
Directional control valves DN 10 (NG 10)



Systemtechnik
GmbH

**Directly actuated
with switching position monitoring
Interface to DIN 24 340 and ISO 4401**

7501297.06.08.05

Description (standard units)

Design

These directional control valves are based on the **5-chamber system**, and are designed in the form of spool valves. A spool of hardened steel slides in an housing made of high-strength cast iron. Therefore the units are suitable for rough operating conditions. Depending on the design of the device the end switching position of the spool is monitored via inductive or mechanical proximity switches.

Actuation

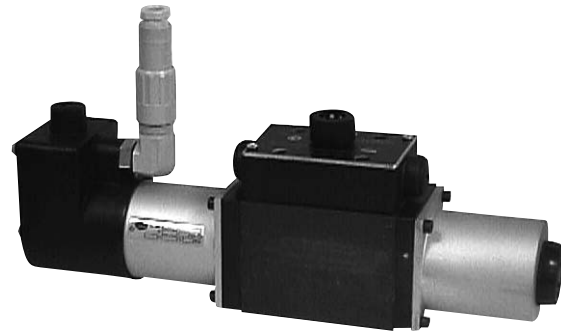
The directional control valves are actuated electromagnetically and by means of a spring.

Mounting

The units are bolted on subplates and sealed by O-rings.

Line connection

Subplate, hole pattern to DIN 24340 - A10 and ISO 4401-AC-05-4-A.



Features

- Valves with Viton seals standard
- Leakage port on request
- Via drain of leakage oil into spring space (additional hole in housing and subplate is needed - not included in international standard subplate) the port T can be pressurized up to p_{max} , what leads to a larger range of application
- Good guidance of the spool - this means reliable switching, even with long rest periods

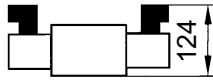
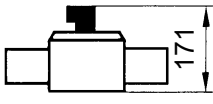
Type code

Directional control valve

S	10	...	...	G	...	...	...	...	...
		1	2		3	4	5	6	7

- 1 Actuation:
- G** – DC solenoid (with dry operation system) with manual override
 - B** – DC solenoid (with dry operation system) without manual override
 - V** – DC solenoid, pressure-tight without manual override
 - VH** – DC solenoid, pressure-tight with manual override

2 Electrical connection:

Actuation	Code Number	Symbol	Description
G, B	10		Connector Pg 11 to DIN 43 650 on solenoid
G, B	56		Connector (Tuchel) at connection box

- 3 Symbol: **020** – See type survey
- 4 Code: **Mechanical end switch**
- 039** – Position monitoring of switching position directly at spool, 1 end switch. Electrical connection: Tuchel-connector
 - 061** – Position monitoring of 3 switching positions at the solenoid, 3 end switches. Electrical connection: Harting-connector R 15
 - 066** – Position monitoring of 2 switching positions at the solenoid, 2 end switches. Electrical connection: Tuchel-connector

4 Code:

Inductive proximity switches

- 221** – Position monitoring of 1 switching position switch at side b → spool position b damped switch at side a → spool position a damped with 4/3-directional control valves spool position 0 damped
- 222** – Position monitoring of 2 switching positions 1 switch at side a spool position a damped 1 switch at side b spool position b damped
- 224** – Position monitoring of 1 switching position (2 switches) spool position 0 damped
- 225** – Position monitoring of 1 switching position 1 switch at side b spool position a damped

5 Engineering version: **5**

- 6 Additional data: **O** – Standard design
M – Mechanical detent

- 7 Sealing material: **V** – FKM (e.g. Viton)

Subplate

P	S	10	G	...	...	...	...	O	O
				1	2	3			

- 1 Line connection: **4** – G 1/2 (Internal thread)
5 – G 3/4 to DIN ISO 228/1)
- 2 Code: **001** – Standard design
- 3 Engineering version: **2**

Parameters according to VDI 3267

Type designation	G	B	VH	V
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General parameters

Designation	Directional control valve		
Symbol	See type survey		
Design	Spool-type valve		
Type of mounting	Flange		
Line connection	Subplate		
Mounting position	Preferably horizontal		
Weight	1 actuator [kg]	7,2	6,5
	2 actuators	8,8	7,3
Weight of subplate	G 1/2 [kg]	2	
	G 3/4	2,7	
Ambient temperature range ϑ_u	[°C]	–20 to +50	
Size	DN	10	

Type designation	G	B	VH	V
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Hydraulic parameters

