HD-4WRLE-4X/

High Frequency Sounding Valve

BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO.,LTD.

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BEING ONE OF THE
BEST HYDRAULIC
BASE IN CHINA

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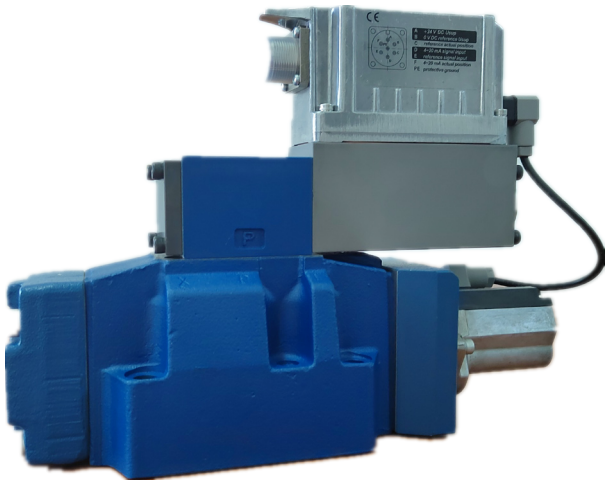
Type 4WRLE

Directional control valves, pilot-operated, with electrical position feedback and integrated electronics (OBE)

Size 10...27
Component series 4X
Maximum operating pressure 350bar
Rated flow: 60~ 600L/min(Δp=10bar)



Contents

Features

- Reliable – proven and robust design
- High quality – control spool and sleeve of the pilot control valve in servo quality
- Safe
  1.The control spool of the pilot control valve is in the "fail safe" position when the unit is switched off
  2.The control spool of the main valve is in the spring-centerde central position and/or in the offset position
- FLexible – suitable for position, velocity and pressure control
- Precise – high response sensitivity and little hysteresis

Ordering code

HD	-	4WRL	E	16	E	200	L	J	-	4X	/	M	XY	/	24	A1	*
01		02	03	04	05	06	07	08		09		10	11		12	13	14

01

HD	Beijing Huade Hydraulic Technology

02

4WRL	4 main ports,directional control valve, pilot-operated

03

E	With integrated electronics (OBE)

04

10	Size 10
16	Size 16
25	Size 25
27	Size 27

Symbols

05

E	E, E1-, W6-, W8-, V, V1-,Q3-; See "Hydraulic Symbols" table for details

Rated flow (Δp = 5 bar/control edge)

06

60	60 l/min (only symbol E, E1-, W6-, W8-, V, V1-)	10
100	100 l/min	
200	200 l/min (only symbol W6-, W8-)	16
250	250 l/min (only symbol E, E1-, V, V1-, Q3-)	
350	350 l/min (only symbol W6-, W8-)	25
400	400 l/min (only symbol E, E1-, V, V1-, Q3-)	
430	350 l/min (only symbol W6-, W8-)	27
600	400 l/min (only symbol E, E1-, V, V1-, Q3-)	

07

L	Linear
P	Linear with fine control range (available for NG 10, other sizes on request)
M	Progressive with linear fine control (only symbol Q3-)

HD	-	4WRL	E	16	E	200	L	J	-	4X	/	M	XY	/	24	A1	*
01		02	03	04	05	06	07	08		09		10	11		12	13	14

08

J	Overlap jump (opening point 5% with covered valve; only symbols E, E1-, W6-, W8-)

09

4X	Component series 40 …49 (40 …49: unchanged installation and mounting dimensions)

Seal material

10

M	NBR
V	FKM

Pilot oil flow

11

XY	External pilot oil supply, external pilot oil return
PY	Internal pilot oil supply, external pilot oil return
PT	Internal pilot oil supply; internal pilot oil return
XT	External pilot oil supply, internal pilot oil return

12

24	Supply voltage 24 V

Interfaces ofthe control electronics

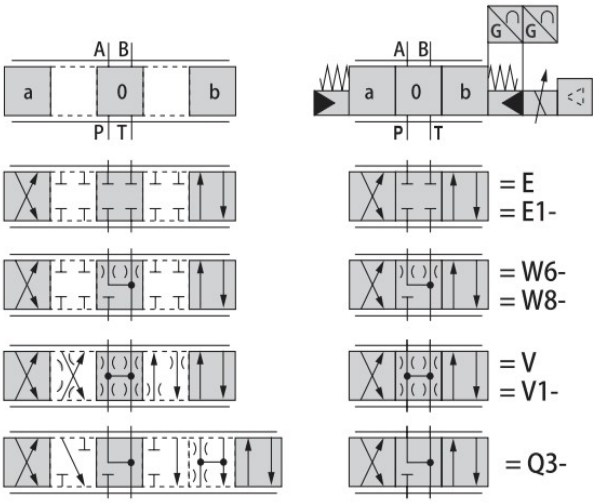
13

A1	C**ommand value input ±10 V**
F1	Command value input 4 …20 mA

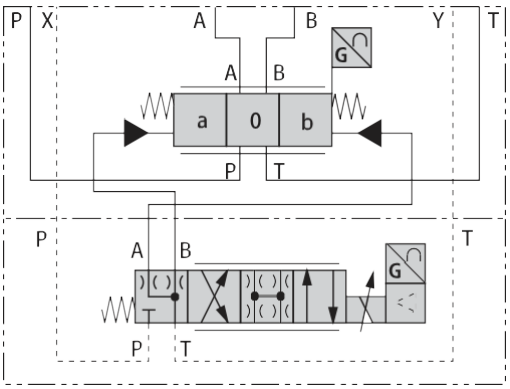
14

*	For further details, see the plain text

Symbols



detailed("XY")

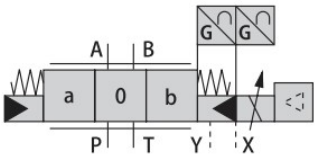


With symbol E1–, V1– and W8–:

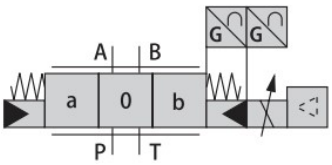
P→A: $q_{V\,nom}$ B→T: $q_{V\,nom}$ /2

P→B: $q_{V\,nom}$ /2 A→T: $q_{V\,nom}$

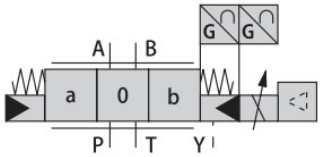
simple



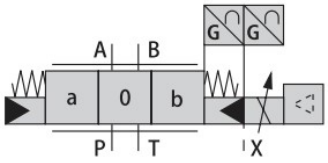
XY



PT



PY



XT

Function, section

The valve type 4WRLE is pilot-operated directional control valve with electrical position feedback and integrated electronics (OBE).

Valve composition:

1. Pilot valve with valve core and valve sleeve structure (1)
2. Main valve with centering spring and position feedback (2)
3. Integrated amplifier (3)

Function:

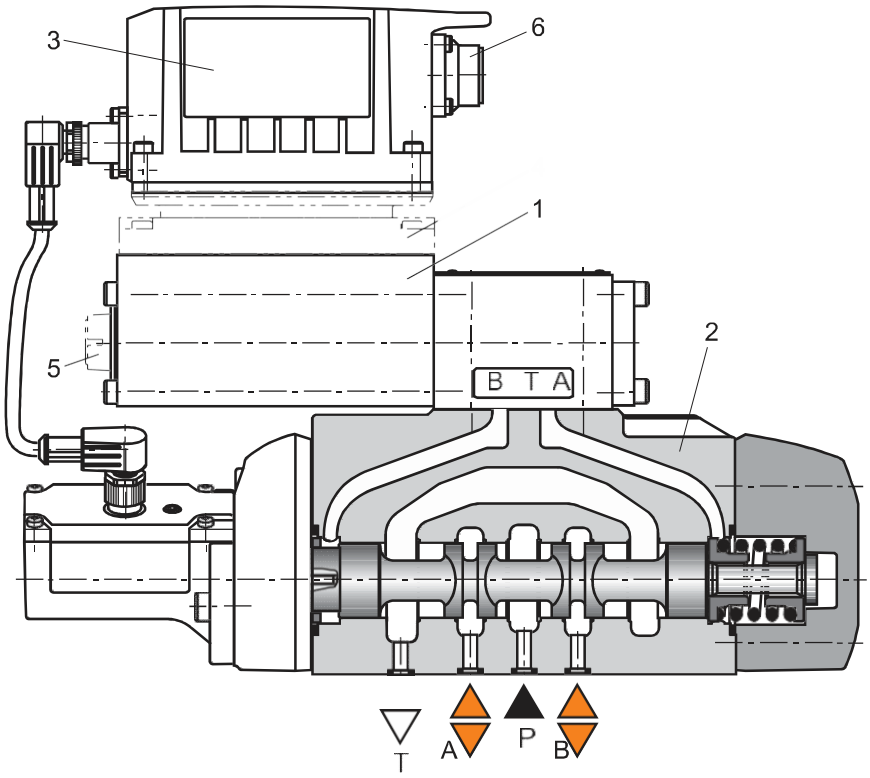
When the integrated electronics (OBE) are switched off or inactive, the control spool of the pilot control valve is spring-operated in the “fail-safe" position. The control spool of the main valve is in its spring-centered central position.

The integrated electronics (OBE) compare the specified command value to the position actual value of the main valve control spool. In case of control deviations, the control solenoid will be activated. Due to the changed magnetic force, the pilot control spool is adjusted against the spring.
The flow, which is activated via the control cross-sections, leads to an adjustment of the main control spool. The stroke/control cross-section of the main control spool is regulated proportionally to the command value.
The pilot oil supply in the pilot control valve is either internal via port P or external via port X. The feedback can be internal via port T or external via port Y to the tank.

Control solenoid shut-off

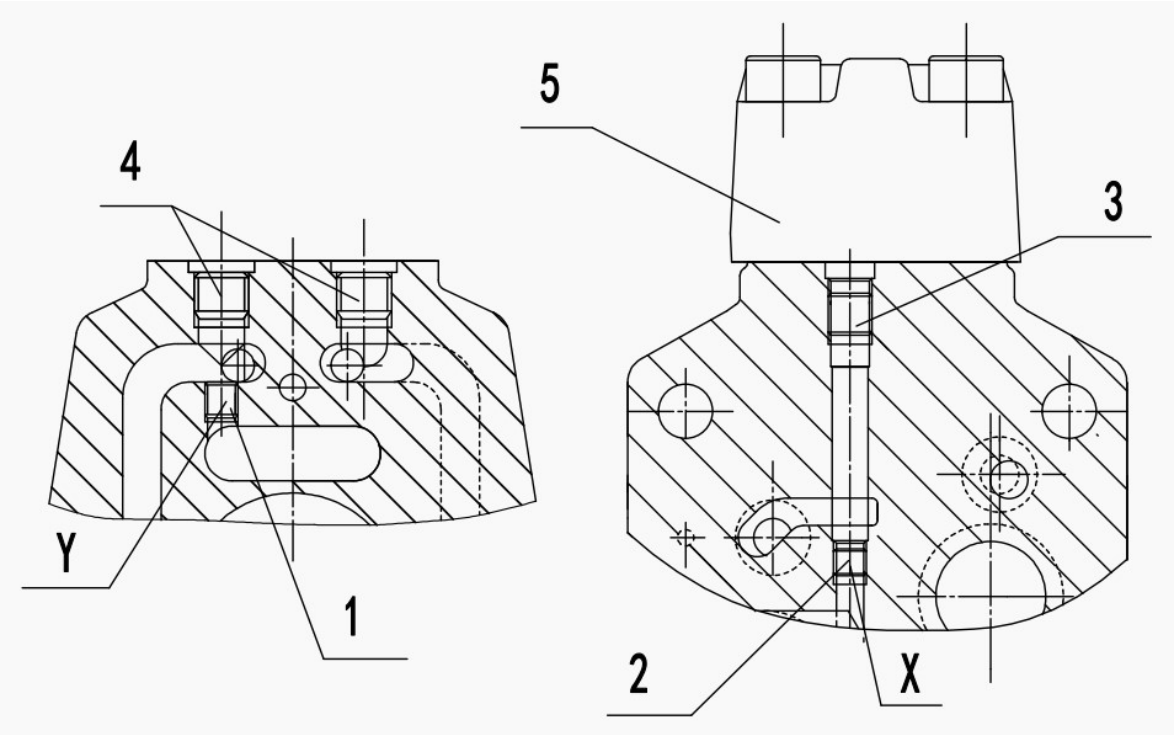
In case of the following errors, the control solenoids are de-energized by the integrated electronics (OBE), the pilot control spool is set to its “fail-safe” position and unloads the pilot oil chambers of the main valve. Operated by the spring, the main valve control spool will move to the central position.

HD-4WRLE...-4X/...



Function, section:

Pilot oil supply and drain (16 bore as an example)



1. Cone plug ZM6X1 for controlling pilot oil discharge
2. Cone plug ZM6X1 for controlling pilot oil supply
3.Cone plug ZM8X1
4.Cone plug ZM12X1.5
5. Main valve body end cover (away from the sensor side)

Pilot oil supply	Pilot oil return
External: 2 closed	Internal:1 open
External: 2 open	Internal:1 closed

Pilot oil supply

Version "XY"
External pilot oil supply
External pilot oil return
Inthis version, the pilot oil issupplied from aseparate control circuit (external).
The pilot oil return isnot directed intochannelT ofthe main valve but isseparately directed tothe tank via portY (external).

Version "PY"
Internal pilot oil supply
External pilot oil return
With this version, the pilot oil issupplied from channelP ofthe main valve (internal).
The pilot oil return isnot directed intochannelT ofthe main valve but isseparately directed tothe tank via portY (external).
Inthe subplate, portX istobe closed.

