3/2- and 4/2-way directional poppet valves with solenoid actuation
Type M-.SED 6

Nominal size 6
Series 1X
Maximum operating pressure 350 bar
Maximum flow 25 L/min

H/A 4243/94

Type M-3SED 6$^{UK}_{CK}$1X/350CG24N9K4 with plug-in connector

Contents

Features

- Direct operated directional poppet valve with solenoid actuation
- Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP–RP 121 H subplates to catalogue sheet RE 45 052 (separate order)
- Closed port is leak-free
- Switching is ensured even when under pressure for long periods of time
- Wet pin DC solenoids with removable coil (AC voltage possible by means of rectifier)
- Solenoid coil can be rotated by 90°
- When changing coils, opening of the pressure-tight chamber is not required
- Individual electrical connection
- With protected manual override, optional

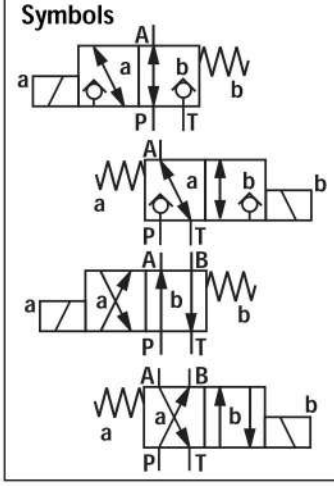
Ordering details

M–	SED	6		1X/350	C			K4/		*

3 actuator ports = **3**
4 actuator ports = **4**

Poppet valve

Nominal size 6 = **6**

Actuator ports	3	4	
Symbols 	●	–	= **UK**
	●	–	= **CK**
	–	●	= **D**
	–	●	= **Y**

● = available

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

Operating pressure 350 bar = **350**

Wet-pin solenoid (in oil immersed) with removable coil = **C**

Further details in clear text

No code = NBR seals
V = FKM seals
(other seals on request)

⚠ Attention!
The compatibilty of the seals and pressure fluid has to be taken into account!

No code = without cartridge check valve, with throttle insert
P = with cartridge check valve
B12 = throttle - Ø1.2 mm
B15 = throttle - Ø1.5 mm
B18 = throttle - Ø1.8 mm
B20 = throttle - Ø2.0 mm
B22 = throttle - Ø2.2 mm

Electrical connection
K4 [1] = individual connection; with component plug DIN 43 650-AM2, without plug-in connector

N9 = with protected manual override
No code = without manual override

G24 = 24 V DC
G205 [2] = 205 V DC

AC supply (permissible voltage tolerance ± 10%)	**Nominal voltage of the DC solenoids when used with AC voltages**	**Order code**
110 V - 50/60 Hz	96 V	**G96**
120 V - 60 Hz	110 V	**G110**
230 V - 50/60 Hz	205 V	**G205**

Preferred types and standard components are highlighted in the RPS (Rexroth Price list Standard).

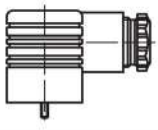
[1] Plug-in connectors have to be ordered separately (see below).

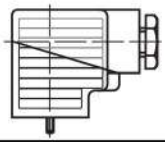
[2] Whenconnecting to an AC supply a DC solenoid **must** be used which is controlled via a rectifier (see table on the left).

For individual connections a large plug-in connector with integrated recifier can be used (separate order, see below).

Ordering details: plug-in connectors to DIN 43 650 A and ISO 4400 for component plug "K4"

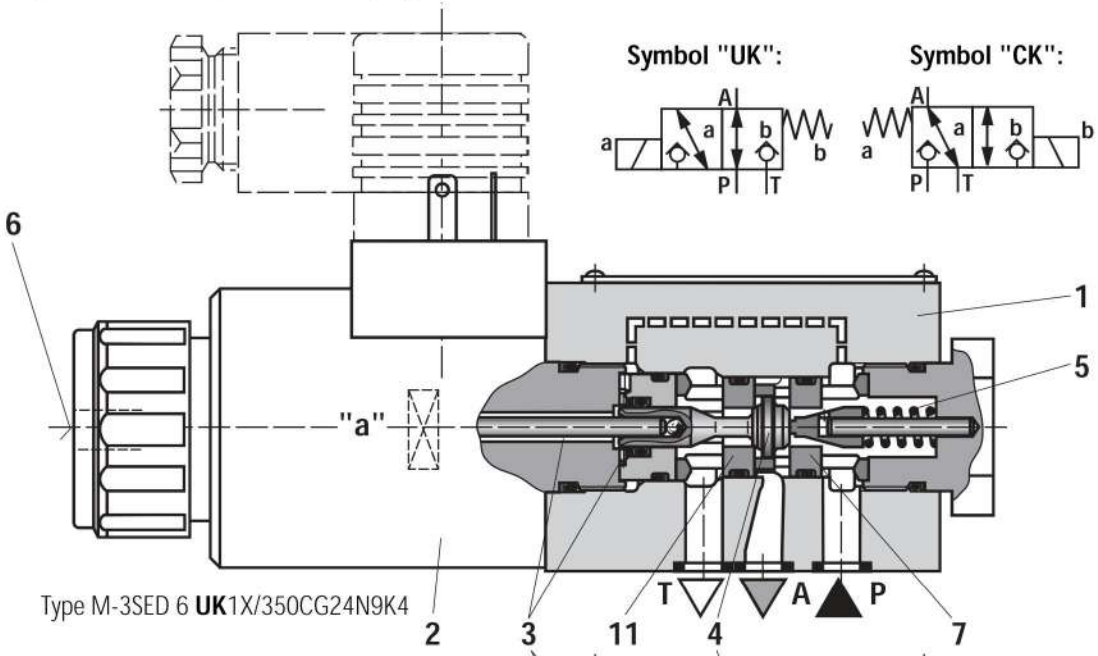
For further plug-in connectors see RE 08 006



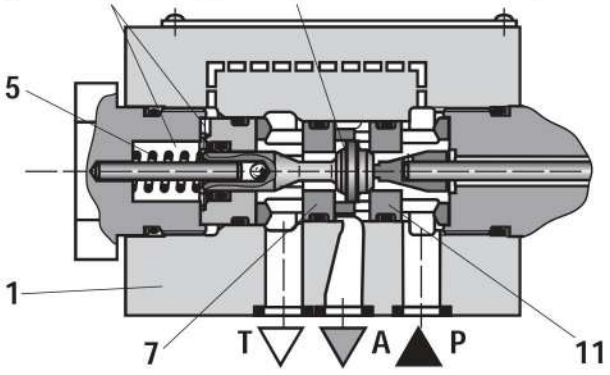


Valve side	**Colour**	**Material no.** Without circuitry	With indicator lamp 12 … 240 V	With rectifier 12 … 240 V	With indicator lamp and Z-diode protective circuit 24 V
a	grey	**00074683**	–	–	–
b	black	**00074684**	–	–	–
a/b	black	–	**00057292**	**00313933**	**00310995**

Function, section, symbols: 3/2way directional poppet valve



Type M-3SED 6 **UK**1X/350CG24N9K4



Type M-3SED 6 **CK**1X/350CG24N9K4

General:

Directional valves type M-.SED are directly actuated directional poppet valves with solenoid actuation. They control the start, stop and direction of a flow and basically consist of a housing (1), the solenoid (2), the valve seats (7) and (11) and as the closing device (4).

The manual override (6) allows the valve to be switched without energising the solenoid.

Basic function:

The arrangement of the spring (5) determines the initial position of the valve (open when de-energised "UK" or closed when de-energised "CK"). The chamber (3) behind the closing element (4) is connected to port P and sealed off from port T. Hence the valve is pressure-balanced with respect to the operating forces (solenoid and spring).

Due to the special closing element (4) it is possible to apply the maximum operating pressure (350 bar) to ports P, A and T. The flow can also pass in both directions (see symbols)!

In the initial position the closing element (4) is pressed onto seat (11) by the spring (5), in the switched position it is pushed onto seat (7) by the solenoid (2). This results in leak-free closure.

Throttle insert

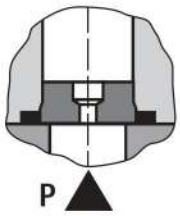
The use of a throttle insert is required, if, due to the operating conditions, flows are to be expected during the switching procedure, which are higher than the stated maximum performance limits of the valve.

Example:

- Accumulator operation,
- Use as pilot valve with internal pilot oil supply.

3/2-way directional poppet valve
The throttle is inserted into port P of the poppet valve.

4/2-way directional poppet valve
(see page 4)
The throttle is inserted into port P of the plus-1 plate.

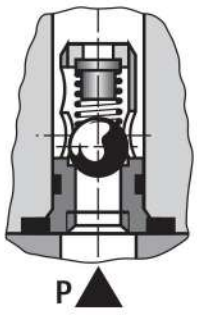


Cartridge check valve

The cartridge check valve allows free flow from P to A and provides leak-free closure from A to P.
For examples, see page 12.

3/2-way directional poppet valve
The cartridge check valve is inserted into port P of the poppet valve.

4/2-directional poppet valve
(see page 4)
The cartridge check valve is inserted into port P of the plus-1 plate.



Function, section, schematic illustration: 4/2-way directional poppet valve

In conjuntion with a sandwich plate, a **plus-1 plate**, under the 3/2-way directional poppet valve enables this valve to be used as a 4/2-way directional poppet valve.

Type M-4SED 6 D1X/350CG24N9K4 with plug-in connector

Function of the plus-1 plate:

Initial position:

The main valve is not actuated. The spring (5) holds the closing element (4) in its seat (11). Port P is closed, and port A is connected to T. In addition, a control line runs from A to the large area of the control piston (8) so that this is unloaded to tank. The pressure applied via P now moves ball (9) onto seat (10). P is now connected to B and A with T.

Transition position:

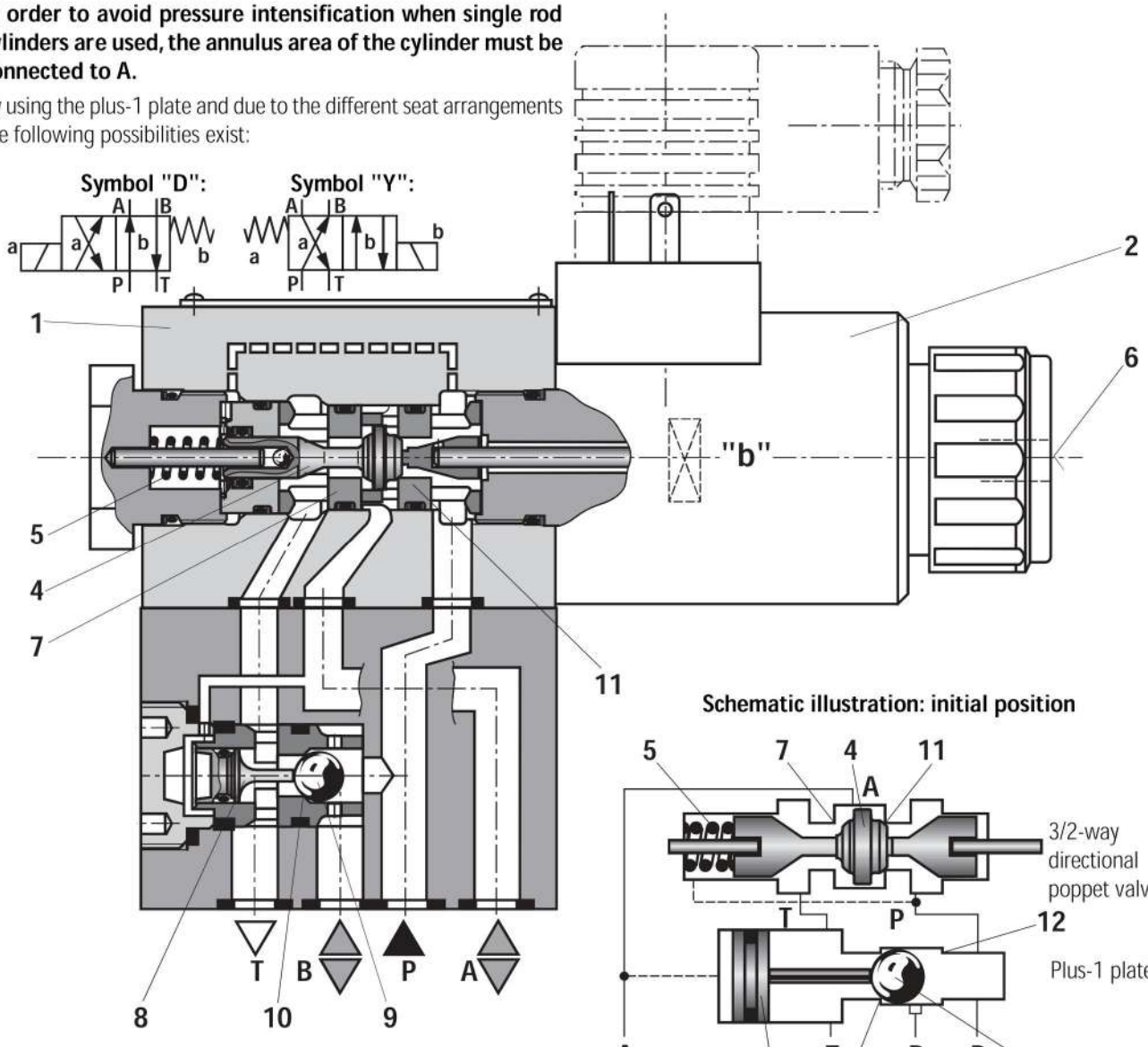
When the main valve is operated, the closing element (4) is pushed against the spring (5) and hence onto seat (7). Port T is, therefore, closed and P, A and B are briefly connected.