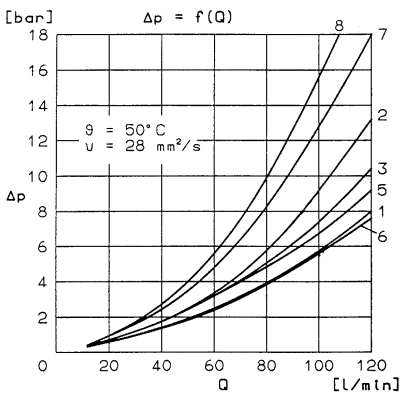
Operating pressure range p_e max. [bar]	... 315		
at port P, A, B	... 100		
at port T (without leakage port)	... 315 ¹⁾	... 50 ²⁾	
at port T (with leakage port)	-		
Pressure fluid temperature ϑ_m max. [°C]	+70		
Viscosity range ν [mm ² /s]	12 ... 500		
Flow Q_{max} (l/min)	See characteristic curve		
Filtration	Oil purity class to ISO 4406: 18/15		

Other parameters

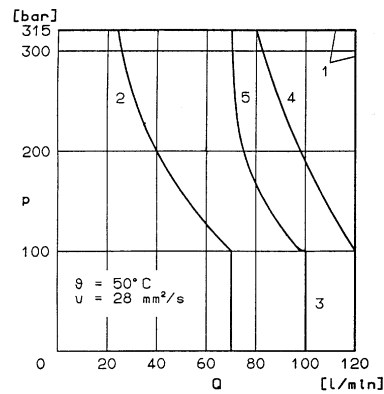
1) on request; 2) > 50 bar on request

PIN assignment for Tuchel-connection:			
Valve with 1 solenoid	Solenoid "a" at 1 and 2 or Solenoid "b" at 3 and 4 Ground wire at ⊥	-	
Valve with 2 solenoids	Solenoid "a" at 1 and 2 Solenoid "b" at 3 and 4 Ground wire at ⊥	-	
Switching times t approx. [ms]			
(measured at 315 bar, 60 l/min)	t_{on}	70 ... 95 ¹⁾	
	t_{off}	70 ... 80 ¹⁾	
Approx. number of switchings/h	15.000 (3600 for symbol 039)		
Rated voltage U_N [V]	DC 24 ± 10 % (Other voltages available on request)		
Power consumption P_{20} [W]	36	42	
Duty cycle ED_{rel} [%]	100		
Degree of protection for solenoid and electrical connection to DIN 40 050	IP 54		IP 65
Manual override	yes	no	yes no

Characteristic curves: flow curves: $\Delta p = f(Q)$



Power limits Q_{max} :



Symbol	Flow direction				
	P-A	P-B	A-T	B-T	P-T
001	6	6	-	-	-
003	1	1	3	3	-
008, 004, 094	1	1	5	5	-
013	3	3	2	7	8
017	-	6	2	-	8
019	1	1	3	3	-
020, 039	1	1	3	3	-
177	1	1	3	-	-

Symbol	Characteristic curve
001, 117	2
003	4
008, 004, 094, 017, 019	1
013, 020, 039	5

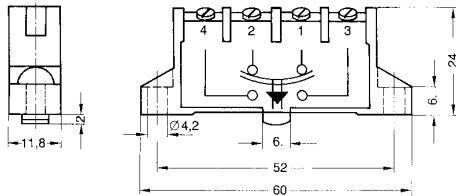
Electrical parameters and pin-plan (inductive proximity switches)

Code 039

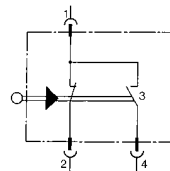
Precision switch according to DIN 43 695

Isolation		Group "C" according to VDE 0110
Nominal voltage	~[V]	250
Continuous current	[A]	6
Contact system		Dual-circuit directional contact with 2 galvanical and thermal separated contact bridges
Switching system		Snap system with friction contacts
Switching force	[N] max.	4,4
Reset force	[N] min.	1,3
Duration of bounce (at 10 mm/min contact velocity)	[ms]	≤ 1,5
Circuit time (at 10 mm/min contact velocity)	[ms]	≤ 10
Number of switching max. switching/min		300
mechanical at 1,6 switchings/s		> 50 million switching cycles (VDE 0660 E3)
electrical		dependance on load cycles/min
Reproduceability of switching point	[μm]	± 2
Allowable ambient temperature	t [°C]	- 30 ... + 90
Contact material		Fine silver, system gold plated
Contact arrangement normally closed contact		1 + 2
normally open contact		3 + 4

Dimensional drawing



Pin plan (switch with Tuchel connector)

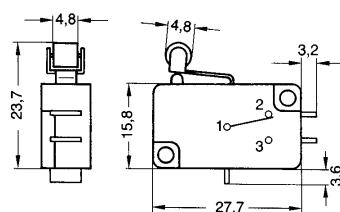


Code 061 und 066

Micro switch (mechanical end switch according to DIN 41 635)

Type	VCS
Directional contact	single line
Reset force [N] max.	1,1
Switching force [N] max.	3,3
Allowable ambient temperature t [°C]	- 20 ... + 85