Version "PT"
Internal pilot oil supply
Internal pilot oil return
With this version, the pilot oil issupplied from channelP ofthe main valve (internal).
The pilot oil isdirectly returned tochannelT ofthe main valve (internal).
Inthe subplate, portsX and Y are tobe closed.

Version "XT"
External pilot oil supply
Internal pilot oil return
Inthis version, the pilot oil issupplied from aseparate control circuit (external).
The pilot oil isdirectly returned tochannelT ofthe main valve (internal).
Inthe subplate, port Y istobe closed.

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

Hydraulic								
Size		NG	10		16		25	27
Maximum operating pressure	▶ Ports A, B, P							
	External pilot oil supply	bar			350			270
	– Internal pilot oil supply	bar			280			270
	▶ Port X	bar			280			270
	▶ Ports T, Y	bar			250			210
Minimum pilot pressure (pilot control valve)		bar	10					
Maximum flow		l/min	300		800		1250	1850
Rated flow (***Δp*** = 5 bar/control edge) [2]		l/min	60/100		200/250		350/400	430/600
Pilot oil flow [3]	▶ Symbol E, W	l/min	2.4		3.5		7.5	
	▶ Symbol V, Q3-	l/min	4.5		11.5		22	
Maximum leakage flow (inlet pressure 100 bar)	▶ Symbol E, E1-							
	– Main valve	l/min	0.06		0.13		0.17	
	Main valve + pilot control valve	l/min	0.14		0.28		0.42	
	▶ Symbol W6-, W8-							
	– Main valve	l/min	0.12		0.26		0.35	
	Main valve + pilot control valve	l/min	0.2		0.41		0.6	
Maximum zero flow (inlet pressure 100 bar)	▶ Symbol V, V1-							
	– Main valve	l/min	1.7		2.3		2.8	3.3
	Main valve + pilot control valve	l/min	1.85		2.6		3.2	3.7
	▶ Symbol Q3-							
	– Main valve	l/min	0.4		1.6		1.8	2.2
	Main valve + pilot control valve	l/min	0.55		1.9		2.2	2.6
Flow unloading central position Δ***p*** = 5 bar/control edge			A→T	B→T	A→T	B→T	A→T	B→T	A→T	B→T
	▶ Symbol W6-	l/min	2.8	2.8	4	4	6	6	6	6
	▶ Symbol W8-	l/min	2.8	1.4	4	2	6	3	6	3
Pilot oil volume	0 ... 100%	cm^3	1.3		2.9		6.8		6.8	
Hydraulic fluid			Hydraulic oil according to DIN 51524... 535							
Viscosity range	▶ Recommended	mm^2/s	20 ... 100							
	▶ Maximum	mm^2/s	10 ... 800							
Hydraulic fluid temperature range (flown-through)		°C	-20 ... +70							
Maximum admissible degree of contamination of the hydraulic fluid; cleanliness class according to ISO 4406 (c)			Class 18/16/13 [4]							

[2] Flow for deviating ***Δp*** (control edge):

$$q_x = q_{Vnom} \times \sqrt{\frac{\Delta p_x}{5}}$$

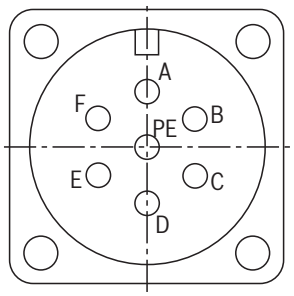
[4] The cleanliness classes specified for the components must be adhered to in hydraulic systems. Effective filtration prevents faults and simultaneously increases the life cycle of the components.

Static/dynamic						
Size (pilot pressure 100 bar)		NG	10	16	25	27
Hysteresis		%	< 0.1			
Response sensitivity		%	< 0.05			
Range of inversion		%	< 0.08			
Manufacturing tolerance q_{Vmax}		%	≤ 10			
Actuating time for 0 ... 100% at X=210 bar	▶ Symbols E, E1-, W6-, W8-	ms	25	37	36	36
Temperature drift (temperature range 20 °C ... 80 °C)		%/10 °C	Zero shift < 0.25			
Zero compensation			Ex plant ±1%			

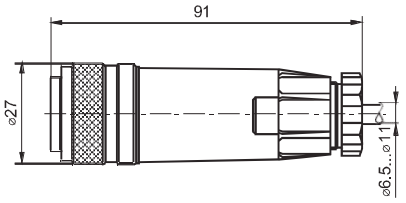
Electrical connections and assignment

Electrical, integrated electronics (OBE) – Interface “A1” and “F1”		
Relative duty cycle	%	100 (continuous operation)
Protection class according to EN 60529		IP 65 with mounted and locked plug-in connectors
Supply voltage	VDC	24
▶ Terminal A	VDC	min. 19 / max. 36
▶ Terminal B	VDC	0
Maximum admissible residual ripple	Vpp	2.5
Maximum power consumption	VA	40
Fuse protection, external	A_T	2.5 (time-lag)
Input, version "A1"		Differential amplifier, R_i = 100 kΩ
▶ Terminal D (U_E)	VDC	0 ... ±10
▶ Terminal E	VDC	0
Input, version "F1"		Load, R_{sh} = 200 Ω
▶ Terminal D (I_{D-E})	mA	4 ... 20
▶ Terminal E (I_{D-E})		Current loop I_{D-E} feedback
Maximum voltage of the differential inputs against 0 V		D → B; E → B (max. 18 V)
Test signal, version "A1"		LVDT
▶ Terminal F (U_{Test})	V	0 ... ±10
▶ Terminal C		Reference 0 V
Test signal, version "F1"		LVDT signal 4 ... 20 mA on external load 200 ... 500 Ω maximum
▶ Terminal F (I_{F-C})	mA	4 ... 20
▶ Terminal C (I_{F-C})		Current loop I_{F-C} feedback
Adjustment		Calibrated in the plant, see valve characteristic curves

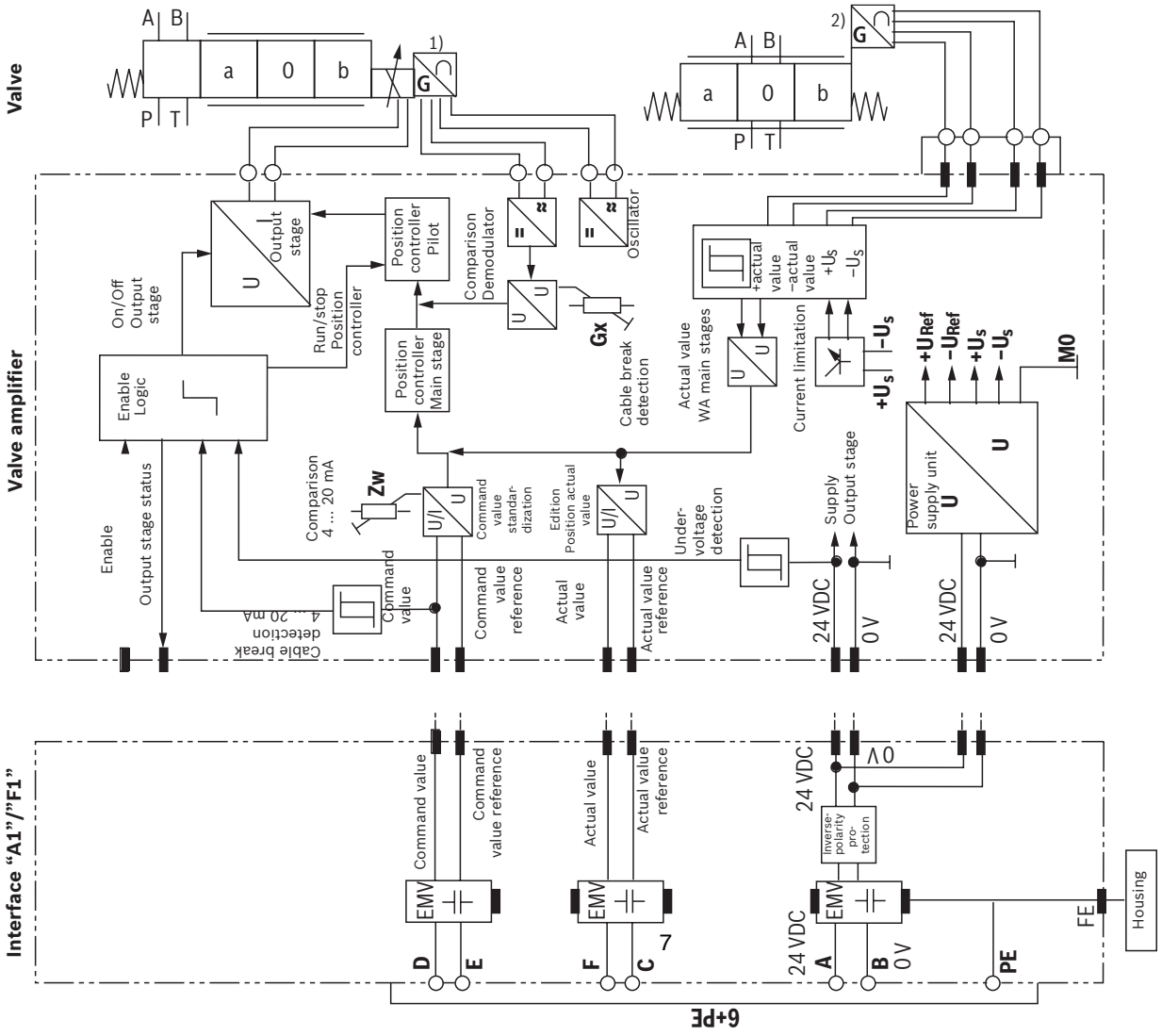
Contact	Interface assignment	
	"A1" (6 + PE)	**"F1"** (6 + PE)
A	24 VDC supply voltage	
B	GND	
C	Reference potential actual value	Reference potential actual value
D	Command value ±10 V (***Re*** > 100 kΩ)	Command value 4 ... 20 mA (***Re*** = 200 Ω)
E	Reference potential command value	Reference potential command value
F	Actual value ±10 V (***Ri*** ≈ 1 kΩ)	Actual value 4 ... 20 mA (Load max. 500 Ω)
FE	Functional ground (directly connected to the valve housing)	



Command value:	▶ Positive command value (0 ... 10 V or 12 ... 20 mA) at D and reference potential at E cause flow from P → A and B → T.
	▶ Negative command value (0 ... −10 V or 12 ... 4 mA) at D and reference potential at E cause flow from P → B and A → T.
Connection cable:	▶ Up to 20 m cable length type LiYCY 7 x 0.75 mm²
	▶ Up to 40 m cable length type LiYCY 7 x 1.0 mm²



Block diagram/controller function block



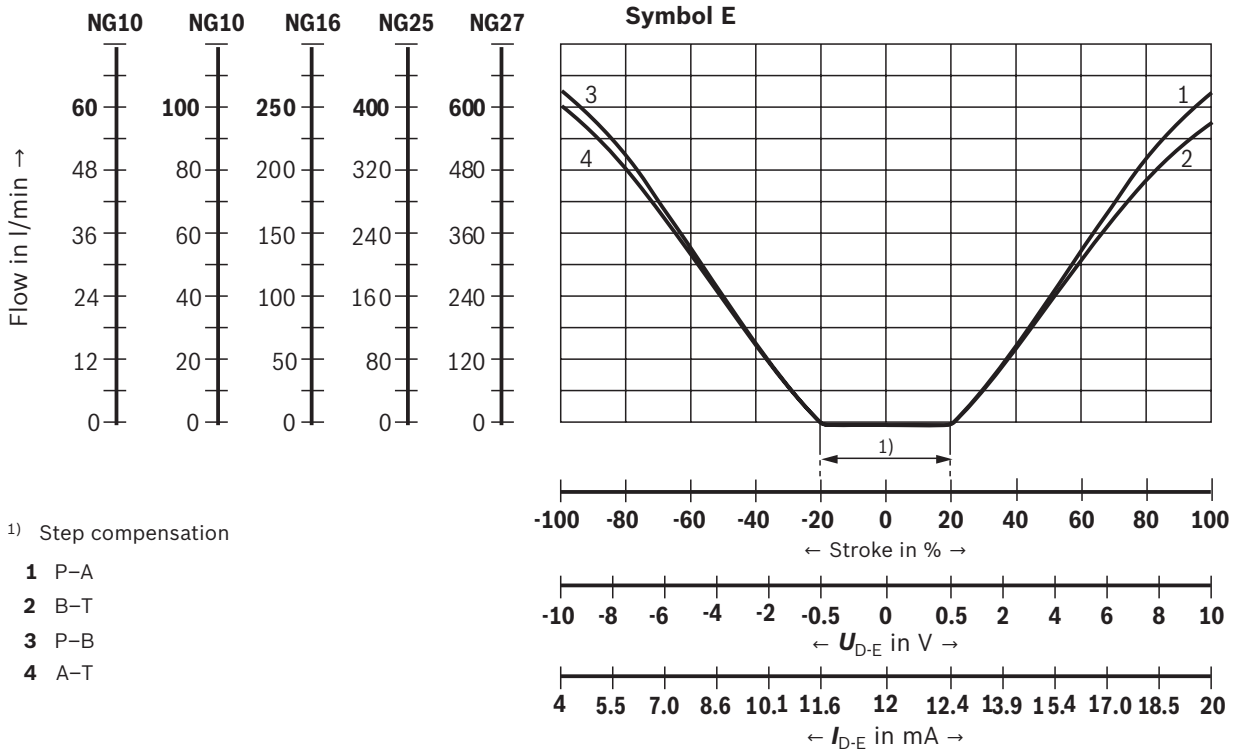
▲ The setting of the potentiometer at the factory must not be changed.

