

2FRE10(16)

2-way proportional flow control valve, with electrical position feedback

Nominal sizes 10 and 16

Series 4X

Maximum operating pressure 315 bar

Maximum flow 160 L/min



Contents

Contents
 Features
 Ordering details
 Functions, section
 Technical data
 Electrical connections
 Characteristic curves
 Unit dimensions

Features

- 1 - 2-way design, valve with a pressure compensator for the pressure compensated control of a flow
- 1 - Actuation via a proportional solenoid
- 3 - For subplate mounting: Porting pattern to ISO 6263
- 4 - With electrical position feedback of the control orifice
- 5 - The position transducer coil can be axially moved making the zero point adjustment of the control orifice easy, without having to touch the electronics (electrical-hydraulic)
- 6 - Flow control is possible in both directions by using a rectifier sandwich plate
- 9 - Electrical amplifier RT-MRPD1-151-30 in modular format (separate order)

Ordering details

Proportional flow control valve

2FRE	10	-	4X	/	10L	B	K4	M	*
01	02		03		04	05	06	07	08

01	2FRE	2-way proportional flow control valve
02	10	NS 10
	16	NS 16
03	4X	Series 40 to 49 (40 to 49: unchanged installation and connection dimensions)

Rate flow and flow characteristics (A→B)

04	10L	10 L/min	Linear	NS 10	
	16L	16 L/min			
	25L	25 L/min			
	50L	50 L/min			
	60L	60 L/min			
	5QE	40 L/min (Fine control range 5 L/min)		Progressive with fast feed	NS 10
	5Q	5 L/min	Progressive		
	10Q	10 L/min			
	16Q	16 L/min			
	25Q	25 L/min			
	80L	80 L/min	Linear	NS 16	
	100L	100 L/min			
	125L	125 L/min			
	160L	160 L/min			

05	B	With pressure compensator stroke limiter
06	K4	With component plug to DIN EN 175301-803 for solenoid and manufacturer Hirschmann for the position transducer

2FRE	10	-	4X	/	10L	B	K4	M	*
01	02		03		04	05	06	07	08

Seal material

07	M	NBR seals
	V	FKM seals
08	*	Further details in clear text

Rectifier sandwich plate

Z4S	10	-	2X	/		*
01	02		03		04	05

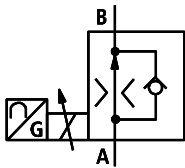
01	Z4S	Rectifier sandwich plate
02	10	NS 10
	16	NS 16
03	2X	Series 20 to 29 (20 to 29: unchanged installation and connection dimensions)

Seal material

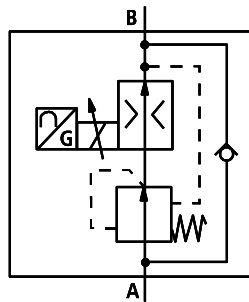
04	No code	NBR seals
	V	FKM seals)
05	*	Further details in clear text

Symbols

Simplified

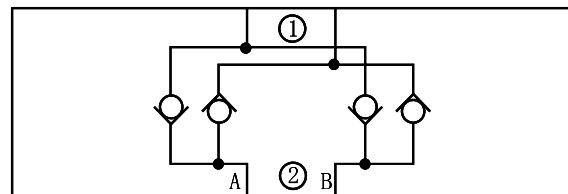


Detailed



Rectifier sandwich plate

(① = component side, ② = subplate side)



Functions, section

The type 2FRE... proportional flow control valves have a 2-way function. They can, from an applied electrical command value, regulate a flow which is pressure and to a great extent temperature compensated.

They basically comprise of the housing (1), proportional solenoid with inductive position transducer (2), measuring orifice (3), pressure compensator (4), stroke limiter (5), as well as an optional check valve (6).

The setting of the flow is determined (0 bis 100 %) at the command value potentiometer. The applied command value, causes via the amplifier as well as the proportional solenoid, the adjustment of the measurement orifice (3). The position of the measurement orifice (3) is obtained by the position transducer. Any deviations from the command value are compensated for by the position feedback control.

The pressure compensator (4) holds the pressure drop at the measurement orifice (3) at a constant value. The flow is, therefore pressure compensated.

The small temperature drift is achieved due to the design of the measurement orifice.