Switched position:

P is connected to A. As the pump pressure acts via A on the large area of the control piston (8), ball (9) is pushed onto seat (12). Thus, B is connected to T, and P to A. The ball (9) in the plus-1 plate has a "positive switching overlap".

In order to avoid pressure intensification when single rod cylinders are used, the annulus area of the cylinder must be connected to A.

By using the plus-1 plate and due to the different seat arrangements the following possibilities exist:



Type M-4SED 10 **Y**1X/350CG24N9K4

Schematic illustration: initial position

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

General

Installation			optional
Ambient temperature range		°C	–30 to +50
Weight	3/2-way directional poppet valve	kg	1.5
	4/2-way directional poppet valve	kg	2.3

Hydraulic data

Max. operating pressure	bar	see table on page 7
Max. flow	L/min	25
Pressure fluid 1) suitable for NBR **and** FKM seals 2) **only** suitable for FKM seals		Mineral oil (HL, HLP) to DIN 51 524 [1]; Fast bio-degradable pressure fluid to VDMA 24 568 (also see RE 90 221); HETG (rape seed oil) [1]; HEPG (Polyglycols) [2]; HEES (synthetic estes) [2]; other fluids on request
Pressure fluid temperature range	°C	– 30 to + 80 (with NBR seals)
		– 20 to + 80 (with FKM seals)
Viscosity range	mm^2/s	2.8 to 500
Degree of contamination		Maximum permissible degree of contamination of the pressure is to NAS 1638 class 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.

Electrical data

Voltage type		DC	AC
Available voltages [3]	V	12, **24**, 42, 96, 110, 205, 220	only possible via rectifier (see ordering details on page 2)
Voltage tolerance (nominal voltage)	%	±10	
Power consumption	W	30	
Duty		continuous	
Switching time to ISO 6403		see table below	
Switching frequency	cyles/h	15000	
Protection to DIN 40 050		IP 65	
Max. coil temperature [4]	°C	150	

[3] Special voltages on request

[4] Due to the occuring surface temperatures of the solenoid coils, please observe the European standards EN563 and EN982!

When connecting the electrics, the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Switching time *t* in ms (installation position: solenoid horizontal)

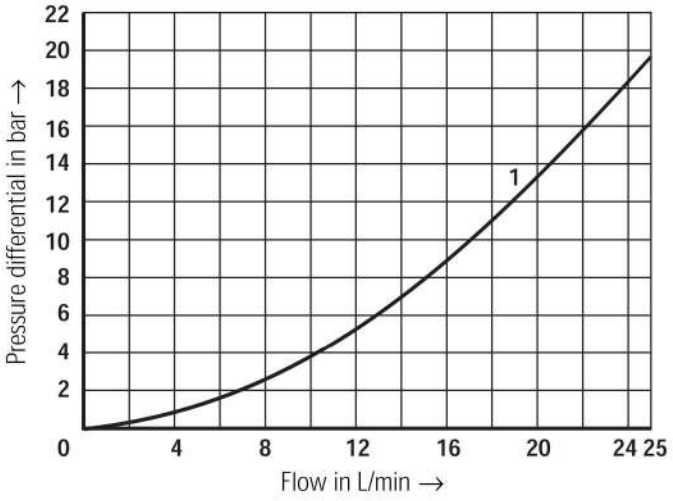
Pressure *p* in bar	Flow q_V in L/min	DC solenoid						DC solenoid + rectifier					
		Symbols UK, CK, D, Y						Symbols UK, CK, D, Y					
		t_{on} Without tank pressure				t_{off} UK CK	t_{off} D Y	t_{on} Without tank pressure				t_{off} UK CK	t_{off} D Y
		UK	CK	D	Y			UK	CK	D	Y		
70	25	45	40	50	50	10	15	45	40	45	40	40	40
140	25	60	40	50	50	10	15	55	40	55	40	40	40
210	25	60	45	60	50	10	15	60	45	60	45	40	40
280	25	60	45	60	50	10	15	65	45	65	45	40	40
315	25	65	45	65	50	10	15	65	45	65	45	40	40
350	25	65	45	65	50	10	15	65	45	65	45	40	40

⚠ Attention!
The switching times relate to a flow direction of P to A and A to T.

With reversed flows deviations are possible!

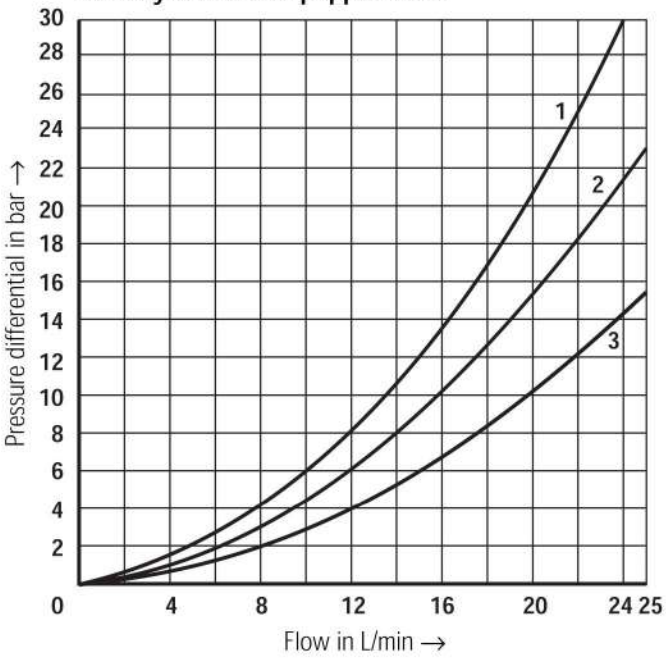
Characteristic curves (measured at ν = 41 mm²/s and ϑ = 50 °C)

Δp-q_V-characteristic curve
3/2-way directional poppet valve



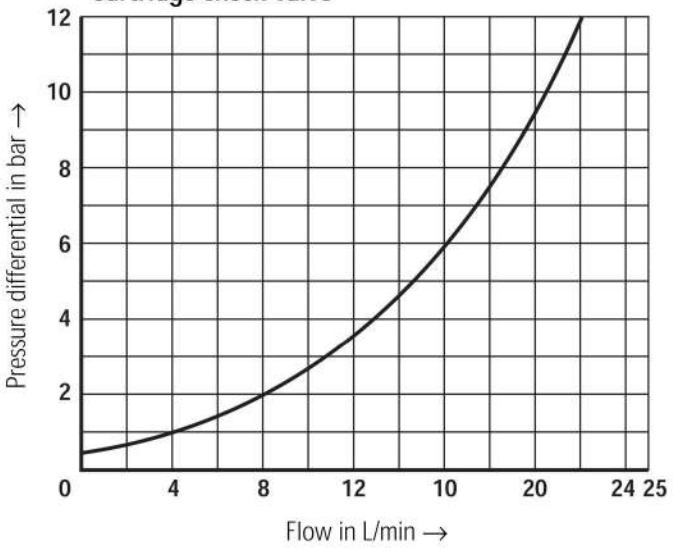
1 M-**3**SED 6 $\frac{\textbf{UK}}{\textbf{CK}}$ ..., P to A and A to T

Δp-q_V-characteristic curves
4/2-way directional poppet valve

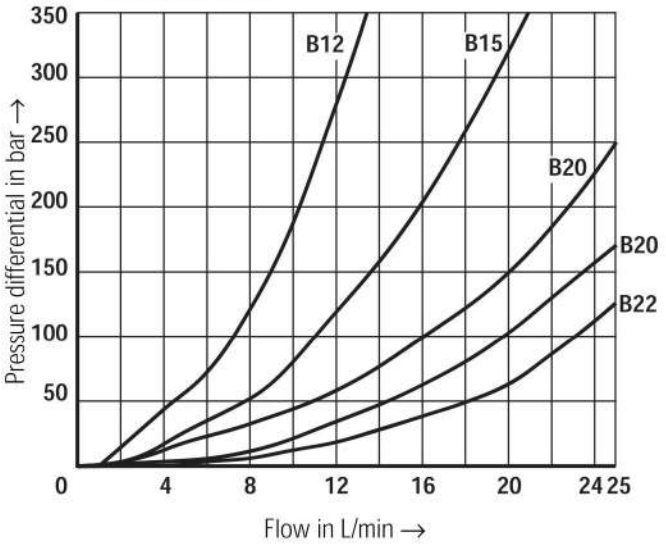


1 M-**4**SED 6 $\frac{\textbf{D}}{\textbf{Y}}$ ..., A to T
2 M-**4**SED 6 $\frac{\textbf{D}}{\textbf{Y}}$ ..., P to A
3 M-**4**SED 6 $\frac{\textbf{D}}{\textbf{Y}}$ ..., B to T, P to B

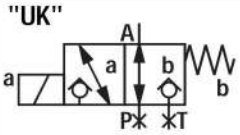
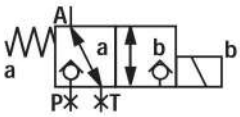
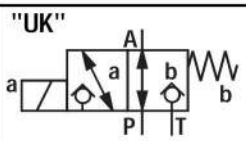
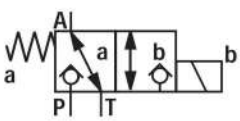
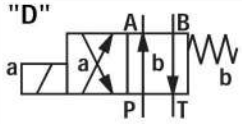
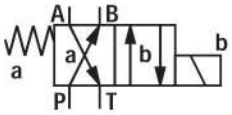
Δp-q_V-characteristic curve
Cartridge check valve