▲ Electrical signals provided via control electronics (e.g. actual value) must not be used for switching off safety-relevant machine functions.

1) Position transducer, pilot control valve
2) Position transducer, main valve

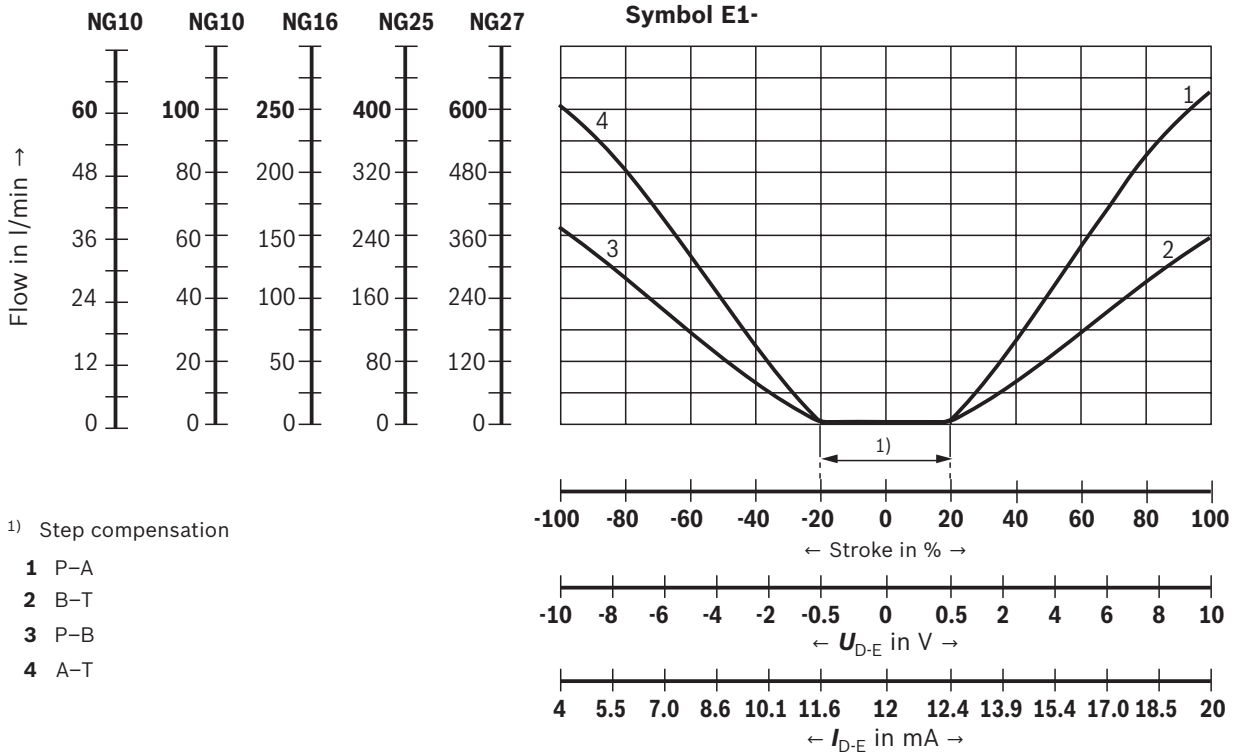
Characteristic curves: Flow characteristic “L”
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

Flow/signal function



1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

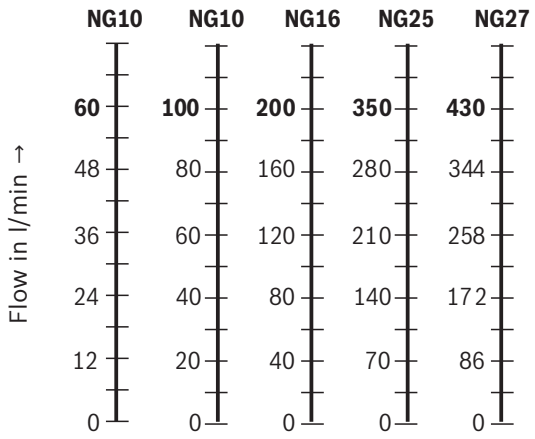


1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

Characteristic curves: Flow characteristic “L”
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

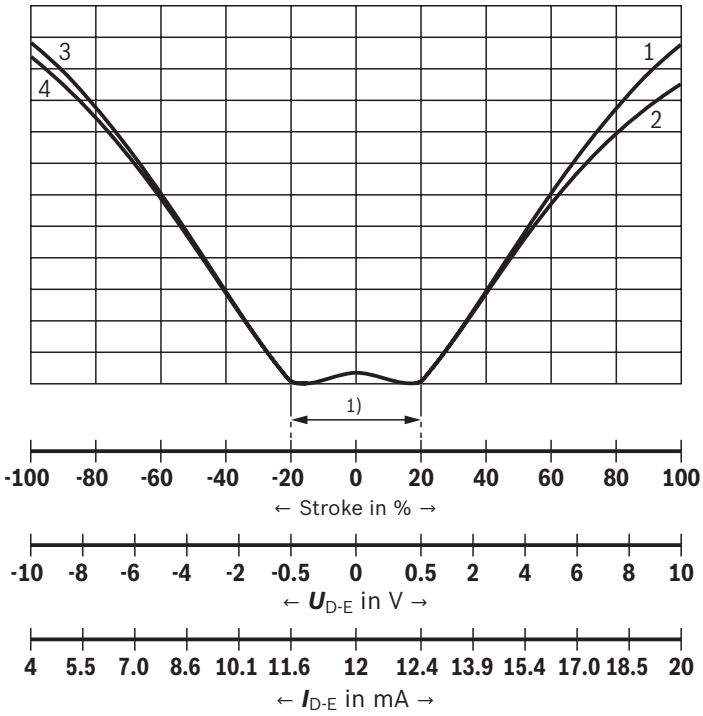
Flow/signal function

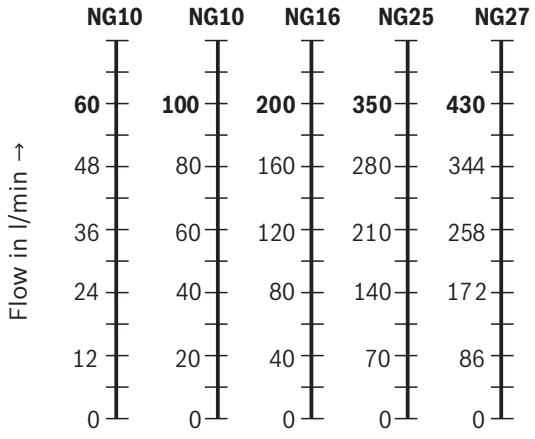


1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

Symbol W6-

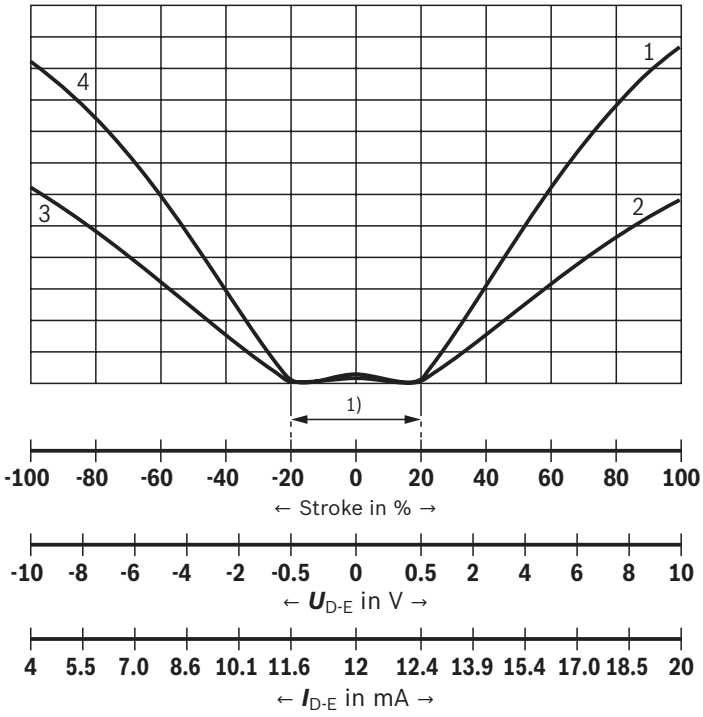




1) Step compensation

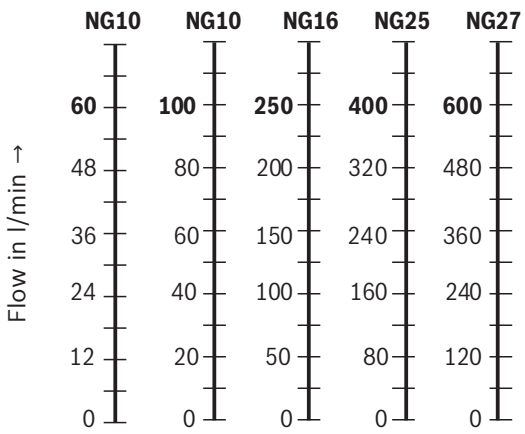
1 P–A
2 B–T
3 P–B
4 A–T

Symbol W8-



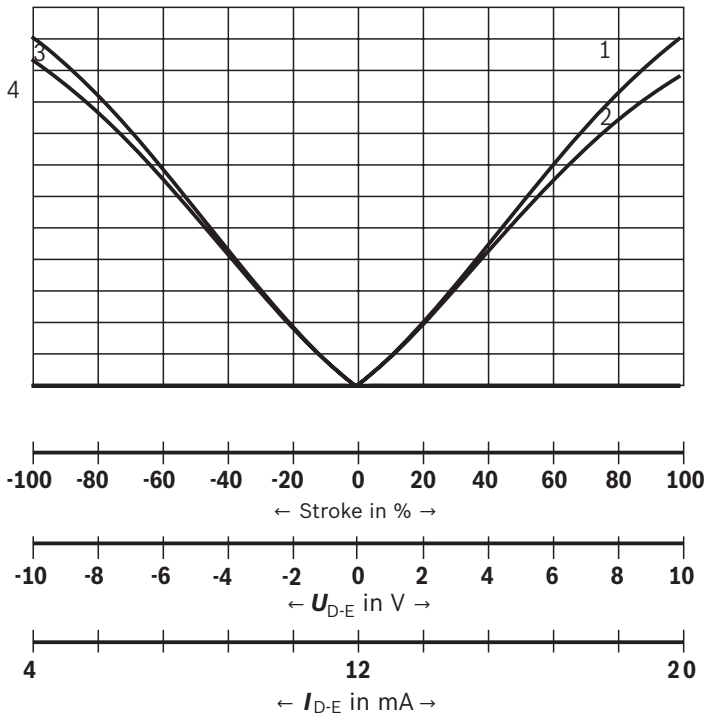
Characteristic curves: Flow characteristic “L”
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