Dimensional drawing



Switching performance

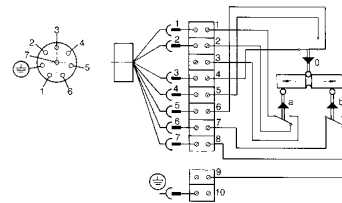
DC ===		AC ~	
Resistive load	24 V 6 A	Resistive load	125 V 10 A
	125 V 0,5 A		250 V 10 A
	250 V 0,25 A		
Inductive load	24 V 6 A	Inductive load	25 V 6 A
	125 V 0,07 A		125 V 0,07 A
	250 V 0,03 A		250 V 0,03 A

- 1 = common
- 2 = normally closed
- 3 = normally open

Pin plan (switch with Harting-connector R15)

Code 061

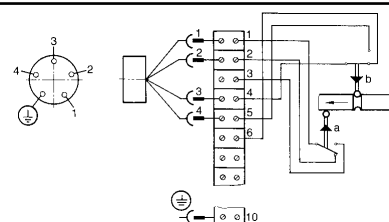
Valve with 3 switching positions



Pin plan (switch with Tuchel-connector)

Code 066

Valve with 2 switching positions



Electrical parameters and pin-plan (inductive proximity switches)

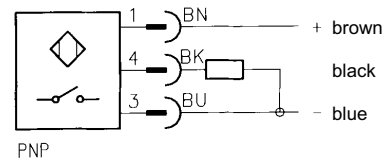
Code 221, 222, 224, 225

Inductive proximity switch (pressure tight)

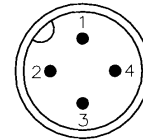
Inductive proximity switch M 12 x 1		PNP-normally opened
Rated voltage	U_e [V] DC	24
Normal voltage	U_B [V] DC	10 to 30
Voltage drop	U_D at I_e [V]	$\leq 1,5$
Rated current	I_e [mA]	200
Safety against reverse polarity		yes
Short circuit proof		yes / yes
Allowable load	[μ F]	$\leq 1,0$
Protection class according to IEC 529		IP 68 according to BWN Pr. 20 (IP 67 plug compl.)
Type of connection		Connector M 12 x 1
Pressure-tight up to	[bar]	50 at active face

Attention! Switches will be adjusted before delivery.

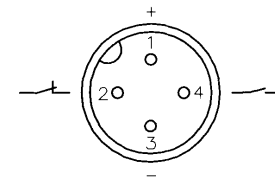
Circuit diagram



Pin assignment end switch



Pin assignment connector



Female connector M 12 x 1 incl. beard with LED

Type	angled connector 4 line
Wire pull relief	Pg 7 for wire \varnothing 4 to 6 mm
Protection class	IP 67
LED-Indication	yes (2)
- Power on	green
- Function	yellow

Type survey (standard)

Code 039

Symbol ¹⁾	Symbol-No.	Overlap	Actuation	Dimensional drawing	Spare part drawing	Electrical connection (Solenoid)	Line connection	Voltage	Type	Cat. No.	
										Valve	Solenoid
	001 ⁵⁾	+	Solenoid-actuated, dry op. system	01	01	No. 10 Connector (Pg 11) to DIN 43650 on solenoid	Subplate G 1/2 P S 10 G 4 001 2 O O Cat. No. 1065184 Subplate G 3/4 P S 10 G 5 001 2 O O Cat. No. 1065185	VDC	S 10 G 10 G 001 039 5 OV	5205219.7623	
	003	+		01	01			VDC	S 10 G 10 G 003 039 5 OV	5205236.7623	
	020	+		01	01			VDC VDC	S 10 G 10 G 020 039 5 OV S 10 B 10 G 020 039 5 OV	5205118.7623 5205210.7624	

Code 061

	008	+	Solenoid-actuated, dry op. system	02	02	No. 56 Connector (Tuchel) at connection box	Subplate G 1/2 P S 10 G 4 001 2 O O Cat. No. 1065184 Subplate G 3/4 P S 10 G 5 001 2 O O Cat. No. 1065185	VDC	S 10 G 56 G 008 061 5 OV	5204988.9000²⁾
	009	+		02	02			VDC	S 10 G 56 G 009 061 5 OV	5204989.9000²⁾
	013	-		02	02			VDC VDC	S 10 G 56 G 013 061 5 OV S 10 B 56 G 013 061 5 OV	5204990.9000²⁾ 5204991.9000³⁾

