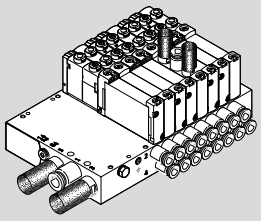
VTUG-...-M/VTUG-...-V
Valve terminal



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www.festo.com

Instructions | Assembly, Installation

8109568
2020-01h
[8109570]

1 Applicable documents

All available documents for the product ➔ www.festo.com/sp.

Documents	Product	Contents
Description	Bus node CTEU-...	Assembly, Installation, Operating
Instructions	H-rail mounting VAME-T-M4	Assembly
Instructions	H-rail mounting VAME-T-M5	Assembly
Instructions	Manifold rail VABM-L1-...GR	Assembly
Instructions	Manifold rail VABM-L1-...HWS1/2-...-GR	Assembly
Instructions	Supply plate VABF-L1-14-P3A4-G18	Assembly
Instructions	Separator VABD-... B	Assembly
Instructions	Inscription label holder ASCF-H-L1	Assembly
Instructions	Identification holders ASLR-D	Assembly
Instructions	Connecting cable NEBV-S1G...-K-...-LE25	Assembly
Instructions	Connecting cable NEBV-S1G...-K-...-LE44	Assembly

Tab. 1 Applicable documents

2 Safety

2.1 General safety instructions

- Prior to mounting, installation and maintenance work: Switch off power supply and secure it from being switched back on.
- Prior to mounting, installation and maintenance work: Switch off compressed air supply and secure it from being switched back on.
- Exhaust system parts with stored compressed air.
- This product can generate high frequency malfunctions, which may make it necessary to implement interference suppression measures in residential areas.
- Use PELV circuits that guarantee a reinforced isolation from the mains network for the electrical power supply with extra-low voltages.
- Observe IEC 60204-1/EN 60204-1.
- Comply with the handling specifications for electrostatically sensitive devices.
- Only use the product if it is in perfect technical condition.
- Only use the product in original status without unauthorised modifications.
- Use exclusively in combination with modules and components that are certified for the specific product variant and have been tested and approved by Festo.

2.2 Intended use

The product is used to control pneumatic actuators and is intended for installation in machines and automated systems.

2.3 Training of qualified personnel

Installation, commissioning, maintenance and disassembly should only be conducted by qualified personnel. The specialized personnel must be familiar with the installation and operation of electrical and pneumatic control systems.

3 Additional information

- Accessories ➔ www.festo.com/catalogue.
- Spare parts ➔ www.festo.com/spareparts.

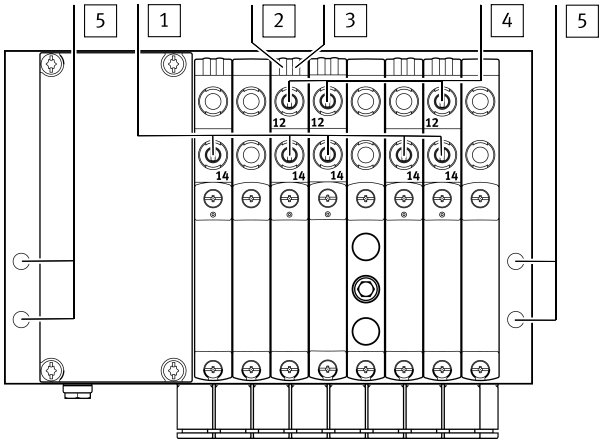
4 Service

Contact your regional Festo contact person if you have technical questions ➔ www.festo.com.