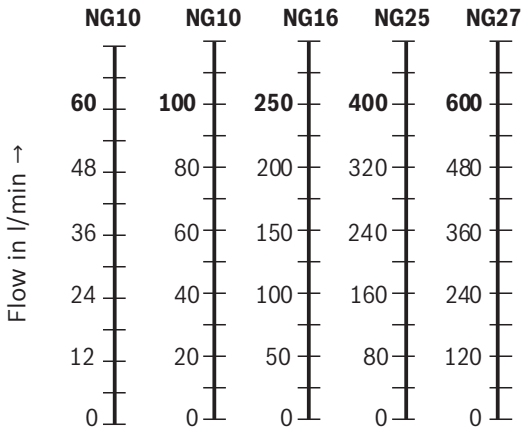
Flow/signal function



1 P–A
2 B–T
3 P–B
4 A–T

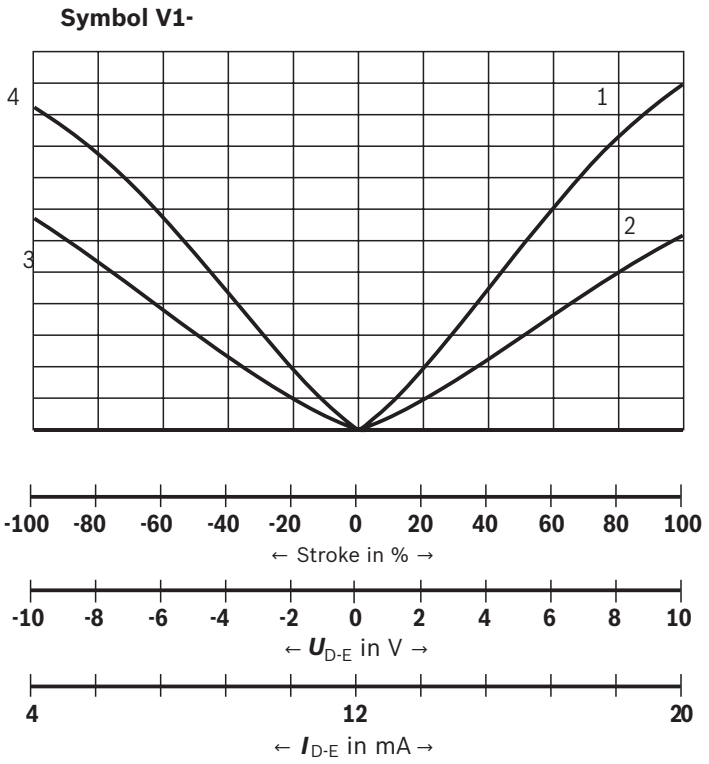
Symbol V





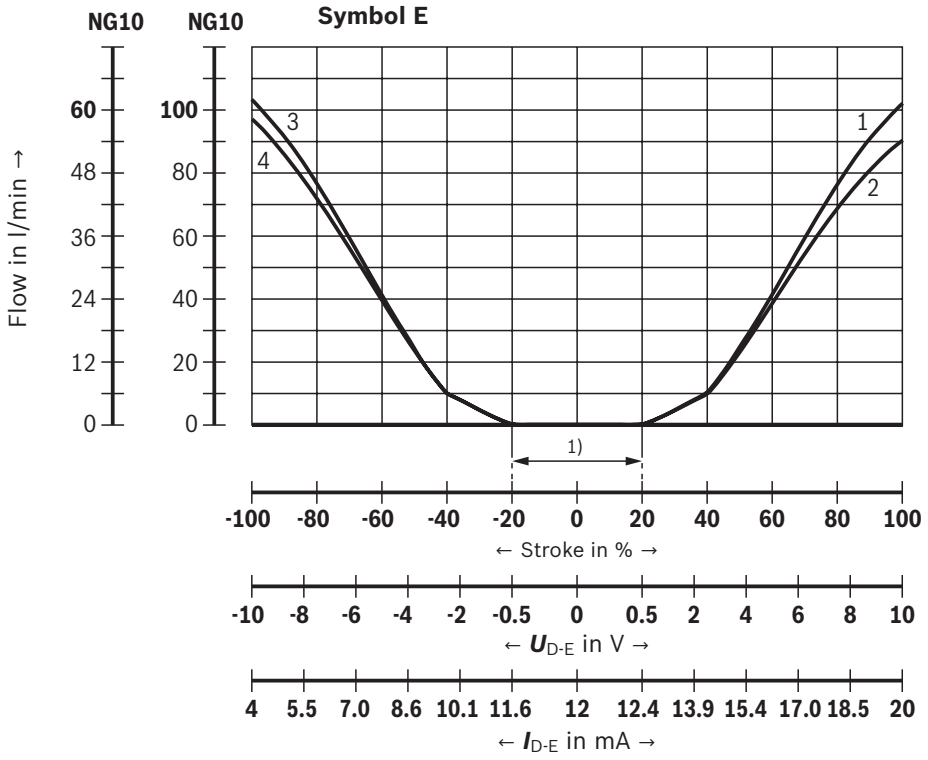
1 P–A
2 B–T
3 P–B
4 A–T

Symbol V1-



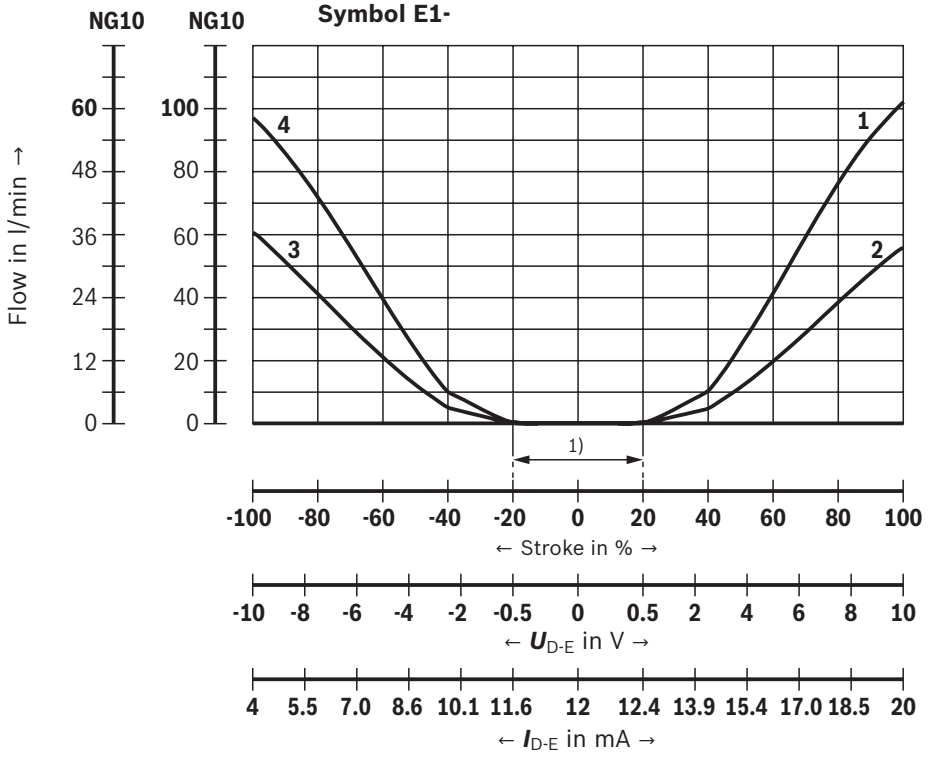
Characteristic curves: Flow characteristic “P”
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

Flow/signal function



1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

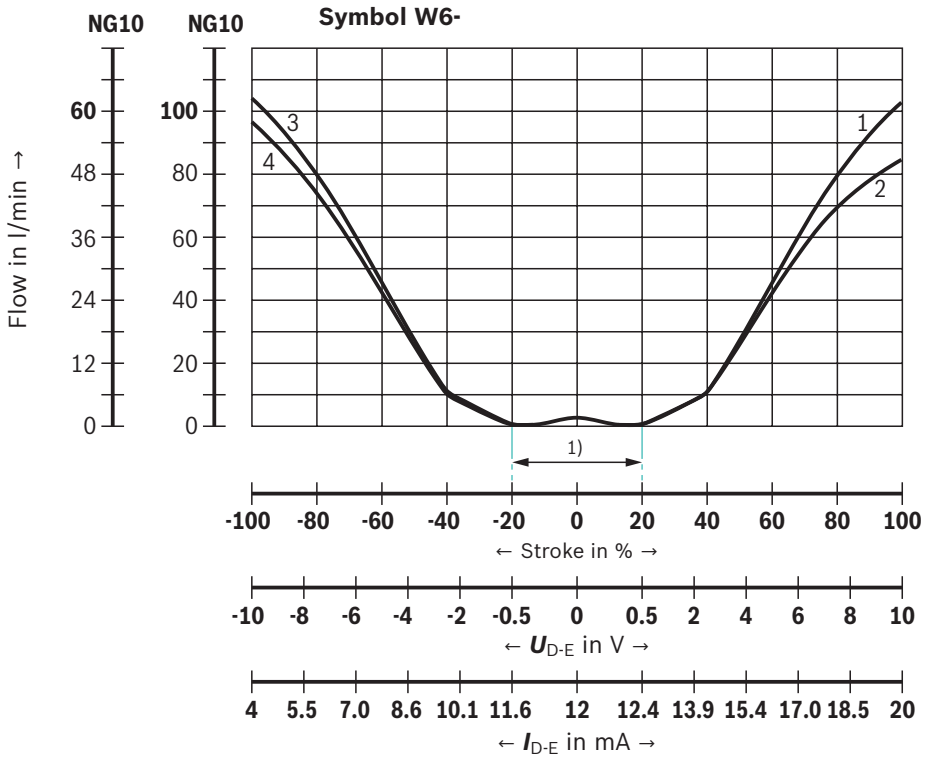


1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

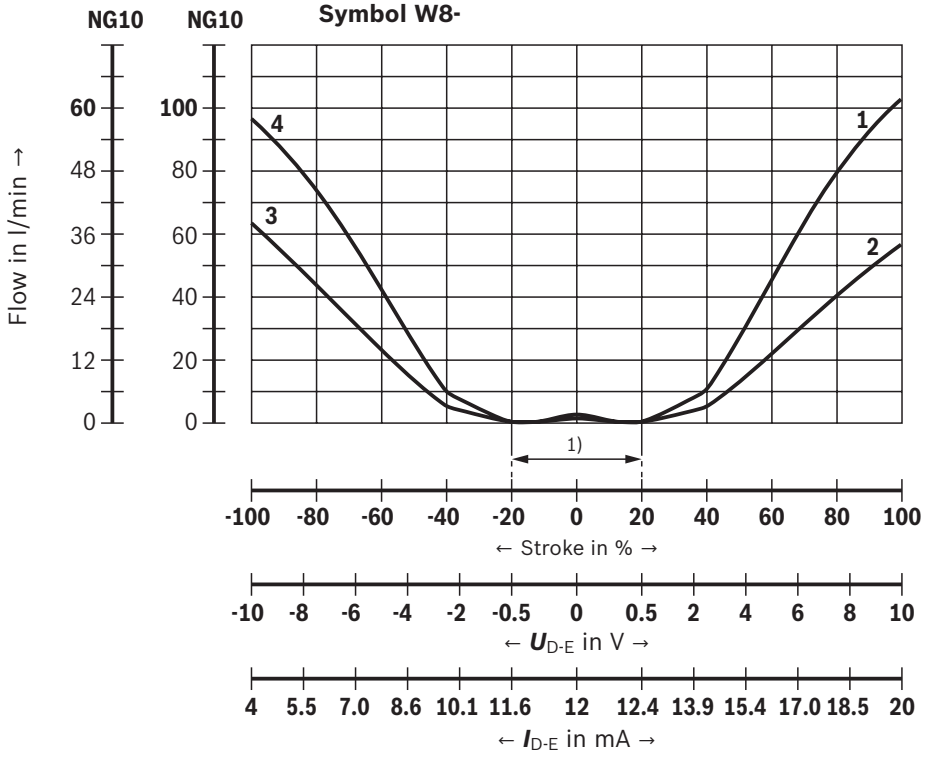
Characteristic curves: Flow characteristic “P”
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

Flow/signal function



1) Step compensation

1 P–A
2 B–T
3 P–B
4 A–T

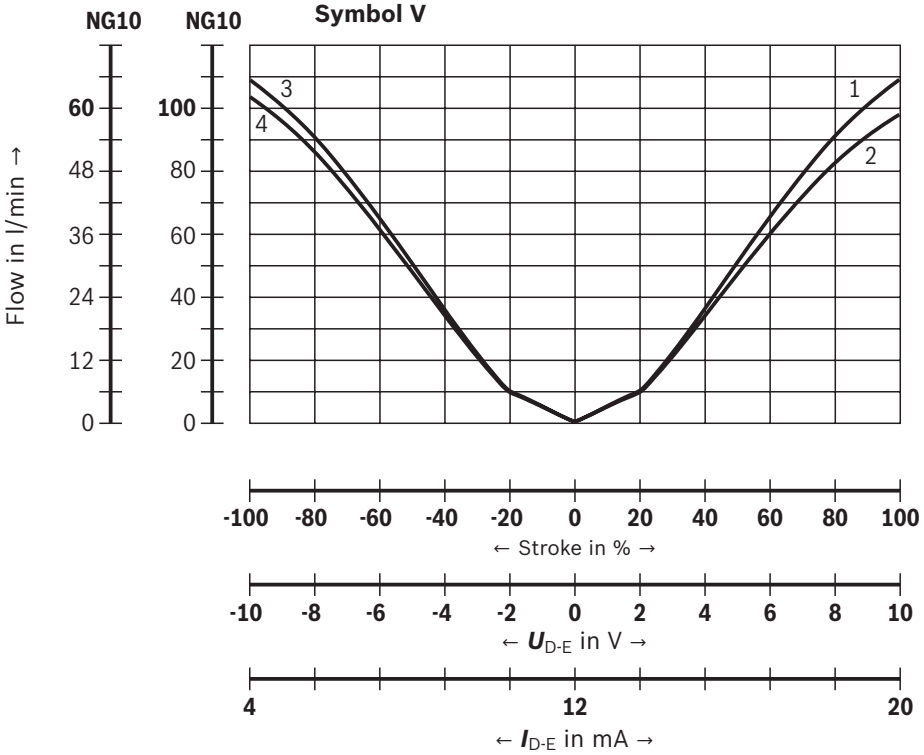


1) Step compensation

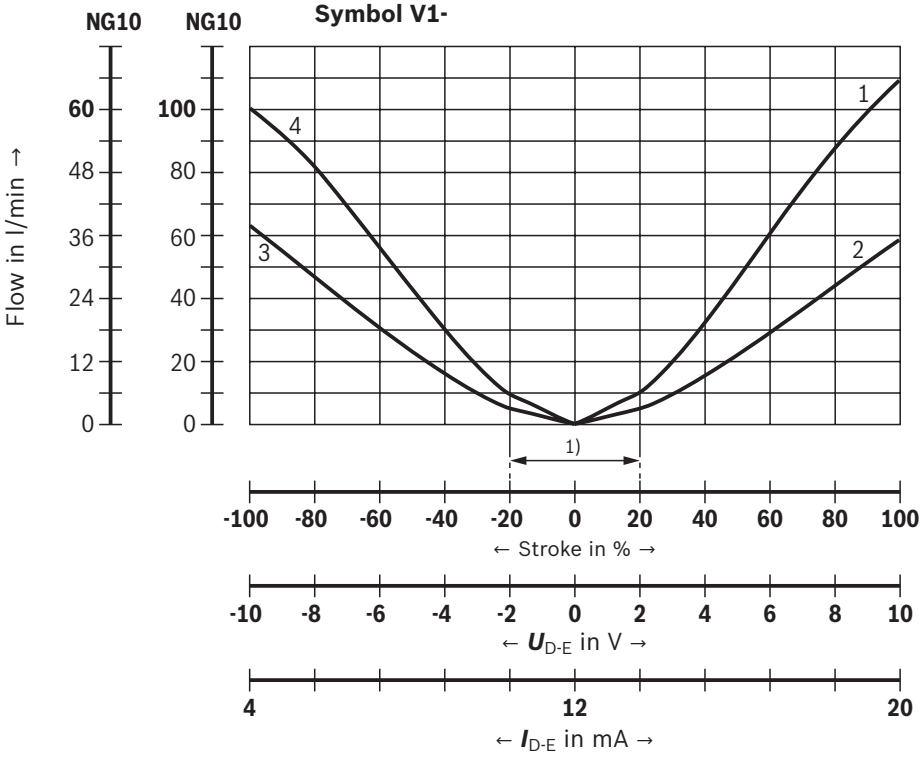
1 P–A
2 B–T
3 P–B
4 A–T

Characteristic curves: Flow characteristic “P”
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