Code 066

	001 ⁵⁾	+	Solenoid-actuated, dry op. system	03	03	No. 56 Connector (Tuchel) at connection box	Subplate G 1/2 P S 10 G 4 001 2 O O Cat. No. 1065184 Subplate G 3/4 P S 10 G 5 001 2 O O Cat. No. 1065185	VDC	S 10 G 56 G 001 066 5 OV	5205101.7639
	003	-		03	03			VDC	S 10 G 56 G 003 066 5 OV	5205121.7639
	020	+		03	03			VDC	S 10 G 56 G 020 066 5 OV	5205192.7639
	019	+		04	02			VDC	S 10 G 56 G 019 066 5 MV	5204987.9000⁴⁾

1) For other symbols, see Publication 7503297

2) Solenoid-Cat.- No. 9000 means: Solenoid a = 7637, Solenoid b = 7601

3) Solenoid-Cat.- No. 9000 means: Solenoid a = 7638, Solenoid b = 7605

4) Solenoid-Cat.- No. 9000 means: Solenoid a = 7639, Solenoid b = 7601

5) Port T of this 3/2 directional control valves is used as leak oil connection

Type survey (standard)

Code-No.	Symbol	Symbol-No.	Overlap	Actuation	Dimensional drawing	Spare part drawing	Electrical connection (Solenoid)	Line connection	Voltage	Type	Cat. No.	
											Valve	Solenoid
221		001 ²⁾	+	Solenoid-actuated, pressure tight	05	04	No. 10 Connector (Pg 11) to DIN 43650 on solenoid	Subplate G 1/2 P S 10 G 4 001 2 O O Cat. No. 1065184 Subplate G 3/4 P S 10 G 5 001 2 O O Cat. No. 1065185	VDC	S 10 V 10 G 001 221 5 O V		5205145.7911
		003	-		05	04			VDC	S 10 V 10 G 003 221 5 O V		5205080.7911
		020	+		05	04			VDC	S 10 VH 10 G 003 221 5 O V		5205092.7908
		004	+		05	04			VDC	S 10 VH 10 G 020 221 5 O V		5205079.7908
		004	+		05	04			VDC	S 10 VH 10 G 004 221 5 O V		5205054.7911
		005	+		06	04			VDC	S 10 V 10 G 005 221 5 O V		5205476.7911
		039	+		06	04			VDC	S 10 VH 10 G 039 221 5 O V		5205191.7908
		094	+		06	04			VDC	S 10 V 10 G 094 221 5 O V		5205040.7911
		166	+		05	04			VDC	S 10 V 10 G 166 221 5 C V		5205070.7911
		008	+		07	05			VDC	S 10 V 10 G 008 221 5 O V		5205085.7911
		008	+		07	05			VDC	S 10 V 10 G 008 221 5 C V		5205398.7911
		117	+		07	05			VDC	S 10 V 10 G 117 221 5 O V		5205086.7911
		138	+						VDC	S 10 V 10 G 138 221 5 O V		5205380.7911
	198	+			VDC	S 10 VH 10 G 198 221 5 O V		5205331.7908				
	241	+			VDC	S 10 V 10 G 241 221 5 O V		5205345.7911				
222		019	+	08	06	VDC	S 10 VH 10 G 019 222 5 M V		5205139.7908			
		013	-	08	06	VDC	S 10 V 10 G 013 222 5 C V		5205071.7911			
		013	-	08	06	VDC	S 10 V 10 G 013 222 5 O V		5205346.7911			
		001	+			VDC	S 10 V 10 G 001 222 5 O V		5205279.7911			
		008	+			VDC	S 10 V 10 G 008 222 5 O V		5205409.7911			
		009	+			VDC	S 10 V 10 G 009 222 5 O V		5205311.7911			
		011	-			VDC	S 10 VH 10 G 011 222 5 O V		5205332.7908			
		003	-			VDC	S 10 V 10 G 003 222 5 O V		5205315.7911			
		020	+			VDC	S 10 VH 10 G 020 222 5 O V		5205273.7908			
		184	-			VDC	S 10 V 10 G 184 222 5 O V		5205340.7911			
	271	+			VDC	S 10 VH 10 G 271 222 5 O V		5205464.7908				
224		013	-	08	06	VDC	S 10 V 10 G 013 224 5 C V		5205185.7911			
225		166	+	05	04	VDC	S 10 V 10 G 166 225 5 C V		5205186.7911			
		019	+	09	07	VDC	S 10 V 10 G 019 225 5 M V		5205090.7911			

1) For other symbols, see Publication 7503297.

2) Port T of this 3/2 directional control valves is used as leak oil connection

Ordering

The units are designated by their type number. The composition of this number can be drawn from the type code. The standard versions are listed in the type survey. When ordering any of the standard versions, please state type number as well as catalog number to preclude possible misinterpretations. Further valve versions can be composed via combination of types. The catalog number of these devices you will get on request. Flanges valves are provided with O-rings and connector. Subplate and mounting screws must be ordered separately.

