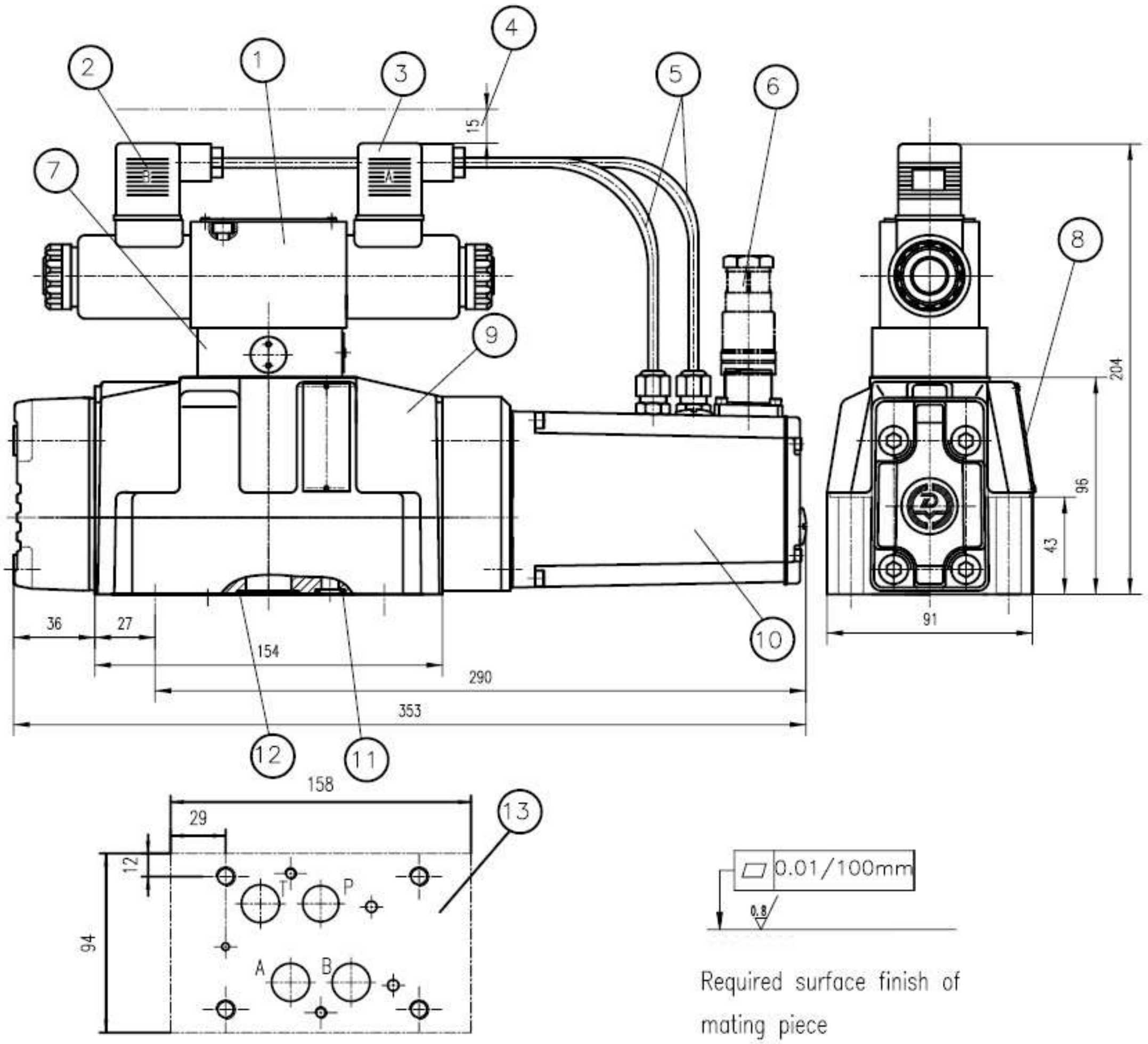
Required surface finish of mating piece

1	Pilot control valve	7	Pressure reducing valve
2	Plug-in connector "B", colour black	8	Nameplate
3	Plug-in connector "A", colour grey	9	Main valve
4	Space required to remove the plug-in connector	10	Integrated control electronics
5	Cable	11	O-ring 12 x 2(for ports A,B,P,T)
6	Plug-in connector (plastic version, separate order)	12	O-ring 10.82 x 1.78(for ports X and Y)
		13	Machined valve mounting surface, position of the ports

Valve fixing screws: 4-M6 x 45 (GB/T70.1); M_A =14 Nm

Unit dimensions: NS 16

(Dimensions in mm)



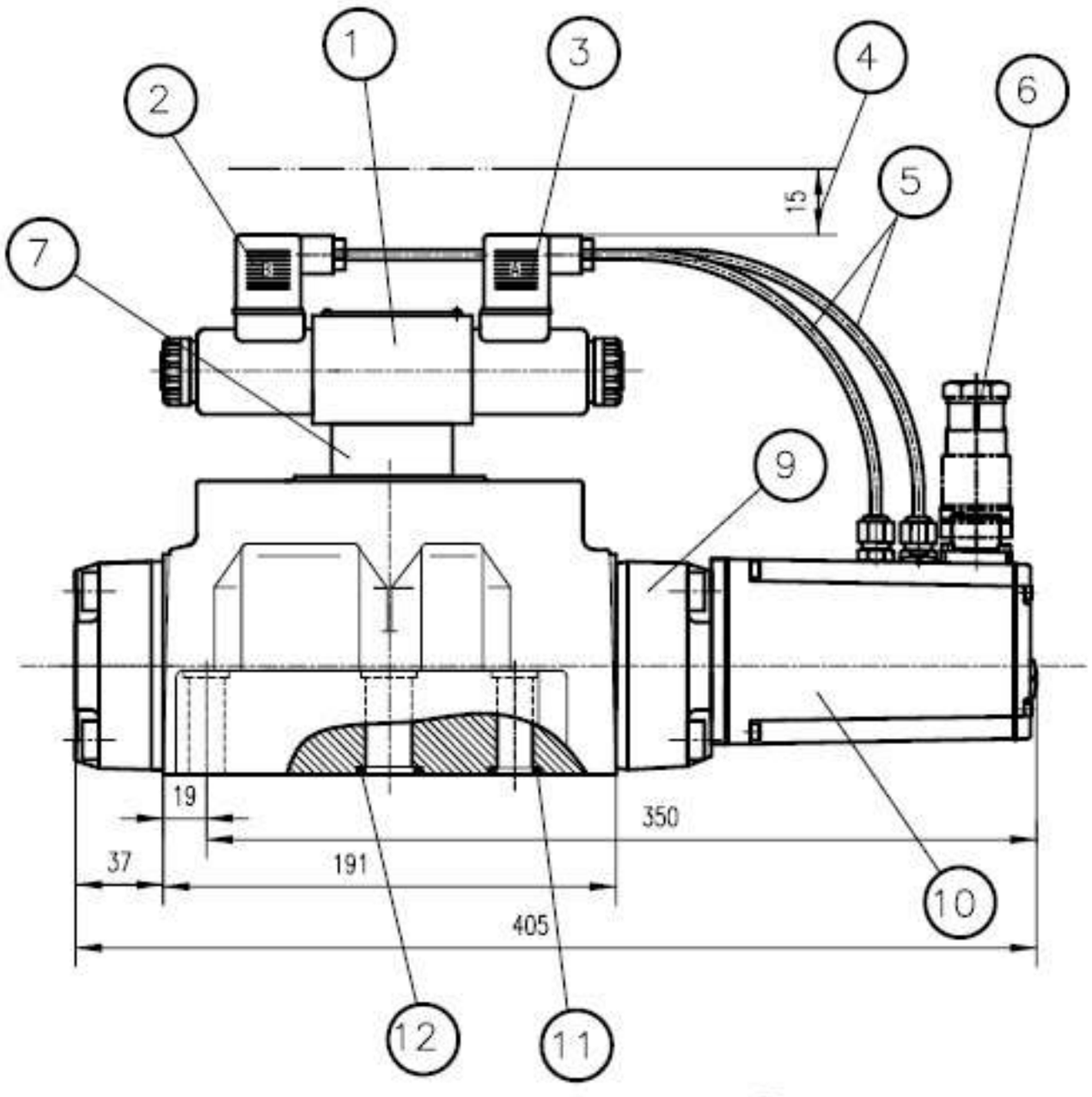
Required surface finish of mating piece

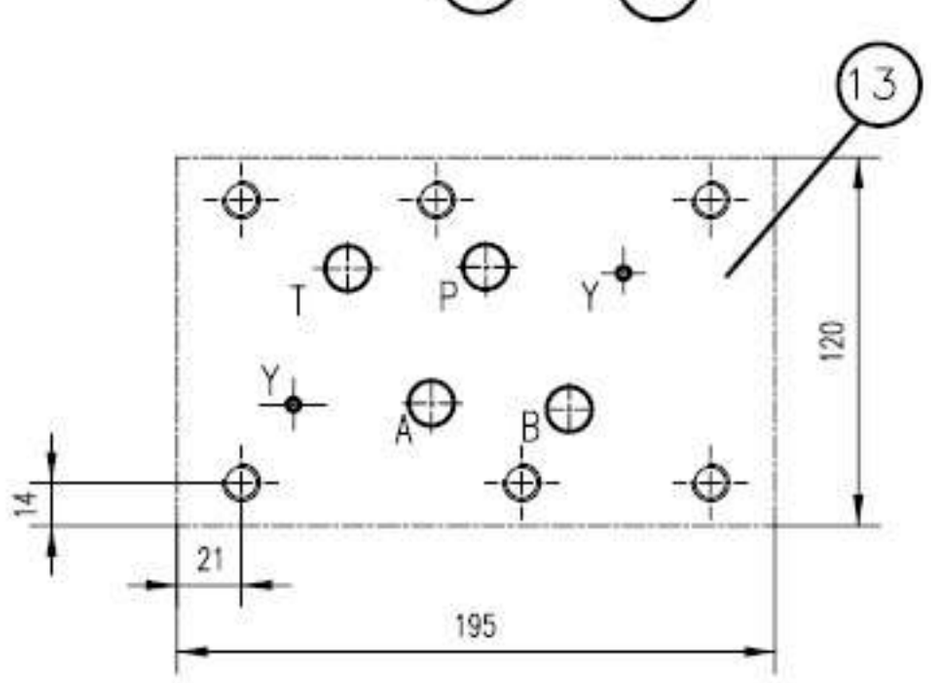
1	Pilot control valve	7	Pressure reducing valve
2	Plug-in connector "B", colour black	8	Nameplate
3	Plug-in connector "A", colour grey	9	Main valve
4	Space required to remove the plug-in connector	10	Integrated control electronics
5	Cable	11	O-ring 12x2(for ports A,B,P,T)
6	Plug-in connector (plastic version, separate order)	12	O-ring 22x2.5(for ports X and Y)
		13	Machined valve mounting surface, position of the ports

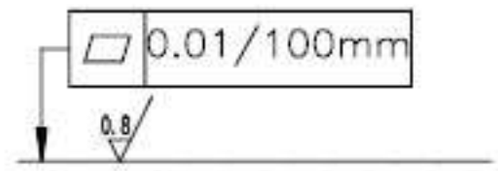
Valve fixing screws: 2 -M6X60(GB/T70.1) M_A=14Nm
4 -M10X60(GB/T70.1) M_A=68Nm

Unit dimensions: NS 25

(Dimensions in mm)







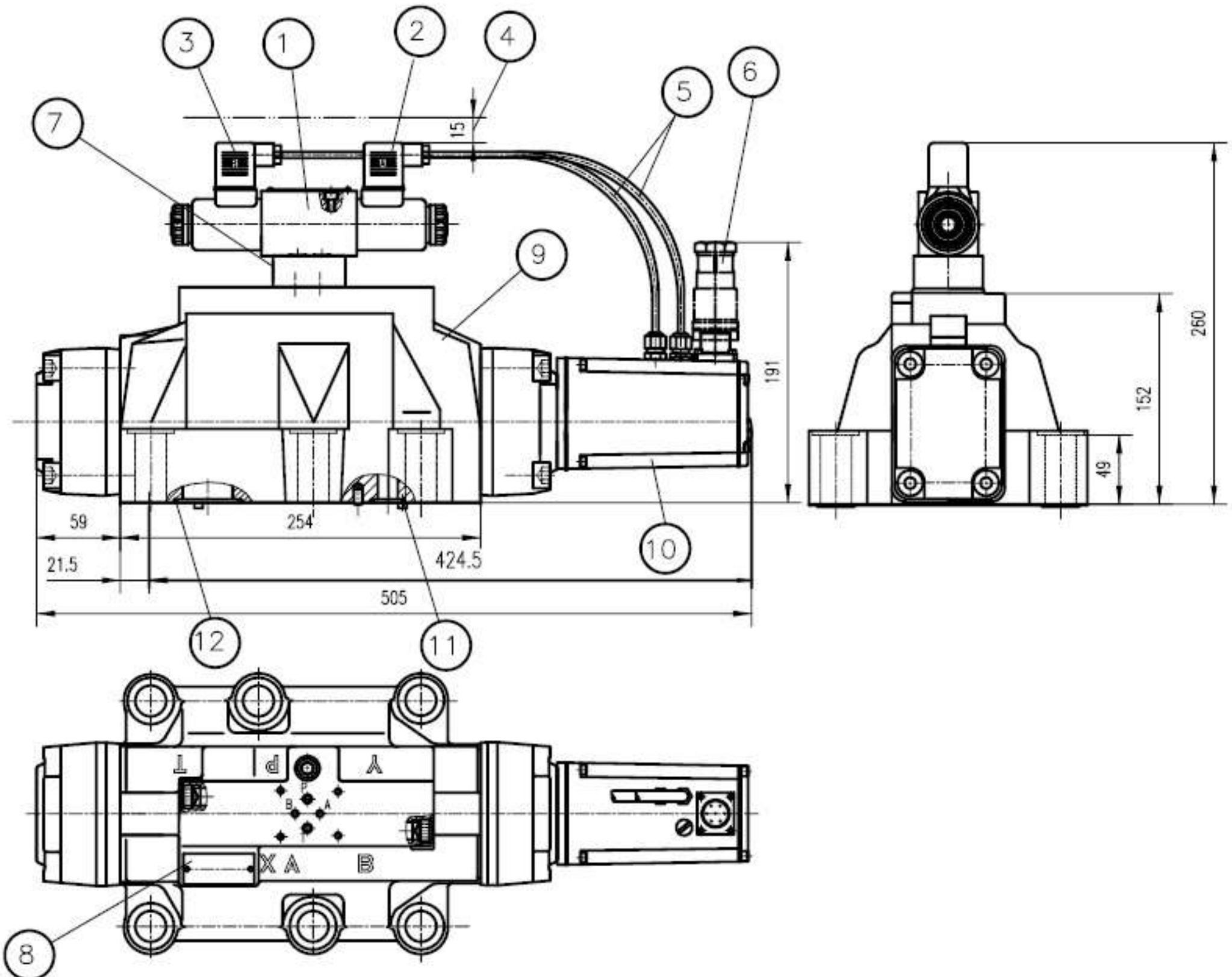
Required surface finish of mating piece

1 Pilot control valve
2 Plug-in connector "B", colour black
3 Plug-in connector "A", colour grey
4 Space required to remove the plug-in connector
5 Cable
6 Plug-in connector (plastic version, separate order)
7 Pressure reducing valve
8 Nameplate
9 Main valve
10 Integrated control electronics
11 O-ring 19x3(for ports A,B,P,T)
12 O-ring 27x3(for ports X and Y)
13 Machined valve mounting surface, position of the ports

Valve fixing screws: 6 -M12X60(GB/T70.1)M_A=130Nm

Unit dimensions: NS 32

(Dimensions in mm)



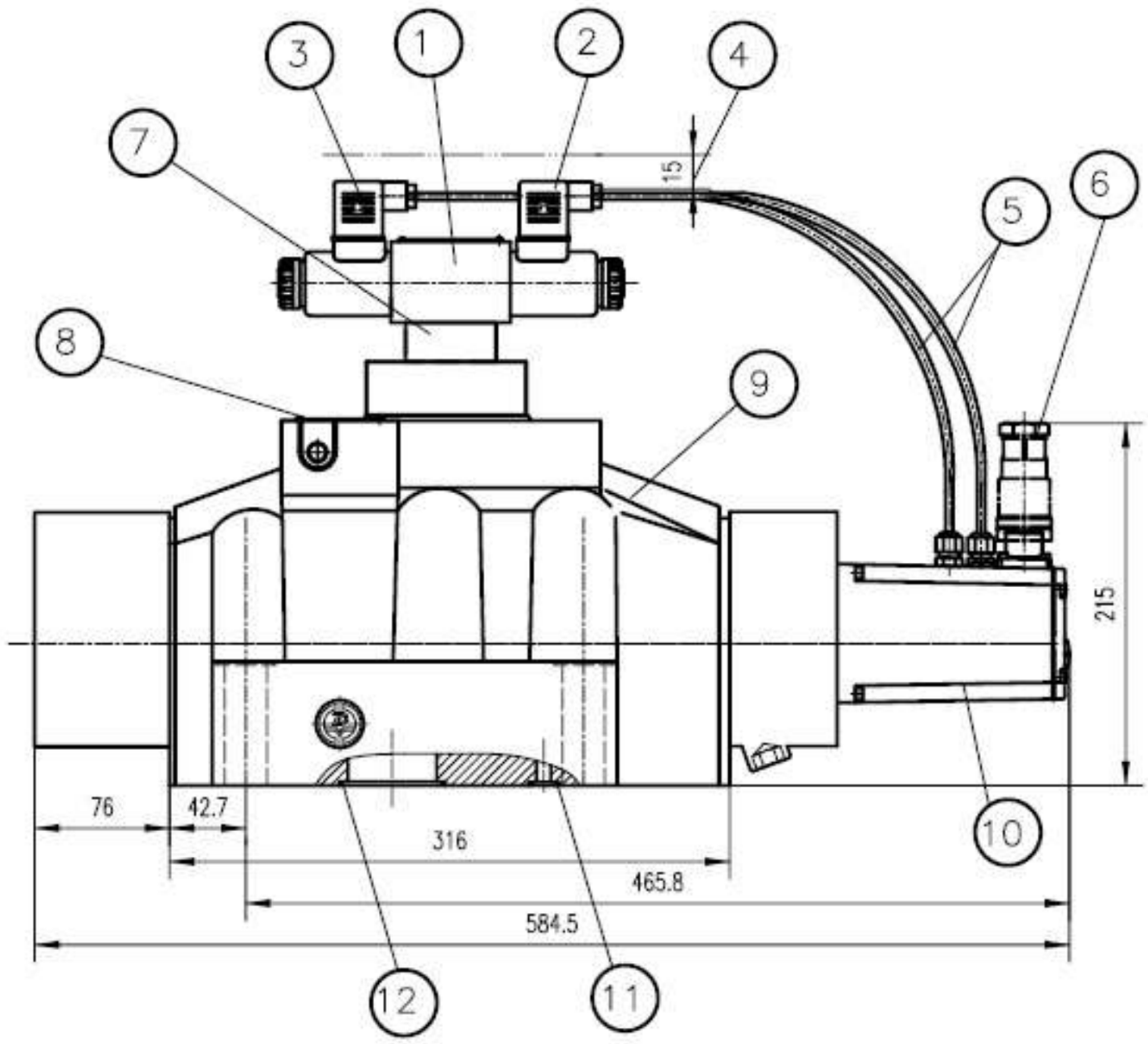
Required surface finish of mating piece

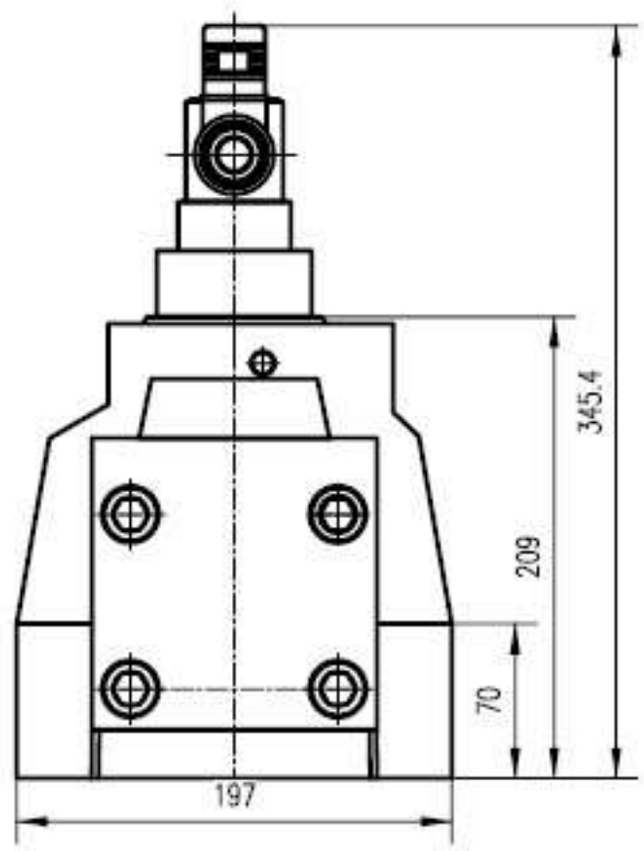
1 Pilot control valve
2 Plug-in connector "B", colour black
3 Plug-in connector "A", colour grey
4 Space required to remove the plug-in connector
5 Cable
6 Plug-in connector (plastic version, separate order)
7 Pressure reducing valve
8 Nameplate
9 Main valve
10 Integrated control electronics
11 O-ring 19x3(for ports A,B,P,T)
12 O-ring 42x3(for ports X and Y)
13 Machined valve mounting surface, position of the ports

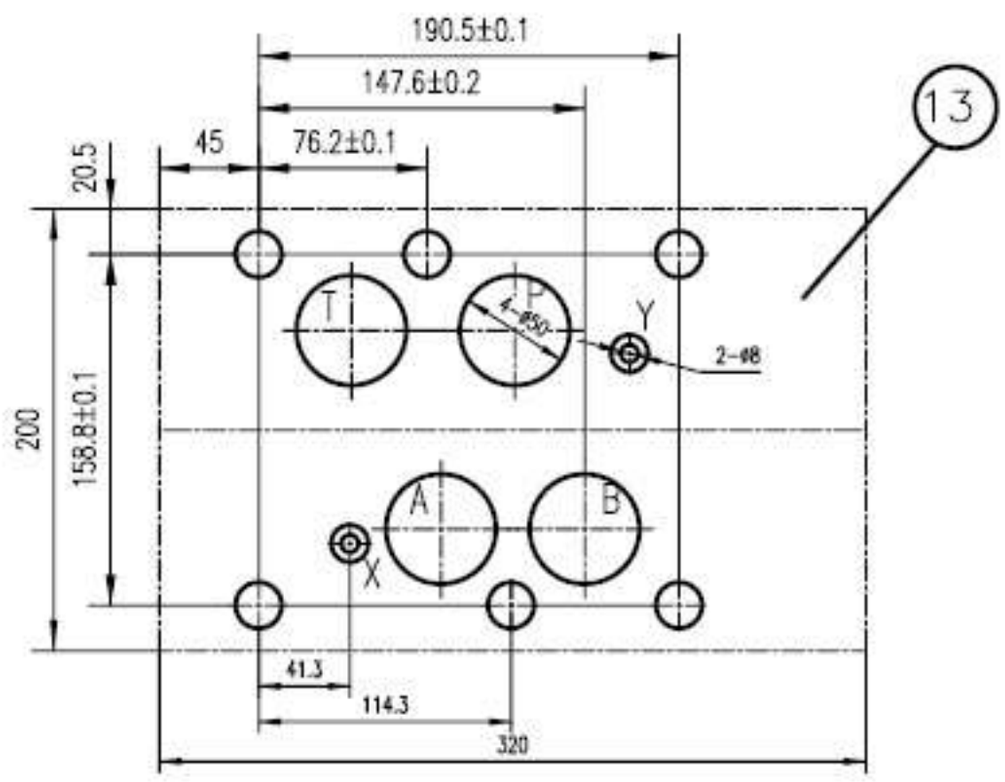
Valve fixing screws: 6 - M20X80(GB/T70.1) M_A=430Nm

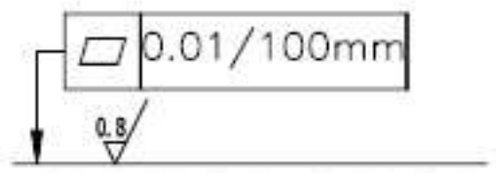
Unit dimensions: NS 35

(Dimensions in mm)









Required surface finish of mating piece

1 Pilot control valve
2 Plug-in connector "B", colour black
3 Plug-in connector "A", colour grey
4 Space required to remove the plug-in connector
5 Cable
6 Plug-in connector (plastic version, separate order)
7 Pressure reducing valve
8 Name plate
9 Main valve
10 Integrated control electronics
11 O-ring 19×3(for ports A,B,P,T)
12 O-ring 42×3(for ports X and Y)
13 Machined valve mounting surface, position of the ports

Valve fixing screws: 6 - M20X100(GB/T70.1) M_A=430N.m

Notice

Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to $\frac{0.8}{\vee}$.
6. Surface finish of mating piece is required to 0.01/100mm.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Proportional pressure reducing valve of 3-way design Types HD-3DREP6 and HD-3DREPE6			
	Size 6	Up to 10 MPa	Up to 15 L/min	

Features:

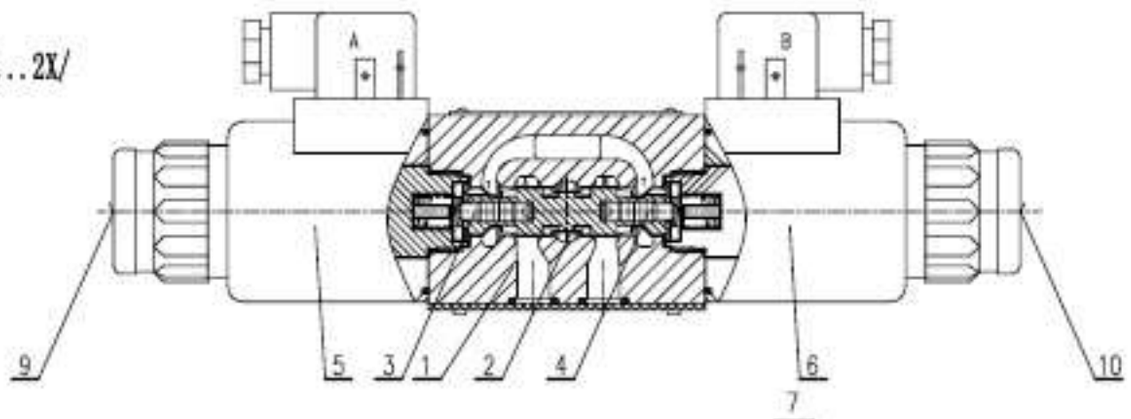
- Directly controlled proportional valves for the control of the pressure and direction of a flow
- Actuated via proportional solenoids with central thread and removable coil
- Hand override, optional
- Spring centered control spool
- Type HD-3DREPE with integrated electronics, interface A1
- External control electronics for type HD-3DREP:
- Analogue amplifier type HD-VT-VSPA2-50-1X/...in Eurocard format
- Digital amplifier type HD-VT-VSPD-1-1X/...in Eurocard format
- Electrical amplifier type HD-VT-11118 of modular design
- Valve and proportional control electronics from a single source



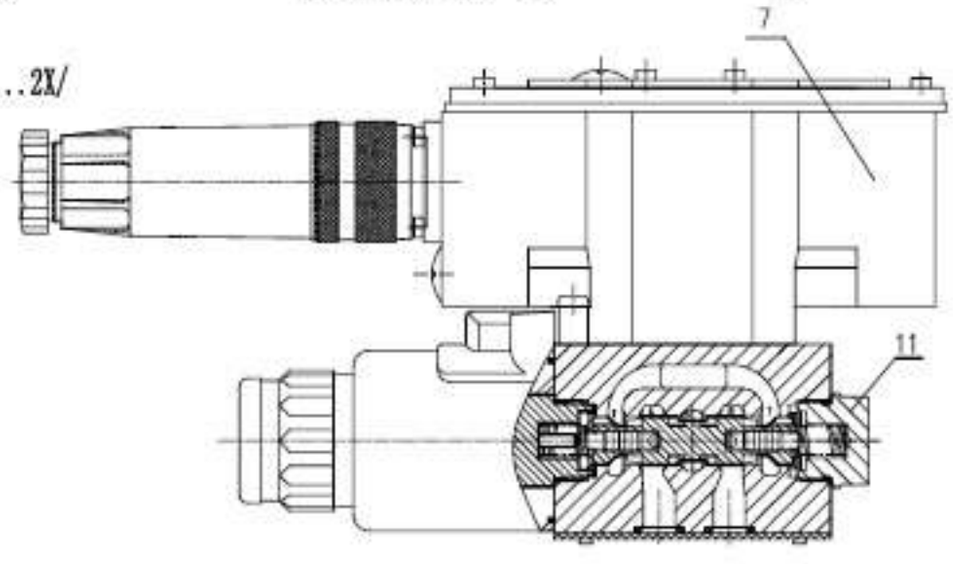
Function, section

The 3-way pressure reducing valve type HD-3DREP6...is directly actuated by proportional solenoids. They convert an electrical input signal into a proportional pressure output signal.
The proportional solenoids are controllable wet pin DC solenoids with central thread and removable coil. The solenoids are controlled optionally via external control electronics(type HD-3DREP)or by integrated control electronics(type HD-3DREPE).
The valve mainly comprises of:solenoids(5 and 6),housing(1),control spool(2)with pressure measuring spools(3 and 4) and optional integrated valve electronics(7).
With the solenoids(5 and 6)de-energised the control spool(2)is held in its centre position by compression springs. The control spool (2)is directly actuated when one of the solenoids is energised.
E.g. by energising solenoid (5):the pressure measuring spool(3)and control spool(2)move to the right in proportion to the electrical input signal. The connection from P to B and A to T is via orifice form cross-sections with progressive flow characteristics.
De-energisation of the solenoid (5):the control spool(2)is returned to its centre position by the compression springs. In the middle position the connections A and B to T are opened, therefore the pressure fluid can freely flow to tank. An optional hand overrides(9 or 10),makes is possible to move the control spool(2)without energising the solenoid.
The function of this version of the 2 position valve is basically the same as that of the valve with 3 switching position. The 2 position valves are however only fitted with either solenoid 5 or 6. A plug (11)is fitted in place of the second solenoid.

Type HD-3DREP6...2X/



Type HD-3DREPE6A...2X/



Ordering details

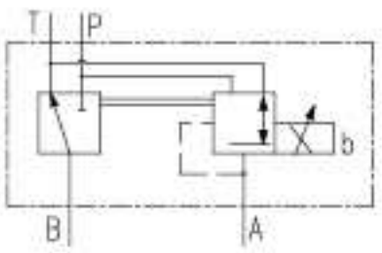
HD ÷ 3DREP | | 6 | ÷2X/ | E | G24 | | | / | *

Technology of Beijing Huade Hydraulic =HD

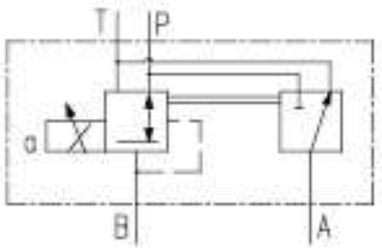
For external control electronics = No code
With integrated control electronics =E

Nominal size 6 = 6

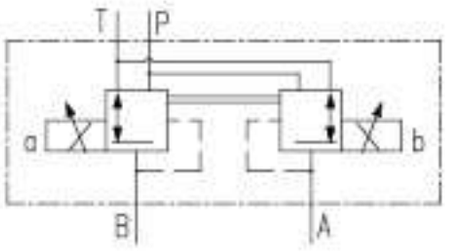
Symbols



=A



=B



=C

Further details in clear text

No code= NBR seals
V= FKM seals

No code = for HD-3DREP
for HD-3DREPE
A1 = Com. value input ±10V

For HD-3DREP
K4= With component plug
Without plug-in connector

For HD-3DREPE
K31= With component plug
Without plug-in connector

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

Supply voltage for the control electronics
G24 = 24V DC

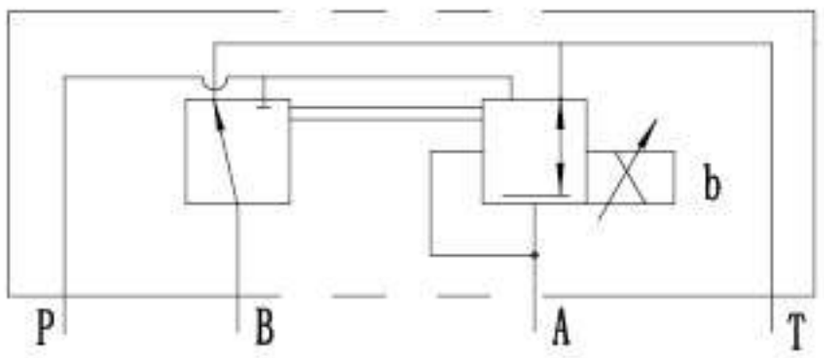
E = Proportional solenoid with removable coil

16 = Pressure stage 1.6MPa
25 = Pressure stage 2.5MPa
45 = Pressure stage 4.5MPa

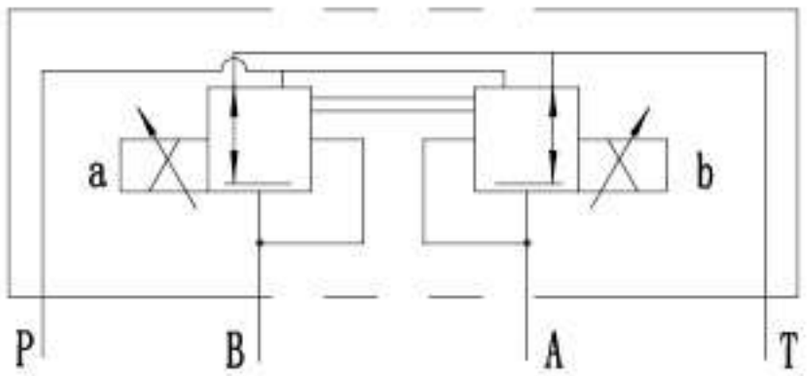
2X = Series 20 to 29
(20 to 29: unchanged installation and connection dimensions)

Symbols

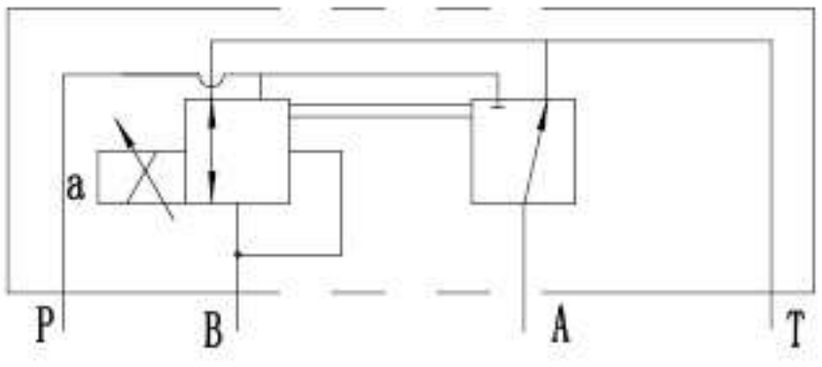
Type HD-3DREP6A-2X/...E...