Δp-q_V-characteristic curves
Throttle insert

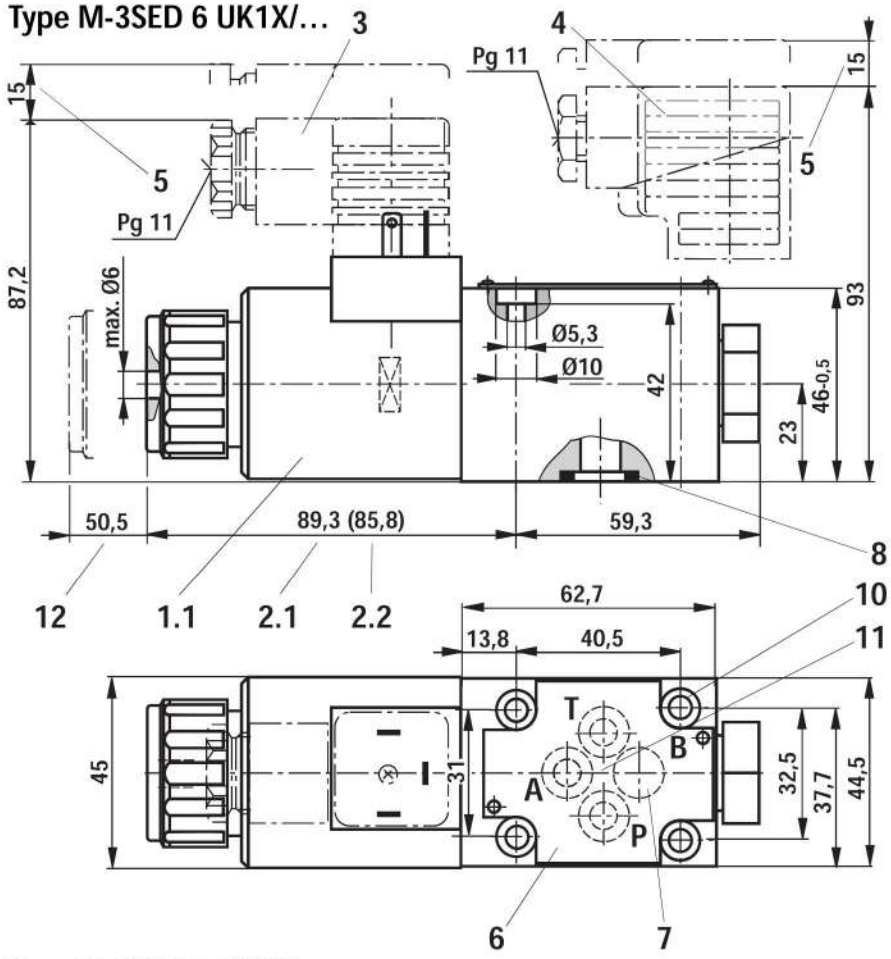


Performance limits (measured at ν = 41 mm²/s and ϑ = 50 °C)

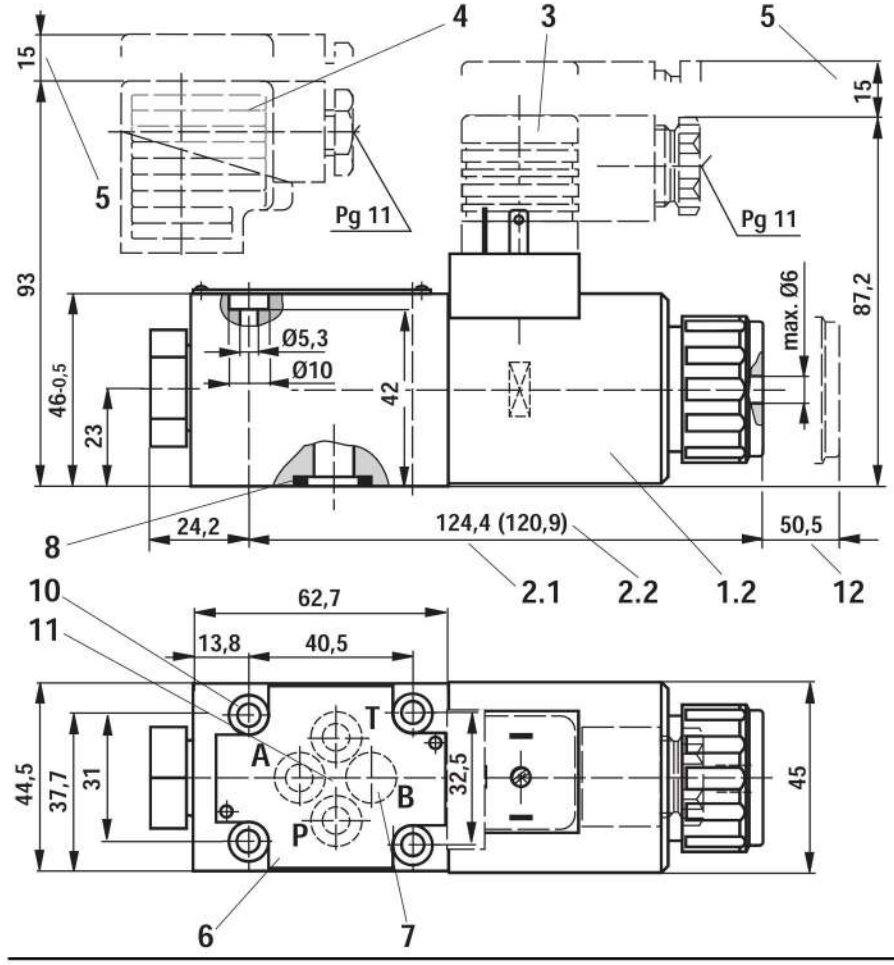
	Symbol	Description	Operating pressure in bar				Flow in L/min
			P	A	B	T	
2-way circuit	"UK" 	with a 2/2-way circuit ports P **or** T has to be plugged by the customer!	350	350		350	25
	"CK" 		350	350		350	25
3-way circuit	"UK" 		350	350		350	25
	"CK" 		350	350		350	25
4-way circuit (Flow is only possible in the direction of the arrow!)	"D" 	3/2-way directional valve (symbol "UK") in conjunction with a plus-1 plate: P ≥ A ≥ B ≥T	350	350	350	P/A/B – 40	25
	"Y" 	3/2-way directional valve (symbol "CK") in conjunction with a plus-1 plate: P ≥ A ≥ B ≥T	350	350	350	P/A/B – 40	25

⚠ Attention!
The performance limit was determined with the solenoids at operating temperature, 10% under voltage and with the tank not pressurised.

Type M-3SED 6 UK1X/...



Type M-3SED 6 CK1X/...



1.1 Solenoid "a" (plug-in connector colour grey)

1.2 Solenoid "b" (plug-in connector colour black)

2.1 Protected manual override "N9"

2.2 Without manual override

3 Plug-in connector **without** circuitry to DIN 43 650 [1)]

4 Plug-in connector **with** circuitry to DIN 43 650 [1)]

5 Space required to remove the plug-in connector

6 Name plate

7 ⚠ **Attention!**
On 3/2-way directional poppet vavles, port B is a blind counterbore.

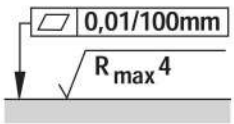
8 R-rings 9.81 x 1.5 x 1.78 for ports A, B and T
R-ring 11.18 x 1.6 x 1.78 for ports P

10 Valve fixing screws
4 off, M5 x 50 DIN 912-10.9,
M_A = 8.9 Nm,
must be ordered separately.

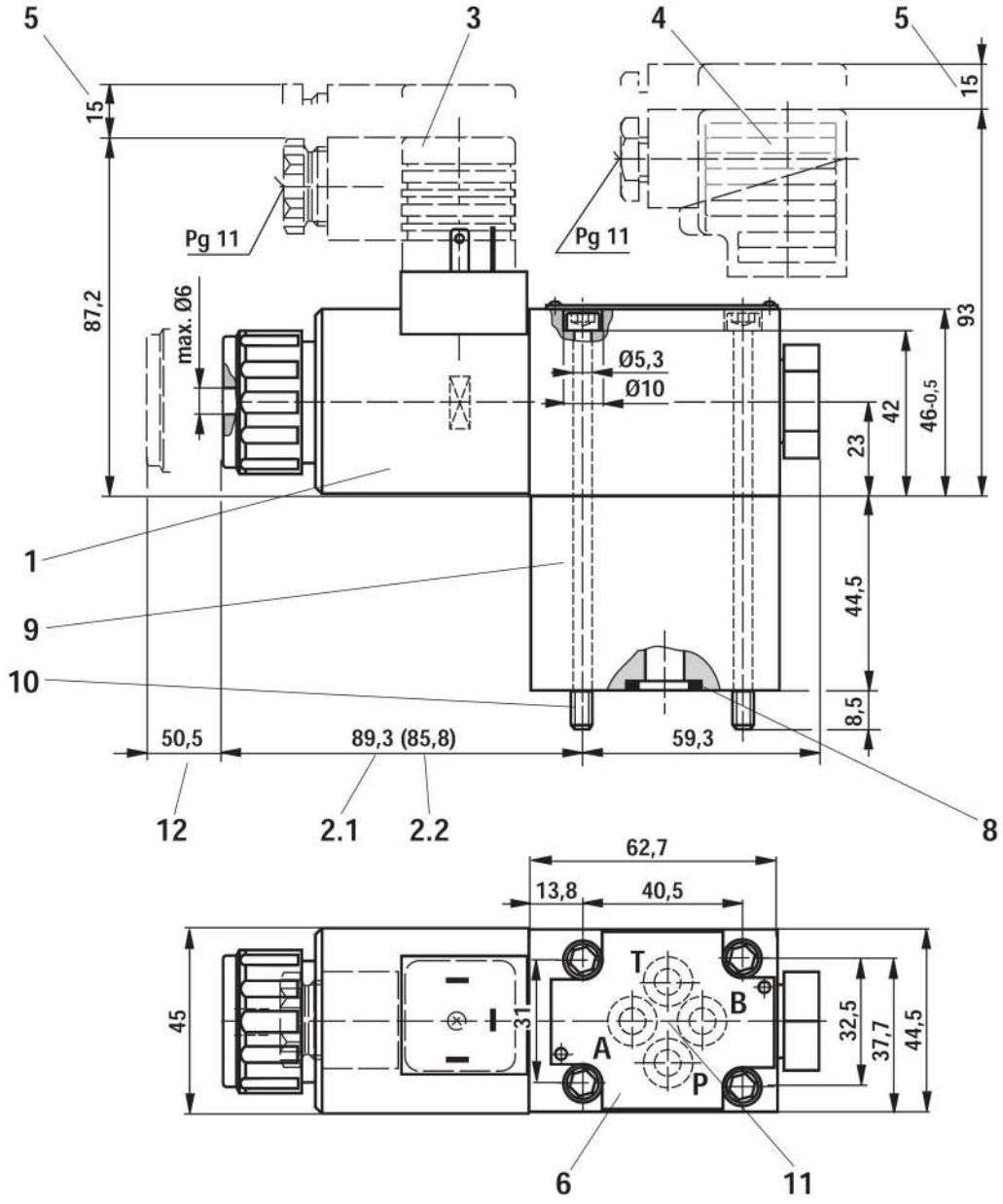
11 Subplates G 341/01 (G1/4)
G 342/01 (G3/8)
G 502/01 (G1/2)
to catalogue sheet RE 45 052
must be ordered separately.

12 Space required to remove the coil

[1)] Must be ordered separately, see page 2.



Required surface finish of the mating piece



1 Solenoid "a" (plug-in connector colour grey)

2.1 Protected manual override "N9"

2.2 Without manual override

3 Plug-in connector **without** circuitry to DIN 43 650 [1)]

4 Plug-in connector **with** circuitry to DIN 43 650 [1)]

5 Space required to remove the plug-in connector

6 Name plate

8 R-rings 9.81 x 1.5 x 1.78 for ports A, B and T

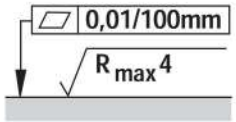
R-ring 11.18 x 1.6 x 1.78 for port P

9 Plus-1 plate

10 **Valve fixing screws**
4 off, M5 x 95 DIN 912-10.9,
M_A = 8.9 Nm
are included within the scope of supply.