Example of order

Wanted: 4/2 directional control valve DN 10, 24 VDC, connector on solenoid, Symbol 020, along with corresponding subplate.

Directional control valve:

Type No.: S 10 G 10 G 020 039 5 O V
 Cat. No.: **5205118.7623**

Subplate:

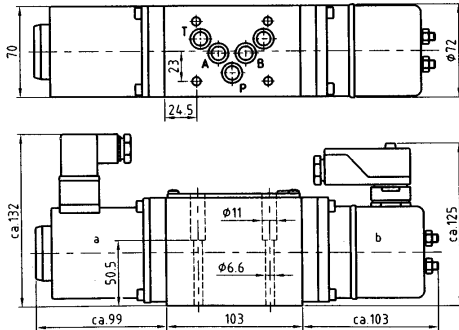
Type No.: P S 10 G 4 001 2 O O
 Cat. No.: **1065184**

Mounting screws: (4 pcs. required)

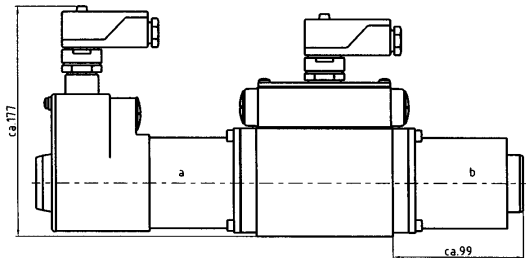
Socket-head screw: (M 6 x 60 DIN 912-10.9)
 Cat. No.: **0700416**

Dimensional drawings

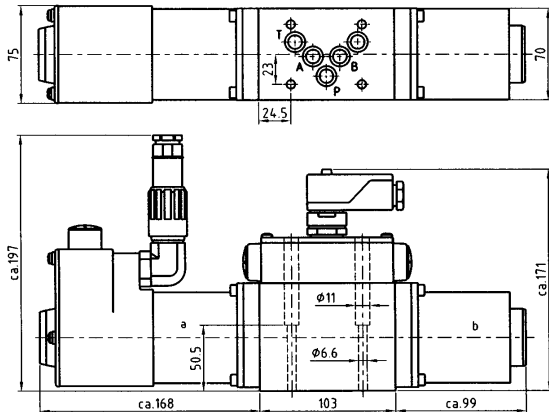
01 Code 039: S 10 G, S 10 B, 3/2- and 4/2-directional control valve



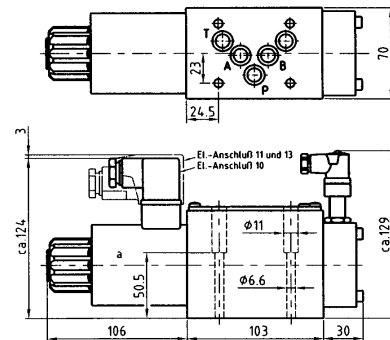
04 Code 066: S 10 G with mechanical detent, 4/2-directional control valve



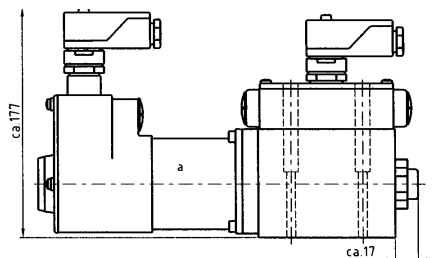
02 Code 061: S 10 G, S 10 B, 4/3-directional control valve



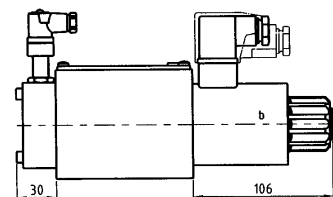
05 Code 221: S 10 V, S 10 VH, 3/2- and 4/2-directional control valve,
 Code 225: S 10 V, S 10 VH, 4/2-directional control valve



03 Code 066: S 10 G, 3/2- and 4/2-directional control valve

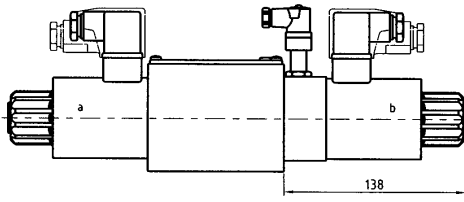


06 Code 221: S 10 V, S 10 VH, 4/2-directional control valve

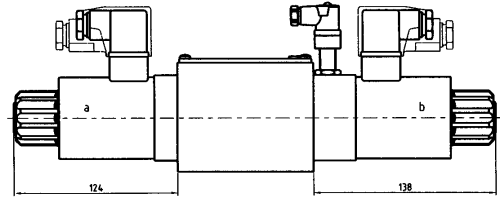


Dimensional drawings

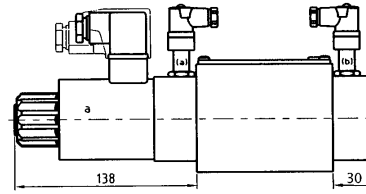
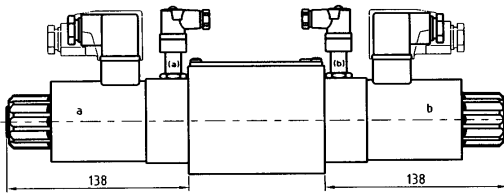
07 Code 221: S 10 V, S 10 VH, 3/2- and 4/3-directional control valve