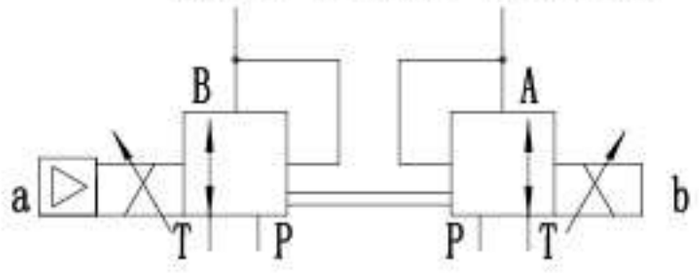
Type HD-3DREP6C-2X/...E...



Type HD-3DREP6B-2X/...E...



Example of a valve with integrated control electronics
Type HD-3DREPE6C-2X/...E...



Technical data

Hydraulic

Valve type		HD-3DREP	HD-3DREPE
Operating pressure range MPa	Port P	2 to 10 for pressure stage 1.6	
		3 to 10 for pressure stage 2.5	
		5 to 10 for pressure stage 4.5	
	Port T	0 to 3	
Max. flow L/min		15(△p=5MPa)	
Filter fineness μm		≤20(preperably ≤10)	
Hysteresis %		≤5	
Repeatability accuracy %		≤1	
Response sensitivity %		≤0.5	
Pressure fluid		Mineral oil, or phosphate ester	
Viscosity range mm^2/s		20~380	
Pressure fluid temperature range ℃		-20~+80	
Weight Kg		2.0	2.2

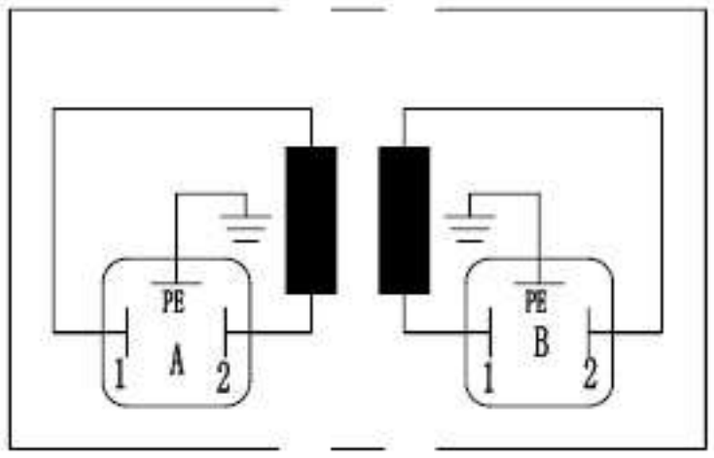
Electrical

Electrical data, solenoid				
Valve type			HD-3DREP	HD-3DREPE
Voltage type			DC	DC
Nominal voltage V			24	
Max. current A			1.5	2.5
Solenoid coil resistance(Ω)	Cold value at 20℃		4.8	2
	Max. warm value		7.2	3
Duty %			100	
Coil temperature ℃			up to 150	
Protection			IP65	
Electrical, control electronics				
Amplifier			HD-VT-VSPA2-50-1X/T1(With 1 ramp time) HD-VT-VSPA2-50-1X/T5(With 5 ramp times)	integrated control electronics
Supply voltage	Nominal voltage VDC		24	
	Lower limiting value V		19	
	Upper limiting value V		35	
current consumption	Imax A		1.8	
	Impulse current A		4	

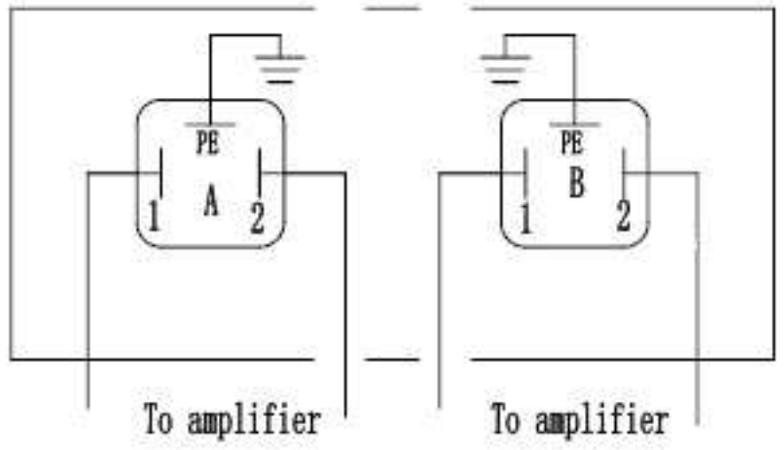
Electrical connections, plug-in connectors

For type HD-3DREP

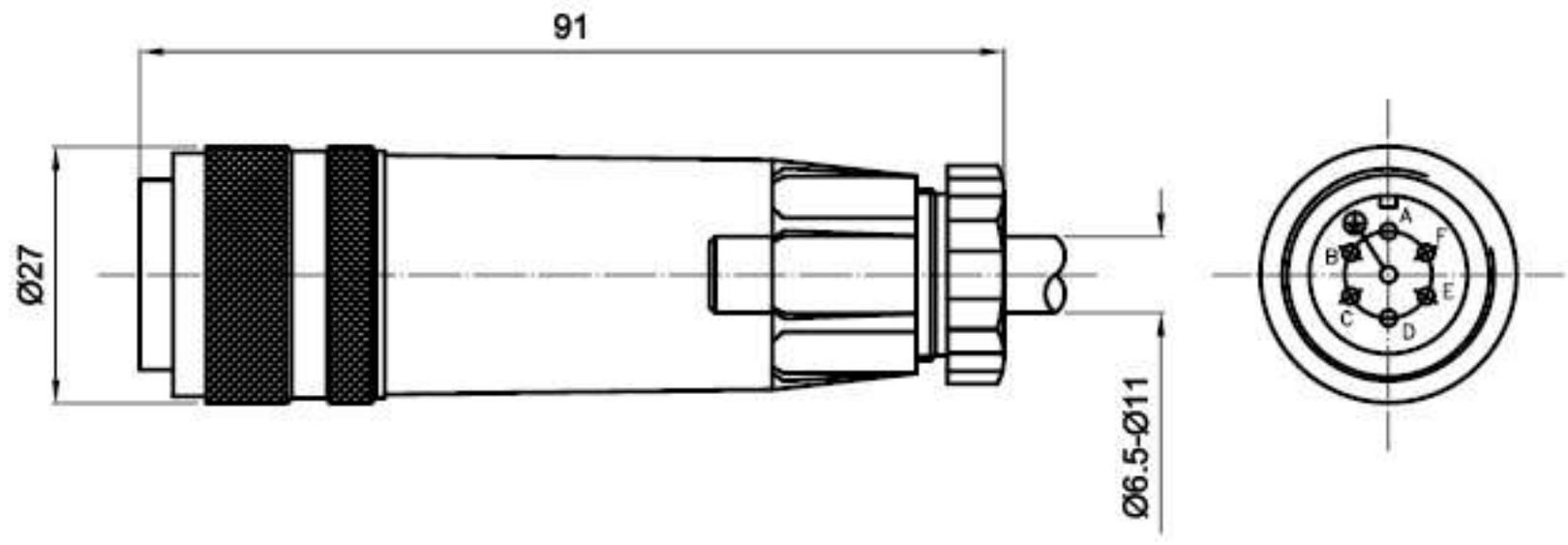
Connection at component plug



Connection at plug-in connector

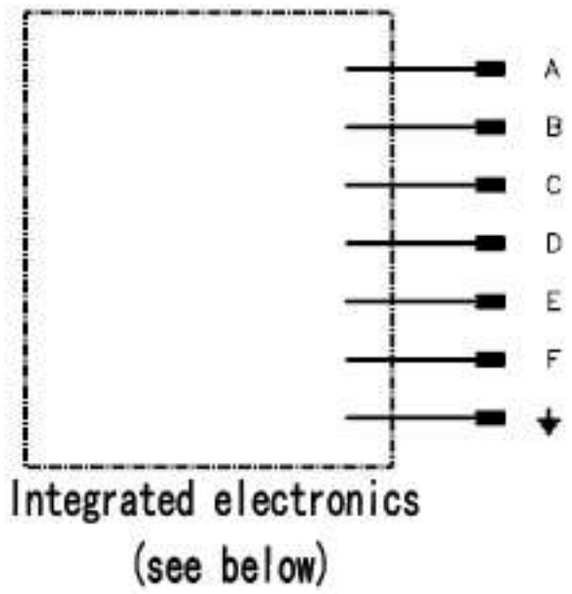


For pin allocation see block circuit diagram
Plug-in connector to E DIN 43 563-BF6-3
(separate order, plastic version)



Integrated control electronics for type HD-3DREPE

Component plug pin allocation

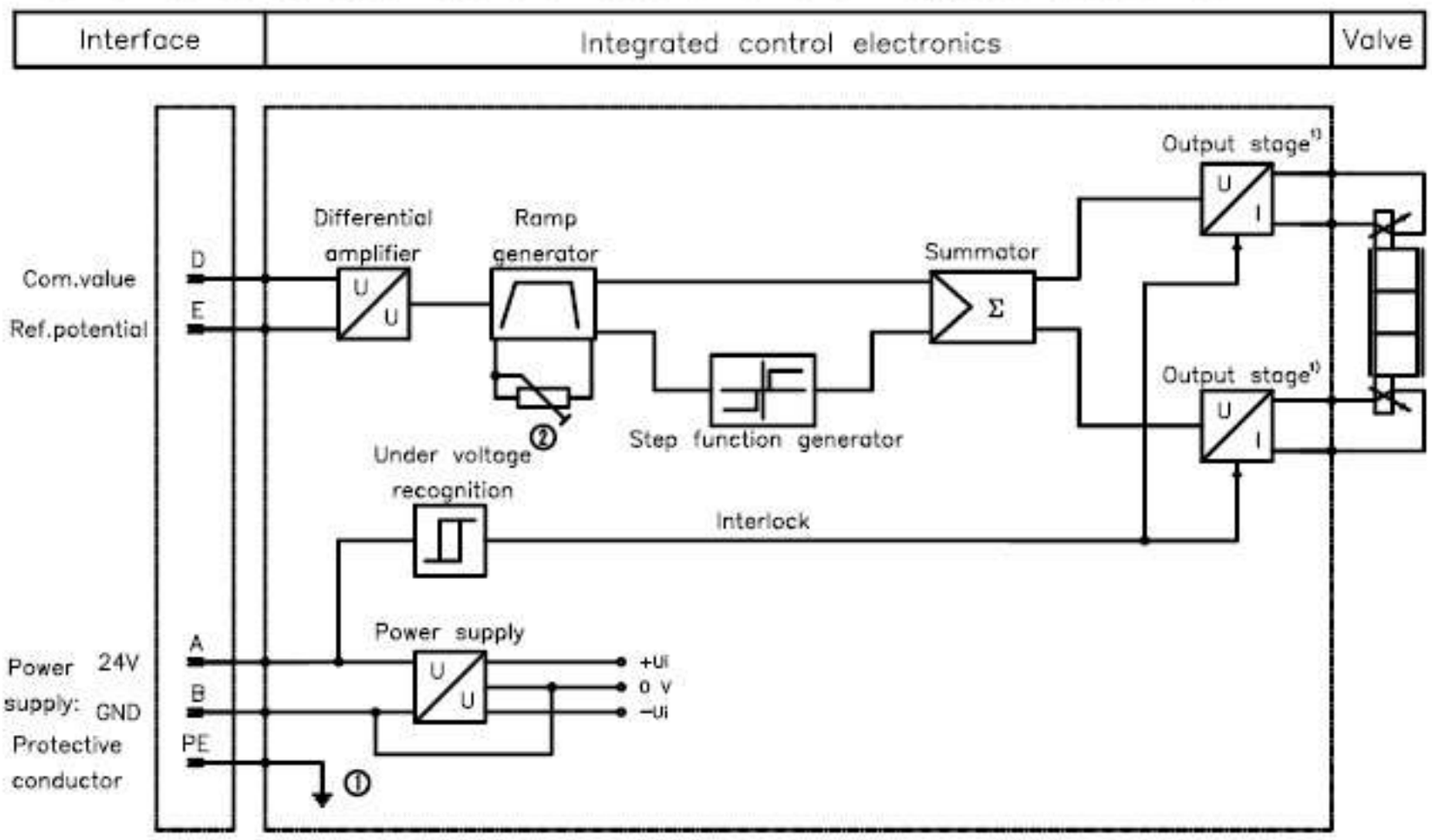


	Slot alloc.	Signal
Power supply	A	24VDC(19 to 35VDC)
	B	GND
	C	n.c.
Differential amplifier input	D	com.value(±10V/4 to 20mA)
	E	ref.potential
	F	n.c.

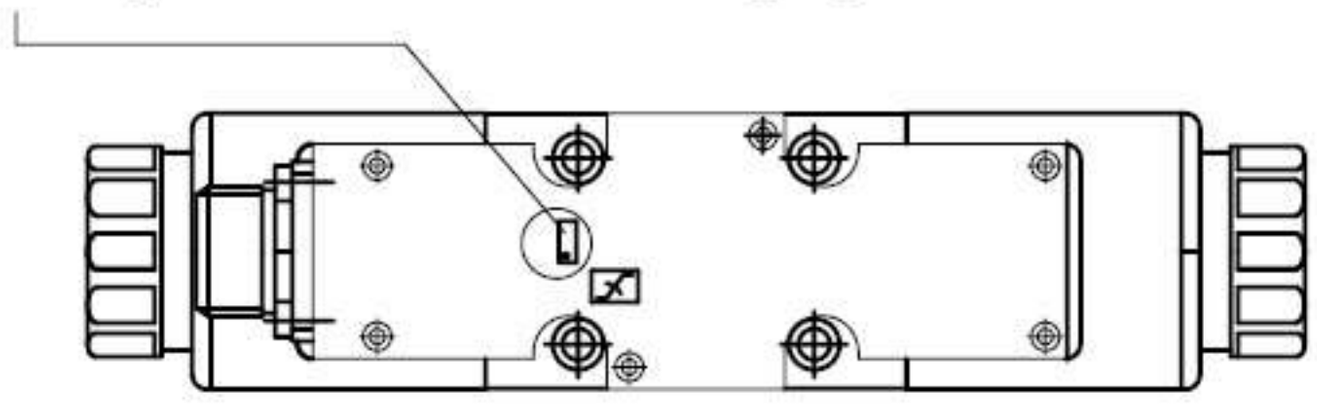
Command value: A positive command value(0 to 10V or 12 to 20mA)at D and the reference potential at E results in pressure in A.
A positive command value(0 to -10V or 12 to 4mA)at D and the reference potential at E results in pressure in B.
For a valve with one solenoid on side B(version A)a positive command value at D(4 to 20mA) and the reference potential at E, results in pressure in A and for a valve with one solenoid on side A(version B))a negative command value at D(4 to 20mA)and the reference potential at E, results in pressure in B.

Connection cable: Recommended: -up to 25m cable length LiYCY 5×0.75mm^2;
-up to 50m cable length LiYCY 5×1.0mm^2;
Outside diameter 6.5 to 11mm or 8 to 13.5mm
Only attach screen to PE on the supply side.

Block circuit diagram/connection allocation for the integrated electronics



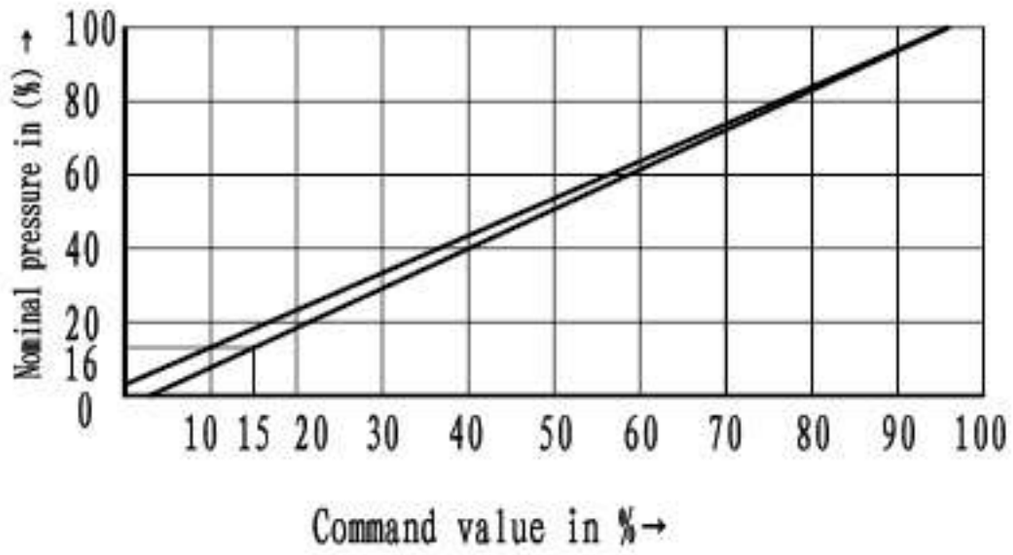
1 Protective conductor screwed onto housing and cover
2 Ramp from 0 to 5s can be externally adjusted



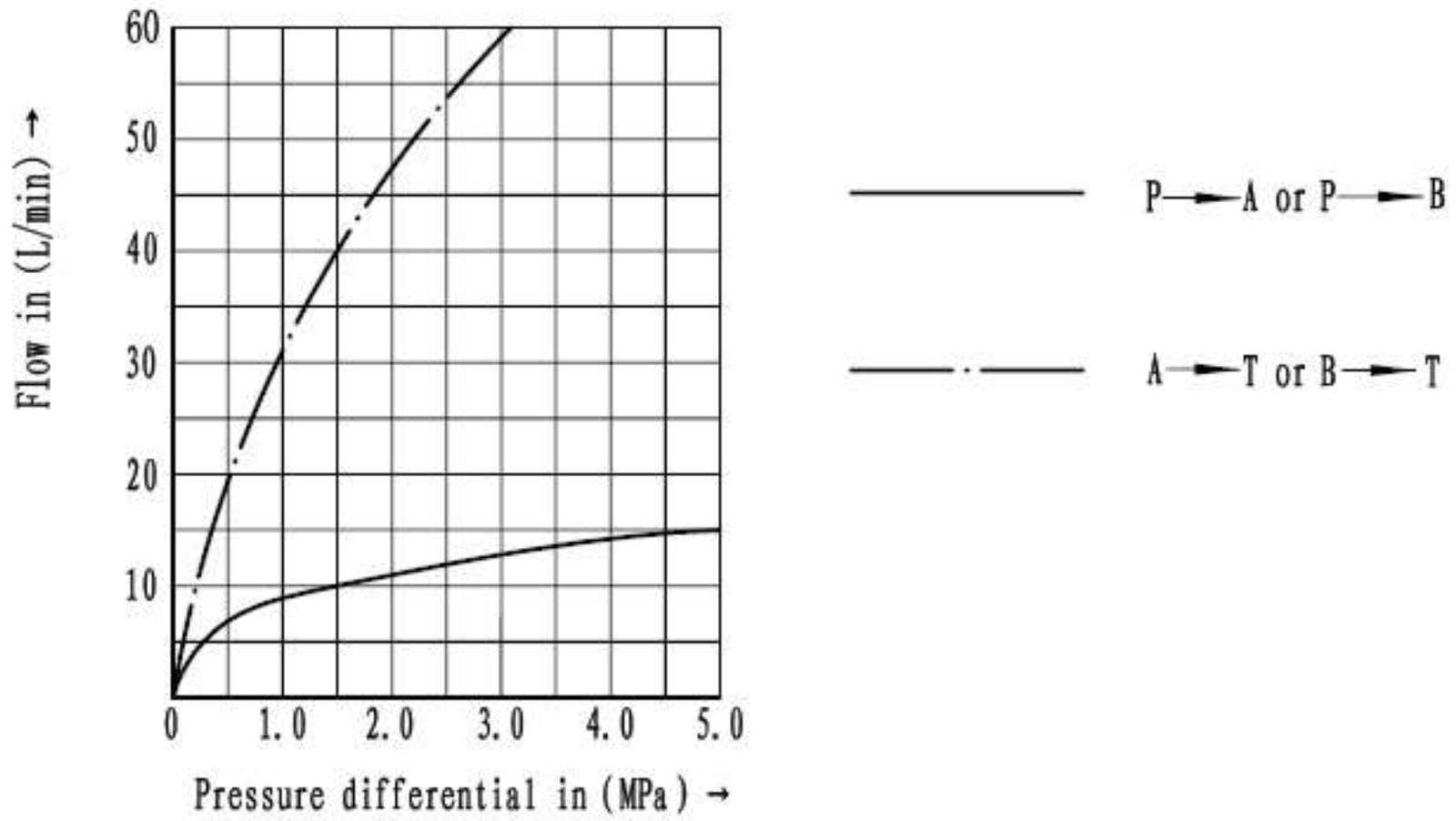
1) Output stages are current controlled

Characteristic curves (P=10MPa, v=36×10^{-6}m^2 /s, t=50°C)

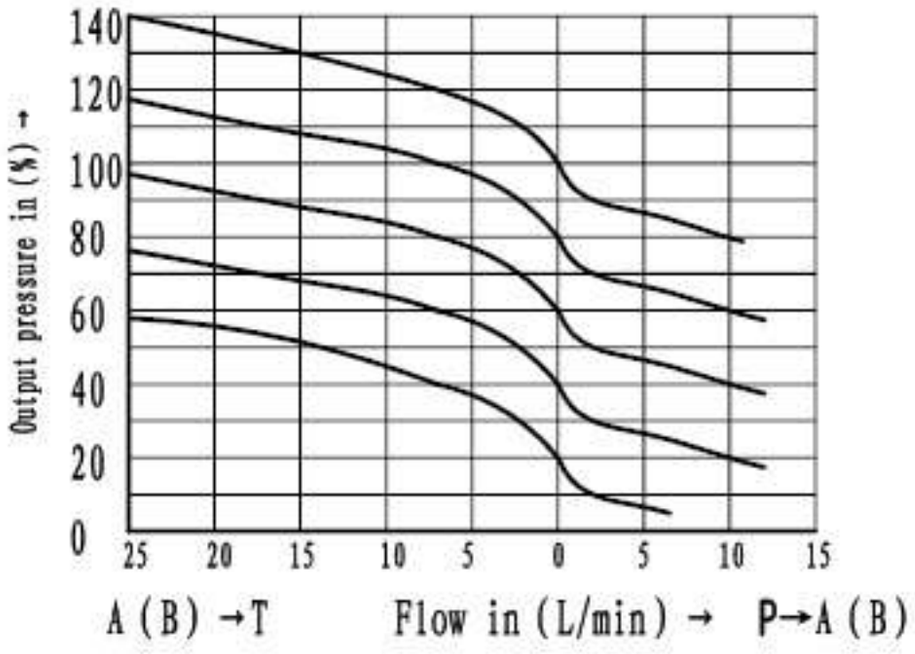
Pressure stages 1.6、2.5、and 4.5MPa



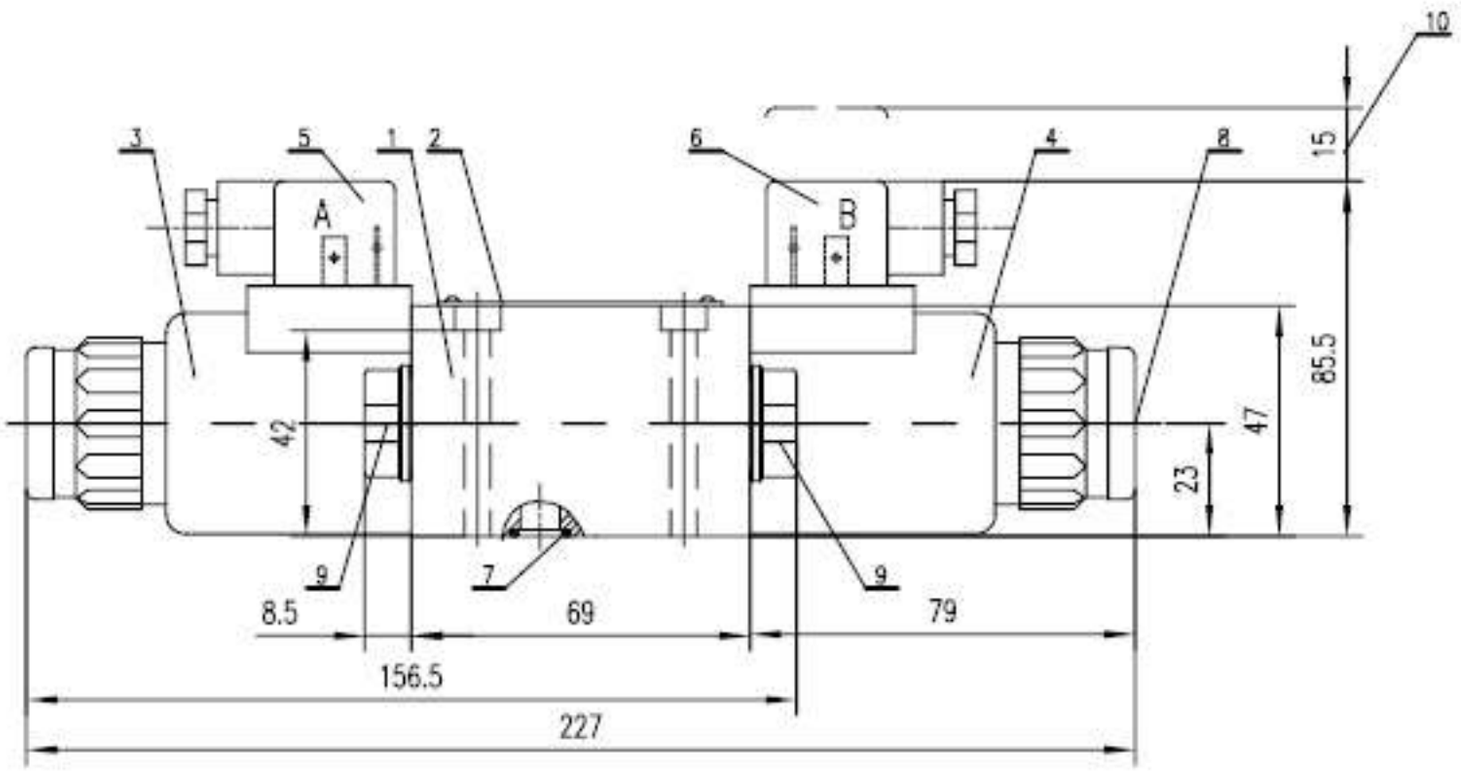
Pressure stages 1.6、2.5、and 4.5MPa

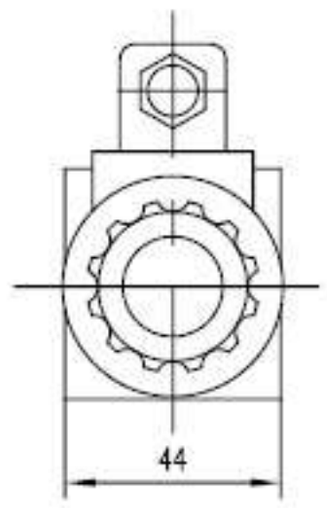


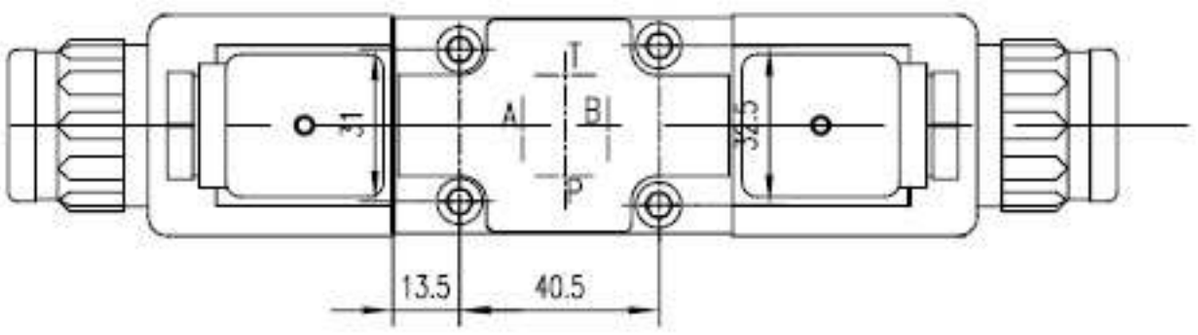
Pressure-flow relationship

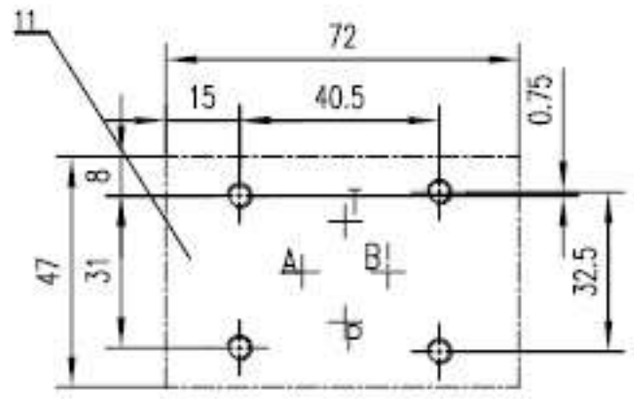


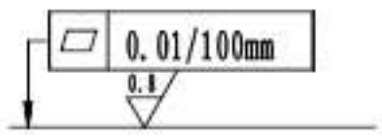
Unit dimensions:HD-3DREP (Dimensions in mm)











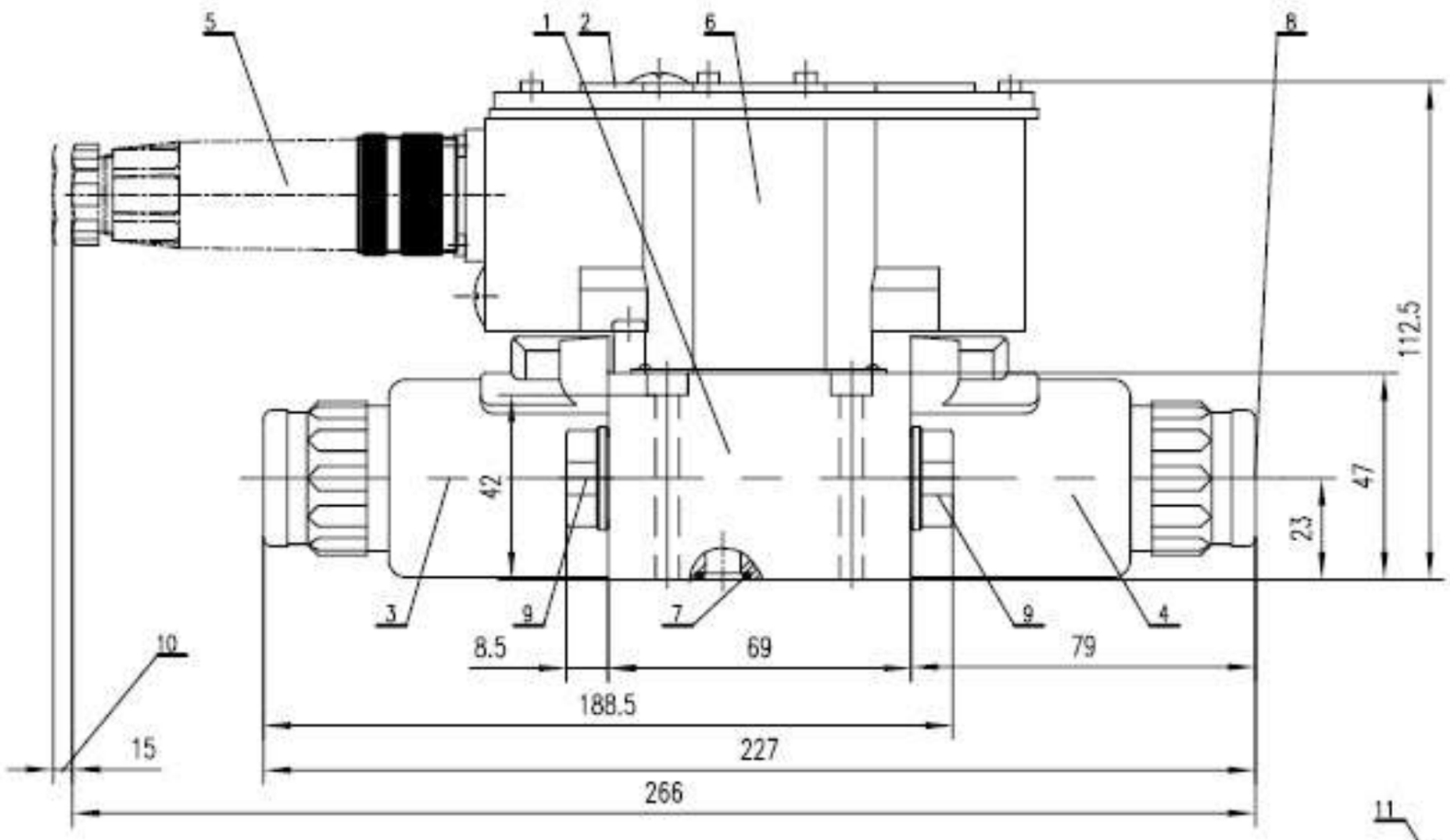
Required surface finish of mating piece

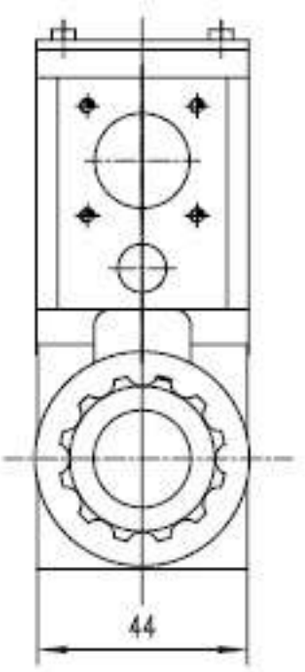
1 Valve housing
2 Nameplate
3 Proportional solenoid "a"
4 Proportional solenoid "b"
5 Plug-in connector "A"
6 Plug-in connector "B"
7 O-rings 9.25X1.78(for ports A,B,P,T)
8 Protected hand override "N9"
9 Cover for valves with one solenoid(versions "A"or"B")
10 Space required to remove the plug-in connector
11 Machined valve mounting face and position of the ports