Flow/signal function



1 P–A
2 B–T
3 P–B
4 A–T

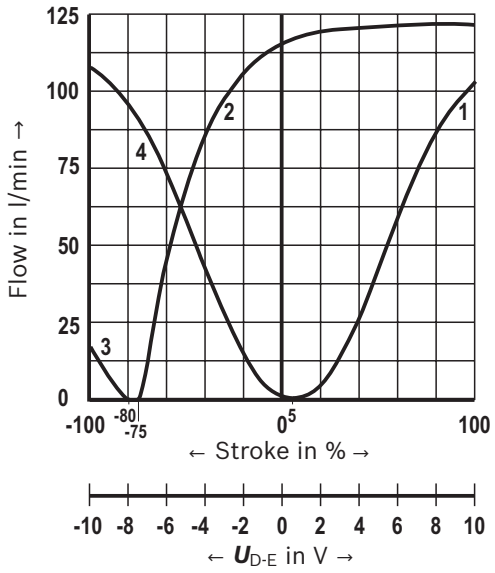


1 P–A
2 B–T
3 P–B
4 A–T

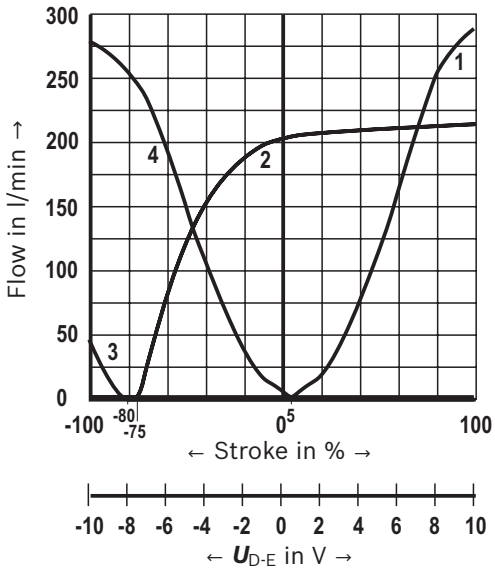
Characteristic curves: Flow characteristic "M"
(valid for HLP46, ϑ_{oil} = 40 ±5 °C; Δp = 5 bar/control edge)

Flow/signal function

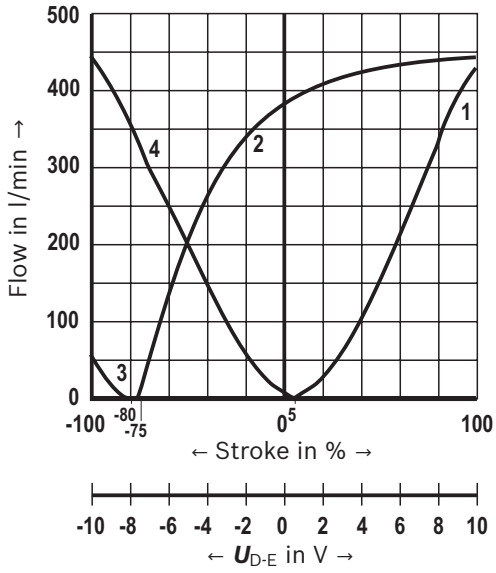
Symbol Q3, version "100"



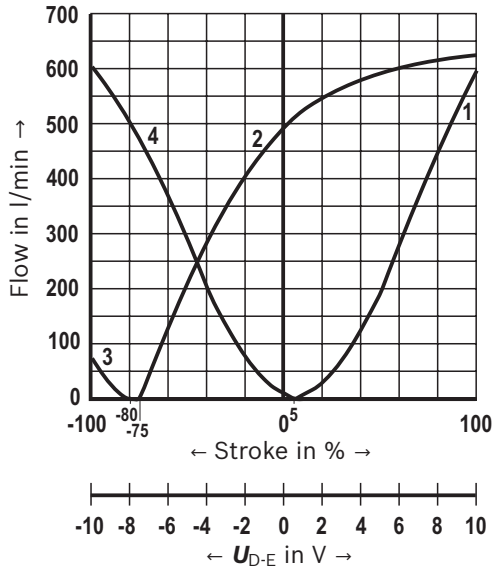
Symbol Q3, version "250"



Symbol Q3, version "400"



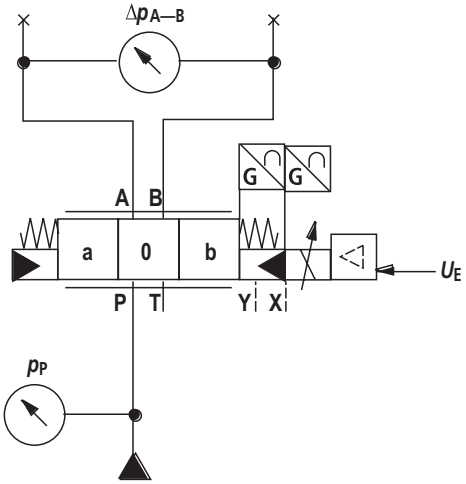
Symbol Q3, version "600"

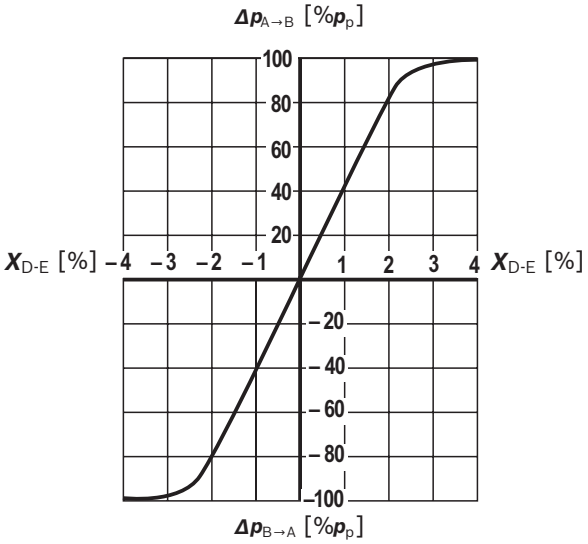


1 P–A
2 B–T
3 P–B
4 A–T

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

Pressure/signal characteristic curve

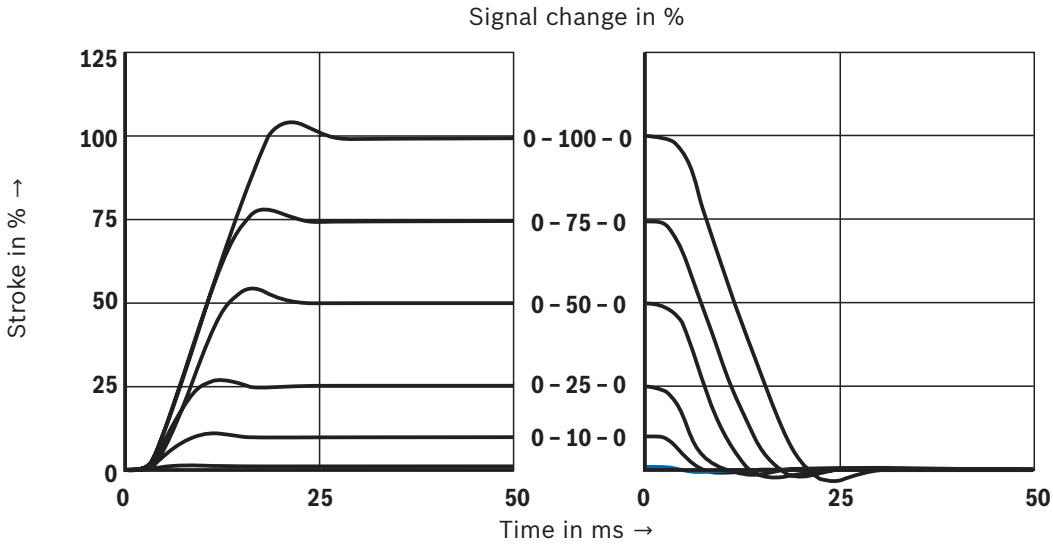




Characteristic curves: Size 10
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Transition function with stepped electric input signals

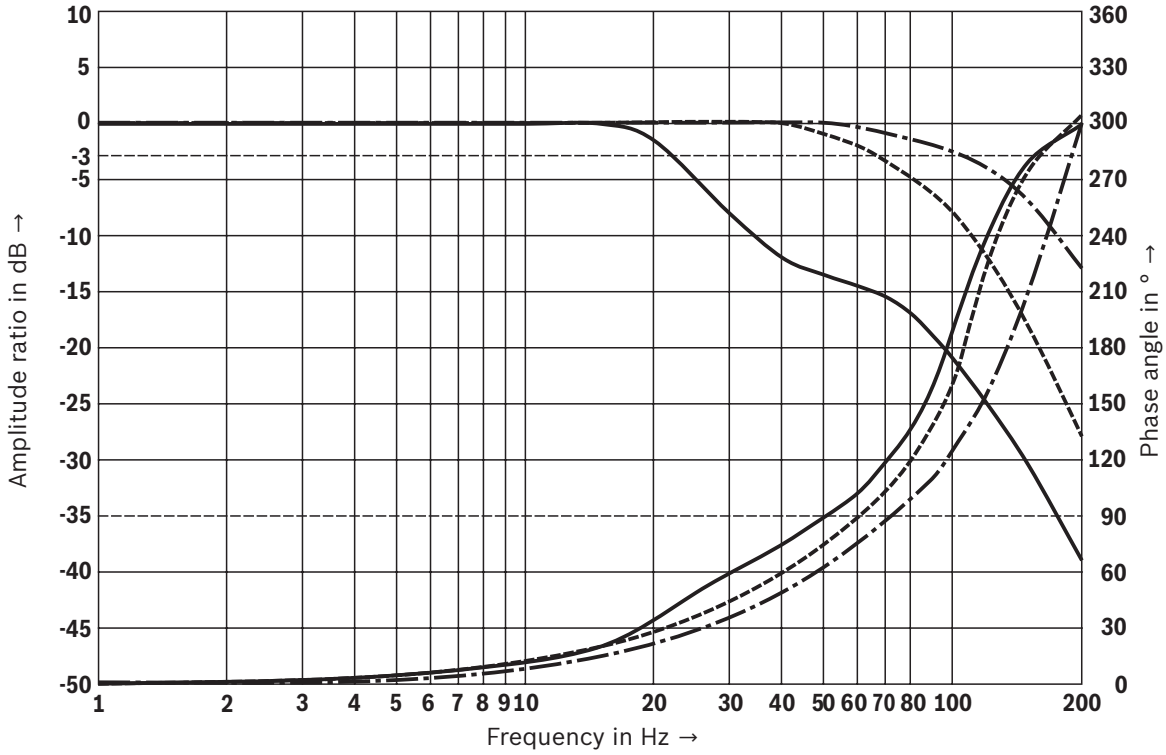
Symbols V and Q3-



- Main valve, port P = 10 bar
- Pilot control valve, port X = 210 bar

Frequency response characteristic curves

Symbols V and Q3-



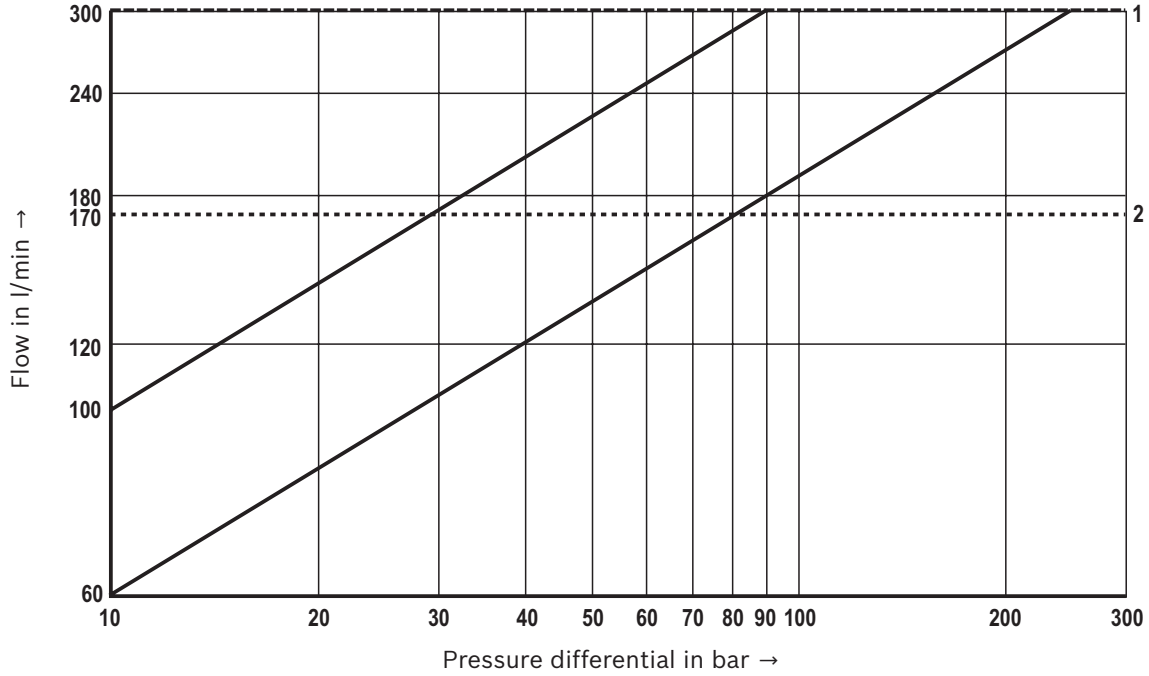
Signal ±5%

Signal ±25%

Signal ±100%

Characteristic curves: Size 10
(valid for HLP46, ϑ_{oil} = 40 ±5 °C)