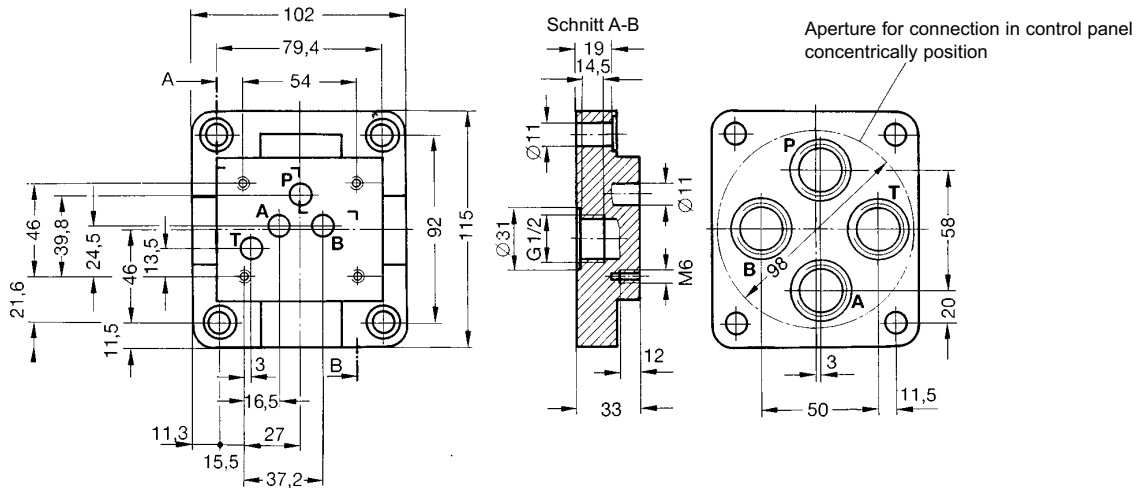
09 Code 225: S 10 V, S 10 VH, 4/2-directional control valve with mechanical detent



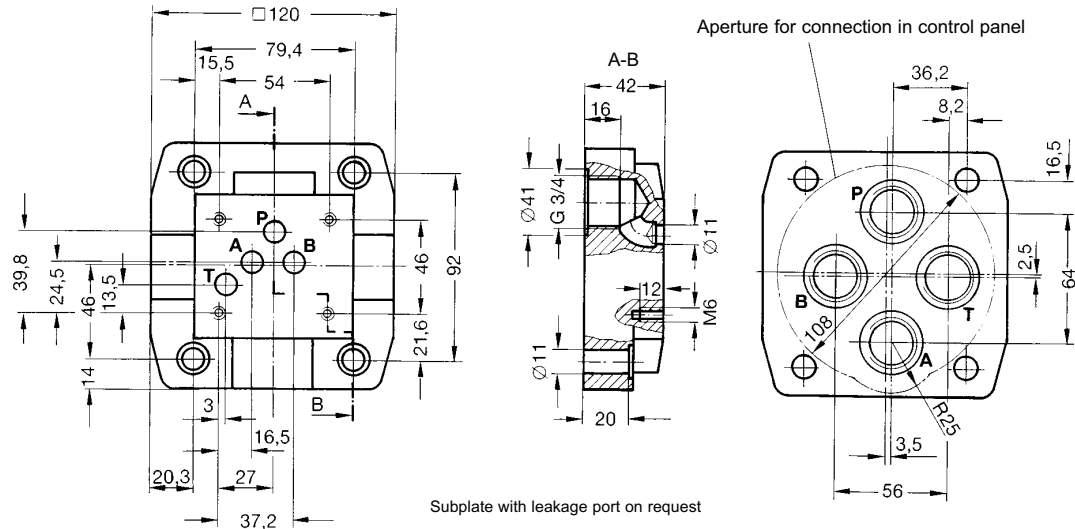
08 Code 222: S 10 V, S 10 VH, 4/2-directional control valve with and without mechanical detent
S 10 V, S 10 VH, 4/3-directional control valve
Code 224: S 10 V, S 10 VH, 4/3-directional control valve



