

V81 series

Redundant valve manifold systems - Modular with bypass

1oo2 "Safety", 2oo2 "Availability" and 2oo3 "Safety and Availability"

Modular design - Herion valves

Bypass function enables valve removal online

Stainless steel visual status indicators and exhaust guards as standard

Optional electrical position indicators for valves

SIL certified components and system*

International approvals

Available in aluminium and stainless steel construction

Utilizing industry proven technology

* In operational mode



Technical features

Medium:

Filtered, non-lubricated or dry compressed air, instrument air nitrogen and other non-flammable neutral dry fluids

Operation:

3/2 Direct solenoid operated poppet valves

Bypass:

5/2 Manual operated spool valve (lockable)

Operating pressure:

1 ... 10 bar

Flow:

Standard valves 165 ... 240 l/min
High flow valves 600 ... 720 l/min
details see page 2

Port size:

G 1/4, 1/4 NPT, G 1/2, 1/2 NPT

Additional filter:

Installation of an in-line filter is recommended (in the direction of flow from the actuator to the RVM).

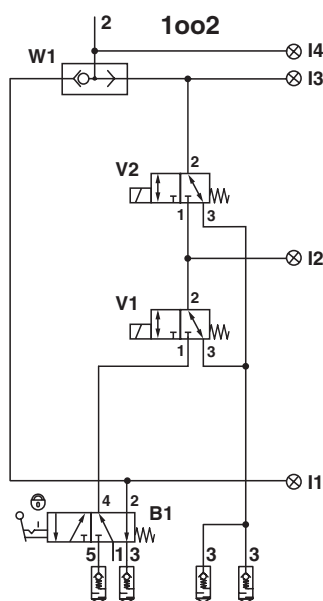
Temperature range:

-40 ... +80°C, see option selector page 2
Air supply must be dry enough to avoid ice formation at temperatures below 2°C.

Materials:

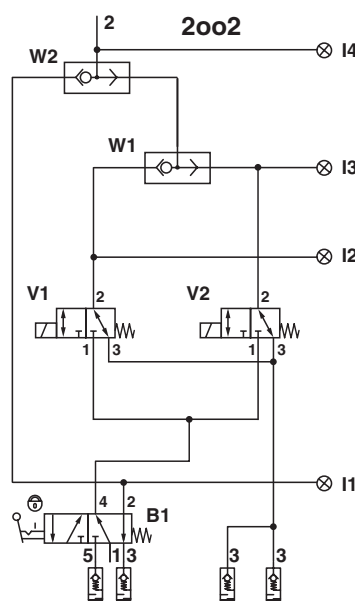
Manifold and valve body: Anodized aluminium or stainless steel
Seal: NBR, VMQ
Internal parts: stainless steel, brass

1oo2 with bypass valve exhaust guards and indicators

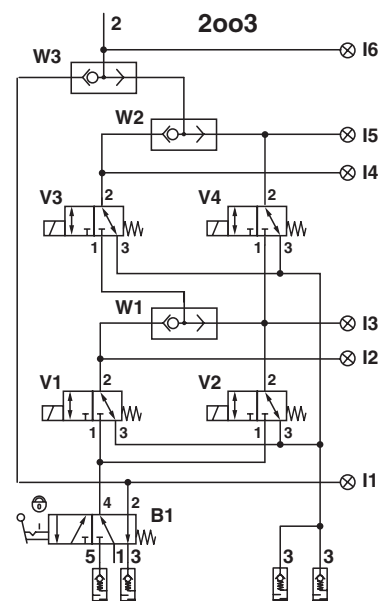


B Bypass valve
I Visual pressure indicators
V Solenoid actuated valves
W Shuttle valves ('OR' function)

2oo2 with bypass valve exhaust guards and indicators



2oo3 with bypass valve *1) exhaust guards and indicators



*1) for 2oo3
V1 & V4 = channel 1
V2 = channel 2
V3 = channel 3

*1) for 3oo4
V1 = channel 1
V2 = channel 2
V3 = channel 3
V4 = channel 4

Please have a look to instructions

Option selector

V81★★★★★0★0

Valve function	Substitute	
1oo2 normally closed	1	
2oo2 normally closed	3	
2oo3 normally closed	5	
Flow	Substitute	
Standard (24011 and 24010 solenoid valves)	1	
High (98015 solenoid valves)	2	
Port sizes	Substitute	
G 1/4 (standard flow system)	1	
1/4 NPT (standard flow system)	2	
G 1/2 (high flow system)	3	
1/2 NPT (high flow system)	4	
Valve type	Temperature *1)	Substitute
24011 series		
Aluminium	-40°C ... +60°C	01
Stainless steel	-40°C ... +60°C	02
Aluminium with proximity sensor	-25°C ... +70°C	03
Stainless steel with proximity sensor	-25°C ... +70°C	04
Aluminium	-25°C ... +80°C	05
Stainless steel	-25°C ... +80°C	06
98015 series		
Aluminium	-40°C ... +60°C	07
Stainless steel	-40°C ... +60°C	08
Aluminium with proximity sensor	-25°C ... +60°C	09
Stainless steel with proximity sensor	-25°C ... +60°C	10
Aluminium	-25°C ... +80°C	11
Stainless steel	-25°C ... +80°C	12
24010 series		
Aluminium	-25°C ... +60°C	21
Stainless steel	-25°C ... +60°C	22
Aluminium with proximity sensor	-25°C ... +60°C	23
Stainless steel with proximity sensor	-25°C ... +60°C	24
Bypass valve	Temperature	Substitute
Aluminium	-40°C ... +60°C	1
Stainless steel	-40°C ... +60°C	2
Aluminium	-25°C ... +80°C	3
Stainless steel	-25°C ... +80°C	4
Manifold material	Substitute	
Aluminium (screws & plugs: zinc plated steel or nickel plated brass)	1	
Stainless steel	2	
Aluminium (screws and plugs: stainless steel)	4	

*1) Depending on solenoid system

Flow rates and valve combinations

Flow direction (port to port)	Standard flow systems Bypass mode	Operation mode	Operation mode	High flow systems Bypass mode	Operation mode
1oo2	97109	2 x 24011	2 x 24010	97109	2 x 98015
1 » 2 *1) [l/min]	950	170	170	1450	620
2 » 3 *2) [l/min]	—	970 ... 2200	970 ... 2200	—	2800 ... 4600
2oo2	97109	2 x 24011	2 x 24010	97109	2 x 98015
1 » 2 *1) [l/min]	950	240	240	1450	720
2 » 3 *2) [l/min]	—	950 ... 2200	950 ... 2200	—	2500 ... 4600
2oo3	97109	4 x 24011	4 x 24010	97109	4 x 98015
1 » 2 *1) [l/min]	950	165	165	1450	600
2 » 3 *2) [l/min]	—	950 ... 2200	950 ... 2200	—	2500 ... 4600

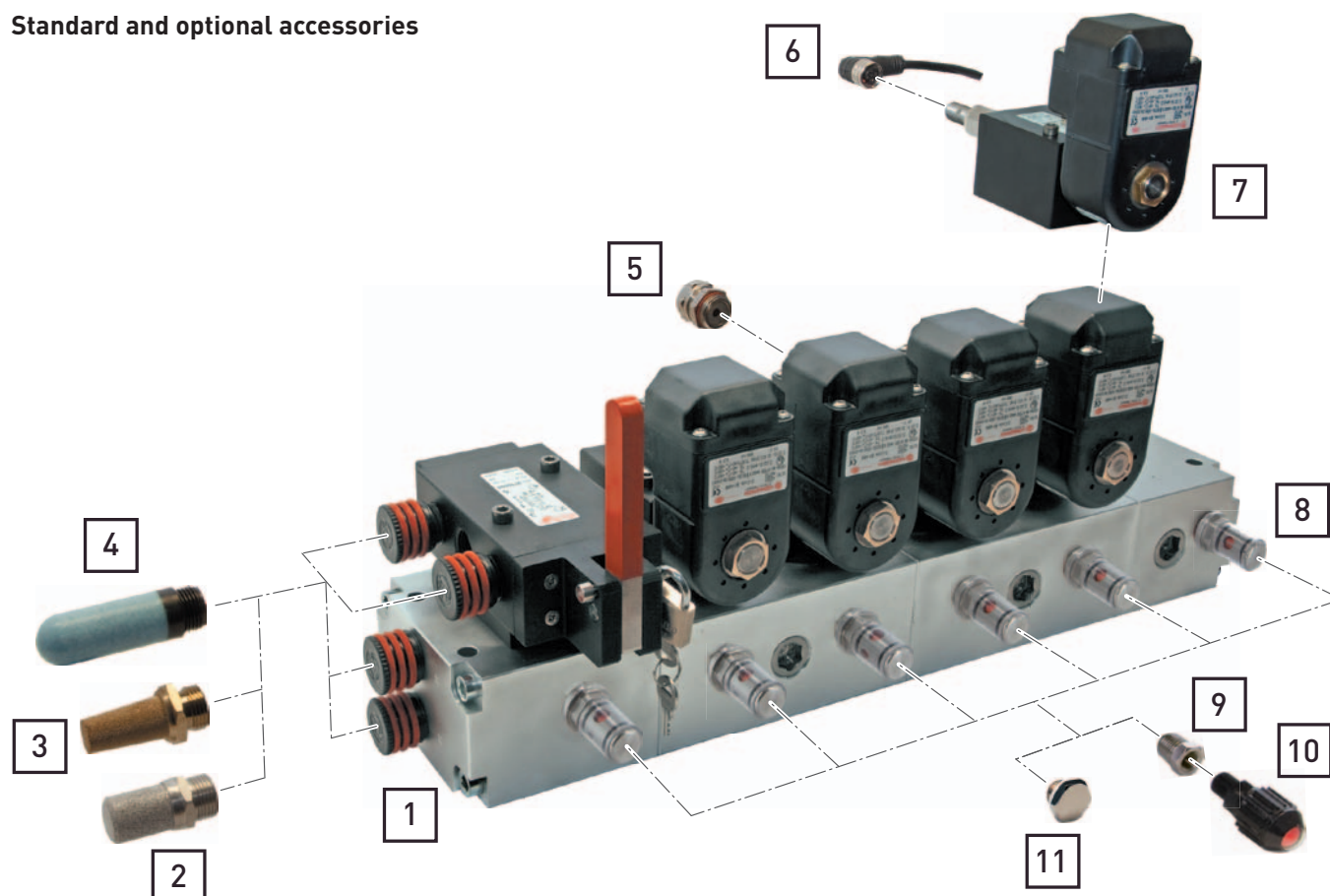
*1) Flow characteristics conforms to ISO6358 from port 1 (bypass valve) to port 2 (sub-base) [6 » 5 bar], see page 1

*2) Flow characteristics conforms to ISO6358 from port 2 (sub-base) to port 3 (sub-base or bypass valve) [10 » 0 bar], see page 1