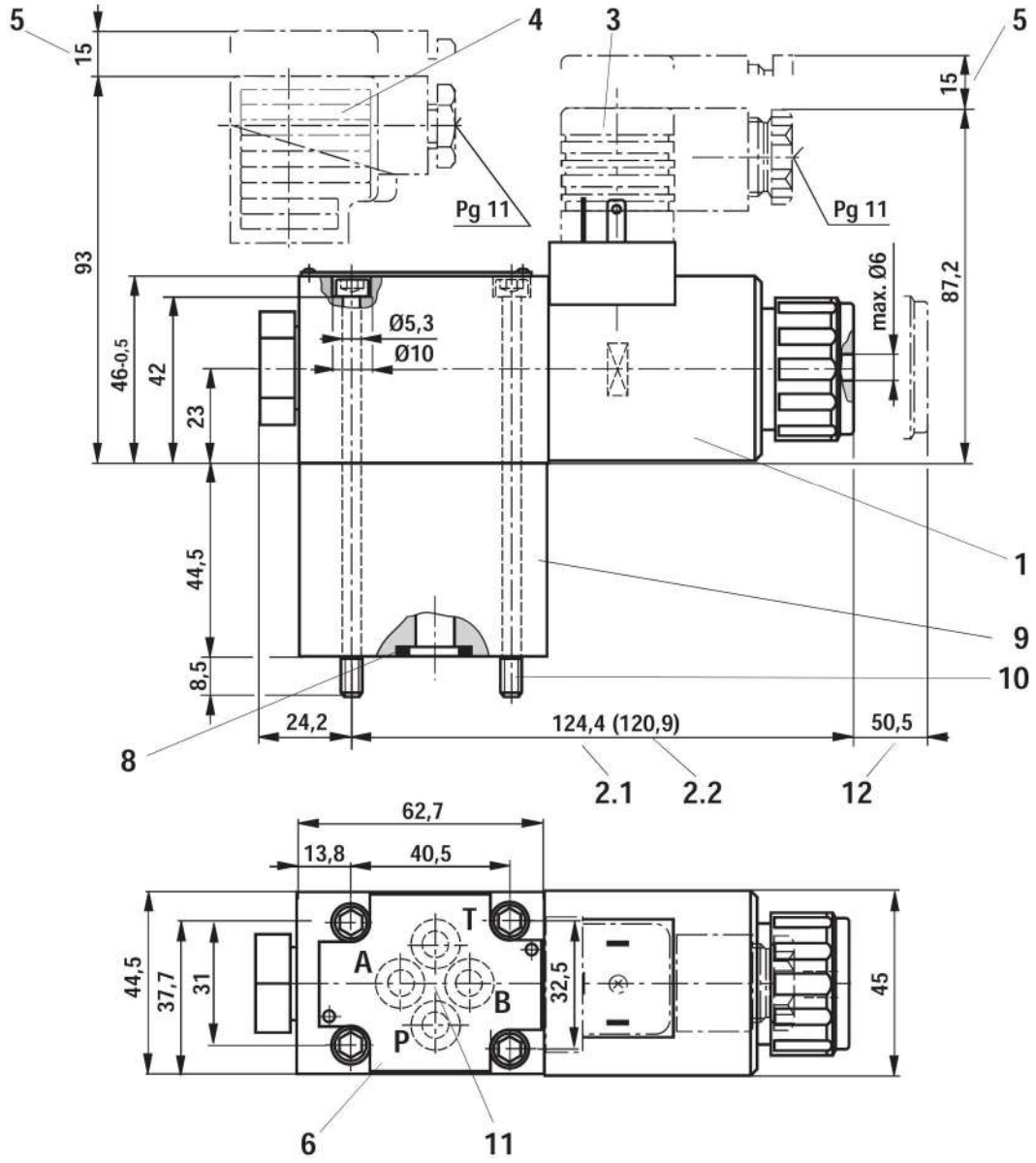
11 **Subplates** G 341/01 (G 1/4)
G 342/01 (G 3/8)
G 502/01 (G 1/2)
to catalogue sheet RE 45 052
must be ordered separately.

12 Space required to remove the coil



Required surface finish of the mating piece

[1)] Must be ordered separately, see page 2.



1 Solenoid "b" (plug-in connector colour black)

2.1 Protected manual override "N9"

2.2 Without manual override

3 Plug-in connector **without** circuitry to DIN 43 650 [1)]

4 Plug-in connector **with** circuitry to DIN 43 650 [1)]

5 Space required to remove the plug-in connector

6 Name plate

8 R-rings 9.81 x 1.5 x 1.78 for ports A, B and T

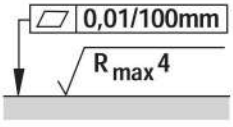
R-ring 11.18 x 1.6 x 1.78 for port P

9 Plus-1 plate

10 **Valve fixing screws**
4 off, M5 x 95 DIN 912-10.9,
M_A = 8.9 Nm
are included within the scope of supply.

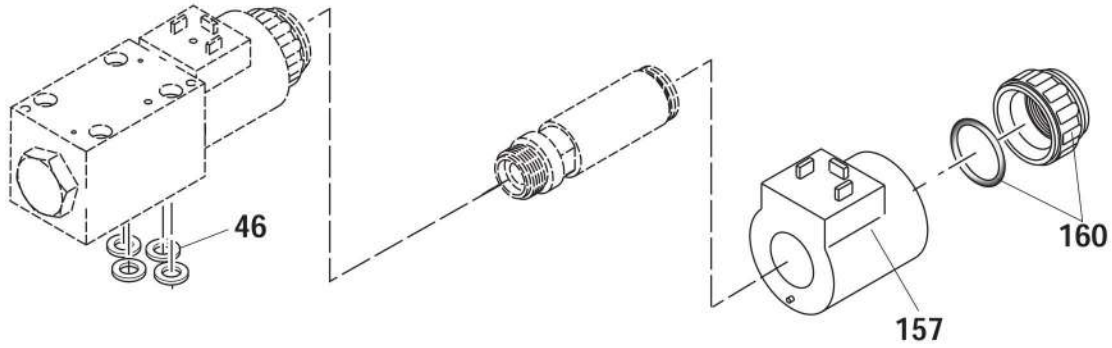
11 **Subplates** G 341/01 (G 1/4)
G 342/01 (G 3/8)
G 502/01 (G 1/2)
to catalogue sheet RE 45 052 must be ordered separately.

12 Space required to remove the coil



Required surface finish of the mating piece

[1)] Must be ordered separately, see page 2.



Spare parts – solenoid

Pos.	Designation	DC	
		Voltage	Material no.
157	Coil for individual connection	12 V	00021388
		24 V	00021389
		96 V	00021392
		205 V	00071036
160	Seal kit – nut for pressure tube without manual override Seal kit – nut for pressure tube with protected manual override		00838254

Seal kit – valve

Pos.	Sealing material	Material no.
46	NBR seals	00075699
	FKM seals	00075700

General guidelines

Poppet valves are to be applied in accordance with symbols as well as the operating pressures and flows (see performance limits on page 7).

To guarantee the safe function the following points must be taken into account:

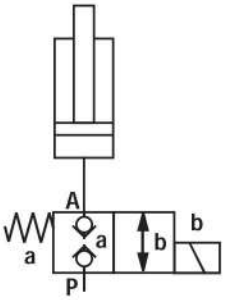
- Poppet valves have a negative overlap, therefore, during switching leakage oil occurs. This process however takes place in such a short period of time that in most cases it is without meaning.
- The stated maximum flows must not be exceeded (if necessary a cartridge throttle for flow limitation has to be fitted)!

Plus-1 plate:

- When using the plus-1 plate (4/2-way functions) the following function values have to be taken into account: p_{min} = 8 bar, q_V > 3 L/min.
- Ports P, A, B and T are defined in accordance with their functions. They must not be changed or plugged!
- Port T must always be connected.
- Pressures and pressure distribution is to be taken into account!
- The direction of flow is only permissible in the direction of the arrow!

Examples of application

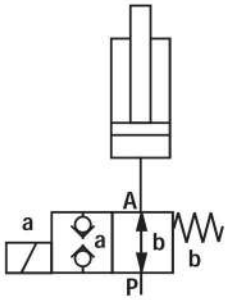
These examples serve **only to explain** the possibilities offered by the poppet valve. They do not include all of the functions.



2/2-way circuit

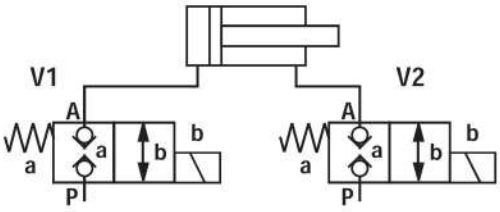
Initail position:
Flow path is blocked, maximum pressure is permissible. The pressure at the actuator is held constant even when the pump is switched off.

Switched position:
Flow path is open, maximum pressure is permissible.



2/2-way circuit

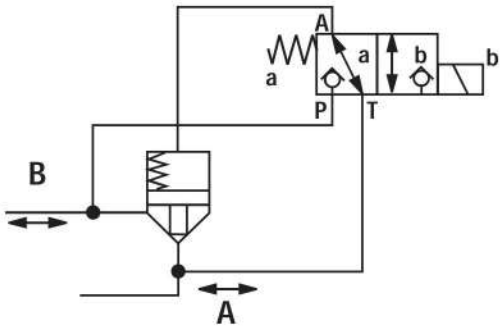
Initial position: Lifting
Holding only due to limitation of travel and pressure in port P.
Switched position: closed



2/2- way circuit with 2 valves

Initial position:
Hold cylinder.

Switched position:
Flow path in both directions.
The travel direction is determined by actuating V1 and V2.

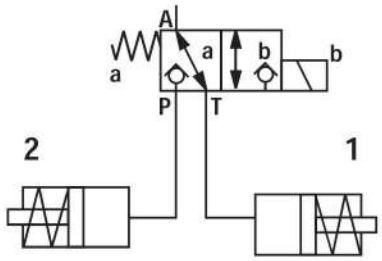


3/2- way circuit

Initial position:
Logic held closed from side A.

Switched position:
Logic held closed from side B

Symbol **„CK"**

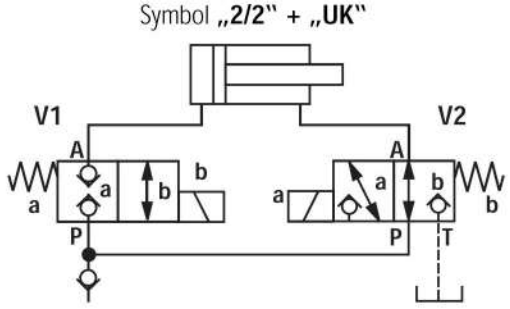


3/2-way circuit

Initial position:
P closed, pressure at A and T.
Cylinder 1 moves to the right, unloaded at A.
Cylinder 1 moves to the left.

Switched position:
T closed, pressure at A and P.
Cylinder 2 moves to the left, unloaded at A.
Cylinder 2 mover to the right.

Symbol **„2/2" + „UK"**



4/2-way circuit with a 2/2- and a 3/2-way poppet valve

V1 and V2 are in the initial position: piston is externally locked in position.
V1 and V2 in their switched position: piston moves to the right.
V1 in its switched position and V2 is in its initialposition: cylinder moves to the left, both sides of the cylinder are connected to the pump connection.

⚠ Attention!
When using differential cylinders the performance limits (double flow) and the maximum operating pressure (pressure intensification) of the valve have to be taken into account!