5 Design

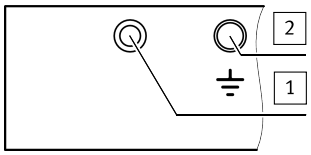
5.1 Product design

5.1.1 Standard valve terminal (straight sub-base)



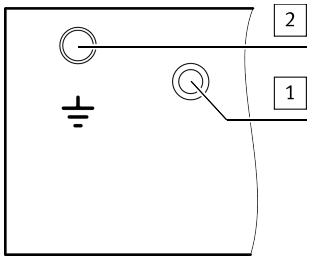
1 Manual override 14 (non-detenting/detenting by turning)
2 LED solenoid coil 12
3 LED solenoid coil 14
4 Manual override 12 (non-detenting/detenting by turning)
5 Mounting holes

Fig. 1 Standard valve terminal (straight sub-base)



1 Pilot air selector/blanking plug (port 14)
2 Earth terminal

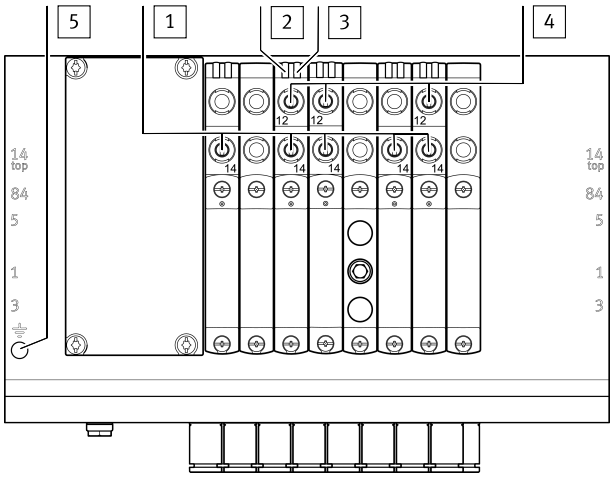
Fig. 2 Width 10 and 18 mm



1 Pilot air selector/blanking plug (port 14)
2 Earth terminal

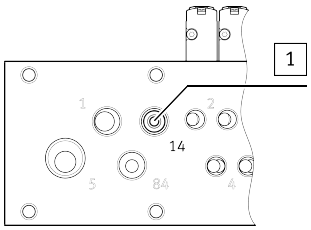
Fig. 3 Width 14 mm

5.1.2 Valve terminal for installation in the control cabinet (T-profile sub-base)



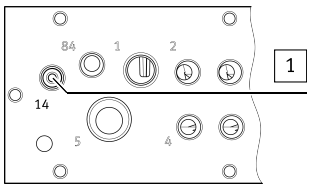
1 Manual override 14 (non-detenting/detenting by turning)
2 LED solenoid coil 12
3 LED solenoid coil 14
4 Manual override 12 (non-detenting/detenting by turning)
5 Earth terminal

Fig. 4 Valve terminal for installation in the control cabinet (T-profile sub-base)



1 Pilot air selector/blanking plug (port 14)

Fig. 5 Width 10 mm



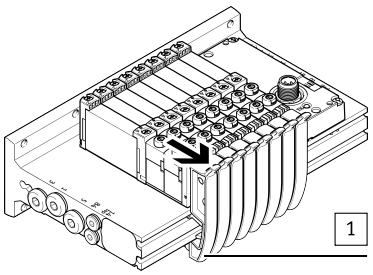
1 Pilot air selector/blanking plug (port 14)

Fig. 6 Width 14 mm

5.1.3 Valve terminal with hot swap function

Hot swap for channel 1

The hot swap function for channel 1 enables the replacement of a valve during operation of the valve terminal.



1 Lever

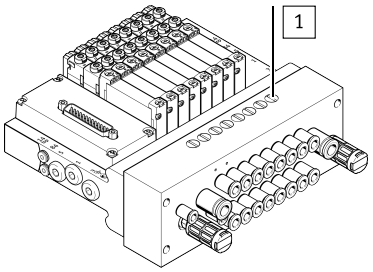
Fig. 7 Hot swap for channel 1

To replace the valve, proceed as follows:

1. Pull lever in the direction of the arrow.
   - The valve is disconnected from the compressed-air supply (channel 1) and at the same time the working ports (channels 2 and 4) are exhausted on the valve side.
2. Replace valve.
3. If required, lock the lever (hole: ∅ 4.4 mm) with a pin or bolt (∅ 4 mm) to prevent accidental actuation.