Flow/load function (with maximum valve opening; tolerance ±10%)

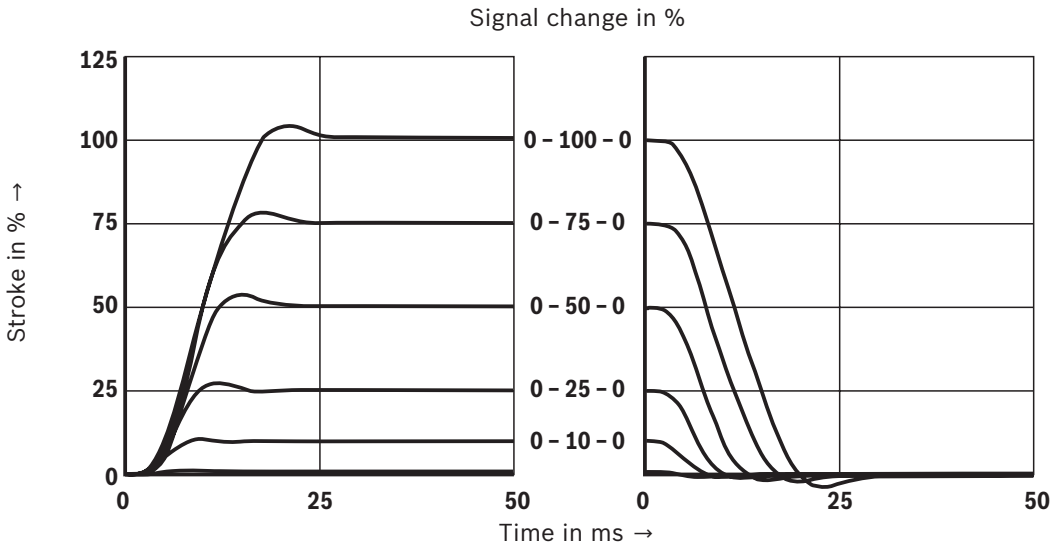


1 Maximum admissible flow
2 Recommended flow
(flow velocity 30 m/s)

Characteristic curves: Size 16
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Transition function with stepped electric input signals

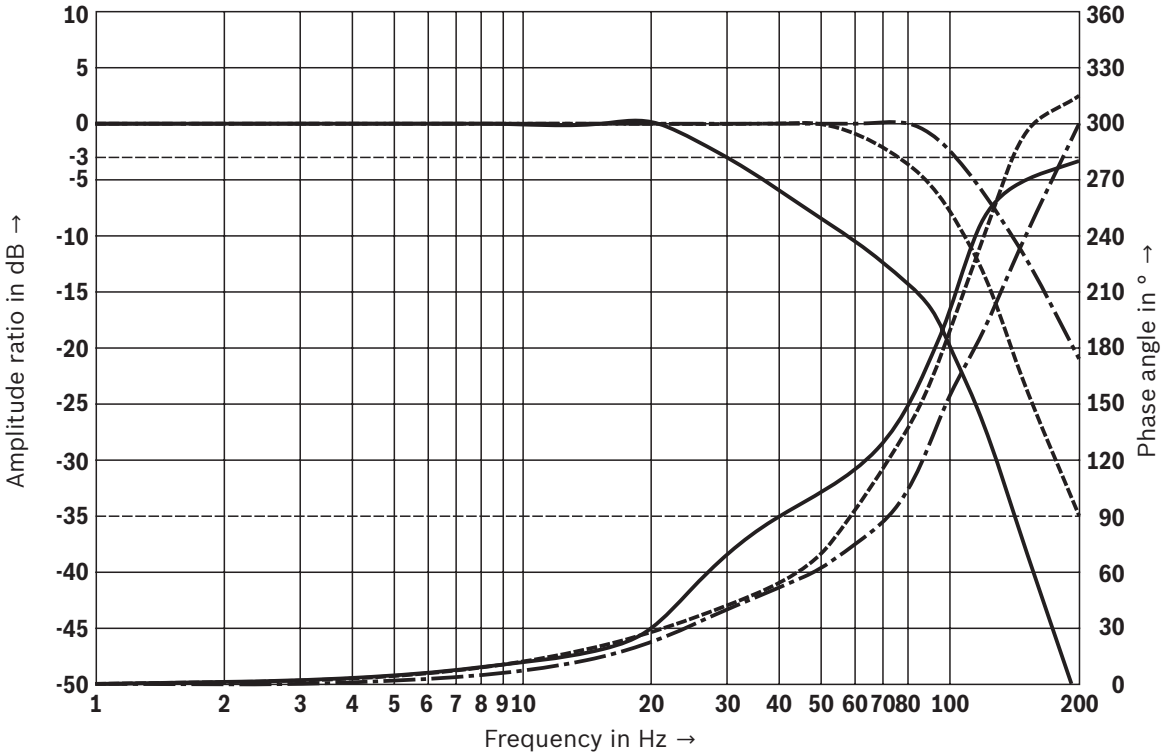
Symbols V and Q3-



- ▶ Main valve, port P = 10 bar
- ▶ Pilot control valve, port X = 210 bar

Frequency response characteristic curves

Symbols V and Q3-



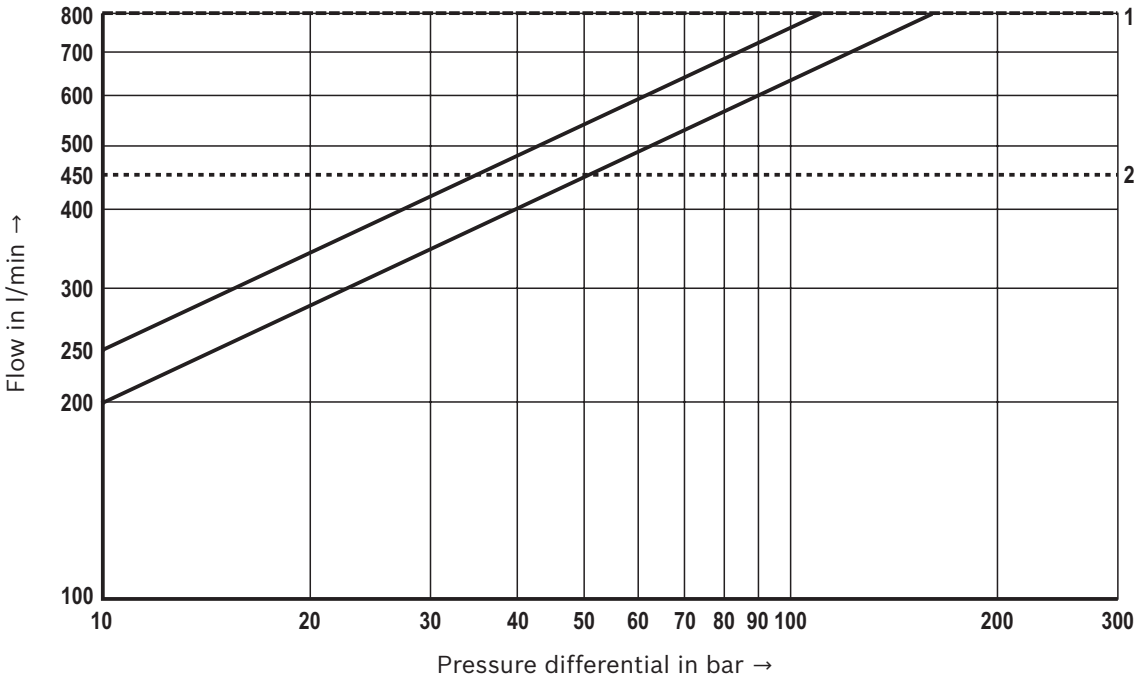
Signal ±5%

Signal ±25%

Signal ±100%

Characteristic curves: Size 16
(valid for HLP46, ϑ_{oil} = 40 ±5 °C)

Flow/load function (with maximum valve opening; tolerance ±10%)



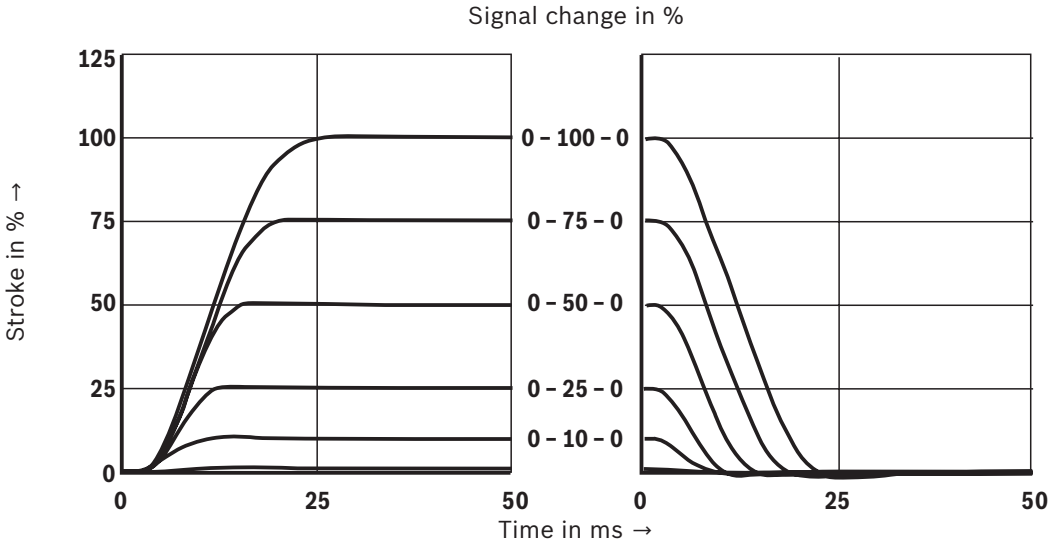
1 Maximum admissible flow

2 Recommended flow
(flow velocity 30 m/s)

Characteristic curves: Size 25
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Transition function with stepped electric input signals