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Rexroth Hydraulics

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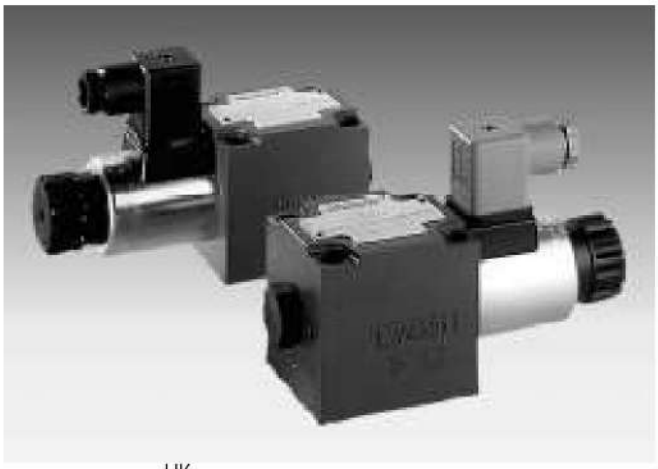
3/2- and 4/2-way directional poppet valves with solenoid actuation
Type M-.SED 10

Nominal size 10
Series 1X
Maximum operating pressure 350 bar
Maximum flow 40 L/min



H/A 4666/95

Type M-3SED 10$^{UK}_{CK}$1X/350CG24N9K4 with plug-in connector

Contents

Features

- Direct operated directional poppet valve with solenoid actuation
- Porting pattern to DIN 24 340 form A, ISO 4401 and CETOP–RP 121 H subplates to catalogue sheet RE 45 054 (separate order)
- Close port is leak-free
- Switching is ensured even when under pressure for long periods of time
- Wet pin DC solenoids with removable coil (AC voltage possible by means of rectifier)
- Solenoid coil can be rotated by 90°
- When changing coils, opening of the pressure-tight chamber is not required
- Individual electrical connection
- With protected manual override, optional

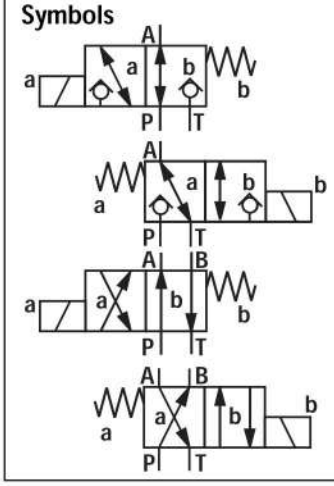
Ordering details

M–	SED	10		1X/350	C			K4/		*

3 actuator ports = **3**
4 acturator ports = **4**

Poppet valve

Nominal size 10 = **10**

Actuator ports	3	4	
Symbols 	●	–	= **UK**
	●	–	= **CK**
	–	●	= **D**
	–	●	= **Y**

● = available

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

Operating pressure 350 bar = **350**

Wet pin solenoid (in oil immersed) with removable coil = **C**

Further details in clear text

No code = NBR seals
V = FKM seals
(other seals on request)

⚠ Attention!
The compatibility of the seals and pressure fluid has to be taken into account!

No code = without cartridge check valve, without throttle insert
P = with cartridge check valve
B12 = throttle - Ø1.2 mm
B15 = throttle - Ø1.5 mm
B18 = throttle - Ø1.8 mm
B20 = throttle - Ø2.0 mm
B22 = throttle - Ø2.2 mm

Electrical connection
K4 [1] = individual connection; with component plug DIN 43 650-AM2, without plug-in connector

N9 = with protected manual override
No code = without manual override

G24 = 24 V DC
G205 [2] = 205 V DC

AC supply (permissible voltage tolerance ± 10%)	**Nominal voltage of the DC solenoids when used with AC voltages**	**Order detail**
110 V - 50/60 Hz	96 V	**G96**
120 V - 60 Hz	110 V	**G110**
230 V - 50/60 Hz	205 V	**G205**

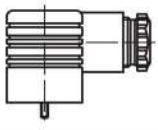
Preferred types and standard components are highlighed in the RPS (Rexroth Price list Standard).

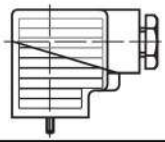
[1] Plug-in connectors must be ordered separately (see below).

[2] When connecting to an AC supply a DC solenoid **must** be used which is controlled via a rectifier (see table on the left).
For individual connections a large plug-in connector with integrated rectifier can be used (separate order, see below).

Ordering details: Plug-in connectors DIN 43 650 A and ISO 4400 for component plug "K4"

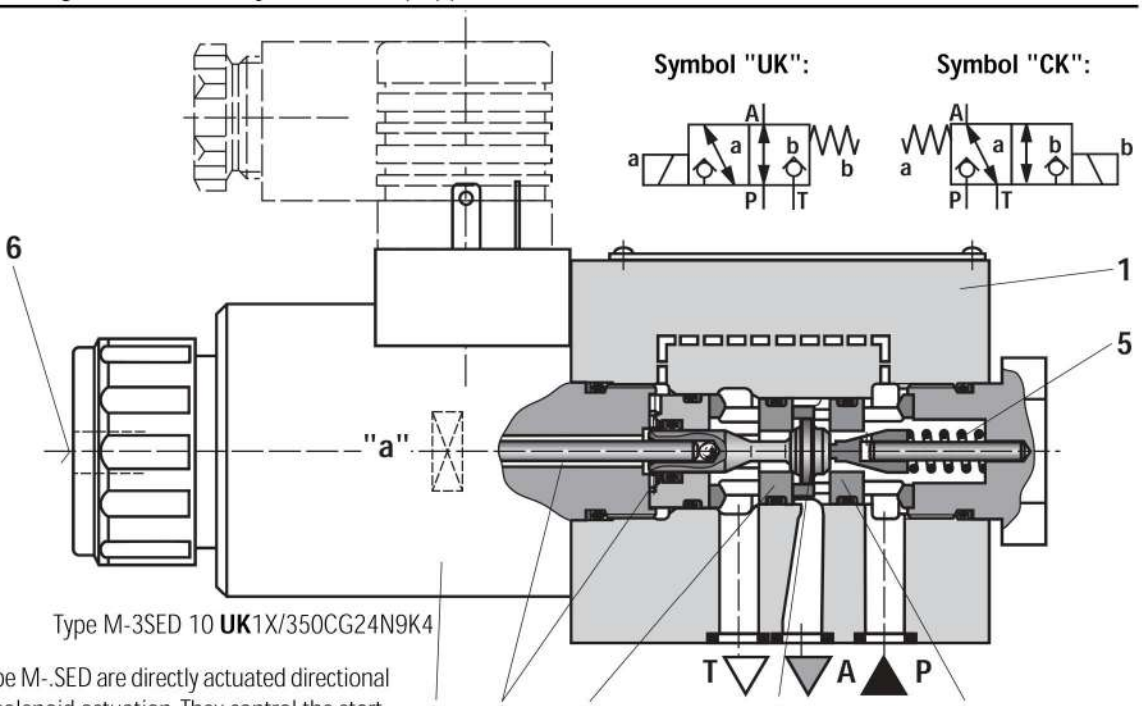
For further plug-in connectors see RE 08 006





Valve side	Colour	Material no. Without circuitry	With indicator lamp 12 … 240 V	With rectifier 12 … 240 V	With indicator lamp and Z-diode protective circuit 24 V
a	grey	**00074683**	–	–	–
b	black	**00074684**	–	–	–
a/b	black	–	**00057292**	**00313933**	**00310995**

Function, section, symbols: 3/2-way directional poppet valve



Type M-3SED 10 **UK**1X/350CG24N9K4

General:

Directional valves type M-.SED are directly actuated directional poppet valves with solenoid actuation. They control the start, stop and direction of a fluid flow and basically consist of a housing (1), the solenoid (2), the valve seats (7) and (11) and as the closing device (4).

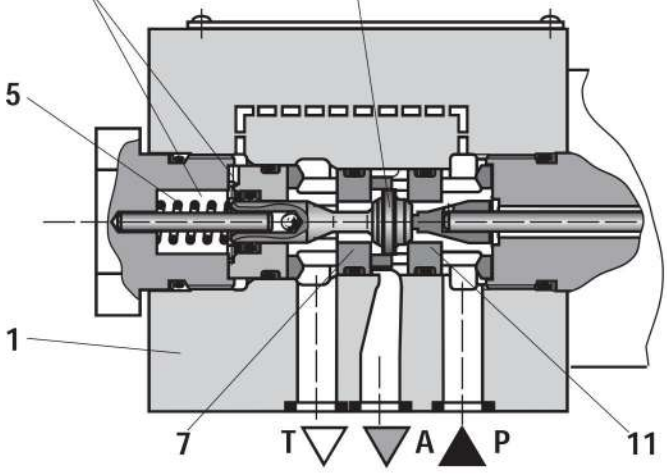
The manual override (6) allows the valve to be switched without energiszing the solenoid.

Basic function:

The arrangement of the spring (5) determines the initial position of the valve (open when de-energised "UK" or closed when de-enegised "CK"). The chamber (3) behind the closing element (4) is connected to port P and sealed off from port T. Hence the valve is pressure-balanced with respect to the operating forces (solenoid and spring).

Due to the special closing element (4) it is possible to apply the maximum operating pressure (350 bar) to ports P, A and T and the flow can also pass in both directions (see symbols)!

In the initial position the closing element (4) is pressed onto seat (11) by the spring (5), in the switched position it is pushed onto seat (7) by the solenoid (2). This results in leak-free closure.



Type M-3SED 10 **CK**1X/350CG24N9K4

Throttle insert

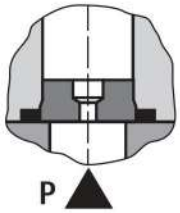
The use of a throttle insert is required, if, due to the operating conditions, flows are to be expected during the switching procedure, which are higher than the stated maximum performance limits of the valve.

Examples:

- Accumulator operation,
- Use as pilot valve with internal pilot oil supply.

3/2-way directional poppet valve
The throttle is inserted into port P of the poppet valve.

4/2-way directional poppet valve
(see page 4)
The throttle is inserted into port P of the plus-1 plate.

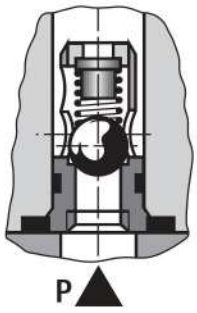


Cartridge check valve

The cartridge check valve allows free flow from P to A and provides leak-free closed from A tp P.
For examples, see page 12.

3/2-way directional poppet valve
The cartridge check valve is inserted into port P of the poppet valve.

4/2-way directional poppet valve
(see page 4)
The cartridge check valve is inserted into port P of the plus-1 plate.



Function, section, schematic illustration: 4/2-way directional poppet valve

In conjunction with a sandwich plate, a **plus-1 plate**, under the 3/2-way directional poppet valve enable this valve to be used as 4/2-way directional poppet valve.

H/A 5285/95

Type M-4SED 10 D1X/350CG24N9K4 with plug-in connector

Function of the plus-1 plate:

Initial position:

The main valve is not actuated. The spring (5) holds the closing element (4) on its seat (11). Port P is closed, and port A is connected to T. In addition, a control line runs from A to the large area of the control piston (8) so that is unloaded to tank. The pressure applied via P now moves ball (9) onto seat (10). P is now connected to B, and A to T.