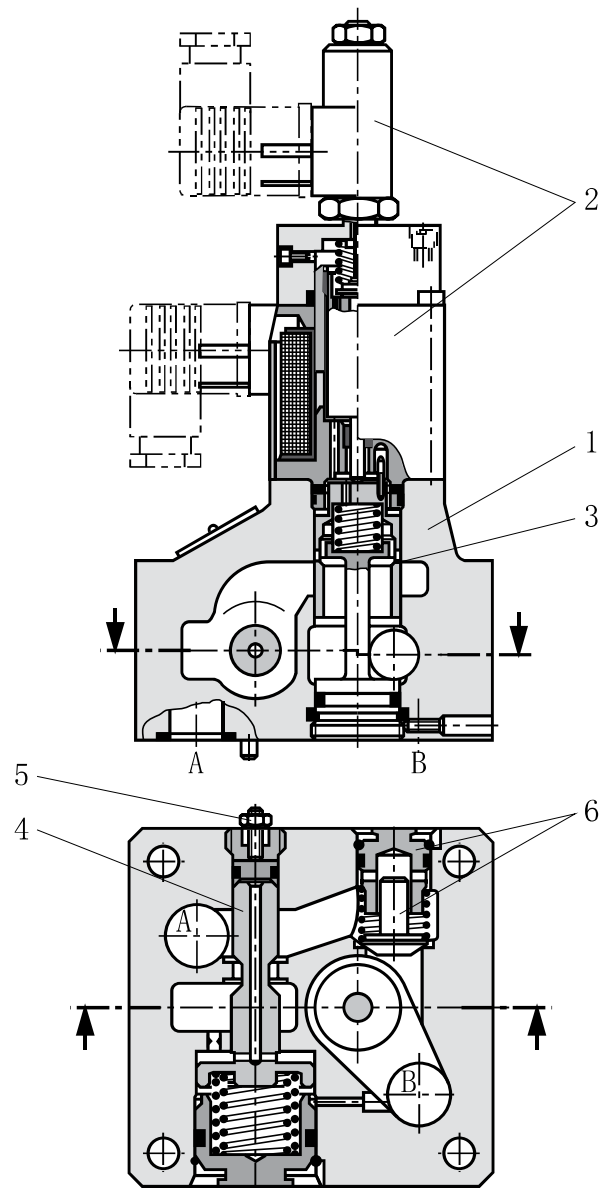
At a 0 % command value the measurement orifice is closed.

In the case of a loss of power or a cable break at the position transducer the measurement orifice closes.

From a 0 % command value a jump free start is possible. Via two ramps within the electrical amplifier it is possible to delay the opening and closing of the measurement orifice.

Via the check valve (6) free flow is possible from B to A.

With an additional rectifier sandwich plate type Z4S..., which is fitted under the proportional control valve, it is possible to control the flow too and from the actuator.



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

general

Nominal size		10	16	
Installation		optional		
Ambient temperature range	°C	-20 ... +70		
Storage temperature range	°C	-20 ... +80		
Weight	Proportional flow control valve	kg	6.1	8.5
	Rectifier sandwich plate	kg	3.2	9.3

Hydraulic, proportional flow control valve (HLP46 at 40 °C ± 5 °C)

Max. perm. operating pressure Port A			bar		315							
Flow q_{Vmax}	Linear	L/min	10	16	25	50	60	80	100	125	160	
	Progressive with fast feed	L/min	40					-				
Minimum pressure differential		bar	3~8					6~10				
Pressure fluid			DIN51524 further pressure fluids on request!									
Pressure fluid temperature range		°C	-20 ... +80									
Viscosity range		mm²/s	15 ... 380									
Degree of contamination			ISO4406 20/18/15 ¹⁾									
Hysteresis		%	< ± 1 at q_{Vmax}									
Repeatability		%	< 1 at q_{Vmax}									
Temperature drift	Hydraulic + electrical Δq_v /°C	%	0.1 at q_{Vmax}									
	Pressure compensated (up to Δp = 315 bar	%	±2 at q_{Vmax}									

Hydraulic, rectifier sandwich plate

Operating pressure	bar	Up to 315	
Cracking pressure	bar	1.5	
Nominal flow	L/min	60	160

Electrical, proportional solenoid

Voltage type			DC
Duty	%		100
Protection to DIN 40 050			IP65
Coil resistatance	Cold value at 20 °C	Ω	10
	Max. warm value	Ω	13.9
Electrical connection			Plug-in connector to DIN EN 175301-803-B