Hot swap for channels 2 and 4

The hot swap function for channels 2 and 4 enables replacement of an actuator during operation of the valve terminal.



1 Plunger

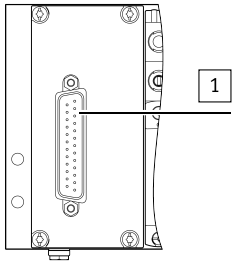
Fig. 8 Hot swap for channels 2 and 4

To replace the actuator, proceed as follows:

1. Screw in plunger with screwdriver.
   - The working ports (channels 2 and 4) are blocked on the valve side and actuator side.
2. Replace actuator.

5.2 Connections

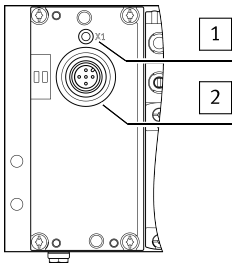
5.2.1 Valve terminal VTUG-...-M



1 Electrical multi-pin plug connection

Fig. 9 Connections of the valve terminal VTUG -...- M

5.2.2 Valve terminal VTUG-...-V



1 LED X1 (status)
2 IO-Link/I-Port connection

Fig. 10 Connections of the valve terminal VTUG -...- V

6 Assembly

The valve terminal is designed for mounting on an H-rail.

NOTICE!

It is not approved for mounting on an H-rail if vibration and shock loads are expected.

The valves can be labelled with an inscription label holder ASCF-H-L1 or with identification holders ASLR-D.
The IO-Link/I-Port connecting plate can be fitted with the inscription label ASLR-C-E4.

7 Pneumatic installation

7.1 Pilot air supply for pilot control

The valve terminal is supplied as standard with internal pilot air branched off from channel 1. Ports 14 are sealed with blanking plugs. The valve terminal can optionally be supplied with external pilot air using the pilot air selector. The pilot air is then supplied via port 14 of the valve terminal ➔ 5.1 Product design. Mounting of the pilot air selector is described in the instructions VABM-L1 -... GR or VABM-L1 -... HWS1 / 2 -...- GR.

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When using the module VTUG hot swap, only an internal pilot air supply is permitted.

7.2 Exhaust

If there are more than 6 simultaneously switched valves, exhaust on both sides is required.

7.3 Supply plates (optional)

i

The supply plates VABF-L1-14-P3A4-G18-T1 and VABF-L1-18-P3A4-G14-T1 must not be equipped with fittings with R-thread.

- Use only fittings with G-thread.

7.4 Pressure zones

The valve terminal can be divided into pressure zones using separators. Mounting of the separators is described in the VABD-... B instructions.

7.5 Check valves

The check valves reduce the back pressure (dynamic pressure) of the air from exhaust ducts 3 and 5 into the solenoid valve. The check valves are integrated into the channels of the sub-base to prevent unintended switching of actuators. Mounting of the check valves in the exhaust ducts 3 and 5 of the sub-base is described in the VABM-L1 -... HWS1 / 2 -...- GR instructions.

7.6 Fixed flow restrictors

The fixed flow restrictors can be used to set the exhaust flow rate permanently in channels 3 and 5. Mounting of the fixed flow restrictors in exhaust ducts 3 and 5 of the sub-base is described in the instructions VABM-L1 -... HWS1 / 2 -...- GR.

7.7 Manual override

After mounting the inscription label holder ASCF-H-L1 or the identification holder ASLR-D, these valves can only be actuated non-detenting. A combination with the cover cap VAMC-L1-CD for detenting operation is not permissible.

8 Electrical installation

8.1 Power Supply

The operating voltage is supplied via the IO-Link master or the CTEU bus node. The load voltage is supplied via the IO-Link master port class B or the CTEU bus node. When using a IO-Link master port class A, the load voltage supply must be supplied separately. Separate fuses are required for operating and load voltage.