Country of manufacture			
Norgren internal use			
Indicators		Temperature Pressure range	Substitute
Visual pressure indicators in stainless steel - standard option; to be included in the scope of supply		-40°C ... +80°C 2,5 ... 10 bar	0
Visual pressure indicators in plastic - optional; to be included in the scope of supply		+2°C ... +66°C 1 ... 10 bar	1
No pressure indicator optional; replaced with plugs (nickel plated brass)			2
No valve status indicator optional; replaced with plugs (stainless steel)			3
Silencers		Temperature	Substitute
Exhaust guard (standard)		-55°C ...+80°C	0
Plastic silencers to replace exhaust guards		-20°C ...+80°C	1
Brass silencers to replace exhaust guards		-40°C ...+80°C	2
Stainless steel silencers to replace exhaust guards		-40°C ...+60°C	3
Solenoids coil	Temperature *3) Standard	SIL conforming	Substitute
24011 series			
3824.024.00	-20 ... +60°C	-20 ... +60°C	02
3825.120.60	-20 ... +60°C	-20 ... +60°C	03
3826.024.00	-20 ... +60°C	-20 ... +60°C	04
3827.120.60	-20 ... +60°C	-20 ... +60°C	05
4260.024.00	-40 ... +80/55°C	-40 ... +80/55°C	06
4261.230.50	-40 ... +80/55°C	-40 ... +80/55°C	07
4270.024.00	-40 ... +65/55°C	-40 ... +65/55°C	08
4271.230.50	-40 ... +65/55°C	-40 ... +65/55°C	09
4660.024.00	-40 ... +80/55°C	-40 ... +80/55°C	10
4661.230.50	-40 ... +80/55°C	-40 ... +80/55°C	11
4662.024.00	-40 ... +80/55°C	-40 ... +80/55°C	12
4663.230.50	-40 ... +80/55°C	-40 ... +80/55°C	13
4670.024.00	-40 ... +70/40°C	-40 ... +70/40°C	14
4671.230.50	-40 ... +70/40°C	-40 ... +70/40°C	15
4672.024.00	-40 ... +70/40°C	-40 ... +70/40°C	16
4673.230.50	-40 ... +70/40°C	-40 ... +70/40°C	17
4872.024.00	-40 ... +50/40°C	-40 ... +50/40°C	18
4873.230.50	-40 ... +50/40°C	-40 ... +50/40°C	19
98015 series			
3824.024.00	-20 ... +60°C	—	02
3825.120.60	-20 ... +60°C	—	03
3826.024.00	-20 ... +60°C	-20 ... +60°C	04
3827.120.60	-20 ... +60°C	-20 ... +60°C	05
4270.024.00	-40 ... +65/55°C	-25 ... +60°C	08
4271.230.50	-40 ... +65/55°C	-25 ... +60°C	09
4670.024.00	-40 ... +70/40°C	-25 ... +60°C	14
4671.230.50	-40 ... +70/40°C	-25 ... +60°C	15
4672.024.00	-40 ... +70/40°C	-25 ... +60°C	16
4673.230.50	-40 ... +70/40°C	-25 ... +60°C	17
4872.024.00	-40 ... +50/40°C	—	18
4873.230.50	-40 ... +50/40°C	—	19
24010 series			
2003	-40 ... +70/55°C	-20 ... +60°C	55

*3) Temperature range depend on classification T4, T5 or T6, see pages 8, 9, 12 and 15

Standard and optional accessories



Accessories - Standard (Included in the scope of supply)

Exhaust guard *2)	Visual pressure indicators (stainless steel)
	
Page 20	Page 20
0613422 (G 1/4, 1/4 NPT)	74749-61 (G 1/4)
—	74749-60 (1/4 NPT)
0613423 (G 1/2, 1/2 NPT)	—

*1) For indoors use

*2) For outdoors use

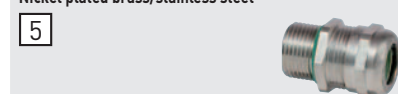
Accessories - Optional Other silencers, plastic indicator and plugs

Silencer (stainless steel) *1)	Silencer (brass) *1)	Silencer (plastic) *1)	Visual pressure indicators (plastic), Adaptor	Plug plus Sealing washer
				
Page 20	Page 20	Page 20	Page 20	Page 20
0014613 (G 1/4)	T40C2800 (G 1/4)	M/S2 (G 1/4)	5VS-212-000 (1/8 NPT)	0657380 (G 1/4, nickel plated brass)
0613678 (1/4 NPT)	MS002A (1/4 NPT)	C/S2 (1/4 NPT)	Adaptor (1/8 NPT to 1/4 NPT) *3)	0663943 (G 1/4, stainless steel)
0014813 (G 1/2)	T40C4800 (G 1/2)	M/S4 (G 1/2)	0613658 (zinc plated steel)	0682082 (1/4 NPT, stainless steel)
0613679 (1/2 NPT)	MS004A (1/2 NPT)	C/S4 (1/2 NPT)	0613659 (stainless steel)	Sealing washer *4)
—	—	—	—	0660835 (plastic)

*3) Must be ordered separately; *4) Must be ordered separately for G thread only

Accessories - Cable glands (ordered separately)

Cable gland
Protection class Ex e, Ex d (ATEX),
Nickel plated brass/stainless steel



Page 21 For solenoid	Thread	Cable Ø	Material	Protection class (ATEX)	Model
42xx, 46xx	M 20x1,5	5,0...8,0 mm	Nickel plated brass	II2GD Ex e	0588819
46xx	M 20x1,5	10...14 mm	Nickel plated brass	II2GD Ex d	0588851
46xx	1/2-14-NPT	7,5...11,9 mm	Nickel plated brass	II2GD Ex d	0588925
48xx	M 20x1,5	9,0...13 mm	Stainless steel 1.4571	II2GD Ex e	0589385
48xx	M 20x1,5	7,0...12 mm	Stainless steel 1.4404	II2GD Ex d	0589395
48xx	M 20x1,5	10...14 mm	Stainless steel 1.4404	II2GD Ex d	0589387

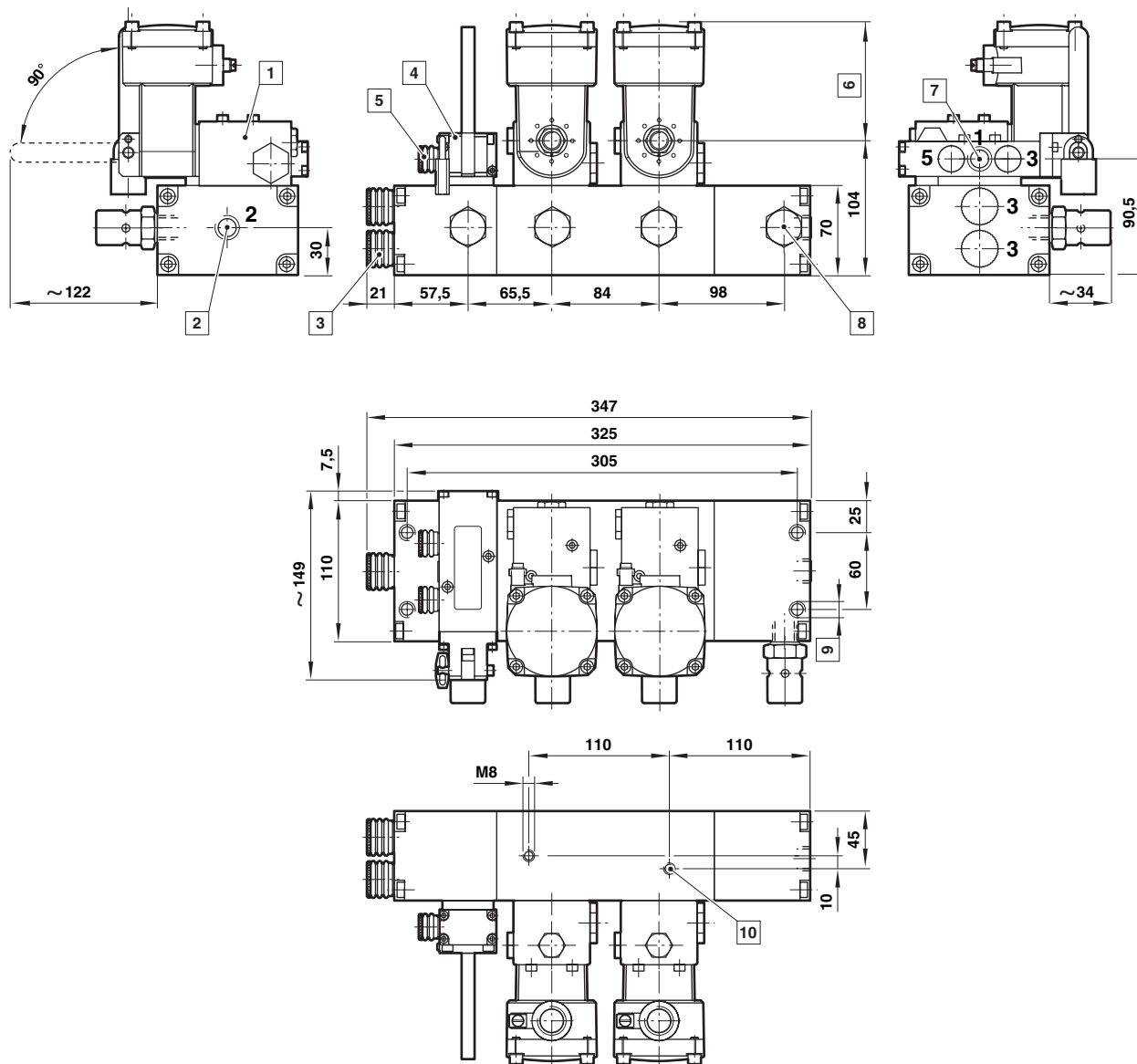
Accessories - Connectors (for valve position sensor ordered separately)

Connector M12 x 1 (straight)	M12 x 1 (90°)
	
Page 21	Page 21
0523055 (without cable)	0523056 (90°, without cable)
0523057 (cable length 2 m)	0523058 (90°, cable length 2 m)
0523052 (cable length 5 m)	0523053 (90°, cable length 5 m)

Alternative valves with position sensors



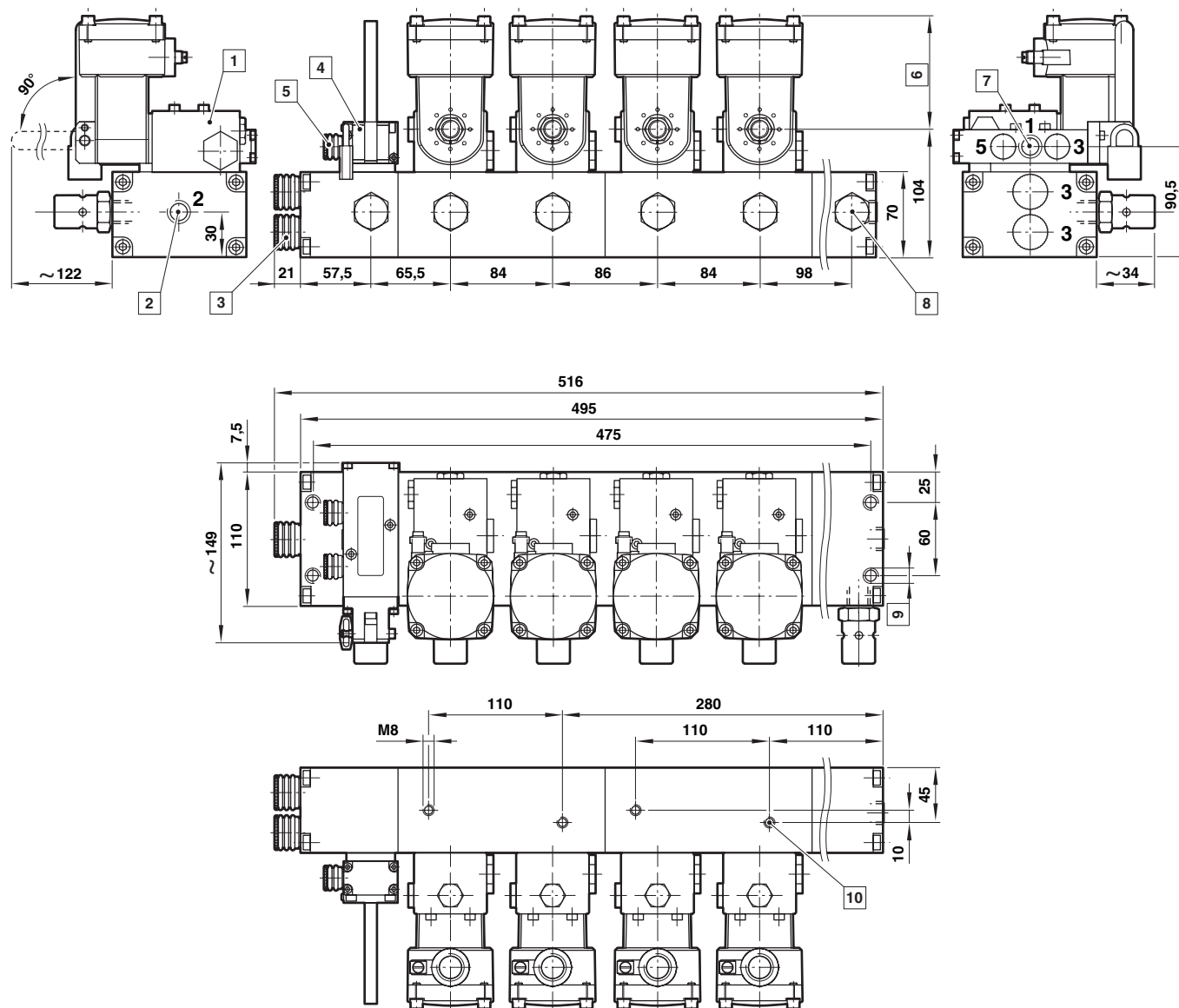
Note: Valve position sensors are supplied complete with the valve. See pages 8, 12 & 14 for valve part numbers