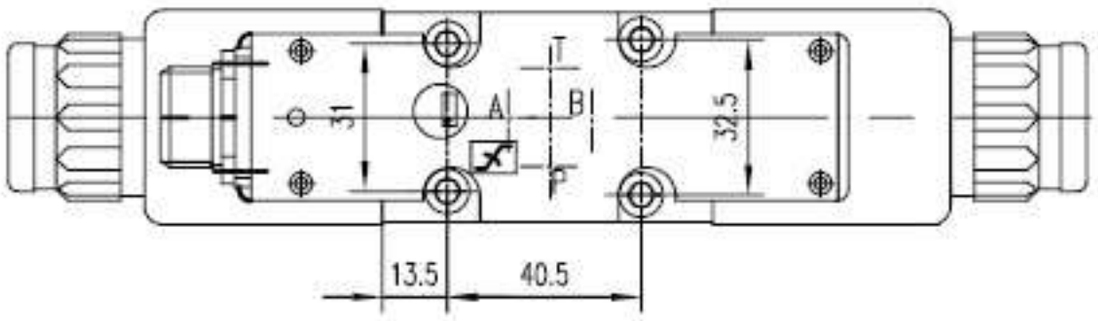
Subplates G341/01(G1/4")
G342/01(G3/8")
G502/01(G1/2")

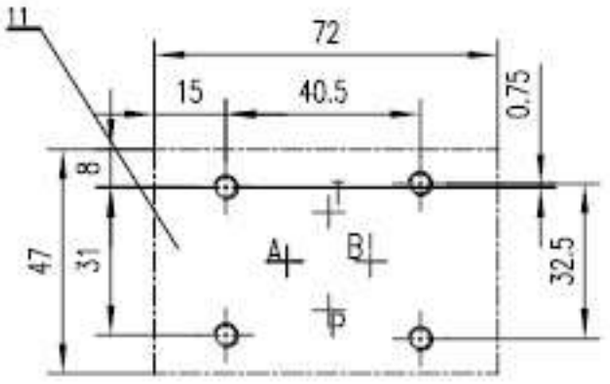
Valve fixing screws :4-M5X50 (GB/T70.1) M_A=8.9N.m

Unit dimensions:HD-3DREPE (Dimensions in mm)









Required surface finish of mating piece

1	Valve housing	9	Cover for valves with one solenoid(versions "A"or"B")
2	Nameplate	10	Space required to remove the plug-in connector
3	Proportional solenoid "a"	11	Machined valve mounting face and position of the ports
4	Proportional solenoid "b"	Subplates	G341/01(G1/4")
5	Plug-in connector(separate order)		G342/01(G3/8")
6	Integrated control electronics		G502/01(G1/2")
7	O-rings 9.25X1.78(for ports A,B,P,T)	Valve fixing screws: 4-M5X50 (GB/T70.1) M_A=8.9N.m	
8	Protected hand override "N9"		

Throttle insert

When used as pilot valve with a proportional directional valve type HD-4WRZ then the following throttle inserts are to be used for ports A and B:

NS	10	16	25	32
n in mm	1.8	2.0	2.8	—

Notice

Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to $\overset{0.8}{\nabla}$.
6. Surface finish of mating piece is required to 0.01/100mm.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Proportional pressure relief valve Types HD-(Z)DBE and HD-(Z)DBEE			
	Nominal size 6	Up to 31.5 MPa	Up to 30L/min	

- Valve for limiting a system pressure
- Actuation via proportional solenoids
- For subplate mounting or sandwich plate design
- Valve and control electronics from a single source
- Types HD-DBEE and HD-ZDBEE with integrated control electronics:
  - Low example spread of the command value pressure characteristic curve
  - Independently adjustable up and down ramps

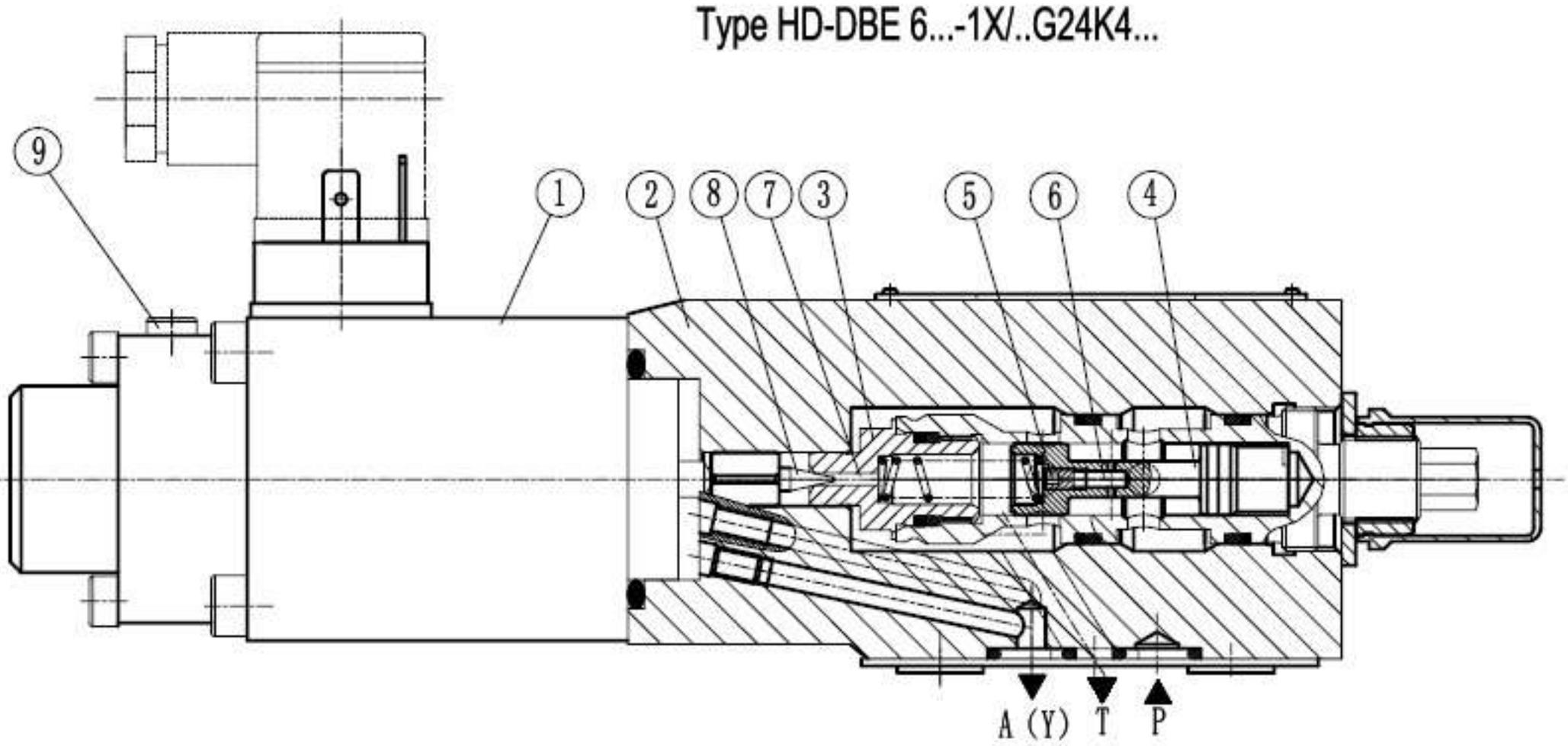


Function, section

Proportional pressure relief valves, types HD-DBE and HD-ZDBE are actuated by means of a proportional solenoid. These valves are used to limit a system pressure. With these valves it is possible to steplessly adjust the system pressure, which is to be limited, in relation to the electrical command value.

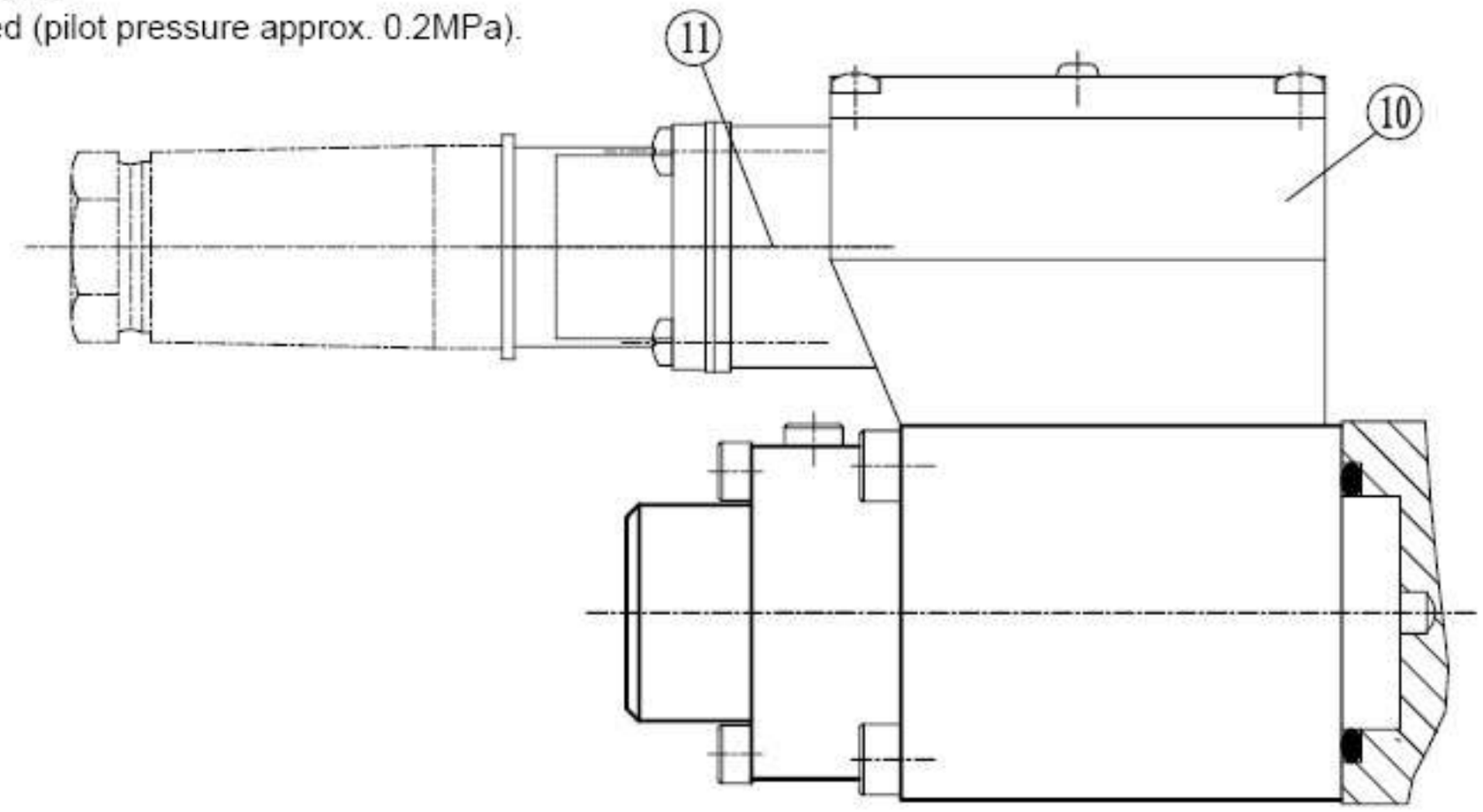
These valves basically consist of a proportional solenoid (1), the housing (2), the valve cartridge (3), the spool (4) and the pilot poppet (8). The proportional solenoid converts the electrical current proportionally into a mechanical force. An increase in current causes a corresponding rise in the solenoid force. The solenoid armature chamber is filled with hydraulic fluid and is pressure-balanced. The setting of the system pressure is carried out via the proportional solenoids (1) in relation to the command value. Pressure arising from the system in port P acts on the right hand side of the spool (4). At the same time the system pressure acts via the control line (6) which is fitted with an orifice (5) on the spring loaded side of the spool (4). Via a further rifice (7) the system pressure acts on the pilot poppet (8) against the force of the proportional solenoid (1). Once the system pressure has reached the pre-set value the pilot poppet (8) lifts from its seat. Depending on the model, pilot oil can now flow away externally via port A (Y) or internally into the tank, this has the effect of limiting the pressure on the spring loaded side of the spool (4). If the system pressure continues to rise slightly then the higher pressure on the right hand side of the spool pushes the spool to the left into control position P to T. At a minimum control current - corresponding to a command value of zero - the minimum settable pressure will be set.

Type HD-DBE 6...-1X/..G24K4...



Function, section

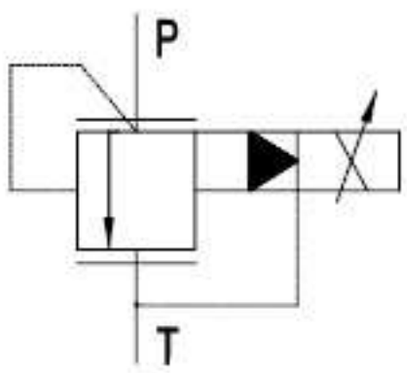
Note!
To ensure optimum function, the valve must be bled at the commissioning stage:
- Remove bleed screw (9),
- Pour hydraulic fluid into the open threaded hole 9,
- When no more bubbles appear, re-fit screw.
- The tank should be prevented from draining. Where installation conditions are applicable a back pressure insert should be
used (pilot pressure approx. 0.2MPa).



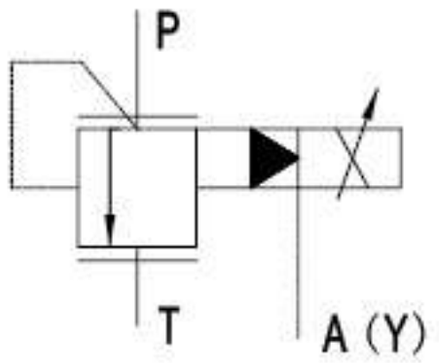
In terms of function and design these valves basically correspond to the types DBE and ZDBE.
An additional housing (10) is fitted on the proportional solenoid which contains the control electronics. Supply and command value
voltages are applied to the plug-in connector (11).
The command value pressure characteristic curve is factory pre-set (zero point at the valve cartridge (12) and the increase at the
Imax potentiometer (R30) in the control electronics).At two potentiometers it is possible to independently adjust the ramp times for the increase and decrease in pressure. For further details regarding the integrated electronics, see page afterwards.

Symbols (for sandwich plate symbol: 1 = component side, 2 = subplate side)

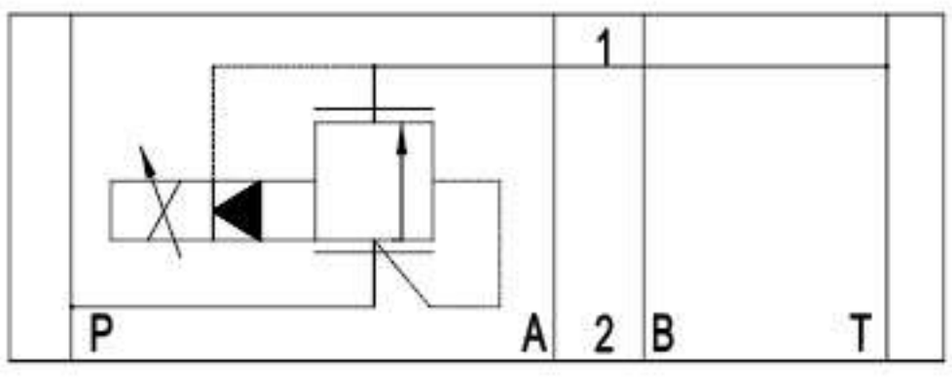
Type DBE(E) 6···



Type DBE(E) 6···Y..



Type ZDBE(E) 6 VP···



Ordering details

HD		DBE		6			— 1X /			G24			*

Technology of Beijing Huade Hydraulic =HD

Subplate mounting=No code
Sandwich plate =Z

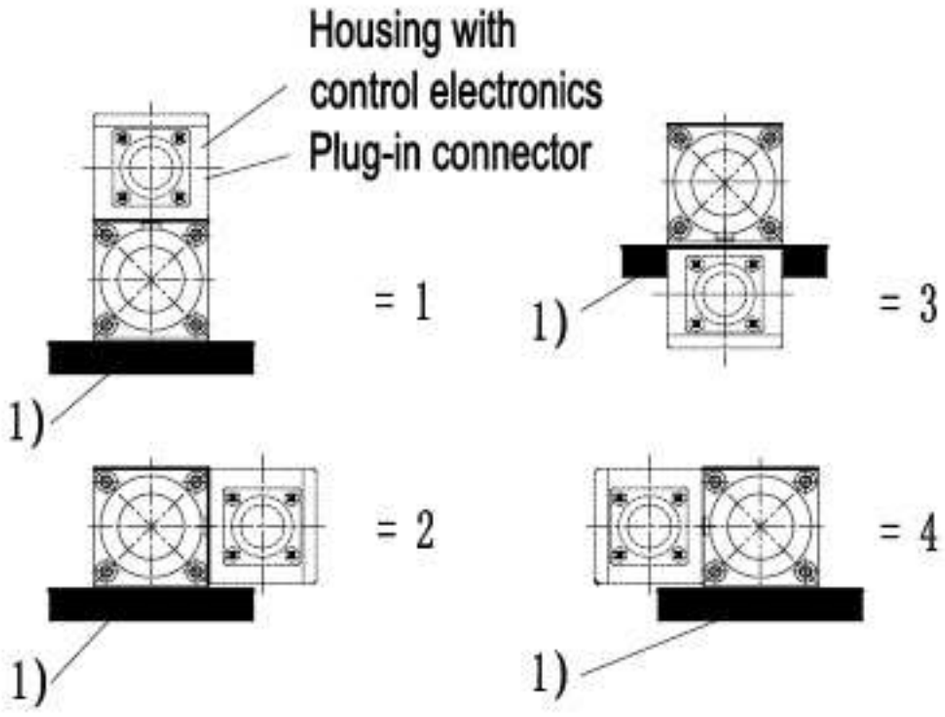
Proportional pressure relief valve

For external control electronics = No code
With integrated control electronics = E

Nominal size 6 = 6

Subplate mounting valve = No code
Sandwich plate P—►T = VP

Position of the plug-in connector for the type ZDBE
Position of housing with control electronics, type ZDBEE



1)Valve mounting side (O-ring grooves in the housing)

Further details in clear text

No code = NBR seals
V = FKM seals

Electrical connection for DBE; ZDBE
K4= Without plug-in connector

Electrical connection For DBEE; ZDBEE
K31= Without plug-in connector

G24 = Supply voltage for
the control electronics, 24 V DC

No code = Internal pilot oil drain
(Recommendation: subplate mounting up to q_{vmax} =15 L/min)
Y= External pilot oil drain
(only possible with subplate mounting)

50 = Pressure stage 5MPa
100= Pressure stage 10MPa
200= Pressure stage 20MPa
315= Pressure stage 31.5 MPa

1X= Series 10 to 19
(10 to19: unchanged installation and connection dimensions)

Technical data (for applications outside these parameters, please consult us!)

General			
Installation			optional
Storage temperatue range		°C	-20 to +80
Ambient temperature range	DBE and ZDBE	°C	-20 to +70
	DBEE and ZDBEE	°C	-20 to +50
Weight	DBE and ZDBE	Kg	2.4
	DBEE and ZDBEE	Kg	2.5
Hydraulic (measured at ν = 46 mm^2/s and t= 40°C ±5°C)			
Max. operating pressure	Ports P ; P1 - P2; A1 - A2; B1 - B2	MPa	31.5
	Port T	MPa	5
Max. settable pressure	Pressure stage 5	MPa	5
	Pressure stage 10	MPa	10
	Pressure stage 20	MPa	20
	Pressure stage 31.5	MPa	31.5
Min. settable pressure at signal value 0		MPa	see characteristic curves
Return pressure port A; with external pilot oil drain (Y)			separate and at zero pressure to tank
Pilot oil flow		L/min	0.6 to 1.2
Max. flow		L/min	30
Pressure fluid			mineral oil (HL, HLP) to DIN 51 524
			further pressure fluids on request!
Pressure fluid temperature range		°C	-20 to +80
Viscosity range		mm^2/s	15 to 380
Degree of contamination to ISO			Max. permissible degree of contamination of the fluid pressure to ISO 4406 (C) 20/18/15
Hysteresis		%	± 1.5 of maximum settable pressure
Repeatability		%	± 2 of maximum settable pressure
Linearity		%	± 3.5 of maximum settable pressure
Example spread of the com. value pressure char. curve, referring to the hysteresis char. curve, pressure increasing	DBE and ZDBE	%	± 2.5 of maximum settable pressure
	DBEE and ZDBEE	%	± 1.5 of maximum settable pressure
Step response Tu + Tg	10% ⟶ 90%	ms	approx. 80
	90% ⟶ 10%	ms	approx. 50

depending on installation

Technical data (for applications outside these parameters, please consult us!)

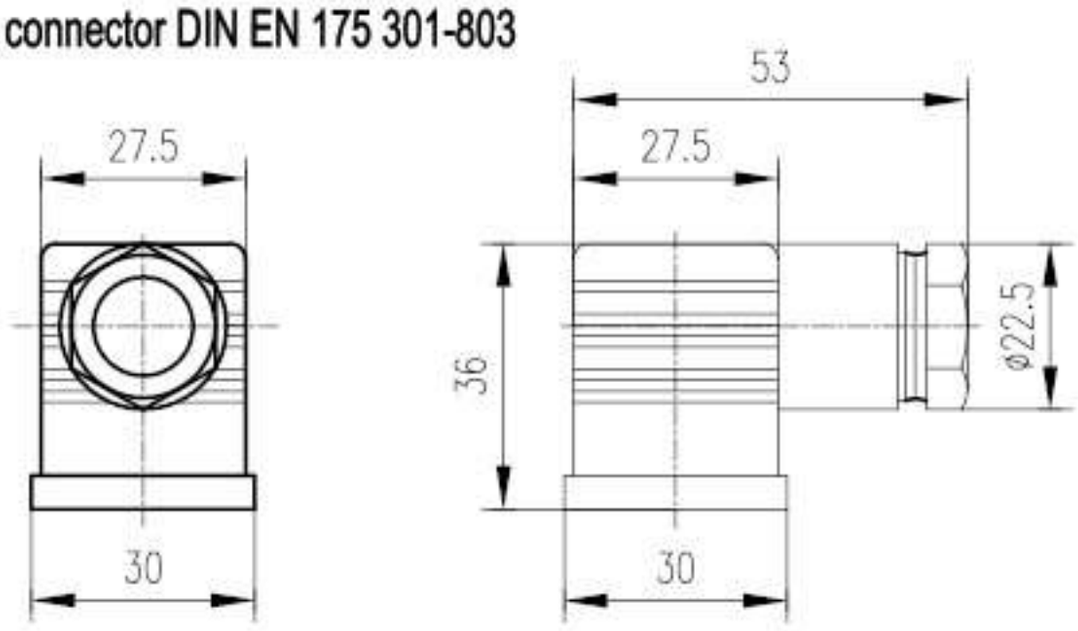
Electrical			
Voltage type			24V DC
Min. control current		mA	100
Max. control current		mA	1600
Solenoid coil resistance	Cold value at 20° C	Ω	5.4
	Max. warm value	Ω	7.8
Duty		%	100
Electrical connections	DBE and ZDBE		With component plug to DIN EN 175 301-803
			Plug-in connector to DIN EN 175 301-803 1)
	DBEE and ZDBEE		With component plug to E DIN 43 563-AM6-3
			Plug-in connector to E DIN 43 563-BF6-3 1)
Valve protection to DIN 40 050			IP 65
Control electronics For DBEE and ZDBEE			Integrated into the valve
For DBE and ZDBE			
Amplifier in Eurocard format		analogue	HD-VT-VSPA1-1-1X/ 1)

1) separate order

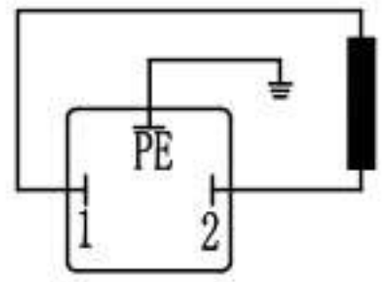
Electrical connections

For type DBE, ZDBE (for external control electronics)

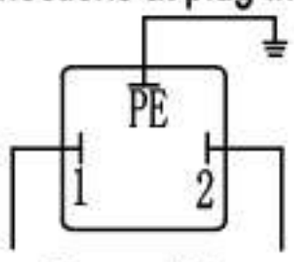
Plug-in connector DIN EN 175 301-803



Connections at component plug



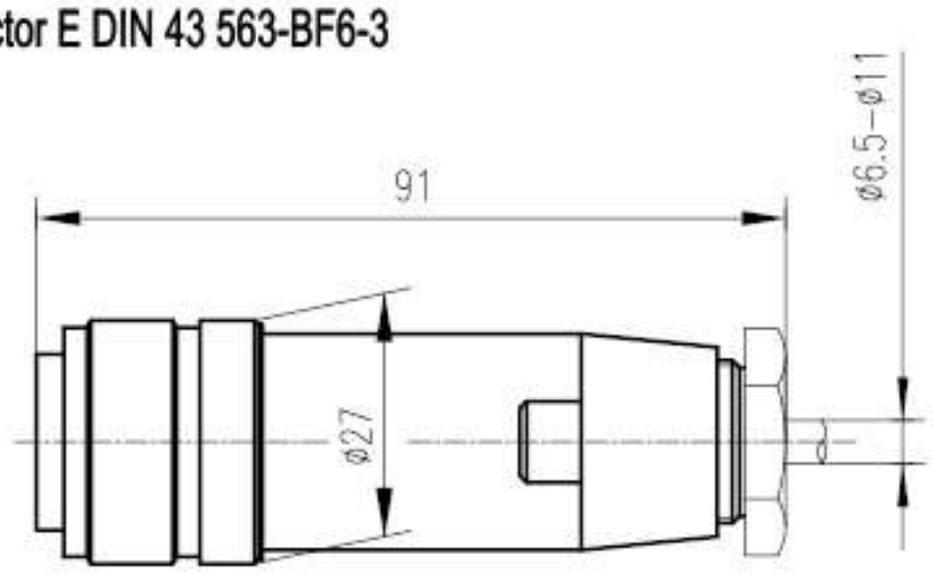
Connections at plug-in connector

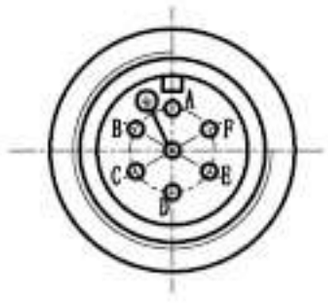


To amplifier

For types DBEE, ZDBEE (with integrated control electronics)

Plug-in connector E DIN 43 563-BF6-3





Integrated control electronics for types DBEE, ZDBEE

Function:

The control of the integrated electronics is at the two differential amplifier ports D and E.

The ramp generator generates a delayed increase or decrease of the solenoid current from a command value jump (0 to 10 V or 10 to 0 V).At the potentiometer R14 the increase time of the solenoid current may be set and the decrease time at potentiometer R13.

The maximum ramp time of 5 s is only possible over the complete command value range. With smaller command value changes the ramp is shortened accordingly.

The command value-solenoid current characteristic curve is adjusted to the valve via the characteristic curve generator in such a way that unlinearities are compensated for in the hydraulics and thus a linear command value-pressure characteristic curve is formed.

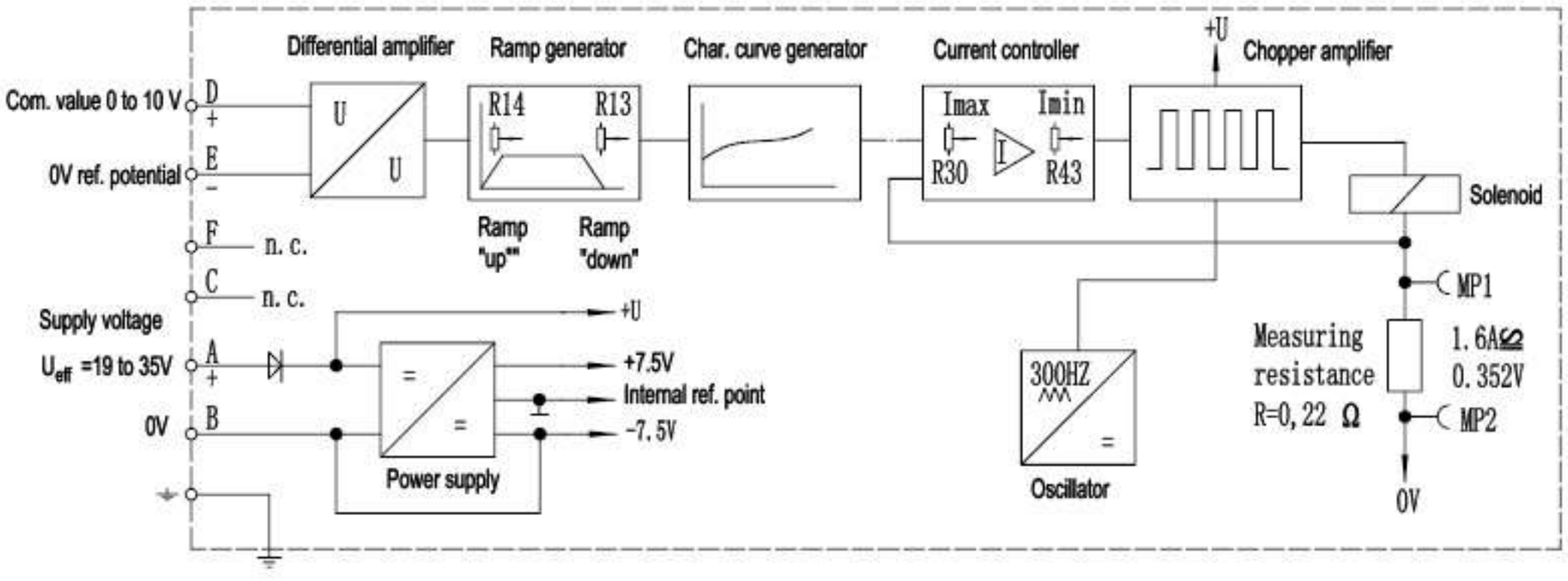
The current contoller controls the solenoid current independent from the solenoid coil resistance.

At the potentiometer R30 the increase of the command value-current characteristic curve and thus also the increase of the command value-pressure characteristic curve of the proportional pressure valve may be altered.The potentiometer R43 is used for the setting of the bias current.This setting should not be altered. If necessary the zero point of the command value-pressure characteristic curve may be set at the valve seat.

The power stage of the electronics for the control of the proportional solenoid is formed by a chopper amplifier. It is pulse width modulated with a pulse frequency of 300 Hz.

The solenoid current may be measured at both test points MP1 and MP2. A voltage decrease of 0.352 V at the measuring resistance equals a solenoid current of 1.6 A.

Block circuit diagram / Terminal connection of integrated control electronics



Supply voltage

Power supply with rectification

One-phase rectification or three-phase bridge: U = 19 to 35 V

Resisdual ripple factor at power supply: < 5 %

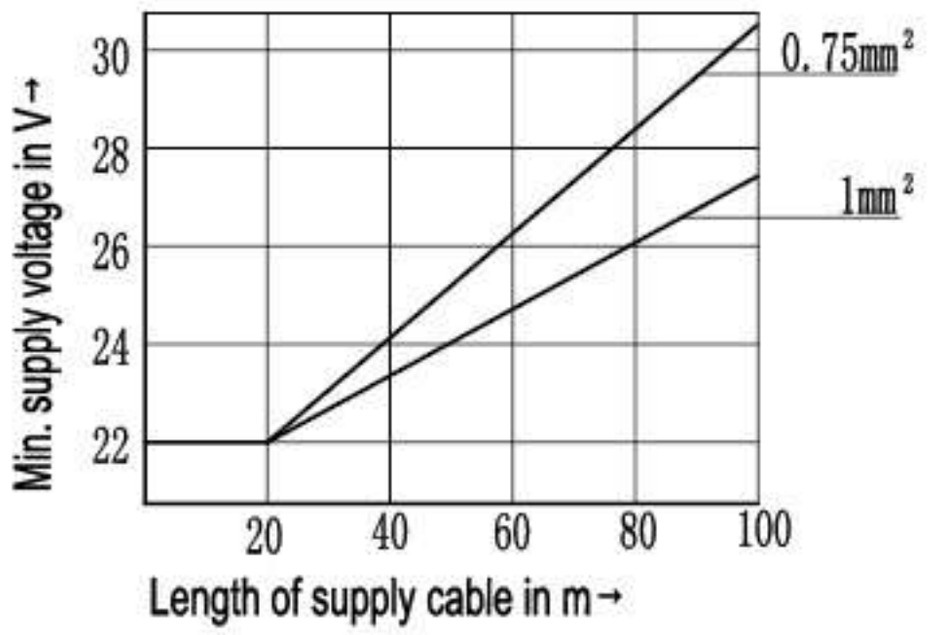
Output current: Ieff= max. 1.4 A

Supply cable: - Recommendation 5 core 0.75 or 1 mm with protective conductor and screen
- External diameter 6.5 to 11 mm
- Screen on 0 V supply voltage
- Max. permissible length 100 m

The minimum supply voltage at the power supply depends on the length of the supply cable (see diagram).

With lengths > 50 m a capacitor of 2200 µF must be installed near

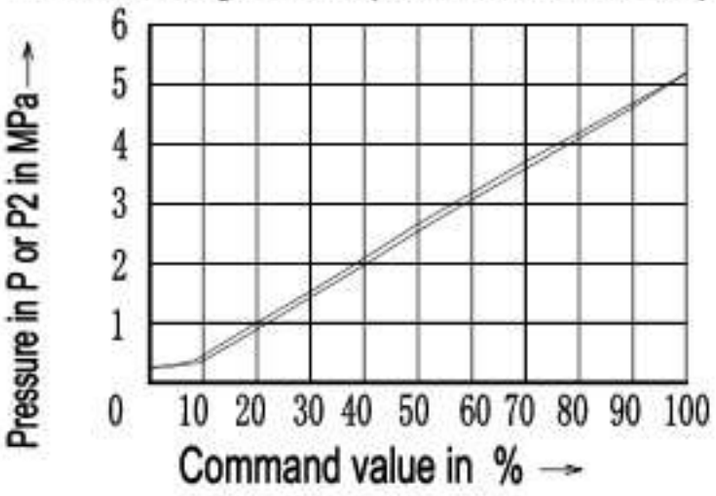
the valve in the supply line.