8.2 Earth terminal

Connect the valve terminal to the functional earth via the earth terminal ➔ 5.1 Product design.

i

The anodised layer must be penetrated to ensure a conductive connection. If necessary, use a retaining screw with toothed disc.

8.3 Electrical interfaces VTUG-...-M

Depending on the connection variant, the valve terminal VTUG -...- M can actuate up to 48 solenoid coils via a multi-pin plug connection. Each solenoid coil of the valve terminal VTUG-...-M must be assigned to a specific pin of the multi-pin plug. Use the following sockets with cables from the Festo range of accessories for connecting the valve terminal VTUG with multi-pin plug connection.

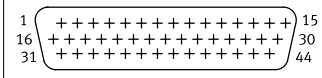
Sockets with cables		
Number of controllable coils	≤ 24	≤ 42
Protection class	IP40 or IP67	IP40 or IP67
Sub-D socket with cable	NEBV-S1... 25 -...- LE25	NEBV-S1... 25 -...- LE44

Tab. 2

i

Double-solenoid valves with 2 coils cannot be mounted on all valve positions. Observe the following tables.

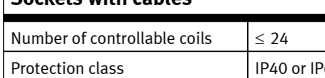
44-pin Sub-D-HD connection (variant 21)

Pin	Address	Valve position no./coil
		
1	0	0/14 0/12
2	1	
3	2	1/14 1/12
4	3	
5	4	2/14 2/12
6	5	
7	6	3/14 3/12
8	7	
9	8	4/14 4/12
10	9	
11	10	5/14 5/12
12	11	
13	12	6/14 6/12
14	13	
15	14	7/14 7/12
16	15	
17	16	8/14 8/12
18	17	
19	18	9/14 9/12
20	19	
21	20	10/14 10/12
22	21	
23	22	11/14 11/12
24	23	
25	24	12/14 12/12
26	25	
27	26	13/14 13/12
28	27	
29	28	14/14 14/12
30	29	
31	30	15/14 15/12
32	31	
33	32	16/14 16/12
34	33	
35	34	17/14 17/12
36	35	
37	36	18/14
38	37	19/14
39	38	20/14
40	39	21/14
41	40	22/14
42	41	23/14
43	Com for coil 0 ... 41[1]	
44	Com for coil 0 ... 41[1]	

1) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 3 44-pin Sub-D-HD connection (variant 21)

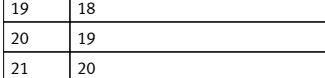
25-pin Sub-D connection (variant V20)

Pin	Address	Number of valve positions (variant V20)			
		4 ... 12	16	20	24
					
		Valve position no./coil designation			
1	0	0/14 0/12	0/14 0/12	0/14 0/12	0/14
2	1				23/14
3	2	1/14 1/12	1/14 1/12	1/14 1/12	1/14
4	3				22/14
5	4	2/14 2/12	2/14 2/12	2/14 2/12	2/14
6	5				21/14
7	6	3/14 3/12	3/14 3/12	3/14 3/12	3/14
8	7				20/14
9	8	4/14 4/12	4/14 4/12	4/14	4/14
10	9			19/14	19/14
11	10	5/14 5/12	5/14 5/12	5/14	5/14
12	11			18/14	18/14
13	12	6/14 6/12	6/14 6/12	6/14	6/14
14	13			17/14	17/14
15	14	7/14 7/12	7/14 7/12	7/14	7/14
16	15			16/14	16/14
17	16	8/14 8/12	8/14	8/14	8/14
18	17		15/14	15/14	15/14
19	18	9/14 9/12	9/14	9/14	9/14
20	19		14/14	14/14	14/14
21	20	10/14 10/12	10/14	10/14	10/14
22	21		13/14	13/14	13/14
23	22	11/14 11/12	11/14	11/14	11/14
24	23		12/14	12/14	12/14
25	–	COM[1]			

1) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 4 25-pin Sub-D connection (variant V20)

25-pin Sub-D connection (variants V22 ... V25)