1002 and 2002 with bypass (standard flow)
Weight: 6,8 kg aluminium (18,4 kg stainless steel) sub-base only, valves and accessories see refer page


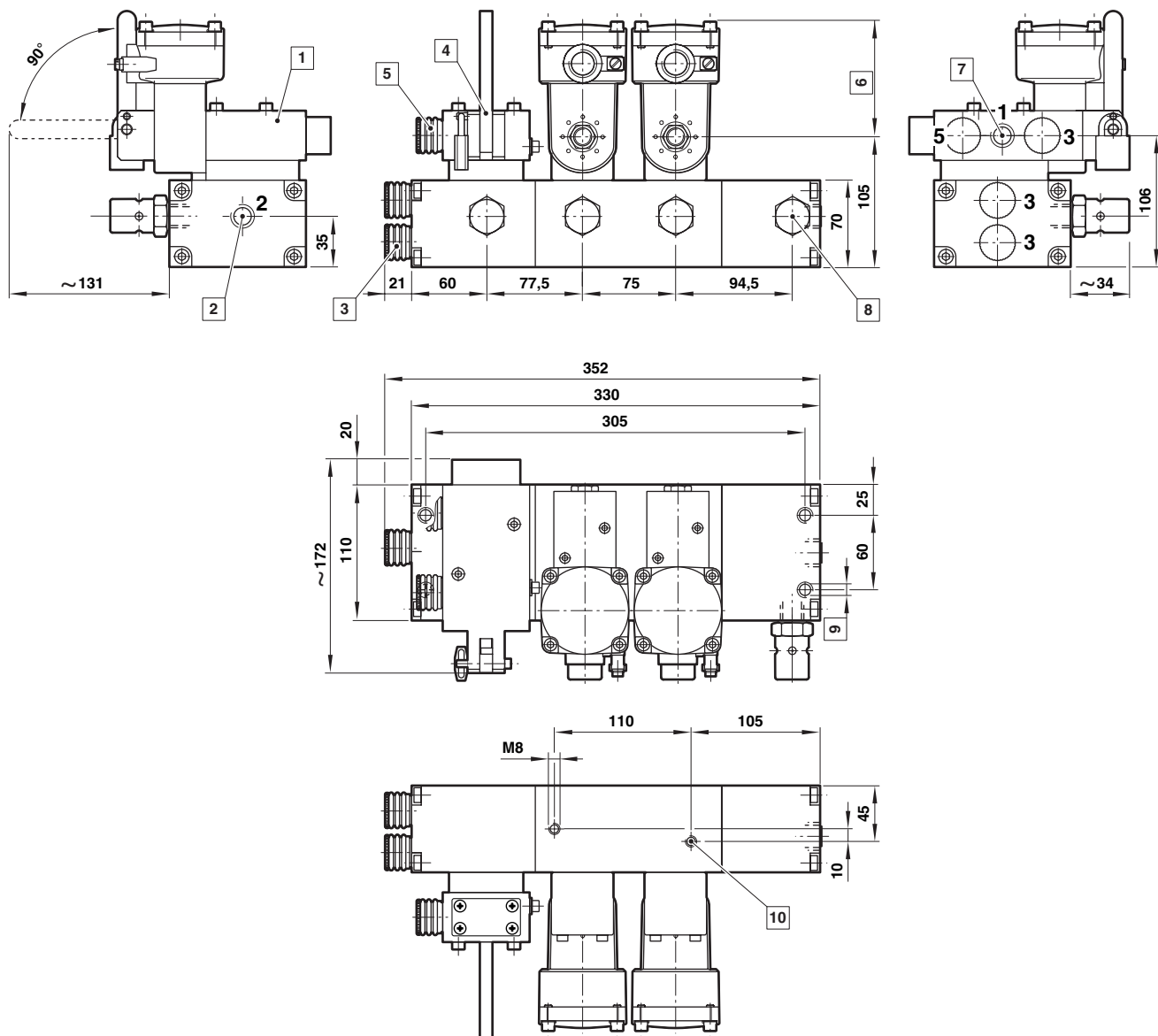
- 1 Valve 24011 and 24010 series
- 2 Outlet port G 1/4 or 1/4 NPT
- 3 Exhaust guard (sub-base), ports G 1/2 or 1/2 NPT
- 4 Bypass valve 97109 series
- 5 Exhaust guard (bypass valve), ports G 1/4 or 1/4 NPT
- 6 Dependent on solenoid models (see solenoid drawing)
- 7 Inlet port G 1/4 or 1/4 NPT
- 8 Visual indicator, stainless steel as standard
- 9 Through mounting holes $\varnothing 8,5$ with M10 x 20 threads for transport lug (see page 21)
- 10 Mounting threads

2003 with bypass (standard flow)

Weight: 10,3 kg aluminium (27,5 kg stainless steel) sub-base only, valves and accessories see refer page



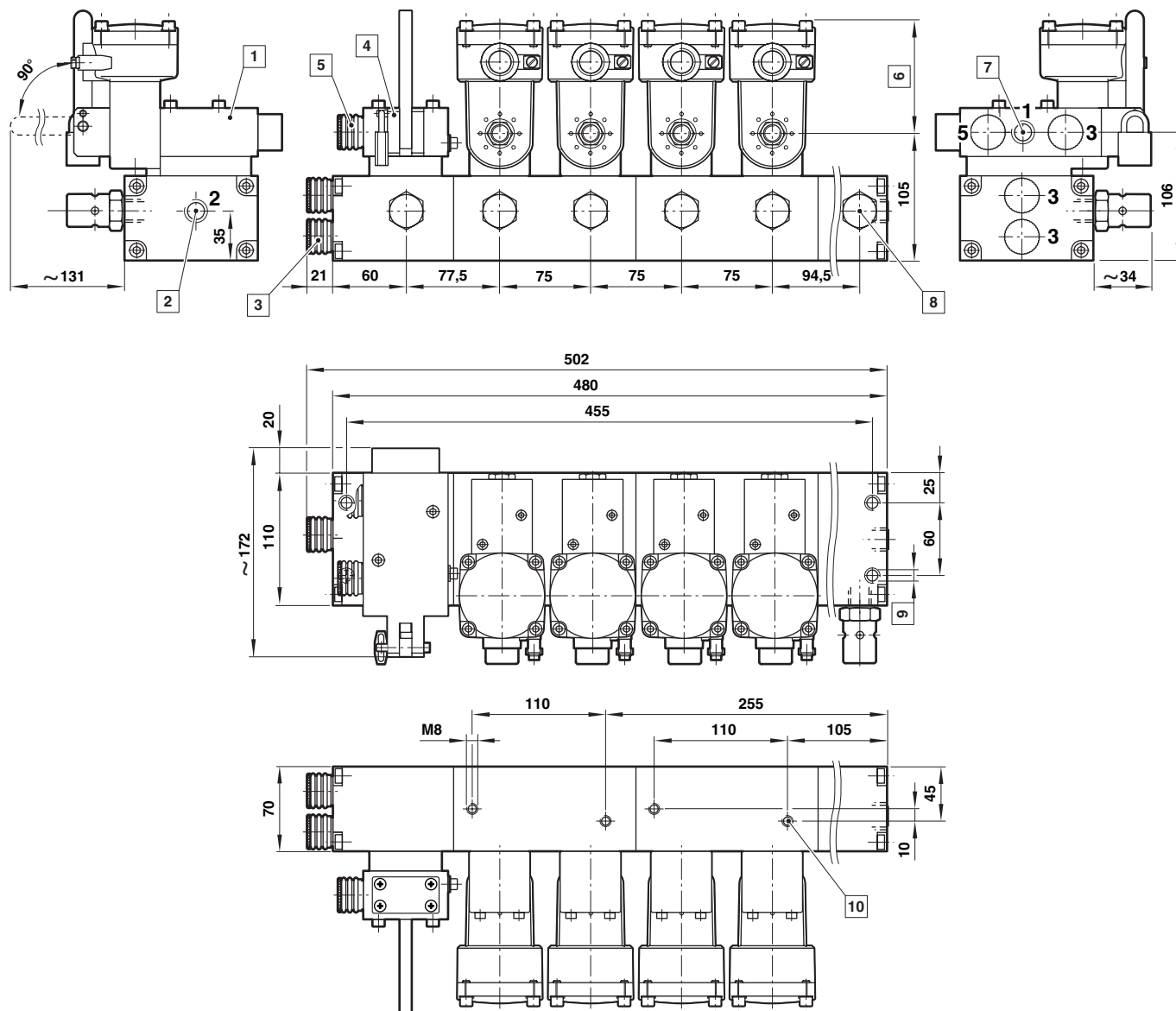
- 1 Valve 24011 and 24010 series
- 2 Outlet port G 1/4 or 1/4 NPT
- 3 Exhaust guard (sub-base), ports G 1/2 or 1/2 NPT
- 4 Bypass valve 97109 series
- 5 Exhaust guard (bypass valve), ports G 1/4 or 1/4 NPT
- 6 Dependent on solenoid models (see solenoid drawing)
- 7 Inlet port G 1/4 or 1/4 NPT
- 8 Visual indicator, stainless steel as standard
- 9 Through mounting holes $\varnothing 8,5$ with M10 x 20 threads for transport lug (see page 21)
- 10 Mounting threads

1002 and 2002 with bypass (high flow)
Weight: 6,8 kg aluminium (18,5 kg stainless steel) sub-base only, valves and accessories see refer page


- 1 Valve 98015 series
- 2 Outlet port G 1/2 or 1/2 NPT
- 3 Exhaust guard (sub-base), ports G 1/2 or 1/2 NPT
- 4 Bypass valve 97109 series
- 5 Exhaust guard (bypass valve), ports G 1/2 or 1/2 NPT
- 6 Dependent on solenoid models (see solenoid drawing)
- 7 Inlet port G 1/2 or 1/2 NPT
- 8 Visual indicator, stainless steel as standard
- 9 Through mounting holes Ø 8,5 with M10 x 20 threads for transport lug (see page 21)
- 10 Mounting threads

2003 with bypass (high flow)

Weight: 9,9 kg aluminium (26,6 kg stainless steel) sub-base only, valves and accessories see refer page



- 1 Valve 98015 series
- 2 Outlet port G 1/2 or 1/2 NPT
- 3 Exhaust guard (sub-base), ports G 1/2 or 1/2 NPT
- 4 Bypass valve 97109 series
- 5 Exhaust guard (bypass valve), ports G 1/2 or 1/2 NPT
- 6 Dependent on solenoid models (see solenoid drawing)
- 7 Inlet port G 1/2 or 1/2 NPT
- 8 Visual indicator, stainless steel as standard
- 9 Through mounting holes Ø 8,5 with M10 x 20 threads for transport lug (see page 21)
- 10 Mounting threads

Standard flow range (340 l/min)

Direct acting 3/2 valve switches at power failure into starting position (mechanical spring return)

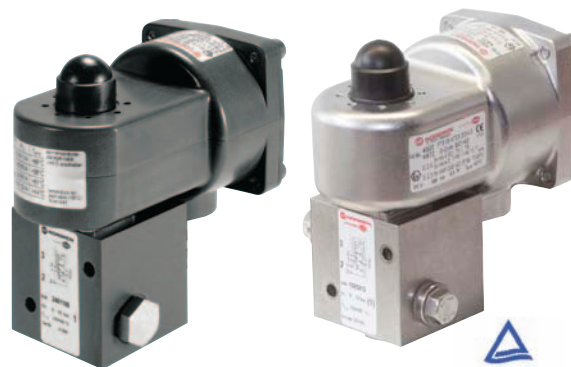
Optional valve position sensor

Suitable for outdoor installation in extreme environmental conditions

Solenoid valves suitable for use in area classification category: 2 and 3 GD/ zone 1 & 2 (gas), 21 & 22 (dust)

Coil protection concepts: Ex e mb, Ex d mb, Ex tb

International approvals: IECEx, others on request



Technical features

Medium:

Filtered, non-lubricated or dry compressed air, instrument air nitrogen and other non-flammable neutral dry fluids

Operation:

3/2 Direct solenoid operated poppet valves

Port size:

Flanged

Orifice:

5 mm

Operating pressure:

0 ... 10 bar (0 ... 145 psi)

Fluid/Ambient Temperature:

-25°C ... +80°C (-13 ... +176°F) (NBR),

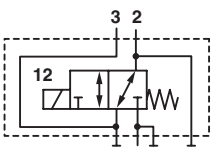
-40°C ... +60°C (-40 ... +140°F) (VMQ)

Depending on solenoid system
Air supply must be dry enough to avoid ice formation at temperatures +2°C (+35°F).