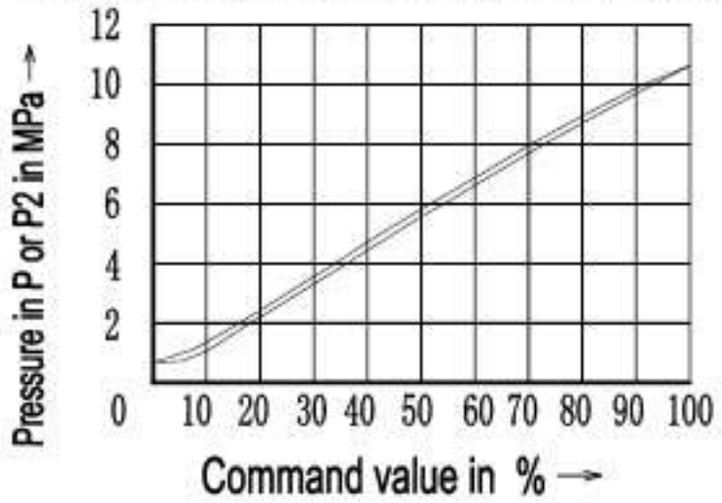
Characteristic curves (measured at v=46mm^2 /s and t=40°C±5°C)

Pressure in ports P or P2 in relation to the command value (q_V= 5 L/min)

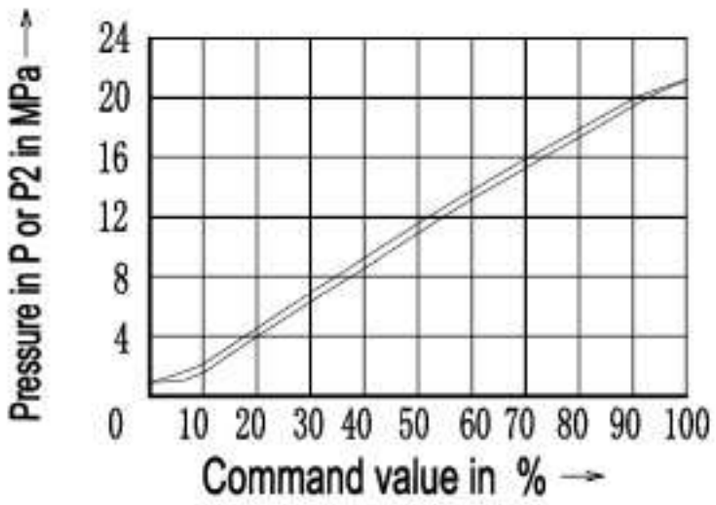
Pressure stage 5MPa (external and internal)



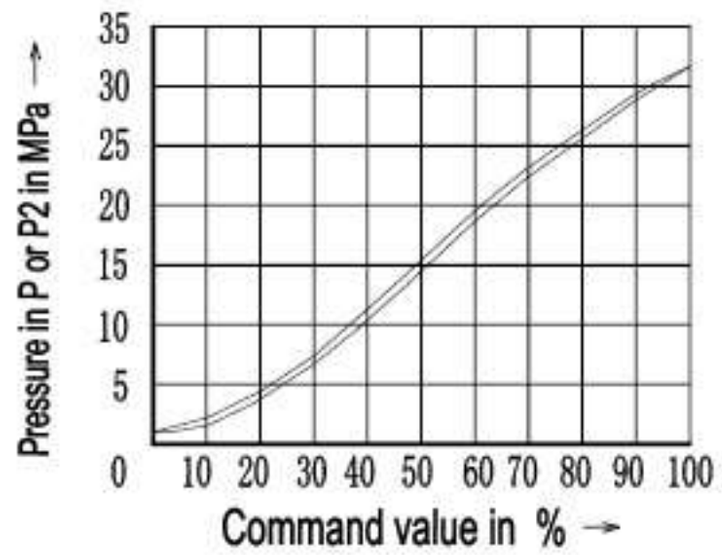
Pressure stage 10MPa (external and internal)



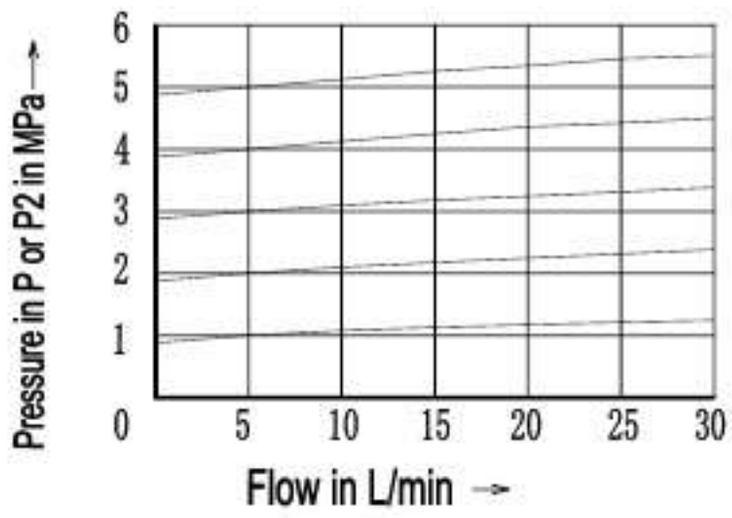
Pressure stage 20MPa (external and internal)



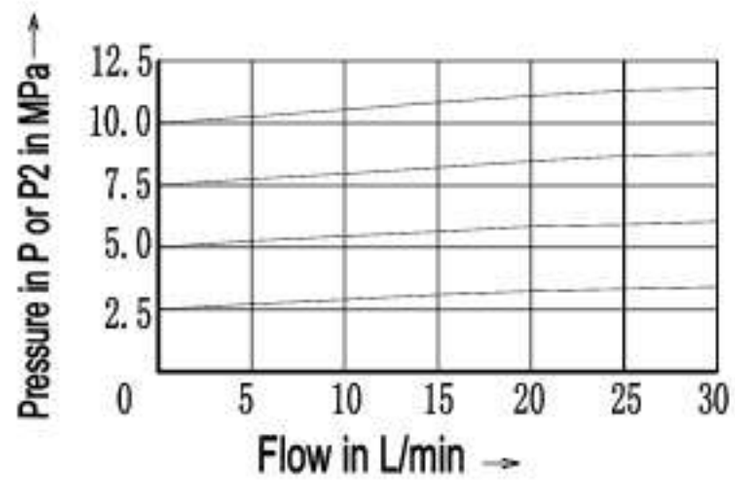
Pressure stage 31.5MPa (external and internal)



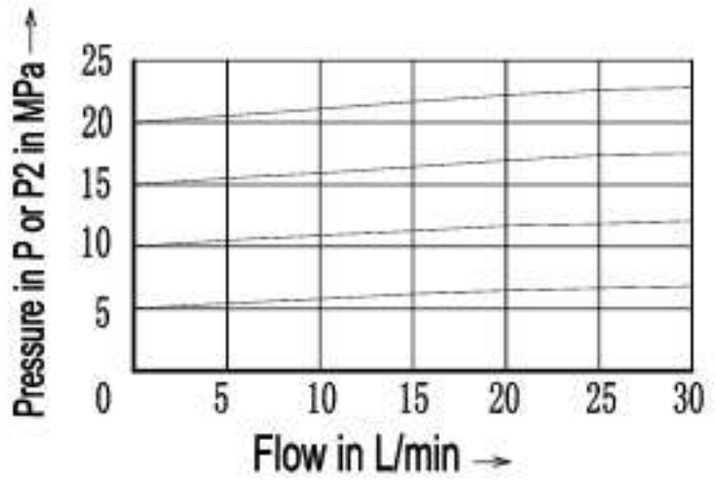
Pressure stage 5MPa (external and internal)



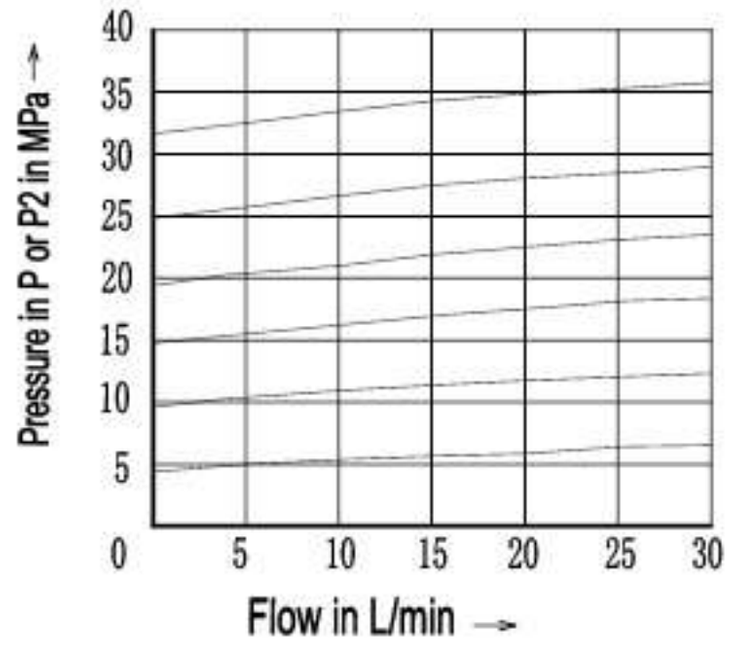
Pressure stage 10MPa (external and internal)



Pressure stage 20MPa (external and internal)



Pressure stage 31.5MPa (external and internal)



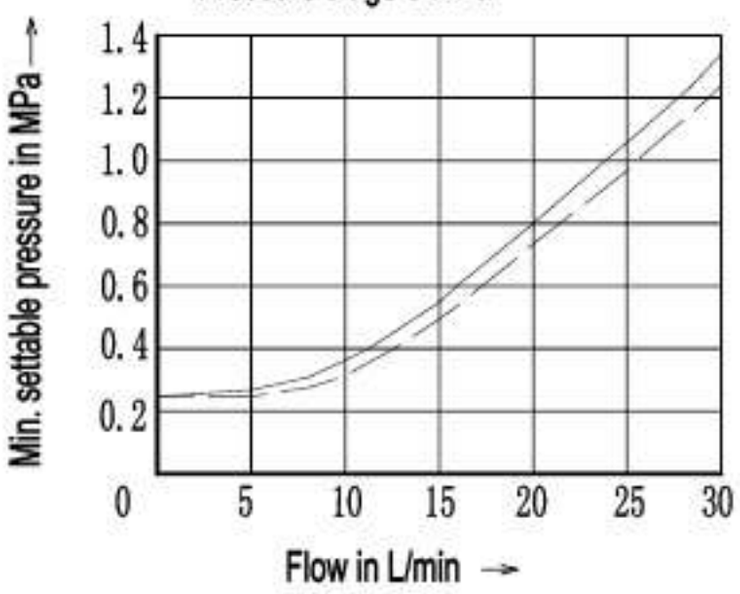
The characteristic curves were measured without back pressure at port A (external pilot oil drain) and T (internal pilot oil drain).
With internal pilot oil drain the pilot oil drain increases the pressure in P or P2 by the amount acting in port T.

Characteristic curves (measured at v=46mm^2 /s and t=40°C±5°C)

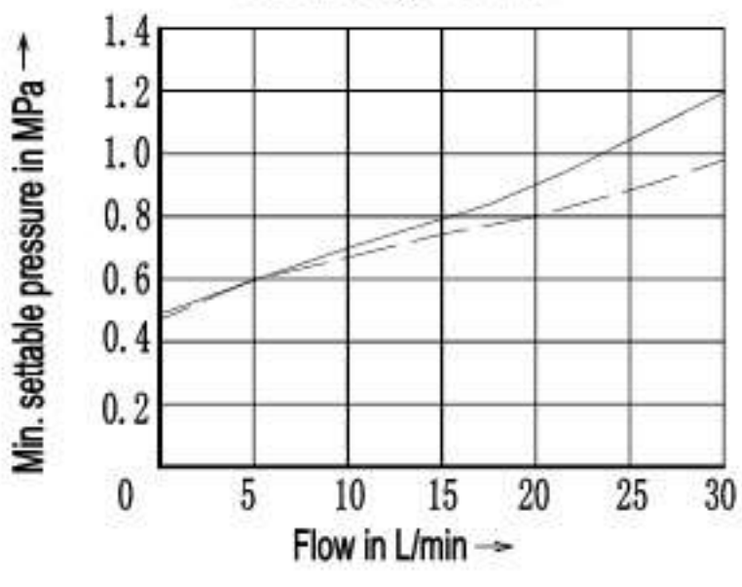
Min. settable pressure at port P or P2 with a 0 command value

先导油排放 ——内排 - - -外排

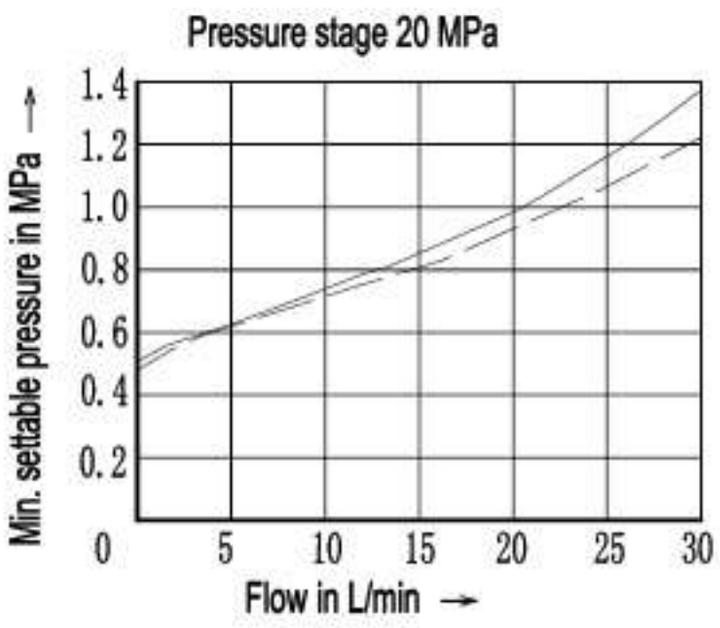
Pressure stage 5 MPa



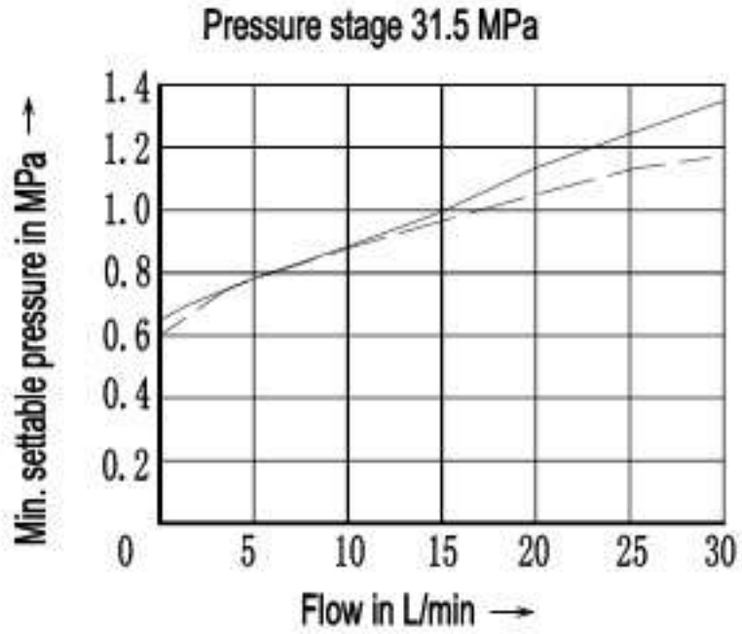
Pressure stage 10 MPa



Pressure stage 20 MPa

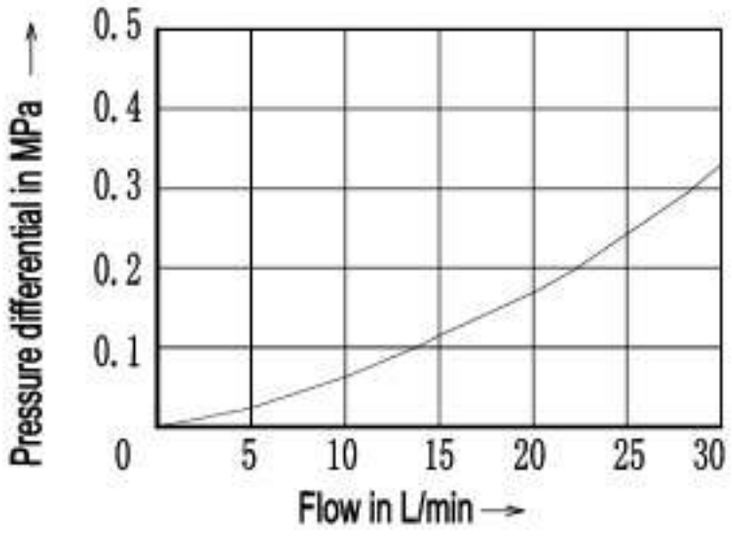


Pressure stage 31.5 MPa

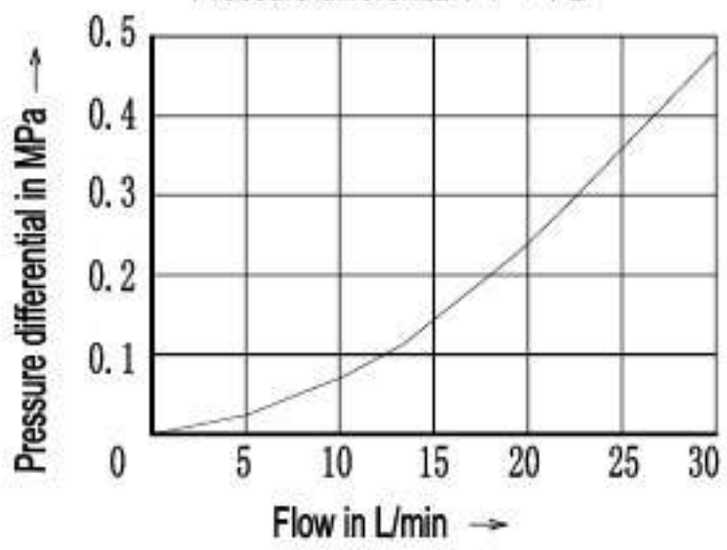


The characteristic curves were measured without back pressure at port A (external pilot oil drain) and T (internal pilot oil drain).
With internal pilot oil drain the pilot oil drain increases the pressure in ports P or P2 by the amount acting on port T.

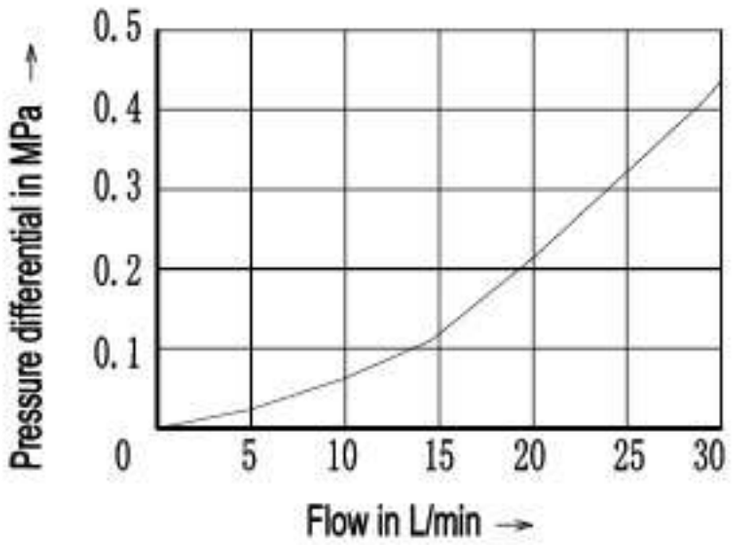
Pressure differential A1 → A2 and B1 → B2



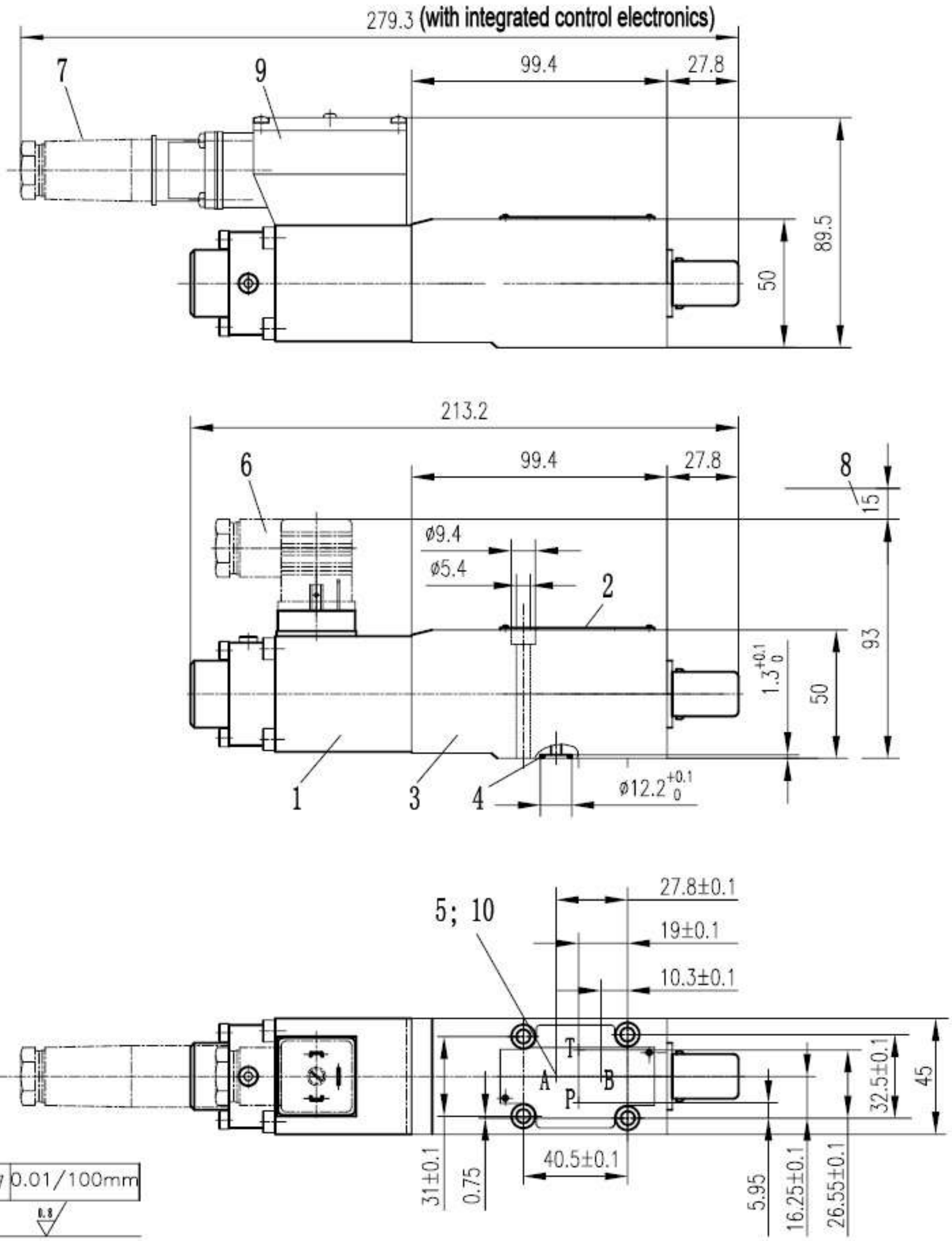
Pressure differential P1 → P2



Pressure differential T1 → T2



Unit dimensions: types HD-DBE and HD-DBEE (Dimensions in mm)

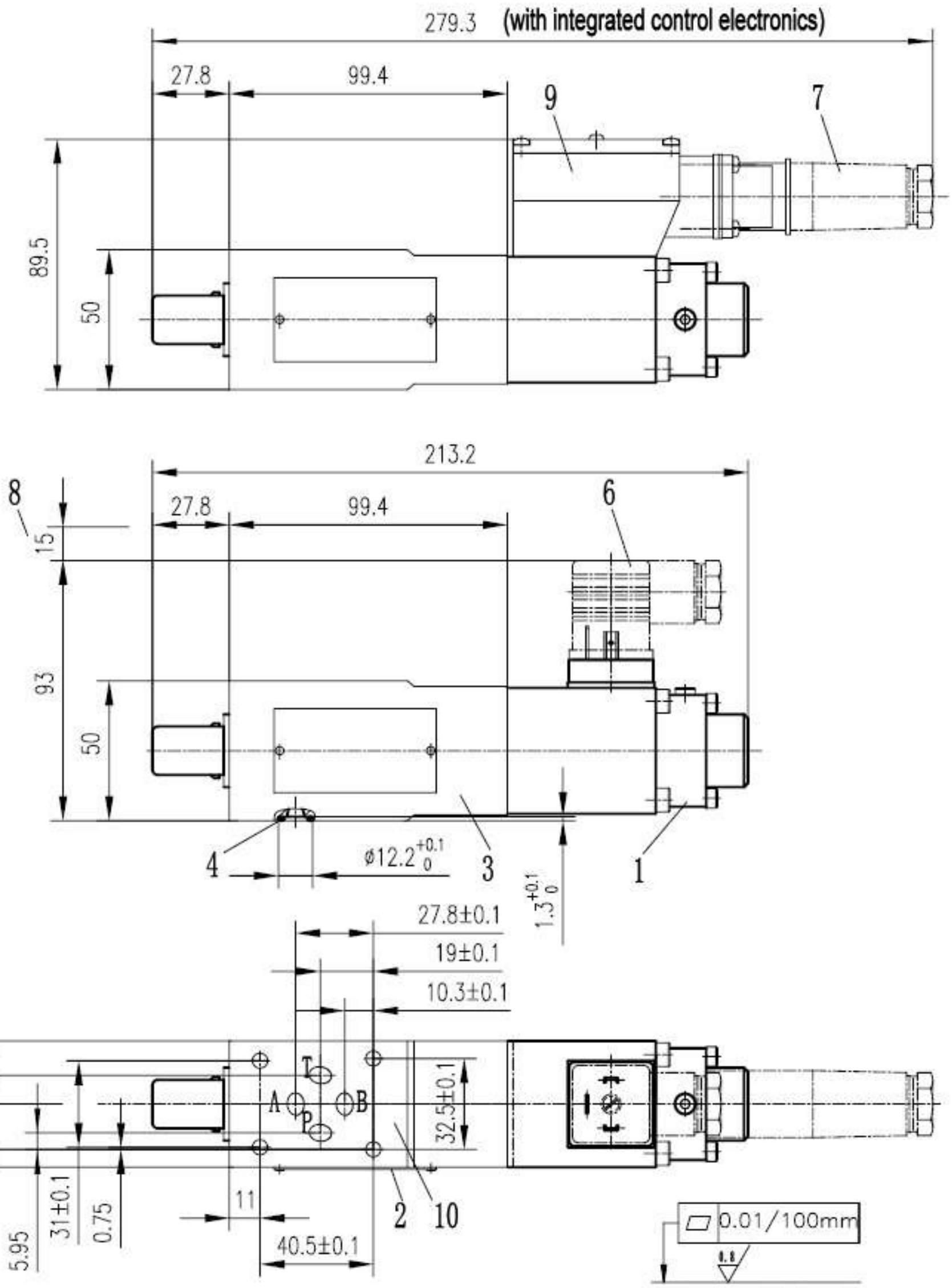


Required surface finish of mating piece

1 Proportional solenoid
2 Nameplate
3 Valve housing
4 O-rings 9.25 x 1.78(for ports A, B, P and T)
5 Pilot oil drain for version Y is external via port A (Y)
6 Plug-in connector (separate order)
7 Plug-in connector (separate order)
8 Space required to remove plug-in connector
9 Integrated control electronics
10 Porting pattern to DIN 24 340

Subplates and valve fixing screws must be ordered separately
Subplates: G 341/01 (G 1/4")
G 342/01 (G 3/8")
G 502/01 (G 1/2")
Valve fixing screws: 4-M5(GB/T70.1); M_A = 7 Nm

Unit dimensions: types HD-DBE and HD-DBEE (Dimensions in mm)



Required surface finish of mating piece

1	Proportional solenoid
2	Nameplate
3	Valve housing
4	O-rings 9.25 x 1.78(for ports A, B, P and T)
6	Plug-in connector (separate order)
7	Plug-in connector (separate order)
8	Space required to remove plug-in connector
9	Integrated control electronics
10	Porting pattern to DIN 24 340

Subplates and valve fixing screws must be ordered separately

Subplates: G 341/01 (G 1/4")
G 342/01 (G 3/8")
G 502/01 (G 1/2")

Valve fixing screws: 4-M5 (GB/T70.1); M_A = 7 Nm

Notice

Notice

1. The fluid must be filtered. Minimum filter fineness is 20 μm.
2. The tank must be sealing up and an air filter must be installed on air entrance.
3. Products without subplate when leaving factory, if need them, please ordering specially.
4. Valve fixing screws must be high intensity level (class 10.9). Please select and use them according to the parameter listed in the sample book.
5. Roughness of surface linked with the valve is required to $\frac{0.8}{\nabla}$.
6. Surface finish of mating piece is required to 0.01/100mm.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Electrical amplifier type HD-VT-VRPA2-.-1X/···			

Features:

- Suitable for controlling direct operated 4/3 proportional directional valves with electrical position feedback, type HD-4WRE, sizes 6 and 10, component series 2X
- Designed as printed circuit board in Euro-format 100 × 160 mm and suitable for installation in a rack
- Command value inputs:
- Differential input ±10 V
- Four callable command value inputs ±10 V
- Current input 4 to 20 mA
- Inversion of the internal command value signal via 24V input or by means of jumpers
- Characteristic curve correction by means of separately adjustable jump heights and maximum values
- Selection of ramp time through quadrant recognition (24V input) or ramp time call-ups (24V inputs) (option T5)
- Changeover of the ramp time range by means of jumpers
- Enable input
- Output signal “ready for operation“
- Measuring sockets that can be switched over (option T5)
- Reverse polarity protection for voltage supply
- Power supply unit with DC/DC converter without raised zero point



Ordering code:

HD – VT-VRPA2 – .– 1X / V0 / *

Technology of Beijing Huade Hydraulic =HD

Analogue amplifier in Euro-card format

For controlling HD-4WRE 6-2X valves =1
For controlling HD-4WRE 10-2X valves =2

1X= Series 10 to 19
(10 to 19:unchanged tecnical data and pin assignment)

Basic version

T1= With one ramp time
T5= With five ramp times

Further details in clear text[1)]

Note:

1) Additional functions-e.g.output stage monitoring, actual value monitoring or ramp-ready signal on enquiry

Functional description:

Power supply unit [1]

The amplifier card is provided with a power supply unit with making-current limiter. It supplies all the internally required positive and negative voltages. The making-current limiter prevents high making-current peaks caused by smoothing capacitors in the current output stage.

Command value preselection

The internal command value signal is generated from the sum (summation [6]) of the external command value signal applied to differential input [2] and current input [3], called signal [4] and zero point offset [5] (zero point potentiometer "Zw").

The following is valid:

Normalized value	Current input	Differential input	Comm. value meas. socket	Direction of flow
-100 %	4 mA	-10 V	-10 V	P to B, A to T
0 %	12 mA	0 V	0 V	
100 %	20 mA	10 V	10 V	P to A, B to T
0 %	< 1 mA **		0 V	

**If the current input is not activated or in the case of a cable break of the command value cable, the resulting internal command value signal is 0 %.

There is no changeover between current and voltage inputs. The inputs are permanently available (see terminal assignment).

Command value call-ups[4]

Four command value signals, "w1" to "w4", can be called up. External command value voltages (command values 1 to 4) are fed forward either directly through regulated voltage outputs +10 V and –10 V or via external potentiometers. If the command value inputs are connected directly to the regulated voltages, the command values can be adjusted using potentiometers "w1" to "w4". If external potentiometers are used, the internal potentiometers act as attenuators or limiters.

Only one call-up is possible at a time. If several call-ups are activated simultaneously, call-up "1" has lowest priority, call-up "4" highest priority.

The active call-up is signalled by a yellow LED on the front panel.

Command value inversion [7]

The command value that was generated internally from input signals, command value call-ups and the zero point offset signal can be inverted with the help of an external signal or jumper J1. The application of an external inversion signal is signalled by an LED ("–1") on the front panel.

Enable function [8]

The enable function enables the current output stages and passes the internal command value signal on to the ramp generator. The enable signal is indicated by an LED on the front panel. When the enable is cut in, the internal command value changes (with any preselected command value) according to the set ramp time. This ensures that a controlled valve does not open abruptly.

Ramp generator [9]

The ramp generator limits the gradient of the control variable. The downstream step functions and amplitude attenuators do not extend or shorten the ramp time.

Jumper J2 can be used to set the ramp time to minimum (< 2 ms) (ramp off).

External ramp time adjustment

The ramp time set internally can be extended using an external potentiometer. The setting can be checked with the help of the measuring socket. In the case of a cable break, the internal presetting will be used automatically.

Characteristic curve generator [11]

The adjustable characteristic curve generator can be used to adjust the step-change height and maximum values separately for positive and negative signals in accordance with the hydraulic requirements. The actual curve shape through the zero point is not step-like, but linear.

Amplitude limiter [12]

The internal command value is limited to approx. ±110% of the nominal range.

Oscillator [14]

The oscillator generates the control signal for the inductive position transducer.

Demodulator [15]

The demodulator generates the actual value signal of the valve spool position from the position transducer signal. 100%=10V.

Position controller [17]

The position controller is optimised to the individual valve.