Transistion position:

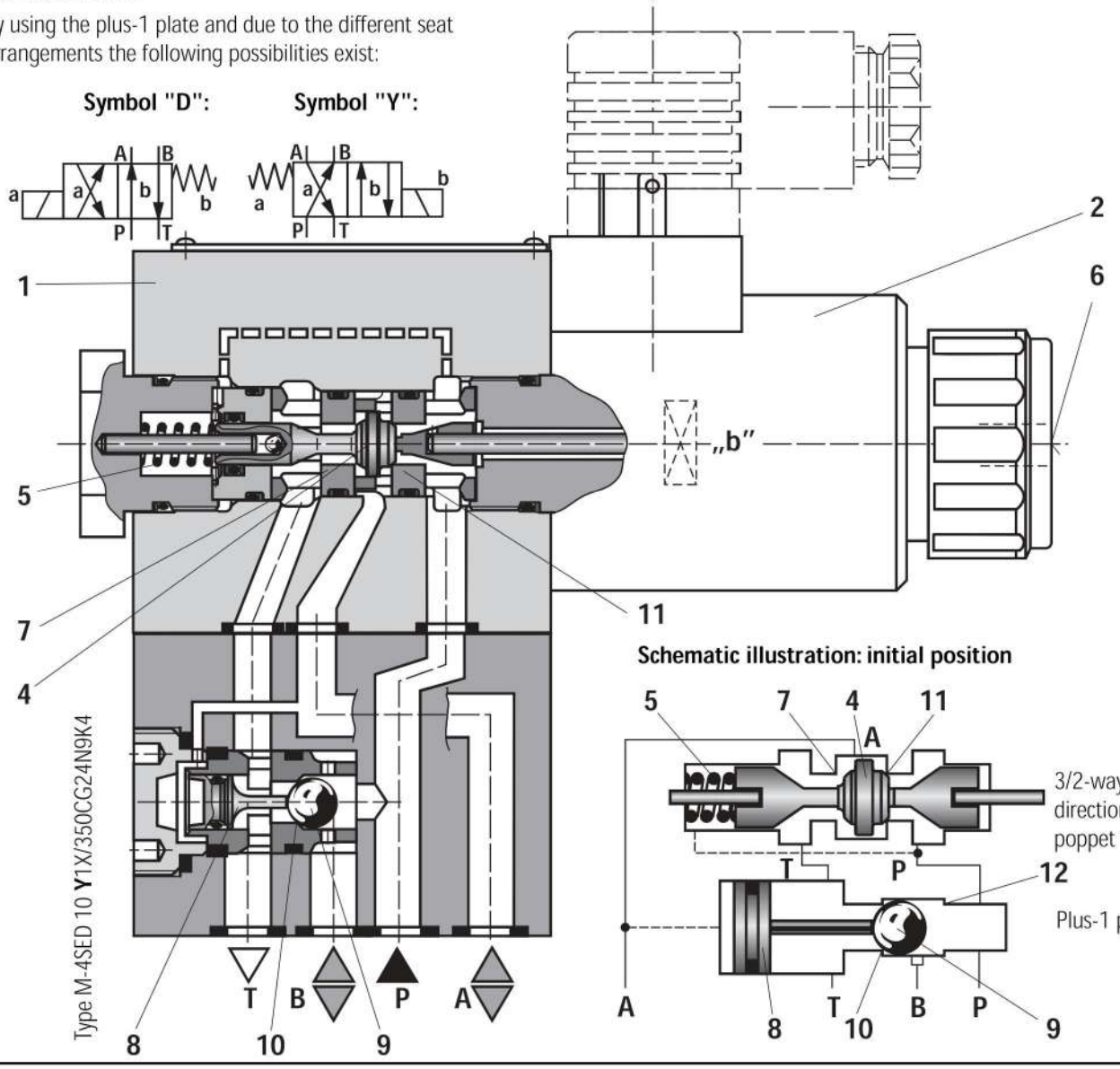
When the main valve is operated, the closing element (4) is pushed against the spring (5) and hence onto seat (7). Port T is, therefore, closed and, P, A and B are briefly connected.

Switched position:

P is connected to A. As the pump pressure acts via A on the large area of the control piston (8), ball (9) is pushed onto seat (12). Thus, B is connected to T and P to A. The ball (9) in the plus-1 plate has a "positive switching overlap".

In order to avoid pressure intensification when single rod cylinders are used, the annulus area of the cylinder must be connected at A.

By using the plus-1 plate and due to the different seat arrangements the following possibilities exist:



Schematic illustration: initial position

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

General

Installation			optional
Ambient temperature range		°C	–30 to +50
Weight	3/2-way directional poppet valve	kg	2.6
	4/2-way directional poppet valve	kg	3.9

Hydraulic data

Max. operating pressure	bar	see table on page 7
Max. flow	L/min	40
Pressure fluid [1] suitable for NBR **and** FKM seals [2] **only** suitable for FKM seals		Mineral oil (HL, HLP) to DIN 51 524 [1]; fast bio-degradable pressure fluids to VDMA 24 568 (also see RE 90 221); HETG (rape seed oil) [1]; HEPG (polyglycols) [2]; HEES (synthetic esters) [2]; other pressure fluids on request
Pressure fluid temperature range	°C	– 30 to + 80 (with NBR seals)
		– 20 to + 80 (with FKM seals)
Viscosity range	mm^2/s	2.8 to 500
Degree of contamination		Maximum permissible degree of contamination of the pressure fluid is to NAS 1638 classe 9. We, therefore, recommend a filter with a minimum retention rate of $\beta_{10} \geq 75$.

Electrical data

Voltage type		DC	AC
Available voltages [3]	V	12, **24**, 42, 96, 110, 205, 220	only possible via rectifier (see ordering details on page 2)
Voltage tolerance (nominal voltage)	%	±10	
Power consumption	W	30	
Duty		continuous	
Switching time to ISO 6403		see table below	
Switching frequency	cycles/h	15000	
Protection to DIN 40 050		IP 65	
Max. coil temperature [4]	°C	150	

[3] Special voltages on request

[4] Due to the occuring surface temperature of the solenoid coils, the European standards EN563 and EN982 have to be taken into account!

When connecting the electrics, the protective conductor (PE ⏚) must be connected according to the relevant regulations.

Switching time *t* in ms (installation: solenoid horizontal)

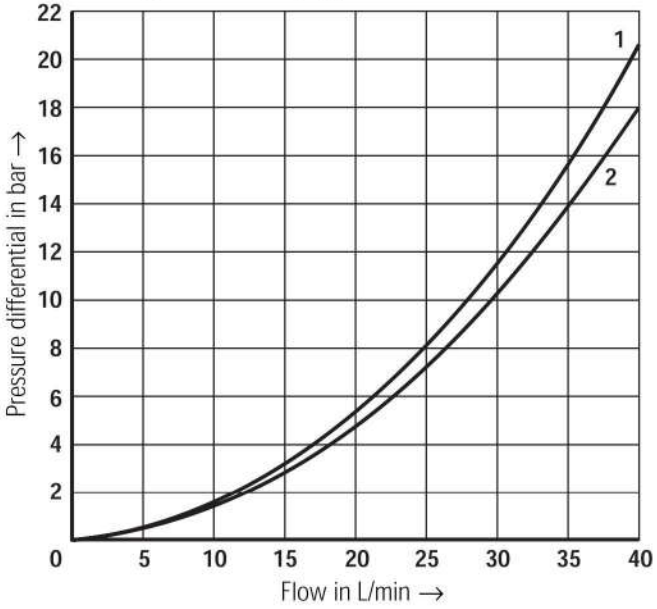
Pressure *p* in bar	Flow q_V in L/min	DC solenoid						DC solenoid + rectifier					
		Symbols UK, CK, D, Y						Symbols UK, CK, D, Y					
		t_{on} Without tank pressure				t_{off} UK CK	t_{off} D Y	t_{on} Without tank pressure				t_{off} UK CK	t_{off} D Y
		UK	CK	D	Y			UK	CK	D	Y		
70	40	40	30	40	35	10	10	35	30	40	35	40	40
140	40	40	30	40	35	10	10	40	30	40	35	40	40
210	40	45	35	45	35	10	10	45	35	45	35	40	40
280	40	45	35	45	35	10	10	45	35	45	35	40	40
315	40	50	35	50	35	10	10	50	40	50	40	40	40
350	40	50	45	50	45	10	10	50	45	50	45	40	40

⚠ Attention!
The switching types relate to a flow direction of P to A and A to T.

With reversed flows deviations are possible!

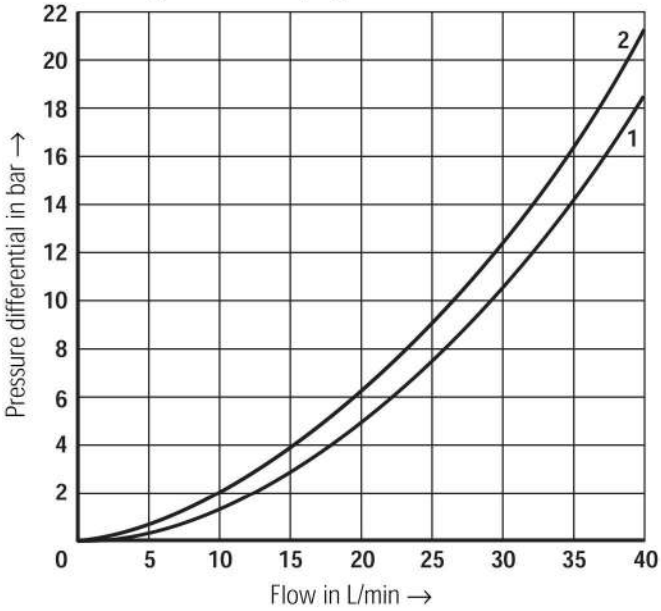
Characteristic curves (measured at ν = 41 mm²/s and ϑ = 50 °C)

Δp-q_V-characteristic curves
3/2-way directional poppet valve



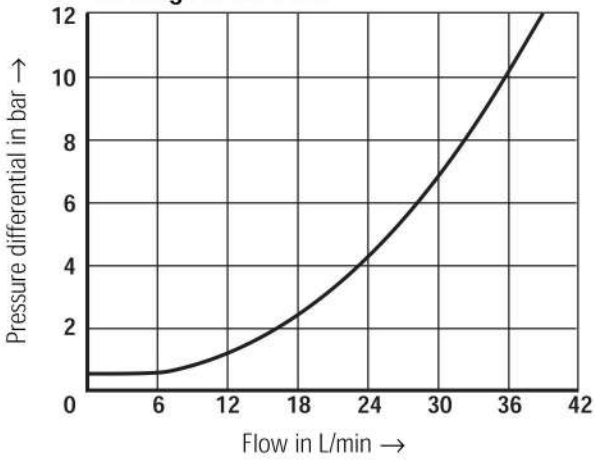
1 M-**3**SED 10 **UK / CK** ..., P to A
2 M-**3**SED 10 **UK / CK** ..., A to T

Δp-q_V-characteristic curves
4/2-way directional poppet valve

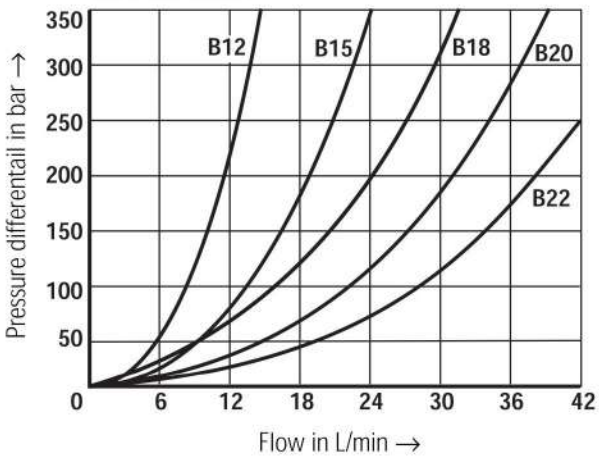


1 M-**4**SED 10 **D / Y** ..., P to B, A to T
2 M-**4**SED 10 **D / Y** ..., B to T, P to A

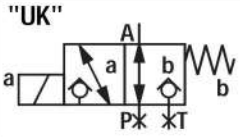
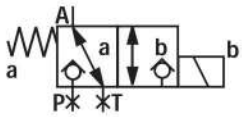
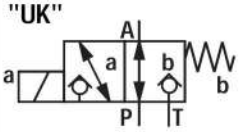
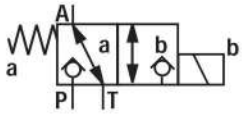
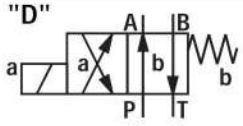
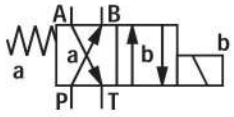
Δp-q_V-characteristic curves
Cartridge check valve



Δp-q_V-characteristic curves
Throttle insert

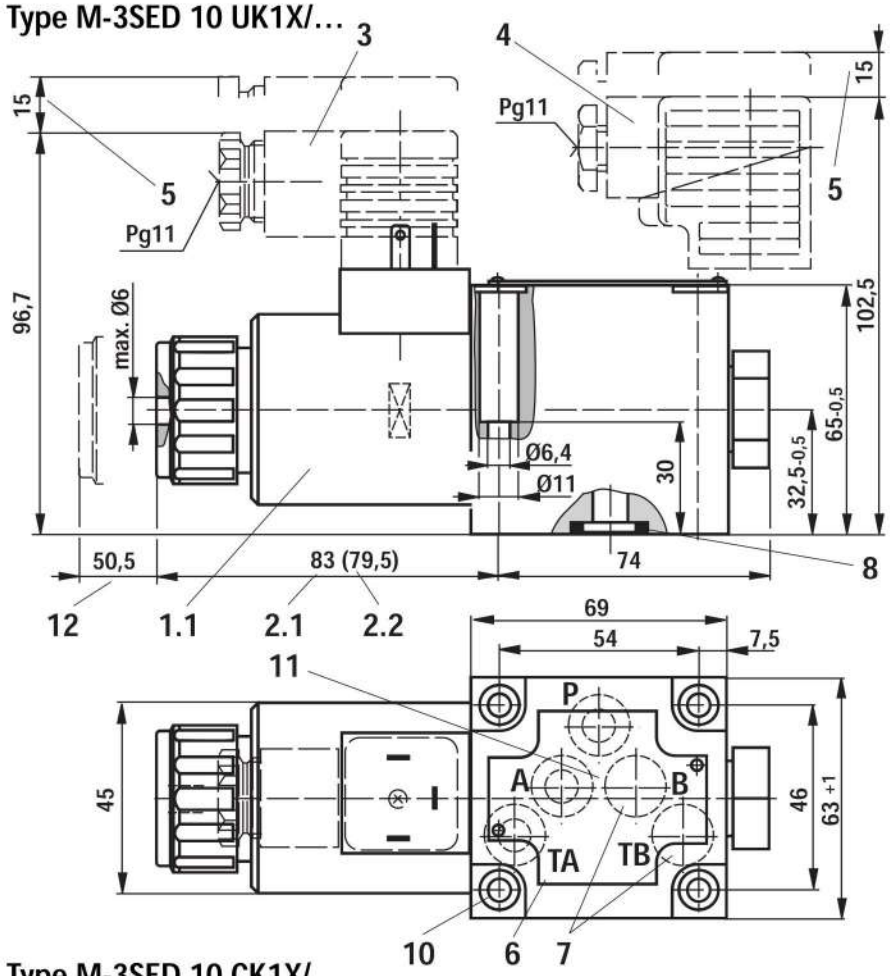


Performance limits (measured at ν = 41 mm²/s and ϑ = 50 °C)

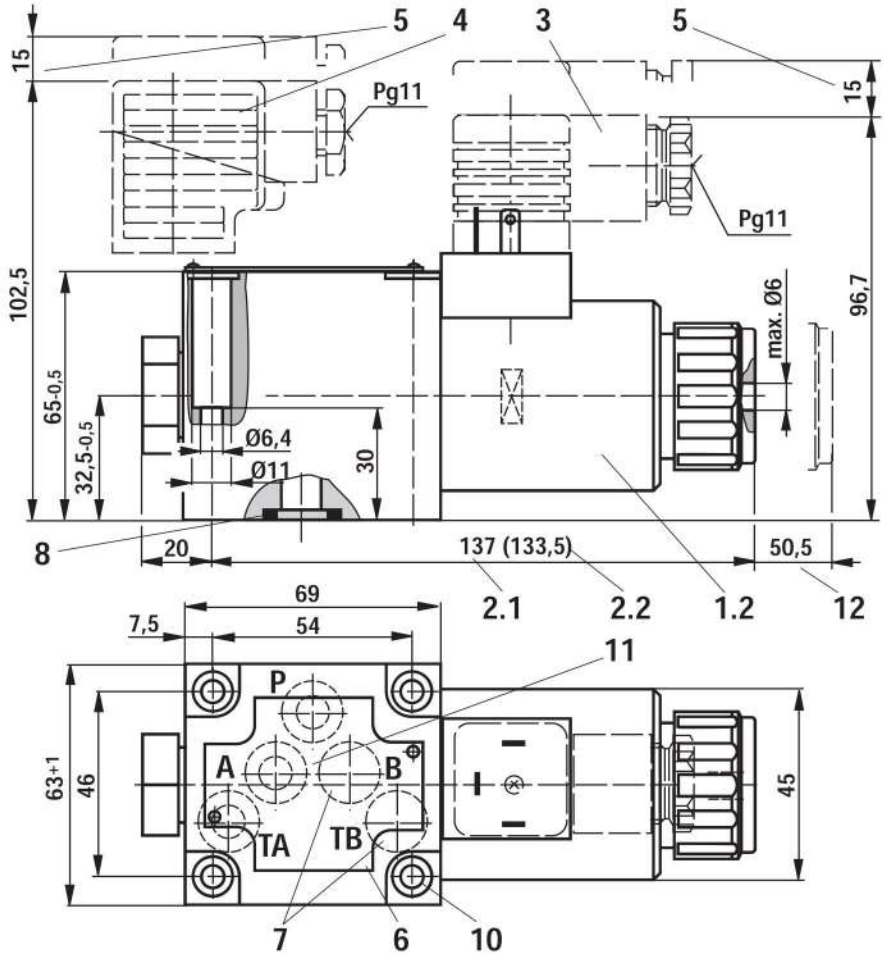
	Symbol	Description	Operating pressure in bar				Flow in L/min
			P	A	B	T	
2-way circuit	"UK" 	with a 2/2-way circuit ports P **or** T has to be plugged by the customer!	350	350		350	40
	"CK" 		350	350		350	40
3-way circuit	"UK" 		350	350		350	40
	"CK" 		350	350		350	40
4-way circuit (Flow is only possible in the direction of the arrow!)	"D" 	3/2-way directional valve (symbol "UK") in conjunction with a plus-1 plate: P ≥ A ≥ B ≥T	350	350	350	P/A/B – 40	40
	"Y" 	3/2-way directional valve (symbol "CK") in conjunction with a plus-1 plate: P ≥ A ≥ B ≥T	350	350	350	P/A/B – 40	40

⚠ Attention!
The performance limit was determined with the solenoids at operating temperature, 10% under voltage and with the tank not pressurised.

Type M-3SED 10 UK1X/…



Type M-3SED 10 CK1X/…



1.1 Solenoid "a" (plug-in connector colour grey)

1.2 Solenoid "b" (plug-in connector colour black)

2.1 Protected manual override "N9"

2.2 Without manual override

3 Plug-in connector **without** circuitry to DIN 43 650 [1)]

4 Plug-in connector **with** circuitry to DIN 43 650 [1)]

5 Space required to remove the plug-in connector

6 Name plate

7 ⚠ **Attention!**
On 3/2-way directional poppet valves, ports B and TB are a blind counterbore.

8 R-rings 13 x 1.6 x 2
for ports A, B and T

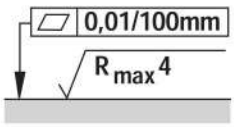
R-ring 14.6 x 1.6 x 1.78
for port P

10 Valve fixing screws
4 off, M6 x 40 DIN 912-10.9,
M_A = 15.5 Nm,
must be ordered separately.

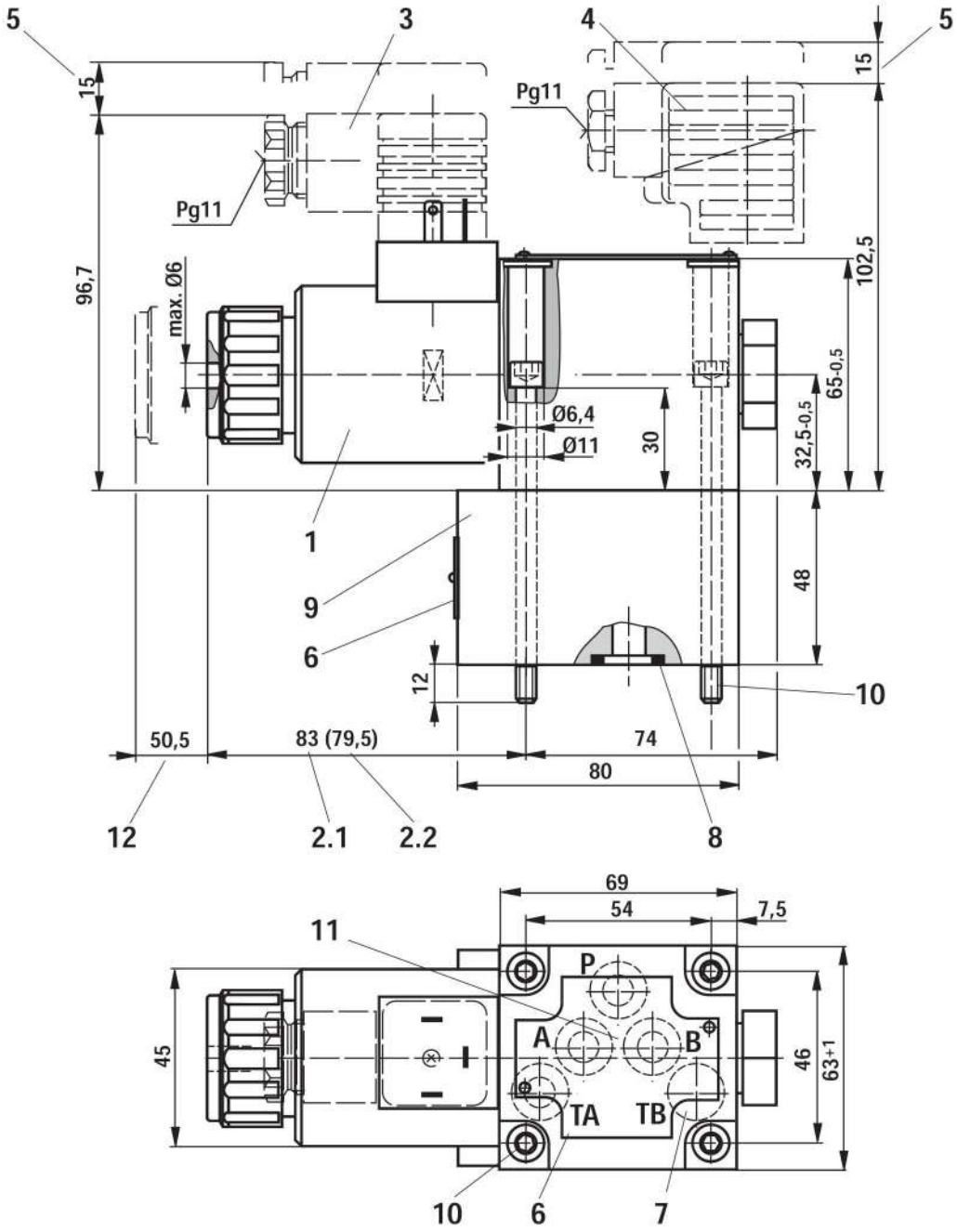
11 Subplates G 66/01 (G3/8)
G 67/01 (G1/2)
to catalogue sheet RE 45 054
must be ordered separately.

12 Space required to remove the coil

[1)] must be ordered separately, see page 2.