Materials:

Housing: hard anodized aluminium 3.0615 or stainless steel 1.4404 (316 L)
Seal: NBR (perbunan) or VMQ (silicon)
Internal parts: stainless steel, brass

Technical data

Symbol	Temperature (°C)	Material seat seal	housing	Position sensor	Weight (kg)	Test certificate IEC 61508 *2)	Dimension No.	Model *1)
	-25 ... +80	NBR	aluminium	without	0,55	X	1	2401109
	-25 ... +80	NBR	stainless steel	without	1,00	X	1	1025212
	-25 ... +70	NBR	aluminium	integrated	0,62	X	2	1025352
	-25 ... +70	NBR	stainless steel	integrated	1,07	X	2	1160006
	-40 ... +60	VMQ	aluminium	without	0,55	X	1	1025390
	-40 ... +60	VMQ	stainless steel	without	1,00	X	1	1160007

*1) When ordering please indicate solenoid, voltage and current type (frequency).

*2) Particular for valves with TÜV approval and attachment in plants based on safety standards IEC 61508, taking into account to the operating and maintenance instructions document 7503444.

Solenoid operators

	Power consumption		Rated current		ATEX-Category	Protection class *7)	Temperature Ambient/Fluid (°C)	Electrical connection	Weight (kg)	Dimension No.	Circuit diagram No.	Model
	24 V d.c. (W)	230 V a.c. (VA)	24 V d.c. (mA)	230 V a.c. (mA)								
	3,9	—	162	—	I12G	Ex e mb IIC T4/T6 Gb	-40...+80 T4 -40...+55 T6 -40...+80	M20 x 1,5 *6)	0,6	6	4	4260 *8)
	—	5,3	—	23	I12D	Ex tb IIIC T 130°C Db IP66 *2), *10)	-40...+80 T4 -40...+55 T6 -40...+80	M20x1,5 *6)	0,6	6	7	4261 *8)
	8,9	—	369	—	I12G	Ex e mb IIC T4/T5 Gb	-40 ... +65 T4 -40 ... +55 T5 -40 ... +65	M20 x 1,5 *6)	0,5	6	4	4270 *8)
	—	10,0	—	43	I12D	Ex tb IIIC T 130°C Db IP66 *2), *10)	-40 ... +65 T4 -40 ... +55 T5 -40 ... +65	M20 x 1,5 *6)	0,5	6	7	4271 *8)

	Power consumption		Rated current		ATEX-Category	Protection class *7)	Temperature Ambient/ Fluid (°C)	Electrical connection	Weight (kg)	Dimension No.	Circuit diagram No.	Model
	24 V d.c. (W)	230 V a.c. (VA)	24 V d.c. (mA)	230 V a.c. (mA)								
	3,9	—	162	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40...+80 T4 -40...+55 T6 -40...+80	1/2 NPT *6)	0,8	7	20	4660 *8)
	—	5,3	—	23	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40...+80 T4 -40...+55 T6 -40...+80	1/2 NPT *6)	0,8	7	21	4661 *8)
	3,9	—	162	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40...+80 T4 -40...+55 T6 -40...+80	M20x1,5 *6)	0,8	7	20	4662 *8)
	—	5,3	—	23	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40...+80 T4 -40...+55 T6 -40...+80	M20x1,5 *6)	0,8	7	21	4663 *8)
	8,9	—	369	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	1/2 - 14 NPT *6)	0,8	7	20	4670 *8)
	—	10,0	—	43	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	1/2 - 14 NPT *6)	0,8	7	21	4671 *8)
	8,9	—	369	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	20	4672 *8)
	—	10,0	—	43	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	21	4673 *8)
	8,9	—	369	—	II2G	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mbD 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	4	4872 *8)
	—	10	—	43	II2G	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mbD 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	7	4873 *8)
Stainless steel												
	8,9	—	369	—	II2G	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mbD 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	4	4872 *8)
	—	10	—	43	II2G	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mbD 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	7	4873 *8)

	Power consumption		Rated current		ATEX-Category	Protection class *7)	Temperature Ambient/ Fluid (°C)	Electrical connection	Weight (kg)	Dimension No.	Circuit diagram No.	Model
	24 V d.c. (W)	120 V a.c. (VA)	24 V d.c. (mA)	120 V a.c. (mA)								
	8,9	—	369	—	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II / III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9	-20 ... +60	Flying leads 450 mm long	0,5	8	1	3824
	—	9,5	—	41	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II / III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9	-20 ... +60	Flying leads 450 mm long	0,5	8	5	3825
	13,6	—	567	—	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II/III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9 *4)	-20 ... +60	Flying leads 450 mm long	0,5	8	1	3826
	—	15,7	—	68	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II/III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9 *4)	-20 ... +60	Flying leads 450 mm long	0,5	8	5	3827

Standard voltages 24 V d.c., 230 V a.c., other voltages on request.
Design according to VDE 0580, EN 50014/50028. 100% duty cycle.

*1) EG-Type-Examination-Certificate KEMA 02 ATEX 1347 X

*2) EG-Type-Examination-Certificate KEMA 98 ATEX 4452 X, edition no. 3

*3) EG-Type-Examination-Certificate PTB 02 ATEX 2085 X

*4) CSA-LR 57643-6, FM Approval

*6) Connector cable gland not supplied, see table »Accessories«

*7) IP-Protection class according to EN60529

*8) Suitable for outdoor installation

*10) IEC Ex Certificate of Conformity IEC Ex KEM 09.0068

*11) EG-Type-Examination-Certificate PTB 06 ATEX 2054 X

*12) IEC Ex Certificate of Conformity PTB 07.0039 X

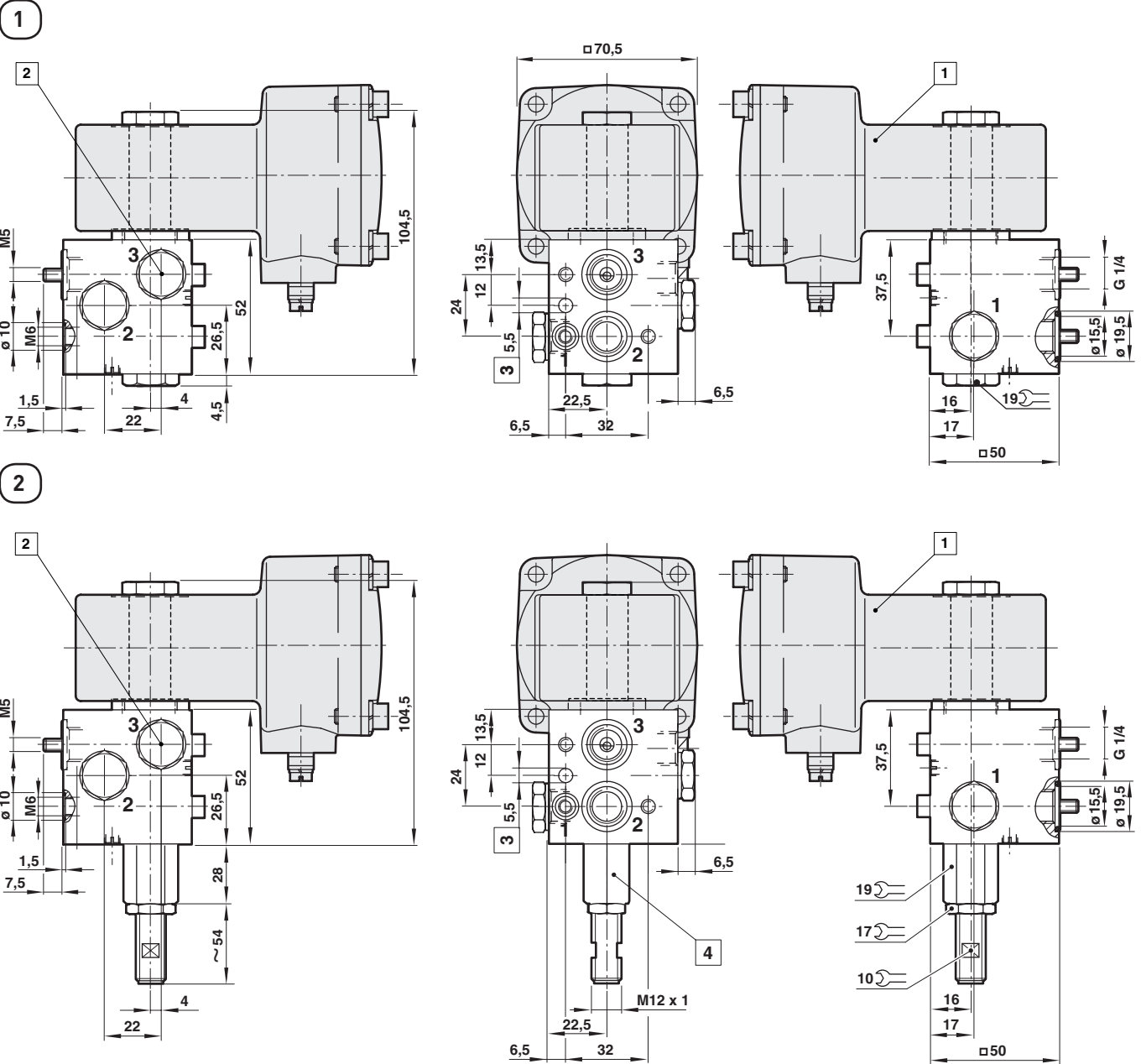
*13) IEC Ex Certificate of Conformity PTB 11.0094 X

Attention:

The protection class for coil series 46xx and 48xx is determined by the choice of cable gland.

Example: if an ATEX-certified cable gland is used that has Ex d type of protection, the solenoid will have the protection class Ex dmb; if a cable gland with Ex e type of protection is used, the solenoid will have protection class Ex emb.

Valves



- 1 Solenoids optional
- 2 Locked with plug and sealing washer
- 3 3 mm deep
- 4 Position sensor

Position sensor

Supply voltage (U_b):

7,7 ... 9 V DC

Ripple:

15%

Frequency of operating cycles:

1000 Hz

Protection class:

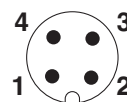
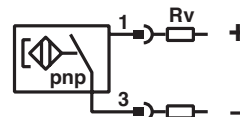
IP68

Pressure-resistant:

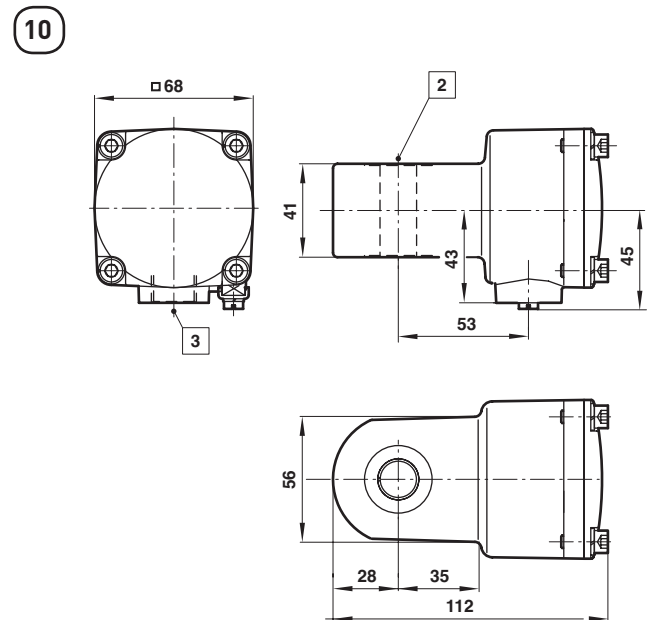
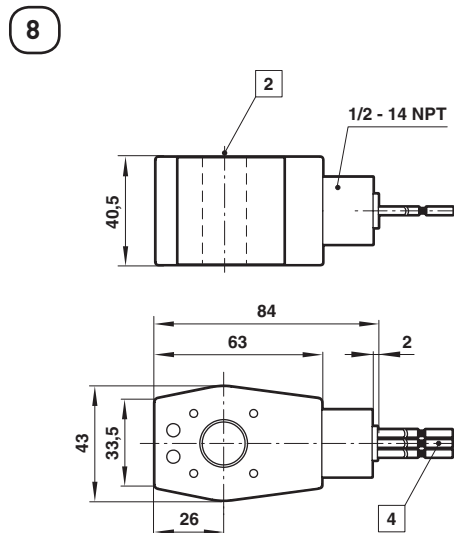
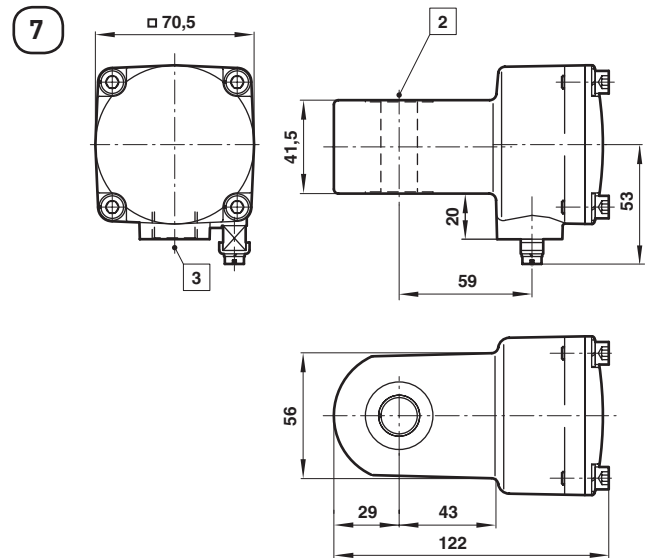
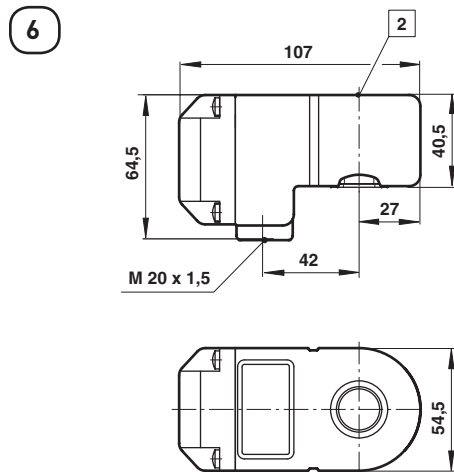
500 bar

Ambient temperature:

-25 ... +70°C

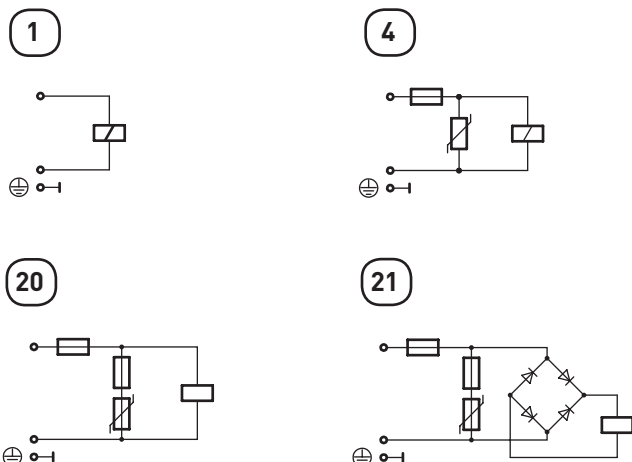


Solenoids



- 2 Ø 16
- 3 M20 x 1,5 or 1/2 - 14 NPT
- 4 Flying leads AWG 18 (450 mm long)

Circuit diagrams



Standard flow range (340 l/min)

Direct acting 3/2 valve switches at power failure into starting position (mechanical spring return)

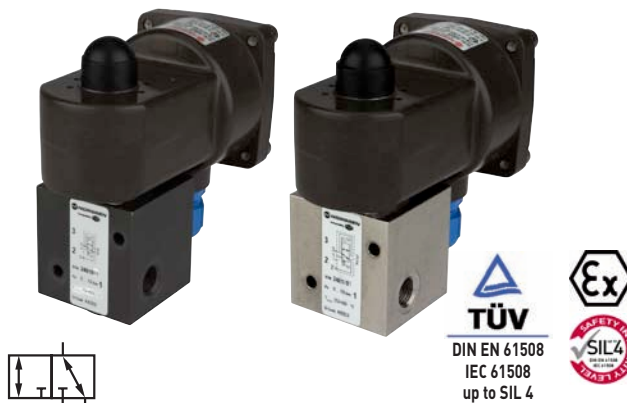
Optional valve position sensor

Suitable for outdoor installation in extreme environmental conditions

Solenoid valves suitable for use in area classification category: 2 and 3 GD / zone 1 & 2 (gas), 21 & 22 (dust)

Coil protection concept: Ex ia (intrinsically safe)

International approvals: IECEx, others on request



Technical features

Medium:

Filtered, non-lubricated or dry compressed air, instrument air nitrogen and other non-flammable neutral dry fluids

Operation:

3/2 Direct solenoid operated poppet valves

Port size:

Flanged

Orifice:

5 mm

Operating pressure:

0 ... 10 bar (0 ... 145 psi)

Fluid/Ambient Temperature:

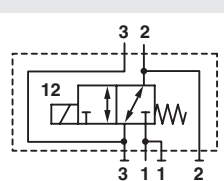
-25°C ... +60°C (-13°F ... +140°F) (NBR)

Air supply must be dry enough to avoid ice formation at temperatures +2°C (+35°F).

Materials:

Housing: hard anodized aluminium 3.0615 or stainless steel 1.4404 (316 L)
Seal: NBR (perbunan)
Internal parts: stainless steel, brass

Technical data

Symbol	Temperature (°C)	Material seat seal	housing	Position sensor	Weight (kg)	Test certificate IEC 61508 *2)	Dimension No.	Model *1)
	-25 ... +60	NBR	aluminium	without	0,55	X	1	2401009.2003
	-25 ... +60	NBR	stainless steel	without	1,00	X	1	2401097.2003
	-25 ... +60	NBR	aluminium	integrated	0,62	X	2	1025353.2003
	-25 ... +60	NBR	stainless steel	integrated	1,07	X	2	2401098.2003

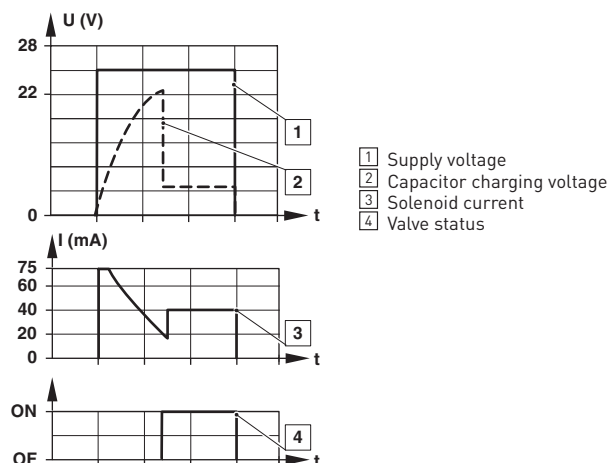
*1) Solenoid to be included in scope of supply; *2) Particular for valves with TÜV approval and attachment in plants based on safety standards IEC 61508, taking into account to the operating and maintenance instructions document 7503444.

Solenoid parameters for use in intrinsically safe circuits

Symbol	Switch-on voltage (V)	Holding current min. (mA)	Holding voltage (V)	Pick-up delay typical *3) (s)	Protection class	Temperature Ambient/Fluid (°C)	Weight (kg)	Model
	22 ... 28	40	approx. 5	0,3 ... 5	IIC Ex ia IIC T6 IIC Ex ia IIC T5 IP66 T95°C	-40 ... +55 -40 ... +70 -40 ... +70	0,85	2003

*3) depending on intrinsic current supply

Operating sequence



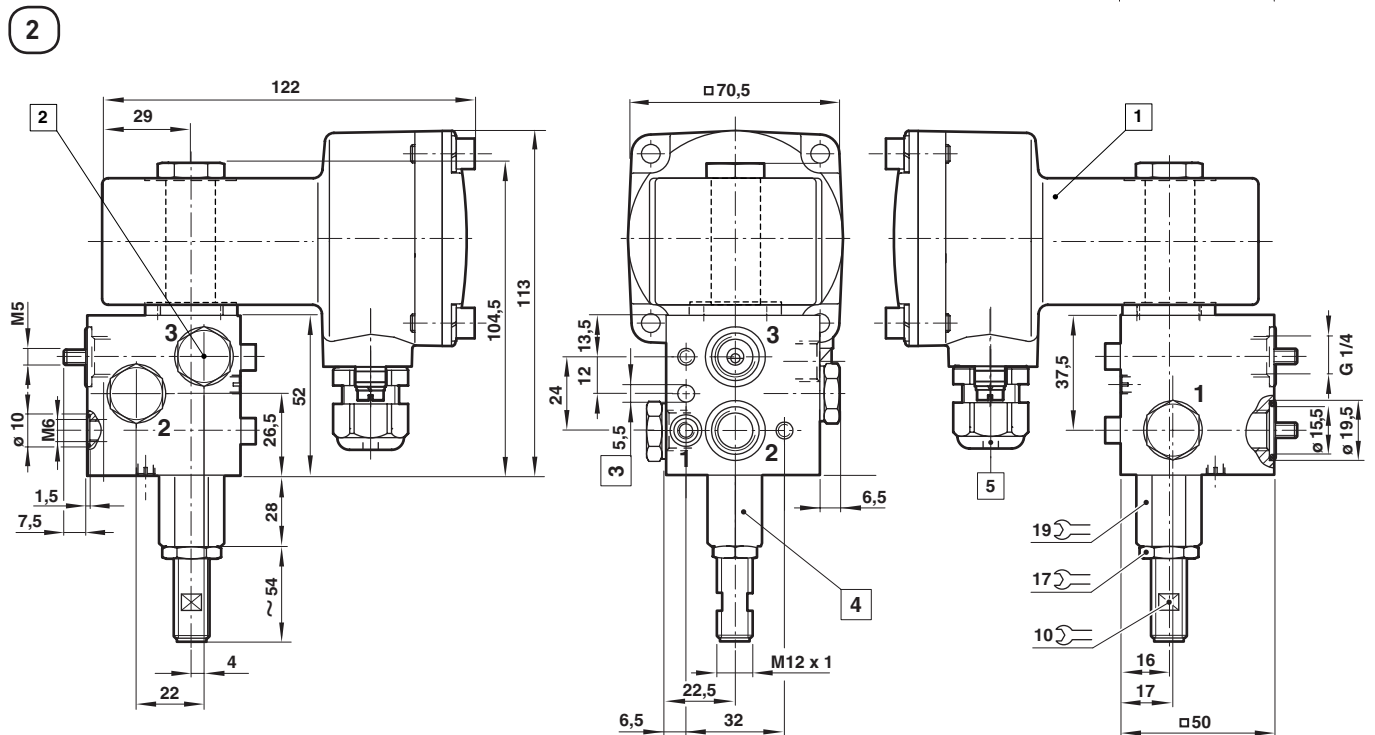
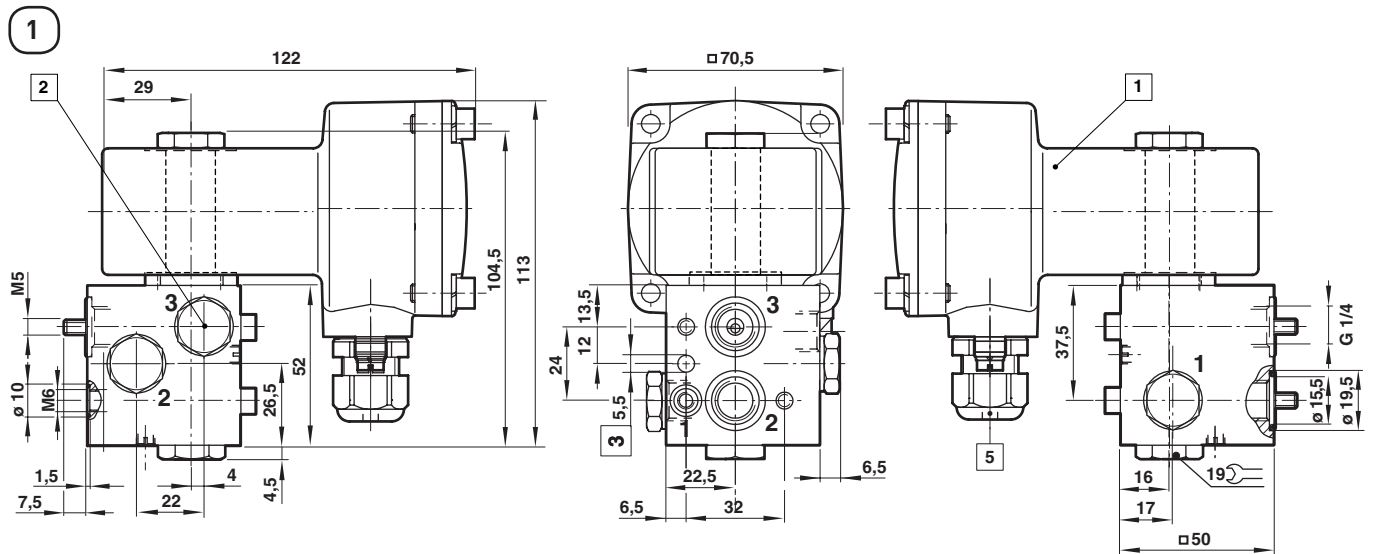
Function of solenoid drive