Pin	Address	Number of valve positions (variant)			
		4 ... 10 (V22)[1]	12 (V23)[1]	16 (V24)[1]	20 (V25)[1]
					
		Valve position no./coil designation			
1	0	0/14 0/12	0/14 0/12	0/14 0/12	0/14
2	1				1/14
3	2	1/14 1/12	1/14 1/12	1/14 1/12	2/14
4	3				3/14
5	4	2/14 2/12	2/14 2/12	2/14 2/12	4/14
6	5				5/14
7	6	3/14 3/12	3/14 3/12	3/14 3/12	6/14
8	7				7/14
9	8	4/14 4/12	4/14 4/12	4/14	8/14
10	9			5/14	9/14
11	10	5/14 5/12	5/14 5/12	6/14	10/14
12	11			7/14	11/14
13	12	6/14 6/12	6/14 6/12	8/14	12/14
14	13			9/14	13/14
15	14	7/14 7/12	7/14 7/12	10/14	14/14
16	15			11/14	15/14
17	16	8/14 8/12	8/14	12/14	16/14
18	17		9/14	13/14	17/14
19	18	9/14 9/12	10/14	14/14	18/14
20	19		11/14	15/14	19/14
21	–	Com for coil 16 ... 19[2]			
22	–	Com for coil 12 ... 15[2]			
23	–	Com for coil 8 ... 11[2]			
24	–	Com for coil 4 ... 7[2]			
25	–	Com for coil 0 ... 3[2]			

1) Not available for valve terminal for installation in the control cabinet with T-profile sub-base.
2) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 5 25-pin Sub-D connection (variants V22 ... V25)

50-pin connection for ribbon cable (variant 26)

Pin	Address	Valve position no./coil
2 ... 50 / 1 ... 49		
1	0	0/14 0/12
2	1	
3	2	1/14 1/12
4	3	
5	4	2/14 2/12
6	5	
7	6	3/14 3/12
8	7	
9	8	4/14 4/12
10	9	
11	10	5/14 5/12
12	11	
13	12	6/14 6/12
14	13	
15	14	7/14 7/12
16	15	
17	16	8/14 8/12
18	17	
19	18	9/14 9/12
20	19	
21	20	10/14 10/12
22	21	
23	22	11/14 11/12
24	23	
25	24	12/14 12/12
26	25	
27	26	13/14 13/12
28	27	
29	28	14/14 14/12
30	29	
31	30	15/14 15/12
32	31	
33	32	16/14 16/12
34	33	
35	34	17/14 17/12
36	35	
37	36	18/14 18/12
38	37	
39	38	19/14 19/12
40	39	
41	40	20/14 20/12
42	41	
43	42	21/14 21/12
44	43	
45	44	22/14 22/12
46	45	
47	46	23/14 23/12
48	47	
49	Com for coil 0 ... 41[1)]	
50	Com for coil 0 ... 41[1)]	

1) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 6 50-pin connection for ribbon cable (variant 26)

26-pin connection for ribbon cable (variant V20)

Pin	Address	Number of valve positions			
		12	16	20	24
2 ... 26 / 1 ... 25					
		Valve position no./coil designation			
1	0	0/14 0/12	0/14 0/12	0/14 0/12	0/14
2	1				23/14
3	2	1/14 1/12	1/14 1/12	1/14 1/12	1/14
4	3				22/14
5	4	2/14 2/12	2/14 2/12	2/14 2/12	2/14
6	5				21/14
7	6	3/14 3/12	3/14 3/12	3/14 3/12	3/14
8	7				20/14
9	8	4/14 4/12	4/14 4/12	4/14	4/14
10	9			19/14	19/14
11	10	5/14 5/12	5/14 5/12	5/14	5/14
12	11			18/14	18/14
13	12	6/14 6/12	6/14 6/12	6/14	6/14
14	13			17/14	17/14
15	14	7/14 7/12	7/14 7/12	7/14	7/14
16	15			16/14	16/14
17	16	8/14 8/12	8/14	8/14	8/14
18	17		15/14	15/14	15/14
19	18	9/14 9/12	9/14	9/14	9/14
20	19		14/14	14/14	14/14
21	20	10/14 10/12	10/14	10/14	10/14
22	21		13/14	13/14	13/14
23	22	11/14 11/12	11/14	11/14	11/14
24	23		12/14	12/14	12/14
25	–	COM[1)]			
26	–	Com[1)]			

1) Connect 0 V with positive-switching control signals, 24 V with negative-switching control signals.