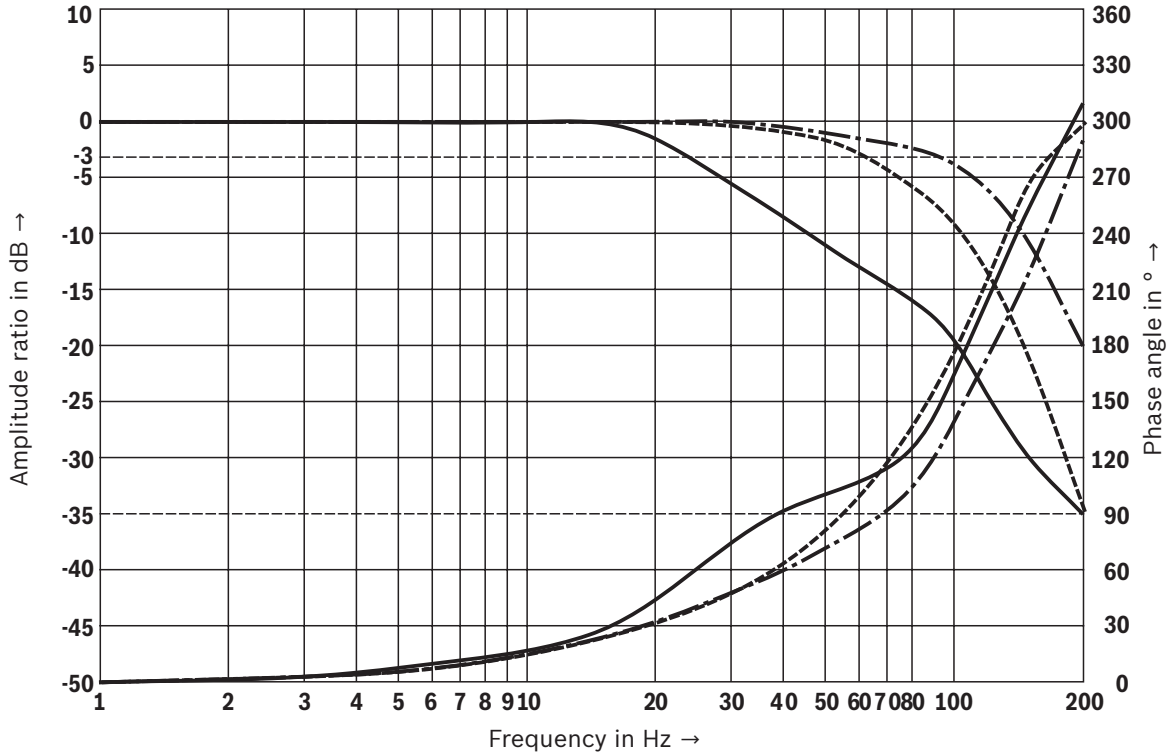
Symbols V and Q3-



- Main valve, port P = 10 bar
- Pilot control valve, port X = 210 bar

Frequency response characteristic curves

Symbols V and Q3-



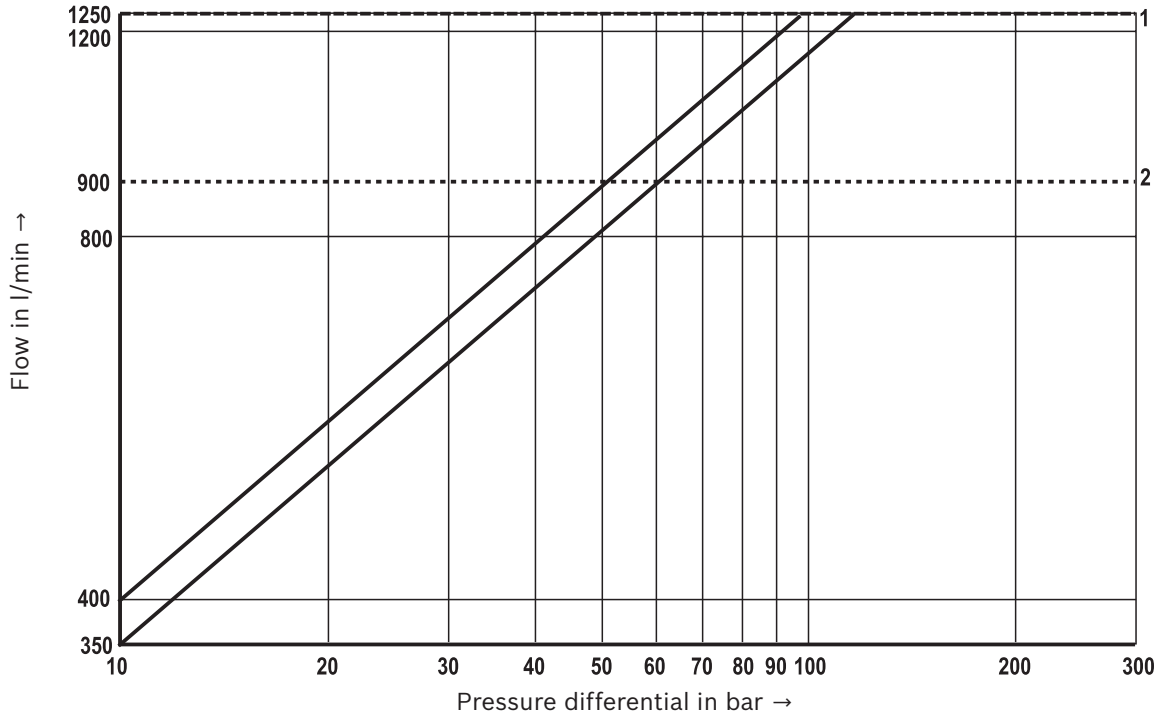
Signal ±5%

Signal ±25%

Signal ±100%

Characteristic curves: Size 25
(valid for HLP46, ϑ_{oil} = 40 ±5 °C)

Flow/load function (with maximum valve opening; tolerance ±10%)



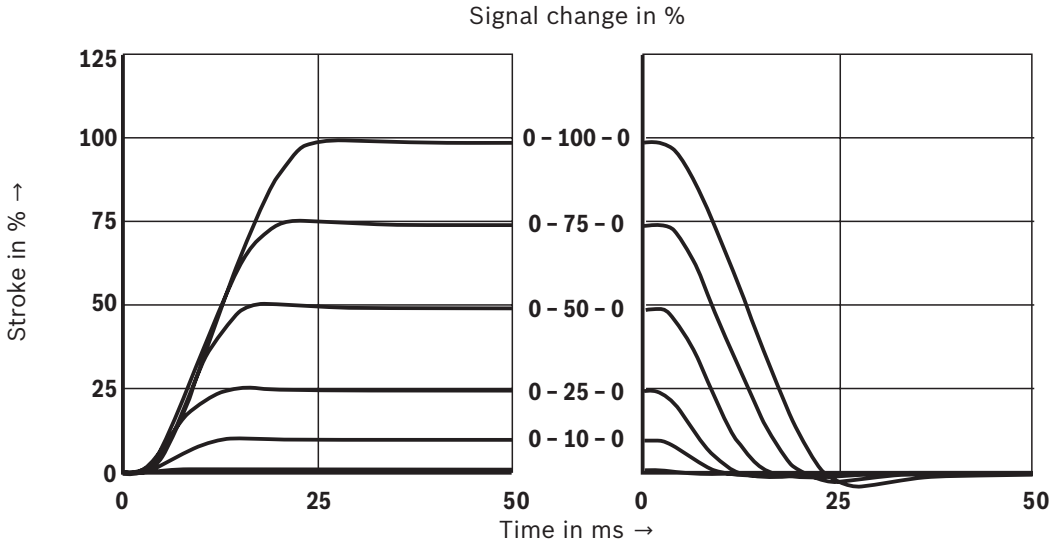
1 Maximum admissible flow

2 Recommended flow
(flow velocity 30 m/s)

Characteristic curves: Size 27
(measured with HLP46, ϑ_{oil} = 40 ±5 °C)

Transition function with stepped electric input signals

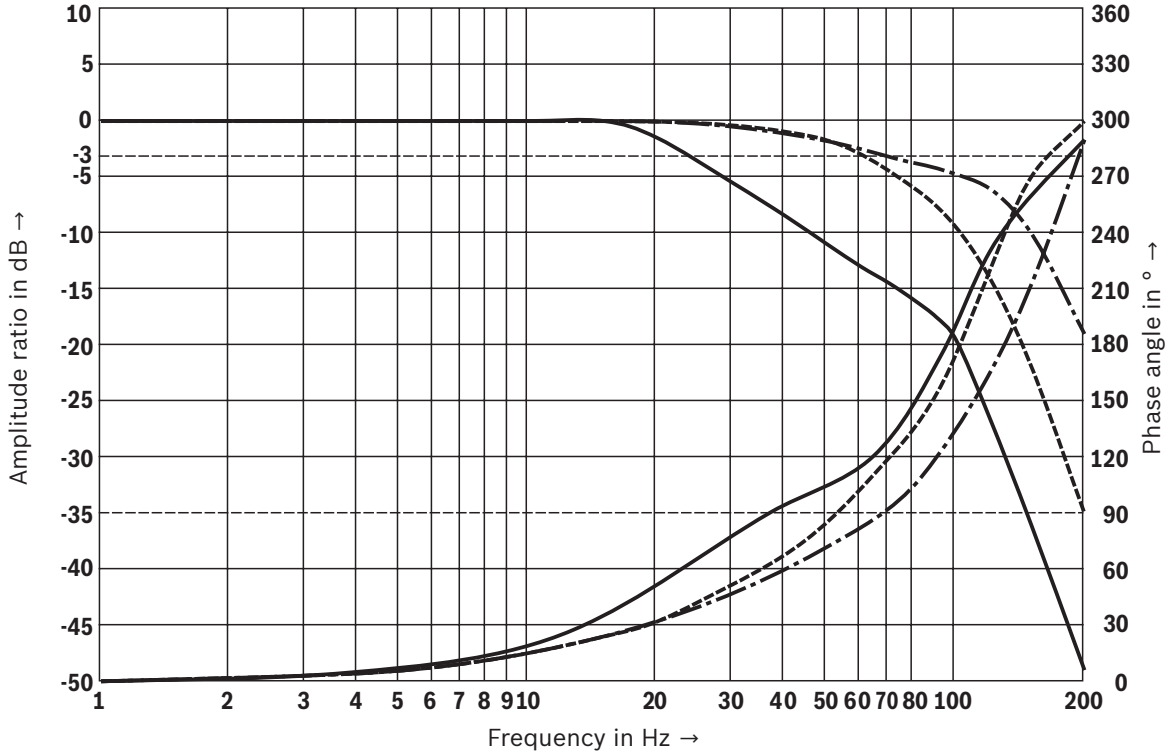
Symbols V and Q3-



- Main valve, port P = 10 bar
- Pilot control valve, port X = 210 bar

Frequency response characteristic curves

Symbols V and Q3-



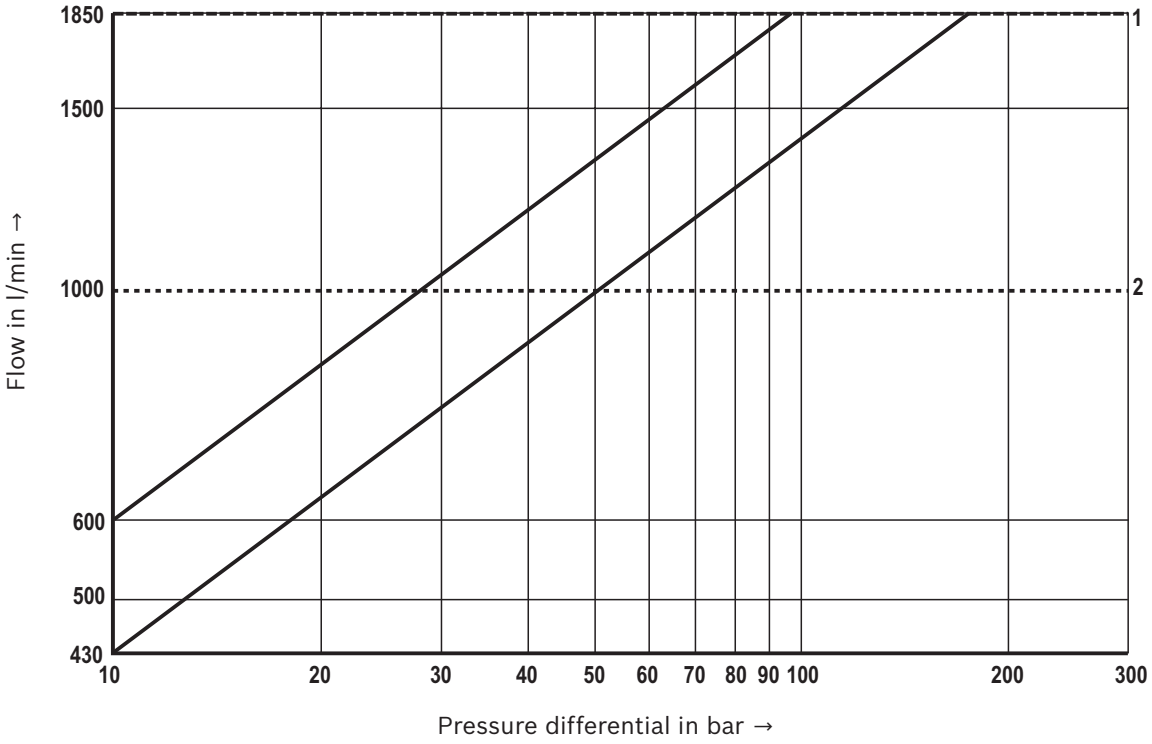
Signal ±5%

Signal ±25%

Signal ±100%

Characteristic curves: Size 27
(valid for HLP46, ϑ_{oil} = 40 ±5 °C)

Flow/load function (with maximum valve opening; tolerance ±10%)

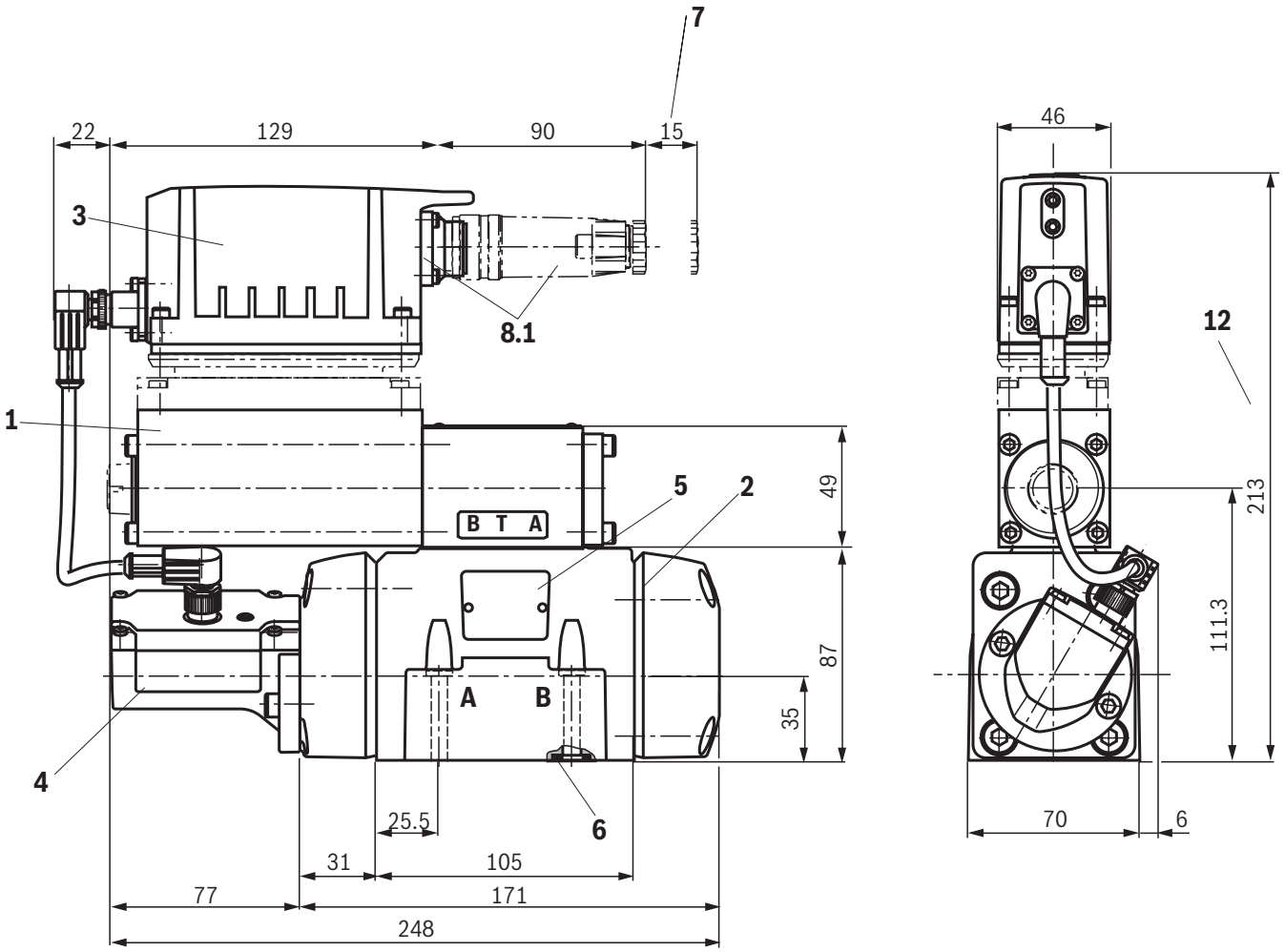


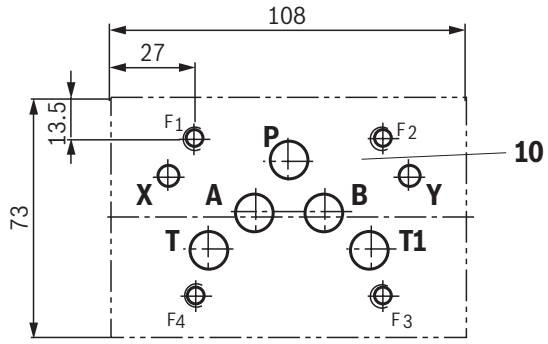
1 Maximum admissible flow

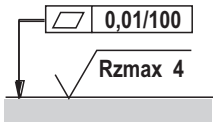
2 Recommended flow
(flow velocity 30 m/s)