Current output stage [18]

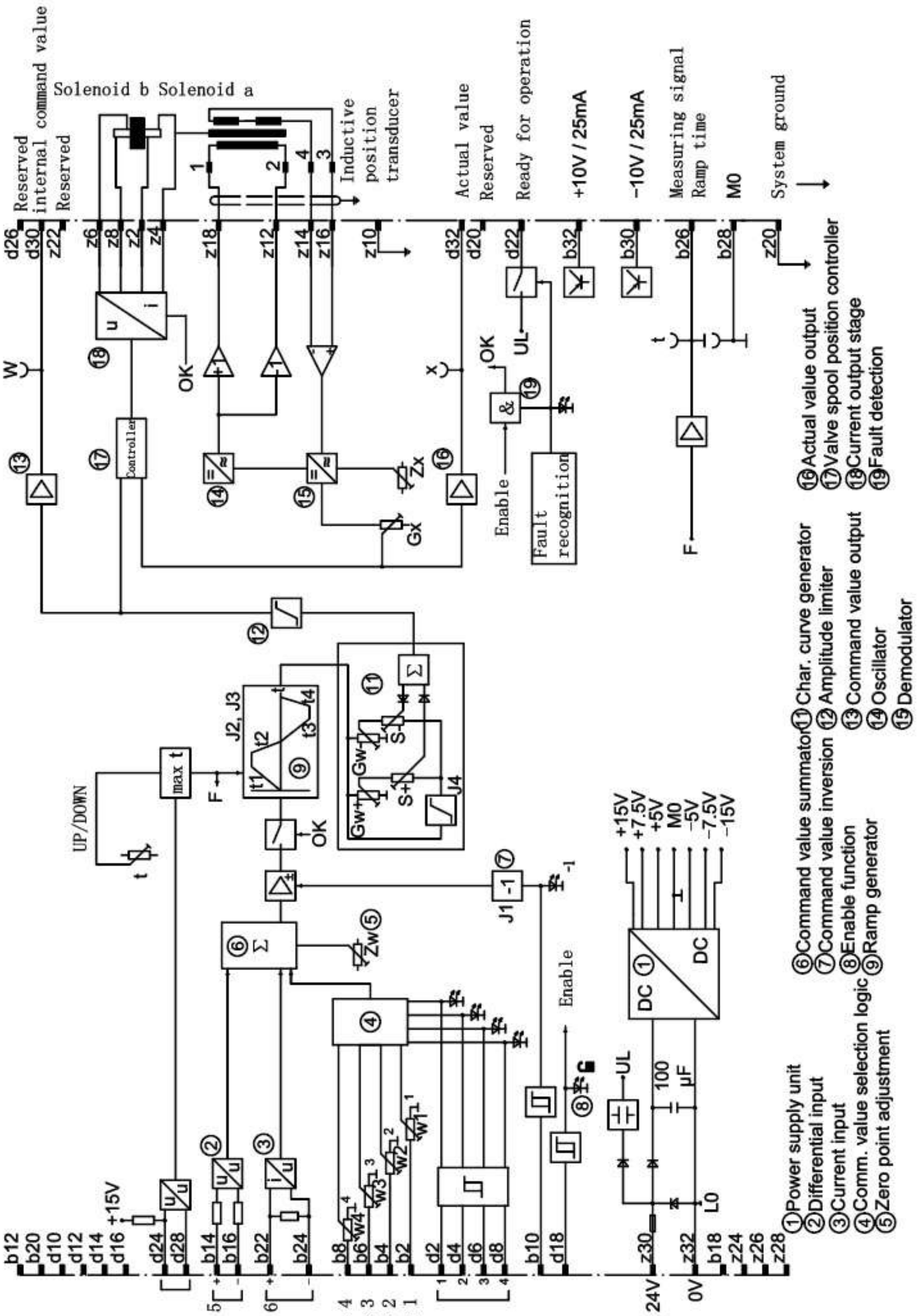
The current output stage generates the clocked solenoid current for the proportional valve.The solenoid current is limited to 2.5A to 2.8A per output.The current output stage outputs are short-circuit-proof.In the case of an internal fault signal or missing enable,the output stages are deactivated.

Fault detection [19]

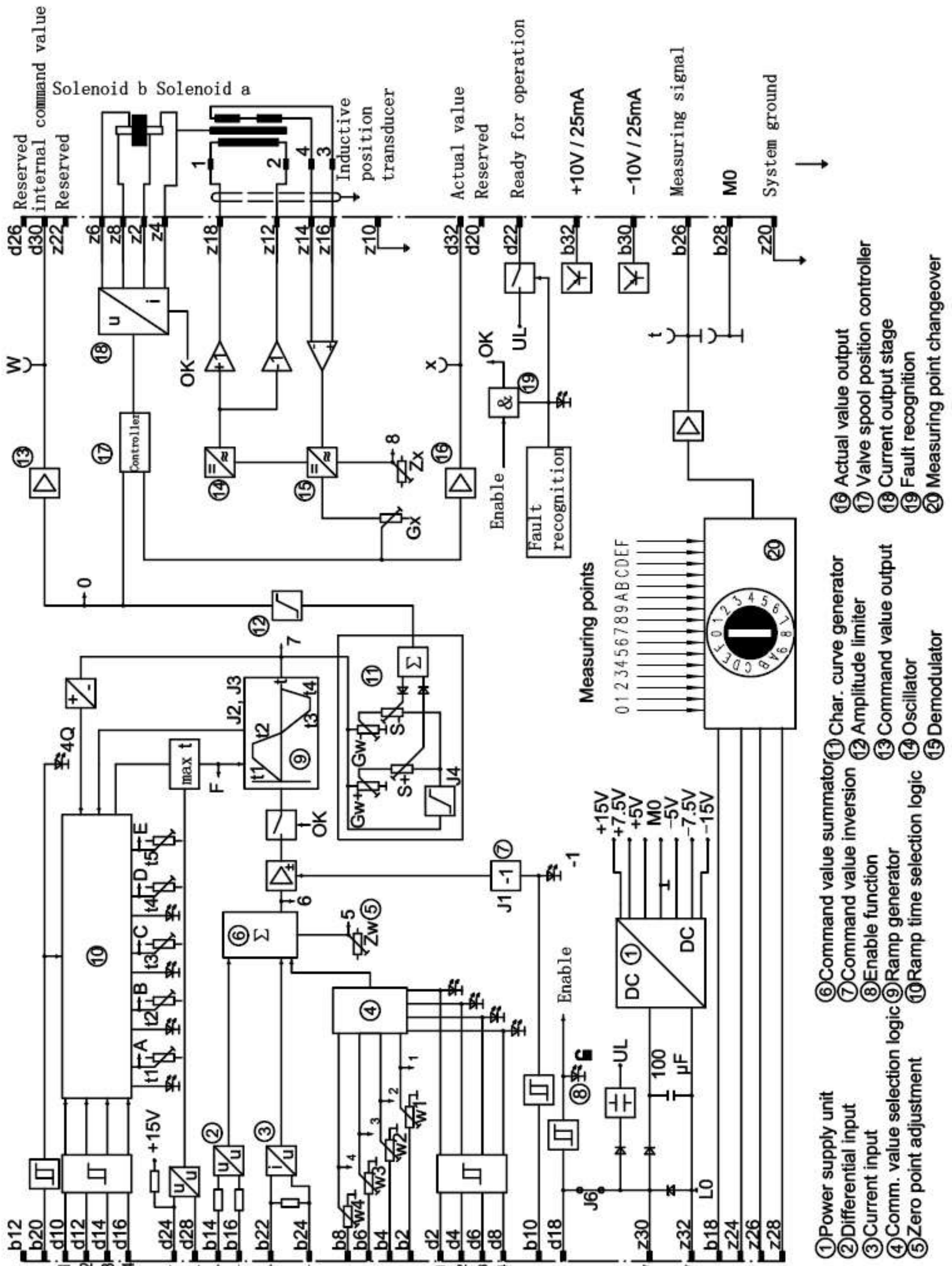
The position transducer cable is monitored for cable break and short-circuit on the primary side, and the output stages for excessive current.

[ ] = Cross-reference to the block circuit diagram on page 89 and 90.

Block circuit diagram/pin assignment HD-VT-VRPA2-.-1X/VO/T1:



Block circuit diagram/pin assignment HD-VT-VRPA2-.-1X/VO/T5:



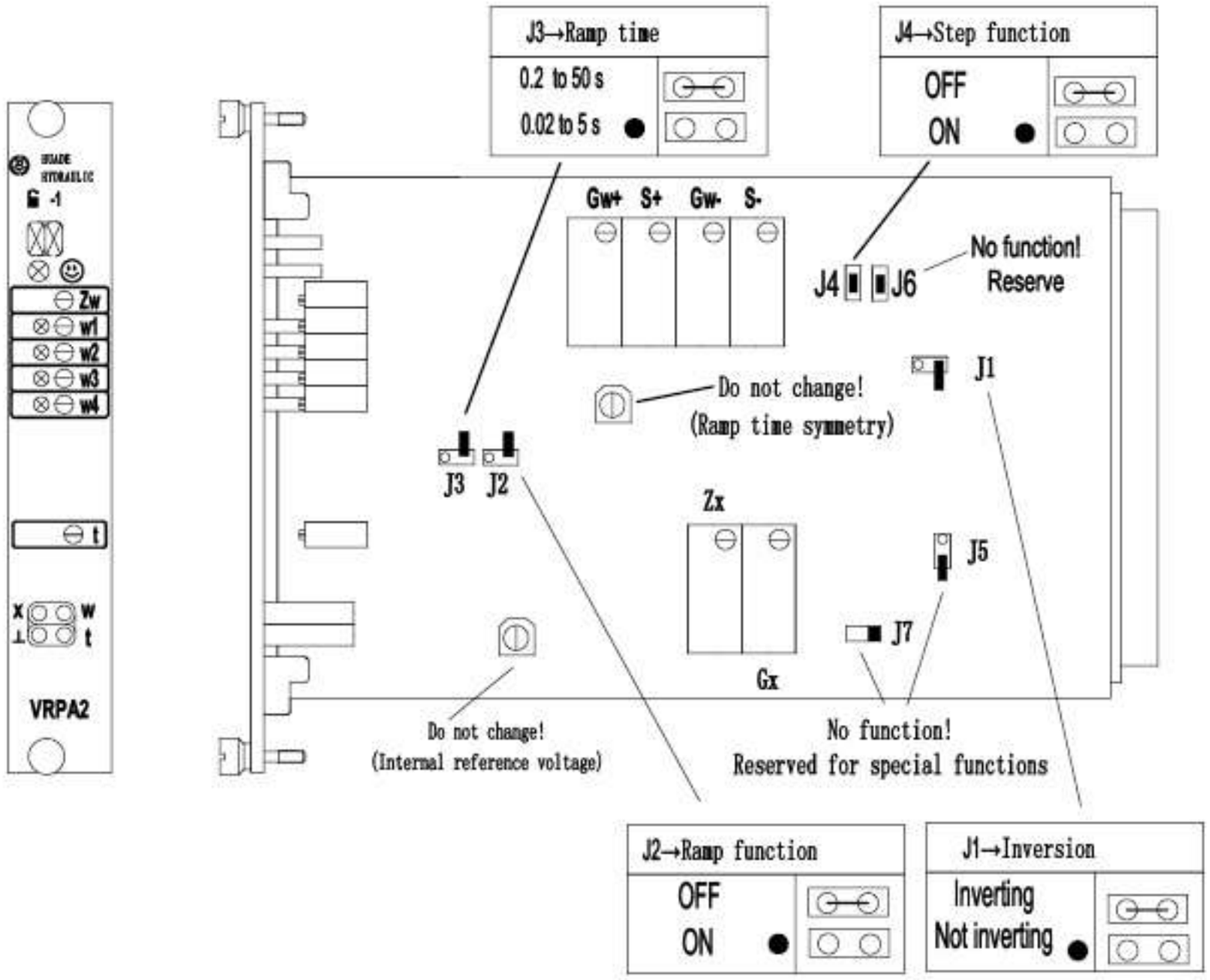
Technical data(for application outside these parameters, please consult us!

Operating voltage	Uo	24 VDC + 40 % - 20 %
Operating range: - Upper limit value - Lower limit value	 $Uo(t)_{max}$ $Uo(t)_{min}$	 35V 18V
Power consumption	P_S	<24VA
Current consumption	I	<2A
Fuse	I_S	2A medium time lag.can be replaced
Inputs: - Analogue		
Command values 1 to 4(potentiometer inputs)	U_i	0 to ±10 V; R_i> 100 kΩ (reference is M0)
Command value 5 (differential input)	U_i	0 to ±10 V; R_i> 50 kΩ
Command value 6(current input)	I_i	4 to 20 mA; load R_i= 100 Ω
Ramp time external	U_i	0 to+10V; R_i=10kΩ(internally raised to+15 V; reference is M0)
- Digital		
Command value call-ups	U U	8.5V toU_o→call-up activated; R_i>100kΩ 0 to 6.5V→ no call-up; R_i>100kΩ
Ramp call-ups	U U	8.5V to U_o→call-up activated; R_i>100kΩ 0 to 6.5V→no call-up; R_i>100kΩ
Quadrant recognition	U U	8.5V to U_o→ON; R_i>100kΩ 0 to 6.5V→OFF; R_i>100 kΩ
Command value inversion	U U	8.5 V to U_o→ON; R_i>100kΩ 0 to 6.5V→OFF; R_i>100 kΩ
Enable	U U	8.5 V to U_o→ON; R_i>100kΩ 0 to 6.5V→OFF; R_i>100 kΩ
Adjustment ranges:		
- Zero balancing (potentiometer"Zw")		±30%
- Command value (potentiometers"w1"to"w4")		0 to 110%
- Ramp times (potentiometers"t1"to"t5")		20 ms to 5 s; can be changed over, 0.2 to 50 s
- Step-change height (potentiometers"S+"and"S-")		0 % to 50%
- Amplitude attenuator (potentiometers"G+"and"G-")		0 % to 110 % (valid for setting of step-change height to 0 %)

Technical data(for application outside these parameters, please consult us!

Outputs:		
- Command value signal	U	±10V±2%; I_{max}=2mA
- Actual value signal	U	±10V±2%; I_{max}=2mA
- Measuring point signal (option 5)	U	±10V±2%; I_{max}=2mA
- Ready for operation	U	>16V;50mA(in case of fault:U<1V;R_i= 10kΩ)
- Regulated voltages	U	±10V±2%;25mA;short-circuit-proof
- Current output stages	I	0 to 2.5A;short-circuit-proof;clocked ca.5kHz
- Oscillator	U	±5V_{ss} per output; 10mA
	F	5.6kHz±10%
- Measuring sockets	U	±10V±2%; I_{max}=2mA
Type of connection		48-pin male connector, DIN41612, form F
Card dimensions		Euro-card 100×160mm, DIN41494
Front panel dimensions: - Height - Width soldering side - Width component side		 3HE(128.4mm) 1TE(5.08mm) 3TE
Permissible operating temperature range Storage temperature range		0 to +50°C -25°C to +85°C
Weight		0.17kg(net)

Indicator/adjustment elements



LED lamps:

☺ Ready for operation (green)

Enable (yellow)

-1 External inversion

Measuring sockets:

x, w, t Measuring signal

⊥ Measuring zero

Jumper plugged

Jumper open

● Factory setting of jumpers

Potentiometers (some with LED lamps):

Zw Zero point balancing

w1 Command value 1

w2 Command value 2

w3 Command value 3

w4 Command value 4

t Ramp time

Can be adjusted on the printed-circuit board:

Gw+ Amplitude attenuator for positive command values

Gw- Amplitude attenuator for negative command values

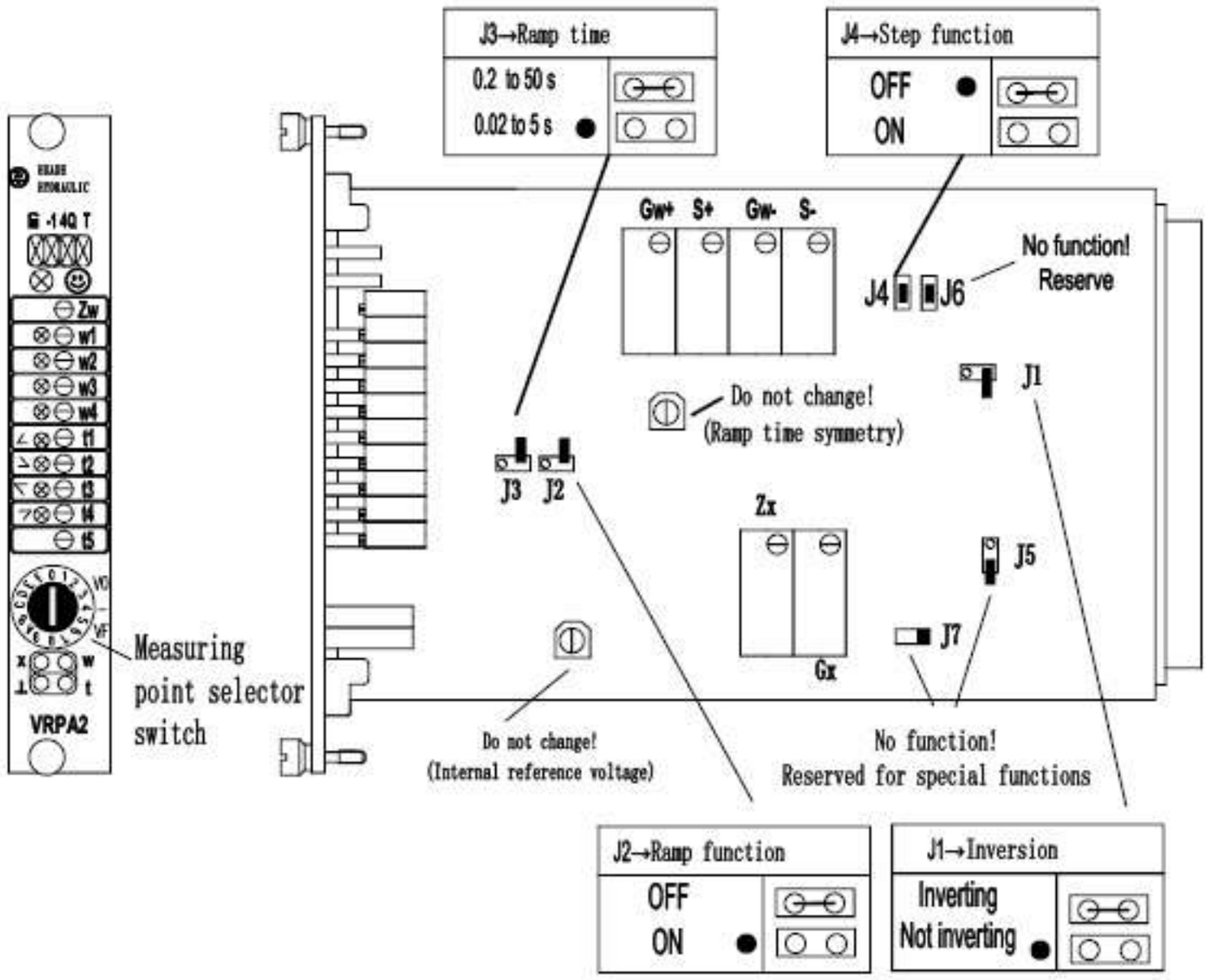
S+ Step-change height for positive direction

S- Step-change height for negative direction

If you change sealed potentiometer settings, the warranty will become void!

Indicator/adjustment elements

HD-VT-VRPA2-.-1X/V0/T5



LED lamps:

- ☺ Ready for operation (green)
- Enable (yellow)
- -1 External inversion
- 4Q Quadrant recognition
- T Reserved

Measuring sockets:

- x, w, t Measuring signal
- ⊥ Measuring zero

- Jumper plugged
- Jumper open
- ● Factory setting of jumpers

Potentiometers (some with LED lamps):

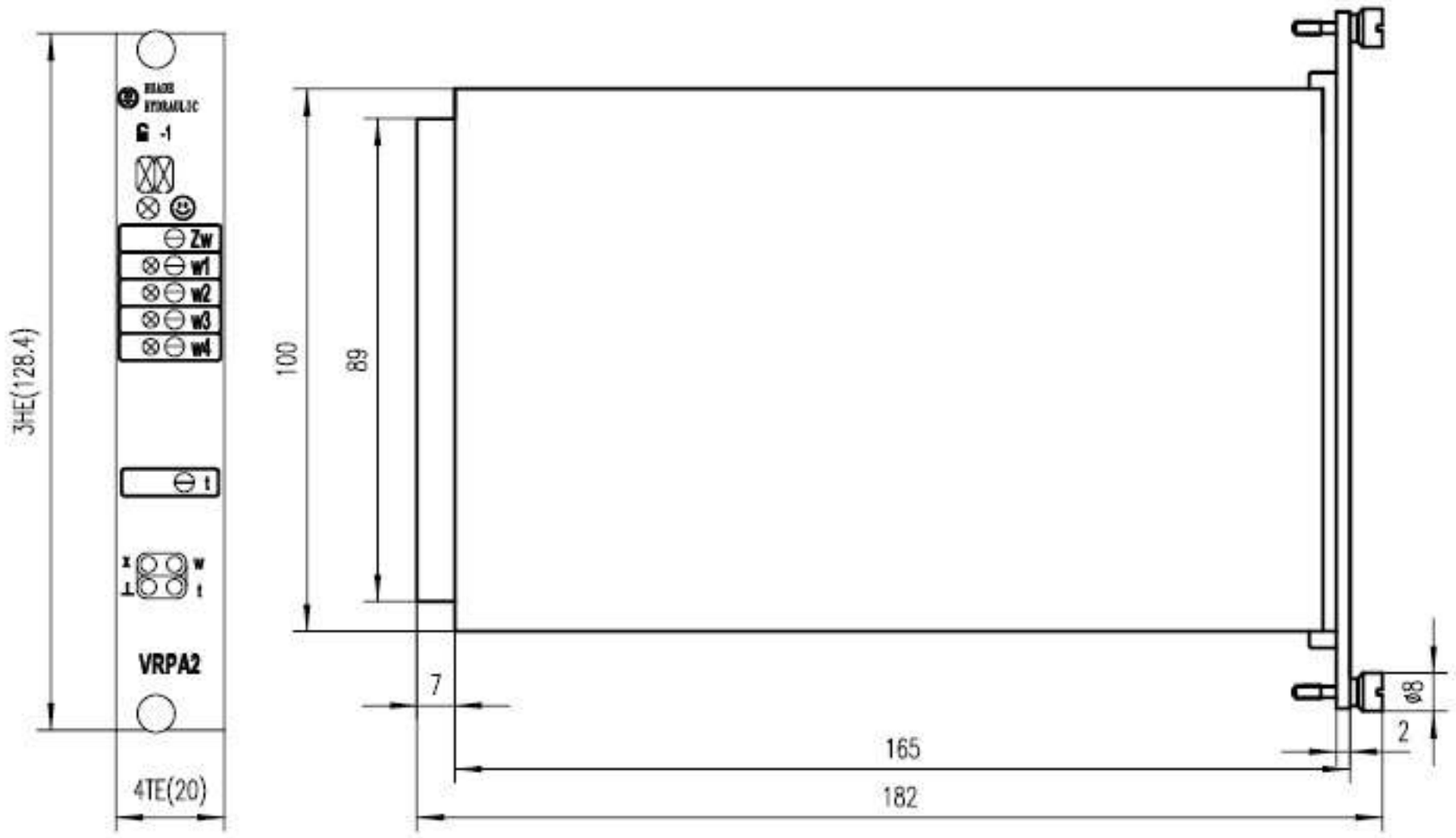
- Zw Zero point balancing
- w1 Command value 1
- w2 Command value 2
- w3 Command value 3
- w4 Command value 4
- t1 Ramp time 1
- t2 Ramp time 2
- t3 Ramp time 3
- t4 Ramp time 4
- t5 Ramp time 5

Can be adjusted on the printed-circuit board:

- Gw+ Amplitude attenuator for positive command values
- Gw- Amplitude attenuator for negative command values
- S+ Step-change height for positive direction
- S- Step-change height for negative direction

If you change sealed potentiometer settings, the warranty will become void!

Unit dimensions (nominal dimensions in mm)



Engineering/maintenance notes/supplementary information

For further information, see “Product description and commissioning instructions HD-VT-VRPA2-.-1X/...”

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Electrical amplifier type HD-VT-VSPA2-1-1X/···			

Features:

- Suitable for the control direct operated proportional directional valves without electrical position feedback (type HD-4WRA, sizes 6 and 10, from series 2X)
- Four command values that can be adjusted by means of potentiometers
- Four command value call-ups with LED indicator lamp
- Differential input, can be changed over to current input
- Enable input with LED indicator lamp
- Indication of "Ready for operation "by LED
- Step function generator
- Ramp generator with one or five ramp times
- Two clocked current output stages
- Reverse polarity protection for voltage supply



Card holder:

- Type HD-VT3002-2X/32
  single cardholder without power supply unit

Power supply unit:

- Type HD-VT-NE30-1X
  compact power supply unit 115/230VAC→24VDC,70VA

Ordering code:

HD – VT-VSPA2 – 1 – 1X / *

Technology of Beijing Huade Hydraulic =HD

Amplifier for controlled proportional directional valves, analogue,with 2 output stages

Amplifier for proportional directional valves type HD-4WRA6 and type HD-4WRA10(from series 2X) =1

Further details in clear text

T1= 1 ramp time

T5= 5 ramp times

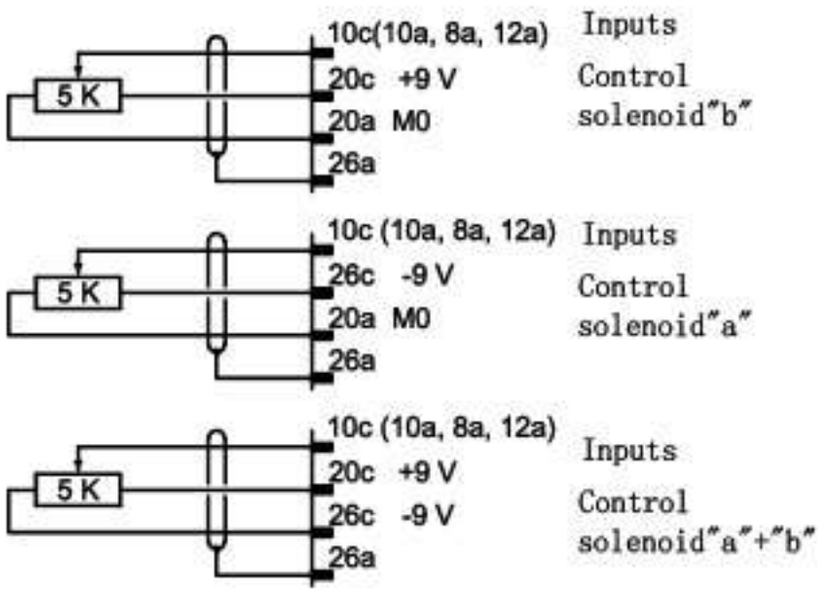
1X= Series 10 to 19

(10 to 19:unchanged technical data and pin assignment)

Functional description:

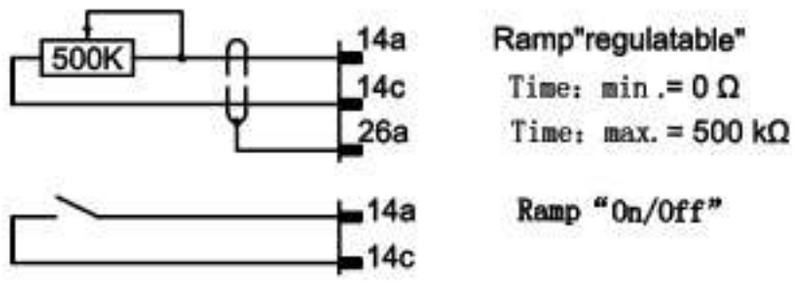
With the command value inputs 1 to 4 command values [1] can be called up by controlling associated relays (K1 to K4). The command value voltage is applied either directly through regulated ± 9 V voltages of the power supply [9] or via an external command value potentiometer. For these inputs±9V =±100 % 1); is valid. If these four command value inputs are connected directly to the regulated voltages ± 9 V, then four different command values can be set using potentiometers R1 to R4. When using external command value potentiometers at these inputs the internal potentiometers act as attenuatos or limiters, unless they are set to maximum.

External command value potentiometer



Which command value is momentarily called up is indicated by the LEDs "H1" to "H4". If more than one command value is called up at a time, then the input with the highest number has priority. Example: If command values 1 and 3 are called-up simultaneously, then command value 3 becomes active.
A further output of the card provides a supply voltage for the command value call-ups which can be switched over from + 9 V to - 9 V with the relay K6 1);.
An adjustable ramp time ("t1" to "t4") is assigned to each of the four call-up command values with the amplifier variant with 5 ramp times (ordering code T5).If no command value is called up, then time "t5" is effective with this unit.
All relays on the card are operated with 24 VDC (smoothed).
Additionally, direct command value input 5 is available for the input voltage 0 to ±6 V. The following is Valid: ±6 V = ±100 %) 1).
The command value input is a differential input (0 to ±10 V). It can be configured (see "adjustment elements" on page 100) as current input (4 to 20 mA or 0 to ±20mA) through the setting of jumpers (plug-in bridges). If the command value is applied by separate electronics with a different reference potential, this input must be used. When applying or withdrawing the command value voltage, care must be taken to ensure that both signal cables are either disconnected from or connected to the input.
Before being passed on, all command values are summated with the correct amount and sign [3].
The downstream ramp generator [4] generates a ramp-shaped out put signal from a stepped input signal. The time constant of the out put signal can be adjusted using potentiometers "t" or "t1" to "t5". The given ramp time refers to a command value step-change of 100 % and can be ca. 1 s or 5 s, depending on the jumper setting (J5, J6). If a command value step-change of less than 100 % is fed to the input of the ramp generator, the ramp time shortens appropriately.

External ramp time potentiometer and ramp "off"



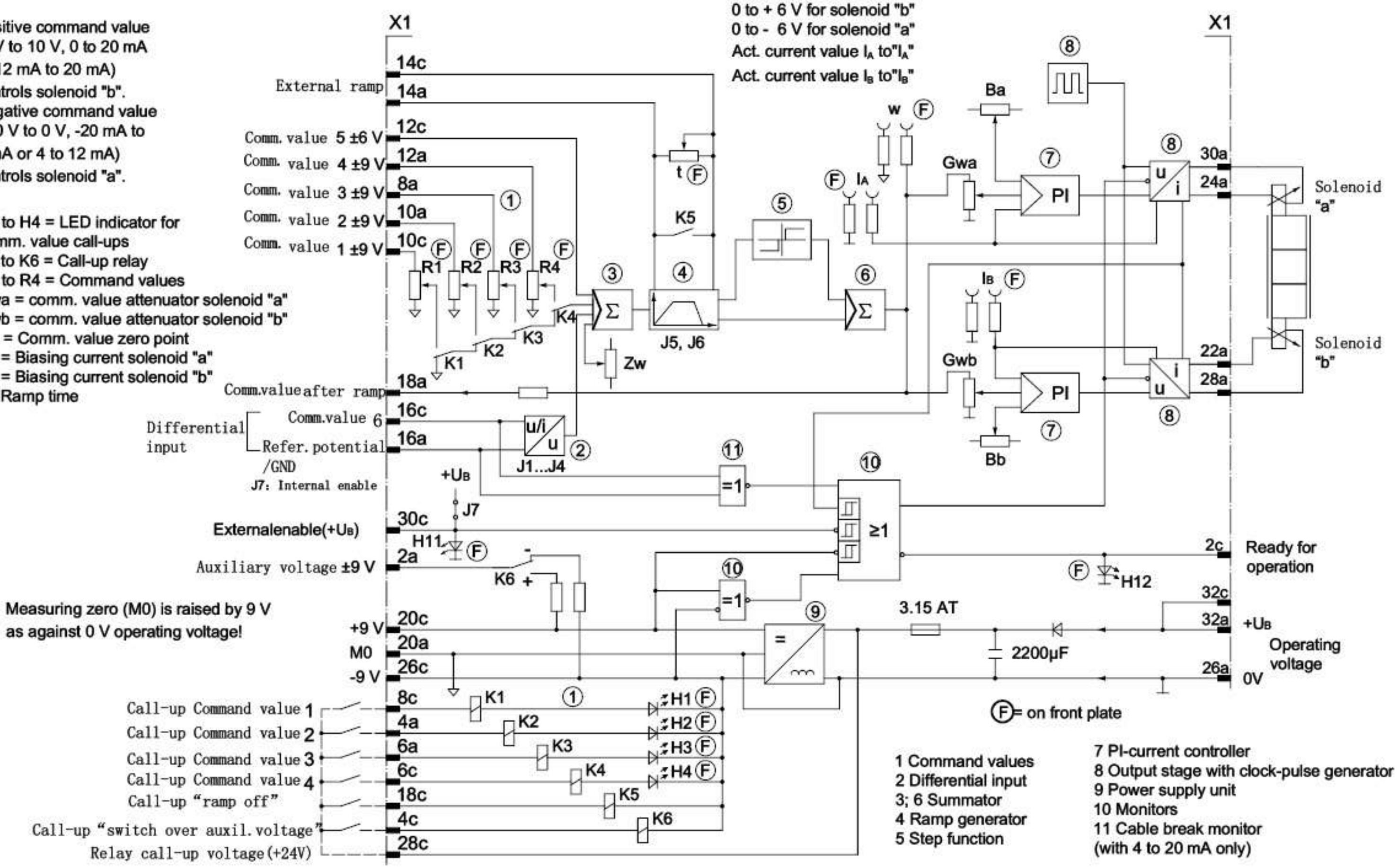
Note:
When an external time potentiometer is used, the internal ramp time potentiometer must be set at maximum. The maximum ramp time shortens, because the resistance of the external potentiometer is connected in parallel to that of the internal potentiometer (ca. 500 kΩ).
By operating relay K5 or plugging an external jumper,the ramp time is set to its minimum value (ca. 30 ms).
The output signal of the ramp generator [4] is fed in parallel to the summator [6] and the step function generator [5]. At command value voltages > ±1 % the step function generator generates a polarity-dependent step-change signal that is added to the output signal of the ramp generator. This step function results in the fact that the overlap section of the valve spool is passed quickly. At higher command value voltages, the step function generator outputs a constant output signal.
The output signal of the summator [6] is the command value current value that is fed to the two current regulators [7] and to measuring socket "w" on the front panel of the card. A voltage of 6 V at the command value measuring socket corresponds to a command value of 100 %. A positive command value signal at the input of the amplifier controls the output stage of solenoid "b", and a negative signal controls the output stage of solenoid "a". When the command value signal is less than ±1% (step function still ineffective), a biasing current of 50 mA flows through both solenoids. The actual values of the currents through both solenoids can be measured separately at sockets "IA" (solenoid "a") and "IB" (solenoid "b").
Here, a voltage of 2.5 V is the equivalent to a current of 2.5 A.
The output stages are enabled with a signal of > 8.5 V at the enable input (indicated by yellow LED "H11" on the front panel). The output stages can be permanently enabled independently of the state of the enable input by setting jumper J7.
In this case, the switching input is ineffective.
The signal "Ready for operation" is output [10] and the green LED "H12" on the front panel lights up, if:
– the enable signal is applied
– the internal ± 9 V voltage supply is operable (amplitude and symmetric)
– There is no short-circuit of the solenoid cable
– the current input (with circuitry of the input amplifier [2] for 4 to 20mA) does not report any faults [10]
In case of fault, both output stages are immediately switched off and the message "Ready for operation" is reset. After elimination of the fault, the card is immediately operable; "Ready for operation" , however, is only signaled after a delay of 75ms (±30%) so that even short-time malfunction can be acquired by a PLC.
1) = Reference potential for the command values 1 to 5 is M0 (measuring zero).
[ ] = Cross-reference to block circuit diagram pages 98 and 99.

Block circuit diagram/pin assignment HD-VT-VSPA2-1-1X/T1:

Positive command value
(0 V to 10 V, 0 to 20 mA
or 12 mA to 20 mA)
controls solenoid "b".
Negative command value
(-10 V to 0 V, -20 mA to
0 mA or 4 to 12 mA)
controls solenoid "a".