Tab. 7 26-pin connection for ribbon cable (variant V20)

8.4 Electrical interfaces VTUG- ... -V

8.4.1 IO-LinkI-port interface

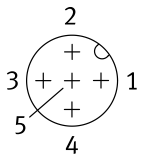
Through the IO-Link/I-Port interface , the valve terminal can be connected as follows:

– Directly to the fieldbus, through mounting of a CTEU bus node on the valve terminal
– Decentralised to an external IO-Link master
– Decentralised at an external I-Port master (e.g. CTEU)

Electrical connection:

– Plug connector, 5-pin, M12x1, A-coded

Port Pin Allocation IO-Link/I-Port Interface

Connection	Pin	Allocation	Function
	1	24 $V_{EL/SEN}$(PS)	Operating voltage supply
	2	24 $V_{VAL\ /\ OUT}$(PL)	Load voltage supply
	3	0 $V_{EL/SEN}$(PS)	Operating voltage supply
	4	C/Q	Data communication
	5	0 $V_{VAL\ /\ OUT}$(PL)	Load voltage supply
		Housing, FE	Functional earth (optional)

Tab. 8 Port Pin Allocation IO-Link/I-Port Interface

Device Description File IODD

If the valve terminal is operated as a IO-Link device, download the corresponding device description file: ➔ www.festo.com/sp.

8.4.2 Fieldbus Interface

Information on the bus nodes CTEU -... ➔ www.festo.com/sp.

9 Commissioning

NOTICE!

Material damage due to incorrect or incomplete installation.

The following conditions must be fulfilled for commissioning:

- The system must be fully assembled.
- The electrical installation must be complete and checked.
- The pneumatic installation must be complete and checked.

10 Operation

10.1 Manual override

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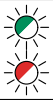
Observe permissible actuating force ≤ 20 N.

10.2 LED display X1, IO-Link/I-Port communication

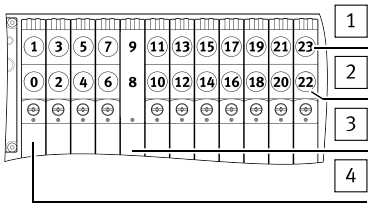
The meaning of the LED display depends on the revision of the software. The software revision is printed on the product label at the IO-Link/I-Port connection.

LED X1		Meaning (up to Rev 07)	Meaning (from Rev. 08)
	green light	Normal operating status	Data communication faulty.
	flashing green	Data communication faulty.	Normal operating status
	flashing alternately red/green	24 V load voltage supply faulty.	–
	flashing red	Device error	
	red light	24 V load voltage supply and data communication faulty.	24 V load voltage supply faulty. Data communication may be faulty.
	Off	No 24 V operating voltage supply or undervoltage	

Tab. 9 LED X1

10.3 Address Assignment

- A maximum of 48 solenoid coils can be actuated.
- Valve position 0 is located on the left-hand side.
- Address assignment is in ascending order without gaps, from left to right.
- Address assignment does not depend on whether the module is equipped with blanking plates.
- A valve position always occupies two addresses. The following allocation applies here:
  - Solenoid coil for switching position 14: low-value address
  - Solenoid coil for switching position 12: higher-value address



1 Addresses of the solenoid coils 12
2 Addresses of the solenoid coils 14
3 Blanking plate
4 Example of valve position 0: Solenoid coil SP1 (address 0) Solenoid coil SP2 (address 1)

Fig. 11 Example of address assignment with 12 valve positions.