Overall dimensions

Dimensions: Size 10
(dimensions in mm)



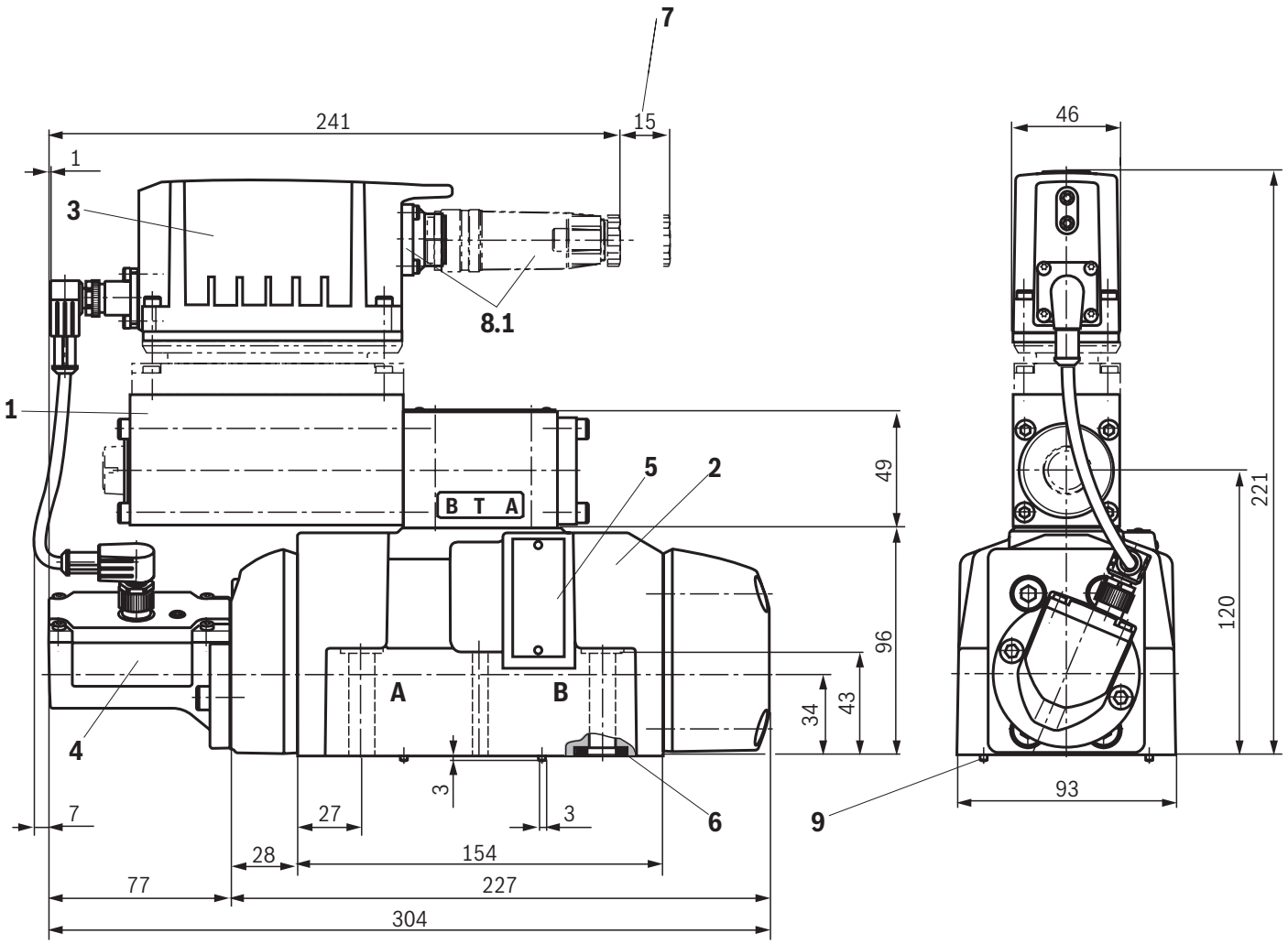


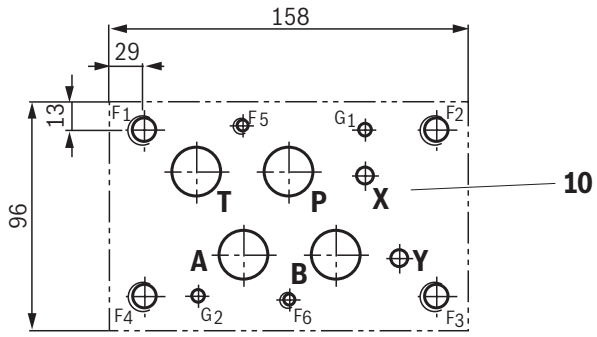


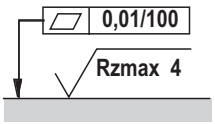
Required surface quality
of the valve contact surface

Valve mounting screws
Four GB/T70.1 - M6x45-10.9
Tightening torque M_A = 15.5 Nm ±10%

Dimensions: Size 16
(dimensions in mm)







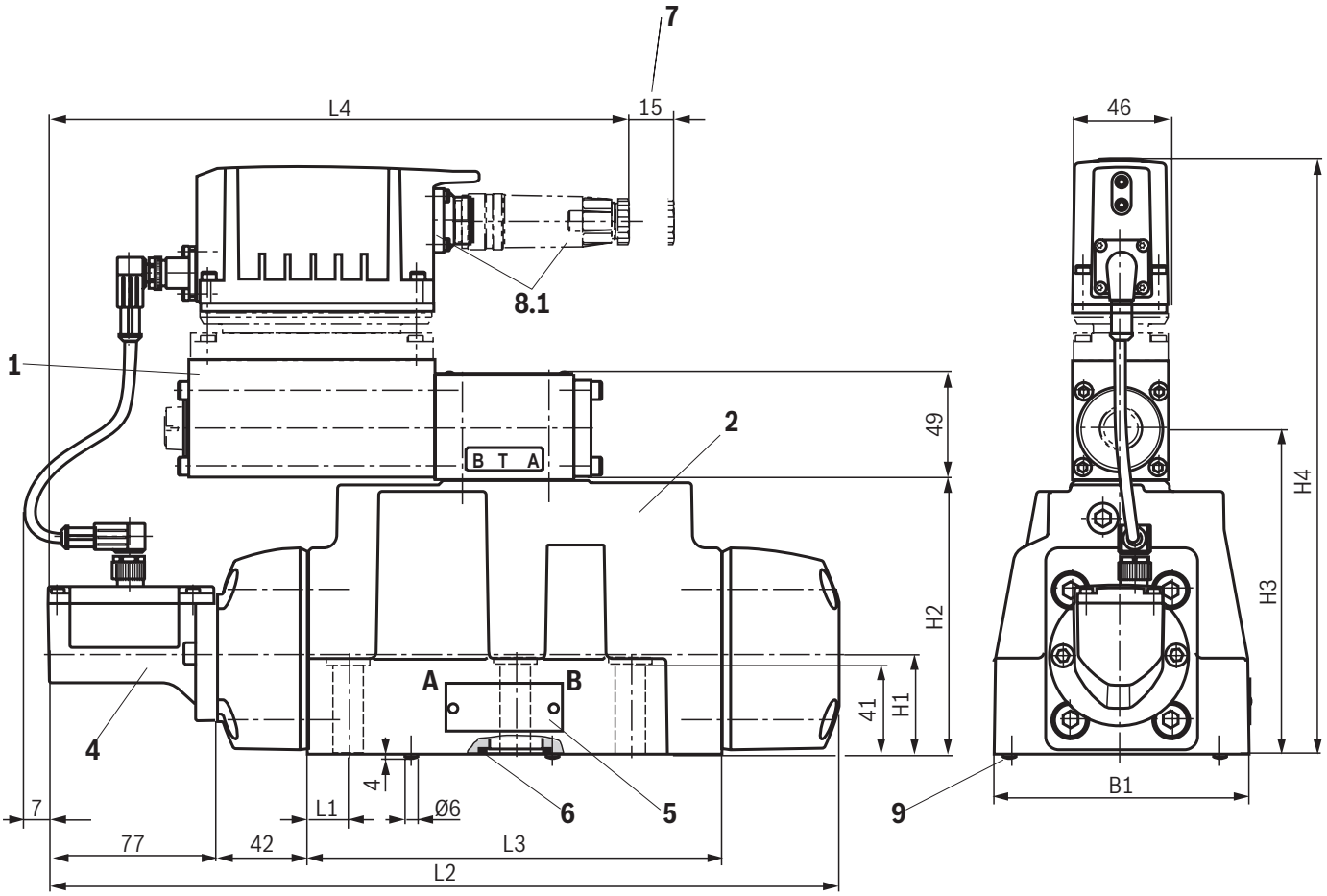
Required surface quality
of the valve contact surface

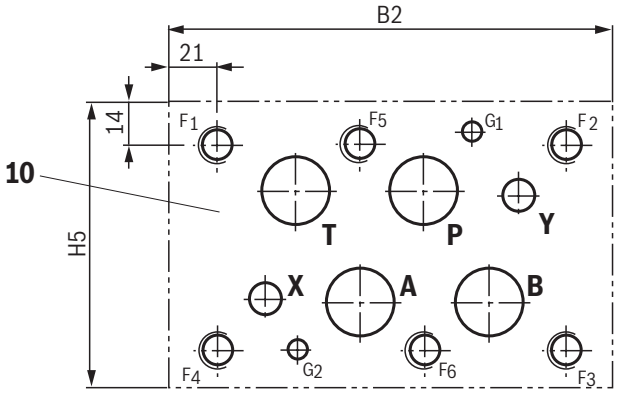
Valve mounting screws

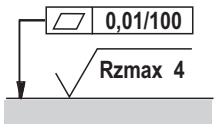
Two GB/T70.1 - M6x60-10.9
Tightening torque M_A = 15.5 Nm ±10%

Four GB/T70.1 - M10x60-10.9
Tightening torque M_A = 75 Nm ±20%

Dimensions: Sizes 25 and 27
(dimensions in mm)







Required surface quality
of the valve contact surface

Valve mounting screws
Six GB/T70.1 - M12x60-10.9
Tightening torque M_A = 130 Nm ±20%

NG	L1	L2	L3	L4	H1	H2	H3	H4	H5	B1	B2
25	19	364	191	274	46	126	150	251	120	118	195
27	20.5	371	198	277	50	140	164	265	124	120	200

Dimensions

1 Pilot control valve
2 Main valve
3 Integrated electronics (OBE)
4 Inductive position transducer (main valve)
5 Name plate
6 Identical seal rings for ports P, A, B, T
Identical seal rings for ports X, Y
7 Space required for removing the mating connector
8 Mating connectors for version “A1”, “F1” ,
9 Locking pin
10 Machined valve contact surface
- Size 10:
  Porting pattern according to ISO 4401-05-05-0-05
- Size 16:
  Porting pattern according to ISO 4401-07-07-0-05
  Deviating from the standard:
  Ports P, A, B, T – Ø20 mm
- Size 25 and 27:
  Porting pattern according to ISO 4401-08-08-0-05
  Deviating from the standard:
  NG27: Ports P, A, B, T – Ø32 mm

BEIJING HUADE HYDRAULIC INDUSTRIAL GROUP CO., LTD.

ADD: No. 5 tongji north road, economic & technological development zone, beijing china, 100176

http://www.huade-hyd.com.cn

TEL: 400-000-6987

Our Company Has Passed:

·ISO9001 Quality Managing System Certificate

·ISO14001 Environment Managing System Certificate

·OH SAS18001 Occupational Health Safety Managing System Certificate

·CE Certificate

official website