To switch the direct operated valve, a certain energy is required. This energy is stored in a capacitor. The charging voltage is 22 V. The higher the supply voltage, the shorter the charging time. As soon as the charging voltage has been reached, the valve switches. The small current now flowing through the coil is sufficient to hold the valve in the open position. At least 40 mA are required for this.

Current supply units:

Intrinsically safe power supply units can be chosen in a list of compatibility in www.norgren.com. When selecting an intrinsically safe power supply, it is important to observe the maximum permissible values acc. to the EC-Type-Examination Certificate PTB 04 ATEX 2010 respectively IECEx PTB 05.0020 Ui 28 V, Ii 110 mA, Pi 1,5 W. The effective internal capacities Ci; and inductivities Li of the solenoid are negligibly low.

Valves



- 1 Solenoid
- 2 Locked with plug and sealing washer
- 3 3 mm deep
- 4 Position sensor
- 5 Cable gland included in scope of supply

Position sensor

Supply voltage (U_b):

7,7 ... 9 V DC

Ripple:

15%

Frequency of operating cycles:

1000 Hz

Protection class:

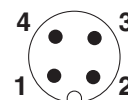
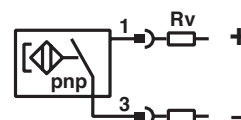
IP68

Pressure-resistant:

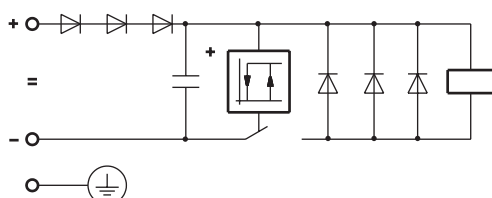
500 bar

Ambient temperature:

-25 ... +70°C



Circuit diagram



High flow range (950 l/min)

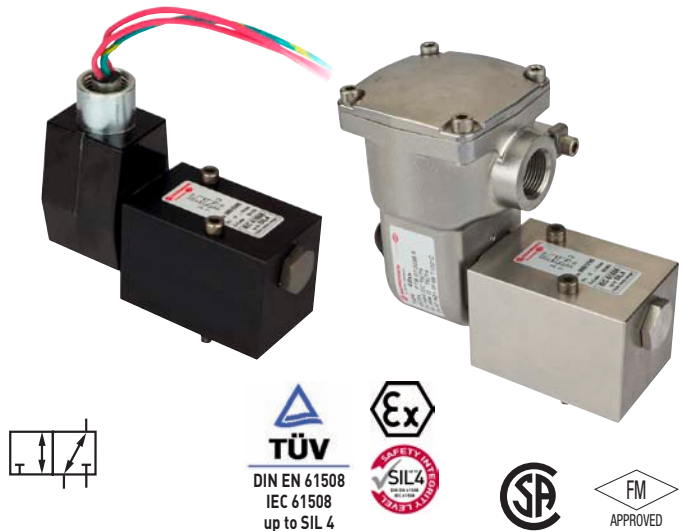
Direct acting 3/2 valve switches at power failure into starting position (mechanical spring return)

Optional valve position sensor

Suitable for outdoor installation in extreme environmental conditions

Solenoid valves suitable for use in area classification category: 2 and 3 GD / zone 1 & 2 (gas), 21 & 22 (dust)

Coil protection concepts: Ex e mb, Ex d mb, Ex tb
International approvals: IECEx, others on request



Technical features

Medium:

Filtered, non-lubricated or dry compressed air, instrument air nitrogen and other non-flammable neutral dry fluids

Operation:

3/2 Direct solenoid operated poppet valves

Port size:

Flanged

Orifice:

8 mm

Operating pressure:

0 ... 10 bar (0 ... 145 psi)

Fluid/Ambient temperature:

-40 ... +60°C (-40 ... +140°F)

-25 ... +60°C (-13 ... +140°F) (SIL approval)

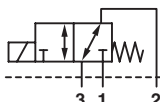
Depending on solenoid system
Air supply must be dry enough to avoid ice formation at temperatures +2°C (+35°F).

Materials:

Housing: hard anodized aluminium 3.0615 or stainless steel 1.4404 (316 L)

Seal: NBR (special perbunan)
Internal parts: stainless steel

Technical data

Symbol	Temperature [°C]	Material seat seal	housing	Inductive limit sensor	Weight (kg)	Test certificate IEC 61508 *2)	Dimension No.	Model *1)
	-40 ... +60	NBR	aluminium	without	0,65	X	1	9801595
	-40 ... +60	NBR	stainless steel	without	1,50	X	1	9801795
	-25 ... +60	NBR	aluminium	integrated	0,72	X	2	9801594
	-25 ... +60	NBR	stainless steel	integrated	1,57	X	2	9801794

*1) When ordering please indicate solenoid, voltage and current type (frequency).

*2) For operation in plants according to IEC 61511/61508 (-25 ... +60°C)

Solenoid operators

	Power consumption		Rated current		ATEX-Category	Protection class *7)	Temperature Ambient/Fluid (°C)	Electrical connection	Weight (kg)	Dimension No.	Circuit diagram No.	Model
	24 V d.c. (W)	230 V a.c. (VA)	24 V d.c. (mA)	230 V a.c. (mA)								
	8,9	—	369	—	II2G	Ex e mb IIC T4/T5 Gb	-40 ... +65 T4 -40 ... +55 T5 -40 ... +65	M20 x 1,5 *6)	0,5	6	4	4270 *8)
	—	10,0	—	43	II2D	Ex tb IIIC T 130°C Db IP66 *2), *10)						
	—	10,0	—	43	II2G	Ex e mb IIC T4/T5 Gb	-40 ... +65 T4 -40 ... +55 T5 -40 ... +65	M20 x 1,5 *6)	0,5	6	7	4271 *8)
	—	10,0	—	43	II2D	Ex tb IIIC T 130°C Db IP66 *2), *10)						
	8,9	—	369	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	1/2 - 14 NPT *6)	0,8	7	20	4670 *8)
	—	10,0	—	43	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	1/2 - 14 NPT *6)	0,8	7	21	4671 *8)
	—	10,0	—	43	II2D	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	1/2 - 14 NPT *6)	0,8	7	21	4671 *8)
	8,9	—	369	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	20	4672 *8)
	—	10,0	—	43	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	21	4673 *8)
	—	10,0	—	43	II2D	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	21	4673 *8)
	8,9	—	369	—	II2G	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	20	4672 *8)
	—	10,0	—	43	II2D	Ex d mb IIC T4/T6 Gb Ex e mb IIC T4/T6 Gb Ex tb IIIC T130°C Db *3), *13)	-40 ... +70 T4 -40 ... +40 T6 -40 ... +70	M20 x 1,5 *6)	0,8	7	21	4673 *8)
	8,9	—	369	—	II2G	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mb D 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	4	4872 *8)
	—	10	—	43	II2G	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mb D 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	7	4873 *8)
	—	10	—	43	II2D	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mb D 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	7	4873 *8)
	—	10	—	43	II2D	Ex mb d IIC T4/T6 Ex mb e II T4/T6 Ex mb D 21 tD A21 IP66 T100°C Ex tD A21 IP66 T100°C *11) *12)	-40 ... +50 T4 -40 ... +40 T6 -40 ... +50	M20x1,5 *6)	1,2	10	7	4873 *8)

	Power consumption		Rated current		ATEX-Category	Protection class *7)	Temperature Ambient/Fluid (°C)	Electrical connection	Weight (kg)	Dimension No.	Circuit diagram No.	Model
	24 V d.c. (W)	120 V a.c. (VA)	24 V d.c. (mA)	120 V a.c. (mA)								
	8,9	—	369	—	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II / III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9	-20 ... +60	Flying leads 450 mm long	0,5	8	1	3824
	—	9,5	—	41	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II / III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9	-20 ... +60	Flying leads 450 mm long	0,5	8	5	3825
	13,6	—	567	—	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II/III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9 *4)	-20 ... +60	Flying leads 450 mm long	0,5	8	1	3826
	—	15,7	—	68	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II/III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9 *4)	-20 ... +60	Flying leads 450 mm long	0,5	8	5	3827
	—	15,7	—	68	—	XP/DIP, Div. 1 & 2 Cl. I, Gr. A-D Cl. II/III, Gr. E-G T3 (160°C) *4) NEMA 4, 4X, 6, 6P, 7, 9 *4)	-20 ... +60	Flying leads 450 mm long	0,5	8	5	3827

Standard voltages 24 V d.c., 230 V a.c., other voltages on request.
Design according to VDE 0580, EN 50014/50028. 100% duty cycle.

*1) EG-Type-Examination-Certificate KEMA 02 ATEX 1347 X

*2) EG-Type-Examination-Certificate KEMA 98 ATEX 4452 X, edition no. 3

*3) EG-Type-Examination-Certificate PTB 02 ATEX 2085 X

*4) CSA-LR 57643-6, FM Approval

*6) Connector cable gland not supplied, see table »Accessories«

*7) IP-Protection class according to EN60529

*8) Suitable for outdoor installation

*10) IEC Ex Certificate of Conformity IEC Ex KEM 09.0068

*11) EG-Type-Examination-Certificate PTB 06 ATEX 2054 X

*12) IEC Ex Certificate of Conformity PTB 07.0039 X

*13) IEC Ex Certificate of Conformity PTB 11.0094 X

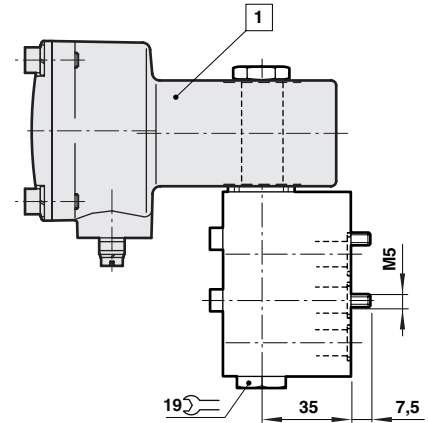
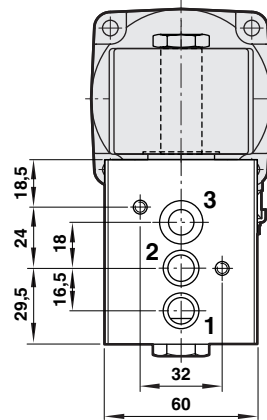
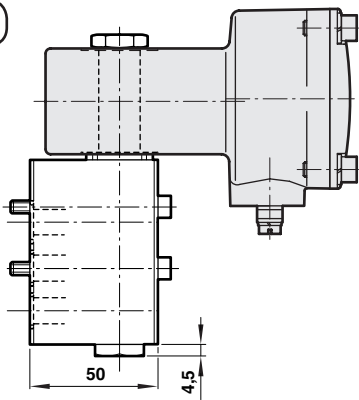
Attention:

The protection class for coil series 46xx and 48xx is determined by the choice of cable gland.

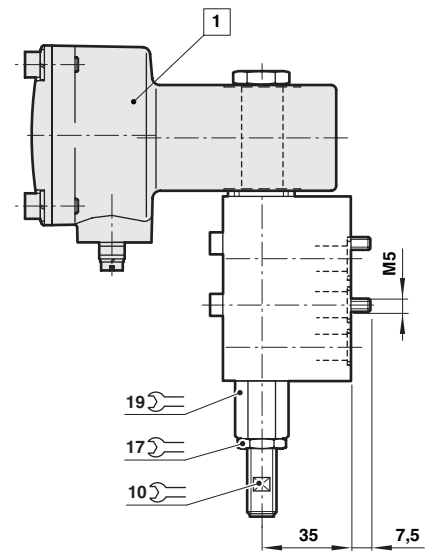
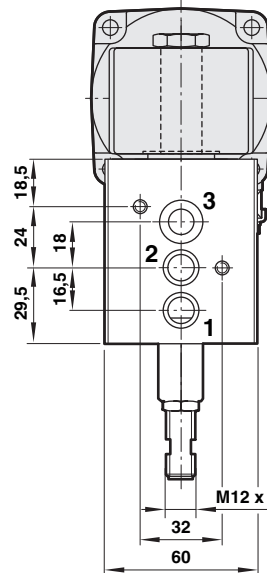
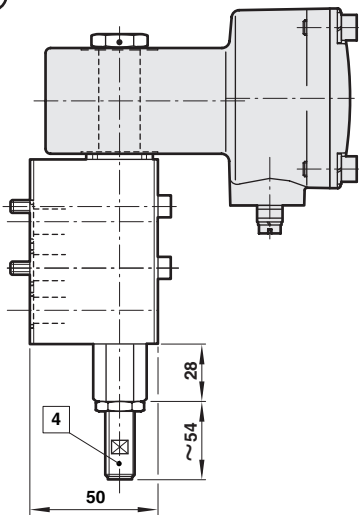
Example: if an ATEX-certified cable gland is used that has Ex d type of protection, the solenoid will have the protection class Ex dmb; if a cable gland with Ex e type of protection is used, the solenoid will have protection class Ex emb.

Valves

1



2



- 1 Solenoids optional
- 4 Position sensor

Position sensor

Supply voltage (U_b):

7,7 ... 9 V DC

Ripple:

15%

Frequency of operating cycles:

1000 Hz

Protection class:

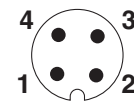
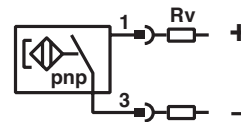
IP68

Pressure-resistant:

500 bar

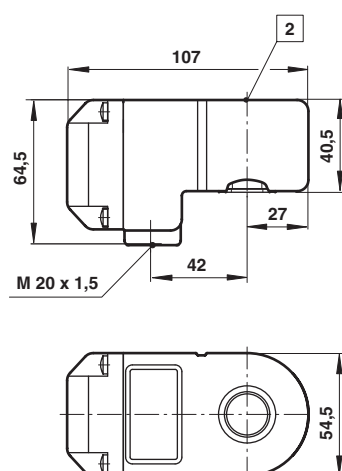
Ambient temperature:

-25 ... +60°C

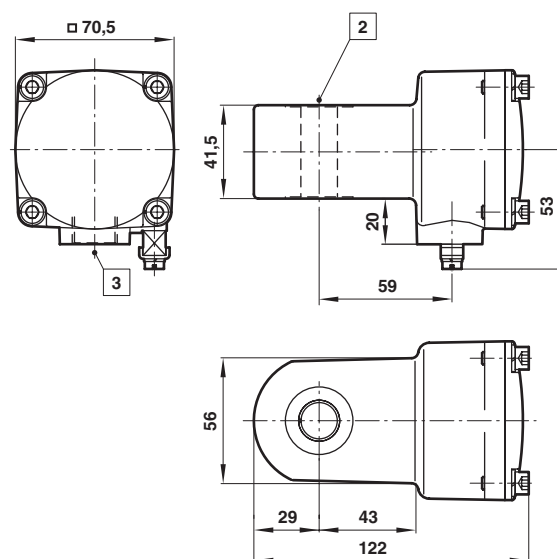


Solenoids

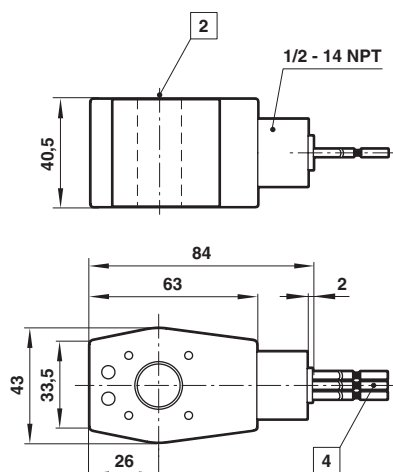
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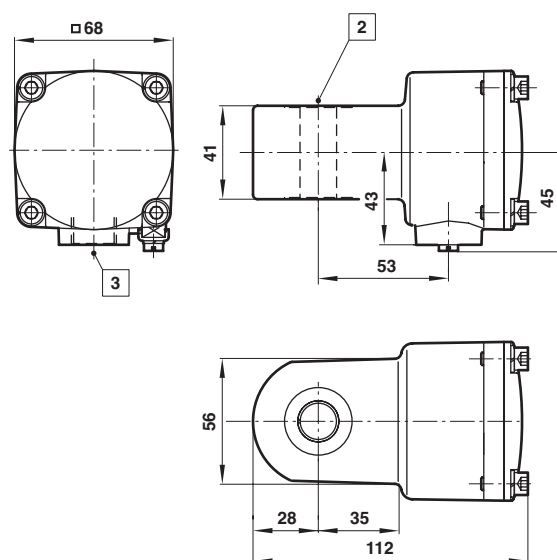
7



8



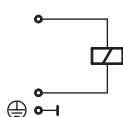
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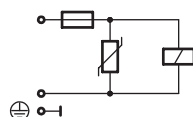
- 2 Ø 16
- 3 M20 x 1,5 or 1/2 - 14 NPT
- 4 Flying leads AWG 18 (450 mm long)

Circuit diagrams

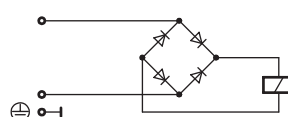
1



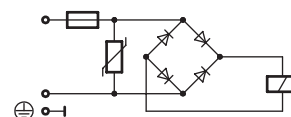
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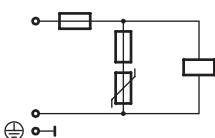
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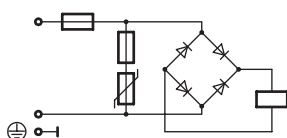
7



20



21



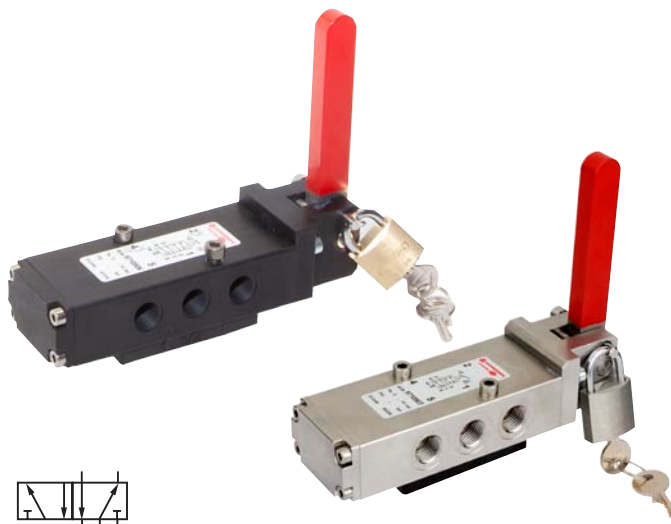
No open port cross over position during lever movement

Reliable operation even with minimal air flow

Lockable manual operator with detent as standard

Simple design with soft seal spool system

Padlock with two keys



Technical features

Medium:

Filtered, non-lubricated or dry compressed air, instrument air nitrogen and other non-flammable neutral dry fluids

Operation:

Manual actuated spool valves

Port size:

see below, according to selecte system (standard flow or high flow)

Operating pressure:

0 ... 10 bar

Fluid/Ambient temperature:

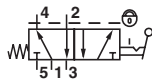
-40 ... +80°C,
Air supply must be dry enough to avoid ice formation at temperatures below +2°C.
For outdoor installation please protect all connections against moisture ingress!

Materials:

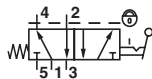
Housing: hard anodized aluminium 3.0615 or stainless steel 1.4404 (316 L)
Seals: NBR (special perbunan) or HNBR

Technical data

Temperature range: -40 ... +60°C

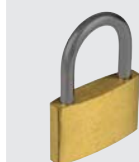
Symbol	Port size 1, 3 and 5	2 and 4	Flow	Material housing	seals	Weight (kg)	Dimension No.	Model
	G1/4	flange	standard	aluminium	NBR	0,60	1	9710906
	1/4 NPT	flange	standard	aluminium	NBR	0,60	1	9710911
	G1/4	flange	standard	stainless steel	NBR	1,40	1	9710907
	1/4 NPT	flange	standard	stainless steel	NBR	1,40	1	9710912
	G1/2	flange	high	aluminium	NBR	1,30	2	9710908
	1/2 NPT	flange	high	aluminium	NBR	1,30	2	9710913
	G1/2	flange	high	stainless steel	NBR	3,20	2	9710909
	1/2 NPT	flange	high	stainless steel	NBR	3,20	2	9710914

Temperature range: -25 ... +80°C

Symbol	Port size 1, 3 and 5	2 and 4	Flow	Material housing	seals	Weight (kg)	Dimension No.	Model
	G1/4	flange	standard	aluminium	HNBR	0,60	1	9710915
	1/4 NPT	flange	standard	aluminium	HNBR	0,60	1	9710919
	G1/4	flange	standard	stainless steel	HNBR	1,40	1	9710916
	1/4 NPT	flange	standard	stainless steel	HNBR	1,40	1	9710920
	G1/2	flange	high	aluminium	HNBR	1,30	2	9710917
	1/2 NPT	flange	high	aluminium	HNBR	1,30	2	9710921
	G1/2	flange	high	stainless steel	HNBR	3,20	2	9710918
	1/2 NPT	flange	high	stainless steel	HNBR	3,20	2	9710922

Accessories

U-lock with two keys
(brass)



0613633

U-lock with two keys
(stainless steel)

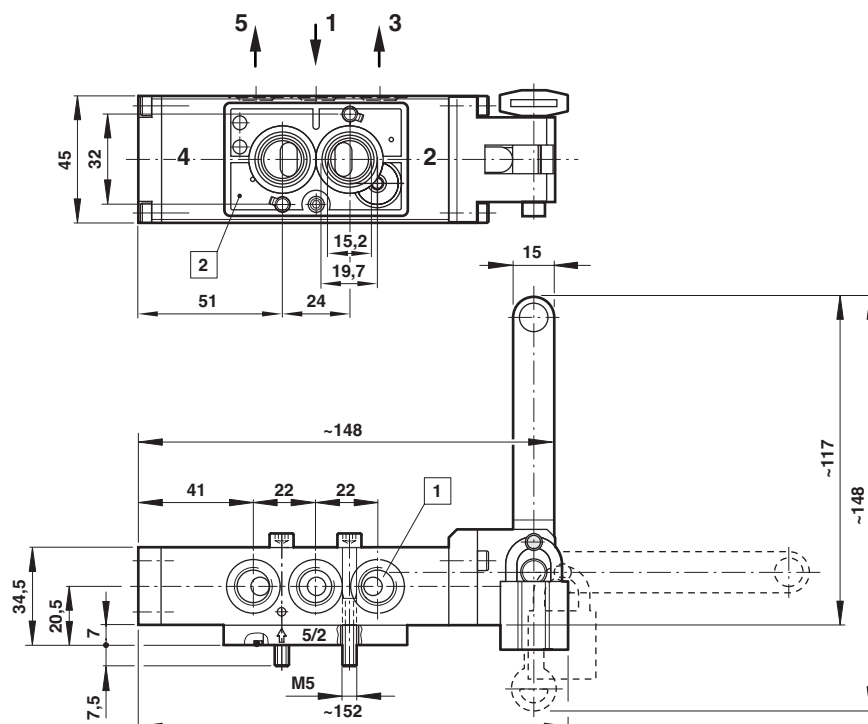


0613836

97109 bypass valves for standard and high flow systems

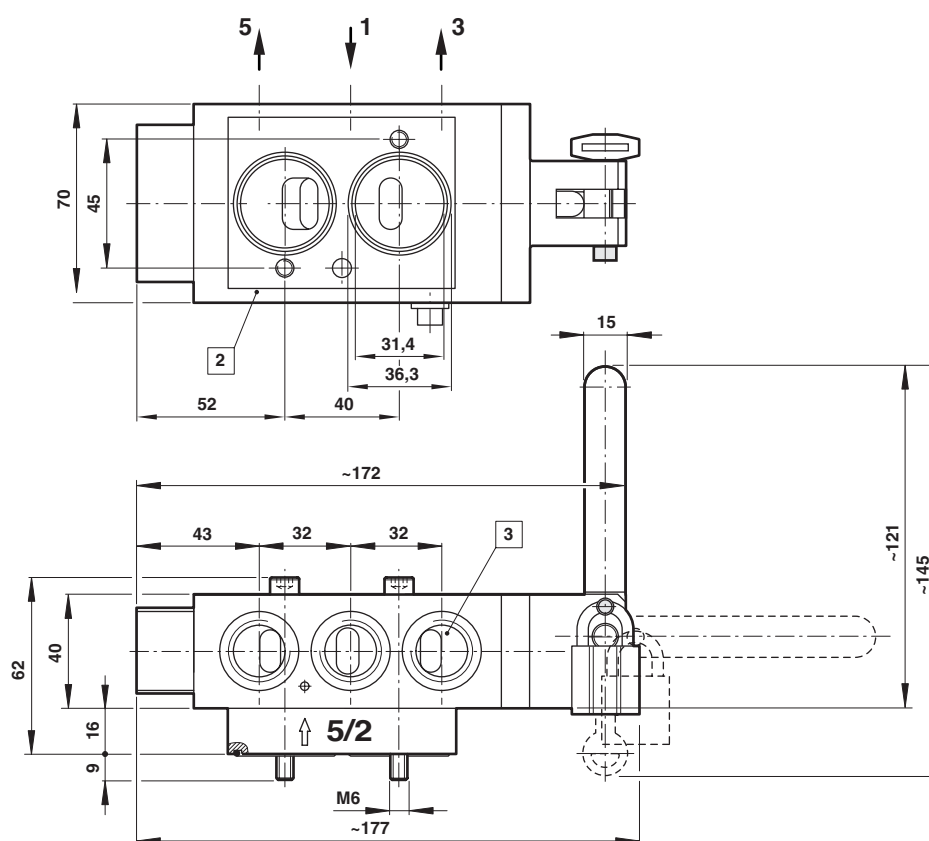
Standard flow valves

1



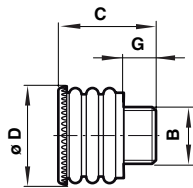
High flow valves

2



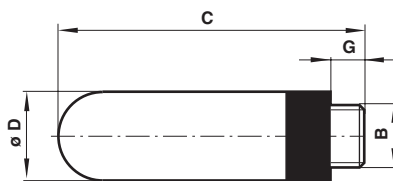
- 1 Inlet and exhaust ports G 1/4 or 1/4 NPT
- 2 Namur flange plate
- 3 Inlet and exhaust ports G 1/2 or 1/2 NPT

Exhaust guard (plastic) - standard option



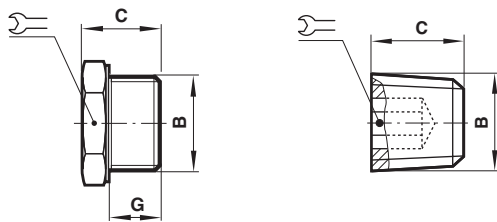
B	Suitable for	G	C	Ø D	Weight (g)	Model
1/4"	G 1/4, 1/4 NPT	10	26,5	21	5	0613422
1/2"	G 1/2, 1/2 NPT	12	33,5	29	11	0613423

Silencer (plastic)



B	G	C	Ø D	Weight (g)	Model
G 1/4	7	35,5	15,5	2,9	M/S2
1/4 NPT	7	35,5	15,5	2,9	C/S2
G 1/2	12	67	23	11,5	M/S4
1/2 NPT	12	67	23	11,5	C/S4

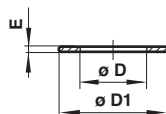
Plug (nickel plated brass or stainless steel)



B	C	G	Ø D	Weight (g)	Model
G1/4	13	8	17	14	0657380
G1/4	21	12	13	24	0663943 *1)
1/4 NPT	10	—	7	8	0682082 *1)

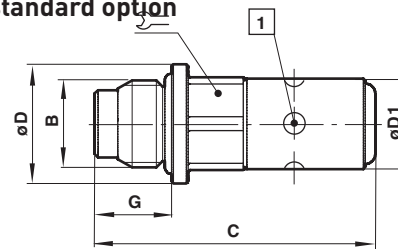
*1) stainless steel

Sealing washer (plastic)



For plug	Ø D	Ø D1	E	Weight (g)	Model
G 1/4	13,5	17	1,5	2	0660835

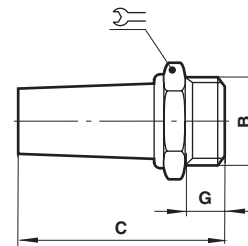
Visual pressure indicator (stainless steel) - standard option



1 Visual colour
Red (unactuated)
Green (actuated)

B	C	Ø D	Ø D1	G	Weight (g)	Model
G 1/4	42	18	14	11,5	35	74749-61
1/4 NPT	42	18	14	16	35	74749-60

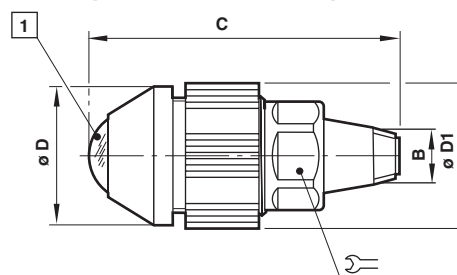
Silencer (brass or stainless steel)



B	C	G	Weight (g)	Model
G 1/4	33	8	17	T40C2800
1/4 NPT	35	8	9/16	MS002A
G 1/4	36	8	16	0014613 *1)
1/4 NPT	36	8	16	0613678 *1)
G 1/2	56	12	27	T40C4800
1/2 NPT	48	12	7/8	MS004A
G 1/2	49	12	24	0014813 *1)
1/2 NPT	49	12	24	0613679 *1)

*1) stainless steel

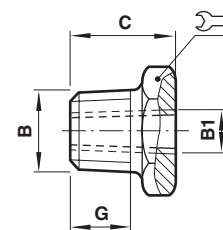
Visual pressure indicator (plastic)



1 Visual colour
Red (unactuated)
Green (actuated)

B	C	Ø D	Ø D1	Weight (g)	Model
1/8 NPTF	46	20	21	25	5VS-212-000

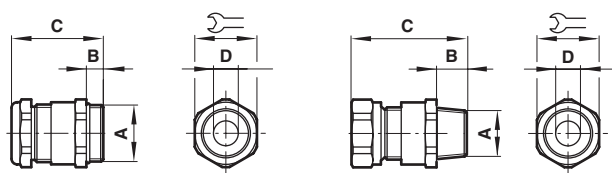
Adapter (zinc plated steel or stainless steel)



B	B1	C	G	Weight (g)	Model
1/4 NPT	1/8 NPT	21,5	14	10	0613658
1/4 NPT	1/8 NPT	21,5	14	10	0613659 *1)

*1) stainless steel

Cable gland - solenoid

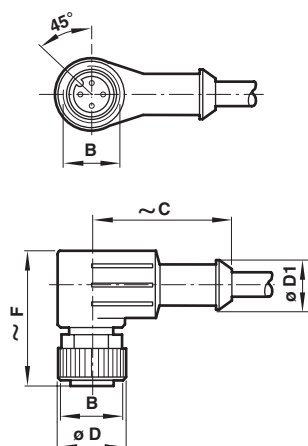


0588925 only

A	B	C	ø D		Weight (g)	Model
M20 x 1,5	9	36	5 ... 8	22	29	0588819
M20 x 1,5	6,5	27,5	9 ... 13	22	30	0589385
M20 x 1,5	14	39	10 ... 14	24	29	0588851
1/2-14 NPT	15	58	7,5 ... 11,9	24	50	0588925
M20 x 1,5	14	39	7 ... 12	24	40	0589395
M20 x 1,5	10	34	10 ... 14	24	35	0589387

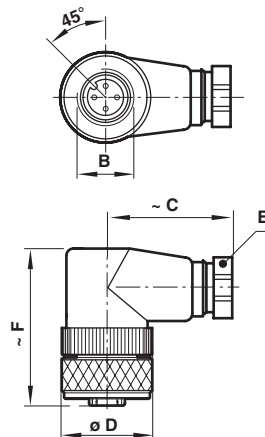
Connector - valve position sensor

90°, 4 pin, with cable



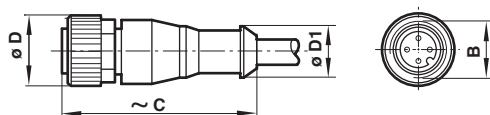
B	C	ø D	ø D1	F	Cable Wire x dim.	Cable Material	Cable length (m)	Weight (g)	Model
M12 x 1,5	32,5	15	11	27	4 x 0,34 mm ²	PUR	2	90	0523058
M12 x 1,5	32,5	15	11	27	4 x 0,34 mm ²	PUR	5	180	0523053

90°, 4 pin, without cable



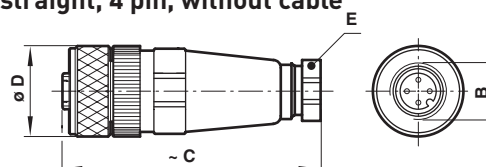
B	C	ø D	E	F	Weight (g)	Model
M12 x 1,5	40,5	20	Pg 7	35	30	0523055

straight, 4 pin, with cable



B	C	ø D	ø D1	Cable Wire x dim.	Cable Material	Cable length (m)	Weight (g)	Model
M12 x 1,5	40	15	11	4 x 0,34 mm ²	PUR	2	80	0523057
M12 x 1,5	40	15	11	4 x 0,34 mm ²	PUR	5	200	0523052

straight, 4 pin, without cable

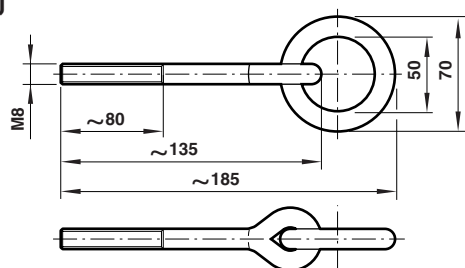


B	C	ø D	E	Weight (g)	Model
M12 x 1,5	40,5	20	Pg 7	26	0523056

Transport lug (zinc plated steel)

Model: 0613909

Weight: 0,2 kg



Warning

These products are intended for use in industrial compressed air systems only. Do not use these products where pressures and temperatures can exceed those listed under »**Technical features**«.

Before using these products with fluids other than those specified, for non-industrial applications, life-support systems, or other applications not within published specifications, consult NORGREN.

Through misuse, age, or malfunction, components used in fluid power systems can fail in various modes.

The system designer is warned to consider the failure modes of all component parts used in pneumatic systems and to provide adequate safeguards to prevent personal injury or damage to

equipment in the event of such failure.

System designers must provide a warning to end users in the system instructional manual if protection against a failure mode cannot be adequately provided.

System designers and end users are cautioned to review specific warnings found in instruction sheets packed and shipped with these products.

Functional safety (SIL):

Suitable for certain applications can only be evaluated through examination of each safety-related overall system with regard to the requirements of IEC 61508/61511.