Required surface finish of the mating piece



1 Solenoid "a" (plug-in connector colour grey)

2.1 Protected manual override "N9"

2.2 Without manual override

3 Plug-in connector **without** circuitry to DIN 43 650 [1)]

4 Plug-in connector **with** circuitry to DIN 43 650 [1)]

5 Space required to remove the plug-in connector

6 Name plate

7 ⚠ **Attention!**
On 4/2-way directional poppet valves, port TB is a blind counterbore.

8 R-rings 13 x 1.6 x 2 for ports A, B and T

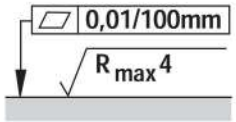
R-ring 14.6 x 1.6 x 1.78 for port P

9 Plus-1 plate

10 Valve fixing screws
4 off, M6 x 90 DIN 912-10.9,
M_A = 15.5 Nm
are included within the scope of supply.

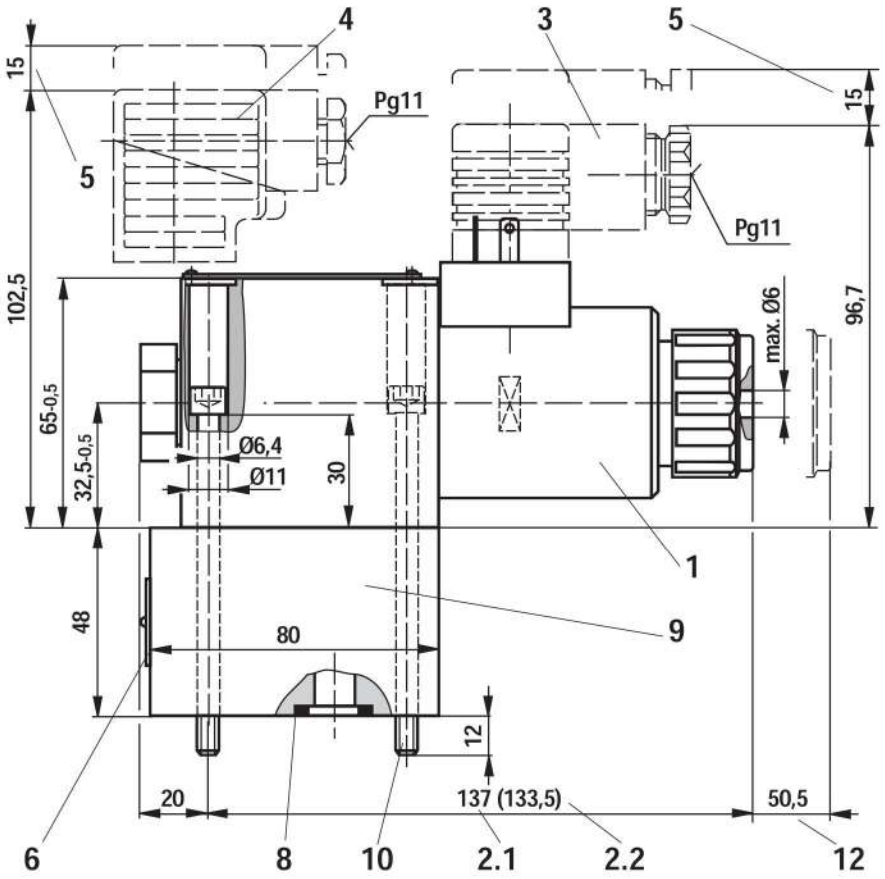
11 Subplates G 66/01 (G3/8)
G 67/01 (G1/2)
to catalogue sheet RE 45 054 must be ordered separately.

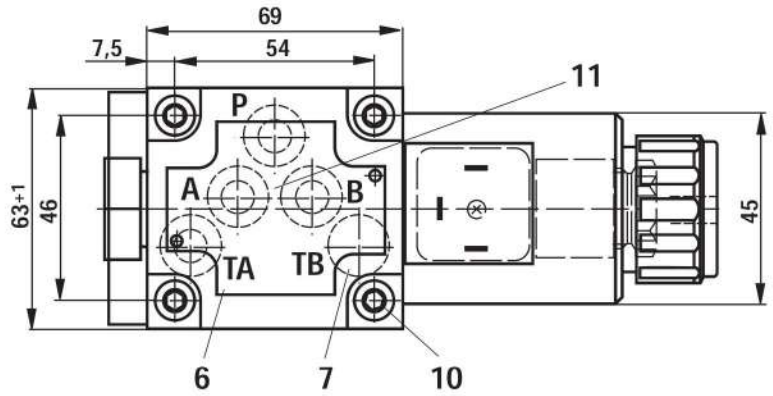
12 Space required to remove the coil



Required surface finish of the mating piece

[1)] must be ordered separately, see page 2.





1 Solenoid "b" (plug-in connector colour black)

2.1 Protected manual override "N9"

2.2 Without manual override

3 Plug-in connector **without** circuitry to DIN 43 650 [1)]

4 Plug-in connector **with** circuitry to DIN 43 650 [1)]

5 Space required to remove the plug-in connector

6 Typenschild

7 ⚠ **Attention!**
On 4/2 way directional poppet valves, port TB is a blind counterbore.

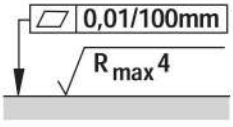
8 R-rings 13 x 1.6 x 2 for ports A, B and T
R-ring 14.6 x 1.6 x 1.78 for port P

9 Plus-1 plate

10 **Valve fixing screws**
4 off, M6 x 90 DIN 912-10.9,
M_A = 15.5 Nm
are included within the scope of supply.

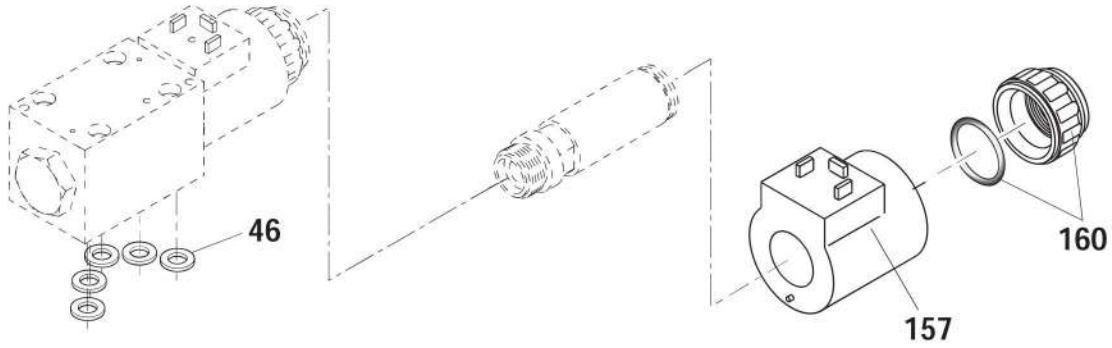
11 **Subplates** G 66/01 (G3/8)
G 67/01 (G1/2)
to catalogue sheet RE 45 054
must be ordered separately.

12 Space required to remove the coil



Required surface finish of the mating piece

[1)] must be ordered separately, see page 2.



Spare parts – solenoid

Item	Designation	DC	
		Voltage	Material no.
157	Coil for individual connection	12 V	00021388
		24 V	00021389
		96 V	00021392
		205 V	00071036
160	Seal kit – nut for pressure tube without manual override		00838254
	Seal kit – nut for pressure tube with protected manual override		

Seal kit – valve

Item	Sealing material	Material no.
46	NBR seals	00074153
	FKM seals	00074157

General guidelines

Poppet valves are to be applied in accordance with symbols as well as the operating pressures and flows (see performance limits on page 7).

To guarantee the safe function, the following points must be taken into account:

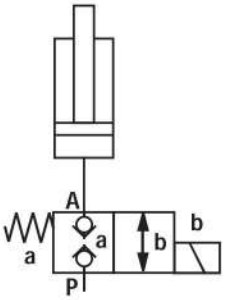
- Poppet valves have a negative overlap, therefore, during switching leakage oil occurs. This process however takes place in such a short period of time that in most cases it is without meaning.
- The stated maximum flows must not be exceeded (if necessary a cartridge throttle for flow limitation has to be fitted)!

Plus-1 plate:

- When using the plus-1 plate (4/2-way function) the following function values have to be taken into account: p_{min} = 8 bar, q_V > 3 L/min.
- Ports P, A, B and T are defined in accordance with their functions. They must not be changed or plugged!
- Port T must always be connected.
- Pressures and pressure distribution is to be taken into account!
- The direction of flow is only permissible in the direction of the arrow!

Examples of application

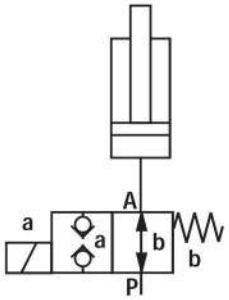
These examples serve **only to explain** the possibilities offered by the poppet valve. They do not include the complete function.



2/2-way circuit

Initial position:
Flow path is blocked, maximum pressure is permissible. The pressure at the actuator is held constant even when the pump is switched off.

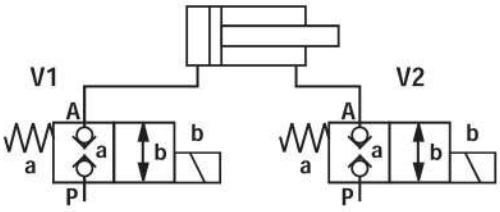
Switched position:
Flow path is open, maximum pressure permissible.



2/2-way circuit

Initial postion: Lifting
Holding only due to limitation of travel and pressure in port P.

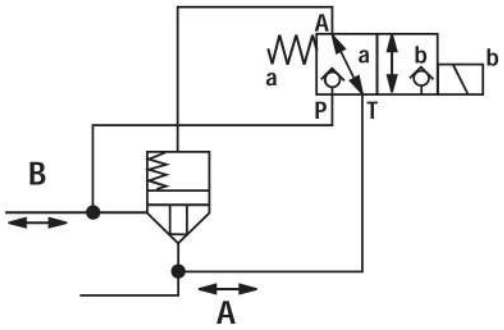
Switched position: Closed



2/2- way circuit with 2 valves

Initial position:
Hold cylinder.

Switched position:
Flow path in both directions.
The travel direction is determined by actuating V1 and V2.

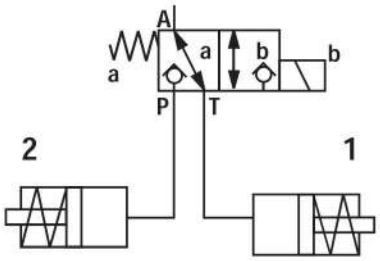


3/2-way circuit

Initial position:
Logic held closed from side A.

Switched position:
Logic held closed from side B.

Symbol **„CK"**

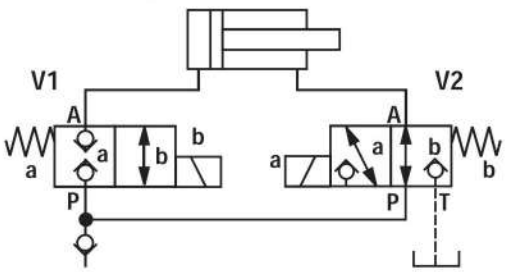


3/2-way circuit

Initial position:
P closed, pressure at A and T.
Cylinder 1 moves to the right, unloaded at A.
Cylinder 1 moves to the left.

Switched position:
T closed, pressure at A and P.
Cylinder 2 moves to the left, unloaded at A.
Cylinder 2 moves to the right.

Symbol **„2/2" + „UK"**



4/2-way circuit with a 2/2- and a 3/2-way poppet valve

V1 and V2 are in the initial position: Piston is externally locked in position.
V1 and V2 in their switched position: Piston moves to the right.
V1 in its switched position and V2 is in its initial position: Cylinder moves to the left, both sides of the cylinder are connected to the pump connection.

⚠ Attention!
When using differential cylinders the performance limits (double flow) and the maximum operating pressure (pressure intensification) of the valve have to be taken into account!

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