11 Error diagnostics valve terminal VTUG-...-V

Error code		Type	Malfunction and error handling
MSB	LSB		
50h	00h	Error	Device error – Switch the device off and on again; if the error persists, the device is defective.
51h	12h	Warning	Error in the load voltage supply – Check load voltage supply

Tab. 10

12 Technical data

General technical data		Valve width [mm]		
		10	14	18
Mounting position				
Wall mounting		Any		
H-rail mounting		Horizontal		
Environmental conditions				
Ambient temperature	[°C]	–5 … +60 (VTUG-...-M)		
		–5 … +50 (VTUG-...-V)		
Storage temperature	[°C]	–20 … +60		–10 … +60
Degree of protection		IP40/IP65/IP67[1]		
Materials		AL, PA, POM, NBR, PU, PC		

1) Valve terminal completely mounted, plug plugged in.

Tab. 11 General technical data

Pneumatic properties		Valve width [mm]		
		10	14	18
Number of valve positions		4 … 24		
Operating and pilot medium		Compressed air to ISO 8573-1:2010 [7:4:4]		
Operating pressure with external pilot air (IC = ID code)				
5/3; 5/2; 2x 3/2; 3/2-way valves (IC: B, E, G; J, A, M, P; VH, VK, VN, VX, VW)	[bar]	–0.9 … +10		
2x 3/2-way valves (IC: H, K, N)	[bar]	1.5 … 10		
Pilot pressure with external pilot air[1] (IC = ID code)				
5/3-way, 5/2-way valves (IC: B, E, G, A)	[bar]	3 … 8		
5/2-way valve (impulse) (IC: J)	[bar]	1.5 … 8		
5/2-way; 3/2-way valve (IC: M, P, VX, VW)	[bar]	2.5 … 8		
2x 3/2-way valve (IC: VH, VK, VN)	[bar]	2 … 8		
2x 3/2-way valve with pneumatic spring (IC: H, K, N)	[bar]	1.5 … 8		
Operating and pilot pressure with internal pilot exhaust air[1)2)] (IC = ID code)				
5/3-way; 5/2-way valves (IC: B, E, G; A)	[bar]	3 … 8		
5/2-way valves (impulse) (IC: J)	[bar]	1.5 … 8		
5/2-way; 3/2-way valves (IC: M, P, VX, VW)	[bar]	2.5 … 8		3.5 … 8
2x 3/2-way valve (IC: VH, VK, VN)	[bar]	2 … 8		
2x 3/2-way valve with pneumatic spring (IC: H, K, D)	[bar]	1.5 … 8		

1) For operation with external pilot air: the pilot pressure must be at least 50% of the operating pressure.
2) If there are more than 12 simultaneously switched valves: reduce pilot pressure to ≤ 6 bar.

Tab. 12 Pneumatic properties

Electrical Characteristics		Valve width [mm]		
		10	14	18
Control voltage (reverse polarity protected)	[V DC]	24 ± 10 %		
Current consumption per solenoid coil at 24 V DC				
Pick-up current: 0 … 20 ms	[mA]	47		–
Holding current: ≥ 20 ms	[mA]	15.5		–
Intrinsic current consumption				
Valves	[mA]	30		
Electronics	[mA]	30		

Tab. 13 Electrical Characteristics

IO-Link Interface	
Specification	V1.1 (V1.0 compatible)
Baud rate	Com 2 (38.4 kBit)
Output data	2 bytes (up to 8 valves)
	4 bytes (up to 16 valves)
	6 bytes (up to 24 valves)

Tab. 14 IO-Link Interface

Tightening Torques		Valve width [mm]		
		10	14	18
Electrical interface	[Nm]	0.7 ± 20%		
Bus node CTEU-... on VTUG -...- V	[Nm]	0.7 ± 0.10		
Valve on terminal strip	[Nm]	0.3 ± 50 %	0.55 ± 20%	0.7 ± 20%
Selector	[Nm]	1.5 – 30%		5 – 20%
Earthing screw	[Nm]	1 ± 20 %		

Tab. 15 Tightening Torques