Subplate G 1/2 with hole pattern according to DIN 24 340-A 10 and ISO 4401-AC-05-4-A



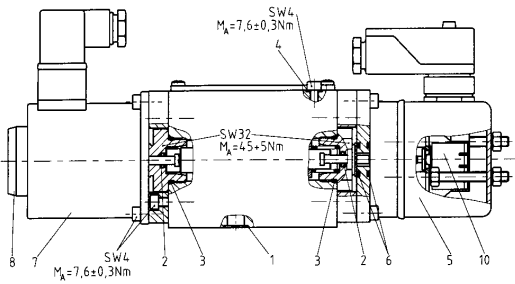
Subplate G 3/4 with hole pattern according to DIN 24 340-A 10 and ISO 4401-AC-05-4-A



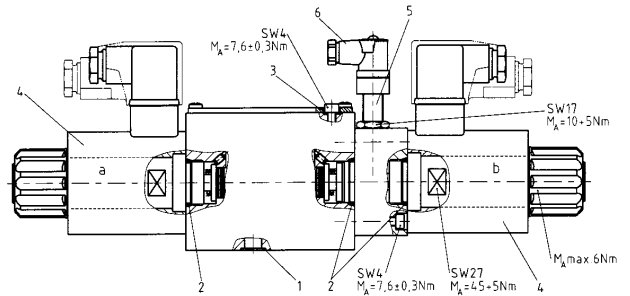
Subplate with leakage port on request

Spare parts drawings

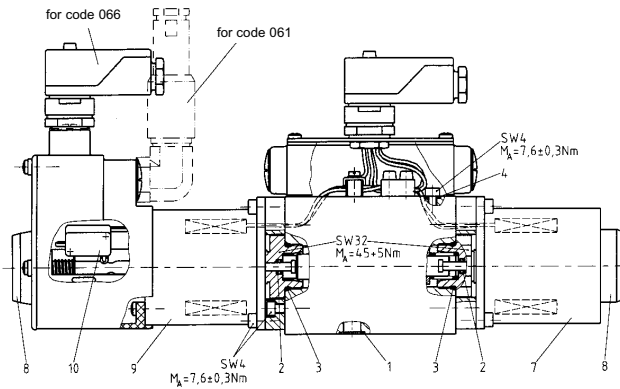
01 Code 039: S 10 G, S 10 B, 3/2- and 4/2-directional control valve



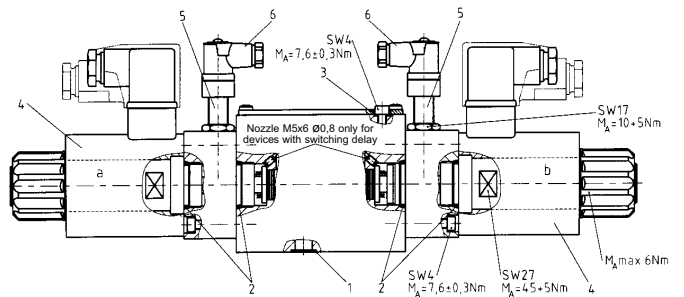
05 Code 221: S 10 V, S 10 VH, 4/3-directional control valve



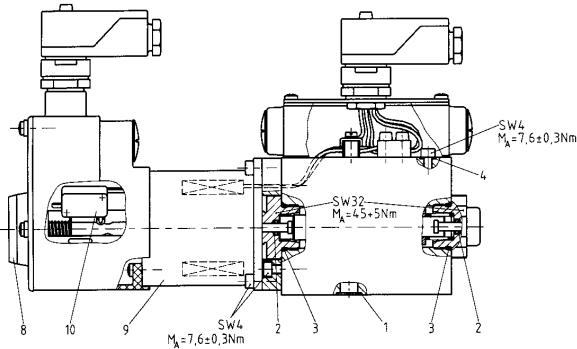
08 Code 061: S 10 G, S 10 B, 4/3-directional control valve
Code 066: S 10 G, 4/2-directional control valve with mechanical detent



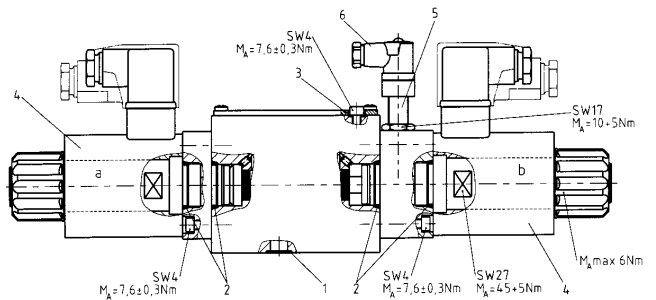
06 Code 222: S 10 V, S 10 VH, 4/2-directional control valve with mechanical detent
S 10 V, S 10 VH, 4/3-directional control valve
Code 224: S 10 V, S 10 VH, 4/3-directional control valve