Electrical, inductive position transducer

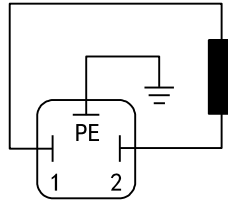
Coil resistance at 20 °C	Ω	1 and 2	2 and $\frac{1}{2}$	$\frac{1}{2}$ and 1
		31.5	45.5	31.5
Electrical connection		GM 209N		
Protection to DIN 40 050		IP65		
Inductivity	mH	6~8		
Oscillator frequency	kHz	2.5		
Electrical position measuring system		differential throttle		
Nominal stroke	mm	4		
Control electronics (separate order)		RT-MRPD1-151-30/A1(F1)		

- 1) In the hydraulic system, the cleanliness of the oil must meet the requirements of the components, and effective filtration can prevent the failure of the hydraulic system and prolong the service life of the components.

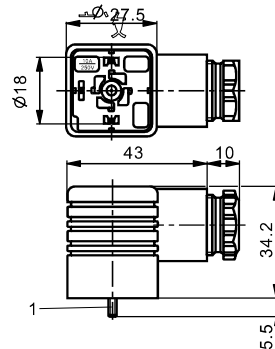
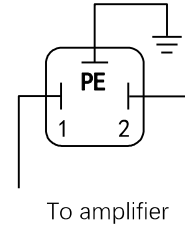
Electrical connections

Proportional solenoid

Connections on component plug



Connections on plug-in connector



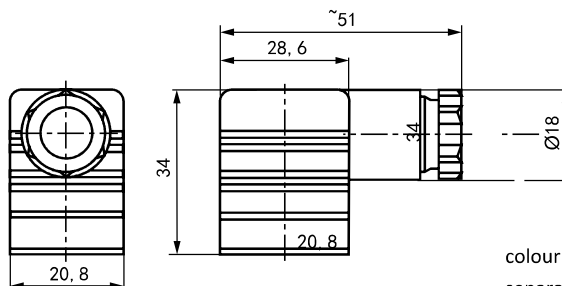
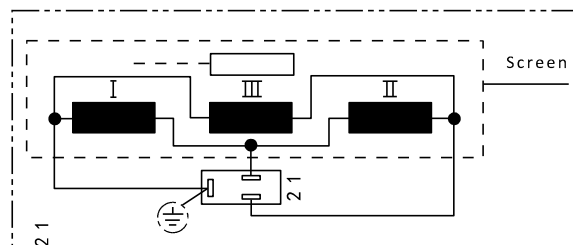
colour black

separate order under material no. HP18110741

Fixing screw: M3, torque 0.5 Nm

Inductive position transducer

16



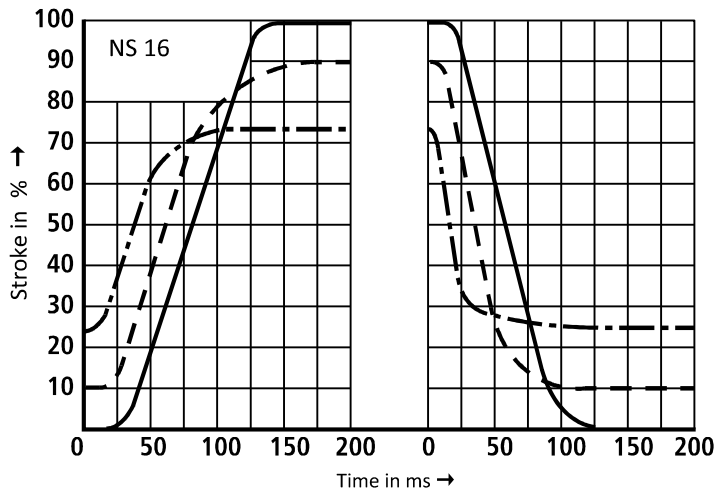
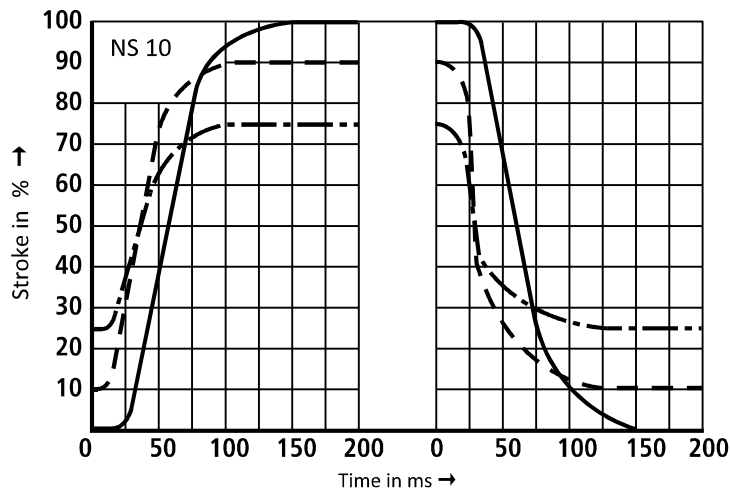
colour black

separate order under material no. HP19030190

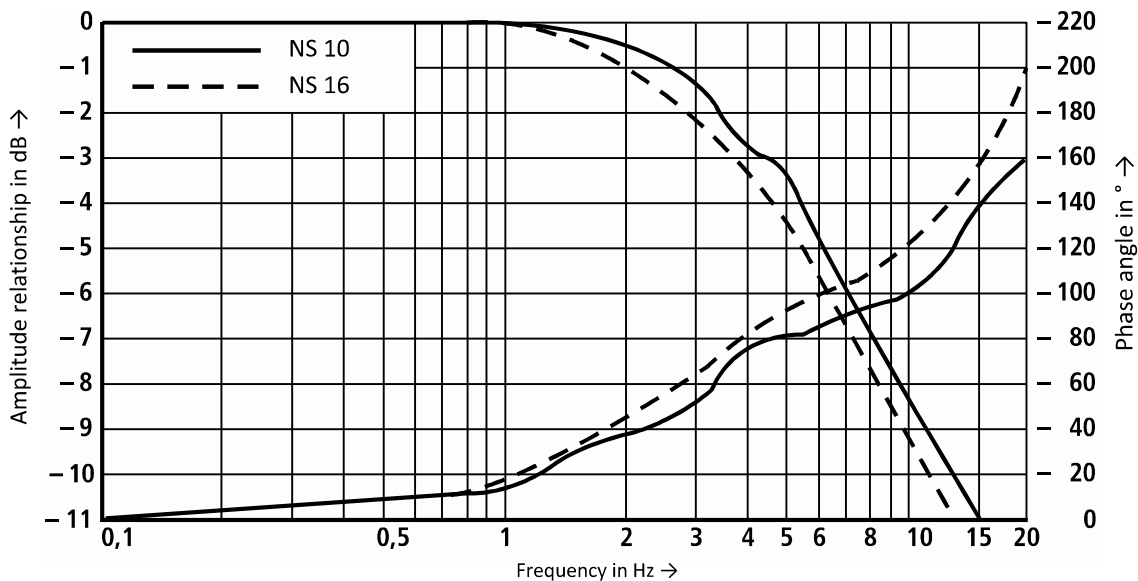
Fixing screw: M3, torque 0.5 Nm

Characteristic curves (HLP46 at 40 °C ± 5 °C)

Transient function with a stepped form of command value change (NS 10: 60 L/min, NS 16: 160 L/min)

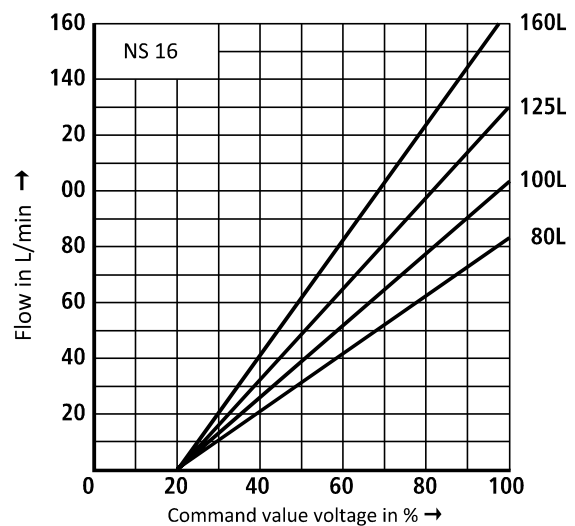
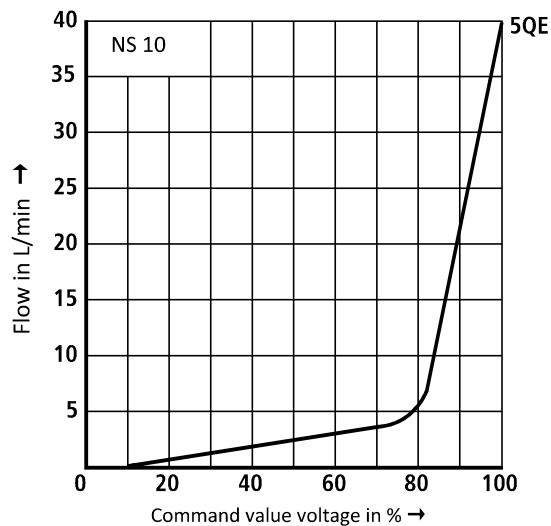
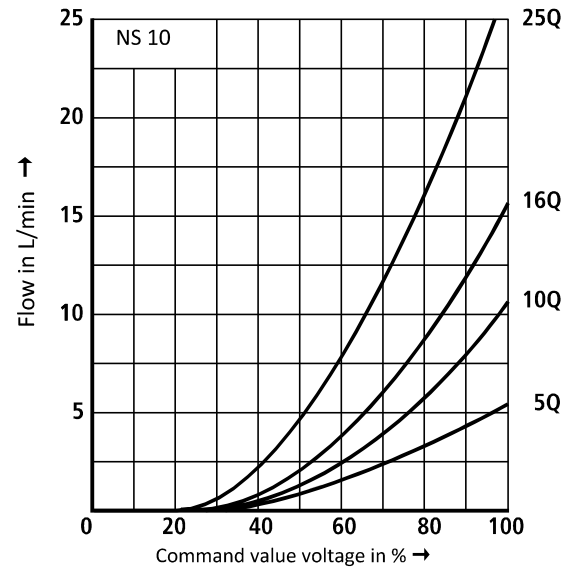
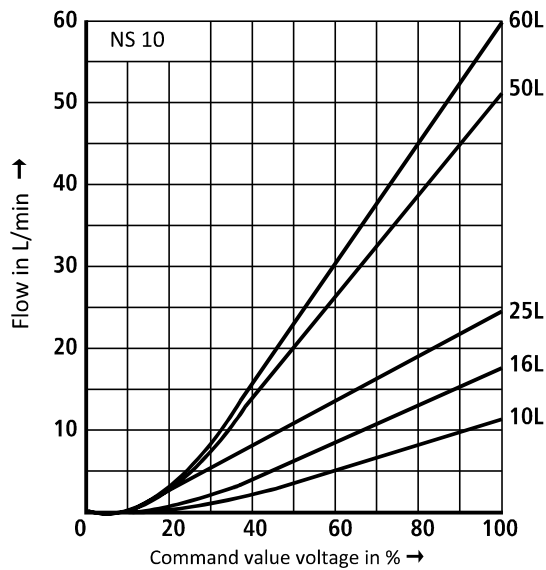


Frequency response characteristic curves (NS 10: 60 L/min, NS 16: 160 L/min)

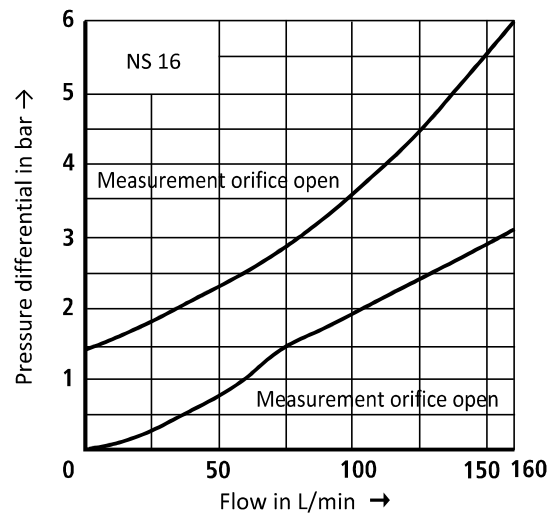
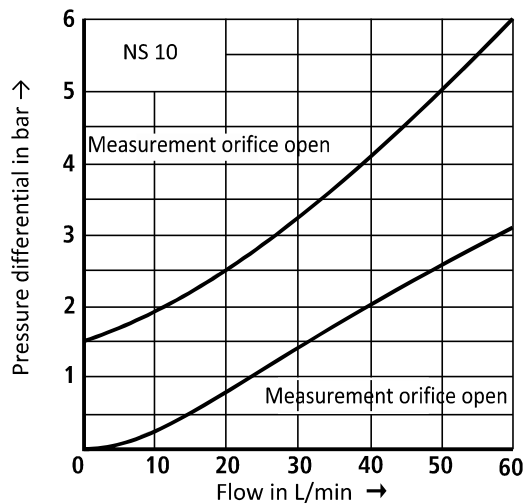


Characteristic curves (HLP46 at 40 °C ± 5 °C)

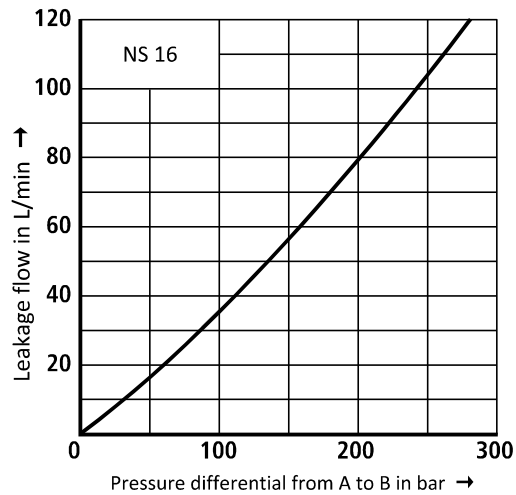
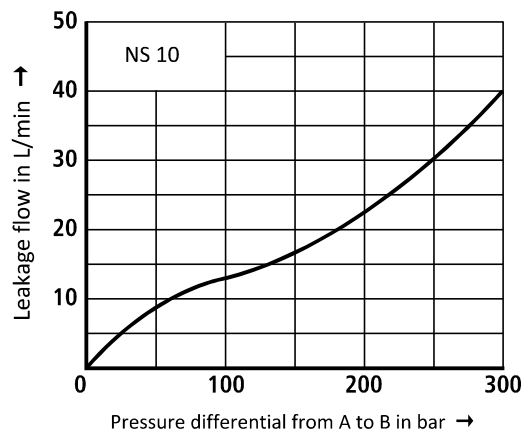
Characteristic curves (flow control from A → B); $p_s = 50 \text{ bar}$



Pressure differential over check valve B → A



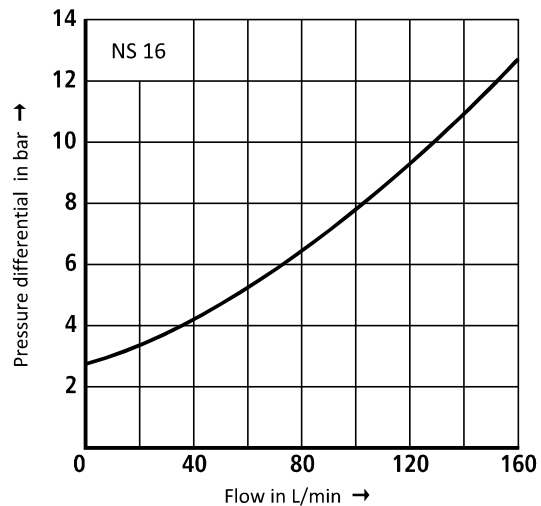
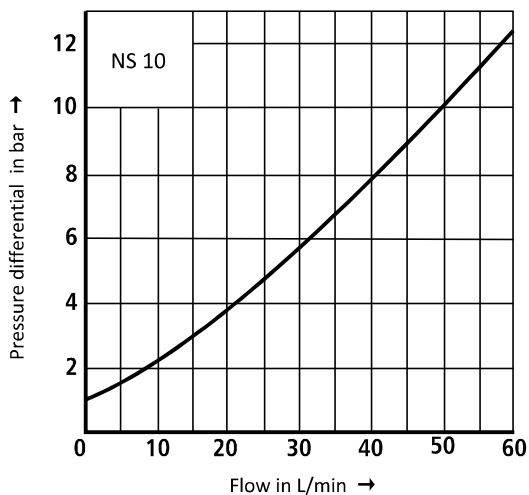
Leakage flow from A → B



Rectifier sandwich plate

Pressure differential with the flows the same in both directions

Flow from A → B (B → A)



Unit dimensions (dimensions in mm)

- 1 Valve housing
- 2 Proportional solenoid with inductive position transducer
- 3.1 Plug-in connector for solenoid(separate order under material no. HP18110741)
- 3.2 Plug-in connector for position transducer(separate order under material no.HP19030190)
- 4 Space required to remove the plug-in connector
- 5 Pressure compensator stroke limiter grub screw
- 6 Valve fixing screws
- 7 R-ring for ports A, B
- 8 Port A
- 9 Port B
- 10.1 Locating pin (NS 10 and 16)
- 10.2 Locating pin (NS 16)
- 11.1 Drilling for locating pin (NS 10 and 16)
- 11.2 Drilling for locating pin (NS 16)
- 13 Name plate
- 14 or subplate mounting: Porting pattern to ISO 6263

Without rectifier sandwich plate

NS 10

4 off M8 x 60 DIN 912-10.9

$M_A = 37 \text{ Nm} \pm 10 \%$

NS 16

4 off M10 x 70 DIN 912-10.9

$M_A = 75 \text{ Nm} \pm 10 \%$

With rectifier sandwich plate

NS 10

4 off M8 x 120 DIN 912-10.9

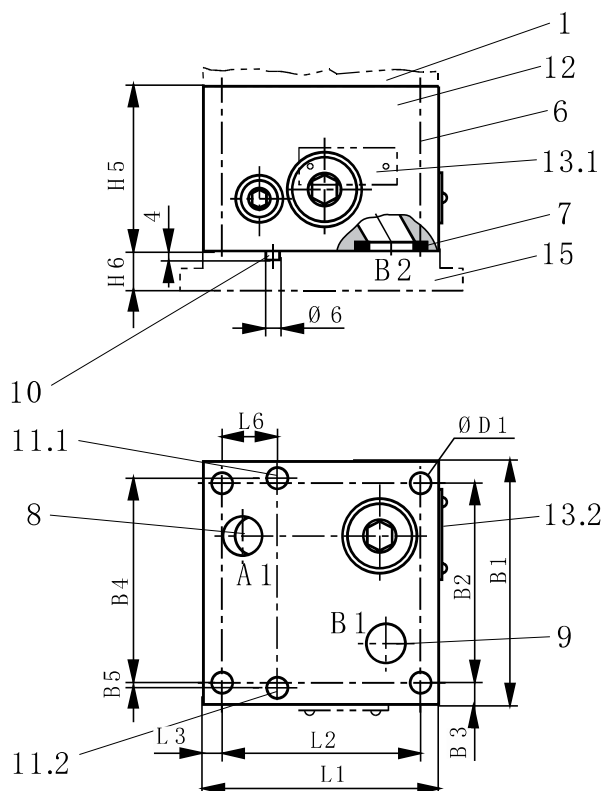
$M_A = 37 \text{ Nm} \pm 10 \%$

NS 16

4 off M10 x 160 DIN 912-10.9

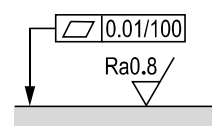
$M_A = 75 \text{ Nm} \pm 10 \%$

Rectifier sandwich plate



- 1 Valve housing
- 6 Valve fixing screws
- 7 R-ring for ports A, B
- 8 Port A1 (A2)
- 9 Port B1 (B2)
- 10 Locating pin (The same 11.1, 11.2)
- 11.1 Locating pin (NS 10 and 16)
- 11.2 Locating pin (NS 16)
- 12 Rectifier sandwich plate
- 13.1 Name plate (NS 10)
- 13.2 Name plate (NS 16)
- 15 Mounting plate

NS	10	16
B 1	95	123.5
B 2	76	101.5
B 3	9.5	11
B 4	79.4	102.4
B 5	-	0.8
Ø D 1	9	11
H 5	60	85
H 6	30	40
L 1	102.5	123.5
L 2	82.5	101.5
L 3	10	11
L 6	23.8	28.6



Required surface quality of the valve contact surface