H1 to H4 = LED indicator for comm. value call-ups
K1 to K6 = Call-up relay
R1 to R4 = Command values
Gwa = comm. value attenuator solenoid "a"
Gwb = comm. value attenuator solenoid "b"
Zw = Comm. value zero point
Ba = Biasing current solenoid "a"
Bb = Biasing current solenoid "b"
t = Ramp time

Comm. current value at "w"
0 to + 6 V for solenoid "b"
0 to - 6 V for solenoid "a"
Act. current value I_A to"I_A"
Act. current value I_B to"I_B"



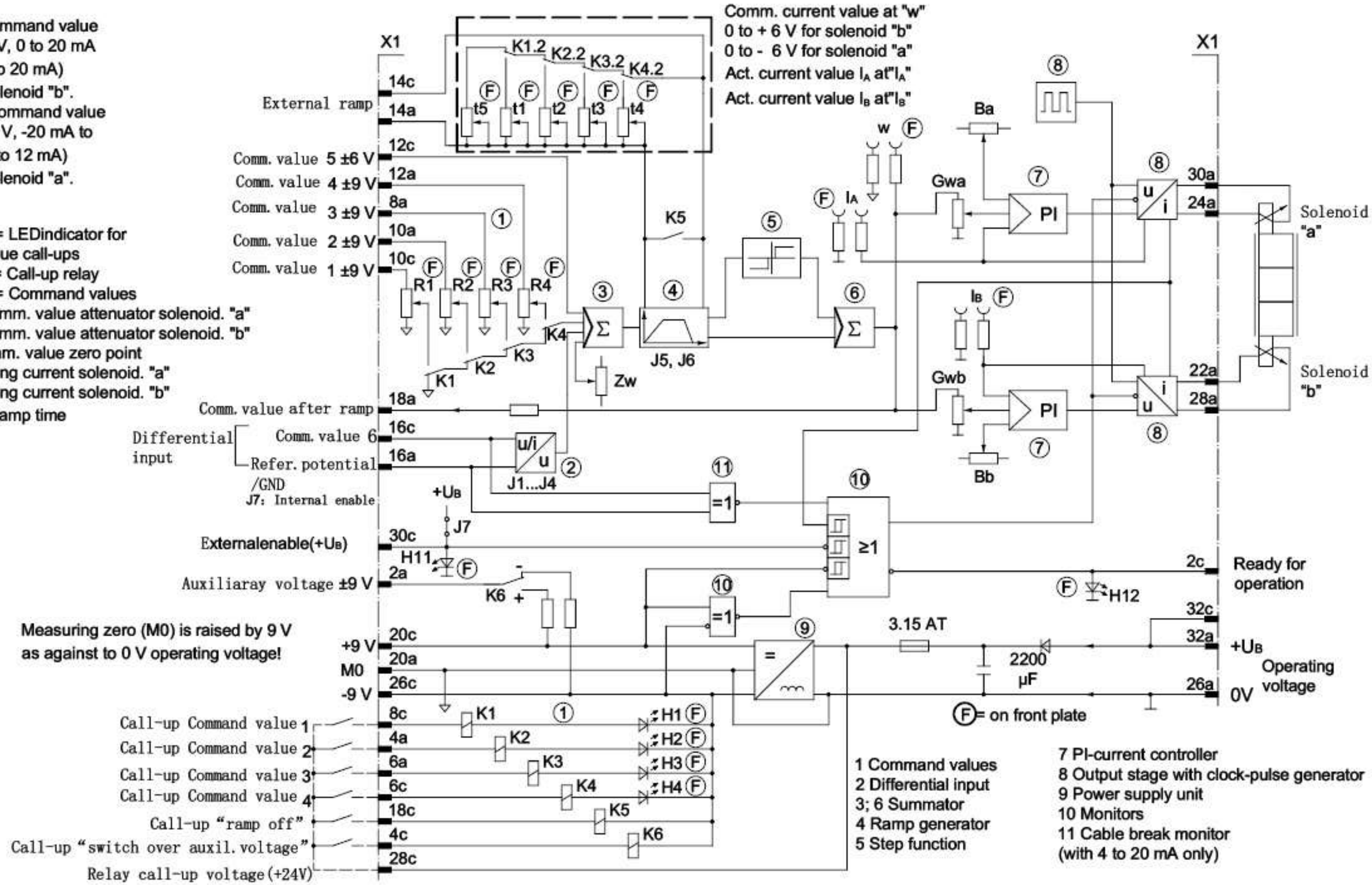
1 Command values
2 Differential input
3; 6 Summator
4 Ramp generator
5 Step function

7 PI-current controller
8 Output stage with clock-pulse generator
9 Power supply unit
10 Monitors
11 Cable break monitor
(with 4 to 20 mA only)

Block circuit diagram/pin assignment HD-VT-VSPA2-1-1X/T5:

Positive command value
(0 V to 10 V, 0 to 20 mA
or 12 mA to 20 mA)
controls solenoid "b".
Negative command value
(-10 V to 0 V, -20 mA to
0 mA or 4 to 12 mA)
controls solenoid "a".

H1 to H4 = LEDindicator for
comm. value call-ups
K1 to K6 = Call-up relay
R1 to R4 = Command values
Gwa = Comm. value attenuator solenoid. "a"
Gwb = Comm. value attenuator solenoid. "b"
Zw = comm. value zero point
Ba = Biasing current solenoid. "a"
Bb = Biasing current solenoid. "b"
t_1 to t_5 = Ramp time



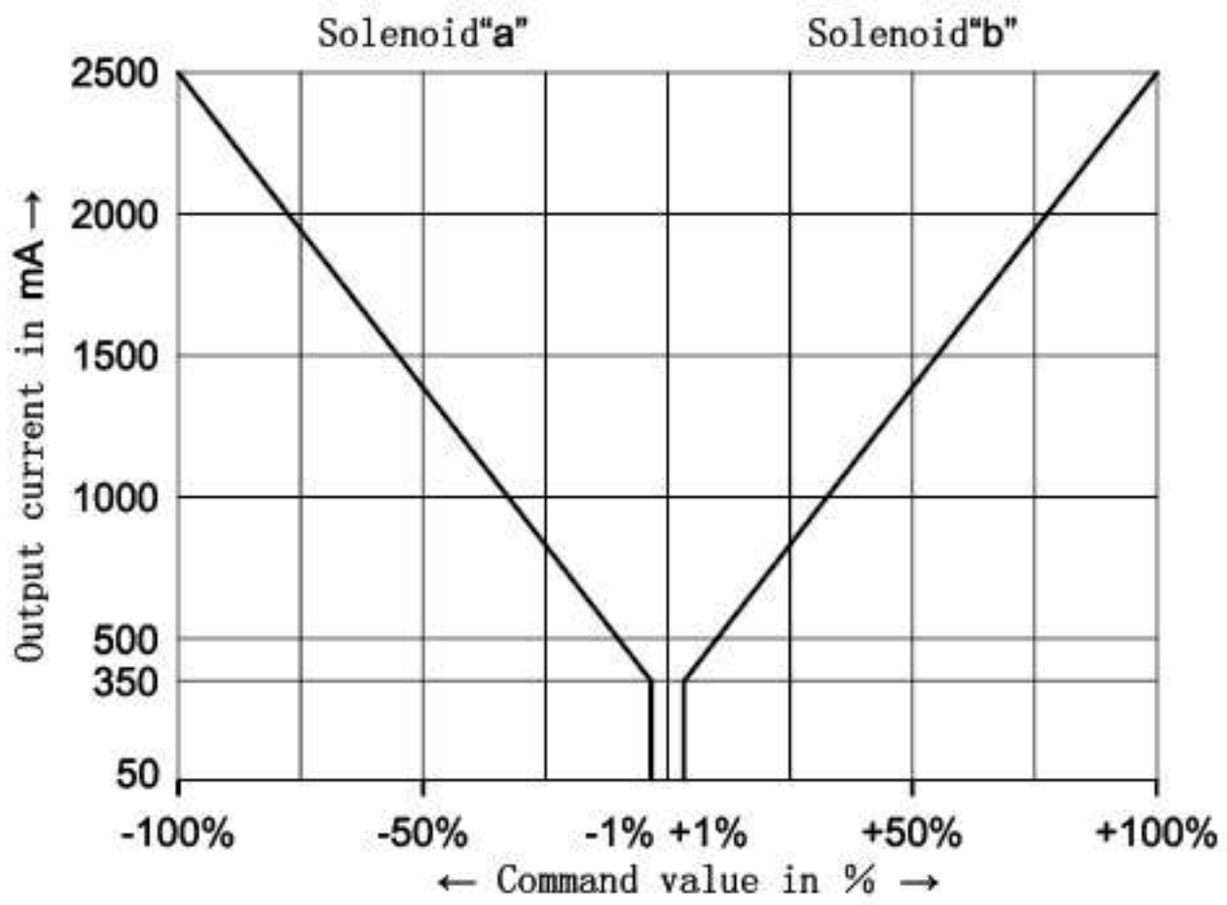
1 Command values
2 Differential input
3; 6 Summator
4 Ramp generator
5 Step function

7 PI-current controller
8 Output stage with clock-pulse generator
9 Power supply unit
10 Monitors
11 Cable break monitor
(with 4 to 20 mA only)

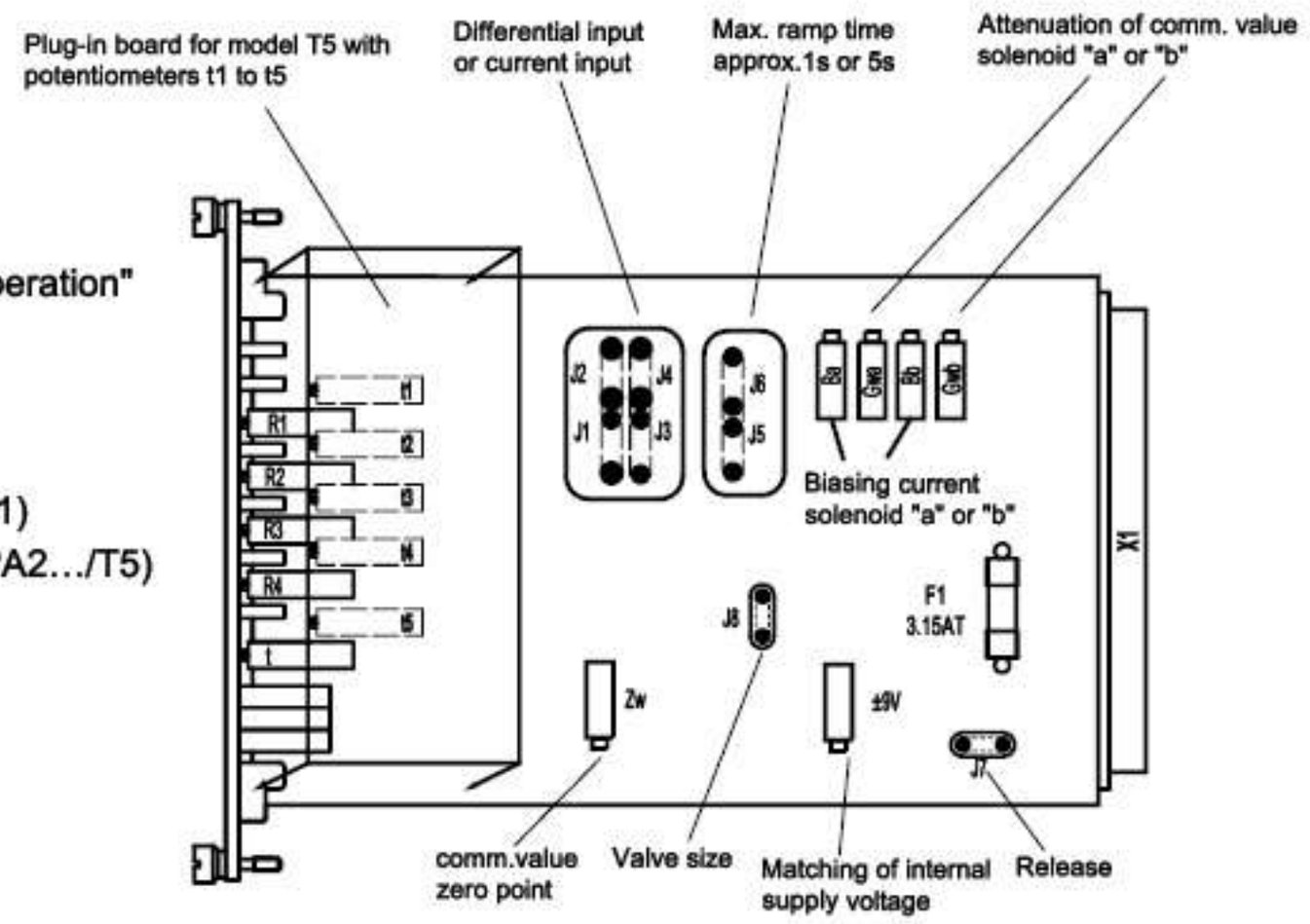
Technical data: For application outside these parameters,please consult us!

Operating voltage	U_0	24 VDC + 40 % - 5 %
Operating range: - upper limit value - lower limit value	 $U_0(t)_{max}$ $U_0(t)_{min}$	 35V 22V
Current consumption	I	<2A
Power consumption	P_S	<50VA
Fuse	I_F	3.15AT
Inputs: - Command values 1 to 4 - Command value 5 - Command value input 6 (differential input) or or - Enable • active • not active	 U_i U_i U_i I_i I_i U_E U_E	 ± 9 V (reference potential is M0) ± 6 V (reference potential is M0) 0 to ±10 V; R_i= 100 kΩ 4 to 20 mA; load R_I= 100 Ω (4 mA ≙ - 100 %;12 mA ≙ 0 %;20 mA ≙+100 %) 0 to ± 20 mA > 8,5 V < 6,5 V
Relay data: - Nominal voltage - Response voltage - Release voltage - Coil resistance	 U U U R	 operating voltage U_B 16,8 V 2,4 V 2150Ω
Ramp time (setting range)	t	30 ms to ca. 1 s or 5 s
Outputs: - Output stage •solenoid current / resistance •biasing current •lock-pulse frequency • for valve size 6 • for valve size 10 - Signal "Ready for operation" series 10 • when ready for operation • in the case of a fault from series 11 • when ready for operation • in the case of a fault - Regulated voltage - Measurement sockets(reference potential is M0) • command value "w" • actual current value "I_A" and "I_B"	 I_{max} I f f U U U U U U U_A; U_B	 2,5 A; $R_{(20)}$= 2 Ω 50 mA ± 25 % 300 Hz ± 10 % ⎫ Set by means of 180 Hz ± 10 % ⎭ jumper J8 ca. U_o ⎫ Load resistance > 10 kΩ < 1 V ⎭ > 16 V, 50 mA < 1 V, R_i= 10 kΩ ± 9 V ± 1 %; ± 25 mA.externally loadable 0 to ± 6 V; R_i= 1 kΩ 0 to 2500 mV ≙ 0 to 2500 mA ± 50 mA; R_i= 1 kΩ
Type of connection		32-pin male connector, DIN 41 612, form D
Card dimensions		Euro-card 100 × 160 mm, DIN 41494
Front panel dimensions: - Height - Width soldering side - Width component side		 3 HE (128,4 mm) 1 TE (5,08 mm) 7 TE
Permissible operating temperature range Storage temperature range		0 to 50 °C -25 to + 85 °C
Weight	m	0,13 kg

Output curve

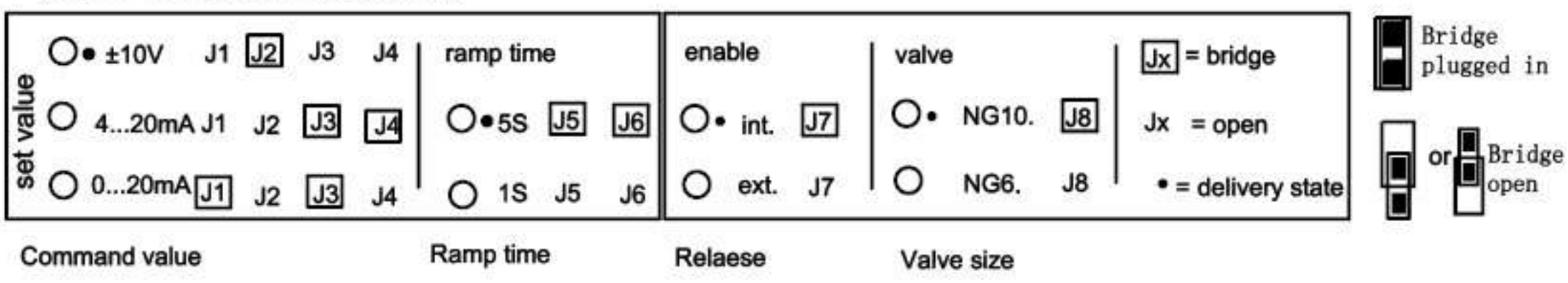


Indicator/setting elements



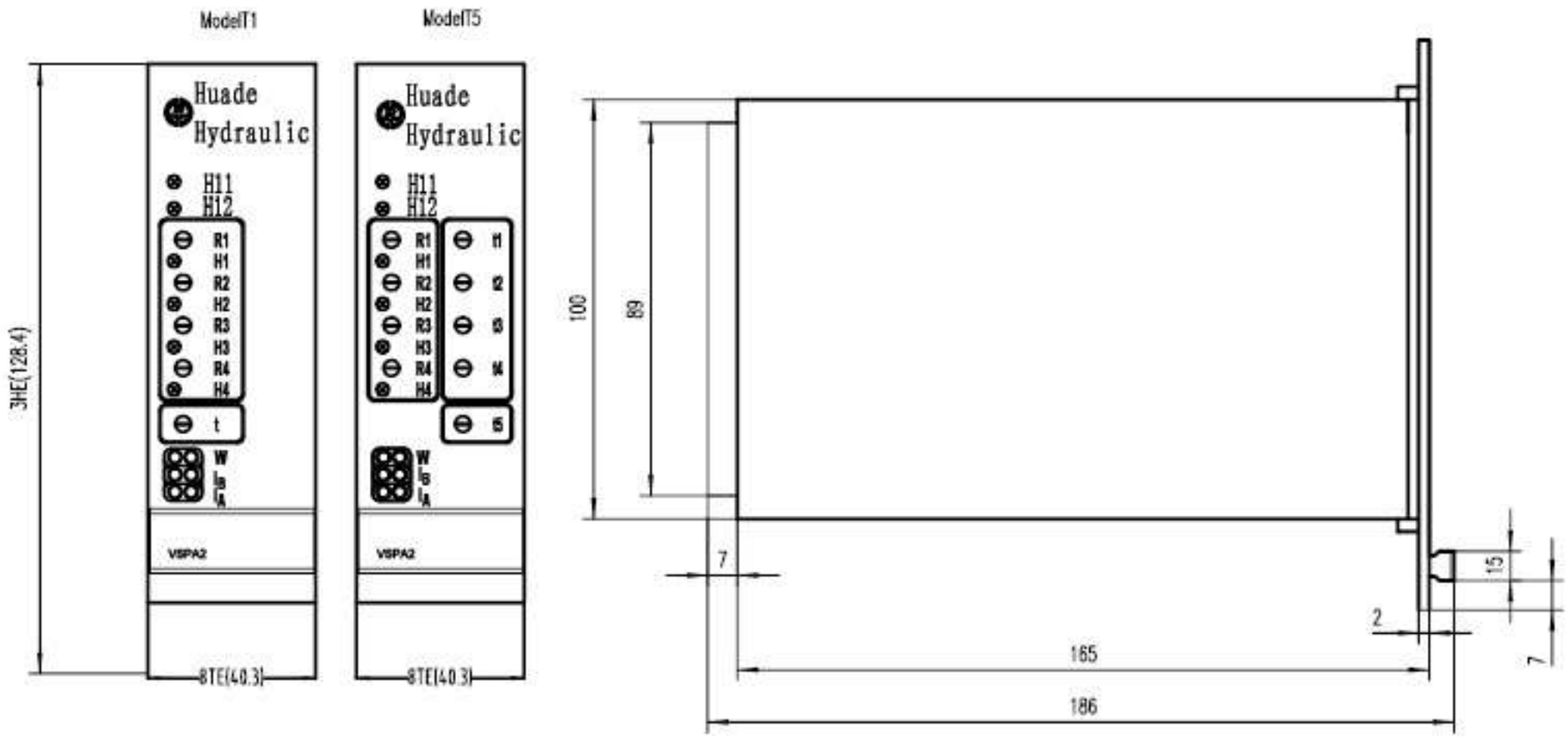
H11 - Yellow LED indicator "enable"
H12 - Green LED display "Ready for operation"
R1/H1 - Command value 1 with LED
R2/H2 - Command value 2 with LED
R3/H3 - Command value 3 with LED
R4/H4 - Command value 4 with LED
t - Ramp time (with HD-VT-VSPA2.../T1)
t1 to t5 - Ramp times (with HD-VT-VSPA2.../T5)
w -Solenoid command current value
I_B- Actual current value solenoid "b"
I_A- Actual current value solenoid "a"

Meaning of jumpers on the card for the settings
(Labels on the back of front plate)



Note:
The circles (○) are used for identifying settings carried out by the customer.
Delivery state is signed by "•".

Unit dimensions (nominal dimensions in mm)



Engineering/maintenance notes/supplementary information

- The amplifier card may only be unplugged or plugged when disconnected from the power supply!
- For the solenoid connection, plugs fitted with free wheel diodes or LED lamps must not be used!
- Measurements on the card may only be taken out using instruments Ri> 100 kΩ!
- Measuring zero (M0) is increased by +9V as against 0V operating voltage and is not electrically isolated,
i.e. -9 V regulated voltage = 0V-operating voltage . Therefore do not connect measuring zero (M0) with the 0 V operating Voltage!
- For switching the command values use relays with gold-plated contacts (small voltages, small currents)!
- For operating the card relay only use contacts with a load carrying capacity of approx. 40 V, 50 mA!
When using external control the control voltage may have a maximum residual ripple content of 10%!
- Always shield command value cable connect shield to 0 V operating voltage on the card side, leave other side open (risk of earth loops)!
Recommendation: Also shield solenoid cables!
For solenoid cables of up to 50 m length, use cable type LiYCY 1,5 mm2.
For greater lengths please consult us!
- The distance to arial lines, radio sources and radar equipment must be at least 1 m!
- Do not lay solenoid and signal lines near power cables!
- Because of the loading current of the smoothing capacitor on the card, back-up fuses must have slow-blowing characteristic!
- **Warning**: When using the **differential input, both inputs** must always be activated or deactivated simultaneously!

Note: Electrical signals generated via control electronics (e. g. signal "Ready for operation") must not be used for switching safety-relevant machine functions.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Electrical amplifier type HD-VT-VSPA2-50-1X/···			

Features:

- Suitable for controlling proportional pressure control valves (type HD-3DREP 6, from series 2X) and pilot operated proportional directional valves (type HD-.WRZ, from series 7X) without electrical position feedback
- Four command values can be adjusted by means of potentiometers
- Four command value call-ups with LED indicator lamp
- Differential input, can be switched over to current input
- Enable input with LED indicator lamp
- Indication "Ready for operation" by LED
- Step function generator
- Ramp generator with one or five ramp times
- Two clocked current output stages
- Reverse polarity protection for the voltage supply



Card holder:

- Type HD-VT3002-2X/32

single card holder without power supply unit

Power supply:

- Type HD-VT-NE30-1X

compact power supply unit 115/230VAC→24VDC,70VA

Ordering code:

HD ┼ VT-VSPA2 ┼ 50 ┼ 1X / ┼ * ┼

Technology of Beijing Huade Hydraulic =HD

Amplifier for controlled proportional directional valves, analogue,with 2 output stages

Amplifier for proportional valves type HD-3DREP6(from series 2X) and type HD-WRZ(from series 7X) =50

Further details in clear text

T1= 1 ramp time

T5= 5 ramp times

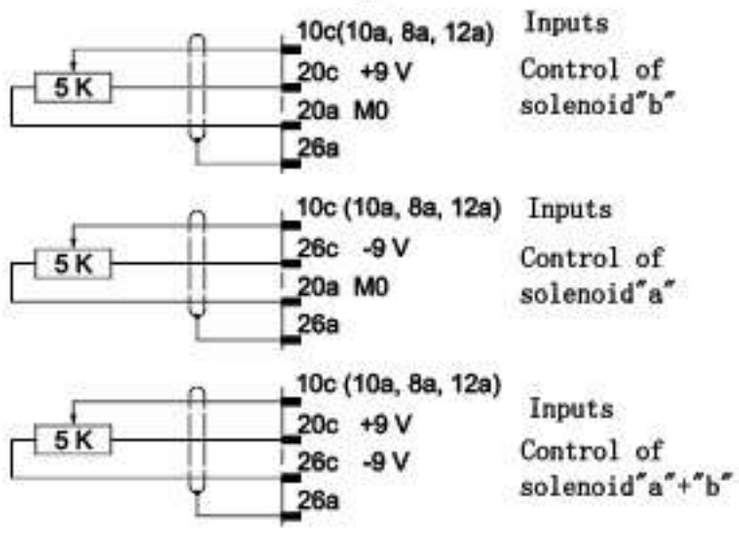
1X= Series 10 to 19

(10 to 19:unchanged tecnical data and pin assignment)

Functional description:

With the command value inputs 1 to 4 command values can be used to called up command value [1] by controlling associated relays (K1 to K4).The command value voltage is applied either directly via the regulated voltages ± 9 V voltage of the power supply unit [9] or via an external command value potentiometer. The following is valid for these inputs: ±9V = ± 100 % 1).If these four command value inputs are connected directly to the regulated voltages ± 9 V, then four different command values can be set using potentiometers R1 to R4. When external command value potentiometers are used at these inputs, the internal potentiometer act as attenuators or limiters, unless they are set to maximum.

External command value potentiometer



LEDs "H1" to "H4" indicate, which command value is currently being called up. If more than one command value is called up at a time, the input with the highest number has priority. Example: If command values 1 and command value 3 are activated at the same time, command value 3 becomes effective.

A further output of the card provides a supply voltage for the command value call-ups, which can be switched over from + 9 V to - 9 V using the relay K6 1).

For the amplifier variant with 5 ramp time (ordering code T5) an adjustable ramp time ("t1" to "t4") is assigned to each of the four call-ups command value. If no command value is called up, time "t5" is effective with this component.

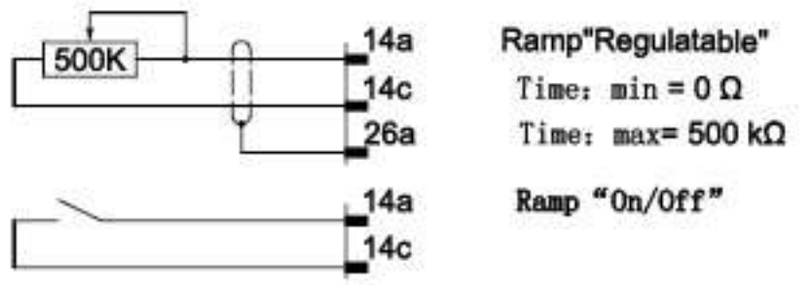
All relays on the card are operated at 24 VDC (smoothed).

Additionally, the direct command value input 5 is available for the input voltage 0 to ± 6 V. The following is valid here: ± 6 V = ± 100 %) 1).

Command value input 6 is a differential input (0 to ± 10 V). It can be configured as current (4 to 20 mA or 0 to ± 20 mA) by setting jumpers.(see "adjustment elements" page 108).If the command value is provided by external electronics with a different reference potential this input must be used. When the command value voltage is applied or removed, care must be taken to ensure that both signal cables are disconnected from or connected to the input. Before being passed on, all command values are summated with the correct amount and sign [3].

The downstream ramp generator [4] generates a ramp-shaped output signal from a stepped input signal. The time constant can be adjusted using potentiometer "t" or "t1"to "t5". The given ramp time refers to a command value step-change of 100 % and can be ca.1 s or 5 s, depending on the jumper setting (J5, J6), If a command value step-change of less than 100 % is fed to the input of the ramp generator, the ramp time shortens accordingly.

External ramp time potentiometer and ramp "off"



Note:

When an external ramp time is used, the internal ramp time potentiometer must be set to maximum. The maximum ramp time shortens, because the resistance of the external potentiometer is connected in parallel to that of the internal potentiometer (ca. 500 kΩ).

By operating relay K5 or by plugging an external jumper, the ramp time is set to its minimum value (ca.30 ms).

The output signal of the ramp generator [4] is fed in parallel to the summator [6] and the step function generator [5]. At command value voltage ±1%, the step function generator generates a polarity-dependent step-change signal that is added to the output signal of the ramp generator. This step function results in the fact that the overlap section of the valve spool is passed quickly.

At higher command value voltage, the step function generator outputs a constant output signal.

The output signal of the summator [6] is the current command value and is fed to the two current regulators [7] and to the measuring socket "w" on the front panel of the card. A command value of 100% corresponds to voltage of 6 V at the command value measuring socket. A positive command value signal at the input of the amplifier controls the output stage for solenoid 'b" and a negative signal the output stage for solenoid "a". When the command value signal is less than ±1% (step function still ineffective), a biasing current of 50 mA flows through both solenoids. The actual values of the currents through the two solenoids can be measured separately at the sockets "IA" (solenoid "a") and "IB" (solenoid "b"). Here a current of 1.5 A corresponds to a voltage of 1.5 V2).

The output stages are enabled with a signal of > 8.5 V at enable input
(indicated by LED "H11"on the front panel).The output stages can be permanently enabled independently of the state of the enable input by setting jumper J7.In this case, the switching input is ineffective.

The signal "Ready for operation" is output [10] and the green LED "H12" on the front panel light up if:

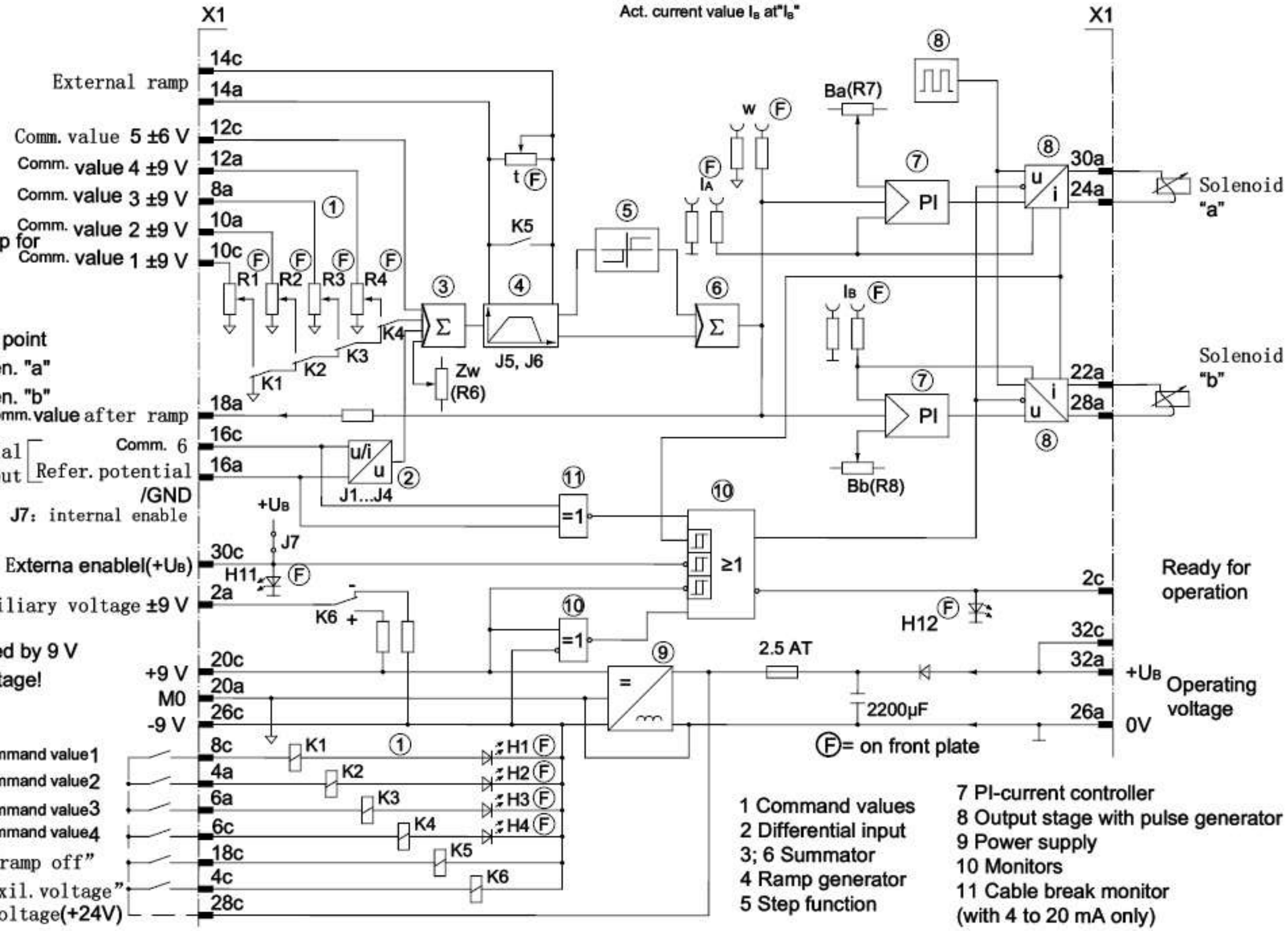
– The enable signal is applied
– The internal ± 9 V voltage supply is operable (amplitude and symmetry)
– There is no short-circuit of the solenoid cables
– the current input (with circuitry of the input amplifier [2] for 4 to 20 mA) does not signal any faults [10]

In the event of a fault, both output stages are immediately de-energised and the message "Ready for operation" is reset. After elimination of the fault, the card is immediately operable; however, "Ready for operation", however, is signaled only after a delay of 75ms (±30%) so that even short-time malfunction can be acquired by a PLC.

1) = Reference potential for the command values 1 to 5 is M0 (measuring zero).
2) = Reference potential for the actual values is 0V operating voltage.
[ ] = Cross-reference to block circuit diagram on pages 105 and 106

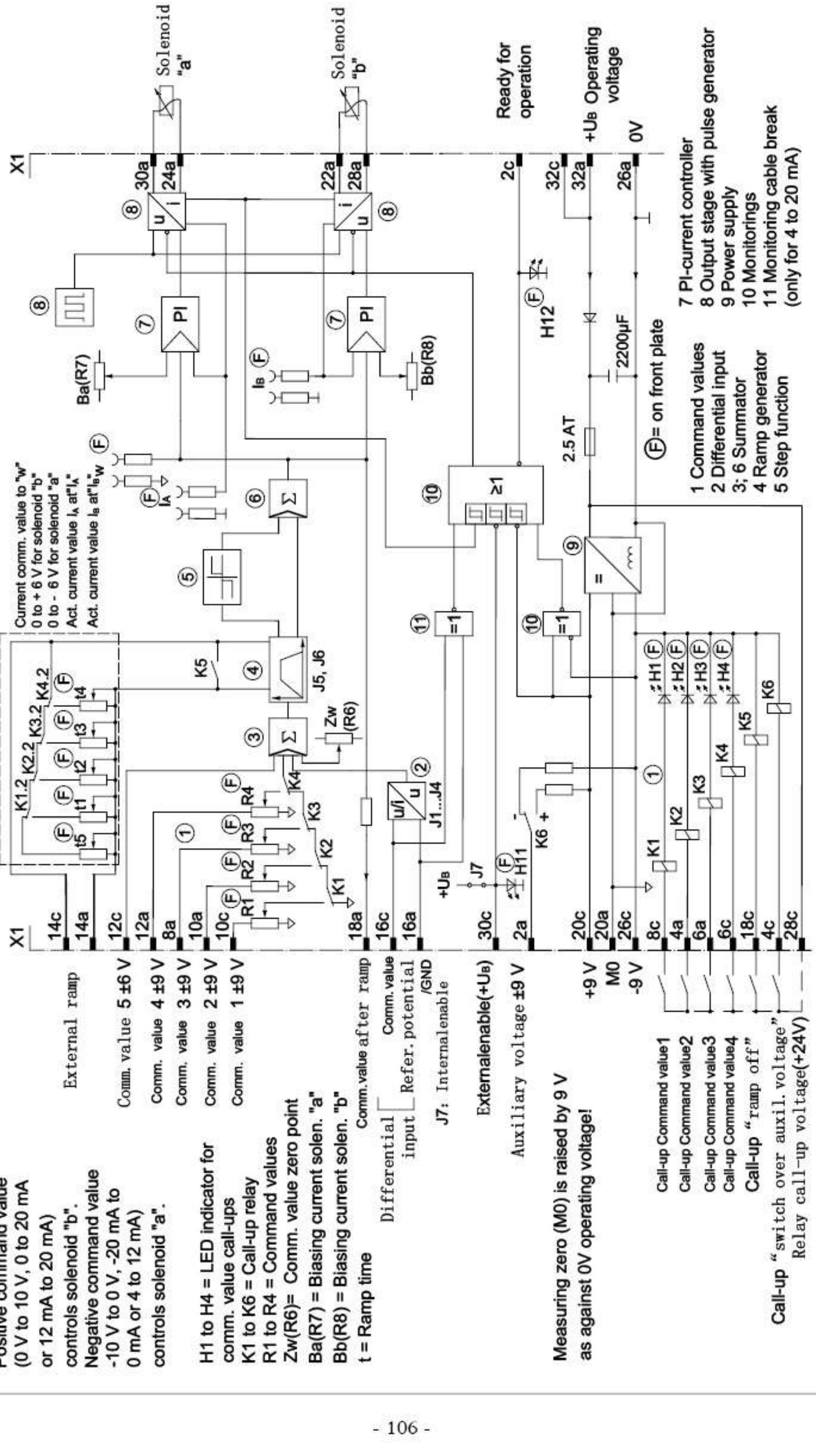
Positive command value
(0 V to 10 V, 0 to 20 mA
or 12 mA to 20 mA)
controls solenoid "b".
Negative command value
(-10 V to 0 V, -20 mA to
0 mA or 4 to 12 mA)
controls solenoid "a".

H1 to H4 = LED indicator lamp for comm. value call-ups
K1 to K6 = Call-up relay
R1 to R4 = Command values
Zw(R6) = Comm. value zero point
Ba(R7) = Biasing current solen. "a"
Bb(R8) = Biasing current solen. "b"
t = Ramp time



1 Command values
2 Differential input
3; 6 Summator
4 Ramp generator
5 Step function
7 PI-current controller
8 Output stage with pulse generator
9 Power supply
10 Monitors
11 Cable break monitor
(with 4 to 20 mA only)

Block circuit diagram/terminal connection HD-VT-VSPA2-50-1 X/T5:



Positive command value
(0 V to 10 V, 0 to 20 mA
or 12 mA to 20 mA)
controls solenoid "b".
Negative command value
-10 V to 0 V, -20 mA to
0 mA or 4 to 12 mA)
controls solenoid "a".

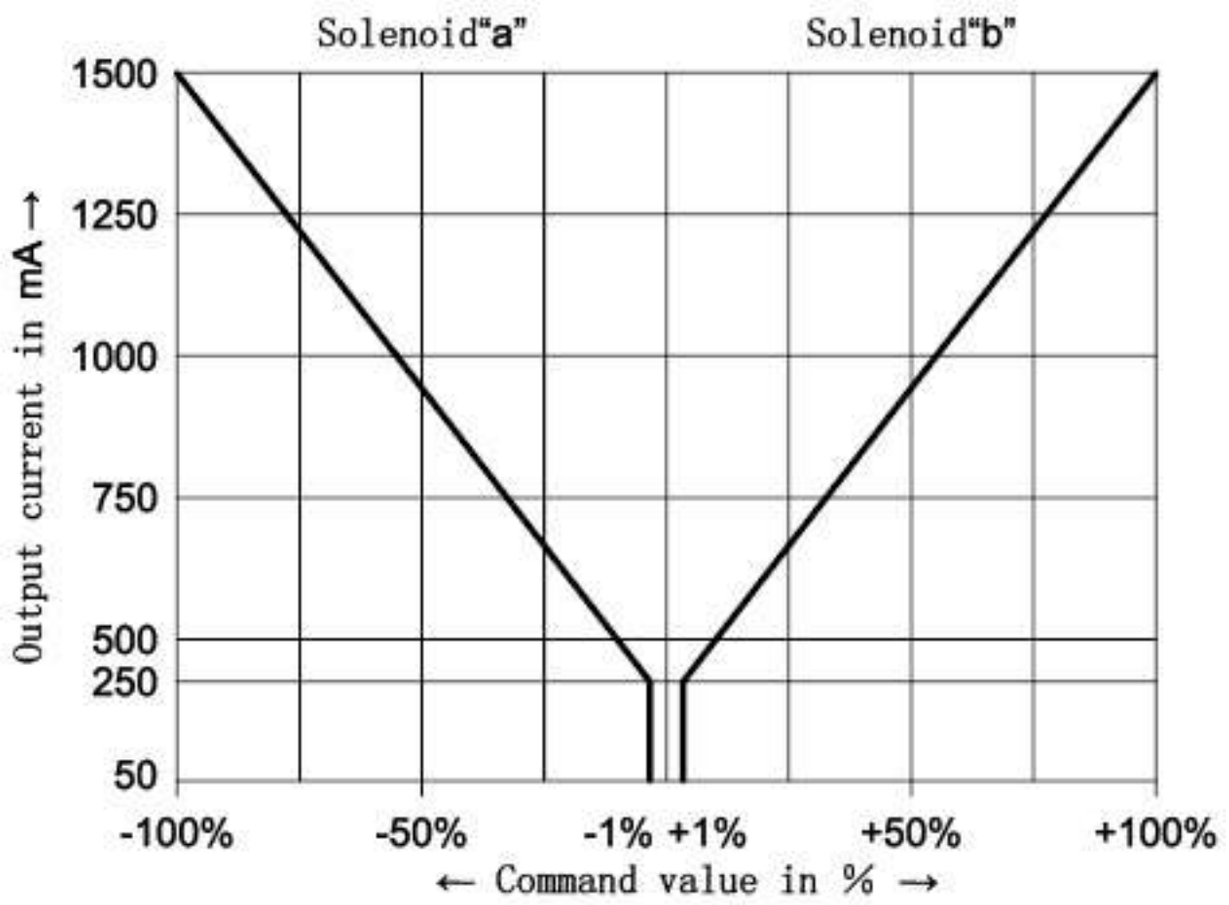
H1 to H4 = LED indicator for comm. value call-ups
K1 to K6 = Call-up relay
R1 to R4 = Command values
Zw(R6)= Comm. value zero point
Ba(R7) = Biasing current solen. "a"
Bb(R8) = Biasing current solen. "b"
t = Ramp time

Measuring zero (M0) is raised by 9 V
as against 0V operating voltage!

Technical data: (for application outside this parameters, please consult us!)

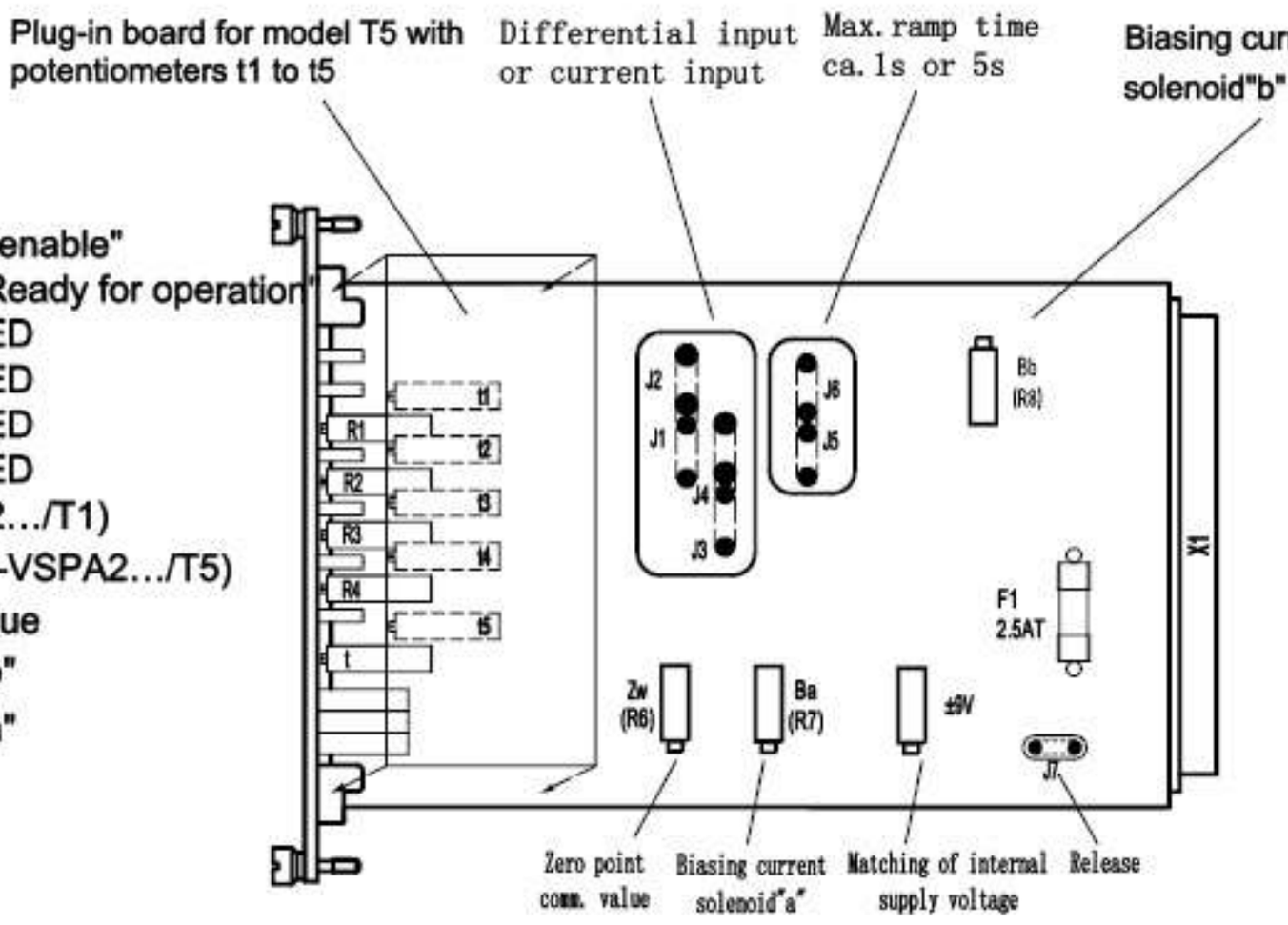
Operating voltage	U_0	24 VDC + 40 % - 5 %
Operating range: - upper limit value - lower limit value	 $U_0(t)_{max}$ $U_0(t)_{min}$	 35V 22V
Current consumption	I	<1.2A
Power consumption	P_S	<30VA
Fuse	I_S	2.5AT
Inputs: - Command values 1 to 4 - Command value 5 - Command value input 6 (differential input) or or - Enable •active •inactive	 U_i U_i U_i I_i I_i U_i U_i	 ± 9 V (reference potential is M0) ± 6 V (reference potential is M0) 0 to ±10 V; R_e= 100 kΩ 4 to 20 mA; load R_e = 100 Ω (4 mA ≙ - 100 %;12 mA ≙ 0 %;20 mA ≙ + 100 %) 0 to ± 20 mA > 8,5 V < 6,5 V
Relay data: - Nominal voltage - Threshold voltage - Release voltage - Coil resistance	 U U U R	 operating voltage U_B 16,8 V 2,4 V 2150Ω
Ramp time (adjustment range)	t	30 ms to ca. 1 s or 5 s
Outputs: - Output stage • solenoid current / resistance • biasing current • clock pulse frequency - Signal "Ready for operation" • when ready for operation • in the event of a fault - Regulated voltage - Measurement sockets • command value "w" • actual current value "I_A" and "I_B"	 I_{max} I f U U U U U_A ; U_B	 1,5 A; $R_{(20)}$= 5 Ω 50 mA ± 25 % 220 Hz ± 10 % > 16 V, 50 mA < 1 V, Ri= 10 kΩ ± 9 V ± 1 %; ± 25 mA.externally loadable 0 to ± 6 V; R_i=5 kΩ(reference potential is M0) 0 to 1.5V ≙0 to1.5A(reference potential is 0V operat.voltage)
Type of connection		32-pin male connector, DIN 41 612, form D
Card dimensions		Euro-card 100 × 160 mm, DIN 41 494
Front panel dimensions: - Height - Width soldering side - Width component side		 3 HE (128,4 mm) 1 TE (5,08 mm) 7 TE
Permissible operating temperature range Storage temperature range		0 to 50 °C -25 to + 85 °C
Weight	m	0,13 kg

Output curve

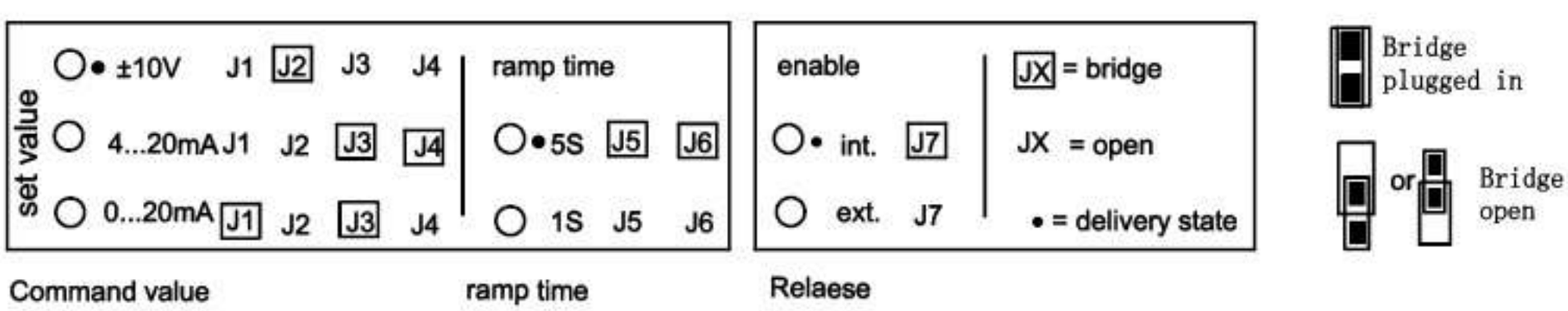


Indicator/setting elements

H11 - yellow LED indicator lamp "enable"
H12 - green LED indicator lamp "Ready for operation"
R1/H1 - Command value 1 with LED
R2/H2 - Command value 2 with LED
R3/H3 - Command value 3 with LED
R4/H4 - Command value 4 with LED
t - Ramp time (with HD-VT-VSPA2.../T1)
t1 to t5 - Ramp times (with HD-VT-VSPA2.../T5)
w - Solenoid current command value
I_B- Actual current value solenoid "b"
I_A- Actual current value solenoid "a"

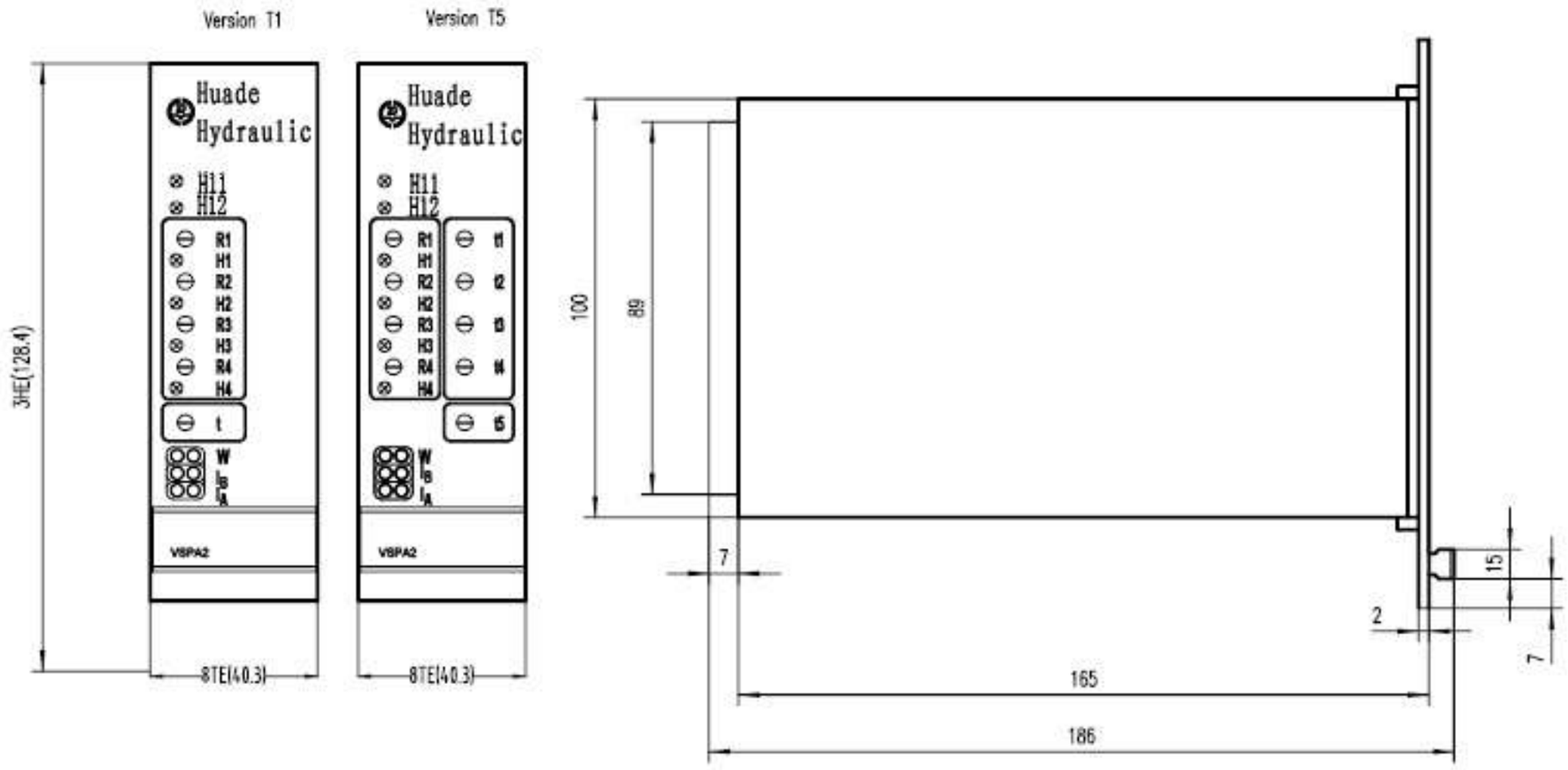


Meaning of jumpers on the card for the settings
(Labels on the back of front plate)



Note:
The circles (◯) are used for identifying settings carried out by the customer.
Delivery state is signed by "•".

Unit dimensions (nominal dimensions in mm)



Engineering/maintenance notes/supplementary information

- The amplifier card may only be unplugged or plugged in when disconnected from the power supply!
- For the solenoid connection, plugs fitted with free wheeling diodes or LED lamps must not be used!
- Measurements at the card may only be carried out with instruments Ri> 100 kΩ!
- Measuring zero (M0) is increased by +9V compared to 0V operating voltage and is not potentially separated, i.e. -9 V controlled voltage = 0V-operating voltage . Therefore do not connect measuring zero (M0) to 0 V operating Voltage!
- For switching the command values use relays with gold-plated contacts (small voltages, small currents)!
- For operating the card relay only use contacts with a load capacity of approx. 40 V, 50 mA!

When using an external control, the control voltage may have a maximum residual ripple content of 10%!

- Always shield command value cable; connect shield to 0 V operating voltage on the card side, leave the other end open (risk of earth loops)!

Recommendation: Also shield solenoid cable!

For solenoid cable of up to 50 m length use cable type LiYCY 1,5 mm2;
For greater lengths, please consult us!

- The distance to arial lines, radio sources and radar equipment must be at least 1 m!
- Do not lay solenoid and signal cables near power lines!
- Because of the charging current of the smoothing capacitor on the card, back-up fuses must have slow-blowing characteristics!
- **Warning:** When using the **differential input, both inputs** must always be activated or deactivated **simultaneously**!

Note: Electrical signals generated via control electronics (e. g. signal "Ready for operation") must not be used for switching safety-relevant machine functions.

BEIJING HUADE HYDRAULIC INDUSTRAL GROUP Co.,LTD	Electrical amplifier HD-VT-VSPA1-1 and HD-VT-VSPA1K-1			

Features:

- Suitable for controlling all direct and pilot operated proportional pressure control valves without electrical position feedback and only one solenoid as actuator that are available at the time of publication of this data sheet.
- Differential input, can be switched between voltage and current input
- Additional command value input 0 to + 9 V
- Ramp generator, separately adjustable for "up" and "down" ramps
- Clocked current output stage
- Message "Ready for operation" (HD-VT-VSPA1K-1 only with LED display)
- Reverse voltage protection for voltage supply
- Cable breaks detection for current input 4 to 20 mA
- Short-circuit protection of the solenoid cable
- Cable breaks detection for the solenoid cable



Card holders for HD-VT-VSPA1-1:

- Type VT 3002-2X/32
  Simple card holder without power supply unit

Power supply unit:

- Type VT-NE30-1X
  Compact power supply unit 115/230 VAC → 24 VDC, 70 VA

Ordering code:

HD – VT-VSPA1 – 1– 1X/ *

Technology of Beijing Huade Hydraulic =HD

Amplifier for controlled proportional pressure control valves, analogue,with one solenoid

With 32-pin male connector and front panel =No code
With 16-pin terminal strip; without front panel =K

Series 10 to 19
(10 to 19: unchanged technical data and pin assignment) =1X

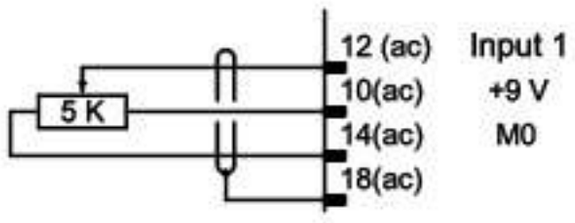
Further details in clear text

When odering spares for the amplifiers VT 2000 (up to series 4X), VT 2010, VT 2013 or VT 2023 for rack installation, the blind plate 4TE/3HE must be ordered separately.

Functional description:

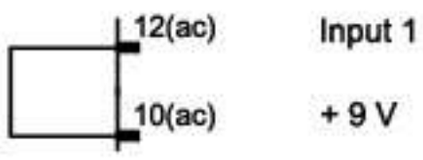
The command value voltage is fed to command value input 1, either directly or via an external command value potentiometer with the regulated voltage + 9 V from the power pack [14].
The following is valid for this input: + 9 V = + 100 % [1].

External command value feed forward

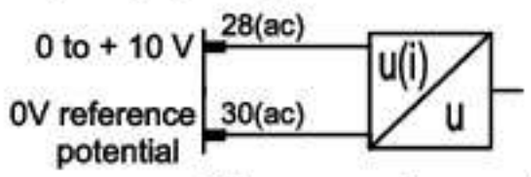


Note:
When using an external command value potentiometer, the internal potentiometer "Gw" [3] must be set to maximum value or to the required maximum pressure.

Internal command value preselection



Differential input (input 2)



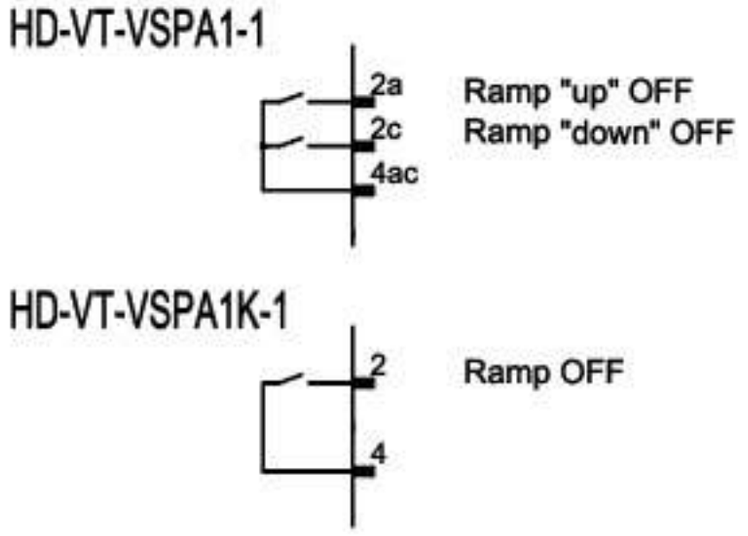
The supplement to the connection designations in brackets is only valid for type HD-VT-VSPA1-1.

Command value input 2 is a differential input [1] (0 to + 10 V). With the help of DIL switches[2]; it can be configured as current input (4 to 20 mA or 0 to + 20 mA). If the command value is provided by external electronics with another reference potential (e.g. from a PLC), this input must be used. When the command value voltage is applied or withdraw, care must be taken that both cables are disconnected from or connected to the input.
Before being passed on, both command values are summated [2] and then fed to a potentiometer [3] that is accessible on the front panel and acts as an attenuator, thus limiting the maximum command value.

The ramp generator [4] connected downstream generates a ramp-shaped output signal from a stepped input signal. The time constant of this signal can be adjusted separately for the "up" and "down" ramps with the help of two potentiometers. The indicated ramp time refers to a command value step-change of 100% and can be approx. 1 s or 5 s, depending on the setting by means of a DIL switch 2). If a command value step-change less than 100 % is fed to the input of the ramp generator, or the attenuator [3] is active, the ramp time shortens accordingly.

The following is valid for type **HD-VT-VSPA1-1**: Due to the external contacts "Ramp Up/Down OFF" the up and down ramp times can be set separately to their minimum value (approx. 30 ms).
The following is valid for type **HD-VT-VSPA1K-1:** Due to the external contacts "Ramp Up/Down OFF" the up and down ramp times can both be set to their minimum value (approx. 30 ms).

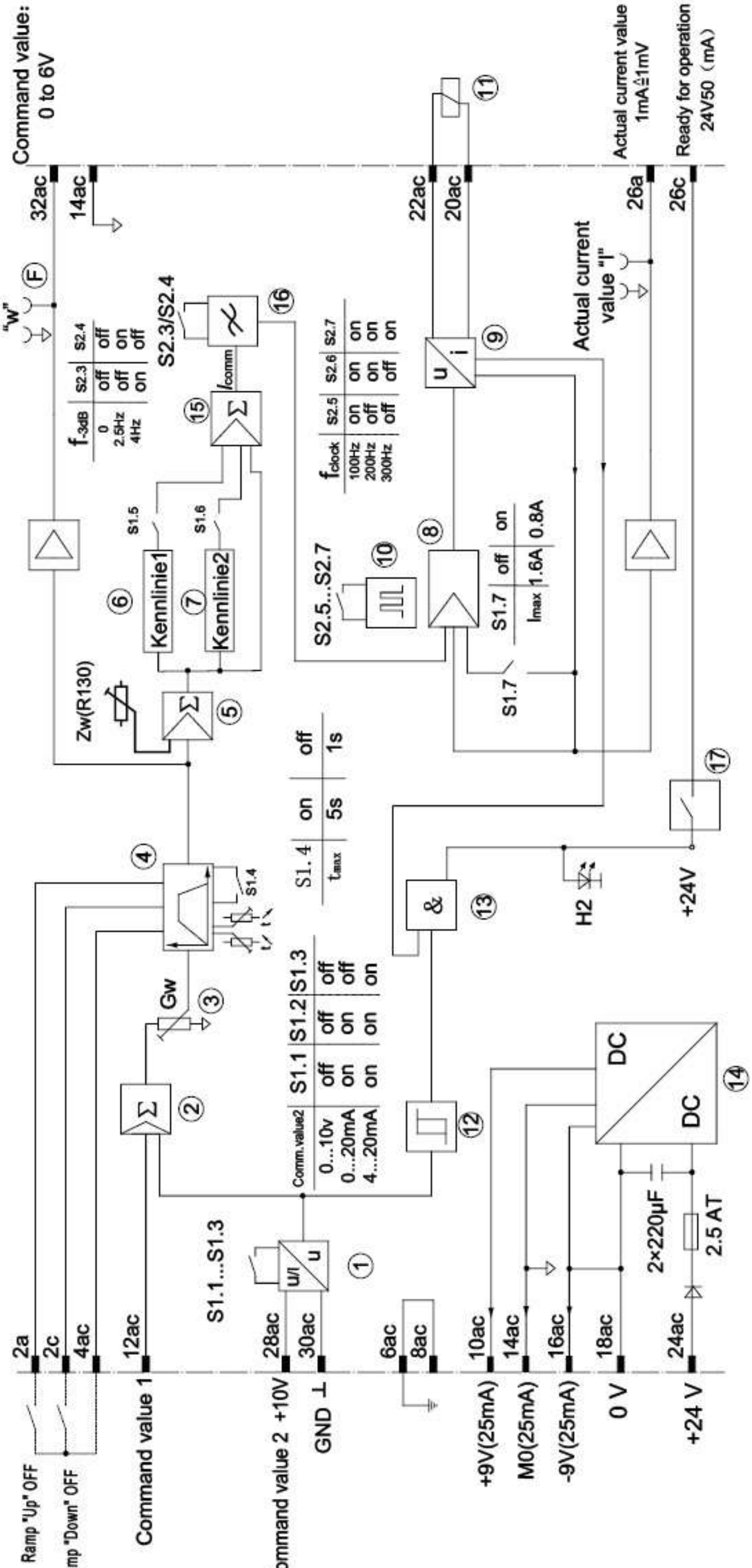
Ramp" Up/Down OFF"



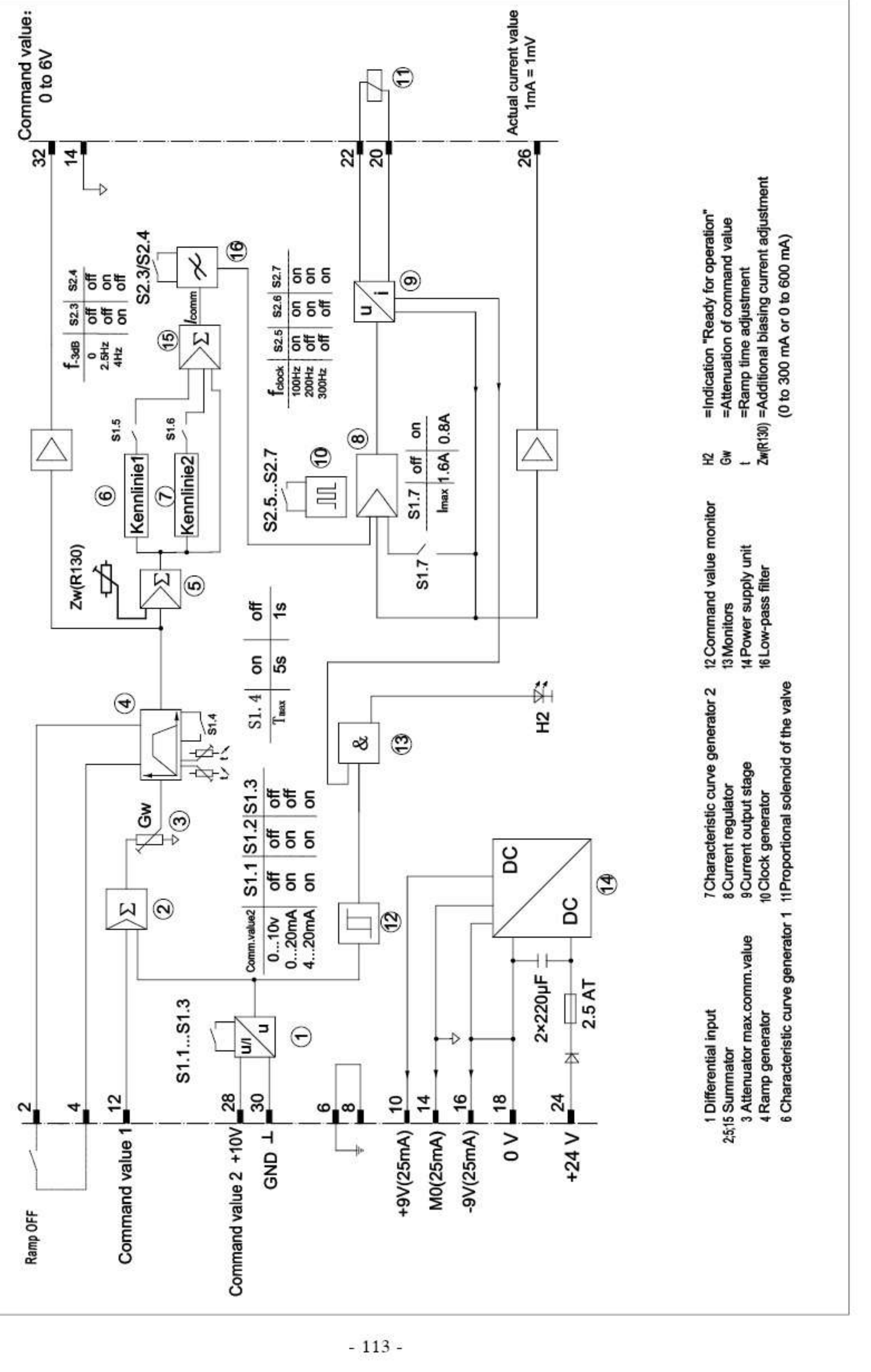
The output signal of the ramp generator [4] is fed as current command value to the summation amplifier [5]. Here, a command value of 100 % corresponds to a voltage of + 6 V.
The summation amplifier [5] adds the output signals of the characteristic curve generators [6 or 7] to the command value (can be selected via DIL switches 2); depending on the valve to be controlled).
The current command value can be filtered through a low-pass that can be cut in. The current output stage [9] is controlled via the current regulator [8]. Inaddition, the urrent regulator modulates the current command value with the clock-pulse generator signal [10] (frequency can be programmed via DIL switches[2]). The clocked actual current value acts in the solenoid of the valve like a constant current with superimposed dither signal. Type HD-VT-VSPA1-1 is provided with measuring sockets for the internal command value and actual value.
The following is valid for the command value: + 6 V= 100 %
The following is valid for the actual value: 1 mV=1 mA
The signal "Ready for operation" is output and LED "H2" on the front panel (for HD-VSPA1-1) or LED "H2" (in the case of HD-VSPA1K-1) lights up when:
– the solenoid cables are not short-circuited and the output stage is not overloaded,
– a command value is applied (cable break detection),
– there is no cable break of the solenoid line.

1) Reference potential for command value 1 is M0 (measurement zero).
2) For DIL switch settings, see "Adjustment elements" on page116
[ ] ... Cross-reference to block circuit diagrams on pages 112 and 113.

Block circuit diagram/Pin assignment HD-VT-VSPA1-1



Block circuit diagram/pin assignment HD-VT-VSPA1K-1:



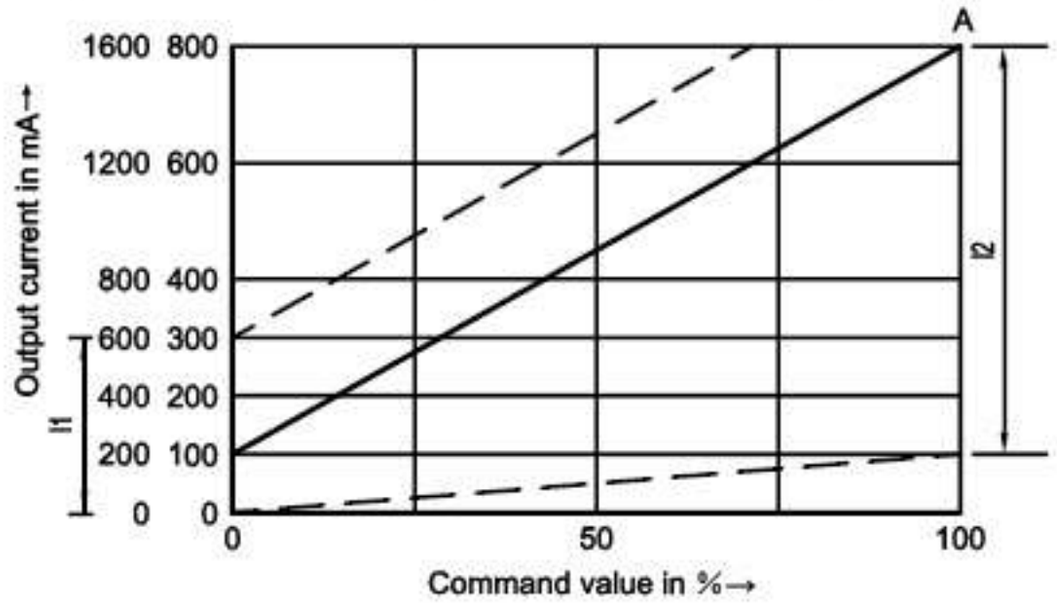
Technical data(For applications outside these parameters, please consult us!)

Operating voltage		U_0	24 VDC + 40 % - 5 %
Operating range:			
- Upper limiting value		$U_0(t)_{max}$	35V
- lower limiting value		$U_0(t)_{min}$	22V
Power consumption		P_S	<50VA
Current consumption		I	<1.8A
Fuse		I_F	2.5AT
Inputs:			
- Command values 1		U_i	0 to + 9 V (reference potential is M0)
- Command value 2 (differential input)		U_i	0 to +10 V; R_e= *100 kΩ*] Dependding on
	or	I_i	4 to 20 mA(load impedance R_e = *100* Ω] setting using
	or	I_i	0 to 20 mA(load impedance R_e = *100* Ω] S11 to S13
Ramp time (adjustment range)		t	30 ms to approx. 1 s or 5 s(depending on setting using S14)
Outputs:			
– Output stage			
• Solenoid current / resistance		I_{max}	800 mA + 20 %; $R_{(20)}$= 19.5 Ω] Depending on setting
	or	I_{max}	1600 mA + 20 %; $R_{(20)}$= 5.4 Ω] using S17[1)]
• Biasing current	at I_{max} = 800 mA	I_V	50 mA or 100 mA] Depending on setting using
	at I_{max} = 1600 mA	I_V	100 mA] S17 and "Zw" (R130)
additionally	at I_{max} = 800 mA	I_V	0 to 300 mA + 20 %] Adjustable using "Zw" (R130)
	at I_{max} = 1600 mA	I_V	0 to 600 mA + 20 %] on the printed board
• Clock frequency		f	100 Hz, 200 Hz, 300 Hz or 370 Hz; ± 10 % each (depending on setting with S25 to S27)
– Signal "Ready for operation" (only with HD-VT-VSPA1-1)			
• Series 10	when ready for operation	U	approx. U_0] load resistance > 10 KΩ
	in the case of a fault	U	< 1 V]
• From series 11	when ready for operation	U	approx. U_0; 50 mA
	in the case of a fault	U	0 V; R_i= 10 kΩ
– Regulated voltage		U	± 9 V ± 1 %; ± 25 mA.externally loadable
– Measuring sockets			
• Command value"w"		U	0 to + 6 V (+ 6 V =100 % solenoid current); R_i= 1 kΩ
• Actual current value "I"		U	0 to 1600 mV = 0 to 1600 mA ± 20 mA
Type of connection:			
– HD-VT-VSPA1-1			32-pin male connector, DIN 41 612, form D
– HD-VT-VSPA1K-1			16-pin terminal strip
Card dimensions			Euro-card 100 × 160 mm, DIN 41 494
Front panel dimensions:			
- Height			3 HE (128.4 mm)
- Width soldering side			1 TE (5,08 mm)
- Width component side			3 TE
Permissible operating temperature range			0 to 50 °C
Storage temperature range			-25 to + 85 °C
Weight		m	0,1 kg

[1)]The maximum current I_{max} can be adjusted to the required value with the help of the command value attenuator (potentiometer "Gw").

Output characteristic curves

Linear output characteristic curve(basic characteristic curve)

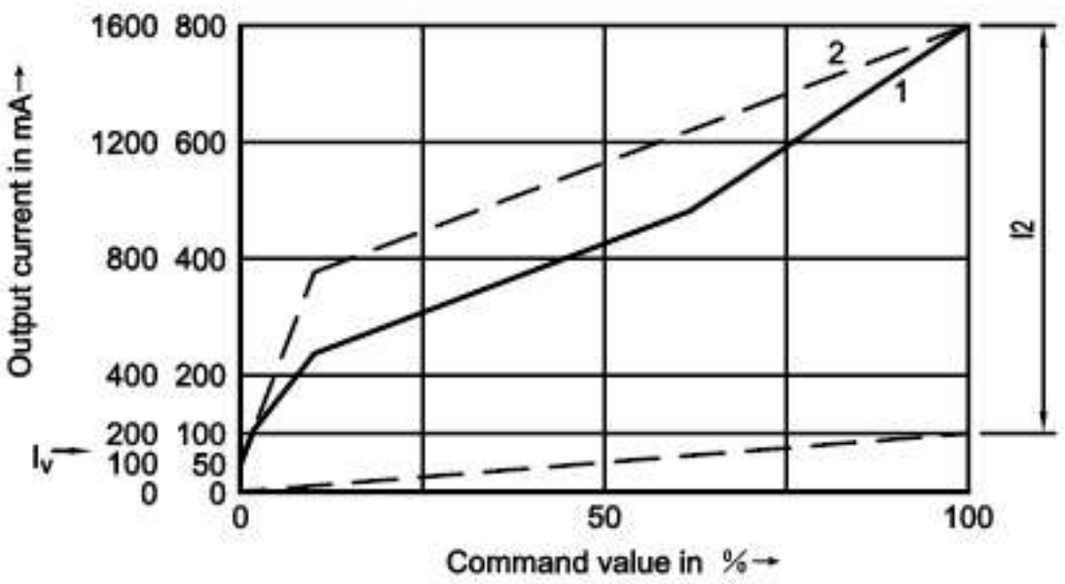


I1 Adjustment range of the biasing current for potentiometer "Zw" (R130) on the printed circuit board

I2 Adjustment range of the maximum command value for potentiometer "Gw"

A Characteristic curve when supplied

Output characteristic curve with fixed characteristic



I_v Biasing current (depending on selected characteristic curve)

I2 Adjustment range of the maximum command value for potentiometer "Gw"

1 Characteristic curve 1 (qualitative representation)

2 Characteristic curve 2 (qualitative representation)

Troubleshooting

If the amplifier card is not operable, follow the steps below for troubleshooting:

1. Operating voltage applied?
Measure contacts 24(ac) against 18(ac)
2. Fuse on the card defective?
3. Internal operating voltage ± 9 V available on the card?
4. When the internal command value potentiometer, is the jumper plugged from 10(ac) to 12(ac) set?
5. Is the external potentiometer correctly connected? (for the connection, see top left on page 111)
6. Is the differential input properly connected?
Check: Reference potential to 30(ac)
0 to + 10 V to 28(ac)
7. Is the solenoid correctly connected?
When the card is unplugged, a resistance of approx. 20 Ω to 30 Ω or 5 Ω to 8 Ω, depending on the valve type, must be available between contacts 22ac and 20ac.

The supplement to the connection designation in brackets refer to type HD-VT-VSPA1-1 only.

Note:

In the case of excessive temperatures (e.g. due to overloading), the output stage switches off. This fault is indicated by LED "H2" on the front panel going out!

In the case of a cable brake of the input "4 to 20 mA" the signal

"Ready for operation" is reset and LED "H2" goes out as well.

The following applies for series 11 or higher:

In the case of a short-circuit or cable break of the solenoid line, the

"Ready for operation" output clocks and LED "H2" flashes at a frequency of 0.5 to 2 Hz as soon as the command value is > 2 %.

Indicator/Adjustment elements

HD-VT-VSPA1-1, series 10

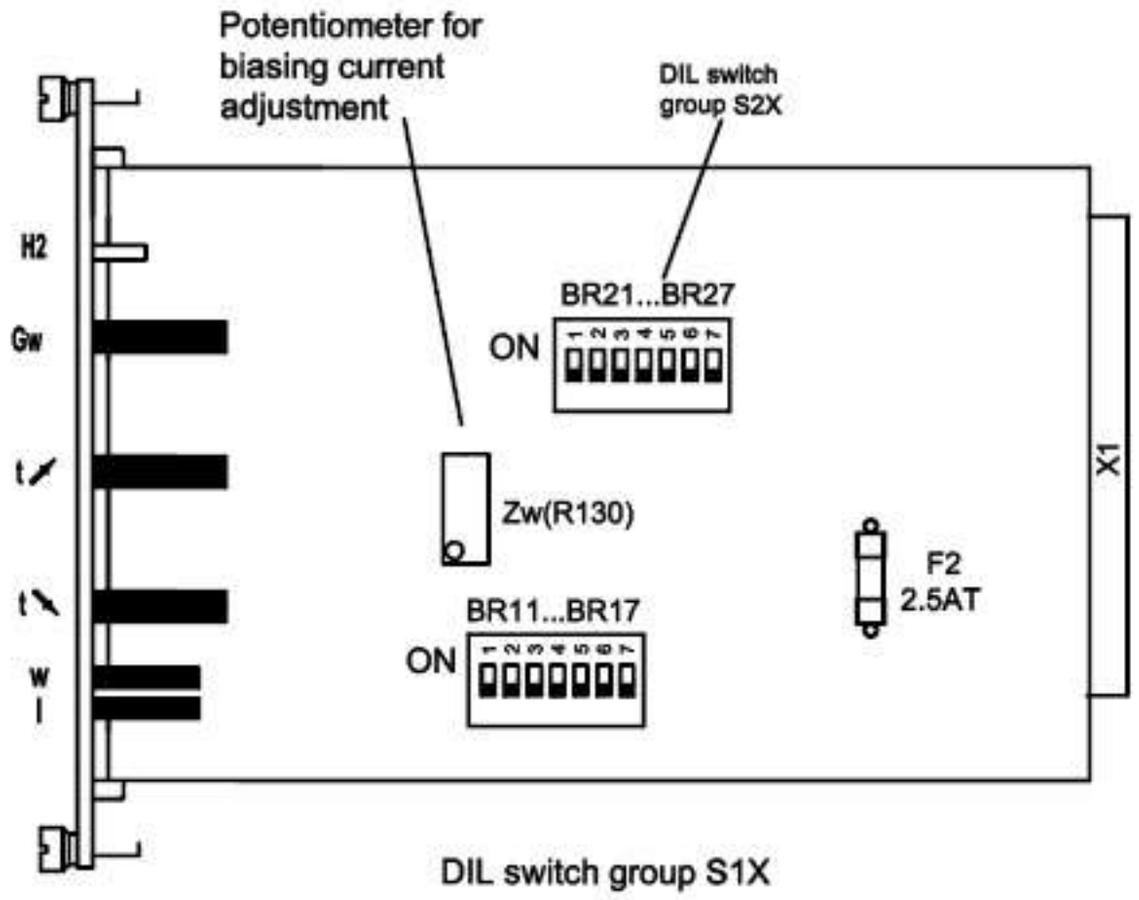
LED "Ready for operation"

Max. command value (attenuator)

Ramp time "Up"

Ramp time "Down"

w - Current command value
I - Actual current value



DIL switch group S1X

HD-VT-VSPA1-1, from series 11

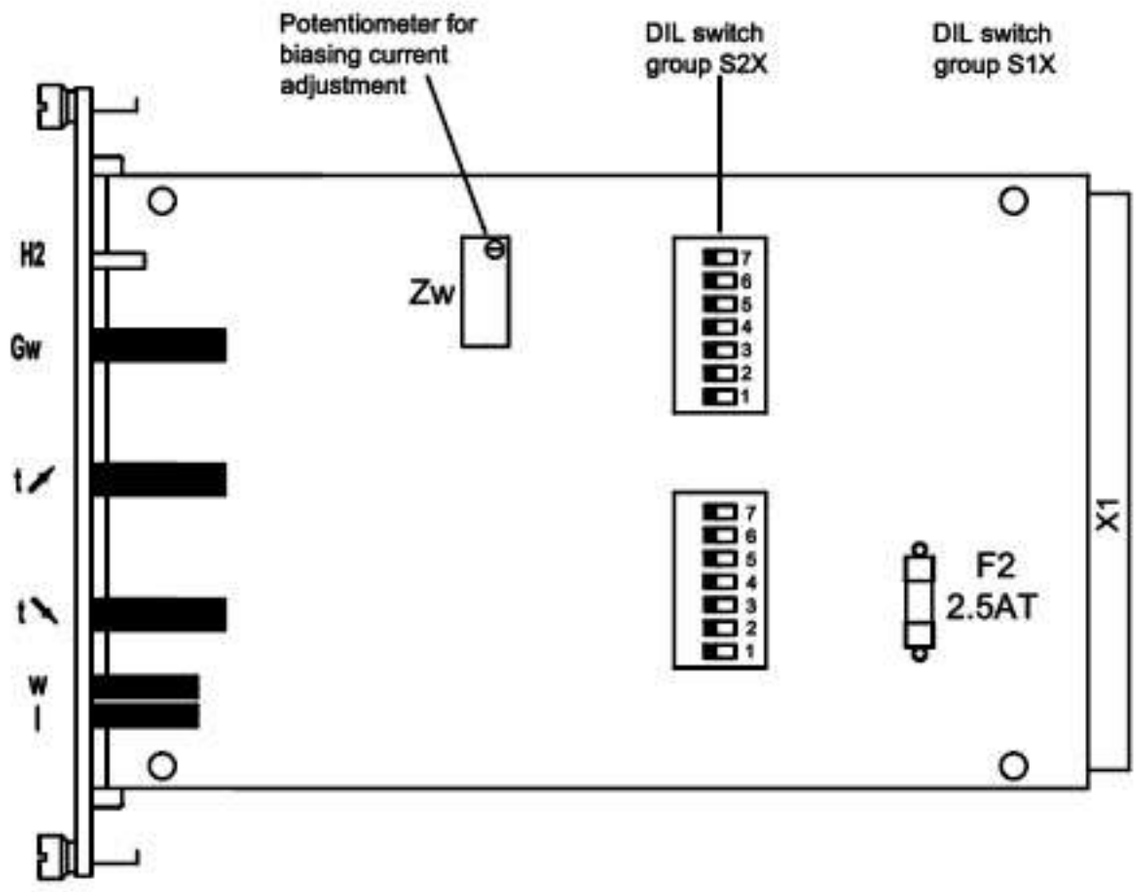
LED "Ready for operation"

Max. command value (attenuator)

Ramp time "Up"

Ramp time "Down"

w - Current command value
I - Actual current value

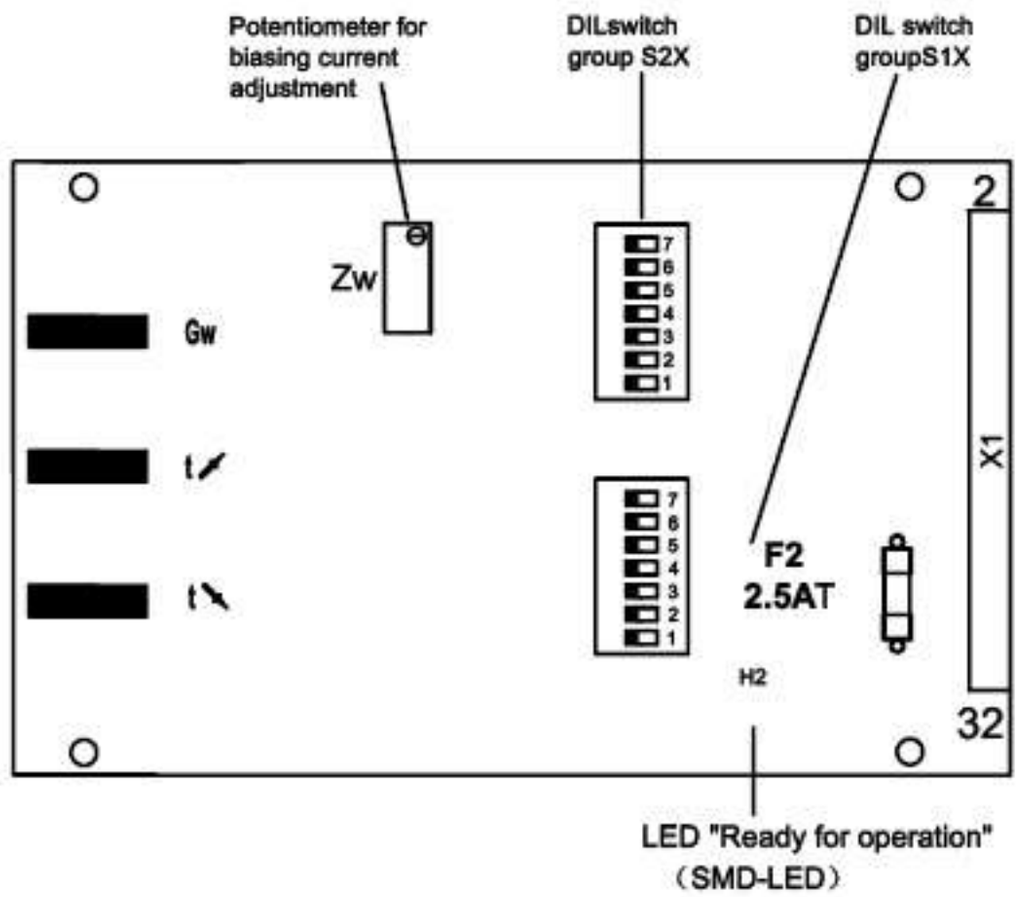


HD-VT-VSPA1K-1

Max. command value (attenuator)

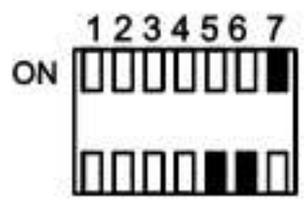
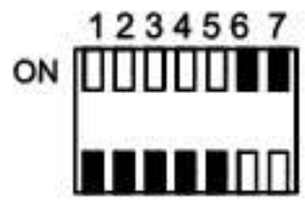
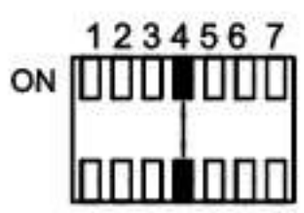
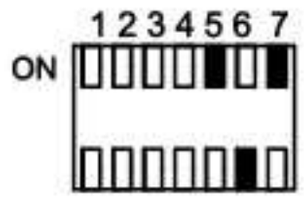
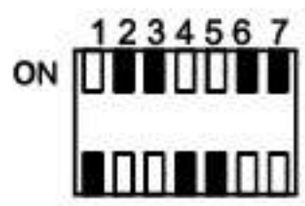
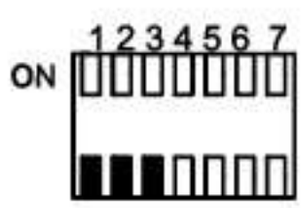
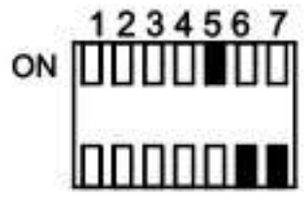
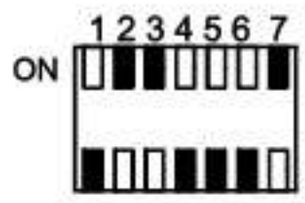
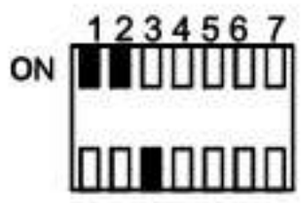
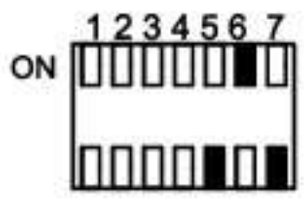
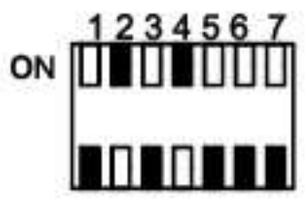
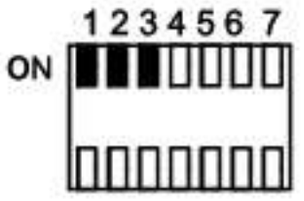
Ramp time "Up"

Ramp time "Down"



Indicator/Adjustment elements(continued)

Assignment of DIL switch settings on the card to the valve types (also see label on the printed circuit board)

Setting for value types:	S15 ··· S17 (BR15 ··· BR17)	S21 ··· S27 (BR21 ··· BR27)	Settings valid for all valve types:	S11 ··· S14 (BR11 ··· BR14)
DBE(M)T, DBE(M)30, DRE(M)30 3DRE(M)10 [1], 3DRE(M)16 [1], DBEP6A, DBEP6B, 3DREP6A, 3DREP6B, Pumpen			Ramp time 5 s 1 s	
DRE(M)10-5X, DRE(M)20-5X		 X	Comm. value 2 + 10 V	
DBE(M)10-5X, DBE(M)20-5X, 3DRE(M)10P-6X, 3DRE(M)16P-6X, ZDRE10, (Z)DBE6			0 ··· 20 mA	
DRE6, ZDRE6			4 ··· 20 mA	

[1] Up to series 5X

Function of potentiometers "Zw" (R130) and "Gw":

- Adjustment of the biasing current with the help of potentiometer "Zw" (R130)
  - Turning clockwise → increasing the biasing current
  - Turning anti-clockwise → reducing the biasing current
- Adjustment of the max. command value with the help of potentiometer "Gw"
  - Turning clockwise → increasing the command value
  - Turning anti-clockwise → reducing the command value

Note (X):

For type HD-VT-VSPA1-1 (series 10) switch BR22 must be set to "ON" and potentiometer "R130" must be turned to the left-hand limit stop before the correct characteristic curves can be set.

For type HD-VT-VSPA1-1 (series 11 or higher) and type HD-VT-VSPA1K-1 switch S22 is irrelevant. Potentiometer "Zw" does not to be actuated.

Meaning of DIL switches

Note:

Before commissioning the amplifiers, make sure that the DIL switches on the printed circuit board are set in according to the relevant application.

Switch settings referred to the current valve types or previous amplifier cards

Switch	Valve types/Amplifier cards			
	DBE(M)T, DBE(M)30, DRE(M)30 3DRE(M)10 [3], 3DRE(M)16 [3], DBEP6A, DBEP6B, 3DREP6A, 3DREP6B, Pumps	DRE(M)10-5X, DRE(M)20-5X	DBE(M)10-5X, DBE(M)20-5X, ZDRE10 (Z)DBE6 3DRE(M)10P-6X 3DRE(M)16P-6X	DRE6 ZDRE6
	VT 2000	VT 2010	VT 2013	VT 2023
	Characteristic curves			
	Basic characteristic curve	Characteristic curve 1	Characteristic curve 1	Characteristic curve 2
S15 (BR15)	OFF	ON	ON	OFF
S16 (BR16)	OFF	OFF	OFF	ON
	Command value filters			
		f_{-3dB} = 4 Hz	f_{-3dB} = 4 Hz	f_{3dB} = 2.5 Hz
S23 (BR23)	OFF	ON	ON	OFF
S24 (BR24)	OFF	OFF	OFF	ON
	Max.output current[1]			
	Imax=800mA	Imax=800mA	Imax=1.6A	Imax=1.6A
S17 (BR17)	ON	ON	OFF	OFF
	Clock-pulse frequency[2]			
	f = 200 Hz	f = 200 Hz	f = 300 Hz	f = 370 Hz
S25 (BR25)	OFF	OFF	OFF	OFF
S26 (BR26)	ON	ON	OFF	OFF
S27 (BR27)	ON	ON	ON	OFF
	Basic biasing current setting			
"Zw" (R130)	100mA	50mA	100mA	100mA

[1] Doubling of the maximum output current also doubles the adjustment range and the set biasing current.

[2] For f = 100 Hz the DIL switches S25, S26 and S27 must be set to the "ON" position.

[3] Up to series 5X

Adjustment range of biasing current using (potentiometer "Zw"(R130):

I_{max} = 800 mA - I_v = 0 to 300 mA

I_{max} = 1600 mA - I_v = 0 to 600 mA

( ) valid for HD-VT-VSPA1-1, series 10

When switch BR22 is operated, the biasing current increases by 50 mA or 100 mA.

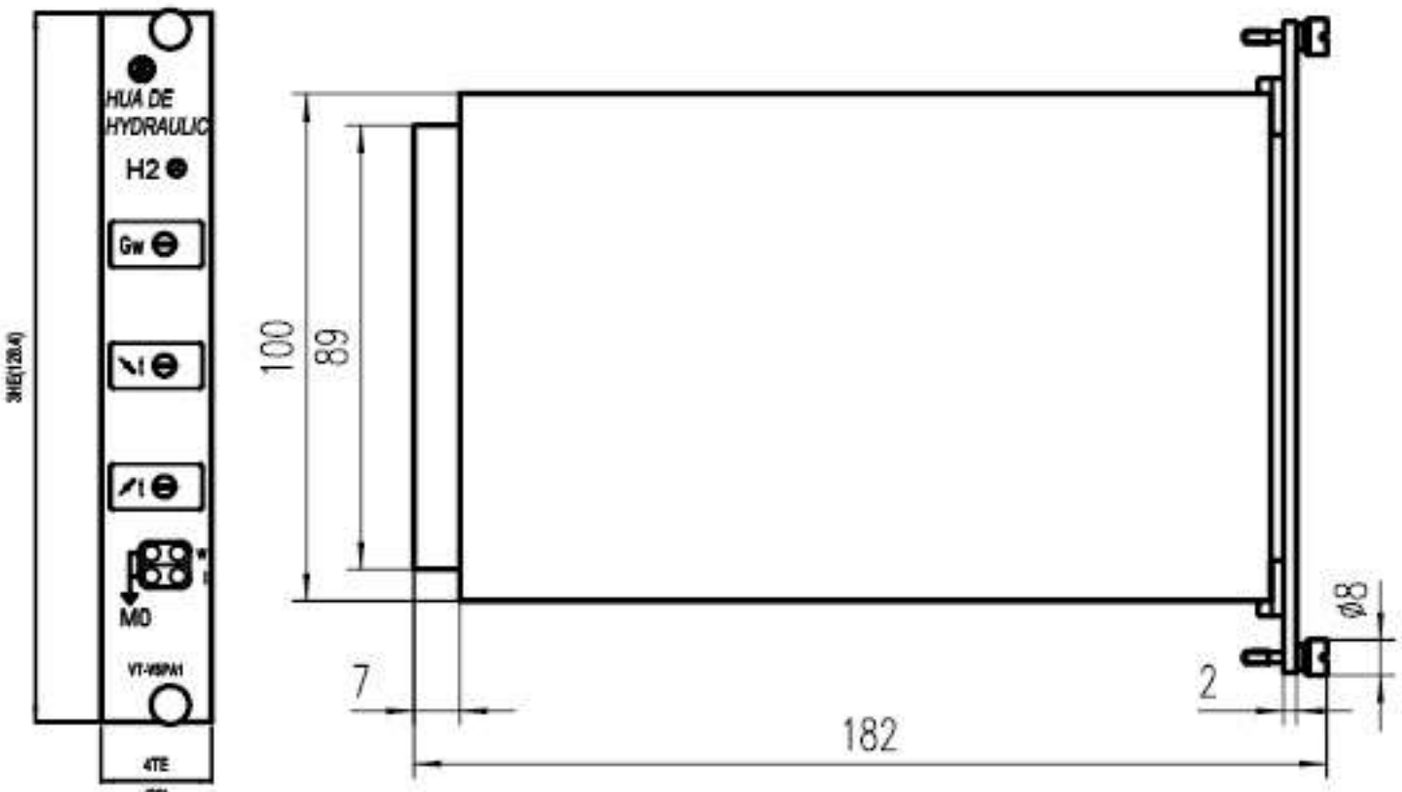
Adjustment options independently of the valve type (command value 2 and ramp time)

	Configuration of the differential input		
	Command value2: + 10 V	Command value2: 0 to 20mA	Command value2: 4 to 20mA
S11 (BR11)	OFF	ON	ON
S12 (BR12)	OFF	ON	ON
S13 (BR13)	OFF	OFF	ON
	Max. ramp time		
S14 (BR14)	OFF = 1s		ON = 5s

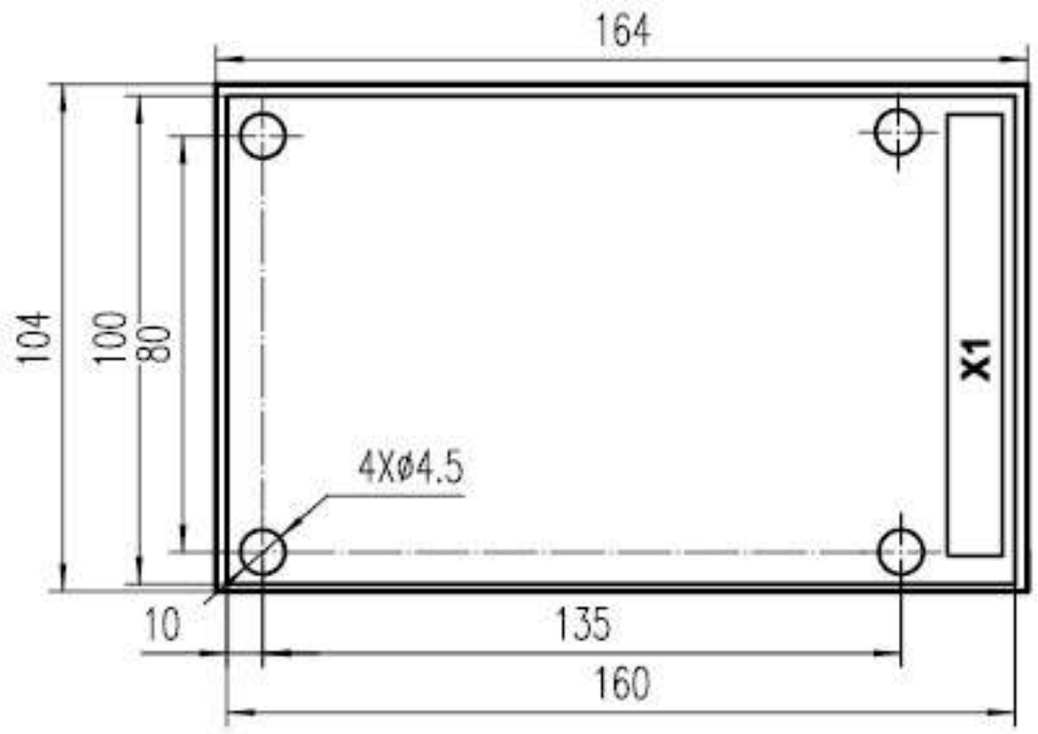
As supplied (corresponds to the configuration of a VT 2000 amplifier)

Unit dimensions (dimensions in mm)

HD-VT-VSPA1-1



HD-VT-VSPA1K-1



Engineering notes/Maintenance instructions/Supplementary information

- Before commissioning the amplifier, make sure that the DIL switches on the printed circuit board are set in accordance with the application at hand.
- When delivered, the parameters of the amplifier set as follows (for parameter setting, see pages 115 to 117):

max. ramp time = 5 s; biasing current = 100 mA; max. output current = 800 mA; clock-pulse frequency = 200 Hz

- The amplifier card may only be plugged or unplugged when disconnected from the power supply!
- Do not use plugs with free-wheeling diodes or LED indicator lamps for connecting the solenoids!
- Measurements on the card may only be taken using instruments Ri> 100 kΩ !
- Measurement zero (M0) is raised by + 9 V as against 0 V operating voltage and not electrically isolated, i.e. - 9 V regulated voltage= 0 V operating voltage. Therefore, do not connect the measuring zero (MO) to 0 V operating voltage!
- Use relays with gold-plated contacts for switching command values (small voltages, small currents)!
- Always shield command value cables; connect the shield end to 0V operating voltage , leave the on the other end open (Caution: Do not connect this end to ground!)

Recommendation: Also shield solenoid cables!

For solenoid cable lengths up to 50 m use cable type LiYCY 1.5 mm2.
For greater lengths, please consult us!

- The distance to aerial lines, radio sources and radar equipment must be at least 1 m!
- Never lay solenoid and signal cables near power cables!
- Due to the charging current of the smoothing capacitor on the card, back-up fuses must be of the slow-blowing type!
- **Caution:** When using the differential input, both inputs must be activated or deactivated simultaneously!

Note: Electrical signals brought out via control electronics (e.g. signal "Ready for operation") must not be used for switching safety-relevant machine functions!

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- ISO14001 Environment Managing System Certificate
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