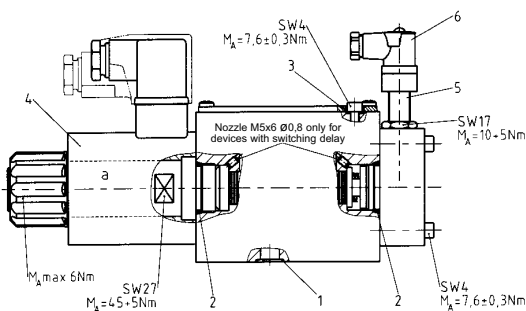
03 Code 066: S 10 G, S 10 B, 3/2- and 4/2-directional control valve



07 Code 225: S 10 V, S 10 VH, 4/2-directional control valve with mechanical detent



04 Code 221: S 10 V, S 10 VH, 3/2- and 4/2-directional control valve
Code 225: S 10 V, S 10 VH, 4/2-directional control valve



Spare parts (Number of pieces)

Spare part drawing		01	01	02	02	03	02	
Code		039	039	061	061	066	066	
Part	Designation	S 10 G ... 3/2- and 4/2 directional control valve	S 10 B ...	S 10 G ... 4/3 directional control valve	S 10 B ...	S 10 G ... 3/2- and 4/2-directional control valve with mech. detent		Cat. No.
1	O-ring (12,42 x 1,78)	5	5	5	5	5	5	0701623
2	Lip seal (Pr. 41; 5 x 9 x 2,5)	2	2	2	2	2	2	0655794
3	O-ring (23,47 x 2,62)	2	2	2	2	2	2	0701650
4	Sealing ring (5,7 x 9 x 1)	1	1	1	1	1	1	0660227
5	Position monitoring	1	1	–	–	–	–	0722742
6	O-ring (15,54 x 2,62)	2	2	–	–	–	–	0651939
7	DC solenoid with manual override (voltage) DC solenoid without manual override (voltage)	–	–	1	–	–	1	7601
		1	–	–	–	–	–	7623
		–	1	–	–	–	–	7624
		–	–	–	1	–	–	7605
8	Lap	1	–	2	–	1	2	0570117
9	DC solenoid with manual override (voltage) DC solenoid without manual override	–	–	1	–	–	–	7637
		–	–	–	–	1	1	7639
		–	–	–	1	–	–	7638
10	Micro switch	–	–	3	3	2	2	0659953
		1	1	–	–	–	–	0662451

Mounting bolts (valve) tightening torque $M_A = 13 \text{ Nm}$

–	Cylinder bolt (M 6 x 60 DIN 912-10.9)	4	0700416
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Spare part set

Set of wearing parts consisting of:	1, 2, 3, 4, 6, 8,	0999316
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Spare parts (Number of pieces)

Spare part drawing		04	05	06	06	04	07	
Code		221	221	222	224	225	225	
Part	Designation	S 10 V ... S 10 VH ... 3/2- and 4/2- directional control valve	S 10 V ... S 10 VH ... 4/3- directional control valve	S 10 V ... S 10 VH ... 4/2-directional control valve with and without mech. detent	S 10 V ... S 10 VH ... 4/3- directional control valve	S 10 V ... S 10 VH ... 3/2- directional control valve	S 10 V ... S 10 VH ... 3/2- and 4/2-directional control valve with mech. detent	Cat. No.
1	O-ring (12,42 x 1,78)	5	5	5	5	5	5	0701623
2	O-ring (23,47 x 2,62)	2	3	4	4	2	4	0701650
3	Sealing ring (5,7 x 9 x 1)	1	1	1	1	1	1	0660227
4	DC solenoid without manual override (voltage)	1	2	2	2	1	2	7911
	DC solenoid with manual override (voltage)	1	2	2	2	1	2	7908
5	Inductive proximity switch	1	1	2	2	1	1	0615392
6	Angled socket compl.	1	1	2	2	1	1	0615517

Mounting bolts (valve) tightening torque $M_A = 13 \text{ Nm}$

–	Cylinder bolt (M 6 x 60 DIN 912-10.9)			4				0700416
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Spare part set

Set of wearing parts consisting of:	1, 2, 3							0999317
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Electrical spare parts

Electrical connection, Symbol 10	Cat. No.
Female connector	
Design A (grey)	0657859
Design B (black)	0570275
e. g. at solenoid 7637 or 7638	Cat. No.
Circular plug-in connector:	
Number of poles: 7 + PE	0570722

Electrical connection, Symbol 56	Cat. No.
Flange connector:	
Number of poles: 4 + PE	0499980
Male connector: ¹⁾	
Number of poles: 4 + PE	0570290

¹⁾ not included

Notes:
