

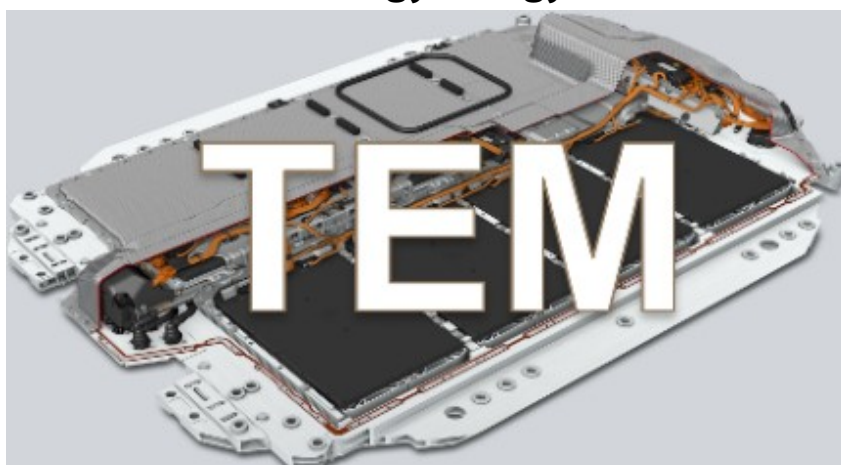
Technology Body in White

TKB



Technology Energy Module

TEM



Creation date	08 /2025
Creator	Festo: Dietmar Düll, Hilmar Klee
Version	1.2

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Constant technical
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Festo AG & Co KG

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1 Change index

Version	date	Type of changes	Name	Page / Chapter
1.0	07.11.2024	Newly created manual. Synchronisation TEM & TKB	DDL / HLKL	-
1.1	22.11.2024	Correction case 5: Two valve terminals on robot	DDL/HKL	P. 12/CHAP. 4.1
		Earthing strap – Reference to BMW SPEC_EMC_EquipmentGrounding		P. 19/ CHAP. 4.5.2 P. 46/ CHAP. 6.4.2
		Delete: Extension 3/4" HIGHFLOW "D2M-DL" 23623417		P. 62/ CHAP. 9.2.1.2
		Delete: Rotary indexing table: Components for format adjustment and automated rotary storage		P. 111/ CHAP. 9.6
1.2	08.2025	Text in matrix "Configurator Case" --> "Configurator Application"	DDL	P.13/CHAP 4.2
		Correction text: "Manual on/off valve in front of robot"	DDL	P.52 /CHAP 7.2
		Correction part No.: C2M single module old 2839638 new 8227267	DDL	P.60 / CHAP 9.2.1.1
		Rename to "531030 - MSB6-AGD:C4:V54-WP"	DDL	P.67 / CHAP 9.2.2
		Rename to "531030 - MSB6-AGD:H3:I10:I5-WP"	DDL	P.73 / CHAP 9.2.8
		Delete feature "T45" - CPX-CTEL-2-M12-5POL-LK	DDL	P.77/ CHAP 9.3.1
		Delete ground strap: CS6-120/010/4.3	DDL	P.83 /CHAP 9.3.3
		Note: Delete "M3". GRLA-	DDL	P.117 / CHAP 9.8.4.5
		Add Link Flow Calculation	DDL	P.122 / CHAP 9.10
		Correction FM No	DDL	P.103 ff / CHAP 9.4.10
		Correction FM No	DDL	P.119/ CHAP 9.9.1
		Correction FM No	DDL	P.132 / CHAP 9.10.7
		Delete specification of flow rate	DDL	P.60 / CHAP 9.2.1.1
		Notice about „Kurzbeschreibung Wartungseinheit ¾“ HIGHFLOW mit C2M TNr.: 8186121“	DDL	P.60 / CHAP 9.2.1.1

TKB Release exclusively for body shop technology

TEM Release exclusively for technology energy module

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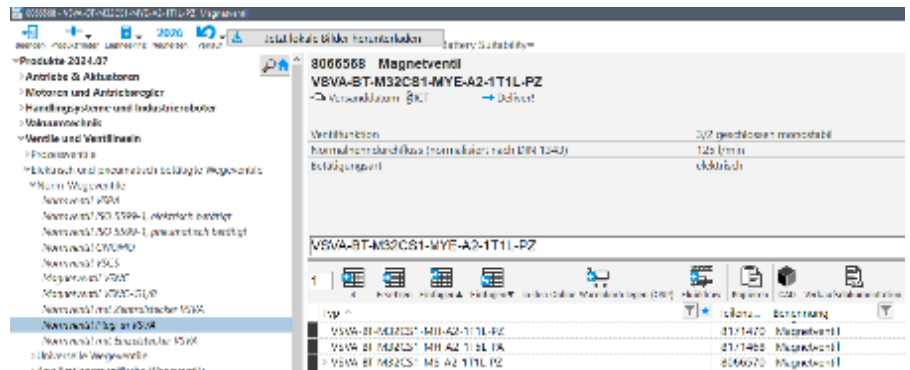


3.2 QuickSearchPlus - Selection and dimensioning

Festo QuickSearchPlus provides you quickly and efficiently with all the information you need about a product. All the functions of our online offer are just a mouse click away. Click on the shopping basket button to place the active product directly into the online shopping basket. Click on the Festo logo to open the selected country page directly.

In QuickSearchPlus you have direct access to:

- Engineering Tools
- Product finder
- Technical information
- CAD data
- Spare parts catalogue

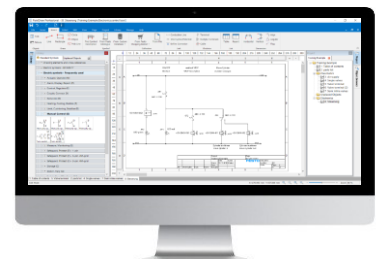


Link to download the EXE file → [Download page for QuickSearchPlus](#)

3.3 Fluid Draw - Circuit diagram creation

FluidDraw is a desktop application for creating **circuit diagrams** for a machine.

- [Test free of charge](#): 30-day trial licence
- [Buy a licence](#):



3.4 Engineering Tools

You can find an overview of all engineering tools via the [Festo search](#) with : [Digital Engineering Tools](#)
Or directly via Festo [QuickSearchPlus](#).

Digital engineering tools

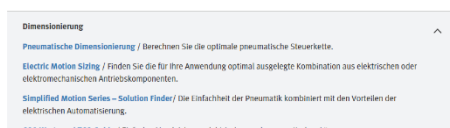
Digitale Engineering Tools

Sie fragen sich, ob die Digitalisierung Möglichkeiten bietet, Ihre Konstruktion und Auslegung zu vereinfachen? Na klar! Mit unseren online verfügbaren Engineering Tools konstruieren Sie Lösungen sicher und einfach, wählen Komponenten präzise aus oder lassen Berechnungen durchführen, ganz unabhängig von Ihrem Kenntnisstand. Schauen Sie gleich unsere Übersicht an und finden Sie das passende Tool, um sich Ihre tägliche Arbeit zu erleichtern.

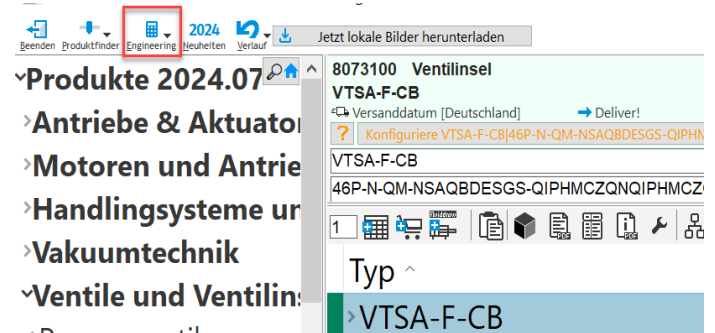
Praktisch

Das Umrechnungstool aus dem Festo Support Portal, wie z.B. die einfache Durchflussberechnung.

[Zum Umrechnungstool](#)



QuickSearchPlus



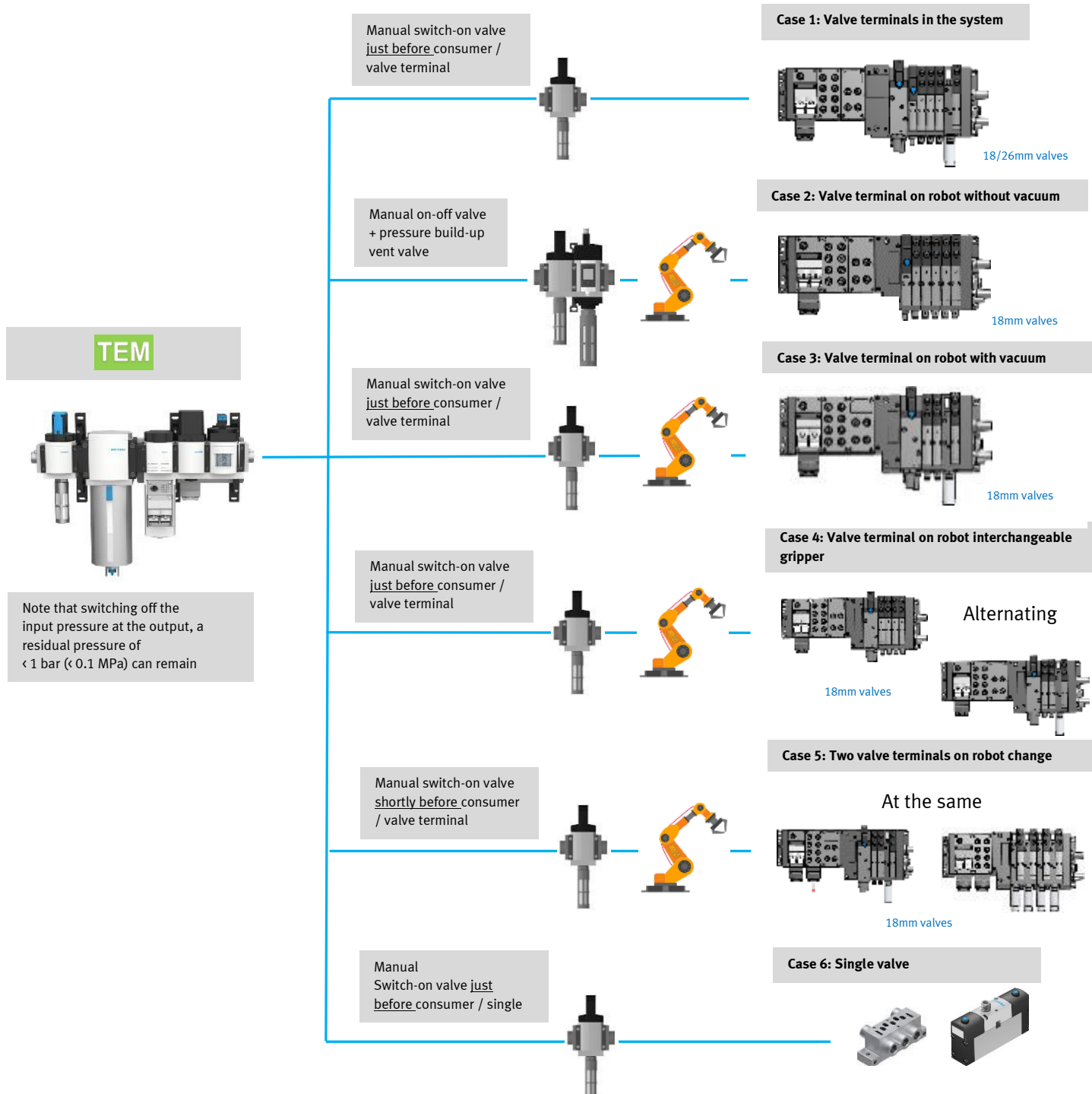
4 TEM - Overview system concept - Technology energy module

TEM

For details: see BMW - "B7 Construction Regulation Chapter 7 Installation"

4.1 General system concept TEM for CPX-VTSA-F-CB

The central maintenance unit is not used for electrically actuated aeration and ventilation. This function is implemented decentrally via the valve terminal or individual valves.



4.2 Matrix - Valve terminals VTSA-F-CB

TEM

Valve Terminals VTSA-F-CB in the system area With ProfiSafe - size 18mm or 26mm								
Preselection			Configurator Application	Venting Valve	Valve S-air	Max. number Working valves / Terminal	Max. number of vacuum ejectors / Terminal	Hint
VTSA-F-CB	without vacuum	18mm	A1	X	X	23pcs		
		26mm	A2	X	X	23pcs		
VTSA-F-CB	with vacuum	18mm	A3	X	X	23pcs	additional+ 4pcs	
		26mm	A4	X	X	23pcs	additional+ 4pcs	
VTSA-F-CB	pure vacuum terminal		A12				6pcs	Only with "RA"
CPX terminal			A13			9 Modules /Terminal		

One valve Terminal on the robot Robot = Master - no ProfiSafe - Size 18mm								
Attention ! Maximum number of working valves + vacuum ejectors is 16 in total No safety modules / No analogue modules								
Preselection			Configurator Application	Venting Valve	Valve S-air	Max. number Working valves / Terminal	Max. number of vacuum ejectors / Terminal	Hint
VTSA-F-CB	without vacuum		A5		X	16pcs		
VTSA-F-CB	with vacuum		A6	X		16pcs	4pcs	Total max. 16
VTSA-F-CB	pure vacuum terminal		A12				6pcs	
CPX terminal			A14			9 Modules /Terminal		

Interchangeable gripper on the robot (change between Terminals with vacuum and Terminals without vacuum) Robot = Master - no ProfiSafe - Size 18mm								
Attention ! Maximum number of working valves + vacuum ejectors is 16 in total No safety modules / No analogue modules								
Preselection			Configurator Application	Venting Valve	Valve S-air	Max. number Working valves / Terminal	Max. number of vacuum ejectors / Terminal	Hint
VTSA-F-CB	without vacuum		A7	X		16pcs		
VTSA-F-CB	with vacuum		A8	X		16pcs	4pcs	Total max. 16
VTSA-F-CB	pure vacuum terminal		A12				6pcs	
CPX terminal			A14			9 Modules /Terminal		

Two valve Terminals on the robot "Terminal 1" is a valve Terminal or pure vacuum Terminal + "Terminal 2" must be a pure vacuum Terminal! Robot = Master - no ProfiSafe - Size 18mm								
Attention ! Maximum number of working valves + vacuum ejectors for both Terminals together is 16 (Terminal 1 + Terminal 2 in total max 16) No safety modules / no analogue modules Maximum number of inputs for both Terminals together 144E (9 x 16E)								
Preselection			Configurator Application	Venting Valve	Valve S-air	Max. number of vacuum ejectors / Terminal	Hint	
Terminal 1	VTSA-F-CB	without vacuum	A9	X			Interlinking block with forwarding "QN" required	
	VTSA-F-CB	with vacuum	A10	X		4pcs		
	VTSA-F-CB	pure vacuum Terminal	A11			6pcs		
Terminal 2	VTSA-F-CB	pure vacuum Terminal	A11			6pcs		
	CPX Terminal		A14			9 Modules /Terminal		

4.3 Concept single valve TEM

TEM

A valve terminal must be used for two or more working valves.

Single valves only with single sub-base, no linking plates.

Individual valves can only be used if there is no dangerous movement.

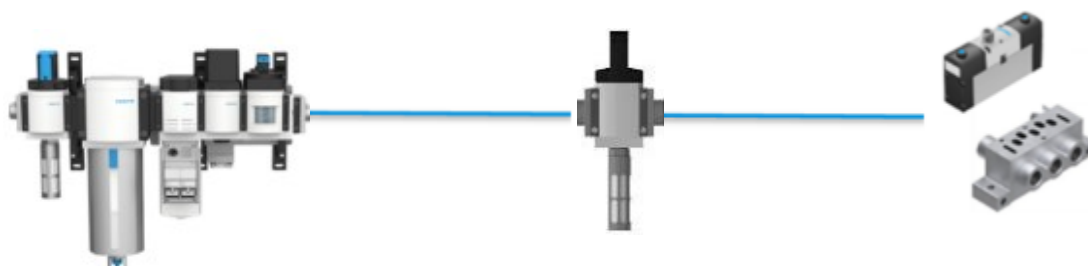
Therefore without pressure build-up / vent valve and without valve for switching the auxiliary control air. Otherwise, a valve terminal must be used.

Central main maintenance unit
MidFlow & HighFlow
Without electric venting function

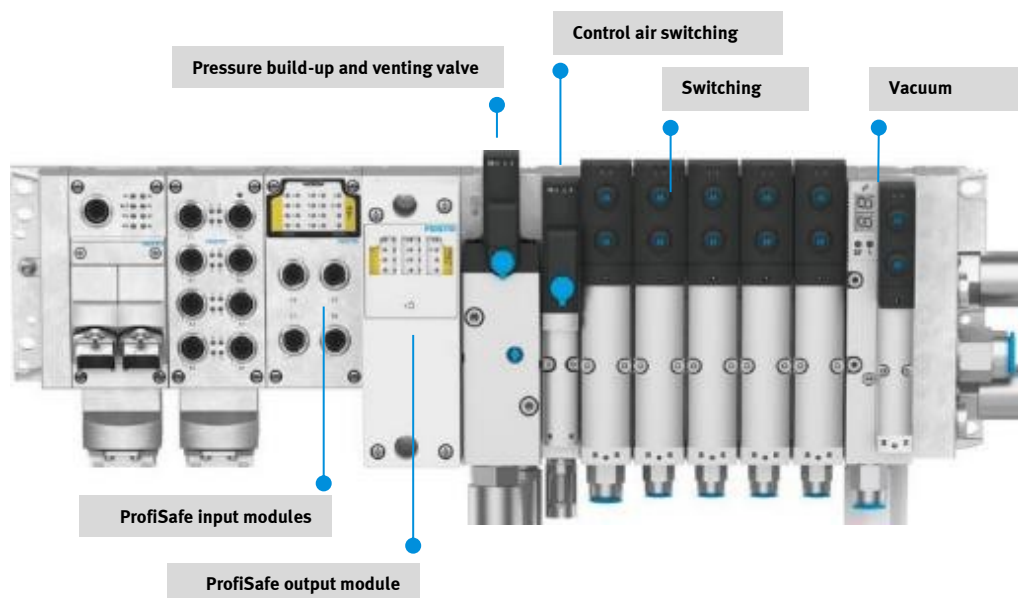
Manual switch-on valve
in front of the individual valves.
See chapter 5.1.6

Single valves
See chapter 7.7

TEM



4.4 Explanation of the pressure build-up and venting valve (soft start) and control air switching valve for VTSA-F-CB (TEM)



The control air switching valve switches off the pneumatic auxiliary control air for a switching operation.

In addition to the pneumatic auxiliary energy, electrical energy is also required for the switching process of a valve.

The control air cut-off in combination with the voltage cut-off is a common redundant solution for realising the basic safety function "Protection against unexpected start-up".

4.4.1 Information on pressure build-up and venting valve for VTSA-F-CB (TEM)

TEM

Manual override
self-resetting

Filling time adjustable
via throttle

Ventilation duct 1

Pressure supply channel 1

Venting ducts 3 and 5

Coil status LED 14

Pressure sensor status LED

Soft start valve control.

Integrated pressure switch

Switching point: 0.2 bar

Coil and pressure switch

are C-Bus participants!

CBus-ASIC

Pressure query/tapping
possible via M5 connection

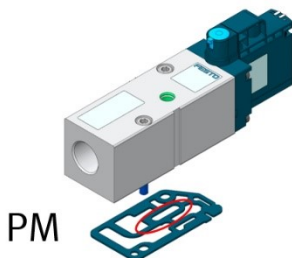
Valve **OFF**
LED **green**
 $P < 0,2 \text{ bar}$
VT **not** under pressure



Ventil **ON**
LED **yellow**
 $P > 0,2 \text{ bar}$
VT under pressure



Variants of the pressure build-up / venting valve WITH or WITHOUT control air switching valve in sequence.



Steuerluft für die Schaltventile über das Softstartventil.

CPX-VTSA-F-CB with: Pressure build-up / venting valve without control air switching valve
Pressure build-up / vent valve supplies the control air duct 14 with compressed air

PS 8068610
PM 8067407

valve

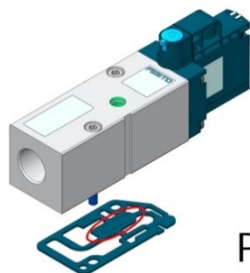
VABV-S6-1Q-G38-CB-T5
VABF-S6-1-P5A4S1YE-G12-1T5-PA

Interlinking plate
Pressure build-up

8115444

VABF-S6-1-...
(seal can be ordered separately)

Gasket PM



Steuerluft für die Schaltventile über Endplatte rechts oder Steuerluft-Schaltventil

CPX-VTSA-F-CB with: Pressure build-up / venting valve and control air switching valve
Control air switching valve supplies the control air duct 14 with compressed air

PV 8068609
PN 8067405

PM valve

VABV-S6-1Q-G38-CB1-T5
VABF-S6-1-P5A4S2YE-G12-1T5-PA

Interlinking plate
Pressure build-up

8115445

VABF-S6-1-...
(seal can be ordered separately)

Gasket PN

4.4.2 Information on control air switching valve for VTSA-F-CB (TEM)

TEM

Structure for internal processing of the pressure switch

The coil of the control air switching valve is switched via the C bus

HHB with automatic reset or concealed HHB

Integrated pressure switch

Switching point: 0.2 bar. Pressure switch of the control switching valve is processed via the C-bus

CBus-ASIC

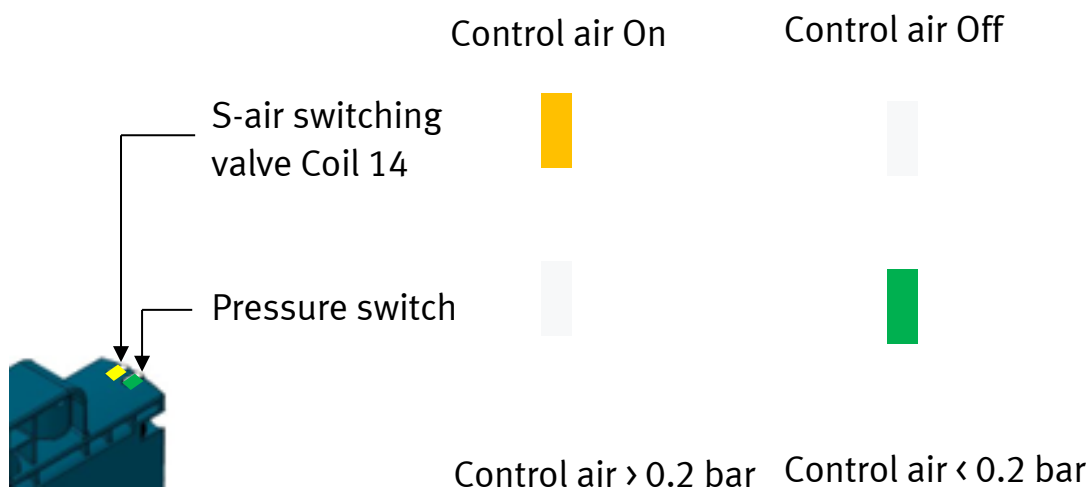
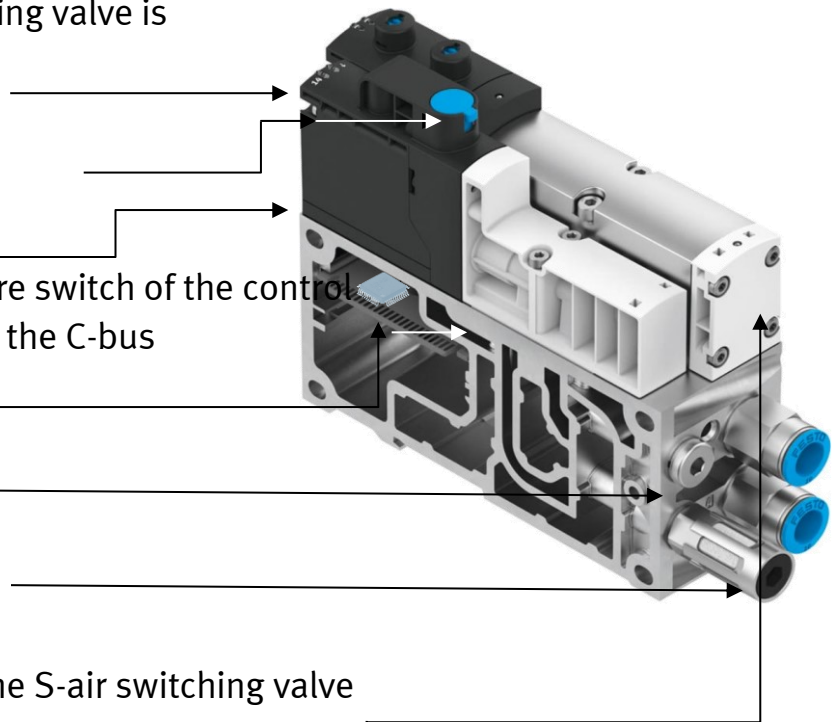
Control air supply for the variant: external control air

Silencer control air exhaust

Switching valve to the right of the S-air switching valve is controlled via

the pneumatic adapter (bits 0 and 1)!

Switching logic pressure switch: PNP-switching, NC contact



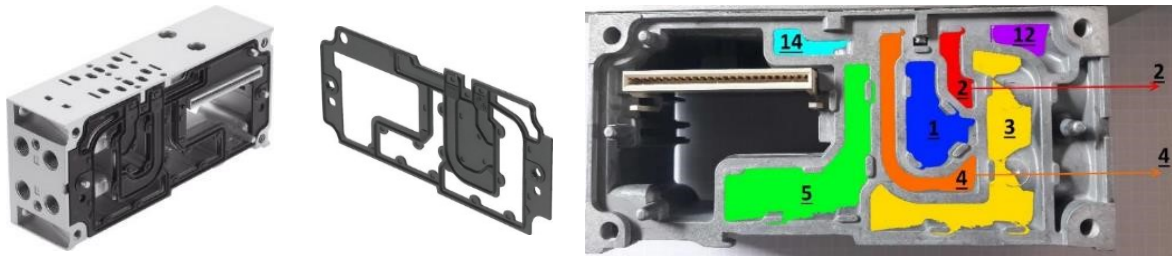
4.5 Assembly principles for valve terminals for VTSA-F-CB (TEM)

TEM

4.5.1 Seals in the valve terminal section for VTSA-F-CB (TEM)

Seals are used between each interlinking plate in the pneumatic part of the valve terminal.

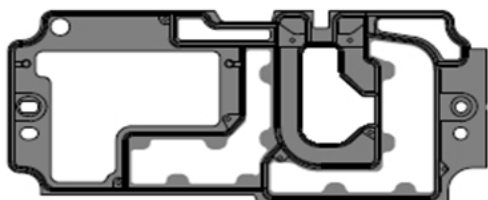
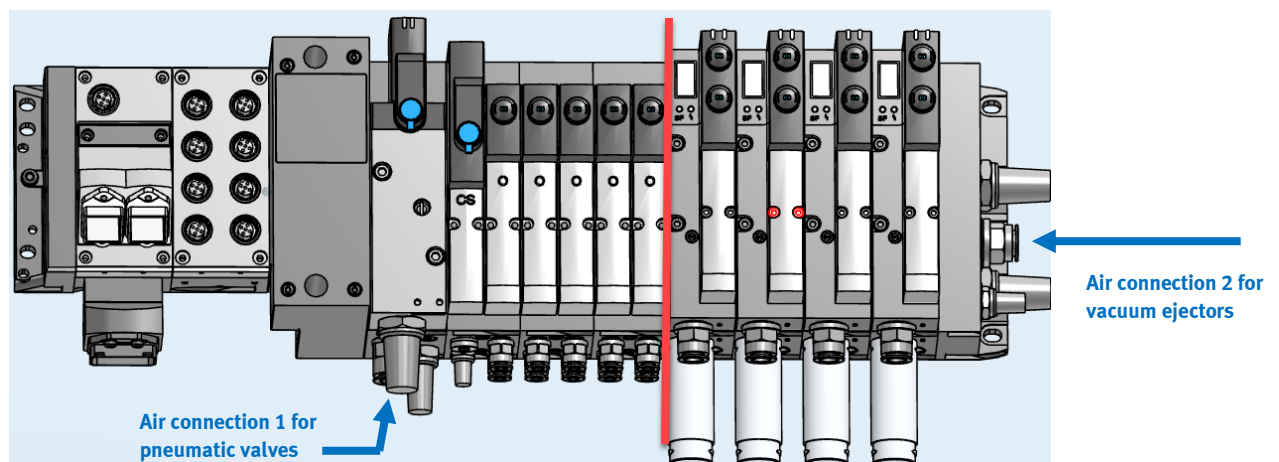
The **standard seal** seals the valve terminal to the outside and between the individual air ducts.



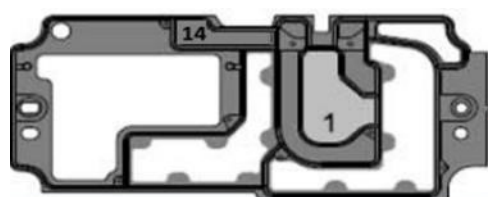
Special feature - use of vacuum ejectors

A special seal is inserted between the last pneumatic valve and the first vacuum ejector.

Seal "TL" - the seal "TL" separates the main air duct "1" and the control air duct "14" between the left-hand pressure area and the right-hand vacuum area (only at this point, the normal standard seal is used at all other interlinking points).



Standard gasket VABD-S6-1-C - 668436
→ All channels open



Separating seal when using vacuum
→ Separation channel 1 + 14
Seal VABD-S6-1-P8-C - 8060483

Distinguishing feature - recognisable from the outside when mounted
RED MARKING



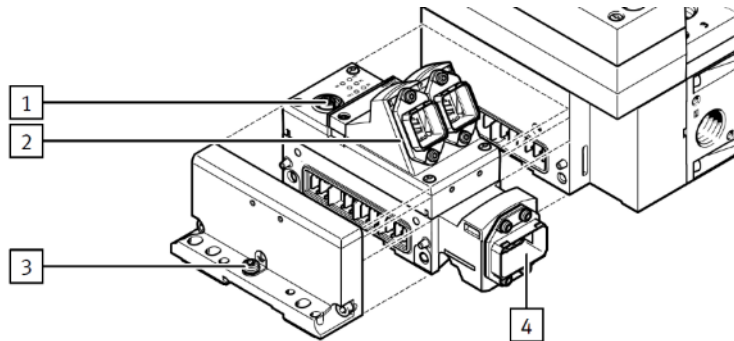
rote Markierung

4.5.2 Earth connection on CPX - Modular electrical terminal

The separate earthing connection is located on the left-hand end plate of the CPX terminal.

The functional earth is screwed directly onto the valve terminal.

The BMW specification EMC and equipotential bonding "SPEC_EMC_EquipmentGrounding" must be observed.

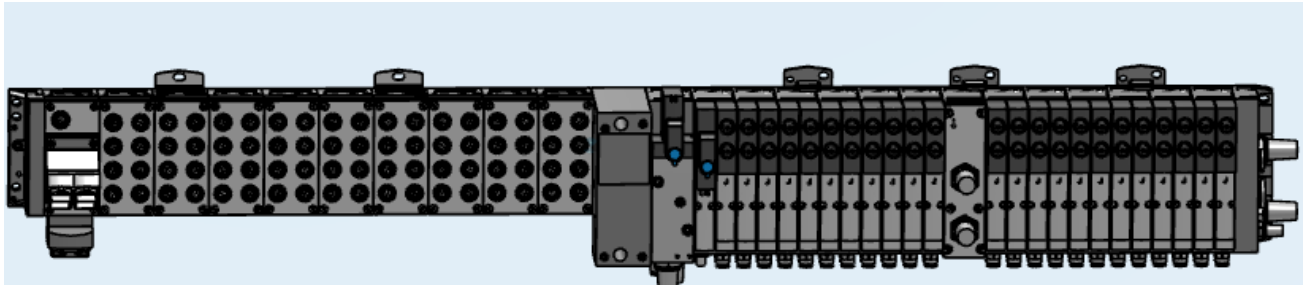


- 1 Service interface, e.g. for operating device
- 2 Fieldbus connection, push-pull
- 3 Earthing connection
- 4 Power supply connection

4.5.3 Fixing points on CPX - Modular electrical terminal and VTSA-F-CB valve terminal

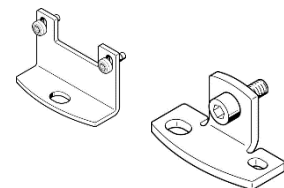
TEM

Additional mounting brackets are available for the CPX metal part and for the valve terminal part.
Depending on the configuration, it is recommended to position the mounting brackets according to the following rules.



550217CPX-M-BG-RW-2X Mounting bracket for CPX

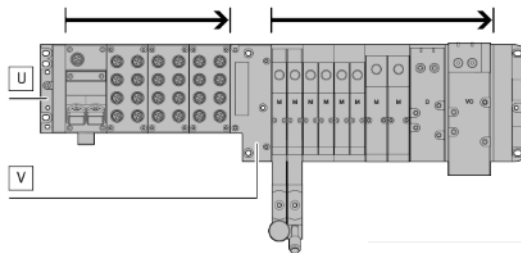
567038VAME-S6-W-M46 Fixing bracket for VTSA-F-CB



The mounting brackets are available separately as accessories.

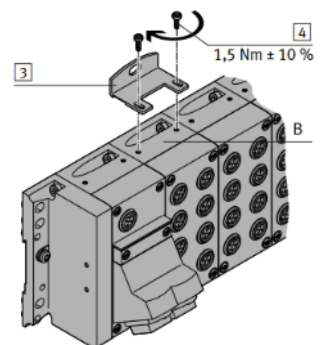
When configuring the valve terminal via a configurator, the number / position is automatically taken into account.

- CPX-Module: Zählrichtung ab der Endplatte [U]
- VTSA-, VTSA-F- und VTSA-F-CB-Module (18 ... 52 mm): Zählrichtung ab dem Pneumatik-Interface [V]



Befestigung [3] bei CPX-Modulen (Metall)

Anzahl Module	Befestigung an den Modulen				
	2	3	4	6	7
1 ... 3	–				
4	•				
5 ... 6		•			
7			•		
8		•		•	
9 ... 10		•			•



Positionen der Befestigung [5] bei VTSA-, VTSA-F- und VTSA-F-CB-Modulen (18 ... 52 mm)

Anzahl Module	Befestigung an den Modulen					
	1	2	4	8	12	16
1 ... 2	•					
3 ... 5		•				
6 ... 8			•			
9 ... 12			•	•		
13 ... 16			•	•	•	
17 ... 20			•	•	•	•
> 20	Befestigung [5] an jedem 4. Modul ¹⁾					

1) An einem Modul direkt neben der rechten Endplatte ist keine zusätzliche Befestigung erforderlich.
Die Befestigung über die Endplatte reicht aus.

4.6 Changing the connection size "*" / exception to the Excel configurator for VTSA-F-CB (TEM)

TEM

Alternatively, the valve terminal code can be adapted to larger hose diameters with the following addition.

	Standard hose outlet (as via configurator)	Alternative hose size IA or JB not applicable (not possible via Excel configurator - change by hand)
18mm valves	6mm outer diameter 51E-F44GCQWNMKB-RC 46P-N-QM-NZABCBESGS-WGIA-PVPNNDZQZYBAA-CS5J	8mm outer diameter (outlet valves) 51E-F44GCQWNMKB-RC 46P-N-QM-NZABCBESGS-WG-PVPNNDZQZYBAA-CS5J
26mm valves	8mm outer diameter 51E-F44GCQWNMKB-RC 46P-N-QM-NZABCBESGS-WGJB-PVPNNDZQZYCB-5J	10mm outer diameter (outlet valves) 51E-F44GCQWNMKB-RC 46P-N-QM-NZABCBESGS-WG-PVPNNDZQZYCB-5J
Vacuum outlet 10mm	46P-N-QM-NSAQBDESGS-WGIA-PVPNZQZYBAAYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-CS5J <i>Standard at BMW</i> 46P-N-QM-NSAQBDESGS-WGIA-PVPNZQZYBAAYQTLQIPHMBZQNQIPHMBZQNQIPHMBZQN-CS5J <i>Alternatively for smaller suction points</i>	
Outlet 8mm		

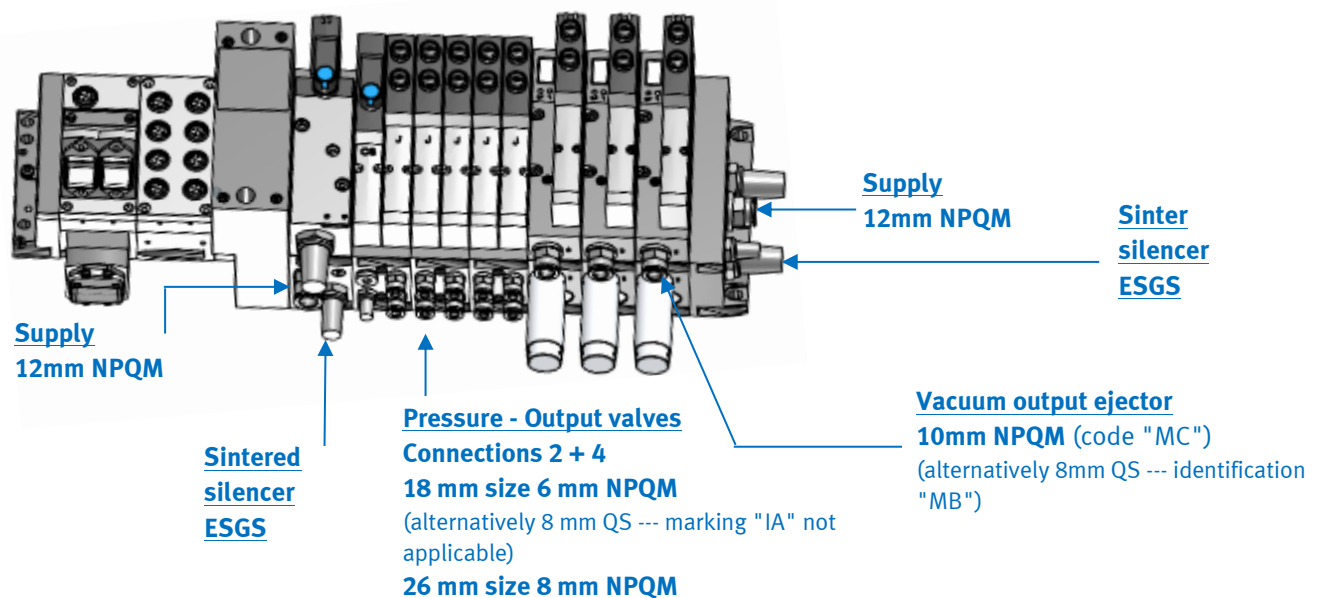
(Example - configuration regarding hose sizes valve outlet, vacuum outlet)

Standard size for the supply air -12mm outer diameter.

(air supply at the air vent valve or at the right-hand end plate of the valve terminal).

51E-F44GCQWNMKB-RC

46P-N-QM-NSAQBDESGS-WGIA-PVPNZQZYBAAYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-CS5J

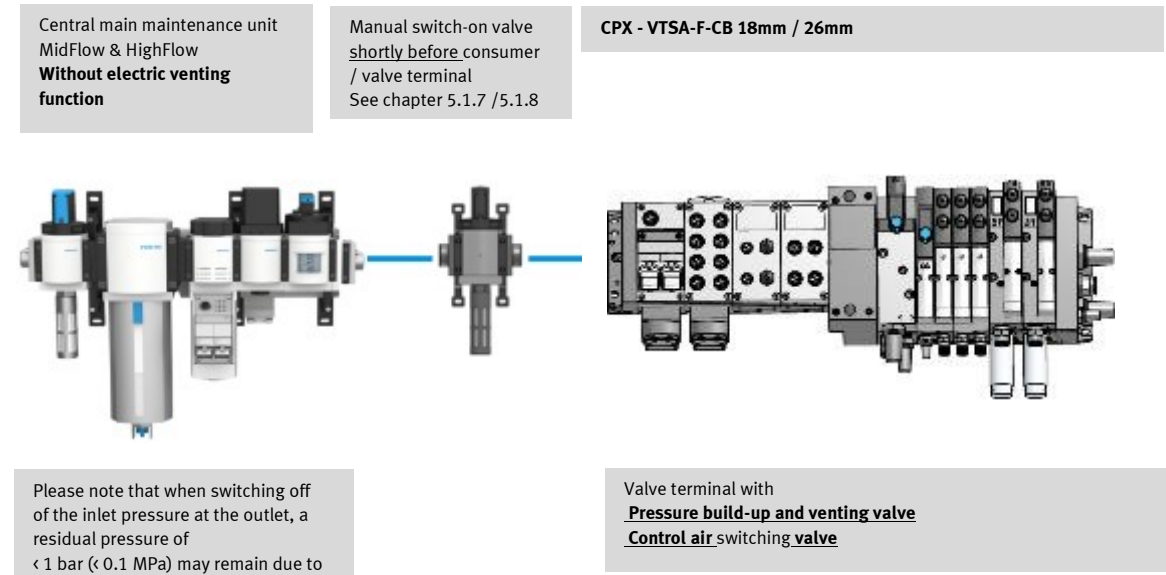


5 TEM - Information and examples for valve terminals CPX-VTSA-F-CB

TEM

5.1 VTSA-F-CB in the plant area / examples

Excel configurator Cases A1, A2, A3, A4, A12, A13



The system cannot be vented via the PLC at the central maintenance unit.

The system / system area can only be vented by the control system in the valve terminals.

From the central maintenance unit to the valve terminal, the system always remains pressurised (Exception - manual venting at the maintenance unit).

plausible condition:

The system remains in a **defined state** "under pressure".

The pressure build-up and venting valve does not vent in this case

The valve coils of the working valves are switched off electrically via zone "0".

The valve coil of the control air switching valve is switched off electrically. This switches off the pressure in the pilot control of the switching valves.

➔ Protection against unexpected start-up.

implausible condition:

The valve island is depressurized via the pressure build-up and venting valve (zone "1").

In the event of danger, this can be used to depressurize the entire valve terminal up to the actuators (depending on the operating valve).

5.1.1 System area without vacuum

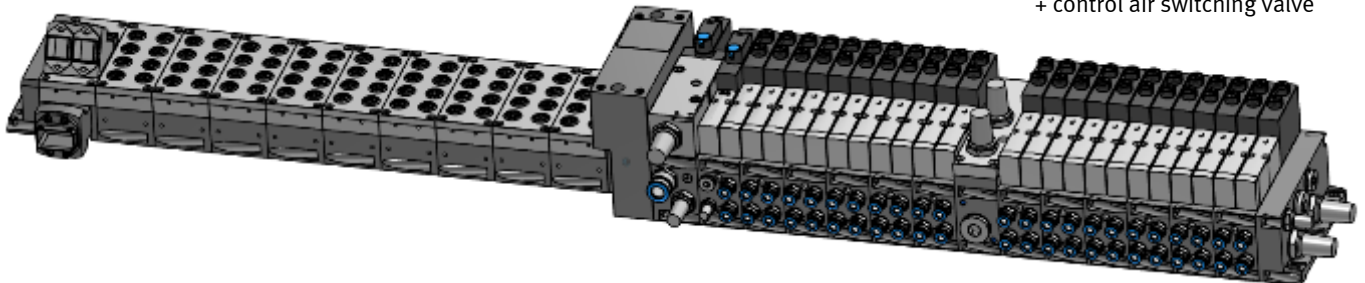
TEM

Excel configurator cases A1, A2

51E-F44GCQW NMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RC

46P-N-QM-NZABCESGS-WGIA-PVPNNDZQZYB5AUSWYK6A-CS23J+U

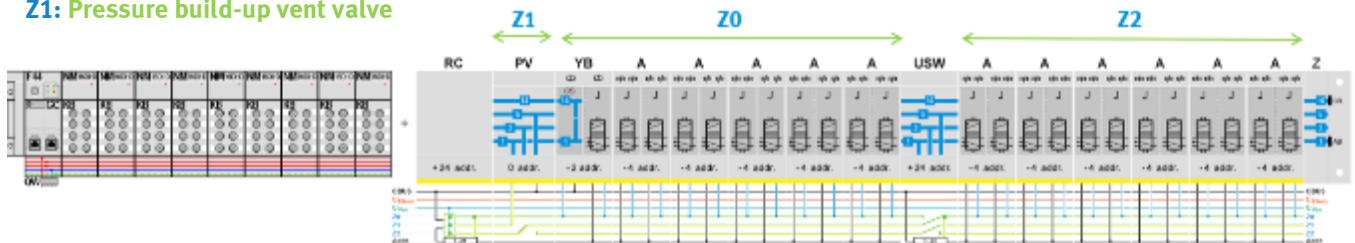
max. 23 valves - 18 or 26mm
+ Pressure build-up vent valve
+ control air switching valve



Z0: Control air switching valve & working valves 1 to 11

Z1: Pressure build-up vent valve

The required air volume must be observed.



5.1.2 System area with vacuum

TEM

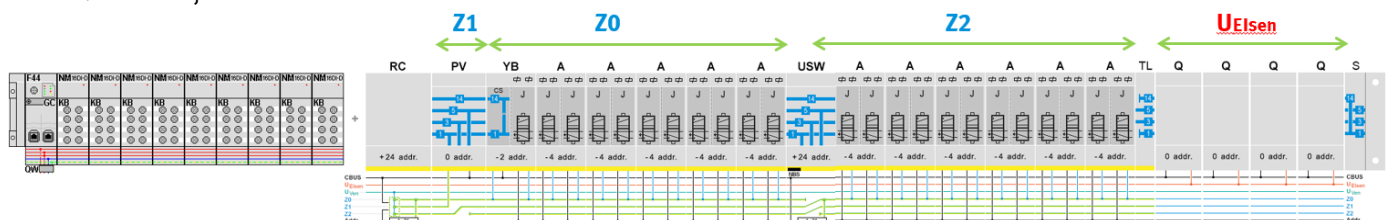
Excel configurator Cases A3, A4

51E-F44GCQW NMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RC

46P-N-QM-NSAQBDESGS-WGIA-PVPNZQZYB5AUSWYKNBS6AYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-CS23J+U

23 valves - 18 or 26mm
+ Pressure build-up vent valve
+ control air switching valve
+ max. 4 vacuum ejectors

The required air volume must be observed.



Z0: Control air switching valve & working valves 1 to 11

Z1: Pressure build-up vent valve

Z2: Working valves 12 to 23

UElse: Vacuum ejectors (supply via sensor voltage)

5.2 VTSA-F-CB on the robot / examples

TEM

Please note the **limits of the BMW A03 control package**. This results in restrictions. These are shown in the BMW Excel valve terminal configurator for VTSA-F-CB.

See also BMW B7 construction regulations, chapter 7 Installation.

5.2.1 Robot = Master - without vacuum ejector

Excel configurator case: A5

The **pressure build-up and venting valve** (in combination with a manual on-off valve) is **placed in front of the robot** in the case without vacuum (reason: robot currently not ProfiSafe-capable). The valve terminals with control air switching valve are used on the robot.

Attention: in the case of interchangeable grippers on the robot

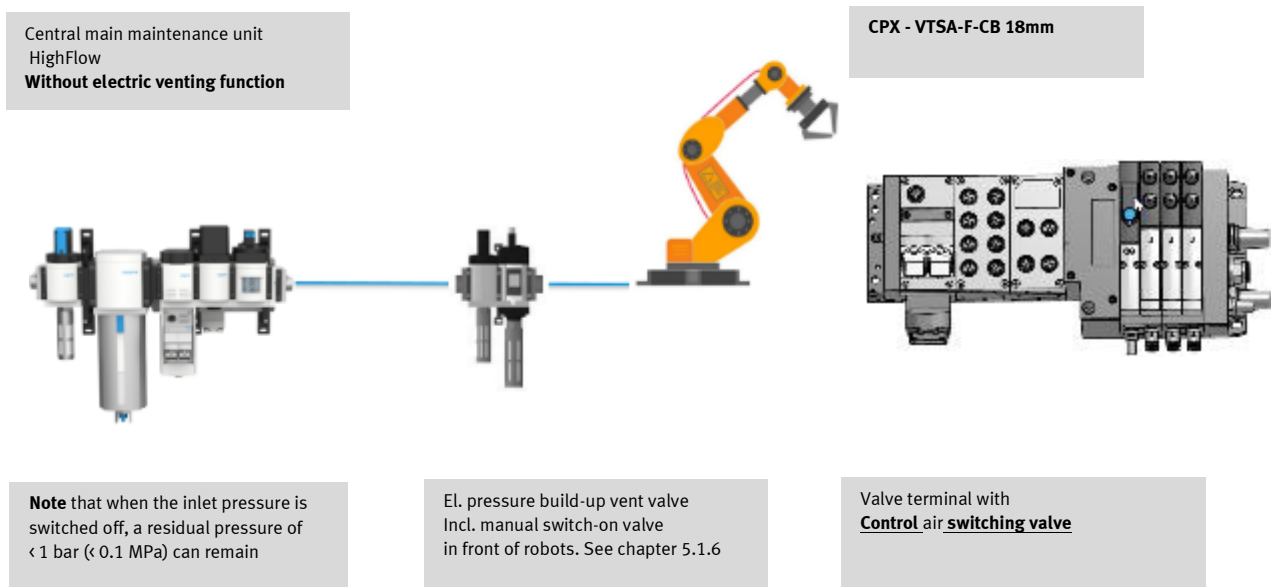
Interchangeable gripper:

a gripper with a valve terminal without vacuum

and a gripper with a valve terminal with vacuum are used alternately

--> applies if at least one Terminal with vacuum is installed

--> see chapter 5.2.3



Example: Robot = Master without vacuum

TEM

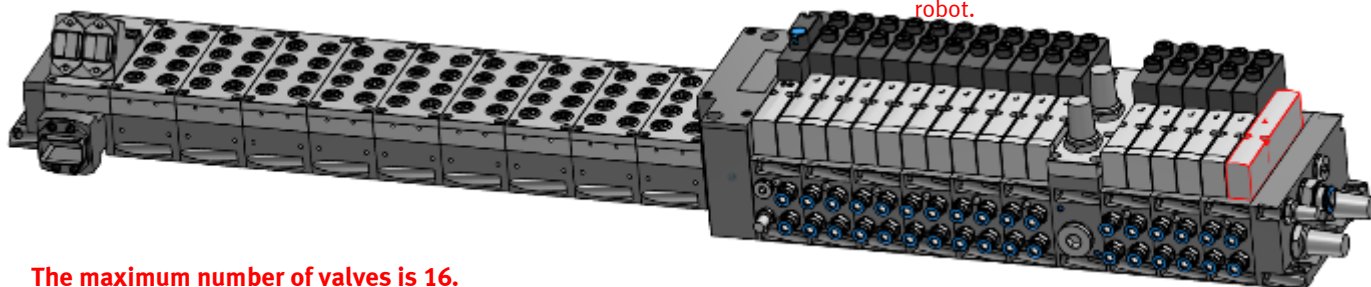
Excel configurator case: A5

51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA
46P-N-QM-NZAQBDCBESGS-WGIA-YB5AUWYKNBS3A-CS16JL+U

max. 11 + 5 valves = 16 valves - 18mm

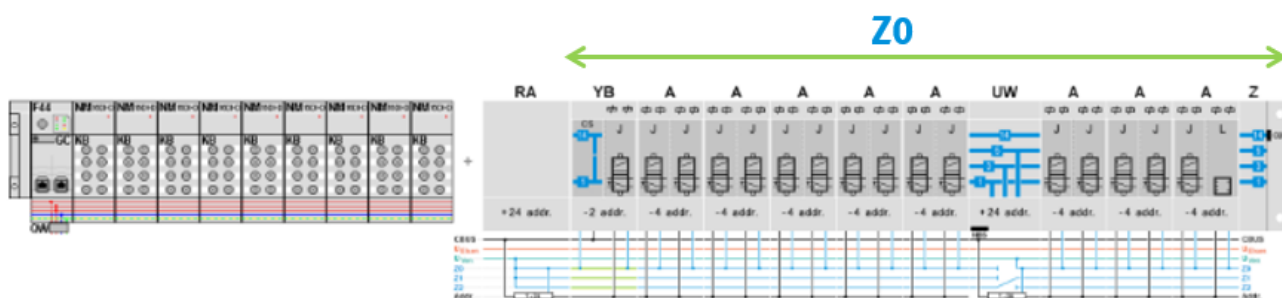
+ control air switching valve

NO pressure build-up vent valve on the valve terminal. This is located in front of the robot.



The maximum number of valves is 16.

The required air volume must be observed.



Z0: Control air switching valve & working valves 1 to 16

1 to max. 16

Position 17 must not be occupied. Cannot be controlled via A03 package!

5.2.2 Robot = Master - with vacuum ejector

TEM

Excel configurator case: A6

[GSDML - VTSA-F-CB vacuum ejector data set mode Basic](#)

GSDML file specially customised for the BMW A03 package (purely for robots)

The manual switch-on valve is placed in front of the robot.

The **pressure build-up and venting valve** is only used in the **valve terminal** on the robot for the working valves, not for the vacuum

(Vacuum should not be vented - separating seal "TL").

The pneumatic side of the valves can thus be vented, pressure for the vacuum side is still present.

NO control air switching valve is used here (robot = master with vacuum ejector).

Only the pressure build-up and venting valve. Reason: The robot is not yet ProfiSafe-capable.

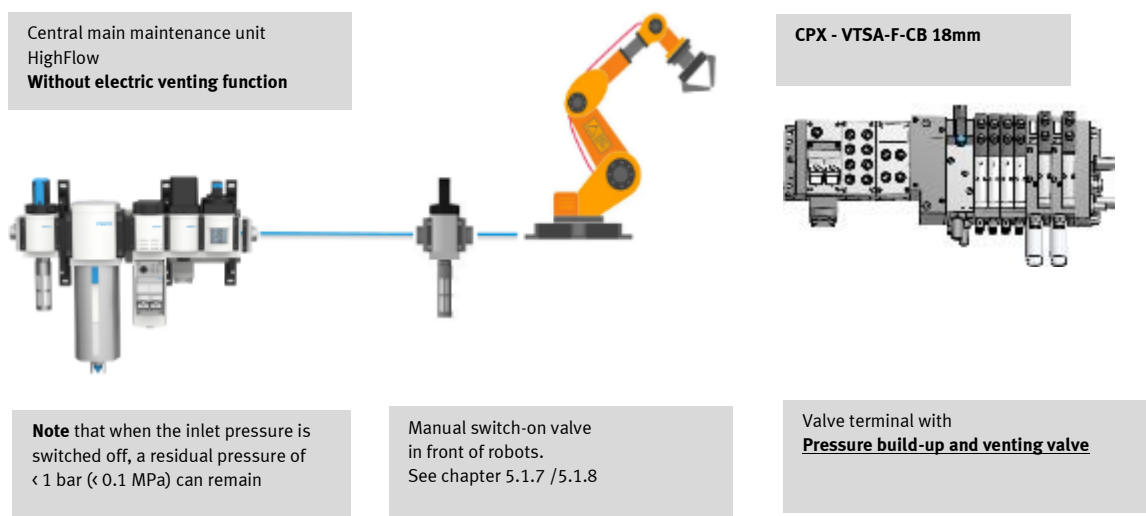
- **The sum of working valves and vacuum ejectors is a maximum of 16 units.**
(Limitation by A03 control package)
- The pressure build-up vent valve is not included in the sum of the working valves and vacuum ejectors.

Examples:

- | | |
|----------------------------------|--------------------------|
| a. 15 valves + 1 vacuum ejector | = 16 (maximum occupancy) |
| b. 12 valves + 4 vacuum ejectors | = 16 (maximum occupancy) |

➤ If more than 4 vacuum ejectors are required, see case 5.2.4 and case 5.2.2

➤ The required air volume must be observed.



Robot = Master - with vacuum

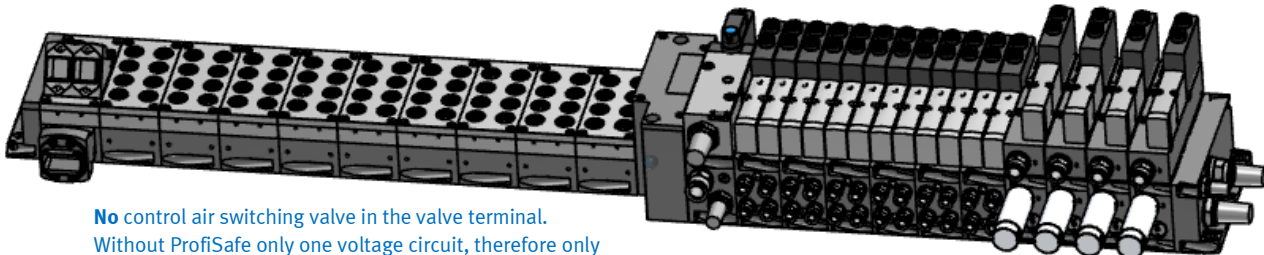
TEM

Excel configurator Case: A6

Expansion with 12 working valves and 4 vacuum ejectors

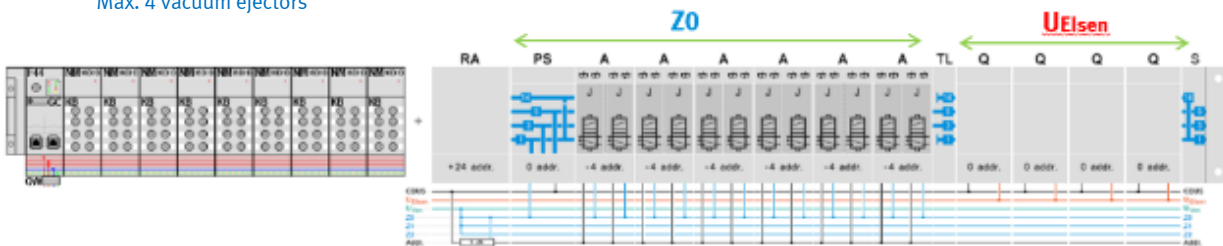
51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA

46P-N-QM-NSAQBDESGS-WGIA-PSPMZQZ6AYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-12J+U



No control air switching valve in the valve terminal.
Without ProfiSafe only one voltage circuit, therefore only
the pressure build-up and venting valve
Max. 4 vacuum ejectors

The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

UElsen: Vacuum ejectors (supply via sensor voltage)

The sum of valves and vacuum ejectors is a maximum of 16 units.

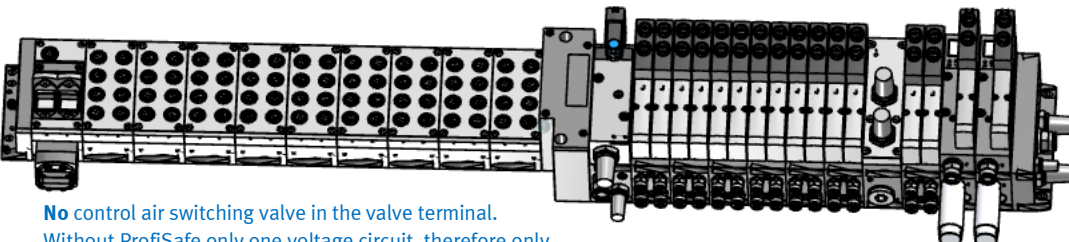
Robot = Master - with vacuum

Excel configurator Case: A6

Expansion with 14 working valves and 2 vacuum ejectors

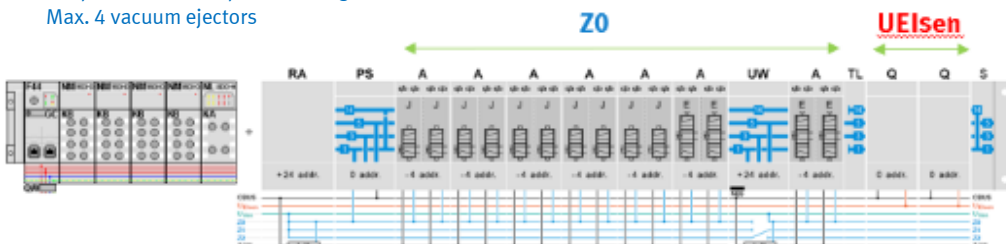
51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA

46P-N-QM-NSAQBDESGS-WGIA-PSPMZQZ6AUWYKNBSAYQTLQIPHMCZQNQIPHMCZQN-14J+U



No control air switching valve in the valve terminal.
Without ProfiSafe only one voltage circuit, therefore only
the pressure build-up and venting valve
Max. 4 vacuum ejectors

The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

UElsen: Vacuum ejectors (supply via sensor voltage)

The sum of valves and vacuum ejectors is a maximum of 16 units.

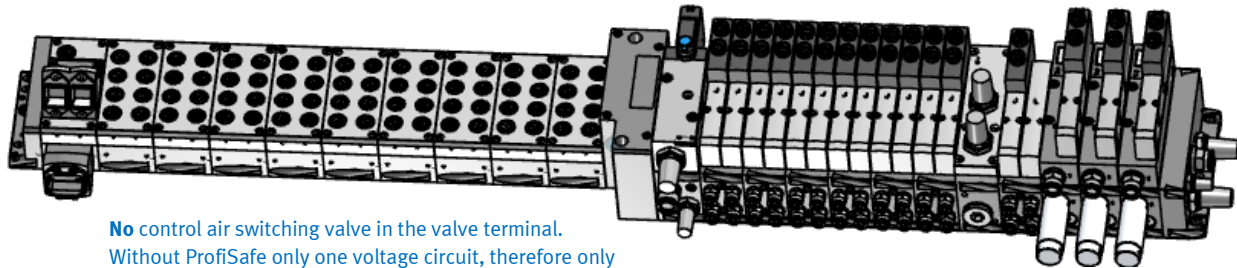
Example robot = master - with vacuum

Excel configurator case: A6
ejectors

Example of maximum configuration with **13 working valves and 3 vacuum**

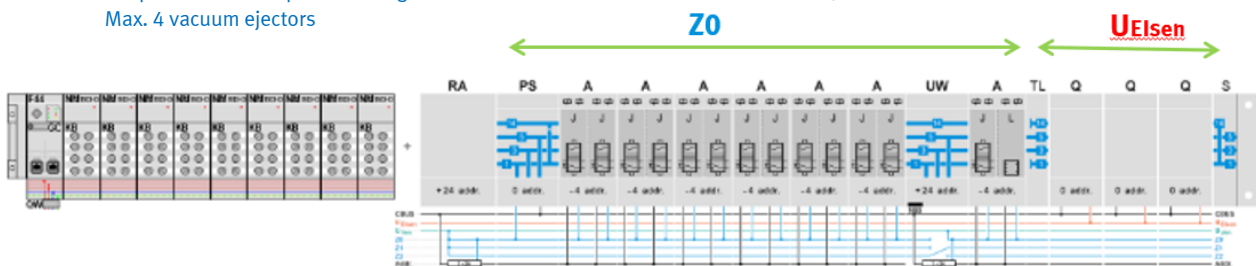
51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA

46P-N-QM-NSAQBDESGS-WGIA-PSPMZQZ6AUWYKNBSAYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-13JL+U



No control air switching valve in the valve terminal.
Without ProfiSafe only one voltage circuit, therefore only
the pressure build-up and venting valve
Max. 4 vacuum ejectors

The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

UEIsen: Vacuum ejectors (supply via sensor voltage)

Position 14 must not be occupied. Cannot be controlled via A03 package!

The sum of valves and vacuum ejectors is a maximum of 16 units.

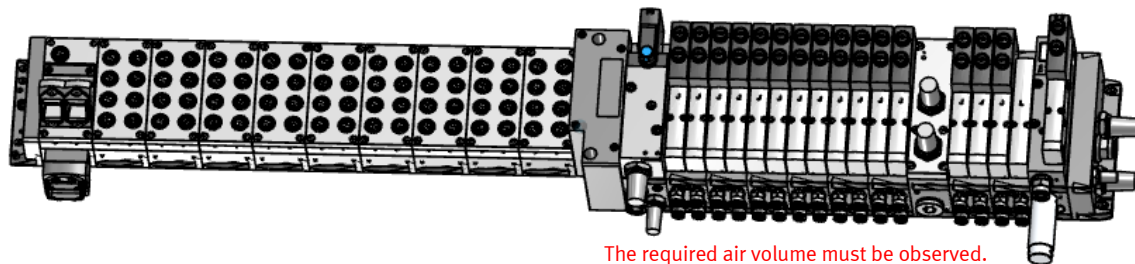
Example robot = master - with vacuum

Excel configurator case: A6
vacuum ejector

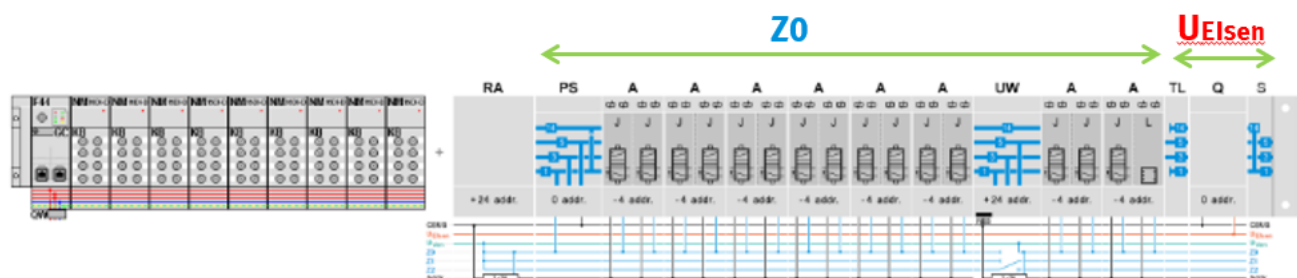
Example of maximum configuration with **15 working valves and 1**

51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA

46P-N-QM-NSAQBDESGS-WGIA-PSPMZQZ6AUWYKNBSAAYQTLQIPHMCZQN-15JL+U



The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

UEIsen: Vacuum ejectors (supply via sensor voltage)

Position 16 must not be occupied. Cannot be controlled via A03 package!

The sum of valves and vacuum ejectors is a maximum of 16 units.

5.2.3 Robot = Master - Interchangeable gripper - At least one Terminal with vacuum installed

TEM

Excel configurator cases: A7, A8, A12, A14

When two robot grippers change between **Terminals with vacuum and Terminals without vacuum.**

Robot gripper - Valve terminal-1 with working valves only

Robot gripper - valve terminal 2 with working valves and vacuum ejectors

- In this case, valve terminal 1 ALSO requires a pressure build-up / vent valve
- Valve terminal 2 requires a pressurisation / venting valve

The manual switch-on valve is placed in front of the robot.

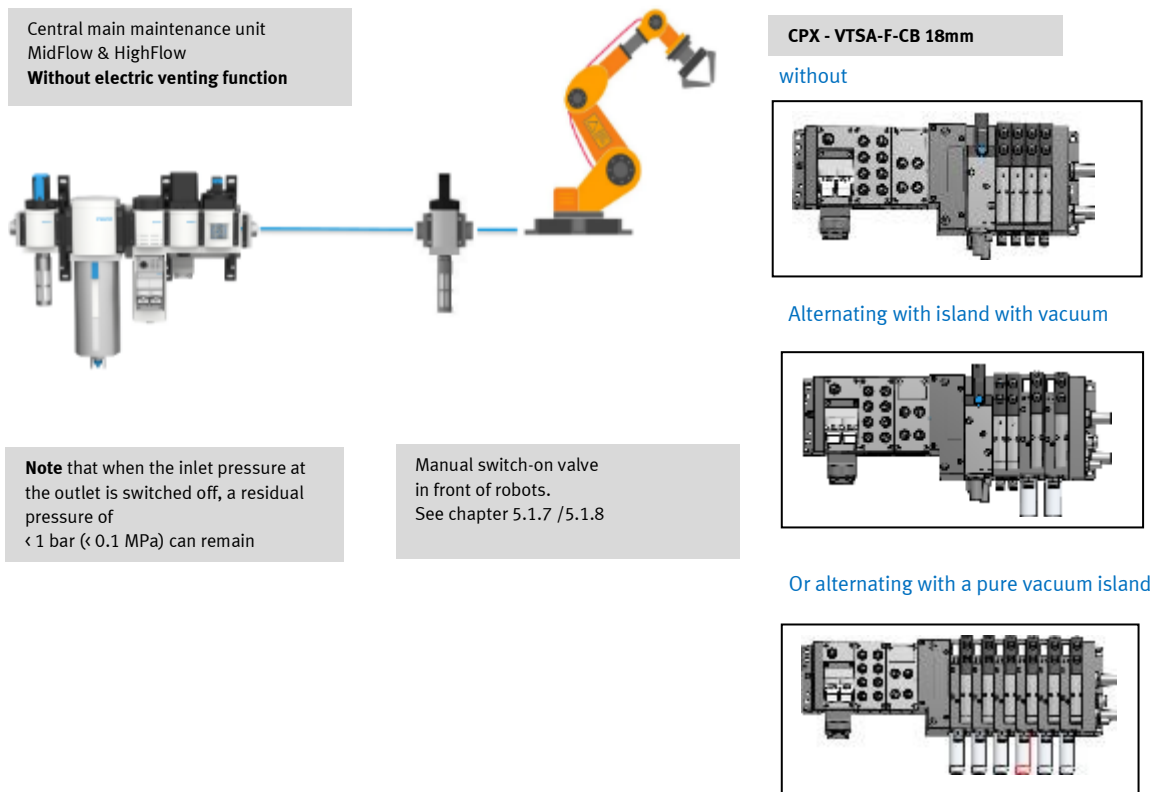
A **pressure build-up and venting valve is installed in the valve terminal** on the robot for the working valves only, not used for the vacuum (vacuum should not be vented - separating seal "TL").

The pneumatic side of the valves can thus be vented, pressure for the vacuum side is still present.

- the pressure build-up and venting valve for the Terminal without vacuum is **ALWAYS** located in the valve terminal
Reason - Interchangeable gripper

- **NO control air switching valve is used.**

Only the pressure build-up and venting valve. Reason: The robot is not yet ProfiSafe-capable.



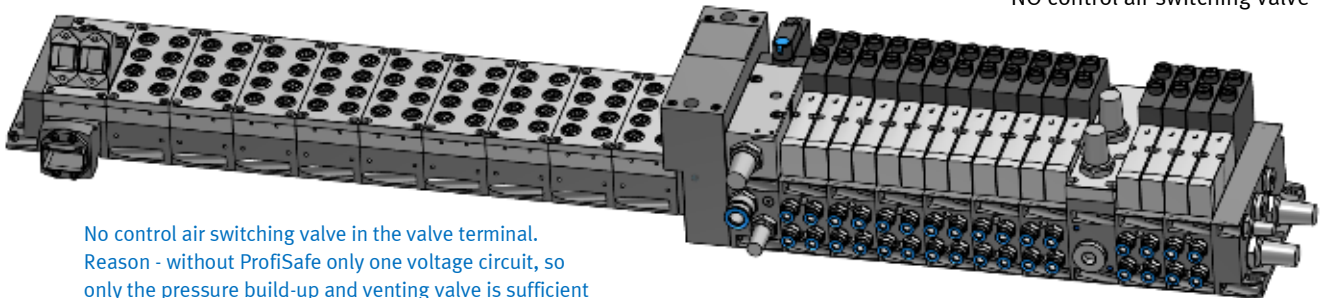
Examples: Robot = Master - Interchangeable gripper – **Valve terminal-1** without vacuum

Excel configurator case: A7

Only for interchangeable grippers if at least one Terminal with vacuum is installed.

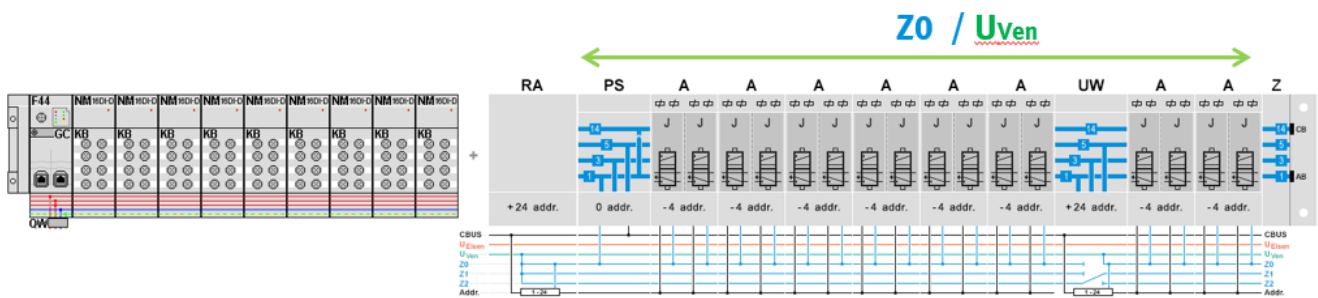
**51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA
46P-N-QM-NZABCBSGS-WGIA-PSPMNDZQZ6AUWYKAA-16J+U**

max. 16 valves - 18 mm
+ Pressure build-up vent valve
NO control air switching valve



No control air switching valve in the valve terminal.
Reason - without ProfiSafe only one voltage circuit, so
only the pressure build-up and venting valve is sufficient

The required air volume must be observed.



The maximum number of valves is 16.

Z0: Pressure build-up vent valve & working valves 1 to 16

Examples: Robot = Master - Interchangeable gripper – **Valve terminal-2** with vacuum

Excel configurator case: A8
installed.

Only for interchangeable grippers if at least one Terminal with vacuum is installed.

51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA

46P-N-QM-NSAQBDESGS-WGIA-PSPMZQZ6AYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-12J

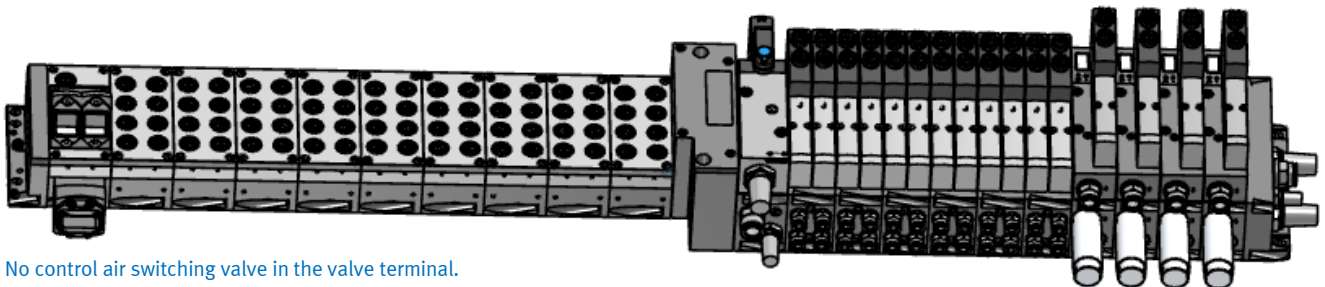
The sum of valves and vacuum ejectors is a maximum of 16 units.

max. 12 valves - 18 mm

+ Pressure build-up vent valve

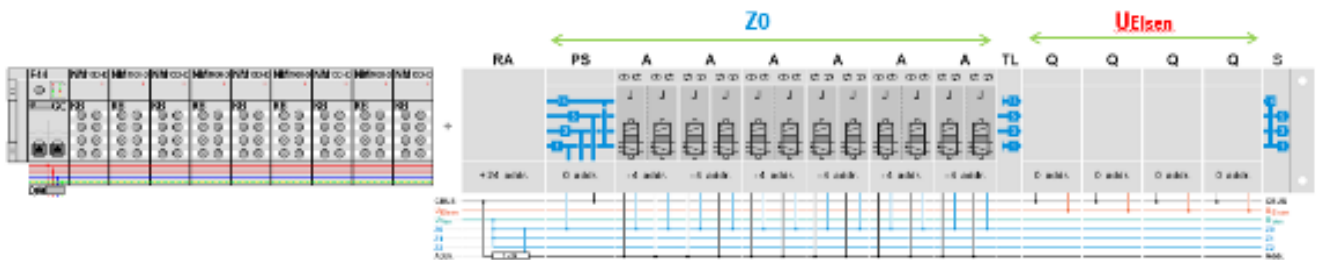
NO control air switching valve

+ max. 4 vacuum ejectors



No control air switching valve in the valve terminal.
Reason - without ProfiSafe only one voltage circuit, so only the pressure build-up and venting valve is sufficient

The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

UEisen: Vacuum ejectors (supply via sensor voltage)

Note: see chapter 6.3.4.2

**The maximum number of working valves must not exceed 16
(sum of working valves and vacuum ejectors ≤ 16)**

With 13 valves and 3 vacuum ejectors or
With 15 valves and 1 vacuum ejector
an empty space must be set.

5.2.4 Robot = Master: Two valve terminals permanently/simultaneously on the robot

- In contrast to the interchangeable gripper, **two Terminals** are on the robot gripper **at the same time**
- **One of the two Terminals must be a pure vacuum Terminal.**
This is necessary, for example, if more than 4 vacuum ejectors are required.

Please note :

- The A03 package allows max. 1 vent valve on the robot.
This means that one of the two Terminals must be a pure vacuum Terminal.
- One of the two Terminals must be provided with a forwarding (type code " QN").
This requires a module on the CPX side
- **The sum of working valves and vacuum ejectors (both Terminals together) is max. 16**
- The venting valve is not one of the max. 16 valves
- **The required air volume must be observed.**
- **The sum of the CPX modules of both valve terminals together must not exceed 9 (max. 144E)**

The following variants are possible:**Valve terminal - 1**

A CPX module is mandatory for QN forwarding

- | | |
|-------------------------|-------------------------------------|
| a) Without vacuum | Excel configurator case: A9 |
| b) With vacuum | Excel configurator case: A10 |
| c) Pure vacuum Terminal | Excel configurator case: A11 |

Valve terminal - 2

- | | |
|-------------------------|-------------------------------------|
| a) Pure vacuum Terminal | Excel configurator case: A11 |
| b) CPX Terminal | Excel configurator case: A14 |

NO working valves may be used on the 2nd valve terminal,
as there is only ONE RA adapter on the robot,
and ONE pressure build-up/bleed valve are possible with the A03 robot package.

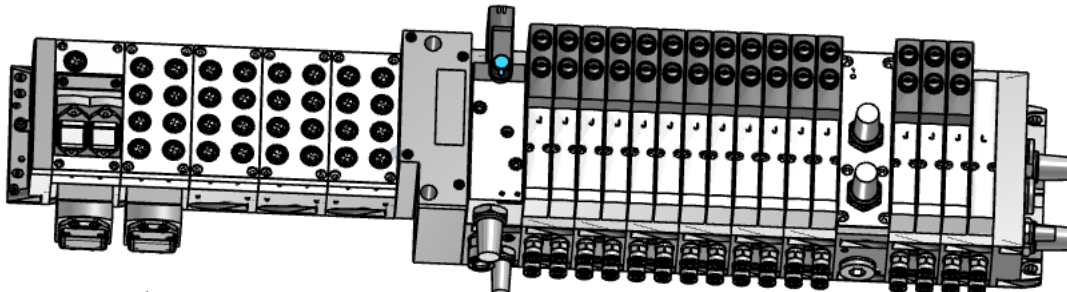
Example **Valve Terminal 1** - Pure working valves

TEM

Excel configurator case: A9

51E-F44GCQWNMKBQNNMKBNMKBNMKBKB-RA

46P-N-QM-NZABCBESGS-WGIA-PSPMNDZQZ6AUWYKAA-15JL+U

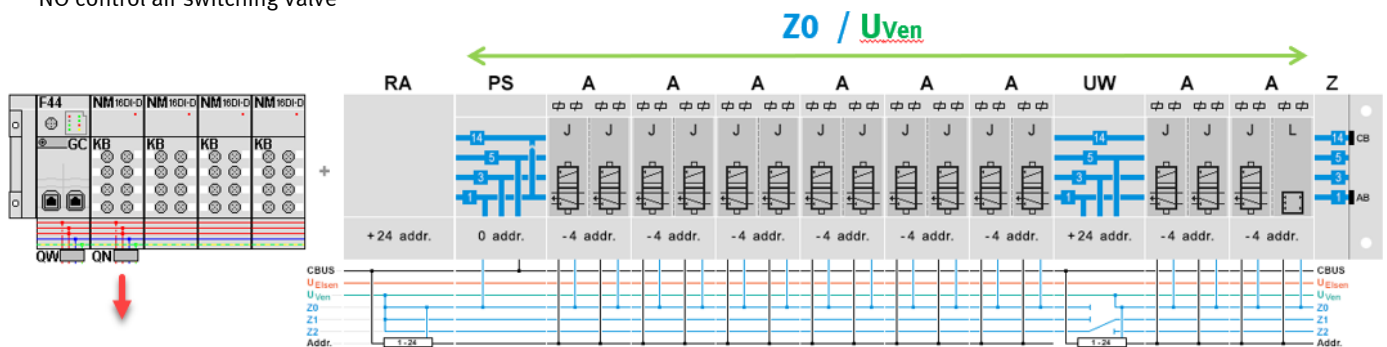


max. 15 valves - 18 mm

+ Pressure build-up vent valve

NO control air switching valve

The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

Note:

In this case, a maximum of 15 working valves can be set.

Valve position 16 **MUST** be an empty position, as a second valve terminal with at least one vacuum ejector must be placed here.

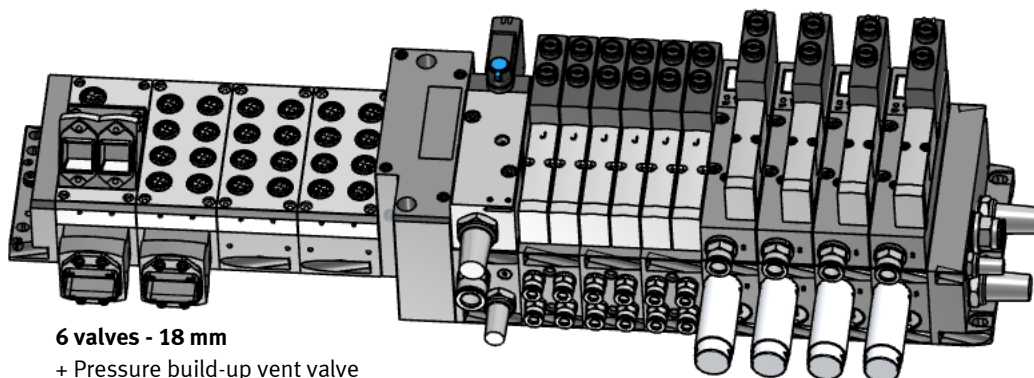
Example **Valve Terminal 1** - Working valves and vacuum ejectors

TEM

Excel configurator case: A10

51E-F44GCQWNMKBQNNMKBNMKB-RA

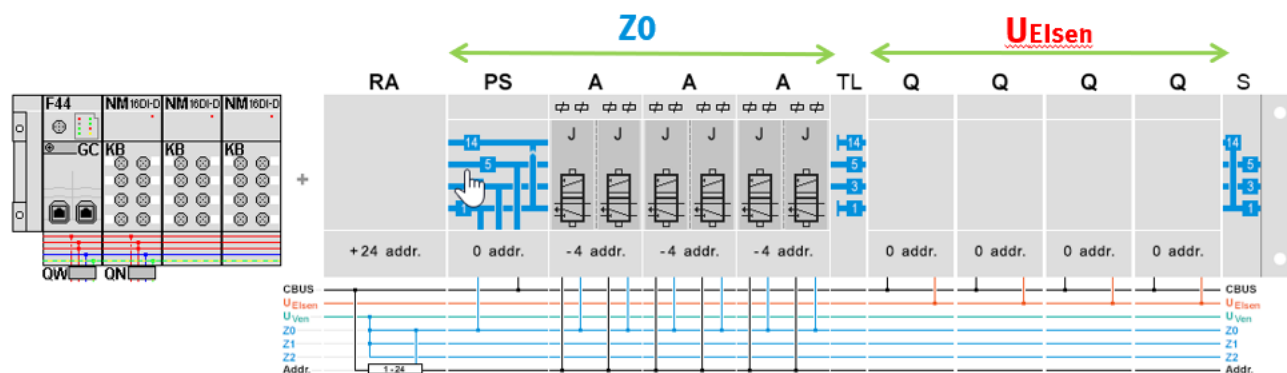
46P-N-QM-NSAQBDESGS-WGIA-PSPMZQZ3AYQTLQIPHMCZQNQIPHMCZQNQIPHMCZQN-6J



6 valves - 18 mm

- + Pressure build-up vent valve
- NO control air switching valve
- + 4 vacuum ejectors

The required air volume must be observed.



Z0: Pressure build-up vent valve & working valves

UElsen: Vacuum ejectors (supply via sensor voltage)

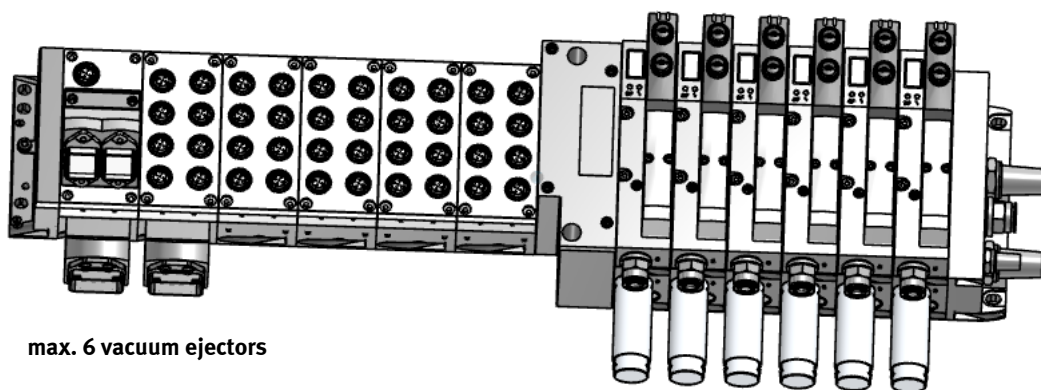
Example Valve Terminal 2 - Pure vacuum Terminal with forwarding "QN"

TEM

Excel configurator case: A11

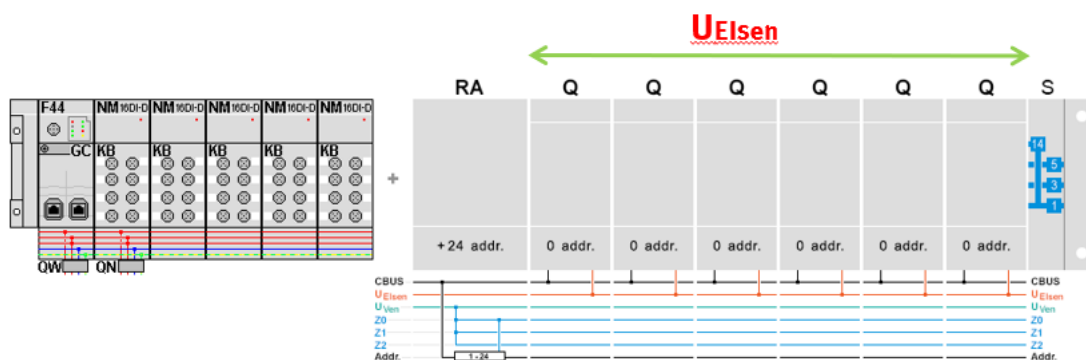
51E-F44GCQWNMKBQNNMKBNMKBNMKBKB-RA

46P-N-QM-NSAQBDESGS-QIPHMCZQNQIPHMCZQNQIPHMCZQNQIPHMCZQNQIPHMCZQNQIPHMCZQN



max. 6 vacuum ejectors

The required air volume must be observed.



UElsen: Vacuum ejectors (supply via sensor voltage)

5.3 Pure vacuum Terminal

TEM

Excel configurator case: A12

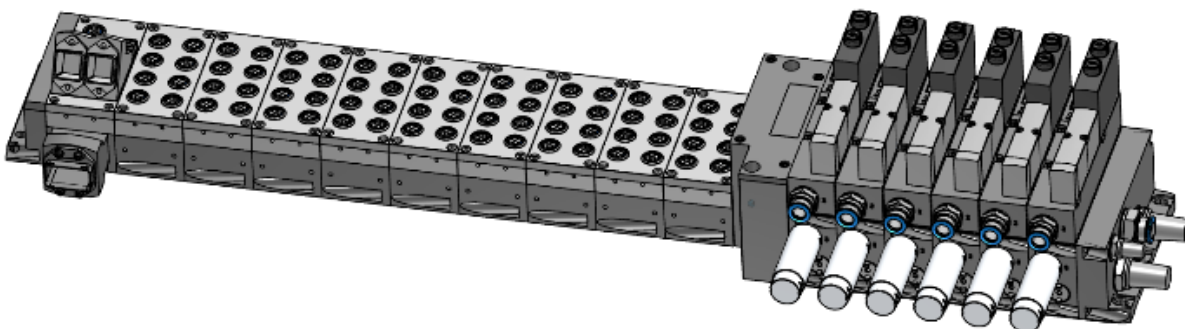
Maximum of 6 individual vacuum ejectors.

WITHOUT ProfiSafe - (with RA adapter) - possible for system and robot.

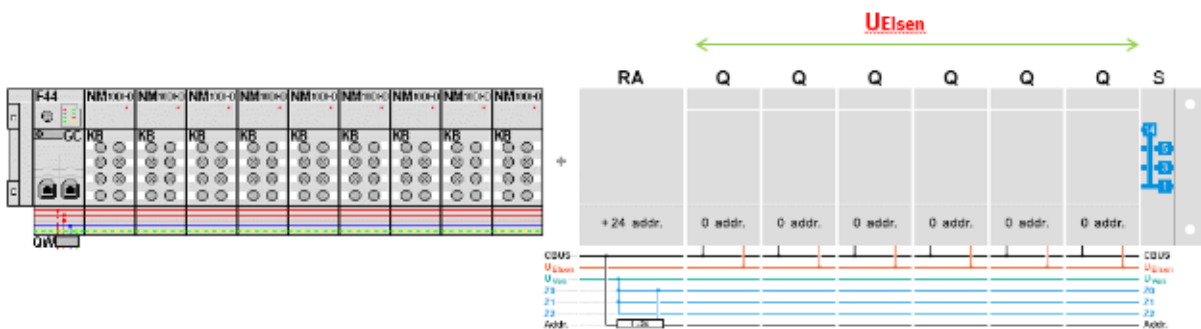
51E-F44GCQWNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKB-RA

46P-N-QM-NSAQBDESGS-QIPHCMZQNQIPHCMZQNQIPHCMZQNQIPHCMZQNQIPHCMZQN

Max. 6 individual vacuum ejectors



The required air volume must be observed.



UElsen: Vacuum ejectors (supply via sensor voltage)

5.4 Pure CPX module

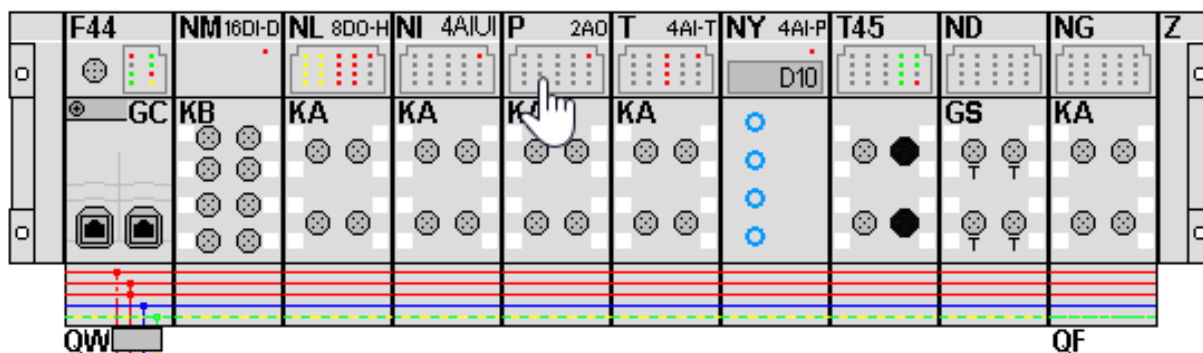
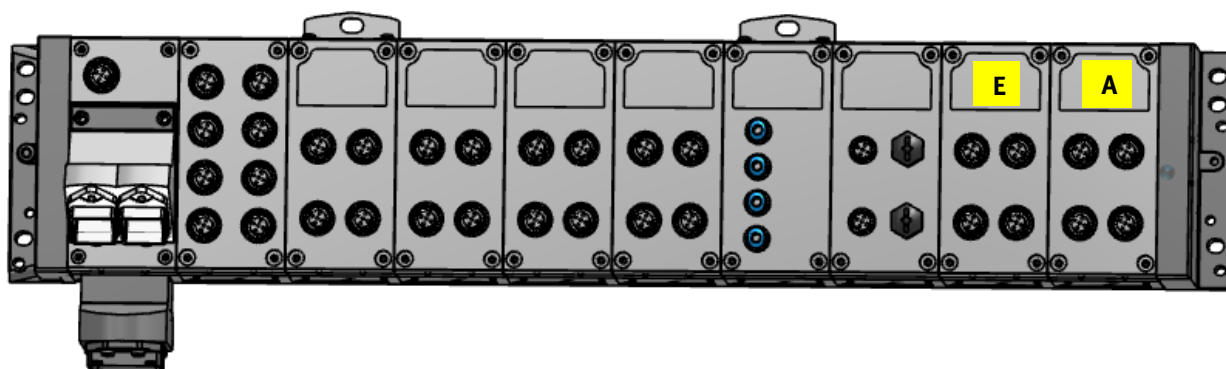
TEM

5.4.1 System area pure CPX module

Excel configurator case: A13

Example:

51E-F44GCQWNMKBNLKANIKAPKATKANYT45NDGSNGKAQF-Z



5.4.2 Robot = Master pure CPX module

TEM

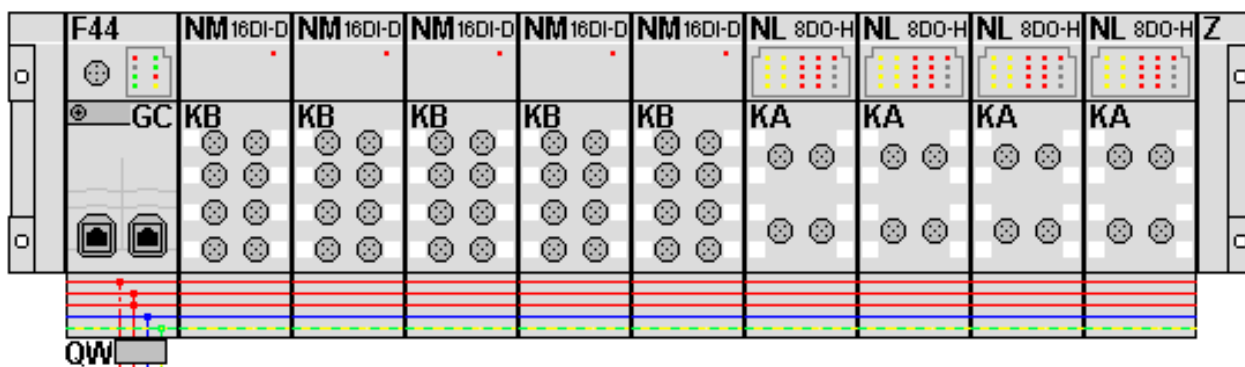
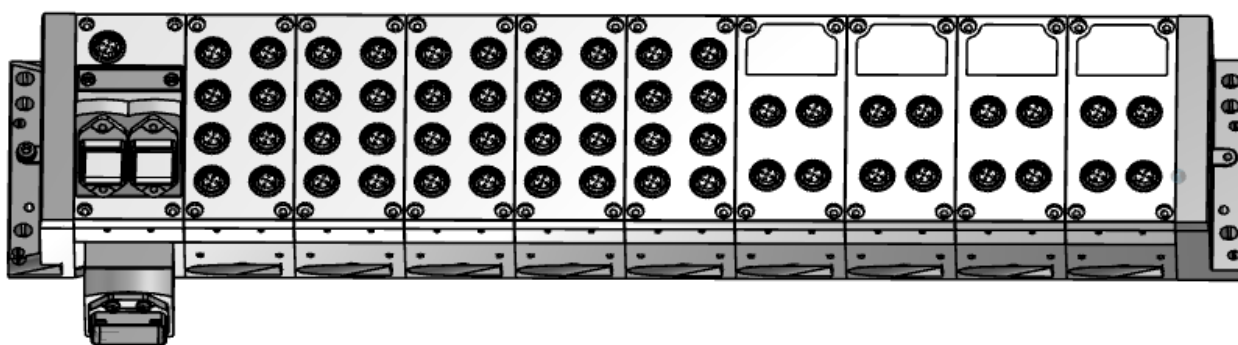
Excel configurator case: A14

ATTENTION

- WITHOUT Profisafe input modules
- WITHOUT Profisafe output module
- WITHOUT analogue modules

Example:

51E-F44GCQWNMKBNMKBNMKBNMKBNLKANLKANLKA-Z



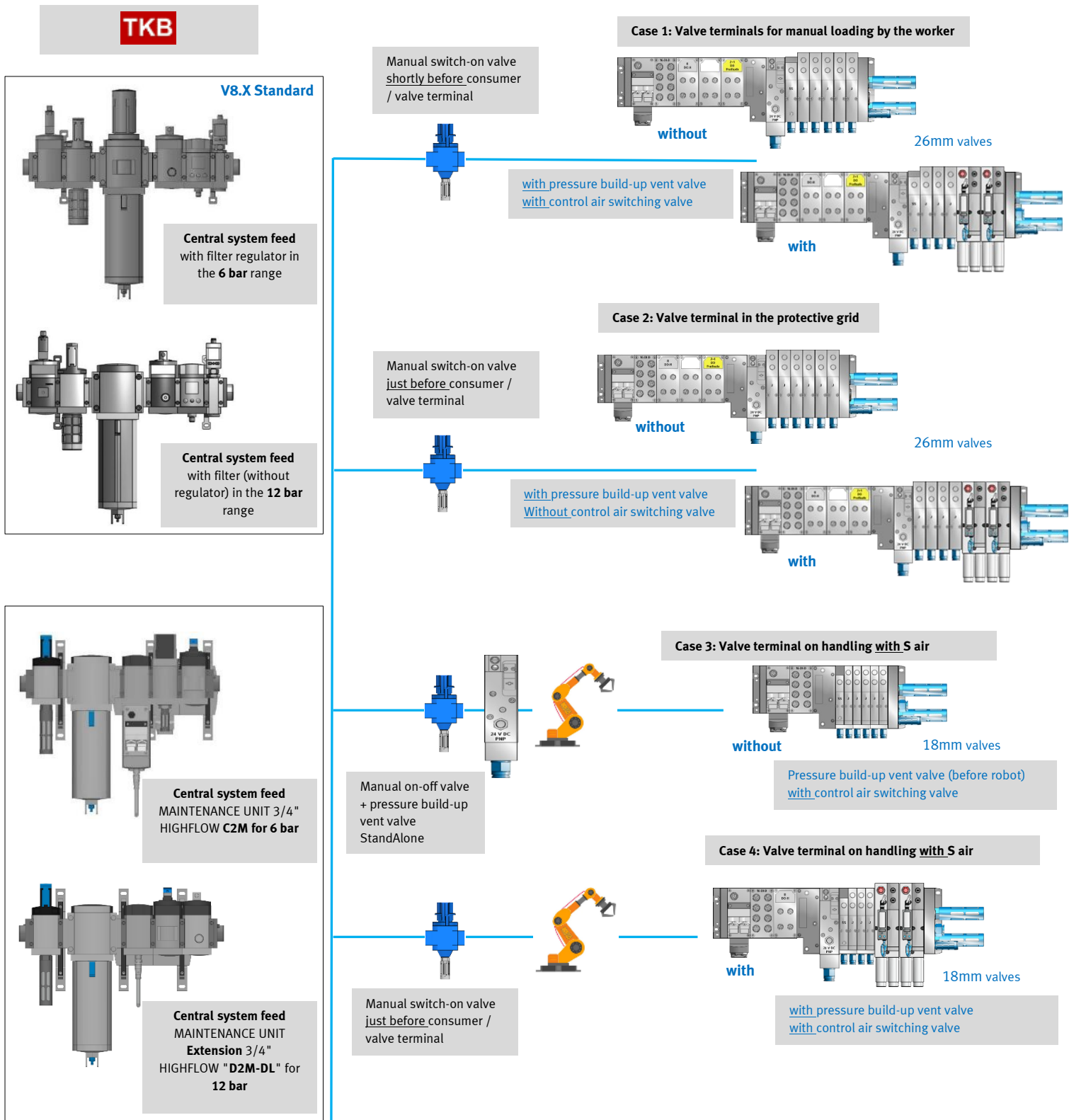
6 TKB - Overview plant concept - Body shop technology (old)

TKB

For details: see BMW - "B7 Construction Regulation Chapter 7 Installation"

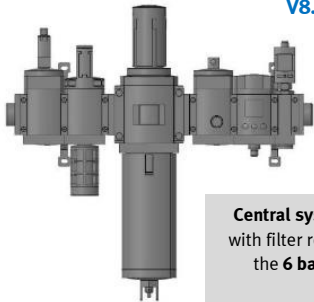
6.1 General system concept TKB for CPX-VTSA-F

There is no electrically operated ventilation by means of the central maintenance unit.
This function is realised decentrally via the valve terminal or individual valves.

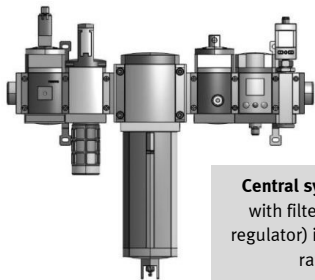


TKB

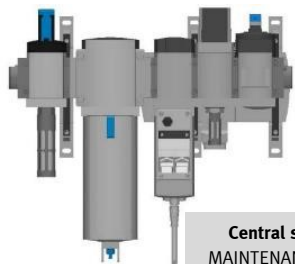
V8.X Standard



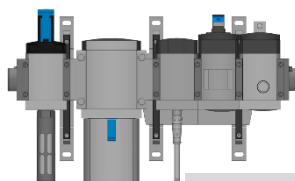
Central system feed
with filter regulator in
the **6 bar** range



Central system feed
with filter (without
regulator) in the **12 bar**
range



Central system feed
MAINTENANCE UNIT 3/4"
HIGHFLOW **C2M** for **6 bar**



Central system feed
MAINTENANCE UNIT
Extension 3/4"
HIGHFLOW **"D2M-DL"** for
12 bar

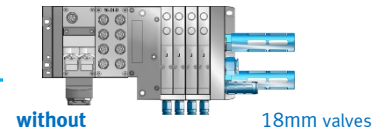
Manual on-off valve
+ pressure build-up
vent valve
StandAlone

Manual switch-on valve
just before consumer /
valve terminal

Manual switch-on valve
just before consumer /
valve terminal

Manual
Switch-on valve just
before consumer / single

Case 5: Valve terminal on handling without S air

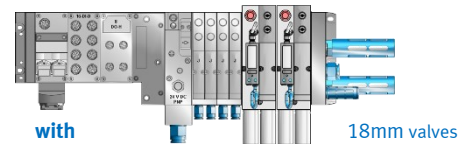


without

18mm valves

Pressure build-up vent valve (before robot)
Without control air switching valve

Case 6: Valve terminal on handling without S air



with

18mm valves

with pressure build-up vent valve
Without control air switching valve

Case 7: Component drawer



without

26mm valves

Component drawer - protective grid area
**without pressure build-up / venting valve, only
permissible without hazardous movement.**

Case 8: Single valve



A valve terminal must be used for two or more working valves.

Single valves only with single sub-base, no linking plate.

Individual valves can only be used if there is no dangerous movement.

Therefore without pressure build-up / vent valve and without auxiliary pilot air valve.

6.2 Concept single valve TKB

A valve terminal must be used for two or more working valves.

Single valves only with single sub-base, no linking plate.

Individual valves can only be used if there is no dangerous movement.

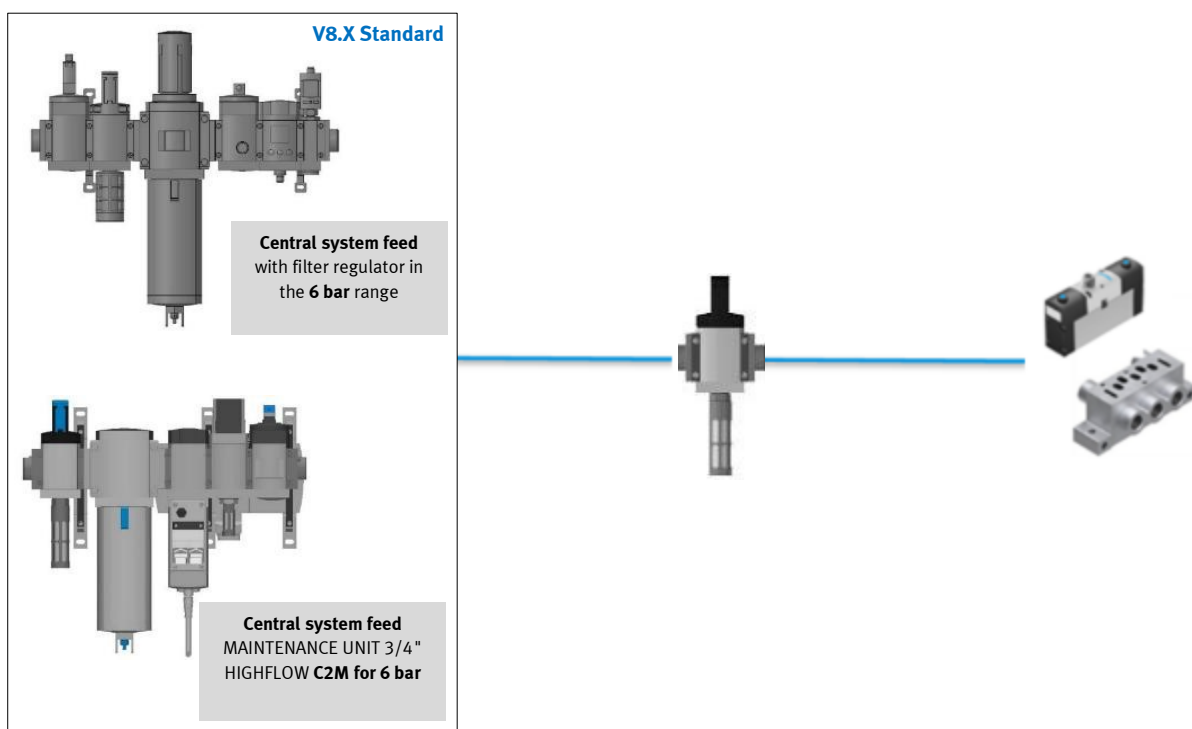
Therefore without pressure build-up / vent valve and without auxiliary pilot air valve.
Otherwise, a valve terminal must be used.

Central main maintenance unit
Without electric ventilation function

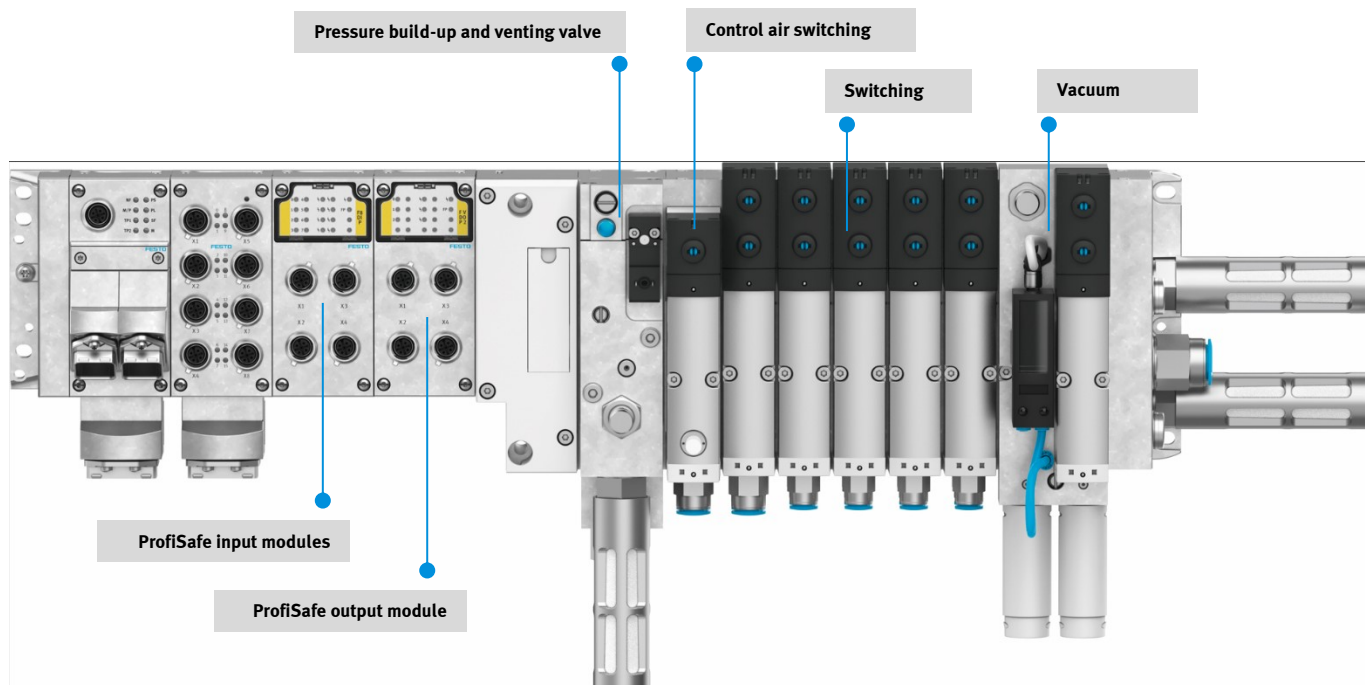
Manual switch-on valve
in front of the individual valves.
See chapter 5.1.6

Single valves
See chapter 7.7

TKB



6.3 Explanation of the pressure build-up and venting valve and control air switching valve for VTSA-F (TKB)



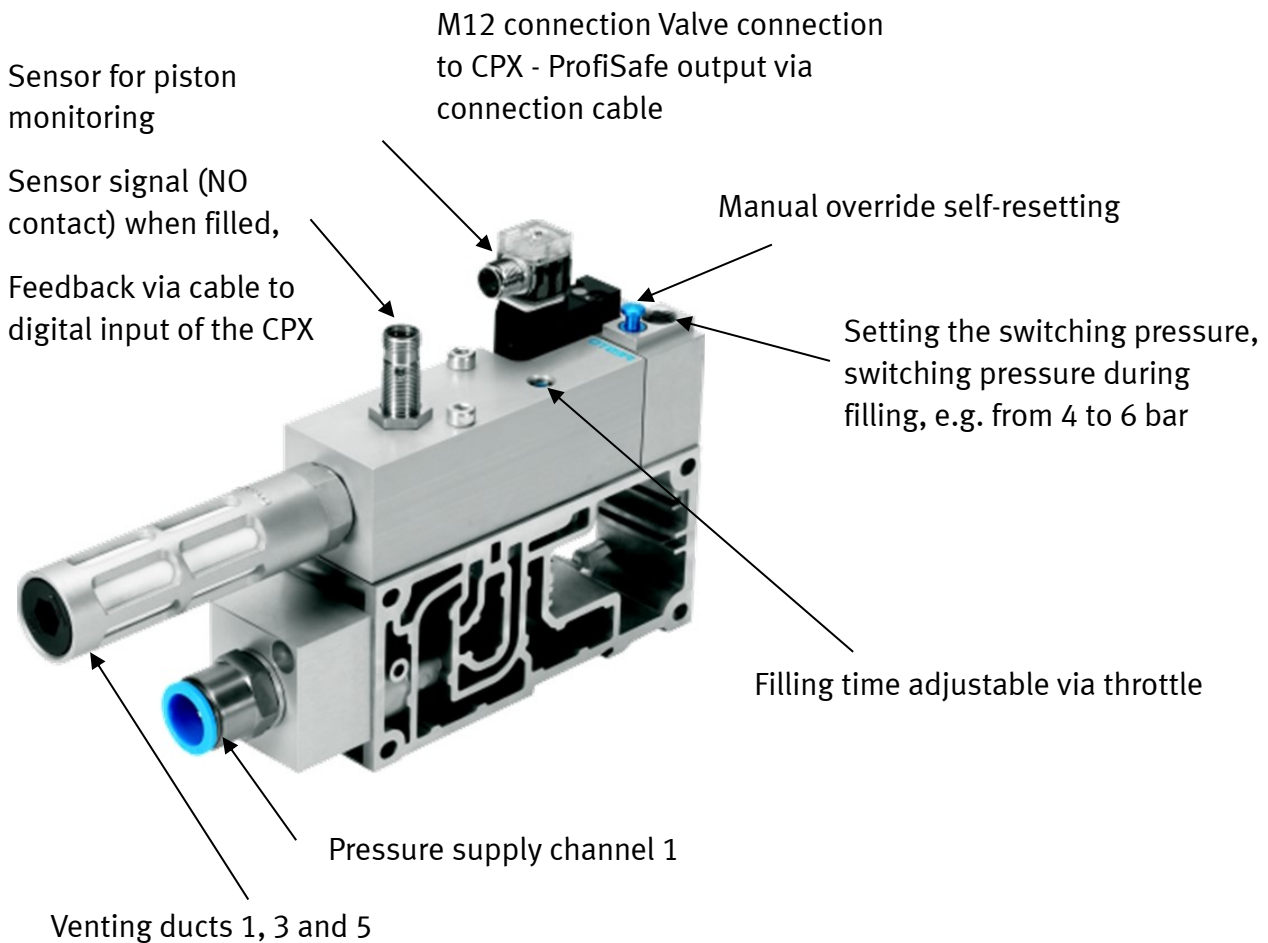
The control air switching valve switches off the pneumatic auxiliary control air for a switching operation.

In addition to the pneumatic auxiliary energy, electrical energy is also required for the switching process of a valve.

The control air cut-off in combination with the voltage cut-off is a common redundant solution for realising the basic safety function "Protection against unexpected start-up".

6.3.1 Information on pressure build-up and venting valve for VTSA-F (TKB)

TKB

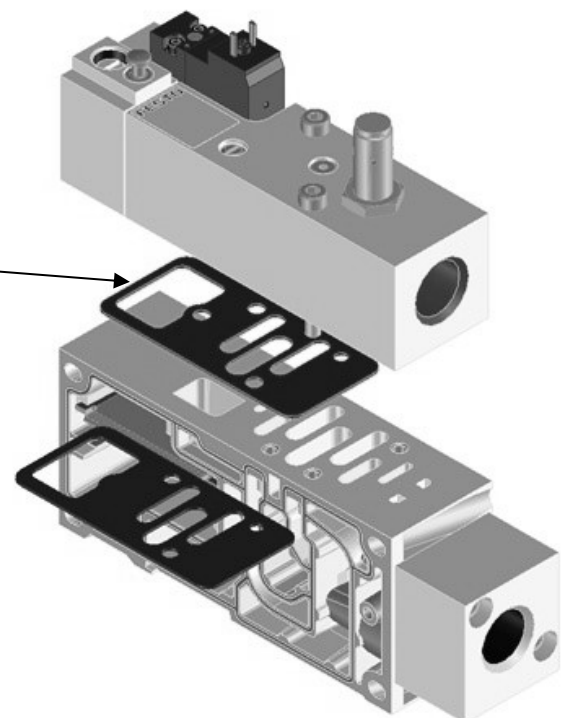


Seal for internal control air (control air is supplied via pressure build-up valve)

(TN 716272)

Seal for external control air (control air is supplied via control air switching valve)

(TN 725611)



6.3.2 Information on control air switching valve for VTSA-F (TKB)

TKB

The control air switching valve is supplied by channel "1" of the valve terminal and switches the control air to channel "14" of the valve terminal

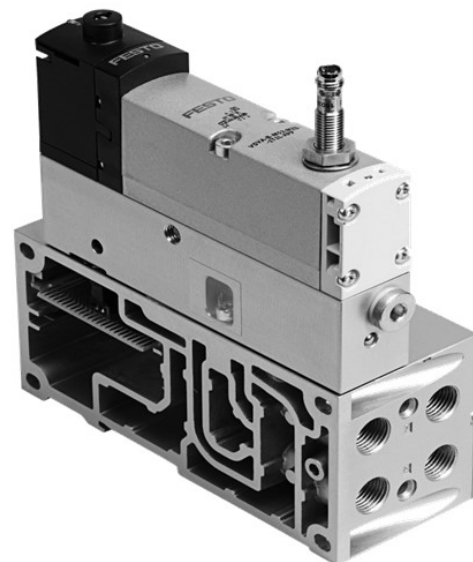
The coil of the control air switching valve is switched via the internal voltage of the valve terminal

Manual override (HHB) "tactile"

Valve with piston position sensor,
Sensor (NC contact) M12 plug,
Sensor signal - when the control air valve piston is
vented in the control air duct position.

Feedback via cable to digital input of the CPX

Height linkage S-air
VTSA ident code Z0



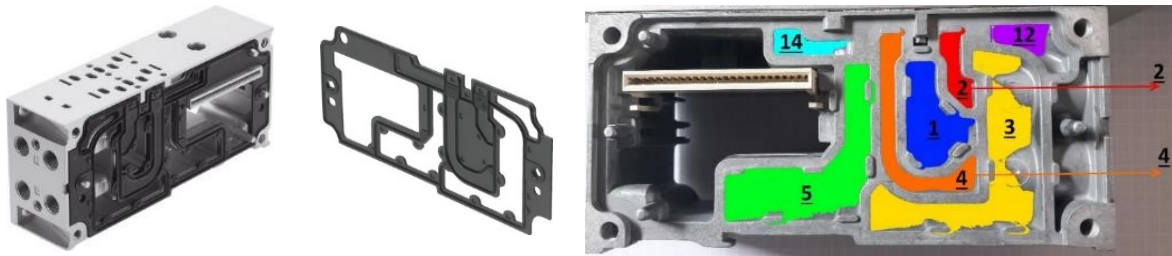
6.4 Assembly principles for valve terminals for VTSA-F (TKB)

TKB

6.4.1 Seals in the valve terminal section for VTSA-F (TKB)

Seals are used between each interlinking plate in the pneumatic part of the valve terminal.

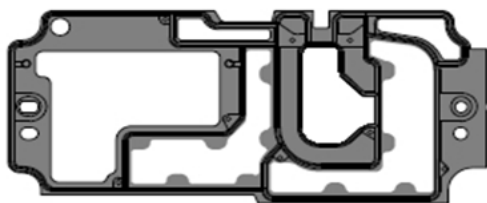
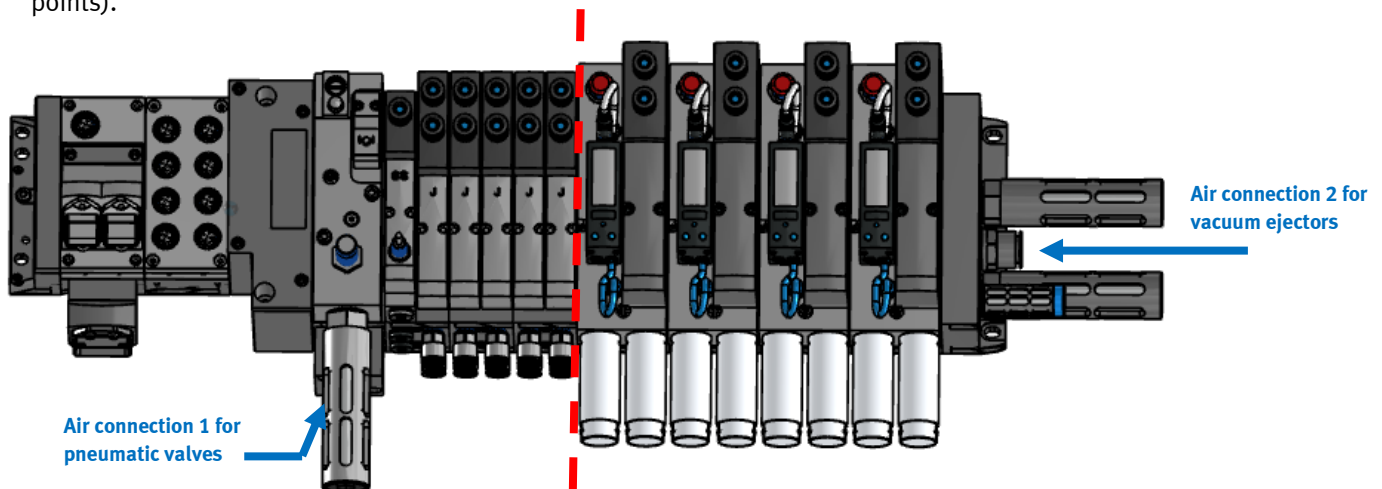
The **standard seal** seals the valve terminal to the outside and between the individual air ducts.



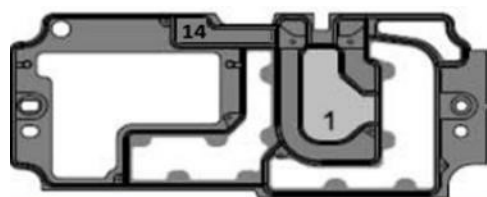
Special feature - use of vacuum ejectors

A special seal is inserted between the last pneumatic valve and the first vacuum ejector.

Seal "TS" - the seal "TS" separates the main air duct "1" and the control air duct "14" between the left-hand pressure area and the right-hand vacuum area (only at this point, the normal standard seal is used at all other interlinking points).



Standard gasket VABD-S6-1-C - 668436
→ All channels open



Separating seal when using vacuum
→ Separation channel 1 + 14
Seal VABD-S6-1-P8-C - 8060483

Distinguishing feature - recognisable from the outside when mounted
RED MARKING



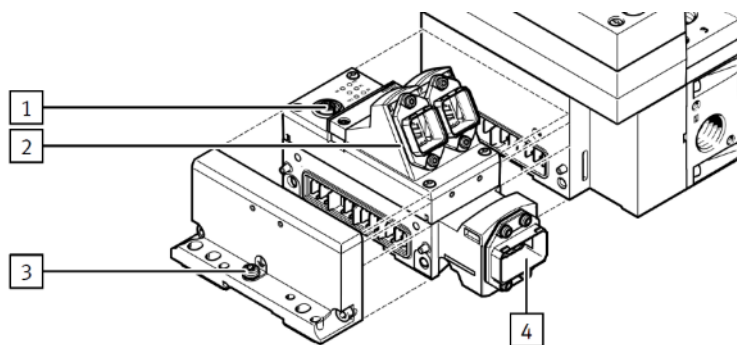
rote Markierung TKB

6.4.2 Earth connection on CPX - Modular electrical terminal

The separate earthing connection is located on the left-hand end plate of the CPX terminal.

The functional earth is screwed directly onto the valve terminal.

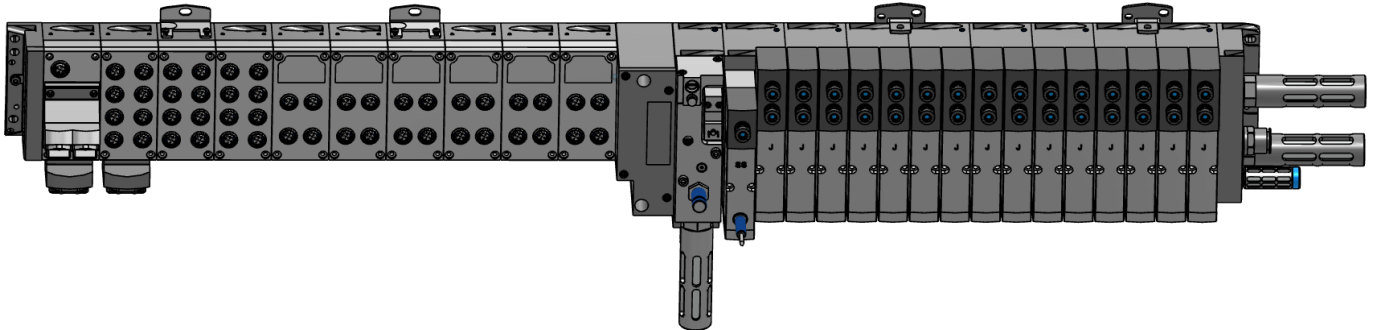
The BMW specification EMC and equipotential bonding "SPEC_EMC_EquipmentGrounding" must be observed.



- 1 Service interface, e.g. for operating device
- 2 Fieldbus connection, push-pull
- 3 Earthing connection
- 4 Power supply connection

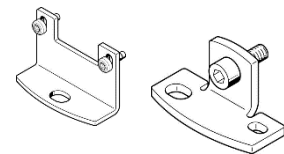
6.4.3 Fastening points on CPX - Modular electrical terminal and VTSA-F valve terminal**TKB**

Additional mounting brackets are available for the CPX metal part and for the valve terminal part.
Depending on the configuration, it is recommended to position the mounting brackets according to the following rules.



550217CPX-M-BG-RW-2X Mounting bracket for CPX

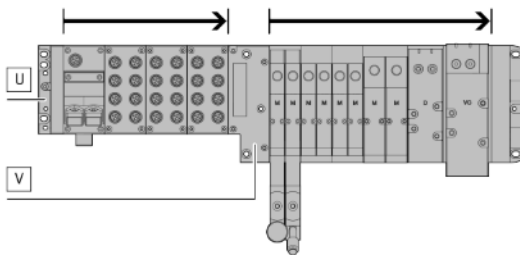
567038VAME-S6-W-M46 Fixing bracket for VTSA-F-CB



The mounting brackets are available separately as accessories.

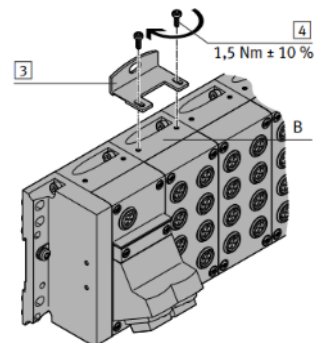
When configuring the valve terminal via a configurator, the number / position is automatically taken into account.

- CPX-Module: Zählrichtung ab der Endplatte [U]
- VTSA-, VTSA-F- und VTSA-F-CB-Module (18 ... 52 mm): Zählrichtung ab dem Pneumatik-Interface [V]



Befestigung [3] bei CPX-Modulen (Metall)

Anzahl Module	Befestigung an den Modulen				
	2	3	4	6	7
1 ... 3	–				
4	•				
5 ... 6		•			
7			•		
8		•		•	
9 ... 10		•			•



Positionen der Befestigung [5] bei VTSA-, VTSA-F- und VTSA-F-CB-Modulen (18 ... 52 mm)

Anzahl Module	Befestigung an den Modulen					
	1	2	4	8	12	16
1 ... 2	•					
3 ... 5		•				
6 ... 8			•			
9 ... 12			•	•		
13 ... 16			•	•	•	
17 ... 20			•	•	•	•
> 20	Befestigung [5] an jedem 4. Modul ¹⁾					

1) An einem Modul direkt neben der rechten Endplatte ist keine zusätzliche Befestigung erforderlich.
Die Befestigung über die Endplatte reicht aus.

6.5 Hose Connection sizes Valve terminal for VTSA-F (TKB)

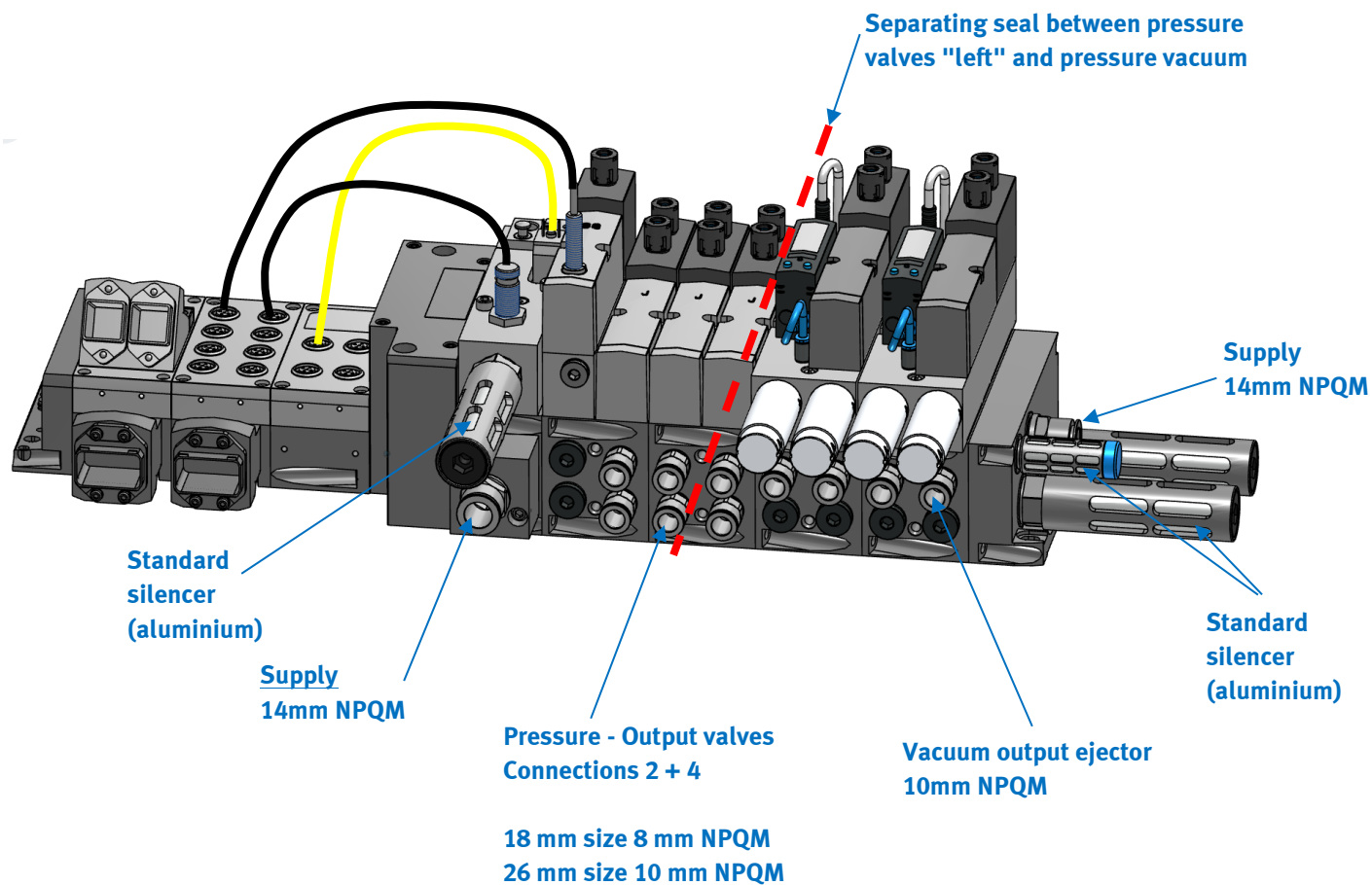
TKB

Example - Configuration

547965

51E-F44GCQWNMKBQNNNGKAQF-S

45P-A-V-SMEPM-BBTSLL-SSZO3JVBWMMVBWMMVBWMM+P1

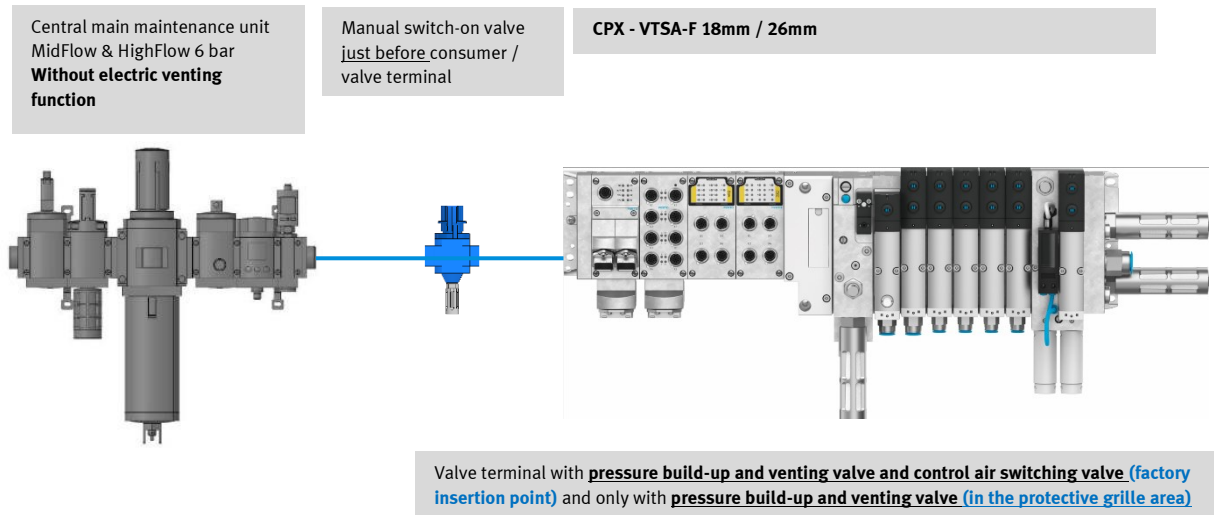


7 TKB - Information and examples for valve terminals CPX-VTSA-F

TKB

7.1 VTSA-F in the plant sector / examples

Excel configurator TKB - Cases "Worker insertion point" or "In the safety fence area"



The system cannot be vented via the PLC at the central maintenance unit.

The system / system area can only be vented by the control system in the valve terminals.

From the central maintenance unit to the valve terminal, the system always remains pressurised (Exception - manual venting at the maintenance unit).

plausible condition:

The system remains in a **defined state** "under pressure".

The pressure build-up and venting valve does not vent in this case

The valve coils of the working valves are switched off electrically via zone "0".

The valve coil of the control air switching valve is switched off electrically. This switches off the pressure in the pilot control of the switching valves.

➔ Protection against unexpected start-up.

implausible condition:

The valve island is depressurized via the pressure build-up and venting valve (zone "1").

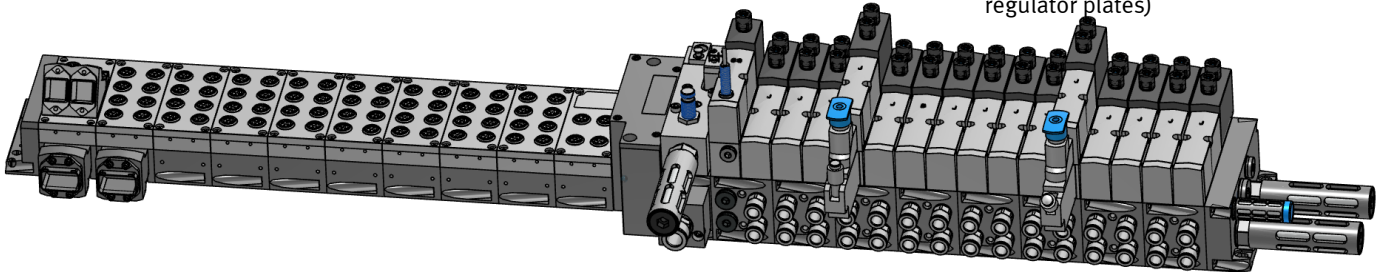
In the event of danger, this can be used to depressurize the entire valve terminal up to the actuators (depending on the operating valve).

7.1.1 "Worker loading station" without vacuum

TKB

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMGKAQF-S
45P-A-XP2-SMEPM-8B-SSZO4JZAJB5JZA4J+UP1

max. 15 valves - 26mm
+ Pressure build-up vent valve
+ control air switching valve
(with / without pressure
regulator plates)



Z0: internal ProfiSafe output - control air switching valve & working valves 1 to 15

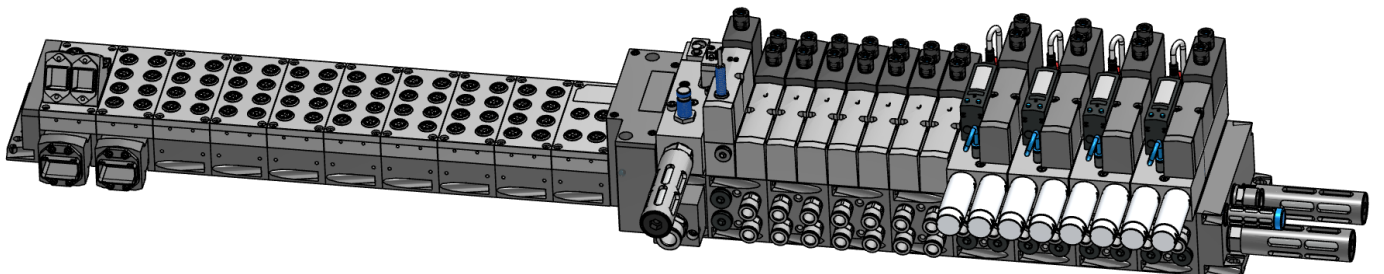
Z1: external ProfiSafe outlet M12 - pressure build-up vent valve

The required air volume must be observed.

7.1.2 "Worker loading area" with vacuum

max. 7 valves - 26mm
+ 4x vacuum ejector
+ Pressure build-up vent valve
+ control air switching valve

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMGKAQF-S
45P-A-V-SMEPM-4BTS4L-SSZO7JVBWMVBWMVBWMVBWMVBWMVBWMVBWM+UP1



Z0: internal ProfiSafe output - control air switching valve & working valves 1 to 15

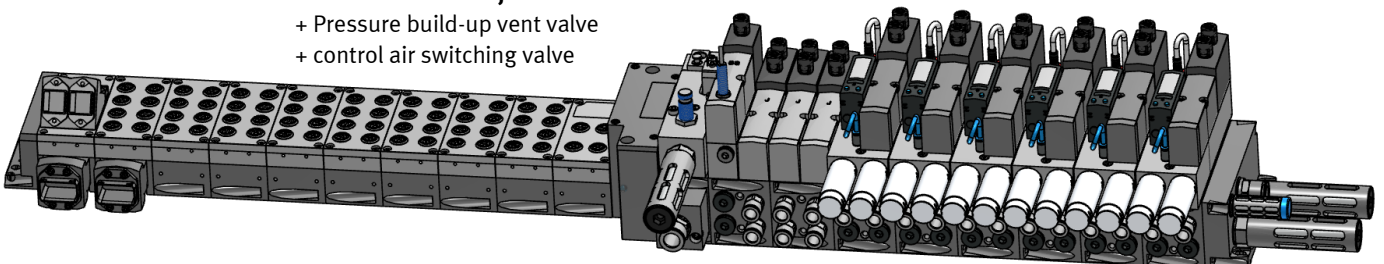
Z1: external ProfiSafe outlet M12 - pressure build-up vent valve

The required air volume must be observed.

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMGKAQF-S
45P-A-V-SMEPM-BBTS6L-SSZO3JVBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWM+UP1

max. 3 valves - 26mm
+ max. 6x vacuum ejector
+ Pressure build-up vent valve
+ control air switching valve

The required air volume must be observed.



TKB

The required air volume must be observed.

The required air volume must be observed.

The required air volume must be observed.

7.2 VTSA-F on the robot / examples

TKB

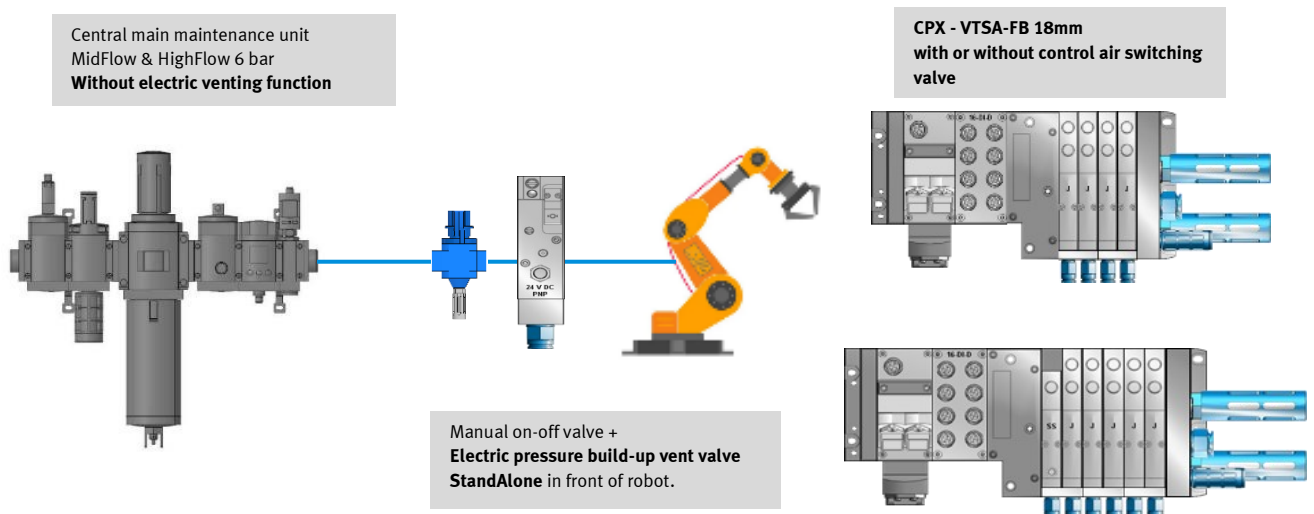
Please note the **limits of the BMW A03 control package**. This results in restrictions. These are shown in the BMW Excel valve terminal configurator for VTSA-F.

See also BMW B7 construction regulations, chapter 7 Installation.

VTSA-F on the robot without vacuum

The **pressure build-up and venting valve** (in combination with a manual switch-on valve) is **placed in front of the robot** if **there is no vacuum** (reason: robot currently not ProfiSafe-capable).

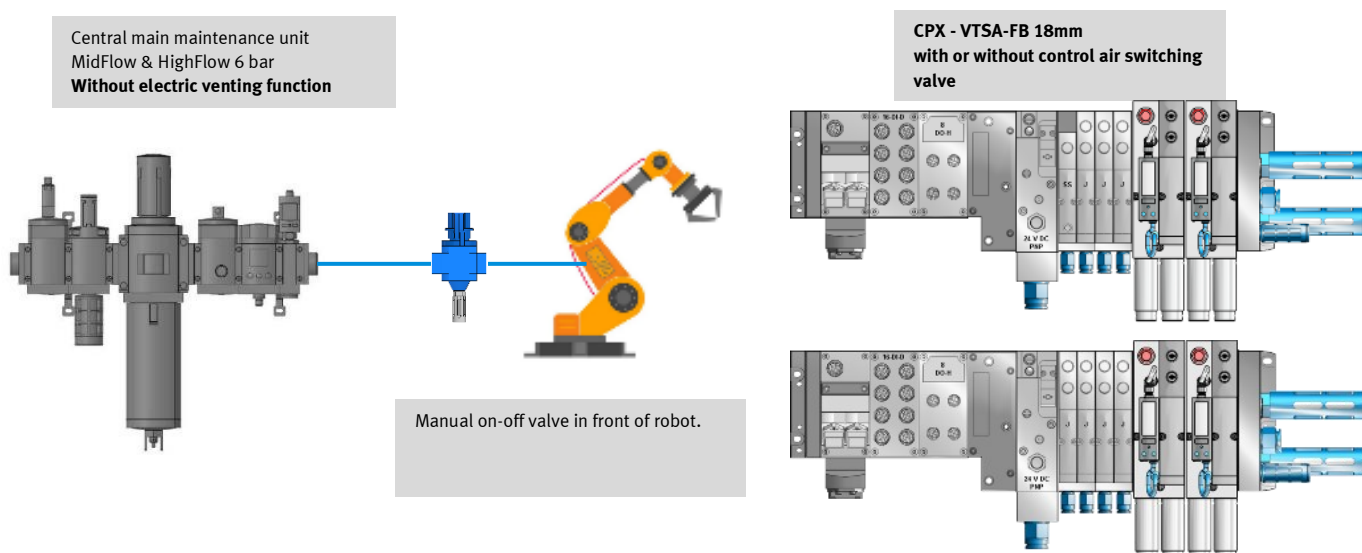
The valve terminals **with control air switching valve** (if the robot moves to a worker loading station) or **without control air switching valve** (robot behind protective grid) are used on the robot.



VTSA-F on the robot with vacuum

In the case **WITH vacuum**, the **pressure build-up and venting valve is placed in the valve terminal on the robot** (Reason: separate switch-off of compressed air valves / compressed air vacuum). The manual switch-on valve is located in front of the robot.

On the robot, the valve terminals **with control air switching valve** (if the robot is travelling to a worker loading station) or **without control air switching valve** (robot behind protective grille).

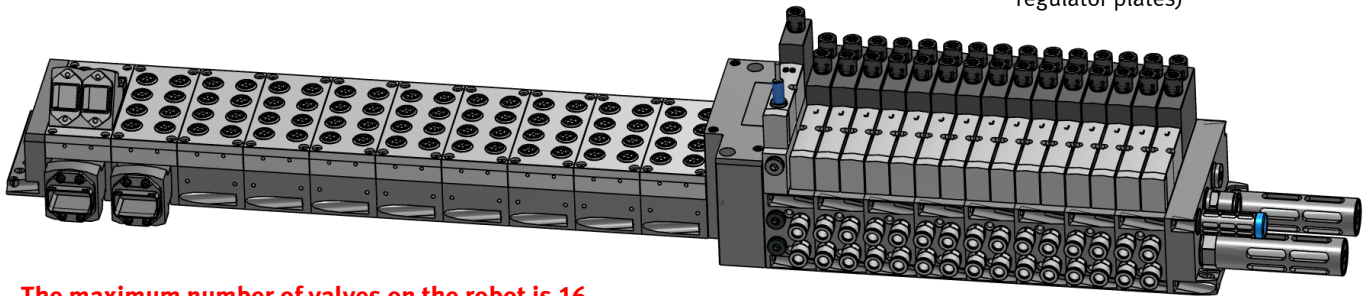


7.2.1 Robot = Master - without vacuum ejector

with **S-air** switching valve

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNGKAQF-S
45P-A-XP2-SMEPM-8B-SSZO4JZAJB5JZA4)+UP1

max. 15 valves - 18mm
+ control air switching valve
(with / without pressure
regulator plates)



The maximum number of valves on the robot is 16.

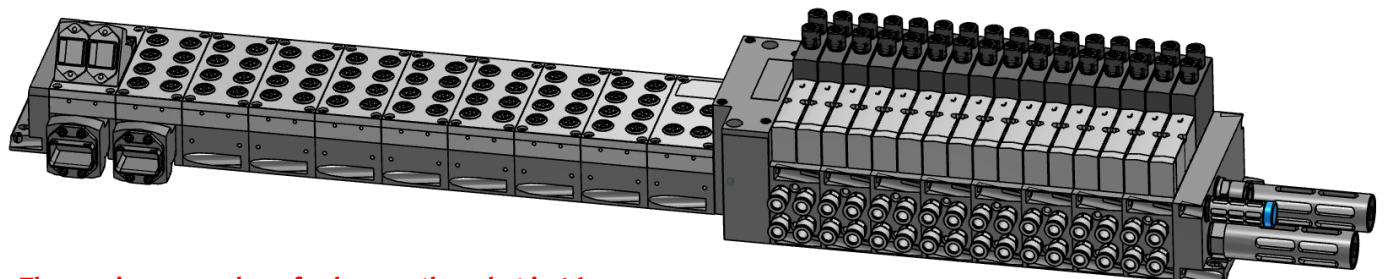
Without ProfiSafe - external switch-off of the valve voltage

The required air volume must be observed.

Without **S-air** switching valve

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNGKAQF-S
45P-A-V-SME-8A-16J

max. 16 valves - 18mm
(with / without pressure
regulator plates)



The maximum number of valves on the robot is 16.

Without ProfiSafe - external switch-off of the valve voltage

The required air volume must be observed.

7.2.2 Robot = Master - with vacuum ejector

with S-air switching valve

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNLKA-S

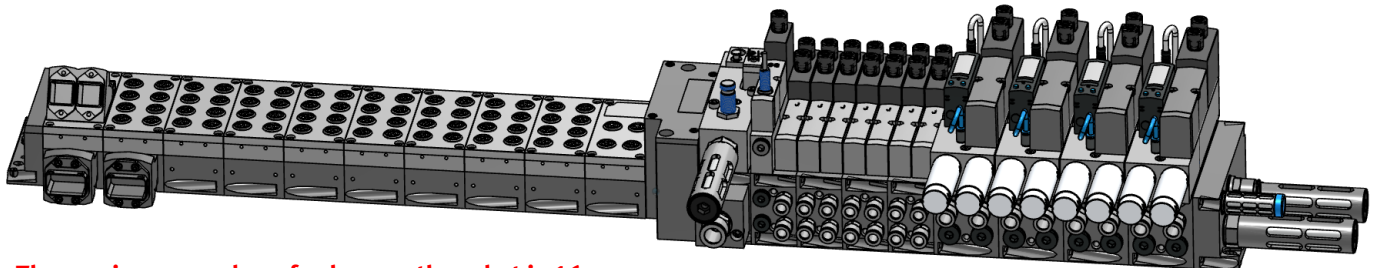
45P-A-V-SMEPM-4ATS4L-SSZO7JBWMVBWMVBWMVBWMVBWMVBWMVBWM+UP1

max. 7 valves - 18mm

+ 4x vacuum ejector

- + Pressure build-up vent valve

+ control air switching valve



The maximum number of valves on the robot is 16.

Without ProfiSafe - external switch-off of the valve voltage

The required air volume must be observed.

Without S-air switching valve

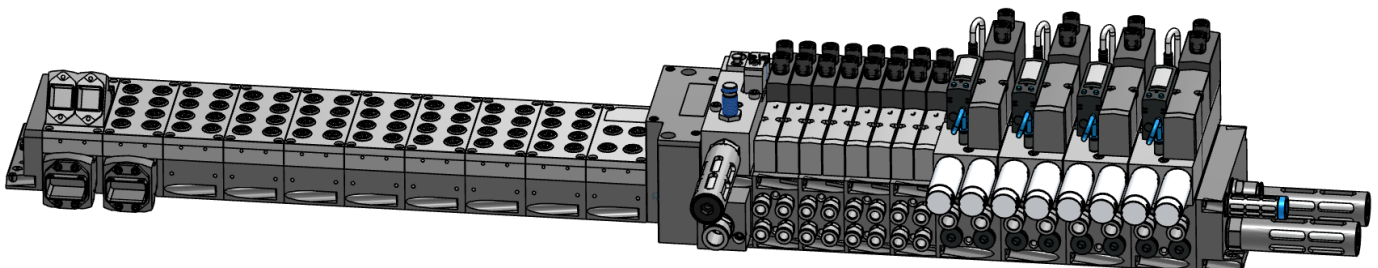
51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNLKA-S

45P-A-V-SMEPP-4ATS4L-8JVBWMVBWMVBWMVBWMVBWMVBWM+UP1

max. 8 valves - 18mm

+ 4x vacuum ejector

- + Pressure build-up vent valve



The maximum number of valves on the robot is 16.

Without ProfiSafe - external switch-off of the valve voltage

The required air volume must be observed.

Without S-air switching valve

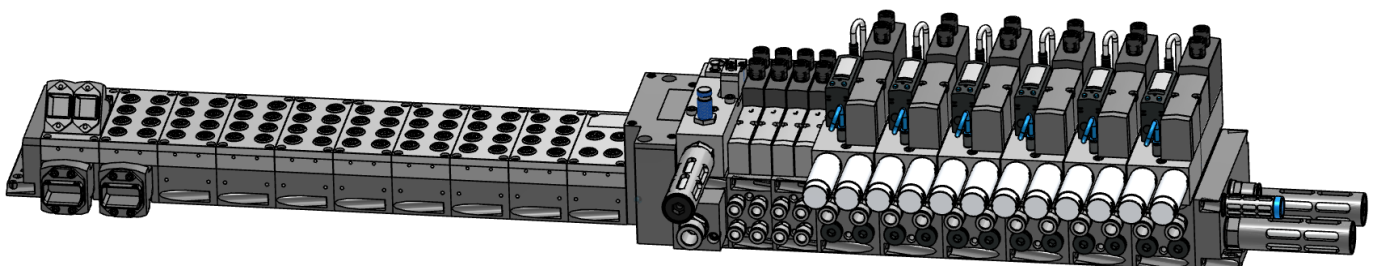
51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNMKBNLKA-S

45P-A-V-SMEPP-AATS6L-4JBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWM+UP1

max. 4 valves - 18mm

+ max. 6x vacuum ejector

- + Pressure build-up vent valve



The maximum number of valves on the robot is 16.

Without ProfiSafe - external switch-off of the valve voltage

The required air volume must be observed.

7.3 Pure vacuum Terminal

TKB

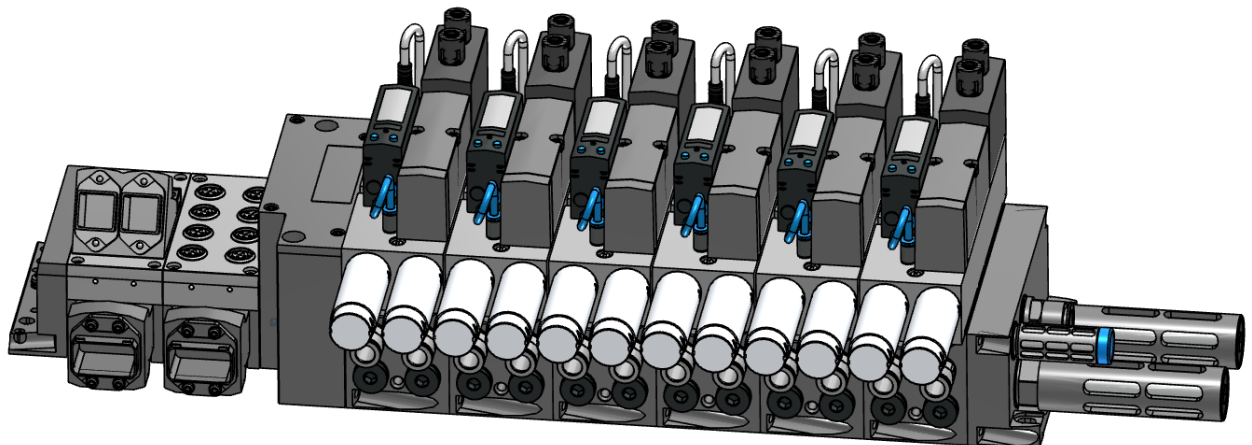
Maximum of six individual vacuum ejectors

Both at the "plant insertion point", "in the protective grid area" and "at the robot".

51E-F44GCQWNMKB-S

45P-A-V-SME-6L-VBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWMVBWM+U

Max. 6 individual vacuum ejectors



The required air volume must be observed.

7.4 Component drawer "Standard / Twin"

In the protective grid area **WITHOUT** soft start valve, **ONLY** permissible **WITHOUT** dangerous movement.

Only permitted on component drawers.

For details: see BMW - "B7 Construction Regulation Chapter 7 Installation"

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNMKBNGKAQF-S

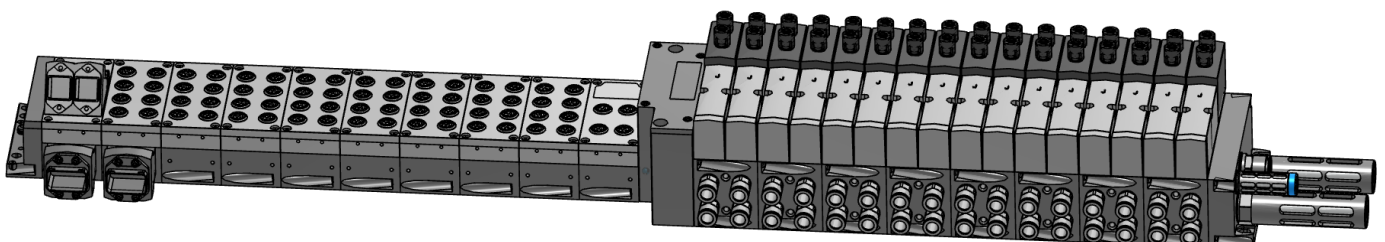
45P-A-V-SME-8B-16J

max. 16 valves - 26mm

No pressure build-up vent valve

No control air switching valve

NO vacuum ejectors



The required air volume must be observed.

7.5 Pure CPX module

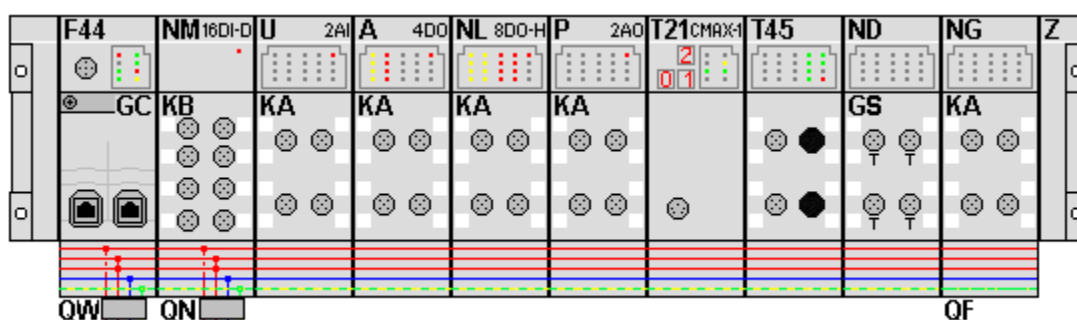
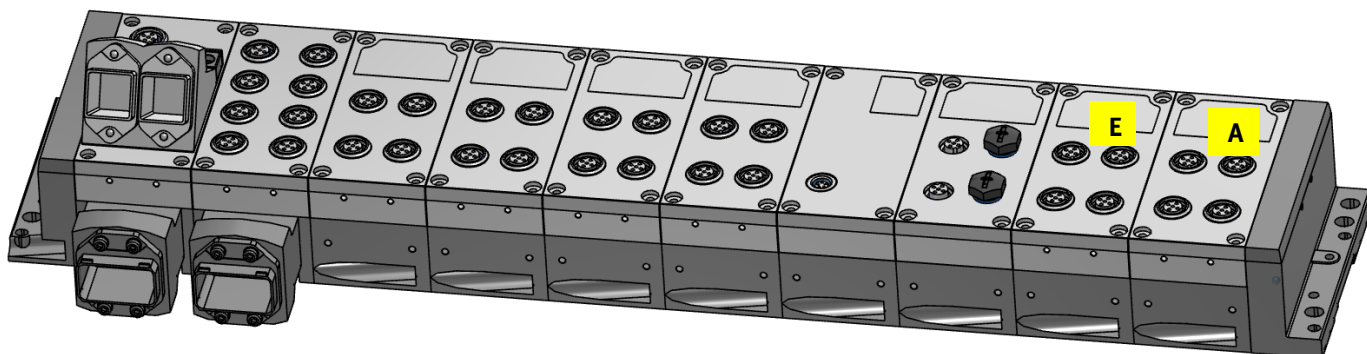
TKB

7.5.1 System area pure CPX module

Permitted modules:

- **NMKB** 16 digital inputs
- **AKA** 4 digital outputs 1A each
- **NLKA** 8 digital outputs 2.1 A each
- **UKA** 2 analogue inputs (current / voltage)
- **PKA** 2 analogue outputs (current / voltage)
- **T45** CTCL - I-O-Link Master
- **T21** Axle controller CMAX
- **NDGS** ProfiSafe input module
- **NGKAQF** ProfiSafe output module

51E-F44GCQWNMKBQNUKAANKAPKAT21T45NDGSNGKAQF-Z



7.5.2 Robot = Master pure CPX module

TKB

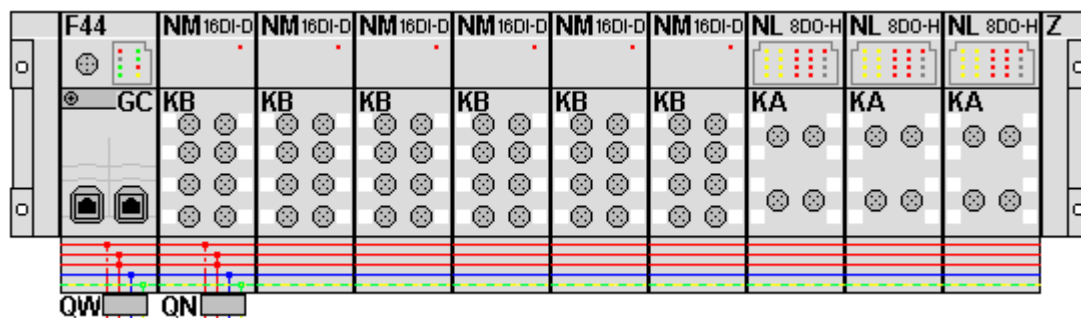
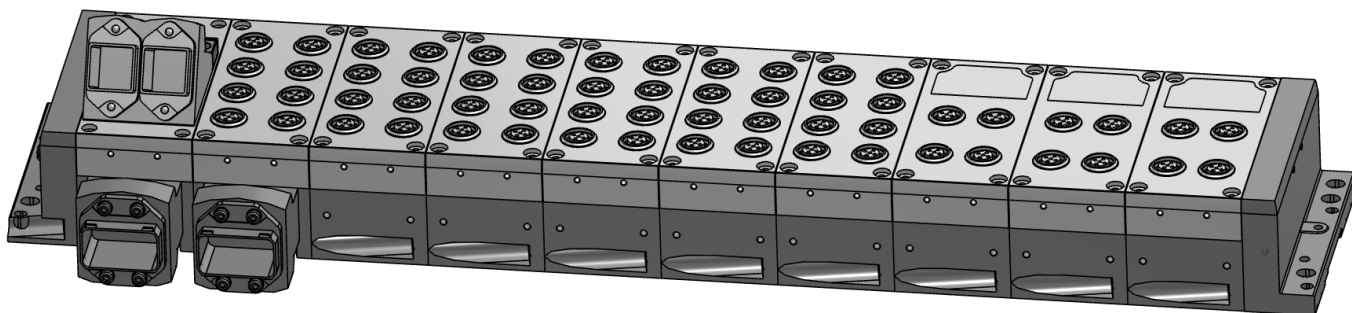
ATTENTION

- **WITHOUT Profisafe input modules**
- **WITHOUT Profisafe output module**
- **WITHOUT analogue modules**

Permitted modules:

- **NMKB** 16 digital inputs
- **AKA** 4 digital outputs 1A each
- **NLKA** 8 digital outputs 2.1 A each

51E-F44GCQWNMKBQNNMKBNMKBNMKBNMKBNMKBNMKBNLKANLKA-Z



8 TEM - TKB - Valve terminals CPX-VTSA-F for cross-technology applications



Detailed: see [BMW construction specification for production equipment](#)

Technology - comprehensive applications that are implemented with the [CPX-VTSA-F](#) (not with CPX-VTSA-F-CB):

In these applications, the **CPX-VTSA-F valve terminal is used in the TKB body construction technology and also in the TEM energy module technology** - across all technologies.

Component - Rotary accumulator

Component - Container tower

Component - Drawer

Variant: Standard

Variant: Standard + tilt window

Variant: Twin

9 Products

9.1 In general

- ➔ The components listed in this component manual correspond to the BMW approval lists TKB and TEM.
- ➔ If other components from the Festo catalogue that are not included in this manual are required for functional reasons, their use must be agreed with the BMW plant engineering managers.
- ➔ No special labelling → approved for and TKB TEM
- ➔ If the components are TKB labelled TEM with or with , they must only be used in the corresponding technology.

9.2 Air treatment

9.2.1 Centralised system feed

9.2.1.1 Highflow air supply with "C2M" for TEM

Type / designation: MAINTENANCE UNIT 3/4" HIGHFLOW C2M
Part no: 8186121

(Maintenance unit with "C2M" exclusively for the 6 bar compressed air network).

BMW-FM-No.: 3C28064

Structure of the maintenance unit (left to right)

Naming	St.	Type	Part no.	
3/4" Connecting plate SET	1	MS6-AGE-EX	541541	TEM
Manual on-off valve incl. silencer	1	MS6-EM1-1/2-S	541268	
Silencer		U-1/2-B	6844	
Module connector	1	MS6-9-AMV-EX	3433264	
Wall mounting SET	1	MS6-WPG	8072794	
Filters	1	MS9-LF-G-EUM	564106	
Replacement filter cartridge 40cm		MS9-LFP-E	570310	
Module connector	1	MS6-9-AMV-EX	3433264	
C2M energy efficiency module with extension	1	MSE6-C2M-5000-FB44-D-M-RG-BAR-AMI-AGE	8227267	
Blanking plug	1	B-1/4	3569	

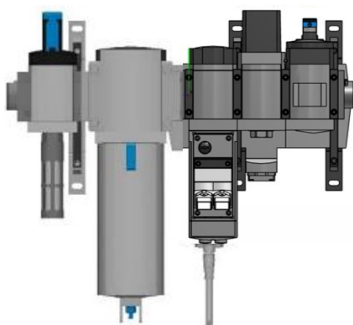
Notice:

- For the C2M energy efficiency module, the BMW planning department has developed a Siemens module for control technology integration in the BMW system environment.
- Further information about flow rate / technology see accompanying documentation: "Kurzbeschreibung Wartungseinheit 3/4" HIGHFLOW mit C2M Tnr.8186121
- Link: [Buy Energy efficiency module MSE6 online | Festo DE](#)

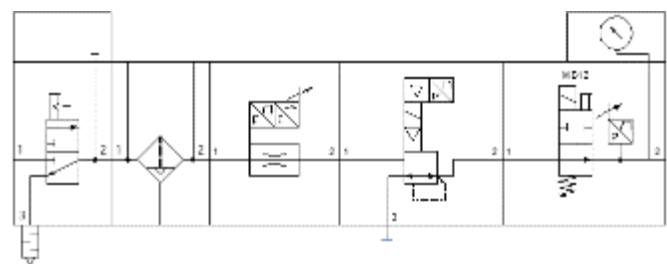
Link: [CAD Files](#)

Link: [Switching symbols](#)

Link: [GSDML - C2M](#)

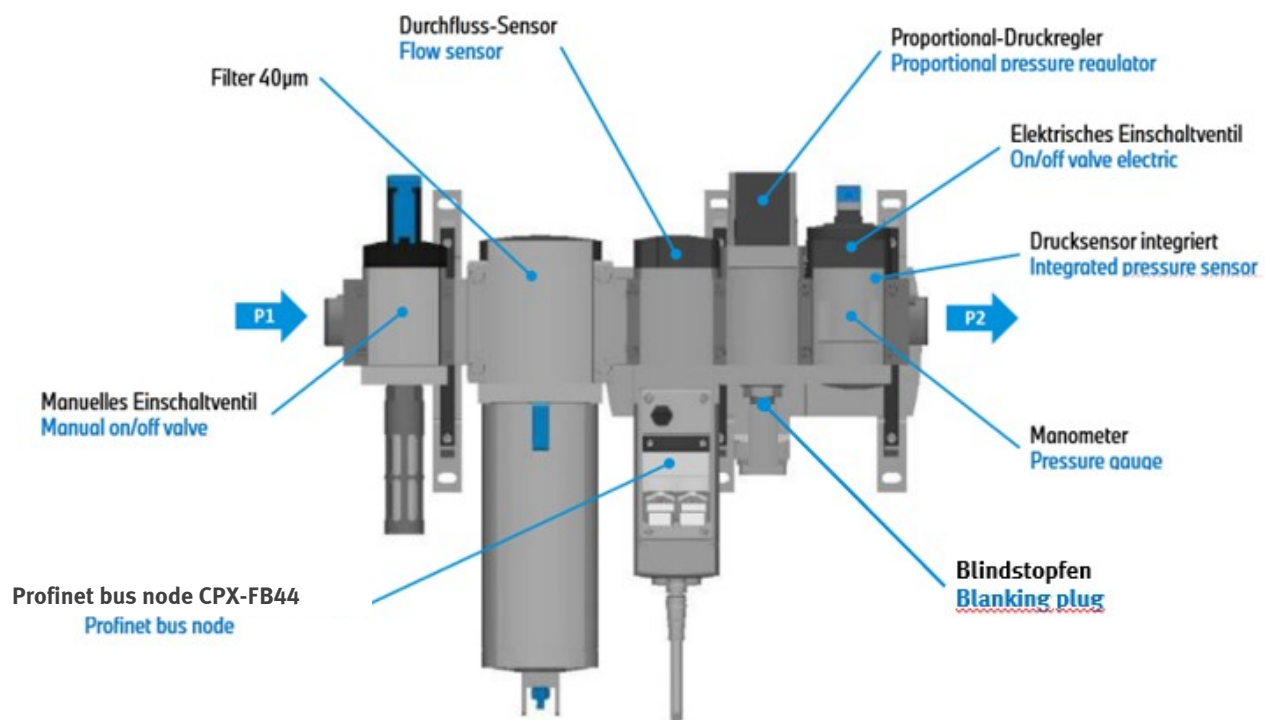


Flow direction



Structure of energy efficiency module MAINTENANCE UNIT 3/4" HIGHFLOW C2M for TEM

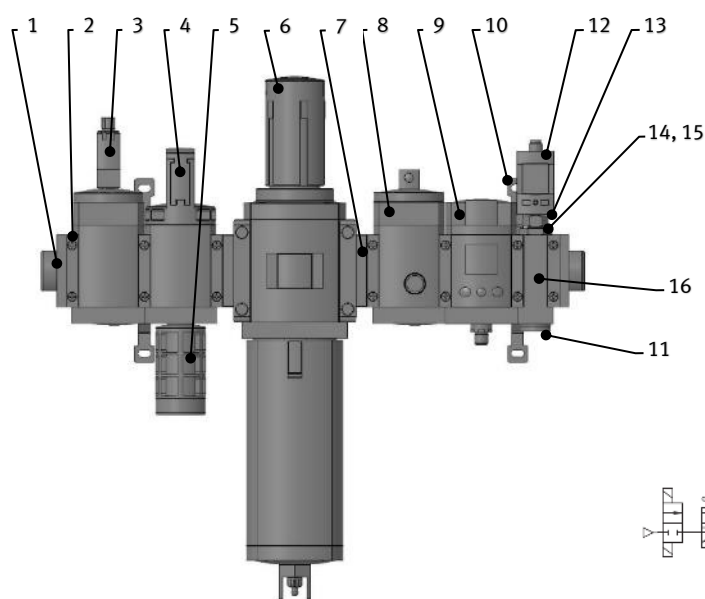
Link: [Energy efficiency module C2M / D2M - Documentation](#)



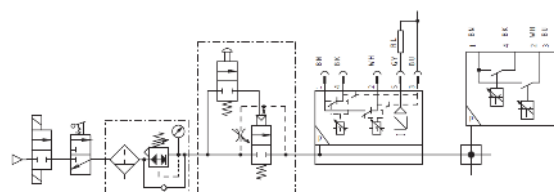
9.2.1.2 High flow system feed - 6 bar - for TKB

TKB

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
System feed 6 bar Ready-to-connect maintenance combination, with filter control valve	MSB6/9-3/4-6bar	8025057	5868798



MSB6/9-3/4-6bar - 8025057

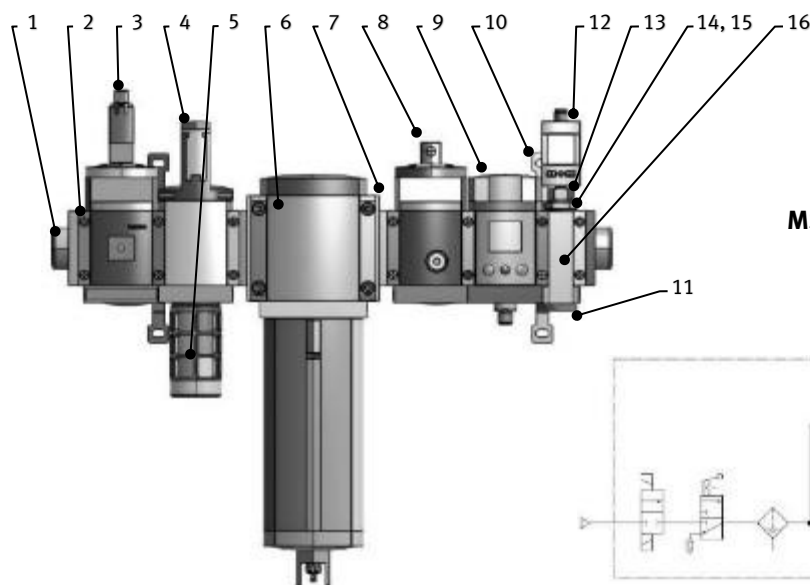


Pos	Piece	Part no.	Designation	Type
1	1	526083	Connecting plate	MS6-AGE
2	3	8119204	Module connector	MS6-MV1
3	1	546868	Switch-on valve	MS6-EE-1/2-V24-SA
4	1	555795	Switch-on valve	MS6-EM1-1/2-SA
5	1	2310	Silencer	U-1/2
6	1	562531	Filter control valve	MS9-LFR-G-D7-E-U-M-AG-BAR-AS
7	2	552951	Module connector	MS6-9-ARMV
8	1	2138223	Pressure build-up valve	MS6-DL-1/2-HHB-SA
9	1	564938	Flow sensor	SFAM-62-5000L-M-2SA-M12
10	2	532195	Mounting bracket	MS6-WP
11	1	3571	Screw plug	B-1/2
12	1	8001222	Pressure sensor SET	SPAU-P16R-H-G18FD-L-PNLK-PNVBA-M12U
13	1	534151	Double nipple	ESK-1/8-1/4
14	1	8030311	Reducing nipple	NPFC-R-G12-G14-MF
15	1	531774	Sealing ring	OK-1/2
16	1	549337	Distribution block	MS6-FRM-FRZ

9.2.1.3 High flow system feed - 12 bar - for TKB

TKB

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
System feed 12 bar Ready-to-connect maintenance combination, with filter WITHOUT control valve	MSB6/9-3/4-12bar	8025058	5868799

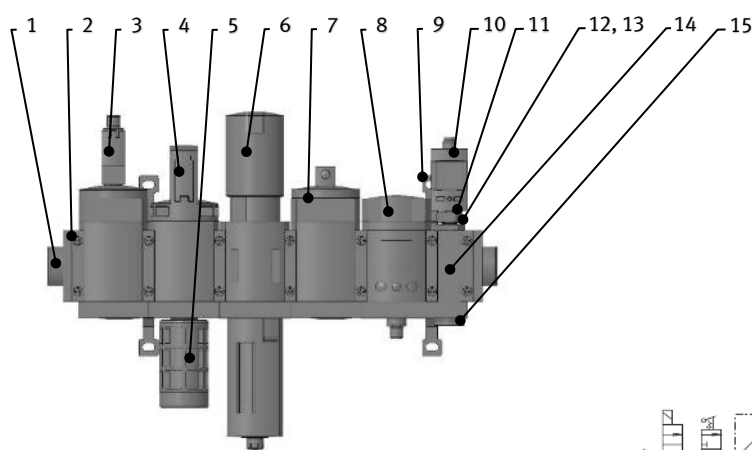


MSB6/9-3/4-12bar - 8025058

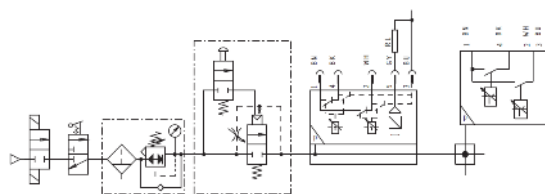
Pos	Piece	Part no.	Designation	Type
1	1	526083	Connecting plate	MS6-AGE
2	3	8119204	Module connector	MS6-MV1
3	1	546868	Switch-on valve	MS6-EE-1/2-V24-SA
4	1	555795	Switch-on valve	MS6-EM1-1/2-SA
5	1	2310	Silencer	U-1/2
6	1	564106	Filters	MS9-LF-G-EUM
7	2	552951	Module connector	MS6-9-ARMV
8	1	2138223	Pressure build-up valve	MS6-DL-1/2-HHB-SA
9	1	564938	Flow sensor	SFAM-62-5000L-M-2SA-M12
10	2	532195	Mounting bracket	MS6-WP
11	1	3571	Screw plug	B-1/2
12	1	8001222	Pressure sensor SET	SPAU-P16R-H-G18FD-L-PNLK-PNVBA-M12U
13	1	534151	Double nipple	ESK-1/8-1/4
14	1	8030311	Reducing nipple	NPFC-R-G12-G14-MF
15	1	531774	Sealing ring	OK-1/2
16	1	549337	Distribution block	MS6-FRM-FRZ

9.2.1.4 Mid Flow system feed - 6 bar - for TKB

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
System feed 6 bar Ready-to-connect maintenance combination, with filter control valve	MSB6-3/4-FRC-6bar	8025626	5868863



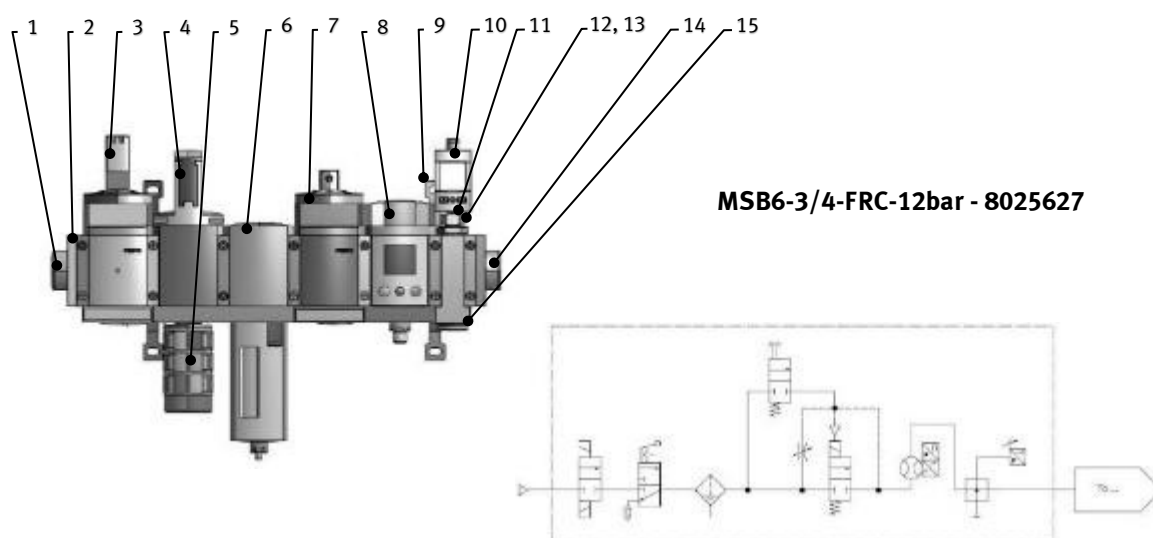
MSB6-3/4-FRC-6bar - 8025626



Pos	Piece	Teile-Nr. / part no.	Designation / Description	Type / Type
1	2	526083	Anschlussplatte / connecting plate	MS6-AGE
2	5	8119204	Modulverbinder / module connector	MS6-MV1
3	1	546868	Einschaltventil / start-up valve	MS6-EE-1/2-V24-SA
4	1	555795	Einschaltventil / start-up valve	MS6-EM1-1/2-SA
5	1	2310	Silencer / silencer	U-1/2
6	1	529188	Filter-Regelventil / filter regulator valve	MS6-LFR-1/2-D7-ERM-AS
7	1	569958	Pressure build-up valve / soft-start valve	MS6-DL-1/2-HHB
8	1	564938	Durchflußsensor / flow sensor	SFAM-62-5000L-M-2SA-M12
9	2	532195	Befestigungswinkel / mounting bracket	MS6-WP
10	1	8001222	Drucksensor-SET / pressure sensor	SPAU-P16R-H-G18FD-L-PNLK-PNVBA-M12U
11	1	534151	Doppelnippel / double nipple	ESK-1/8-1/4
12	1	8030311	Reduziernippel / reducing nipple	NPFC-R-G12-G14-MF
13	1	531774	Dichtring / sealing ring	OK-1/2
14	1	549337	Verteilerblock / distribution manifold	MS6-FRM-FRZ
15	1	3571	Blanking plug / Blanking plug	B-1/2

9.2.1.5 Mid flow system feed - 12 bar - for TKB

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
System feed 12 bar Ready-to-connect maintenance combination, with filter WITHOUT control valve	MSB6-3/4-FRC-12bar	8025627	5868864

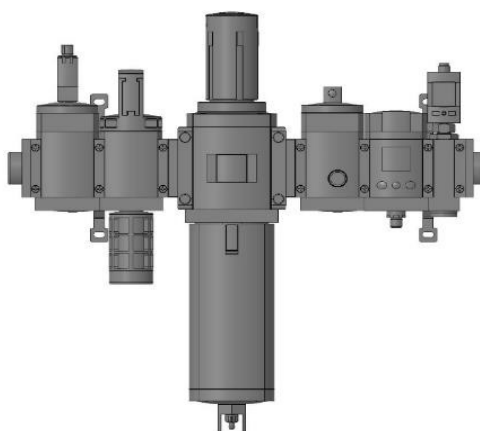


Pos	Piece	Teile-Nr. / part no.	Designation / Description	Type / Type
1	2	526083	Anschlussplatte / connecting plate	MS6-AGE
2	5	8119204	Modulverbinder / module connector	MS6-MV1
3	1	546868	Einschaltventil / start-up valve	MS6-EE-1/2-V24-SA
4	1	555795	Einschaltventil / start-up valve	MS6-EM1-1/2-SA
5	1	2310	Silencer / silencer	U-1/2
6	1	529615	Filter / filter	MS6-LF-1/2-ERM
7	1	569958	Pressure build-up valve / soft-start valve	MS6-DL-1/2-HHB
8	1	564938	Durchflusssensor / flow sensor	SFAM-62-5000L-M-2SA-M12
9	2	532195	Befestigungswinkel / mounting bracket	MS6-WP
10	1	8001222	Drucksensor-SET / pressure sensor	SPAU-P16R-H-G18FD-L-PNLK-PNVBA-M12U
11	1	534151	Doppelnippel / double nipple	ESK-1/8-1/4
12	1	8030311	Reduziernippel / reducing nipple	NPFC-R-G12-G14-MF
13	1	531774	Dichtring / sealing ring	OK-1/2
14	1	549337	Verteilerblock / distribution manifold	MS6-FRM-FRZ
15	1	3571	Blanking plug / Blanking plug	B-1/2

9.2.1.6 Commissioning instructions for 6/12 bar system feed-in

High flow system feed

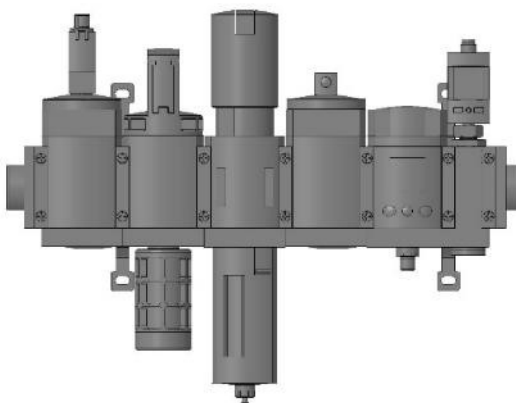
	Start-up valve Start-up valve	Manual start-up valve Start-up valve	Filter/regulator Filter/ regulator	Pressure build-up valve Soft-start valve	Flow sensor Flow sensor	Pressure sensor Pressure sensor
	MS6-EE-1/2-V24-SA 546868	MS6-EM1-1/2-V24-SA 555795	MS9-LFR-G-D7-E-U-M- AG-BAR-AS 562531 MS9-LF-G-EUM 564106	MS6-DL-1/2-HHB-SA 2138223	SFAM-62-5000L-M-2SA-M12 564938	SPAU-P16R-H-G18FD-L- PNLK-PNVBA-M12U 8001222
MSB6/9-3/4-FRC-6 TNR 8025057	Pin 2 Signal (-) Off Pin 3 Ground Pin 4 Signal (+) On	Venting 2 → 3	6 bar	Setpoint throttle / Setpoint throttle Closed / closed approx. 600 l/min	Consumption measurement / consumption measurement 100 l = 1 pulse EDIT → Out A → ConS → L → 100 → NO	Switching point / Switching point SP 5 bar EDIT → Out B → 2x EDIT → SP = 5 or 10 → HY 0.032 → NO - → 2x EDIT
MSB6/9-3/4-FRC-12 TNR 8025058	ditto	ditto	No setting required!	ditto	ditto	SP 10 bar



Picture shows TNR 8025057

Mid flow system feed

	Start-up valve Start-up valve	Manual start-up valve Start-up valve	Filter /-regulator Filter /-regulator	Pressure build-up valve Soft-start valve	Flow sensor Flow sensor	Pressure sensor Pressure sensor
	MS6-EE-1/2-V24-SA 546868	MS6-EM1-1/2-V24-SA 555795	MS6-LFR-1/2-D7-ERM- AS-AS 529188 MS6-LF-1/2-ERM 529615	MS6-DL-1/2-HHB 569958	SFAM-62-5000L-M-2SA-M12 564938	SPAU-P16R-H-G18FD-L- PNLK-PNVBA-M12U 8001222
MSB6-3/4-FRC-6 TNR 8025626	Pin 2 Signal (-) Off Pin 3 Ground Pin 4 Signal (+) On	Venting 2 → 3	6 bar	Setpoint throttle / Setpoint throttle 6 turns open / 6 turns open approx. 140 l/min	Consumption measurement / consumption measurement 100 l = 1 pulse EDIT → Out A → ConS → L → 100 → NO	Switching point / Switching point SP 5 bar EDIT → Out B → 2x EDIT → SP = 5 or 10 → HY 0.032 → NO - → 2x EDIT
MSB6-3/4-FRC-12 TNR 8025627	ditto	ditto	No setting required!	ditto	ditto	SP 10 bar



Picture shows TNR 8025626

9.2.2 Decentralised venting 1/2 " with slow pressure build-up "MS6-SV-C.." for TEM

TEM

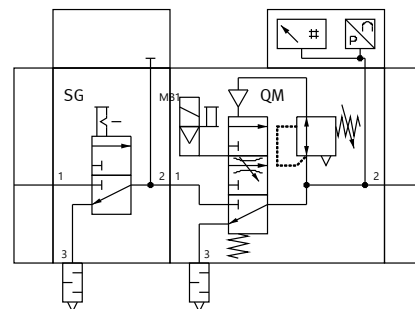
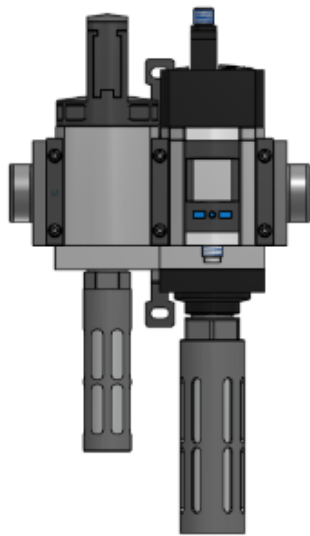
531030 - MSB6-AGD:C4:V54-WP

TEM

Note: Used in front of robots

Structure of the maintenance unit (left to right)

Naming	St.	Type	Part no.
1/2" Connecting plate SET	1	MS6-AGD	526082
Module connector	2	MS6-MV1	8119204
Manual on-off valve incl. silencer	1	MS6-EM1-1/2-S	541268
Mounting bracket	1	MS6-WP	532195
Silencer (component of MS6-EM1-1/2-S)		U-1/2-B	6844
Pressure build-up and venting valve incl. pressure sensor	1	MS6-SV-1/2-C-10V24F-S-AD11	548713
Silencer (component of MS6-SV-1/2-C-10V24F-S-AD11)		U-3/4-B	6845
Pressure sensor (component of MS6-SV-1/2-C-10V24F-S-AD11)		SPAU-P10R-MS6-F-L-PNLK-PNVBA-M12D	8074906

Link: [CAD Files](#)Link: [Switching symbols](#)

**Pressure build-up and venting valve
with upstream manual on/off/vent valve**

- 1) Screw for setting the pressure changeover point in % of p1
- 2) Throttle screw for setting the filling time
- 3) Manual override on the pressure build-up/bleed valve
 - Latching, self-resetting as soon as the solenoid coil is switched on electrically
 - can only be pushed from the outside (not pulled)
 - Resetting the latching function ELECTRICAL 24V
- 4) Manual reset of the manual override on the pressure build-up/bleed valve using button 4. The pressure via the manual switch-on valve must be present for this.

Case studies:

Solenoid coil electrically not switched

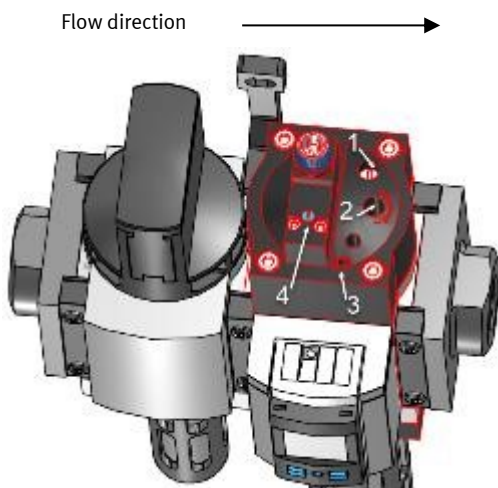
Manual operation of the manual override (3): --> System is pressurised

Manual venting via upstream manual switch-on valve: --> System is vented

Manual activation of the pressure via the manual activation valve for with the manual override (3) pressed and the solenoid not switched:

--> Pressure in the system rises slowly (pressure build-up function).

Manual override (3) is reset by electrically switching on the solenoid or by manually pressing button (4).



9.2.3 Decentralised ventilation 1/2 " with slow pressure build-up for TKB

Type (Festo)	Part No. (Festo)	Designation	BMW FM No.
VABF-S6-1-P5A4-G12-4-1-P-SA	570915	Pressure build-up valve standalone	6028357

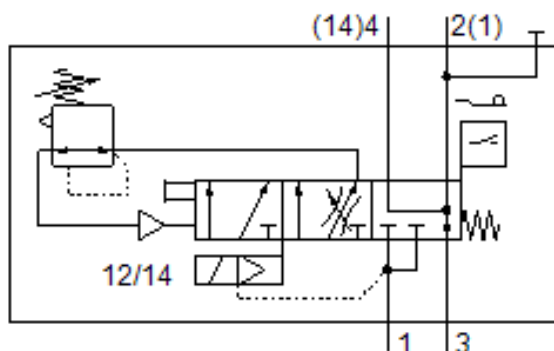
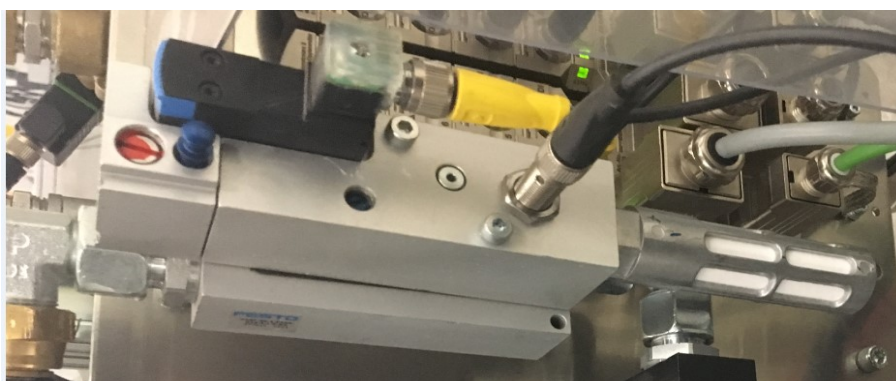
Consisting of:

Type	Designation	Part no.
VABF-S6-1-P5A4-G12-4-1-P-SA	Pressure build-up valve	570916
VAR3-SA	Base plate	749120
U-1/2-B	Silencer	6844

Weight	1075 g
Pneumatic connection	G 1/2 on both sides
Pressure range	0 - 12 bar
Electrical connection valve coil	Plug, wiring diagram form C according to EN 175301-803
Sensor connection	Plug, 4-pin, M12x1

Accessories (please order separately)

Type	Designation	Part no.
MSSD-EB-M12-MONO	M12 adapter soft start valve  Straight plug, M12x1, 2-pin, A-coded	188024

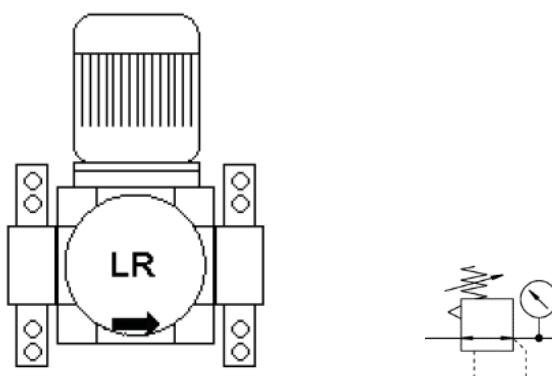


9.2.4 Air feed handling for TKB

Note: Only use in the 12 bar network to reduce the working pressure

Application: on the robot with changeover between welding guns (12 bar) and handling (max. 6 bar).
The air feed reduces the robot inlet pressure from 12 bar to 6 bar during handling.

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
Air feed Handling	D-1/4-MINI	8022470	5279674

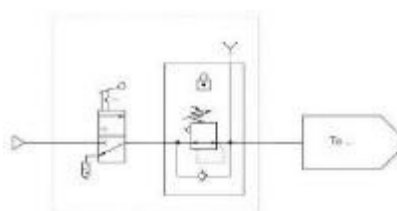
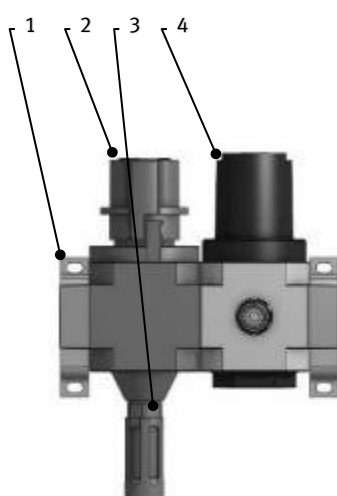


Consisting of

Pos.	Designation	Piece	Type (Festo)	Part No. (Festo)
1	Mounting bracket	1	HFOE-D-MINI	159638
2	Pressure control valve	1	LR-1/4-D-7-MINI	162583

9.2.5 Air feed robot for TKB

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
Robot air feed Pressurisation of the pneumatic welding guns on the robot with max. 10.5 bar pressure. Reduction of the inlet pressure (hall network) from approx. 12 bar to max. p2 = 10.5 bar --- Tolerance -0.5 bar.	LR-1/2-D-I-MIDI-CS	8119296	6420582



Consisting of

Pos.	Designation	Piece	Type (Festo)	Part No. (Festo)	BMW FM No.
1	Mounting bracket	1	HFOE-D-MIDI/MAXI	159593	6543947
2	Manual on-off valve	1	HE-1/2-D-MIDI	162810	5666444
3	Silencer	1	U-1/4-B	6842	3B91B32
4	Pressure regulator robot feed Including coupling socket KD3-1/4-A, TNR 531626 for control pressure gauge	1	LR-D-I-MIDI-CS	8119295	6420583

9.2.6 Manual switch-on valve MSx-EM1-...-S-WP

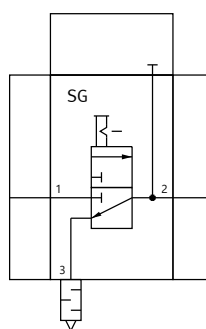
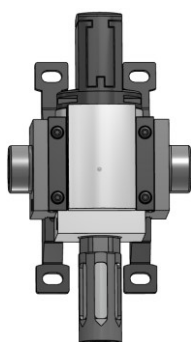
Part no: **541266** (The identcode must also be specified)

Identcode: **MS4-EM1-AGC-S-WP**

Naming	St.	Type	Part no.
3/8" connection plate SET	1	MS4-AGC	526070
Mounting bracket	1	MS4-WP	532184
Manual on-off valve incl. silencer	1	MS4-EM1-1/4-S	541259

Link: [CAD Files](#)

Link: [Switching symbols](#)



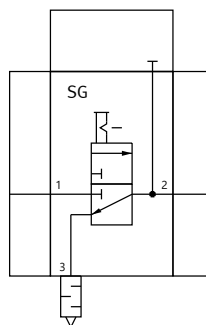
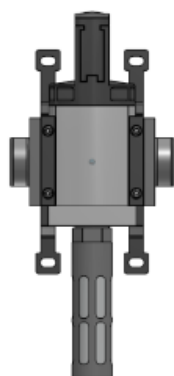
Part no: **541279** (The ident code must be specified)

Identcode: **MS6-EM1-AGD-S-WP**

Naming	St.	Type	Part no.
1/2" Connecting plate SET	1	MS6-AGD	526082
Mounting bracket	1	MS6-WP	532195
Manual on-off valve incl. silencer	1	MS6-EM1-1/2-S	541268

Link: [CAD Files](#)

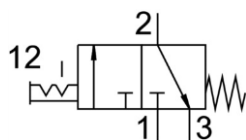
Link: [Switching symbols](#)



Flow direction

9.2.7 Manual on-off valve 3/2-way - HE-... for TKB

Designation	Type (Festo)	Part No. (Festo)	BMW FM No.
Switch-on valve	HE-1/4-D-MIDI	186513	6420574
Switch-on valve	HE-1/2-D-MIDI	162810	5666444
Switch-on valve	HE-3/4-D-MIDI	162811	5868795
Mounting bracket	HFOE-D-MIDI/MAXI	159593	6543947



9.2.8 Ultra-fine filter combination for TEM

TEM

Ultra-fine filter - combination 1/2"

531030 - MSB6-AGD:H3:I10:I5-WP

TEM

Notes: **Filtering: 5µm - 1µm - 0.01µm**
Class 2:3*:2 (Particles:Water:Oil According to ISO 8573-1:2010)

* Festo assumes an ISO class 4 water content as standard.

According to **BMW B7 construction regulation chapter 7**, ISO class 3 is already fulfilled here.

Class 2:3:2 is therefore achieved by the additional installation of an ultra-fine filter combination.

Max. standard flow rate for clean air class 900 l/min

Min. standard flow rate for clean air class 135 l/min

Structure of the maintenance unit (left to right):

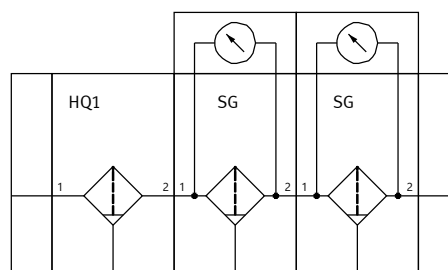
Naming	St.	Type	Part no.
1/2" connection plate SET	1	MS6-AGD	526082
Module connector	2	MS6-MV1	8119204
Mounting bracket	2	MS6-WP	532195
Filter 5µm	1	MS6-LF-1/2-CRM	529607
Replacement filter cartridge 5µm		MS6-LFP-C	534499
Fine filter 1µm	1	MS6-LFM-1/2-BRM-DA	536835
Replacement filter cartridge 1µm		MS6-LFM-B	532910
Ultra-fine filter 0.01µm	1	MS6-LFM-1/2-ARM-DA	536871
Replacement filter cartridge 0.01µm		MS6-LFM-A	532909

Link: [CAD Files](#)

Link: [Switching symbols](#)



LF LFM LFM
 →
 Flow direction



9.3 Valve terminals

- Important notes

Excel valve terminal configurators:

The most common applications in the two technologies TKB and TEM can be configured using the corresponding Excel valve terminal configurators.

- **CPX-VTSA-F**
--> independent valve terminal configurator for **TKB - Car body construction technology** 
- **CPX-VTSA-F-CB**
--> Independent valve terminal configurator for **TEM technology energy module** 

Between the TKB and TEM technologies, the valve terminals VTSA-F or VTSA-F-CB MUST NOT BE MIXED.

Exception:

Chapter 8 - "CPX-VTSA-F valve terminals for cross-technology applications"

--- Rotary storage --- Container tower --- Drawer

These units are implemented in both TKB and TEM - ALWAYS with the CPX-VTSA-F valve terminal.

The configurator only offers the standard hose sizes corresponding to the valve size.

The input/output sensors belonging to the actuators must be implemented via the CPX.

9.3.1 CPX - Modular electrical terminal for TEM & TKB



Example image CPX

[GSDML - VTSA-F-CB vacuum ejector data set mode Basic](#)
[Link Excel configurator CPX Terminal CPX](#)
[Link online spare parts catalogue CPX individual parts](#)

51E	197330	CPX-M - Modular electrical terminal without pneumatics, metal				
As a stand-alone terminal or in conjunction with VTSA-F-CB valve terminals						
51E- 46P-	8073100	Valve terminal type 46 VTSA-F-CB / with C-BUS / with CPX Metal version				
Identcode	Picture	Part no.		Type code	Naming	
		550212		CPX-M-EPL-EV	End plate	
PROFINET fieldbus node						
F44		8110370		CPX-M-FB44	Fieldbus node for PROFINET IO, 2 x AIDA Push Pull RJ45, metal version	
Interlinking blocks						
QW / QN		563057		CPX-M-GE-EV-S-PP-5POL	Interlinking block with system feed, push-pull	
		550206		CPX-M-GE-EV	Interlinking block	
Digital input/output modules						
NM		550202		CPX-M-16DE-D	Input module 16 digital inputs (channel diagnostics)	
NL		550204		CPX-8DA-H	Output module 8 digital outputs (high current)	



Example image CPX

Link Excel configurator CPX [Terminal CPX](#)

Link online spare parts catalogue [CPX individual parts](#)

Identcode	Picture	Part no.		Type code	Naming	
Analogue input/output modules Attention: Not permitted for TEM on robots!						
U		526168	CPX-2AE-U-I	Input module 2 analogue inputs (current or voltage)		TKB
NI		573710	CPX-4AE-U-I	Input module 4 analogue inputs (current or voltage)		TEM
P		526170	CPX-2AA-U-I	Output module 2 analogue outputs		
T		541486	CPX-4AE-T	Input module 4 analogue inputs (temperature)		TEM
NY		560362	CPX-4AE-P-D10	Input module 4 analogue inputs, pressure 0 10 bar		TEM
Connection blocks						
KA		549367		CPX-M-AB-4-M12X2-5POL	Terminal block 4xM12, 5-pin, double, metal version	
KB		549335		CPX-M-AB-8-M12X2-5POL	Terminal block 8xM12, 5-pin, double, metal version	



Example image CPX

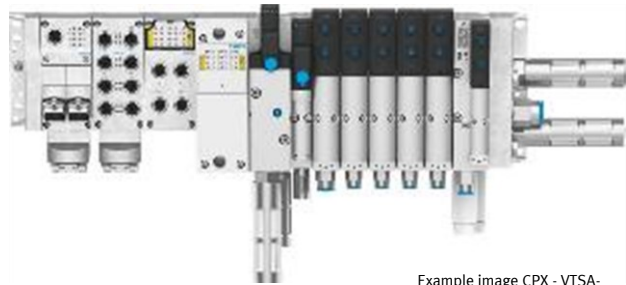
Link Excel configurator CPX [Terminal CPX](#)

Link online spare parts catalogue [CPX individual parts](#)

Identcode	Picture	Part no.		Type code	Naming	
ProfiSafe input module: Cannot be used on the robot (robot = master)						
ND		2597424		CPX-F8DE-P	Profisafe input module CPX-F8DE-P	
		550206		CPX-M-GE-EV	Interlinking block	
GS		2639560		CPX-M-AB-4-M12X2-5POL-T	Connection block 4xM12, clocked sensor supply, metal version	
ProfiSafe switch-off module: "Only for CPX terminals purely electric". Cannot be used in conjunction with VTSA-F-CB. Cannot be used on the robot (robot = master)						
NG		1971599		CPX-FVDA-P2	ProfiSafe switch-off module CPX-FVDA-P2	
KA		549367		CPX-M-AB-4-M12X2-5POL	Terminal block 4xM12, 5-pin, double, metal version	
QF		567806		CPX-M-GE-EV-FVO	Interlinking block for safety cut-off module	
Axle controller CMAX						
T21		548932		CPX-CMAX-C1-1	Axle controller Cmax	TKB
End plate right						
Z		550214		CPX-M-EPR-EV	CPX end plate right	
Accessories						
		550217		CPX-M-BG-RW-2X	Mounting bracket	
BA		165592		ISK-M12	Cover cap M12 To be ordered separately	

9.3.2 Ventilinsel VTSA-F-CB nur für TEM

TEM



Example image CPX - VTSA-F-CB

Link Excel configurator [valve terminal VTSA-F-CB](#)Link online spare parts catalogue [individual parts VTSA-F-CB](#)

51E-46P-	8073100	Valve terminal type 46 VTSA-F-CB / with C-BUS / with CPX metal version		TEM
51E-F44GCQWNMKBQTNDGS-RC Example code CPX				
46P-N-QS-NSAQBDEMGM-WG-PVPNZQZYBAAYQTLQIMCZQN-CS5J+U Example code VTSA-F-CB				
Identcode	Part no.		Hint	
46P			Valve terminal type 46, modular sub-base valves, flow-optimised design	
RA	8082876		CPX pneumatic interface, serial communication; Not a professional safe. a) on robot if robot = master without vacuum max. 16 working valves 18mm b) on robot if robot = master with vacuum Max. 12 working valves 18mm + max. 4 vacuum ejector. c) for pure vacuum Terminals max. 6 vacuum ejectors.	
RC	8068240		CPX pneumatic interface, serial communication. With 3 internal safe zones (ProfiSafe), Zone 0: Auxiliary pilot air valve and working valves max. 23 working valves - max. 4 vacuum ejectors Zone 1: Pressure build-up -/- vent valve.	
Manual override				
N	541010		Cover cap: Button end per valve coil	
Push-in fittings version				
QM	-		Metal screw connections with metal release ring, type NPQM	
Connection size right end plate channel 1/3/5				
N	539234		Right-hand end plate connection 1: 1/2 " with internal auxiliary control air 14.	
Connection type right end plate channel 1				
AQ	558672		Push-in fitting, straight NPQM-D-G12-Q12-P10	
AL *	558719		Push-in fitting, angled NPQM-L-G12-Q12-P10	
AB	3571		Blanking plug	

Identcode	Part no.		Hint	
Channel 1 connection				
BD	558672		Plug-in connection right end plate NPQM-D-G12-Q12-P10	
Connection type right end plate duct 12 (venting control air)				
ES	1205861		Silencer Sinter AMTE-M-LH-G14	
Connection type duct 3/5 (venting)				
GS	1205863		Silencer Sinter AMTE-M-LH-G12	
Working connections 2 / 4				
WG	-		Push-in fitting, straight	
IA	558662		Size 18mm Push-in connection 6mm NPQM-D-G18-Q6-P10	
JB	558665		Size 26mm Push-in connection 8mm NPQM-D-G14-Q8-P10	
No identifier *	558663		Size 18mm Push-in connection 8mm 1/8" NPQM-D-G18-Q8-P10	
	558666		Size 26mm Push-in connection 10mm NPQM-D-G14-Q10-P10	
For CPX module slots, see the selection options for CPX-M - Modular electrical terminal				
Module location - interlinking block				
A	8067932		Linking plate for size 18 mm - 2 valve positions, 4 addresses	
B	8067940		Linking plate for size 26 mm - 2 valve positions, 4 addresses	
UW	8104041		Additional supply venting plate with address extension for unsafe voltage zone - if RA = without ProfiSafe For number of working valves > 11/12 pcs.	
USW	8104043		Extension module with additional safe electrical zone (2), if RC = with ProfiSafe For number of working valves > 11 and ProfiSafe	
YB	8068913		Base plate for control air switching valve for Terminals 18mm	
YC	8068912		Base plate for control air switching valve for Terminals 26mm	
PV	8068609		Interlinking plate Vent valve Own voltage zone, 0 addresses (Combination PVPN with RC adapter)	
PS	8068610		Interlinking plate Vent valve Same voltage zone, 0 addresses (combination PSPM with RA adapter) For robot = master with vacuum.	
	1205863		Silencer Sinter AMTE-M-LH-G12	
	1205862		Silencer Sinter AMTE-M-LH-G38	
Vacuum generator nominal width Laval nozzle and vacuum type (if module position Q is selected)				
QIPH	8088780		Vacuum suction nozzle, 1.4 mm high vacuum, with power ejector pulse	
Manual override vacuum generator				
ZQN	541010		Push-button cover cap	
Duct separations				
S*	539228		Channel separation 1 / 3 / 5	
TL	8060483		Duct separation 1/14. TS with VTSA-F- (when using vacuum ejectors)	
Valve position				
Pressure build-up and venting valve				

Identcode	Part no.		Hint	
PN / ZQZ	8067405		Pressure build-up valve, WITHOUT pilot air supply, Manual override: ZQZ latching - electrically self-resetting	
PM/ ZQZ	8067407		Pressure build-up valve, WITH pilot air supply, With: Robot = Master with vacuum Manual override: ZQZ latching - electrically self-resetting	
Note:	For valve terminals on robots (robot = master): a) Without vacuum Select with auxiliary pilot air valve without soft start valve in the valve terminal. A manual on-off valve and an electric pressure build-up and venting valve in front of the robot for this purpose select ----> see chapter 6.3.4 b) With vacuum. Only venting valve on valve terminal without auxiliary pilot air valve c) Interchangeable gripper See chapter 6.3.4.3 (if at least one vacuum Terminal occurs). See also examples in chapter: 6.3			
	Control air switching valve			
CS	8066569		3/2 control air switching valve internal control air supply via channel 1 of the pressure zone. Latching, electrically self- resetting ; Pressure monitoring control air switching valve INTERNAL	
Valves 18mm ISO-02				
O	539185		5/2 way valve, monostable, mechanical spring	
J	539182		5/2-way pulse valve, bistable	
E	539187		5/3-way valve, centre position vented	
B	539186		5/3-way valve, ventilated centre position	
L	539213		Reserve space	
ZA	540153		Pressure regulator plate for connection 1, max. 10 bar	
ZD	540165		Pressure regulator plate for connection 4/2, max. 10 bar	
ST	543487		Pressure gauge, 10 bar, bar/psi scale	
Valves 26mm ISO-01				
O	539159		5/2 way valve, monostable, mechanical spring	
J	539156		5/2-way pulse valve, bistable	
E	539161		5/3-way valve, centre position vented	
B	539160		5/3-way valve, ventilated centre position	
L	539212		Reserve space	
ZA	540154		Pressure regulator plate for connection 1, max. 10 bar	
ZD	540166		Pressure regulator plate for connection 4/2, max. 10 bar	
ST	543487		Pressure gauge, 10 bar, bar/psi scale	

* Not part of the Excel configurator / Only in consultation with BMW

ISO 01-F (26mm) standard for use on tools and stationary applications!					
B	Linking plate for bistable valves	VABV-S4-1HS-G14-2T2	546211	5677178	
SS	5/2-way valve, monostable, with switching position monitoring (S air valve)	VSVA-B-M52-MZD-A1-1T1L-APX-0.5	570850	5868872	
ZO	Intermediate plate for feature SS (S air valve)	VABF-S4-1-S	570851	5868873	
O	5/2-way valve, monostable, mech. spring	VSVA-B-M52-MZD-A1-1T1L	539159	5749289	
J	5/2-way pulse valve, bistable	VSVA-B-B52-ZD-A1-1T1L	539156	5677180	
B	5/3-way valve, ventilated centre position	VSVA-B-P53U-ZD-A1-1T1L	539160	5677181	
E	5/3-way valve, centre position vented	VSVA-B-P53E-ZD-A1-1T1L	539161	5677183	
G	5/3-way valve, centre position locked Only approved for Destaco swivelling units RFM and GR!	VSVA-B-P53C-ZD-A1-1T1L	539162	3013258	
L	Reserve space (cover)	VABB-S4-1-WT	539212	5677184	
ZA	Controller plate for connection 1	VABF-S4-1-R1C2-C-10	540154	5677084	
End plates, supply plates					
V	Right-hand end panel, with supply air/exhaust air, internal S-air	VABE-S6-1R-G12	539234	5677085	
XP2	Right-hand end panel, with supply air/extract air, external S-air (Only in conjunction with soft start valve)	VABE-S6-1RZ-G12	539236	5677086	
	Additionally: Blanking plug in 1	B-1/2	3571	5677087	
	Additionally: Blanking plugs in 14	B-1/4	3569	5677088	
XS	Right-hand end panel with supply air/exhaust air, external S-air (Only for S-air switching valve, without vacuum, without soft start valve)	VABE-S6-1RZ-G12	539236	5677086	
	Additionally: Blanking plugs in 14	B-1/4	3569	5677088	
PM	Soft start valve (as individual part) (if SSZO - control air switching valve selected)	VABF-S6-1-P5A4-G12-4-1-P	557377	6746429	
	Linking plate Soft start valve	VABV-S6-1Q-G12	556989	6746428	
	Gasket for soft start valve PM as spare part	VABF-S6-...	725611	---	
PP	Soft start valve (as individual part) (without SSZO - control air switching valve)	VABF-S6-1-P5A4-G12-4-1-P	557377	6746429	
	Linking plate Soft start valve	VABV-S6-1Q-G12	556989	6746428	
	Gasket for soft start valve PP as spare part	VABF-S6-...	716272	---	
P1	M12 adapter soft start valve	MSSD-EB-M12-MONO	188024	5677090	
VB WM	Vacuum module, 2x1.4mm nozzle, 2x single silencer Vacuum module in combination with TS seal	VABF-S4-1-V2B1-C-VH-14-CS	8060484	5197593	
L	Interlinking plate for VBWM (without TS gasket)	VABV-S4-1HS-G14-2T2	546211	5677178	
TS	Seal for vacuum module	VABD-S6-1-P8-C	8060483	3A29AD6	

S	Channel separation 1, 3, 5 (necessary for Interbus handling without S air switching valve)	VABD-S6-1-P3-C	539228	3B91B47	L6/L7 Integration
LW- /LX	Ventilation plate/supply plate left with supply air1, exhaust air 3/5 together	VABF-S6-1-P1A7-G12	539231	5868874	
Accessories					
U	Silencer quick exhaust Soft start valve	U-1/2	2310	5677091	
	Additional mounting bracket for CPX	CPX-M-BG-RW-2X	550217	5677092	
U	Additional mounting bracket for VTSA	VAME-S6-W-46M	567038	3A69746	
S	Silencer for quick exhaust Soft start valve and connection 3 and 5	U-1/2-B	6844	5656032	
S	Silencer connection 12	U-1/4	2316	5677094	
ME	Screw connection for working connections with ISO 02	NPQM-D-G18-Q8-P10	558663	5868759	
ME	Screw connection for working connections with ISO 01	NPQM-D-G14-Q10-P10	558666	5868761	
ME	Screw fitting for connection 1	NPQM-D-G12-Q14-P10	570451	5868768	
	Interlinking plate seal	VABD-S6-10-C	668436	---	
A	Cover robust manual override, tactile	VAMC-B-S6-CTR	4105147	5197613	

9.4 Pneumatic drives

9.4.1 Compact cylinder ADN-...to ISO 21287

Name	Remarks	Picture	Documentation	Comment
Compact cylinder ADN	Diameter 16, 20, 25, 32, 40, 50, 63, 80, mm Stroke length max 80 mm Force 121 ... 3016 N Double-acting Fixed/self-adjusting damping		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
ADN-16-10-A-P-A	536220	Data sheet	3C280F5	
ADN-16-20-A-P-A	536222	Data sheet	3C280F6	
ADN-16-30-A-P-A	536224	Data sheet	3C280F7	
ADN-16-40-A-P-A	536225	Data sheet	3C280F8	
ADN-16-50-A-P-A	536331	Data sheet	3C280F9	
ADN-16-60-A-P-A	8178763	Data sheet	3C28100	
ADN-16-70-A-P-A	594950	Data sheet	3C28101	
ADN-20-10-A-PPS-A	577166	Data sheet	3C28102	
ADN-20-20-A-PPS-A	577168	Data sheet	3C28103	
ADN-20-30-A-PPS-A	577170	Data sheet	3C28104	
ADN-20-40-A-PPS-A	577171	Data sheet	3C28105	
ADN-20-50-A-PPS-A	577172	Data sheet	3C28106	
ADN-20-60-A-PPS-A	577173	Data sheet	3C28107	
ADN-20-70-A-PPS-A	593451	Data sheet	3C28108	
ADN-25-10-A-PPS-A	577182	Data sheet	3C28109	
ADN-25-20-A-PPS-A	577184	Data sheet	3C28110	
ADN-25-30-A-PPS-A	577186	Data sheet	3C28111	
ADN-25-40-A-PPS-A	577187	Data sheet	3C28112	
ADN-25-50-A-PPS-A	577188	Data sheet	3C28113	
ADN-25-60-A-PPS-A	577189	Data sheet	3C28114	
ADN-25-70-A-PPS-A	8178883	Data sheet	3C28115	
ADN-25-80-A-PPS-A	8178884	Data sheet	3C28116	
ADN-32-10-A-PPS-A	572655	Data sheet	3C28117	
ADN-32-20-A-PPS-A	572657	Data sheet	3C28118	
ADN-32-30-A-PPS-A	572659	Data sheet	3C28119	
ADN-32-40-A-PPS-A	572660	Data sheet	3C28120	
ADN-32-50-A-PPS-A	572661	Data sheet	3C28121	
ADN-32-60-A-PPS-A	572662	Data sheet	3C28122	
ADN-32-70-A-PPS-A	8179022	Data sheet	3C28123	
ADN-32-80-A-PPS-A	572663	Data sheet	3C28124	
ADN-40-10-A-PPS-A	572673	Data sheet	5091185	
ADN-40-20-A-PPS-A	572675	Data sheet	3C28125	
ADN-40-30-A-PPS-A	572677	Data sheet	3C28126	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
ADN-40-40-A-PPS-A	572678	Data sheet	3C28127	
ADN-40-50-A-PPS-A	572679	Data sheet	3C28128	
ADN-40-60-A-PPS-A	572680	Data sheet	3C28129	
ADN-40-70-A-PPS-A	8179036	Data sheet	5091184	
ADN-40-80-A-PPS-A	572681	Data sheet	3C28130	
ADN-50-10-A-PPS-A	572691	Data sheet	3C28131	
ADN-50-20-A-PPS-A	572693	Data sheet	3C28132	
ADN-50-30-A-PPS-A	572695	Data sheet	3C28133	
ADN-50-40-A-PPS-A	572696	Data sheet	3C28134	
ADN-50-50-A-PPS-A	572697	Data sheet	3C28135	
ADN-50-60-A-PPS-A	572698	Data sheet	3C28136	
ADN-50-70-A-PPS-A	8178340	Data sheet	3C28137	
ADN-50-80-A-PPS-A	572699	Data sheet	3C28138	
ADN-63-10-A-PPS-A	572709	Data sheet	3C28139	
ADN-63-20-A-PPS-A	572711	Data sheet	3C28140	
ADN-63-30-A-PPS-A	572713	Data sheet	3C28141	
ADN-63-40-A-PPS-A	572714	Data sheet	3C28142	
ADN-63-50-A-PPS-A	572715	Data sheet	3C28143	
ADN-63-60-A-PPS-A	572716	Data sheet	3C28144	
ADN-63-70-A-PPS-A	8178287	Data sheet	3C28145	
ADN-63-80-A-PPS-A	572717	Data sheet	3C28146	
ADN-80-10-A-PPS-A	572727	Data sheet	3C28147	
ADN-80-20-A-PPS-A	572729	Data sheet	3C28148	
ADN-80-30-A-PPS-A	572731	Data sheet	3C28149	
ADN-80-40-A-PPS-A	572732	Data sheet	3C28150	
ADN-80-50-A-PPS-A	572733	Data sheet	3C28151	
ADN-80-60-A-PPS-A	572734	Data sheet	3C28152	
ADN-80-80-A-PPS-A	572735	Data sheet	3C28153	

9.4.2 Standard cylinder DSBC-... according to ISO 15552

Name	Remarks	Picture	Documentation	Comment
Standard cylinder DSBC-...-PPSA-N3	Diameter 32, 40, 50, 63, 80, 100, 125 mm Stroke length 25 ... 1000 mm Force 415... 7363 N Double-acting Position detection Damping: Self-adjusting		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DSBC-32-25-PPSA-N3	1376467	Data sheet	6420714	
DSBC-32-50-PPSA-N3	1376469	Data sheet	6420715	
DSBC-32-80-PPSA-N3	1376470	Data sheet	6420716	
DSBC-32-100-PPSA-N3	1376471	Data sheet	6420717	
DSBC-32-125-PPSA-N3	1376472	Data sheet	6420718	
DSBC-32-160-PPSA-N3	1376473	Data sheet	6420719	
DSBC-32-200-PPSA-N3	1376474	Data sheet	6420720	
DSBC-32-250-PPSA-N3	1376475	Data sheet	6420721	
DSBC-32-320-PPSA-N3	1376476	Data sheet	6420722	
DSBC-32-400-PPSA-N3	1376477	Data sheet	6420723	
DSBC-32-500-PPSA-N3	1376478	Data sheet	6420724	
DSBC-32-600-PPSA-N3	1463252-HUB600	Data sheet	3C28070	
DSBC-32-700-PPSA-N3	1463252-HUB700	Data sheet	3C28071	
DSBC-32-800-PPSA-N3	1463252-HUB800	Data sheet	3C28072	
DSBC-32-900-PPSA-N3	1463252-HUB900	Data sheet	3C28073	
DSBC-32-1000-PPSA-N3	1463252-HUB1000	Data sheet	3C28074	
DSBC-40-25-PPSA-N3	1376903	Data sheet	6420725	
DSBC-40-50-PPSA-N3	1376905	Data sheet	6420726	
DSBC-40-80-PPSA-N3	1376906	Data sheet	6420727	
DSBC-40-100-PPSA-N3	1376907	Data sheet	6420728	
DSBC-40-125-PPSA-N3	1376908	Data sheet	6420729	
DSBC-40-160-PPSA-N3	1376909	Data sheet	6420730	
DSBC-40-200-PPSA-N3	1376910	Data sheet	6420731	
DSBC-40-250-PPSA-N3	1376911	Data sheet	6420732	
DSBC-40-320-PPSA-N3	1376912	Data sheet	6420733	
DSBC-40-400-PPSA-N3	1376913	Data sheet	6420734	
DSBC-40-500-PPSA-N3	1376914	Data sheet	6420735	
DSBC-40-600-PPSA-N3	1462835-HUB600	Data sheet	3C28075	
DSBC-40-700-PPSA-N3	1462835-HUB700	Data sheet	3C28076	
DSBC-40-800-PPSA-N3	1462835-HUB800	Data sheet	3C28077	
DSBC-40-900-PPSA-N3	1462835-HUB900	Data sheet	3C28078	
DSBC-40-1000-PPSA-N3	1462835-HUB1000	Data sheet	3C28079	
DSBC-50-25-PPSA-N3	1376301	Data sheet	6420736	
DSBC-50-50-PPSA-N3	1376305	Data sheet	6420737	
DSBC-50-80-PPSA-N3	1376306	Data sheet	6420738	
DSBC-50-100-PPSA-N3	1376307	Data sheet	6420739	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DSBC-50-125-PPSA-N3	1376308	Data sheet	6420740	
DSBC-50-160-PPSA-N3	1376309	Data sheet	6420741	
DSBC-50-200-PPSA-N3	1376310	Data sheet	6420742	
DSBC-50-250-PPSA-N3	1376311	Data sheet	6420743	
DSBC-50-320-PPSA-N3	1376312	Data sheet	6420744	
DSBC-50-400-PPSA-N3	1376313	Data sheet	6420745	
DSBC-50-500-PPSA-N3	1376314	Data sheet	6420746	
DSBC-50-600-PPSA-N3	1463768-HUB600	Data sheet	3C28080	
DSBC-50-700-PPSA-N3	1463768-HUB700	Data sheet	3C28081	
DSBC-50-800-PPSA-N3	1463768-HUB800	Data sheet	3C28082	
DSBC-50-900-PPSA-N3	1463768-HUB900	Data sheet	3C28083	
DSBC-50-1000-PPSA-N3	1463768-HUB1000	Data sheet	3C28084	
DSBC-63-25-PPSA-N3	1383632	Data sheet	6420747	
DSBC-63-50-PPSA-N3	1383634	Data sheet	6420748	
DSBC-63-80-PPSA-N3	1383635	Data sheet	6420749	
DSBC-63-100-PPSA-N3	1383636	Data sheet	6420750	
DSBC-63-125-PPSA-N3	1383637	Data sheet	6420751	
DSBC-63-160-PPSA-N3	1383638	Data sheet	6420752	
DSBC-63-200-PPSA-N3	1383639	Data sheet	6420753	
DSBC-63-250-PPSA-N3	1383640	Data sheet	6420754	
DSBC-63-320-PPSA-N3	1383641	Data sheet	6420755	
DSBC-63-400-PPSA-N3	1383642	Data sheet	6420756	
DSBC-63-500-PPSA-N3	1383643	Data sheet	6420757	
DSBC-63-600-PPSA-N3	1463481-HUB600	Data sheet	3C28085	
DSBC-63-700-PPSA-N3	1463481-HUB700	Data sheet	3C28086	
DSBC-63-800-PPSA-N3	1463481-HUB800	Data sheet	3C28087	
DSBC-63-900-PPSA-N3	1463481-HUB900	Data sheet	3C28088	
DSBC-63-1000-PPSA-N3	1463481-HUB1000	Data sheet	3C28089	
DSBC-80-25-PPSA-N3	1383366	Data sheet	6420758	
DSBC-80-50-PPSA-N3	1383368	Data sheet	6420759	
DSBC-80-80-PPSA-N3	1383369	Data sheet	6420760	
DSBC-80-100-PPSA-N3	1383370	Data sheet	6420761	
DSBC-80-125-PPSA-N3	1383371	Data sheet	6420762	
DSBC-80-160-PPSA-N3	1383372	Data sheet	6420763	
DSBC-80-200-PPSA-N3	1383373	Data sheet	6420764	
DSBC-80-250-PPSA-N3	1383374	Data sheet	6420765	
DSBC-80-320-PPSA-N3	1383375	Data sheet	6420766	
DSBC-80-400-PPSA-N3	1383376	Data sheet	6420767	
DSBC-80-500-PPSA-N3	1383377	Data sheet	6420768	
DSBC-80-600-PPSA-N3	1463500-HUB600	Data sheet	3C28090	
DSBC-80-700-PPSA-N3	1463500-HUB700	Data sheet	3C28091	
DSBC-80-800-PPSA-N3	1463500-HUB800	Data sheet	3C28092	
DSBC-80-900-PPSA-N3	1463500-HUB900	Data sheet	3C28093	
DSBC-80-1000-PPSA-N3	1463500-HUB1000	Data sheet	3C28094	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DSBC-100-25-PPSA-N3	1384890	Data sheet	6420769	
DSBC-100-50-PPSA-N3	1384892	Data sheet	6420770	
DSBC-100-80-PPSA-N3	1384893	Data sheet	6420771	
DSBC-100-100-PPSA-N3	1384894	Data sheet	6420772	
DSBC-100-125-PPSA-N3	1384895	Data sheet	6420773	
DSBC-100-160-PPSA-N3	1384896	Data sheet	6420774	
DSBC-100-200-PPSA-N3	1384897	Data sheet	6420775	
DSBC-100-250-PPSA-N3	1384898	Data sheet	6420776	
DSBC-100-320-PPSA-N3	1384899	Data sheet	6420777	
DSBC-100-400-PPSA-N3	1384900	Data sheet	6420778	
DSBC-100-500-PPSA-N3	1384901	Data sheet	6420779	
DSBC-100-600-PPSA-N3	1463558-HUB600	Data sheet	3C28095	
DSBC-100-700-PPSA-N3	1463558-HUB700	Data sheet	3C28096	
DSBC-100-800-PPSA-N3	1463558-HUB800	Data sheet	3C28097	
DSBC-100-900-PPSA-N3	1463558-HUB900	Data sheet	3C28098	
DSBC-100-1000-PPSA-N3	1463558-HUB1000	Data sheet	3C28099	
DSBC-125-25-PPSA-N3	1804661	Data sheet	6420780	
DSBC-125-50-PPSA-N3	1804663	Data sheet	6420781	
DSBC-125-80-PPSA-N3	1804664	Data sheet	6420782	
DSBC-125-100-PPSA-N3	1804665	Data sheet	6420783	
DSBC-125-125-PPSA-N3	1804666	Data sheet	6420784	
DSBC-125-160-PPSA-N3	1804667	Data sheet	6420785	
DSBC-125-200-PPSA-N3	1804668	Data sheet	6420786	
DSBC-125-250-PPSA-N3	1804669	Data sheet	6420787	
DSBC-125-320-PPSA-N3	1804671	Data sheet	6420788	
DSBC-125-400-PPSA-N3	1804672	Data sheet	6420789	
DSBC-125-500-PPSA-N3	1804673	Data sheet	6420790	
DSBC-125-600-PPSA-N3	1755619-HUB600	Data sheet	3C280A0	
DSBC-125-700-PPSA-N3	1755619-HUB700	Data sheet	3C280A1	
DSBC-125-800-PPSA-N3	1755619-HUB800	Data sheet	3C280A2	
DSBC-125-900-PPSA-N3	1755619-HUB900	Data sheet	3C280A3	
DSBC-125-1000-PPSA-N3	1755619-HUB1000	Data sheet	3C280A4	

9.4.3 Round cylinder DSNU-... to ISO 6432

Name	Remarks	Picture	Documentation	Comment
Round cylinder DSNU-...-PPS-A	Diameter 16, 20, 25 mm (standard) Stroke length 25... 200 mm Force 120 ... 294 N Double-acting Position detection Attenuation: Self-adjusting Mounting flange		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DSNU-16-25-PPS-A	559263	Data sheet	3C28176	
DSNU-16-50-PPS-A	559265	Data sheet	3C28177	
DSNU-16-100-PPS-A	559267	Data sheet	3C28178	
DSNU-16-125-PPS-A	559268	Data sheet	3C28179	
DSNU-16-150-PPS-A	1908281	Data sheet	3C28180	
DSNU-16-200-PPS-A	559270	Data sheet	3C28181	
DSNU-20-25-PPS-A	559271	Data sheet	3C28182	
DSNU-20-50-PPS-A	559273	Data sheet	3C28183	
DSNU-20-100-PPS-A	559275	Data sheet	3C28184	
DSNU-20-125-PPS-A	559276	Data sheet	3C28185	
DSNU-20-150-PPS-A	1908304	Data sheet	3C28186	
DSNU-20-200-PPS-A	559278	Data sheet	3C28187	
DSNU-25-25-PPS-A	559282	Data sheet	3C28188	
DSNU-25-50-PPS-A	559284	Data sheet	3C28189	
DSNU-25-100-PPS-A	559286	Data sheet	3C28190	
DSNU-25-125-PPS-A	559287	Data sheet	3C28191	
DSNU-25-150-PPS-A	1908327	Data sheet	3C28192	
DSNU-25-200-PPS-A	559289	Data sheet	3C28193	

9.4.4 Cylinder with locking unit DFCL-..

Name	Remarks	Picture	Documentation	Comment
Cylinder with holding brake DFLC	Diameter 40, 63, 100 mm Stroke length 100 ... 1000 mm Force 754 ... 4712 N Double-acting Position detection Adjustable damping		Documentation Operating instruct.	Holding brake: Safety component according to Machinery Directive 2006/42/EC Safety function - Holding function: Holding a round bar by clamping with frictional connection - Emergency braking function: Stopping the movement of a round bar by clamping with friction locking Query switching status of holding brake Can be used without additional measures until Performance level c / category 1 With regular brake test and monitoring of actuation up to performance level d / category 3

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DFLC-40-100-PPVA-S	8073331-HUB100	Data sheet	3C281A0	
DFLC-40-125-PPVA-S	8073331-HUB125	Data sheet	3C281A1	
DFLC-40-160-PPVA-S	8073331-HUB160	Data sheet	3C281A2	
DFLC-40-200-PPVA-S	8073331-HUB200	Data sheet	3C281A3	
DFLC-40-250-PPVA-S	8073331-HUB250	Data sheet	3C281A4	
DFLC-40-320-PPVA-S	8073331-HUB320	Data sheet	3C281A5	
DFLC-40-400-PPVA-S	8073331-HUB400	Data sheet	3C281A6	
DFLC-40-500-PPVA-S	8073331-HUB500	Data sheet	3C281A7	
DFLC-40-600-PPVA-S	8073331-HUB600	Data sheet	3C281A8	
DFLC-40-700-PPVA-S	8073331-HUB700	Data sheet	3C281A9	
DFLC-40-800-PPVA-S	8073331-HUB800	Data sheet	3C281B0	
DFLC-40-900-PPVA-S	8073331-HUB900	Data sheet	3C281B1	
DFLC-40-1000-PPVA-S	8073331-HUB1000	Data sheet	3C281B2	
DFLC-63-100-PPVA-S	8073332-HUB100	Data sheet	3C281B3	
DFLC-63-125-PPVA-S	8073332-HUB125	Data sheet	3C281B4	
DFLC-63-160-PPVA-S	8073332-HUB160	Data sheet	3C281B5	
DFLC-63-200-PPVA-S	8073332-HUB200	Data sheet	3C281B6	
DFLC-63-250-PPVA-S	8073332-HUB250	Data sheet	3C281B7	
DFLC-63-320-PPVA-S	8073332-HUB320	Data sheet	3C281B8	
DFLC-63-400-PPVA-S	8073332-HUB400	Data sheet	3C281B9	
DFLC-63-500-PPVA-S	8073332-HUB500	Data sheet	3C281C0	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DFLC-63-600-PPVA-S	8073332-HUB600	Data sheet	3C281C1	
DFLC-63-700-PPVA-S	8073332-HUB700	Data sheet	3C281C2	
DFLC-63-800-PPVA-S	8073332-HUB800	Data sheet	3C281C3	
DFLC-63-900-PPVA-S	8073332-HUB900	Data sheet	3C281C4	
DFLC-63-1000-PPVA-S	8073332-HUB1000	Data sheet	3C281C5	
DFLC-100-100-PPVA-S	8073333-HUB100	Data sheet	3C281C6	
DFLC-100-125-PPVA-S	8073333-HUB125	Data sheet	3C281C7	
DFLC-100-160-PPVA-S	8073333-HUB160	Data sheet	3C281C8	
DFLC-100-200-PPVA-S	8073333-HUB200	Data sheet	3C281C9	
DFLC-100-250-PPVA-S	8073333-HUB250	Data sheet	3C281D0	
DFLC-100-320-PPVA-S	8073333-HUB320	Data sheet	3C281D1	
DFLC-100-400-PPVA-S	8073333-HUB400	Data sheet	3C281D2	
DFLC-100-500-PPVA-S	8073333-HUB500	Data sheet	3C281D3	
DFLC-100-600-PPVA-S	8073333-HUB600	Data sheet	3C281D4	
DFLC-100-700-PPVA-S	8073333-HUB700	Data sheet	3C281D5	
DFLC-100-800-PPVA-S	8073333-HUB800	Data sheet	3C281D6	
DFLC-100-900-PPVA-S	8073333-HUB900	Data sheet	3C281D7	
DFLC-100-1000-PPVA-S	8073333-HUB1000	Data sheet	3C281D8	

9.4.5 Rodless cylinders DGC-...

Name	Remarks	Picture	Documentation	Comment
Linear actuators DGC-K	Diameter 18, 25, 32, 40, 50, 63, 80 mm Stroke length ...1000 mm Force 153 ... 3016 N Position detection		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGC-K-18-100-PPV-A-GK	1312500-HUB100	Data sheet	3C281E3	
DGC-K-18-200-PPV-A-GK	8170672	Data sheet	3C281E4	
DGC-K-18-300-PPV-A-GK	1312500-HUB300	Data sheet	3C281E5	
DGC-K-18-400-PPV-A-GK	8170668	Data sheet	3C281E6	
DGC-K-18-500-PPV-A-GK	1312500-HUB500	Data sheet	3C281E7	
DGC-K-18-600-PPV-A-GK	1312500-HUB600	Data sheet	3C281E8	
DGC-K-18-700-PPV-A-GK	589619	Data sheet	3C281E9	
DGC-K-18-800-PPV-A-GK	1312500-HUB800	Data sheet	3C281F0	
DGC-K-18-900-PPV-A-GK	1312500-HUB900	Data sheet	3C281F1	
DGC-K-18-1000-PPV-A-GK	1312500-HUB1000	Data sheet	3C281F2	
DGC-K-25-100-PPV-A-GK	1312501-HUB100	Data sheet	3C281F3	
DGC-K-25-200-PPV-A-GK	1312501-HUB200	Data sheet	3C281F4	
DGC-K-25-300-PPV-A-GK	593528	Data sheet	3C281F5	
DGC-K-25-400-PPV-A-GK	593529	Data sheet	3C281F6	
DGC-K-25-500-PPV-A-GK	595485	Data sheet	3C281F7	
DGC-K-25-600-PPV-A-GK	593530	Data sheet	3C281F8	
DGC-K-25-700-PPV-A-GK	8173584	Data sheet	3C281F9	
DGC-K-25-800-PPV-A-GK	593531	Data sheet	3C28200	
DGC-K-25-900-PPV-A-GK	610568	Data sheet	3C28201	
DGC-K-25-1000-PPV-A-GK	593532	Data sheet	3C28202	
DGC-K-32-100-PPV-A-GK	578941	Data sheet	3C28203	
DGC-K-32-200-PPV-A-GK	1312502-HUB200	Data sheet	3C28204	
DGC-K-32-300-PPV-A-GK	1312502-HUB300	Data sheet	3C28205	
DGC-K-32-400-PPV-A-GK	1312502-HUB400	Data sheet	3C28206	
DGC-K-32-500-PPV-A-GK	1312502-HUB500	Data sheet	3C28207	
DGC-K-32-600-PPV-A-GK	1312502-HUB600	Data sheet	3C28208	
DGC-K-32-700-PPV-A-GK	1312502-HUB700	Data sheet	3C28209	
DGC-K-32-800-PPV-A-GK	1312502-HUB800	Data sheet	3C28210	
DGC-K-32-900-PPV-A-GK	1312502-HUB900	Data sheet	3C28211	
DGC-K-32-1000-PPV-A-GK	595488	Data sheet	3C28212	
DGC-K-40-100-PPV-A-GK	1312503-HUB100	Data sheet	3C28213	
DGC-K-40-200-PPV-A-GK	1312503-HUB200	Data sheet	3C28214	
DGC-K-40-300-PPV-A-GK	1312503-HUB300	Data sheet	3C28215	
DGC-K-40-400-PPV-A-GK	1312503-HUB400	Data sheet	3C28216	
DGC-K-40-500-PPV-A-GK	1312503-HUB500	Data sheet	3C28217	
DGC-K-40-600-PPV-A-GK	610360	Data sheet	3C28218	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGC-K-40-700-PPV-A-GK	8140147	Data sheet	3C28219	
DGC-K-40-800-PPV-A-GK	1312503-HUB800	Data sheet	3C28220	
DGC-K-40-900-PPV-A-GK	1312503-HUB900	Data sheet	3C28221	
DGC-K-40-1000-PPV-A-GK	589551	Data sheet	3C28222	
DGC-K-50-100-PPV-A-GK	1312504-HUB100	Data sheet	3C28223	
DGC-K-50-200-PPV-A-GK	1312504-HUB200	Data sheet	3C28224	
DGC-K-50-300-PPV-A-GK	1312504-HUB300	Data sheet	3C28225	
DGC-K-50-400-PPV-A-GK	1312504-HUB400	Data sheet	3C28226	
DGC-K-50-500-PPV-A-GK	1312504-HUB500	Data sheet	3C28227	
DGC-K-50-600-PPV-A-GK	1312504-HUB600	Data sheet	3C28228	
DGC-K-50-700-PPV-A-GK	1312504-HUB700	Data sheet	3C28229	
DGC-K-50-800-PPV-A-GK	1312504-HUB800	Data sheet	3C28230	
DGC-K-50-900-PPV-A-GK	1312504-HUB900	Data sheet	3C28231	
DGC-K-50-1000-PPV-A-GK	578173	Data sheet	3C28232	
DGC-K-63-100-PPV-A-GK	1312505-HUB100	Data sheet	3C28233	
DGC-K-63-200-PPV-A-GK	1312505-HUB200	Data sheet	3C28234	
DGC-K-63-300-PPV-A-GK	1312505-HUB300	Data sheet	3C28235	
DGC-K-63-400-PPV-A-GK	1312505-HUB400	Data sheet	3C28236	
DGC-K-63-500-PPV-A-GK	1312505-HUB500	Data sheet	3C28237	
DGC-K-63-600-PPV-A-GK	1312505-HUB600	Data sheet	3C28238	
DGC-K-63-700-PPV-A-GK	1312505-HUB700	Data sheet	3C28239	
DGC-K-63-800-PPV-A-GK	1312505-HUB800	Data sheet	3C28240	
DGC-K-63-900-PPV-A-GK	1312505-HUB900	Data sheet	3C28241	
DGC-K-63-1000-PPV-A-GK	1312505-HUB1000	Data sheet	3C28242	
DGC-K-80-100-PPV-A-GK	1312506-HUB100	Data sheet	3C28243	
DGC-K-80-200-PPV-A-GK	1312506-HUB200	Data sheet	3C28245	
DGC-K-80-300-PPV-A-GK	1312506-HUB300	Data sheet	3C28246	
DGC-K-80-400-PPV-A-GK	1312506-HUB400	Data sheet	3C28247	
DGC-K-80-500-PPV-A-GK	1312506-HUB500	Data sheet	3C28248	
DGC-K-80-600-PPV-A-GK	1312506-HUB600	Data sheet	3C28249	
DGC-K-80-700-PPV-A-GK	1312506-HUB700	Data sheet	3C28250	
DGC-K-80-800-PPV-A-GK	1312506-HUB800	Data sheet	3C28251	
DGC-K-80-900-PPV-A-GK	1312506-HUB900	Data sheet	3C28252	
DGC-K-80-1000-PPV-A-GK	1312506-HUB1000	Data sheet	3C28253	

Name	Remarks	Picture	Documentation	Comment
Linear actuators DGC-	Diameter 12, 18, 25, 32, 40, 50, 63 mm Stroke length ... 1000 mm Force 30 ... 1870 N Position detection Various damping options possible		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGC-12-100-KF-YSR-A	530907-HUB100	Data sheet	3C28254	
DGC-12-200-KF-YSR-A	530907-HUB200	Data sheet	3C28255	
DGC-12-300-KF-YSR-A	530907-HUB300	Data sheet	3C28256	
DGC-12-400-KF-YSR-A	530907-HUB400	Data sheet	3C28257	
DGC-12-500-KF-YSR-A	530907-HUB500	Data sheet	3C28258	
DGC-12-600-KF-YSR-A	530907-HUB600	Data sheet	3C28259	
DGC-12-700-KF-YSR-A	530907-HUB700	Data sheet	3C28260	
DGC-12-800-KF-YSR-A	530907-HUB800	Data sheet	3C28261	
DGC-12-900-KF-YSR-A	530907-HUB900	Data sheet	3C28262	
DGC-12-1000-KF-YSR-A	530907-HUB1000	Data sheet	3C28263	
DGC-18-100-KF-YSR-A	532446-HUB100	Data sheet	3C28264	
DGC-18-200-KF-YSR-A	532446-HUB200	Data sheet	3C28265	
DGC-18-300-KF-YSR-A	595481-HUB300	Data sheet	3C28266	
DGC-18-400-KF-YSR-A	532446-HUB400	Data sheet	3C28267	
DGC-18-500-KF-YSR-A	532446-HUB500	Data sheet	3C28268	
DGC-18-600-KF-YSR-A	532446-HUB600	Data sheet	3C28269	
DGC-18-700-KF-YSR-A	532446-HUB700	Data sheet	3C28270	
DGC-18-800-KF-YSR-A	532446-HUB800	Data sheet	3C28271	
DGC-18-900-KF-YSR-A	532446-HUB900	Data sheet	3C28272	
DGC-18-1000-KF-YSR-A	532446-HUB1000	Data sheet	3C28273	
DGC-25-100-KF-YSR-A	532447-HUB100	Data sheet	3C28274	
DGC-25-200-KF-YSR-A	532447-HUB200	Data sheet	3C28275	
DGC-25-300-KF-YSR-A	532447-HUB300	Data sheet	3C28276	
DGC-25-400-KF-YSR-A	532447-HUB400	Data sheet	3C28277	
DGC-25-500-KF-YSR-A	532447-HUB500	Data sheet	3C28278	
DGC-25-600-KF-YSR-A	532447-HUB600	Data sheet	3C28279	
DGC-25-700-KF-YSR-A	532447-HUB700	Data sheet	3C28280	
DGC-25-800-KF-YSR-A	532447-HUB800	Data sheet	3C28281	
DGC-25-900-KF-YSR-A	532447-HUB900	Data sheet	3C28282	
DGC-25-1000-KF-YSR-A	532447-HUB1000	Data sheet	3C28283	
DGC-32-100-KF-YSR-A	532448-HUB100	Data sheet	3C28284	
DGC-32-200-KF-YSR-A	532448-HUB200	Data sheet	3C28285	
DGC-32-300-KF-YSR-A	582576-HUB300	Data sheet	3C28286	
DGC-32-400-KF-YSR-A	532448-HUB400	Data sheet	3C28287	
DGC-32-500-KF-YSR-A	532448-HUB500	Data sheet	3C28288	
DGC-32-600-KF-YSR-A	532448-HUB600	Data sheet	3C28289	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGC-32-700-KF-YSR-A	532448-HUB700	Data sheet	3C28290	
DGC-32-800-KF-YSR-A	532448-HUB800	Data sheet	3C28291	
DGC-32-900-KF-YSR-A	532448-HUB900	Data sheet	3C28292	
DGC-32-1000-KF-YSR-A	532448-HUB1000	Data sheet	3C28293	
DGC-40-100-KF-YSR-A	532449-HUB100	Data sheet	3C28294	
DGC-40-200-KF-YSR-A	532449-HUB200	Data sheet	3C28295	
DGC-40-300-KF-YSR-A	532449-HUB300	Data sheet	3C28296	
DGC-40-400-KF-YSR-A	532449-HUB400	Data sheet	3C28297	
DGC-40-500-KF-YSR-A	532449-HUB500	Data sheet	3C28298	
DGC-40-600-KF-YSR-A	532449-HUB600	Data sheet	3C28299	
DGC-40-700-KF-YSR-A	532449-HUB700	Data sheet	3C282A0	
DGC-40-800-KF-YSR-A	532449-HUB800	Data sheet	3C282A1	
DGC-40-900-KF-YSR-A	532449-HUB900	Data sheet	3C282A2	
DGC-40-1000-KF-YSR-A	532449-HUB1000	Data sheet	3C282A3	
DGC-50-100-KF-YSR-A	532450-HUB100	Data sheet	3C282A4	
DGC-50-200-KF-YSR-A	532450-HUB200	Data sheet	3C282A5	
DGC-50-300-KF-YSR-A	532450-HUB300	Data sheet	3C282A6	
DGC-50-400-KF-YSR-A	532450-HUB400	Data sheet	3C282A7	
DGC-50-500-KF-YSR-A	532450-HUB500	Data sheet	3C282A8	
DGC-50-600-KF-YSR-A	532450-HUB600	Data sheet	3C282A9	
DGC-50-700-KF-YSR-A	532450-HUB700	Data sheet	3C282B0	
DGC-50-800-KF-YSR-A	532450-HUB800	Data sheet	3C282B1	
DGC-50-900-KF-YSR-A	532450-HUB900	Data sheet	3C282B2	
DGC-50-1000-KF-YSR-A	532450-HUB1000	Data sheet	3C282B3	
DGC-63-100-KF-YSR-A	532451-HUB100	Data sheet	3C282B4	
DGC-63-200-KF-YSR-A	532451-HUB200	Data sheet	3C282B5	
DGC-63-300-KF-YSR-A	532451-HUB300	Data sheet	3C282B6	
DGC-63-400-KF-YSR-A	532451-HUB400	Data sheet	3C282B7	
DGC-63-500-KF-YSR-A	532451-HUB500	Data sheet	3C282B8	
DGC-63-600-KF-YSR-A	532451-HUB600	Data sheet	3C282B9	
DGC-63-700-KF-YSR-A	532451-HUB700	Data sheet	3C282C0	
DGC-63-800-KF-YSR-A	532451-HUB800	Data sheet	3C282C1	
DGC-63-900-KF-YSR-A	532451-HUB900	Data sheet	3C282C2	
DGC-63-1000-KF-YSR-A	532451-HUB1000	Data sheet	3C282C3	

Name	Remarks	Picture	Documentation	Comment
Linear actuators DGC -HD	Diameter 18, 25, 40mm Stroke length ... 1000 mm Force 30 ... 754 N Position detection Shock absorber		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGC-18-100-HD-YSR	567547-HUB100	Data sheet	3C282D6	
DGC-18-200-HD-YSR	567547-HUB200	Data sheet	3C282D7	
DGC-18-300-HD-YSR	567547-HUB300	Data sheet	3C282D8	
DGC-18-400-HD-YSR	567547-HUB400	Data sheet	3C282D9	
DGC-18-500-HD-YSR	567547-HUB500	Data sheet	3C282E0	
DGC-18-600-HD-YSR	567547-HUB600	Data sheet	3C282E1	
DGC-18-700-HD-YSR	567547-HUB700	Data sheet	3C282E2	
DGC-18-800-HD-YSR	567547-HUB800	Data sheet	3C282E3	
DGC-18-900-HD-YSR	567547-HUB900	Data sheet	3C282E4	
DGC-18-1000-HD-YSR	567547-HUB1000	Data sheet	3C282E5	
DGC-25-100-HD-YSR	567548-HUB100	Data sheet	3C282E6	
DGC-25-200-HD-YSR	567548-HUB200	Data sheet	3C282E7	
DGC-25-300-HD-YSR	567548-HUB300	Data sheet	3C282E8	
DGC-25-400-HD-YSR	567548-HUB400	Data sheet	3C282E9	
DGC-25-500-HD-YSR	567548-HUB500	Data sheet	3C282F0	
DGC-25-600-HD-YSR	567548-HUB600	Data sheet	3C282F1	
DGC-25-700-HD-YSR	567548-HUB700	Data sheet	3C282F2	
DGC-25-800-HD-YSR	567548-HUB800	Data sheet	3C282F3	
DGC-25-900-HD-YSR	567548-HUB900	Data sheet	3C282F4	
DGC-25-1000-HD-YSR	567548-HUB1000	Data sheet	3C282F5	
DGC-40-100-HD-YSR	567549-HUB100	Data sheet	3C282F6	
DGC-40-200-HD-YSR	567549-HUB200	Data sheet	3C282F7	
DGC-40-300-HD-YSR	567549-HUB300	Data sheet	3C282F8	
DGC-40-400-HD-YSR	567549-HUB400	Data sheet	3C282F9	
DGC-40-500-HD-YSR	567549-HUB500	Data sheet	3C28300	
DGC-40-600-HD-YSR	567549-HUB600	Data sheet	3C28301	
DGC-40-700-HD-YSR	567549-HUB700	Data sheet	3C28302	
DGC-40-800-HD-YSR	567549-HUB800	Data sheet	3C28303	
DGC-40-900-HD-YSR	567549-HUB900	Data sheet	3C28304	
DGC-40-1000-HD-YSR	567549-HUB1000	Data sheet	3C28306	

9.4.6 Part-turn actuators with rack and pinion DRRD-...

Name	Remarks	Picture	Documentation	Comment
Part-turn actuators DRRD	Size 12, 16, 20, 25, 32, 35, 40 mm Torque 0.2 ... 24 Nm Swivelling angle 0 ... 180° Position detection Cushioning: elastic (P), hydraulic shock absorbers Flange threshold		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DRRD-16-180-FH-PA	1577238	Data sheet	3C28339	
DRRD-16-180-FH-Y9A	1644389	Data sheet	3C28340	
DRRD-20-180-FH-PA	1395606	Data sheet	3C28341	
DRRD-20-180-FH-Y9A	1427379	Data sheet	3C28342	
DRRD-25-180-FH-PA	1359980	Data sheet	3C28343	
DRRD-25-180-FH-Y9A	1360248	Data sheet	3C28344	
DRRD-32-180-FH-PA	1578512	Data sheet	3C28345	
DRRD-32-180-FH-Y9A	1578518	Data sheet	3C28346	
DRRD-35-180-FH-PA	1526825	Data sheet	3C28347	
DRRD-35-180-FH-Y9A	1547102	Data sheet	3C28348	
DRRD-40-180-FH-PA	1503269	Data sheet	3C28349	
DRRD-40-180-FH-Y9A	1526986	Data sheet	3C28350	

9.4.6.1 Locking unit DADL-...

Name	Remarks	Picture	Documentation	Comment
Locking units, clamping elements DADL	For part-turn actuator DRRD size 16, 20, 25, 32, 35, 40,		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DADL-EL-Q11-16	1692770	Data sheet	3C28352	
DADL-EL-Q11-20	1579786	Data sheet	3C28354	
DADL-EL-Q11-25	1568183	Data sheet	3C28356	
DADL-EL-Q11-32	1631139	Data sheet	3C28358	
DADL-EL-Q11-35/40	1544900	Data sheet	3C28360	

9.4.7 Drives with slide

9.4.7.1 Mini sledge DGST

Name	Remarks	Picture	Documentation	Comment
Mini sledge DGST	Size 12, 16, 20, 25 Stroke length 10 ... 200 mm Force 94 ... 589 N Position detection Fixed/adjustable damping Recirculating ball bearing guide, ball cage guide (for size 20, 25)		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGST-12-20-PA	8085124	Data sheet	3C28361	
DGST-12-30-PA	8085125	Data sheet	3C28362	
DGST-12-40-PA	8085126	Data sheet	3C28363	
DGST-12-50-PA	8085127	Data sheet	3C28364	
DGST-12-80-PA	8085128	Data sheet	3C28365	
DGST-12-100-PA	8085129	Data sheet	3C28366	
DGST-16-20-PA	8085131	Data sheet	3C28367	
DGST-16-30-PA	8085132	Data sheet	3C28368	
DGST-16-40-PA	8085133	Data sheet	3C28369	
DGST-16-50-PA	8085134	Data sheet	3C28370	
DGST-16-80-PA	8085135	Data sheet	3C28371	
DGST-16-100-PA	8085136	Data sheet	3C28372	
DGST-16-125-PA	8085137	Data sheet	3C28373	
DGST-16-150-PA	8085138	Data sheet	3C28374	
DGST-20-20-PA	8085140	Data sheet	3C28375	
DGST-20-30-PA	8085141	Data sheet	3C28376	
DGST-20-40-PA	8085142	Data sheet	3C28377	
DGST-20-50-PA	8085143	Data sheet	3C28378	
DGST-20-80-PA	8085144	Data sheet	3C28379	
DGST-20-100-PA	8085145	Data sheet	3C28380	
DGST-20-125-PA	8085146	Data sheet	3C28381	
DGST-20-150-PA	8085147	Data sheet	3C28382	
DGST-20-200-PA	8085148	Data sheet	3C28383	
DGST-25-20-PA	8085150	Data sheet	3C28384	
DGST-25-30-PA	8085151	Data sheet	3C28385	
DGST-25-40-PA	8085152	Data sheet	3C28386	
DGST-25-50-PA	8085153	Data sheet	3C28387	
DGST-25-80-PA	8085154	Data sheet	3C28388	
DGST-25-100-PA	8085155	Data sheet	3C28389	
DGST-25-125-PA	8085156	Data sheet	3C28390	
DGST-25-150-PA	8085157	Data sheet	3C28391	
DGST-25-200-PA	8085158	Data sheet	3C28392	

9.4.7.2 Mini sledge DGSL

Mini slide DGSL, metric	Size 12, 16, 20, 25 Stroke length 10 ... 200 mm Force 68 ... 483 N Position detection Fixed/adjustable damping Ball cage guide.		Documentation Operating instruct.	
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TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DGSL-12-20-P1A	543970	Data sheet	3C28393	
DGSL-12-30-P1A	543971	Data sheet	3C28394	
DGSL-12-40-P1A	543972	Data sheet	3C28395	
DGSL-12-50-P1A	543973	Data sheet	3C28396	
DGSL-12-80-P1A	543974	Data sheet	3C28397	
DGSL-12-100-P1A	543975	Data sheet	3C28398	
DGSL-12-150-P1A	543976	Data sheet	3C28399	
DGSL-16-20-P1A	543992	Data sheet	3C283A0	
DGSL-16-30-P1A	543993	Data sheet	3C283A1	
DGSL-16-40-P1A	543994	Data sheet	3C283A2	
DGSL-16-50-P1A	543995	Data sheet	3C283A3	
DGSL-16-80-P1A	543996	Data sheet	3C283A4	
DGSL-16-100-P1A	543997	Data sheet	3C283A5	
DGSL-16-150-P1A	543998	Data sheet	3C283A6	
DGSL-20-20-P1A	544015	Data sheet	3C283A7	
DGSL-20-30-P1A	544016	Data sheet	3C283A8	
DGSL-20-40-P1A	544017	Data sheet	3C283A9	
DGSL-20-50-P1A	544018	Data sheet	3C283B0	
DGSL-20-80-P1A	544019	Data sheet	3C283B1	
DGSL-20-100-P1A	544020	Data sheet	3C283B2	
DGSL-20-150-P1A	544021	Data sheet	3C283B3	
DGSL-20-200-P1A	544022	Data sheet	3C283B4	
DGSL-25-20-P1A	544040	Data sheet	3C283B5	
DGSL-25-30-P1A	544041	Data sheet	3C283B6	
DGSL-25-40-P1A	544042	Data sheet	3C283B7	
DGSL-25-50-P1A	544043	Data sheet	3C283B8	
DGSL-25-80-P1A	544044	Data sheet	3C283B9	
DGSL-25-100-P1A	544045	Data sheet	3C283C0	
DGSL-25-150-P1A	544046	Data sheet	3C283C1	
DGSL-25-200-P1A	544047	Data sheet	3C283C2	

9.4.8 Drives with guide rods DFM-...

Name	Remarks	Picture	Documentation	Comment
Guide cylinder DFM, metric	Diameter 16, 20, 25, 32, 40, 50, 63, 80mm Stroke length 10 ... 400 mm (depending on type) Force 68 ... 3016 N Position detection Fixed/adjustable damping Sliding guide Recirculating ball bearing guide Variants available.		Documentation Operating instruct.	
TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DFM-16-20-P-A-GF	170833	Data sheet	3C28309	
DFM-16-25-P-A-GF	170834	Data sheet	3C28310	
DFM-16-30-P-A-GF	170835	Data sheet	3C28311	
DFM-16-40-P-A-GF	170836	Data sheet	3C28312	
DFM-16-50-P-A-GF	170837	Data sheet	3C28313	
DFM-16-80-P-A-GF	170838	Data sheet	3C28314	
DFM-16-100-P-A-GF	170839	Data sheet	3C28315	
DFM-20-20-P-A-GF	170840	Data sheet	3C28316	
DFM-20-25-P-A-GF	170841	Data sheet	3C28317	
DFM-20-30-P-A-GF	170842	Data sheet	3C28318	
DFM-20-40-P-A-GF	170843	Data sheet	3C28319	
DFM-20-50-P-A-GF	170844	Data sheet	3C28320	
DFM-20-80-P-A-GF	170845	Data sheet	3C28321	
DFM-20-100-P-A-GF	170846	Data sheet	3C28322	
DFM-25-20-P-A-GF	170847	Data sheet	3C28323	
DFM-25-25-P-A-GF	170848	Data sheet	3C28324	
DFM-25-30-P-A-GF	170849	Data sheet	3C28325	
DFM-25-40-P-A-GF	170850	Data sheet	3C28326	
DFM-25-50-P-A-GF	170851	Data sheet	3C28327	
DFM-25-80-P-A-GF	170852	Data sheet	3C28328	
DFM-25-100-P-A-GF	170853	Data sheet	3C28329	
DFM-32-20-P-A-GF	170854	Data sheet	3013228	
DFM-32-25-P-A-GF	170855	Data sheet	3013229	
DFM-32-30-P-A-GF	170856	Data sheet	3013230	
DFM-32-40-P-A-GF	170857	Data sheet	3013231	
DFM-32-50-P-A-GF	170858	Data sheet	3013232	
DFM-32-80-P-A-GF	170859	Data sheet	3013233	
DFM-32-100-P-A-GF	170860	Data sheet	3013234	
DFM-32-125-P-A-GF	170861	Data sheet	3013235	
DFM-32-160-P-A-GF	170862	Data sheet	3013236	
DFM-32-200-P-A-GF	170863	Data sheet	3013237	
DFM-40-25-P-A-GF	170864	Data sheet	3013238	
DFM-40-50-P-A-GF	170865	Data sheet	3013239	
DFM-40-80-P-A-GF	170866	Data sheet	3013240	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DFM-40-100-P-A-GF	170867	Data sheet	3013241	
DFM-40-125-P-A-GF	170868	Data sheet	3013242	
DFM-40-160-P-A-GF	170869	Data sheet	3013243	
DFM-40-200-P-A-GF	170870	Data sheet	3013244	
DFM-40-250-B-P-A-GF	532319-HUB250	Data sheet	3C28330	
DFM-40-320-B-P-A-GF	532319-HUB320	Data sheet	3C28331	
DFM-40-400-B-P-A-GF	532319-HUB400	Data sheet	3C28332	
DFM-50-25-P-A-GF	170871	Data sheet	5197680	
DFM-50-50-P-A-GF	170872	Data sheet	3013245	
DFM-50-80-P-A-GF	170873	Data sheet	3013246	
DFM-50-100-P-A-GF	170874	Data sheet	3013247	
DFM-50-125-P-A-GF	170875	Data sheet	3013248	
DFM-50-160-P-A-GF	170876	Data sheet	3013249	
DFM-50-200-P-A-GF	170877	Data sheet	3013250	
DFM-50-250-B-P-A-GF	534769-HUB250	Data sheet	3C28333	
DFM-50-320-B-P-A-GF	534769-HUB320	Data sheet	3C28334	
DFM-50-400-B-P-A-GF	534769-HUB400	Data sheet	3C28335	
DFM-63-25-P-A-GF	170878	Data sheet	3013251	
DFM-63-50-P-A-GF	170879	Data sheet	3013252	
DFM-63-80-P-A-GF	170880	Data sheet	3013253	
DFM-63-100-P-A-GF	170881	Data sheet	3013254	
DFM-63-125-P-A-GF	170882	Data sheet	3013255	
DFM-63-160-P-A-GF	170883	Data sheet	3013256	
DFM-63-200-P-A-GF	170884	Data sheet	3013257	
DFM-63-250-B-P-A-GF	534770-HUB250	Data sheet	3C28336	
DFM-63-320-B-P-A-GF	534770-HUB320	Data sheet	3C28337	
DFM-63-400-B-P-A-GF	534770-HUB400	Data sheet	3C28338	

9.4.9 Stopper cylinder and separating stop DFSP-...

Name	Remarks	Picture	Documentation	Comment
Stopper cylinder DFSP	Diameter 32, 40, 50 mm Stroke length 15 ... 30 mm Permissible impact force on the extended piston rod 880 ... 6280 N Position detection Damping fixed. Versions: Spigot		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
DFSP-32-15-S-PA	576096	Data sheet	6543833	
DFSP-32-20-S-PA	576097	Data sheet	6543834	
DFSP-32-25-S-PA	576098	Data sheet	6543835	
DFSP-40-20-S-PA	576120	Data sheet	6543836	
DFSP-40-25-S-PA	576121	Data sheet	6543837	
DFSP-40-30-S-PA	576122	Data sheet	6543838	
DFSP-50-20-S-PA	576144	Data sheet	3C283C3	
DFSP-50-25-S-PA	576145	Data sheet	3C283C4	
DFSP-50-30-S-PA	576146	Data sheet	6543839	

9.4.10 Cylinder mounting parts / fastening elements

Name	Remarks	Picture	Documentation	Comment
Flexo coupling			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
FK-M10X1.25	6140	Data sheet	5656046	
FK-M12X1.25	6141	Data sheet	5656047	
FK-M16X1.5	6142	Data sheet	5656048	
FK-M20X1.5	6143	Data sheet	5656049	
FK-M27X2	10485	Data sheet	5656050	
FK-M6	2061	Data sheet	3C28158	
FK-M8	2062	Data sheet	3C28163	

Name	Remarks	Picture	Documentation	Comment
Flange mounting			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
FNC-16	537246	Data sheet	3C28155	
FNC-20	537247	Data sheet	3C28160	
FNC-25	537248	Data sheet	3C28165	
FNC-32	174376	Data sheet	5656051	
FNC-40	174377	Data sheet	5656053	
FNC-50	174378	Data sheet	5656055	
FNC-63	174379	Data sheet	5656057	
FNC-80	174380	Data sheet	5656059	
FNC-100	174381	Data sheet	5656062	

Name	Remarks	Picture	Documentation	Comment
Foot mounting			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
HBN-12/16X1	5125	Data sheet	3C28196	
HBN-12/16X2	5126	Data sheet	3C28194	
HBN-20/25X1	5127	Data sheet	3C28199	
HBN-20/25X2	5128	Data sheet	3C28197	
HNA-16	537238	Data sheet	3C28154	
HNA-20	537239	Data sheet	3C28159	
HNA-25	537240	Data sheet	3C28164	
HNA-32	537241	Data sheet	3C28166	
HNA-40	537242	Data sheet	3C28168	
HNA-50	537243	Data sheet	3C28171	
HNA-63	537244	Data sheet	3C28172	
HNA-80	537249	Data sheet	3C28174	
HNC-32	174369	Data sheet	5656065	
HNC-40	174370	Data sheet	5656067	
HNC-50	174371	Data sheet	5656069	
HNC-63	174372	Data sheet	5656071	
HNC-80	174373	Data sheet	5656073	
HNC-100	174374	Data sheet	5656076	
HNC-125	174375	Data sheet	5656077	
HPC-12	526388	Data sheet	3C282C4	
HPC-18	533667	Data sheet	3C282C6	
HPC-25	533668	Data sheet	3C282C8	
HPC-32	533669	Data sheet	5868806	
HPC-40	533670	Data sheet	3C282D0	
HPC-50	545236	Data sheet	3C282D2	
HPC-63	545237	Data sheet	3C282D4	

Name	Remarks	Picture	Documentation	Comment
Clevis			Documentation Operating instruct.	

SG-M10X1.25	6144	Data sheet	3C65EF5	
SG-M12X1.25	6145	Data sheet	3C65EF6	
SG-M16X1.5	6146	Data sheet	3C65EF7	
SG-M20X1.5	6147	Data sheet	3C65EF8	
SG-M27X2-B	14987	Data sheet	3C65EF9	
SG-M6	3110	Data sheet	3C28156	
SG-M8	3111	Data sheet	6265289	

Name	Remarks	Picture	Documentation	Comment
Rod end			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SGS-M10X1.25	9261	Data sheet	5660075	
SGS-M12X1.25	9262	Data sheet	5660076	
SGS-M16X1.5	9263	Data sheet	5660077	
SGS-M20X1.5	9264	Data sheet	5660078	
SGS-M27X2	10774	Data sheet	5660079	
SGS-M6	9254	Data sheet	3C28157	
SGS-M8	9255	Data sheet	3C28162	

Name	Remarks	Picture	Documentation	Comment
Coupling piece			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
KSG-M12X1.25	32964	Data sheet	3C281D9	
KSG-M16X1.5	32965	Data sheet	3C281E0	
KSG-M20X1.5	32966	Data sheet	3C281E1	

Name	Remarks	Picture	Documentation	Comment
Bearing pedestal			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
LBN-12/16	6058	Data sheet	3C28195	
LBN-20/25	6059	Data sheet	5868897	

Name	Remarks	Picture	Documentation	Comment
Profile fastening			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
MUC-12	526387	Data sheet	3C282C5	
MUC-18	531752	Data sheet	3C282C7	
MUC-25	531753	Data sheet	3C282C9	
MUC-32	531754	Data sheet	5868807	
MUC-40	531755	Data sheet	3C282D1	
MUC-50	531756	Data sheet	3C282D3	
MUC-63	531757	Data sheet	3C282D5	
MUE-120/185	558044	Data sheet	3C28308	
MUE-70/80	558043	Data sheet	3C28307	

Name	Remarks	Picture	Documentation	Comment
Swivel flange			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SNCB-32	174390	Data sheet	5660108	
SNCB-40	174391	Data sheet	5660109	
SNCB-50	174392	Data sheet	5660111	
SNCB-63	174393	Data sheet	5660113	
SNCB-80	174394	Data sheet	5660115	
SNCB-100	174395	Data sheet	5660117	
SNCB-125	174396	Data sheet	5660119	
SNCL-32	174404	Data sheet	3C280B1	
SNCL-40	174405	Data sheet	3C280B9	
SNCL-50	174406	Data sheet	3C280C7	
SNCL-63	174407	Data sheet	3C280D2	
SNCL-80	174408	Data sheet	3C280E0	
SNCL-100	174409	Data sheet	3C280E5	
SNCL-125	174410	Data sheet	3C280F3	
SNCS-32	174397	Data sheet	6265336	
SNCS-40	174398	Data sheet	6265337	
SNCS-50	174399	Data sheet	6265338	
SNCS-63	174400	Data sheet	6265339	
SNCS-80	174401	Data sheet	6265340	
SNCS-100	174402	Data sheet	6265341	
SNCS-125	174403	Data sheet	6265342	

Name	Remarks	Picture	Documentation	Comment
Trunnion			Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
ZNCF-32	174411	Data sheet	3C65F00	
ZNCF-40	174412	Data sheet	3C65F01	
ZNCF-50	174413	Data sheet	5660066	
ZNCF-63	174414	Data sheet	5660067	
ZNCF-80	174415	Data sheet	5660068	
ZNCF-100	174416	Data sheet	5660069	
ZNCF-125	174417	Data sheet	5660070	

9.5 Gripper

9.5.1 Parallel gripper HGPT-...

Name	Remarks	Picture	Documentation	Comment
Parallel gripper HGPT	Sizes 16, 20, 25, 35, 40, 50, 63, 80 Stroke length ... 25 mm per gripper jaw Force 53 ... 3150 N per gripper jaw Position detection Air purge connection		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
HGPT-16-A-B-G1	560193	Data sheet	5279591	
HGPT-16-A-B-G2	560194	Data sheet	5279592	
HGPT-20-A-B-G1	560199	Data sheet	5279593	
HGPT-20-A-B-G2	560200	Data sheet	5279594	
HGPT-25-A-B-G1	560205	Data sheet	5279595	
HGPT-25-A-B-G2	560206	Data sheet	5279596	
HGPT-35-A-B-G1	560211	Data sheet	5279597	
HGPT-35-A-B-G2	560212	Data sheet	5279598	
HGPT-40-A-B-G1	560217	Data sheet	5279661	
HGPT-40-A-B-G2	560218	Data sheet	5279662	
HGPT-50-A-B-G1	560223	Data sheet	5279663	
HGPT-50-A-B-G2	560224	Data sheet	5279664	
HGPT-63-A-B-G1	560229	Data sheet	5279670	
HGPT-63-A-B-G2	560230	Data sheet	5279671	
HGPT-80-A-B-G1	560235	Data sheet	5279672	
HGPT-80-A-B-G2	560236	Data sheet	5279673	

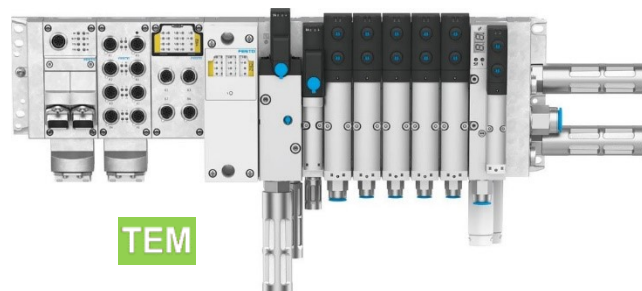
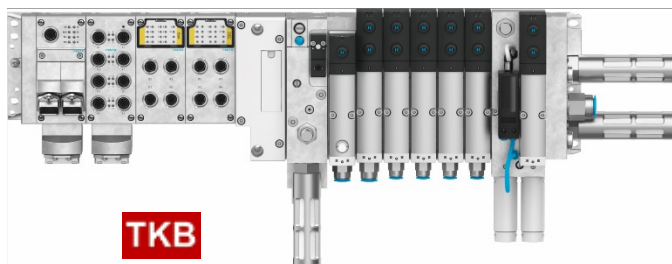
9.5.2 Three-point gripper HGDT-...

Name	Remarks	Picture	Documentation	Comment
Three-point gripper HGDT	Size 25, 35, 40, 50, 63 Stroke length 3 ... 10 mm per gripper jaw Force 69 ... 864 N per gripper jaw Position detection		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
HGDT-25-A-G1	540860	Data sheet	3C283C5	
HGDT-25-A-G2	540861	Data sheet	3C283C6	
HGDT-35-A-G1	540863	Data sheet	3C283C7	
HGDT-35-A-G2	540864	Data sheet	3C283C8	
HGDT-40-A-G1	540866	Data sheet	5873626	
HGDT-40-A-G2	540867	Data sheet	5873627	
HGDT-50-A-G1	540869	Data sheet	5873628	
HGDT-50-A-G2	540870	Data sheet	5873629	
HGDT-63-A-G1	540872	Data sheet	5873630	
HGDT-63-A-G2	540873	Data sheet	5873631	

9.6 Vacuum technology

- Valve terminals with vacuum ejectors



See VTSA-F chapter 6

and VTSA-F-CB Chapter 5

Note on vacuum cups in the body shop sector

TKB

Vacuum resistance (corresponding to vacuum value without workpiece sucked in) --- **Setpoint < 280 mbar**

Max. Number of vacuum cups per vacuum ejector on a valve terminal:

Flat suction pads: 8 pieces for $\leq \varnothing 80\text{mm}$ or 6 pieces for $\varnothing 80\text{-}125\text{mm}$

Bellows suction pads: 8 pieces for $\leq \varnothing 60\text{mm}$ or 6 pieces for $\varnothing 60\text{-}125\text{mm}$

9.7 Electric drives

9.7.1 Electric cylinders ESBF-...

Name	Remarks	Picture	Documentation	Comment
Electric cylinder ESBF-...	Size 32, 40, 50, 63 Stroke length 100 ... 400 mm Force 1000 ... 7000 N Motor can be mounted via axial or parallel kits Ball screw drive in clean design		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
ESBF-BS-32-100-10P	8022565	Data sheet	3C283D0	
ESBF-BS-32-100-5P	8022562	Data sheet	3C283C9	
ESBF-BS-32-200-10P	8022566	Data sheet	3C283D2	
ESBF-BS-32-200-5P	2215384	Data sheet	3C283D1	
ESBF-BS-32-300-10P	8022567	Data sheet	3C283D4	
ESBF-BS-32-300-5P	8022563	Data sheet	3C283D3	
ESBF-BS-32-400-10P	8022568	Data sheet	3C283D6	
ESBF-BS-32-400-5P	8022564	Data sheet	3C283D5	
ESBF-BS-40-100-10P	8022577	Data sheet	3C283D8	
ESBF-BS-40-100-16P	8022581	Data sheet	3C283D9	
ESBF-BS-40-100-5P	8022574	Data sheet	3C283D7	
ESBF-BS-40-200-10P	8022578	Data sheet	3C283E1	
ESBF-BS-40-200-16P	8022582	Data sheet	3C283E2	
ESBF-BS-40-200-5P	2215385	Data sheet	3C283E0	
ESBF-BS-40-300-10P	8022579	Data sheet	3C283E4	
ESBF-BS-40-300-16P	8022583	Data sheet	3C283E5	
ESBF-BS-40-300-5P	8022575	Data sheet	3C283E3	
ESBF-BS-40-400-10P	8022580	Data sheet	3C283E7	
ESBF-BS-40-400-16P	8022584	Data sheet	3C283E8	
ESBF-BS-40-400-5P	8022576	Data sheet	3C283E6	
ESBF-BS-50-100-10P	8022593	Data sheet	3C283F0	
ESBF-BS-50-100-20P	8022597	Data sheet	3C283F1	
ESBF-BS-50-100-5P	8022590	Data sheet	3C283E9	
ESBF-BS-50-200-10P	8022594	Data sheet	3C283F3	
ESBF-BS-50-200-20P	8022598	Data sheet	3C283F4	
ESBF-BS-50-200-5P	2215386	Data sheet	3C283F2	
ESBF-BS-50-300-10P	8022595	Data sheet	3C283F6	
ESBF-BS-50-300-20P	8022599	Data sheet	3C283F7	
ESBF-BS-50-300-5P	8022591	Data sheet	3C283F5	
ESBF-BS-50-400-10P	8022596	Data sheet	3C283F9	
ESBF-BS-50-400-20P	8022600	Data sheet	3C28400	
ESBF-BS-50-400-5P	8022592	Data sheet	3C283F8	
ESBF-BS-63-100-10P	574096	Data sheet	3C28402	
ESBF-BS-63-100-25P	574100	Data sheet	3C28403	

ESBF-BS-63-100-5P	574093	Data sheet	3C28401	
TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
ESBF-BS-63-200-10P	574097	Data sheet	3C28405	
ESBF-BS-63-200-25P	574101	Data sheet	3C28406	
ESBF-BS-63-200-5P	1347390	Data sheet	3C28404	
ESBF-BS-63-300-10P	574098	Data sheet	3C28408	
ESBF-BS-63-300-25P	574102	Data sheet	3C28409	
ESBF-BS-63-300-5P	574094	Data sheet	3C28407	
ESBF-BS-63-400-10P	574099	Data sheet	3C28411	
ESBF-BS-63-400-25P	574103	Data sheet	3C28412	
ESBF-BS-63-400-5P	574095	Data sheet	3C28410	

9.8 Single valves

9.8.1 Standard directional control valves according to ISO 15407-1 1/4"

Name	Remarks	Picture	Documentation	Comment
VSVA standard valves with M12 centre connector ISO 15407-1 (VDMA 24 563)	Flow rate 1000 ... 1100 l/min Voltage 24 V DC Sub-base valve Electrically actuated, pilot operated		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
VSVA-B-B52-H-A1-1R5L	534557	Data sheet	5660167	
VSVA-B-M52-MH-A1-1R5L	534556	Data sheet	5660166	
VSVA-B-P53E-H-A1-1R5L	534560	Data sheet	3C28414	
VSVA-B-P53U-H-A1-1R5L	534561	Data sheet	3C28415	

Single connecting plate Standard to ISO 15407-1

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NAS-1/4-01-VDMA	161109	Data sheet	5660168	

9.8.2 Standard valves ISO 5599-1 size 23/8"

Name	Remarks	Picture	Documentation	Comment
VSVA standard valves with M12 centre connector ISO 5599-1 3/8"	Flow rate 2700 ... 2800 l/min Voltage 24 V DC Sub-base valve Electrically actuated, pilot operated		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
VSVA-B-B52-D-D2-1R5L	566995	Data sheet	6420833	
VSVA-B-M52-MD-D2-1R5L	566994	Data sheet	6420831	
VSVA-B-P53E-D-D2-1R5L	566998	Data sheet	5868754	

Single connecting plate 3/8" standard to ISO 5599-1

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NAS-3/8-2A-ISO	11310	Data sheet	5677004	

9.8.3 Standard valves ISO 5599-1 size 3 1/2"

Name	Remarks	Picture	Documentation	Comment
VSPA standard valves with M12 centre connector ISO 5599-1 Sub-base size 3 1/2"	Flow rate 4000 ... 4600 l/min Voltage 24 V DC Sub-base valve Electrically actuated, pilot operated		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
JMEBH-5/2-D-3-ZSR-C	184509	Data sheet	5655804	
MEBH-5/2-D-3-ZSR-FR-C	184508	Data sheet	5655802	
MEBH-5/3B-D-3-ZSR-C	184513	Data sheet	3C28441	
MEBH-5/3E-D-3-ZSR-C	184511	Data sheet	5655810	

Single connecting plate 1/2" according to ISO 5599-1

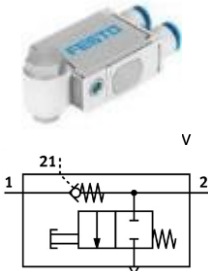
TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NAS-1/2-3A-ISO	10336	Data sheet	5677008	

9.8.4 Shut-off, flow and pressure control valves

9.8.4.1 Check valves and quick exhaust valves

Name	Remarks	Picture	Documentation	Comment
Controlled non-return valves HGL with manual override HAB	Connection M5, G1/8, G1/4, G3/8, G1/2 Flow rate 130 ... 1600 l/min Stop valves - Pneumatically pilot-operated check valves		HAB-.... Documentation Operating instruct. HGL-.... Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
HAB-1/8+HGL-1/8-B	554409	Data sheet Data sheet	5666453	Combination
HAB-1/4+HGL-1/4-B	554408	Data sheet Data sheet	5666452	Combination
HAB-3/8+HGL-3/8-B	554410	Data sheet Data sheet	5666454	Combination
HAB-1/2+HGL-1/2-B	554407	Data sheet Data sheet	5666451	Combination

Name	Remarks	Picture	Documentation	Comment
Check valves VBNF, pilot operated	Connection G1/8, G1/4 Push-in connector 6, 8mm Flow rate 260 l/min Low overall height Can be rotated horizontally through 360° when mounted		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
VBNF-LBA-G18-Q4	8193272	Data sheet	3C28418	
VBNF-LBA-G18-Q6	8001460	Data sheet	3C28416	
VBNF-LBA-G14-Q8	1927027	Data sheet	3C28417	

Name	Remarks	Picture	Documentation	Comment
Quick exhaust valves SEU-...	Connection G1/8, G1/4, G3/8, G1/2, G3/4 Flow rate 300 ... 6480 l/min Stop valve.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SEU-1/8	4616	Data sheet	6543948	
SEU-1/4	6753	Data sheet	6543949	
SEU-3/8	6755	Data sheet	6543950	
SEU-1/2	6822	Data sheet	6543951	

9.8.4.2 Pressure control valves with push-in connection

Name	Remarks	Picture	Documentation	Comment
VRPA pressure regulator	Pressure regulator Connection M5, R1/8, R1/4 Push-in connection 4, 6, 8 mm Flow rate 80 ... 160 l/min Design - Inline, without pressure gauge - Inline, with pressure gauge in MPA - L-shaped, with pressure gauge in MPA		Documentation Operating instruct.	TEM

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
VRPA-CM-Q4-E	8086003	Data sheet	3C28419	TEM
VRPA-CM-Q6-E	8086004	Data sheet	3C28420	TEM
VRPA-CM-Q8-E	8086005	Data sheet	3C28421	TEM

9.8.4.3 Pressure control valves MS-LR

Name	Remarks	Picture	Documentation	Comment
MS4-LR	Connection G1/4 Flow rate 1800 l/min.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
MS4-LR-1/4-D6-RG	567523	Data sheet	3C28422	

9.8.4.4 Precision pressure regulators MS-LRP

Name	Remarks	Picture	Documentation	Comment
MS6-LRP	Connection G1/4 Flow rate 800 ... 3000 l/min.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
MS6-LRP-1/4-D2-A8	538004	Data sheet	3C28423	
MS6-LRP-1/4-D4-A8	538006	Data sheet	3C28424	
MS6-LRP-1/4-D5-A8	538008	Data sheet	3C28425	
MS6-LRP-1/4-D7-A8	538010	Data sheet	3C28426	

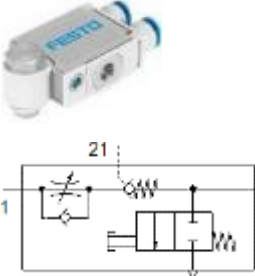
Precision pressure gauge for MS6-LRP-1/4-...

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
MAP-40-1-1/8-EN	161126	Data sheet		
MAP-40-4-1/8-EN	162842	Data sheet		
MAP-40-6-1/8-EN	161127	Data sheet		
MAP-40-16-1/8-EN	161128	Data sheet		

9.8.4.5 Throttle check valves - Exhaust air throttles

Name	Remarks	Picture	Documentation	Comment
GRLA-....-E	Connection M5, G1/8, G1/4, G3/8, G1/2, G3/4, also available with NPT thread Push-in connection 3, 4, 6, 8, 10, 12 mm Flow rate 0 ... 4320 l/min Shut-off flow valve.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
GRLA-M5-QS-6-D	193139	Data sheet		
GRLA-1/8-QS-4-D	193143	Data sheet	3C28427	
GRLA-1/8-QS-6-D	193144	Data sheet	5873619	
GRLA-1/8-QS-8-D	193145	Data sheet	5656012	
GRLA-1/4-QS-6-D	193146	Data sheet	3C28428	
GRLA-1/4-QS-8-D	193147	Data sheet	5656013	
GRLA-1/4-QS-10-D	193148	Data sheet	5656014	
GRLA-3/8-QS-6-D	193149	Data sheet	3C28429	
GRLA-3/8-QS-8-D	193150	Data sheet	5656023	
GRLA-3/8-QS-10-D	193151	Data sheet	5656015	
GRLA-1/2-QS-12-D	193152	Data sheet	5656024	

Name	Remarks	Picture	Documentation	Comment
VFOF	Flow rate 0 ... 650 l/min Stop valve.		Documentation Operating instruct.	TEM

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
VFOF-CE-BAH-Q4-Q4	8193268	Data sheet	3C28430	TEM
VFOF-CE-BAH-Q6-Q6	8193267	Data sheet	3C28431	TEM
VFOF-LE-BAH-G14-Q8	1927030	Data sheet	3C28433	TEM
VFOF-LE-BAH-G18-Q4	8193269	Data sheet	3C28434	TEM
VFOF-LE-BAH-G18-Q6	8001459	Data sheet	3C28432	TEM

9.8.5 Ball valves QH

Name	Remarks	Picture	Documentation	Comment
Ball valves QH	Connection G1/4...G1 1/2 Flow rate 3400 ... 84000 l/min Manually operated Pipe thread according to ISO 228-1		Documentation Operating instruct.	Only in consultation with BMW

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
QH-3/8	9542	Data sheet	3040612	
QH-1/2	9543	Data sheet	5666449	
QH-3/4	9544	Data sheet	5656017	
QH-1	9545	Data sheet	5666450	

9.9 Sensors

- Hint

→ An external query is preferable.

A query via sensor in the cylinder groove only after consultation with the BMW technical department.

9.9.1 for T-slot

T-slot - standard sensor

Name	Remarks	Picture	Documentation	Comment
SMT-.... SDBT-...	Magnetic, contactless, Electronic PNP		SMT-... Documentation Operating instruct. SDBT- Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SMT-8M-A-PS-24V-E-0.3-M12	574337	Data sheet	5868974	
SDBT-MSX-1L-PU-E-0.3-N-M8	8059120	Data sheet	3C28435	Teachbar

T-slot - Sensor welding field resistant

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SDBT-BSW-1L-PU-W-0.3-N-M12	2476855	Data sheet	3C280A7	

* Use after consultation with BMW specialist department

9.9.2 for round groove

Name	Remarks	Picture	Documentation	Comment
SMT-10M-PS-24V-E-0,3-...	Electronic PNP, magnetic, contactless, for round groove. Electrical connection M12 5 ... 30 V DC		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SMT-10M-PS-24V-E-0,3-L-M12	579122	Data sheet	5873602	
SMT-10M-PS-24V-E-0,3-Q-M12	579123	Data sheet	5873603	

9.9.3 Proximity switch accessories

Name	Remarks	Picture	Documentation	Comment
Accessories	Extensive range of accessories for every application. -Mounting kits -Sensor holder -		SMBR-... Documentation Operating instruct. SMM-... Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SMBR-8-16	175094	Data sheet		Sensor holder for DSNU-16-...
SMBR-8-20	175095	Data sheet		Sensor holder for DSNU-20-...
SMBR-8-25	175096	Data sheet		Sensor holder for DSNU-25-...
SMM-8	547941	Data sheet		Positioning element Round groove
SMM-10	547942	Data sheet		Positioning element T-slot

9.9.4 Flow sensors SFAB-...

Name	Remarks	Picture	Documentation	Comment
Flow sensors SFAB-...	Flow measurement ranges - 0,1 ... 10 l/min - 6 ... 600 l/min - 10 ... 1000 l/min Electrical output 1 PNP/NPN/IO-Link Electrical output 2 PNP or NPN or 0 ... 10 V or 1 ... 5 V or 4 ... 20mA		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
SFAB-10U-WQ6-PNLK-PNVBA-M12	8162825	Data sheet	3C28437	
SFAB-600U-WQ10-PNLK-PNVBA-M12	8162833	Data sheet	3C28438	
SFAB-1000U-WQ10-PNLK-PNVBA-M12	8162835	Data sheet	3C28436	

9.10 Pneumatic connection technology / accessories

- Installation specifications

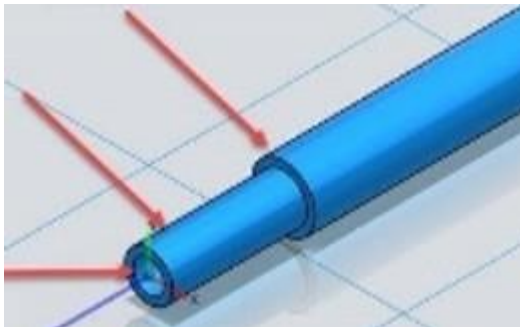
Standard: PUN-H-....SW

Hose colour: Black

Note:

When using PAN-V0-....-SW - double-walled hose.

The PAN-V0S... tool must be used to remove the protective sheath.



PAN-VOS-4 133180

PAN-VOS-6 133181

PAN-VOS-8 133182

PAN-VOS-10 133183

PAN-VOS-12 133184

Anlage zum Produkt (Original: de)
8049755
1605
[8062217]

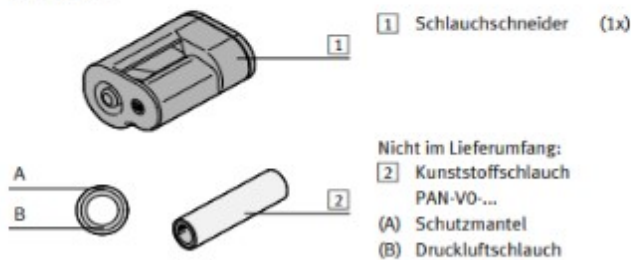
Schlauchschneider PAN-V0S-...

FESTO

Festo SE & Co. KG

Postfach
73726 Esslingen
Deutschland
+49 711 347-0
www.festo.com

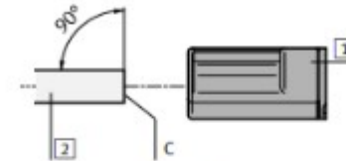
1. Teileliste



2. Bestimmungsgemäße Verwendung

Schlauchschneider PAN-V0S-...:
Entfernen des Schutzmantels (A) vom Druckluftschlauch (B).

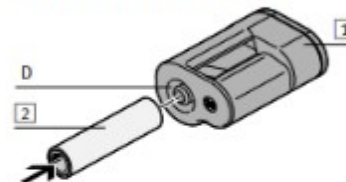
3. Vorbereitung



Falls notwendig:

- Kante (C) des Kunststoffschlauchs 2 im 90°-Winkel abtrennen.

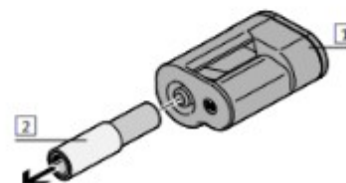
4. Schutzmantel (A) entfernen



- Kunststoffschlauch 2 drehend in die Öffnung (D) des Schlauchschneiders 1 schieben.



- Kunststoffschlauch 2 bis auf Anschlag drehen. Falls notwendig ersatzweise den Schlauchschneider 1 drehen.



- Kunststoffschlauch 2 herausziehen.

Links:

➤ [Media resistance; selection tool](#)

➤ [Flow rate calculation | Festo DE](#)



9.10.1 Externally calibrated hoses

9.10.1.1 Standard hose TEM PUN-H

Name	Remarks	Picture	Documentation	Comment
PUN-H-....SW Colour: Black	Outer diameter 4 ... 16 mm Inner diameter 2.5 ... 11 mm Temperature-dependent Operating pressure -0.95 ... 10 bar Ambient temperature -35 ... 60 °C Operating medium - Compressed air - Vacuum - Water		Documentation Operating instruct.	Application: e.g. in the area of TEM - Standard hose Suitable for drag chains (observe bending radii)

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
PUN-H-4X0.75-SW	197390	Data sheet		TEM
PUN-H-6X1-SW	197391	Data sheet		
PUN-H-8X1.25-SW	197392	Data sheet		
PUN-H-10X1.5-SW	197393	Data sheet		
PUN-H-12X2-SW	197394	Data sheet		
PUN-H-14X2-SW	570387	Data sheet		
PUN-H-16X2.5-SW	197395	Data sheet		

9.10.1.2 Special applications TEM PAN-V0

Name	Remarks	Picture	Documentation	Comment
PAN-V0-.....-SW Colour: black	Outer diameter 6 ... 14 mm Temperature-dependent. Operating pressure -0.95 ... 12 bar Ambient temperature -30 ... 90 °C Operating medium - Compressed air - Vacuum - Water - Mineral oil Double-walled: Outer shell FC2588 PVC Inner tube: PA		Documentation Operating instruct. PVC sheathing, flame-retardant. The hose sheathing must be cut to length before it is inserted into the QS-V0 push-in fitting. The PAN-V0S conduit cutter is the ideal tool for this task. The PAN-V0S hose cutter always cuts the sheathing to the correct length.	Application: e.g. in the area of TEM - Plasma cleaning - Welding applications Suitable for drag chains (observe bending radii) The PAN-V0S... tool must be used to remove the sheathing! PAN-V0S-...

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
PAN-V0-6X1-SW	160550	Data sheet		TEM
PAN-V0-8X1-SW	160551	Data sheet		
PAN-V0-10X1.25-SW	160552	Data sheet		
PAN-V0-12X1.5-SW	160553	Data sheet		

PAN-V0S... tool for removing the sheathing

PAN-V0S-6	133181	Data sheet		TEM
PAN-V0S-8	133182	Data sheet		
PAN-V0S-10	133183	Data sheet		
PAN-V0S-12	133184	Data sheet		

9.10.1.3 TKB PUN-V0 hoses



Name	Order code	Remarks	Picture	Documentation
PUN-V0	PUN-V0...	Outer diameter 6... 14mm Inner diameter 4 ... 10 mm Temperature-dependent operating pressure -0.95 ... 10 bar Ambient temperature -35 ... 60 °C Operating medium - Compressed air - Vacuum	 	Documentation Operating instruct. 

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
PUN-V0-6X2-BL-C	561702	Data sheet		
PUN-V0-6X2-SW-C	561698	Data sheet		
PUN-V0-8X2-BL-C	561703	Data sheet		
PUN-V0-8X2-SW-C	561699	Data sheet		
PUN-V0-10X2-BL-C	561704	Data sheet		
PUN-V0-10X2-SW-C	561700	Data sheet		
PUN-V0-12X2-BL-C	561705	Data sheet		
PUN-V0-12X2-SW-C	561701	Data sheet		
PUN-V0-14X2-BL-C	570352	Data sheet		
PUN-V0-14X2-SW-C	570351	Data sheet		

9.10.2 Push-in fittings

Standard up to hose connection size 14 NPQM-... . For hose connection size QS-...

See also B7 Building regulations

Name	Remarks	Picture	Documentation	Comment
Push-in fittings NPQM, metal	- Connection M5, M7, G1/8, G1/4, G3/8, G1/2 - For hose outer diameter 4, 6, 8, 10, 12, 14 mm - Push-in sleeve 4, 6, 8, 10, 12 mm - Threaded connection - G-thread with sealing ring - Push-in fittings - Plug connections - Plug-in connections with receptacles		Documentation Operating instruct.	Standard series

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NPQM-D-G12-Q10-P10	558671	Data sheet		
NPQM-D-G12-Q12-P10	558672	Data sheet		
NPQM-D-G12-Q14-P10	570451	Data sheet		
NPQM-D-G14-Q10-P10	558666	Data sheet		
NPQM-D-G14-Q12-P10	558667	Data sheet		
NPQM-D-G14-Q6-P10	558664	Data sheet		
NPQM-D-G14-Q8-P10	558665	Data sheet		
NPQM-D-G14F-Q10-P10	558680	Data sheet		
NPQM-D-G14F-Q6-P10	558678	Data sheet		
NPQM-D-G14F-Q8-P10	558679	Data sheet		
NPQM-D-G18-Q4-P10	558661	Data sheet		
NPQM-D-G18-Q6-P10	558662	Data sheet		
NPQM-D-G18-Q8-P10	558663	Data sheet		
NPQM-D-G18F-Q4-P10	558674	Data sheet		
NPQM-D-G18F-Q6-P10	558675	Data sheet		
NPQM-D-G18F-Q8-P10	558676	Data sheet		
NPQM-D-G38-Q10-P10	558669	Data sheet		
NPQM-D-G38-Q12-P10	558670	Data sheet		
NPQM-D-G38-Q14-P10	570450	Data sheet		
NPQM-D-G38-Q8-P10	558668	Data sheet		
NPQM-D-Q10-E-P10	558763	Data sheet		
NPQM-D-Q10-S12-P10	558774	Data sheet		
NPQM-D-Q10-S14-P10	570456	Data sheet		
NPQM-D-Q12-E-P10	558764	Data sheet		
NPQM-D-Q12-S14-P10	570459	Data sheet		
NPQM-D-Q14-E-P10	570452	Data sheet		
NPQM-D-Q4-E-P10	558760	Data sheet		

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NPQM-D-Q4-S6-P10	558765	Data sheet		
NPQM-D-Q4-S8-P10	558766	Data sheet		
NPQM-D-Q6-E-P10	558761	Data sheet		
NPQM-D-Q6-S10-P10	558769	Data sheet		
NPQM-D-Q6-S12-P10	558770	Data sheet		
NPQM-D-Q6-S14-P10	570457	Data sheet		
NPQM-D-Q6-S4-P10	558767	Data sheet		
NPQM-D-Q6-S8-P10	558768	Data sheet		
NPQM-D-Q8-E-P10	558762	Data sheet		
NPQM-D-Q8-S10-P10	558772	Data sheet		
NPQM-D-Q8-S12-P10	558773	Data sheet		
NPQM-D-Q8-S14-P10	570458	Data sheet		
NPQM-D-Q8-S6-P10	558771	Data sheet		
NPQM-D-S10-E-P10	558814	Data sheet		
NPQM-D-S12-E-P10	558815	Data sheet		
NPQM-D-S14-E-P10	570455	Data sheet		
NPQM-D-S4-E-P10	558811	Data sheet		
NPQM-D-S6-E-P10	558812	Data sheet		
NPQM-D-S8-E-P10	558813	Data sheet		
NPQM-H-Q10-E-P10	558809	Data sheet		
NPQM-H-Q12-E-P10	558810	Data sheet		
NPQM-H-Q4-E-P10	558806	Data sheet		
NPQM-H-Q6-E-P10	558807	Data sheet		
NPQM-H-Q8-E-P10	558808	Data sheet		
NPQM-L-G12-Q10-P10	558718	Data sheet		
NPQM-L-G12-Q12-P10	558719	Data sheet		
NPQM-L-G12-Q14-P10	570461	Data sheet		
NPQM-L-G14-Q10-P10	558713	Data sheet		
NPQM-L-G14-Q12-P10	558714	Data sheet		
NPQM-L-G14-Q6-P10	558711	Data sheet		
NPQM-L-G14-Q8-P10	558712	Data sheet		
NPQM-L-G18-Q4-P10	558708	Data sheet		
NPQM-L-G18-Q6-P10	558709	Data sheet		
NPQM-L-G18-Q8-P10	558710	Data sheet		
NPQM-L-G38-Q10-P10	558716	Data sheet		
NPQM-L-G38-Q12-P10	558717	Data sheet		
NPQM-L-G38-Q14-P10	570460	Data sheet		
NPQM-L-G38-Q8-P10	558715	Data sheet		
NPQM-L-Q10-E-P10	558779	Data sheet		
NPQM-L-Q10-S10-P10	558784	Data sheet		
NPQM-L-Q12-E-P10	558780	Data sheet		
NPQM-L-Q14-E-P10	570453	Data sheet		
NPQM-L-Q4-E-P10	558776	Data sheet		
NPQM-L-Q4-S4-P10	558781	Data sheet		

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NPQM-L-Q6-E-P10	558777	Data sheet		
NPQM-L-Q6-S6-P10	558782	Data sheet		
NPQM-L-Q8-E-P10	558778	Data sheet		
NPQM-L-Q8-S8-P10	558783	Data sheet		
NPQM-LFK-G14-Q6-P10	558840	Data sheet		
NPQM-LFK-G14-Q8-P10	558841	Data sheet		
NPQM-LFK-G18-Q4-P10	558837	Data sheet		
NPQM-LFK-G18-Q6-P10	558838	Data sheet		
NPQM-LFK-G18-Q8-P10	558839	Data sheet		
NPQM-LH-G14-Q6-P10	558832	Data sheet		
NPQM-LH-G14-Q8-P10	558833	Data sheet		
NPQM-LH-G18-Q4-P10	558829	Data sheet		
NPQM-LH-G18-Q6-P10	558830	Data sheet		
NPQM-LH-G18-Q8-P10	558831	Data sheet		
NPQM-LH-G38-Q10-P10	558835	Data sheet		
NPQM-LH-G38-Q12-P10	558836	Data sheet		
NPQM-LH-G38-Q8-P10	558834	Data sheet		
NPQM-LK-G14-Q10-P10	558823	Data sheet		
NPQM-LK-G14-Q6-P10	558821	Data sheet		
NPQM-LK-G14-Q8-P10	558822	Data sheet		
NPQM-LK-G18-Q4-P10	558818	Data sheet		
NPQM-LK-G18-Q6-P10	558819	Data sheet		
NPQM-LK-G18-Q8-P10	558820	Data sheet		
NPQM-LK-G38-Q10-P10	558825	Data sheet		
NPQM-T-G12-Q12-P10	558747	Data sheet		
NPQM-T-G14-Q10-P10	558741	Data sheet		
NPQM-T-G14-Q6-P10	558739	Data sheet		
NPQM-T-G18-Q4-P10	558736	Data sheet		
NPQM-T-G18-Q6-P10	558737	Data sheet		
NPQM-T-G18-Q8-P10	558738	Data sheet		
NPQM-T-G38-Q10-P10	558744	Data sheet		
NPQM-T-G38-Q12-P10	558745	Data sheet		
NPQM-T-G38-Q8-P10	558743	Data sheet		
NPQM-T-Q10-E-P10	558789	Data sheet		
NPQM-T-Q10-S10-P10	558794	Data sheet		
NPQM-T-Q12-E-P10	558790	Data sheet		
NPQM-T-Q14-E-P10	570454	Data sheet		
NPQM-T-Q4-E-P10	558786	Data sheet		
NPQM-T-Q4-S4-P10	558791	Data sheet		
NPQM-T-Q6-E-P10	558787	Data sheet		
NPQM-T-Q6-S6-P10	558792	Data sheet		
NPQM-T-Q8-E-P10	558788	Data sheet		
NPQM-T-Q8-S8-P10	558793	Data sheet		
NPQM-Y-Q10-E-P10	558801	Data sheet		

TYPE	Festo TNR	Data sheet	BMW FM No.	Comment
NPQM-Y-Q10-Q8-P10	558805	Data sheet		
NPQM-Y-Q4-E-P10	558798	Data sheet		
NPQM-Y-Q6-E-P10	558799	Data sheet		
NPQM-Y-Q8-E-P10	558800	Data sheet		

Name	Remarks	Picture	Documentation	Comment
Push-in fittings QS..., With "G-" thread and sealing ring	Connection , G1/2, G3/8 For hose outer diameter 16, 22 mm Threaded connection - G-thread with sealing ring Suitable for vacuum Push-in fittings Plug connections Bulkhead connectors Plug-in connections with receptacles Multiple distributor Bulkhead push-in fittings.		Documentation Operating instruct.	Standard For pneumatic applications with a temperature range up to 80 °C and a pressure range up to 14 bar TEM

TYPE	Festo TNR	Data sheet	BMW FM No.	Comment
QS-16	153036	Data sheet		
QS-G1/2-16	186105	Data sheet		
QS-G3/8-16	186347	Data sheet		
QSF-3/8-8-B	153027	Data sheet		
QSH-16-12	153261	Data sheet		
QSH-16	153256	Data sheet		
QSL-16	153075	Data sheet		
QSL-G1/2-16	186126	Data sheet		
QSL-G3/8-16	186348	Data sheet		
QSL-G1/2-16	190665	Data sheet		
QSLV-G1/2-16	186147	Data sheet		
QSO	158419	Data sheet		
QSSF-1/2-16-B	190657	Data sheet		
QST-16-12	130616	Data sheet		
QST-16	153133	Data sheet		
QST-G1/2-16	186167	Data sheet		
QST-G3/8-16	186349	Data sheet		
QSTL-G1/2-16	186178	Data sheet		
QSW-1/2-16	130605	Data sheet		
QSY-16-12	190708	Data sheet		
QSY-16	130609	Data sheet		

9.10.3 Threaded fittings

Name	Remarks	Picture	Documentation	Comment
Blanking plug	Connection G1/8, G1/4, G3/8, G1/2, G3/4 - G-thread with sealing ring.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
B-1/8	3568	Data sheet		
B-1/4	3569	Data sheet		
B-3/8	3570	Data sheet		
B-1/2	3571	Data sheet		
B-3/4	3572	Data sheet		

Name	Remarks	Picture	Documentation	Comment
Threaded fittings NPFC	Connection, G1/8, G1/4, G3/8, G1/2, G3/4, G1 Threaded connection - G-thread with sealing ring.			

Name	Remarks	Picture	Documentation	Comment
Reductions / sockets / double nipples	Connection G1/8, G1/4, G3/8, G1/2, G3/4, G1 - G-thread with sealing ring.			

9.10.4 Couplings

Name	Remarks	Picture	Documentation	Comment
NPHS coupling sockets	Connection G1/4, G3/8, G1/2		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NPHS-D6-M-G14	8059275	Data sheet	6543840	
NPHS-D6-M-G38	8059276	Data sheet	6543841	
NPHS-D6-M-G12	8059277	Data sheet	6543842	

Name	Remarks	Picture	Documentation	Comment
Coupling plug NPHS	Connection AG G1/8, G1/4, G3/8, G1/2 Connection female thread G1/4, G3/8, G1/2 Connection plug nipple N9 For NPHS coupling sockets		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NPHS-S6-M-G12	8059260	Data sheet	6543846	
NPHS-S6-M-G12F	8059264	Data sheet	6543849	
NPHS-S6-M-G14	8059258	Data sheet	6543843	
NPHS-S6-M-G14F	8059262	Data sheet	6543847	
NPHS-S6-M-G18	8059257	Data sheet	6543845	
NPHS-S6-M-G38	8059259	Data sheet	6543844	
NPHS-S6-M-G38F	8059263	Data sheet	6543848	

9.10.5 Distributor

Name	Remarks	Picture	Documentation	Comment
Distributor FR	Connection G1/8, G1/4, G3/8, G1/2 Operating pressure 0 ... 16 bar Disposals 4, 8		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
FR-4-1/2-B	6704	Data sheet		
FR-4-1/4-C	7849	Data sheet		
FR-4-1/4-SA	554305	Data sheet		
FR-4-1/4	2960	Data sheet		
FR-4-1/8-B	6701	Data sheet		
FR-4-3/8-B	6703	Data sheet		
FR-8-1/2	6411	Data sheet		
FR-8-1/4	2078	Data sheet		
FR-8-1/8	2077	Data sheet		

9.10.6 Accessories for pneumatic connection technology

Name	Remarks	Picture	Documentation	Comment
Sealing material	Connection G1/8, G1/4, G3/8, G3/4, G1/2, G1 For G-thread Captive, leak-free.		Documentation Operating instruct.	

Name	Remarks	Picture	Documentation	Comment
Tools	Pipe and hose cutter Assembly and disassembly pliers.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
QSO	158419	Data sheet		Release fork
ZR	194592	Data sheet		Pipe cutter
ZRS	7658	Data sheet		Pipe/hose cutter
ZRS 10PACK.	218606	Data sheet		Spare blades

Name	Remarks	Picture	Documentation	Comment
Tools	Hose cutter for Removal of the protective sheath for PAN-VO-...		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
PAN-V0S-6	133181	Data sheet		TEM
PAN-V0S-8	133182	Data sheet		TEM
PAN-V0S-10	133183	Data sheet		TEM
PAN-V0S-12	133184	Data sheet		TEM

Name	Remarks	Picture	Documentation	Comment
Hose accessories	Organised hose routing Materials - Polyamide - Polyethylene.		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
NPAW-S-T3	554026			
NPAW-S-T4	554027			
NPAW-S-T6	554028			

9.10.7 Silencer

Name	Remarks	Picture	Documentation	Comment
AMTE....	Metal version Connection Thread M5, G1/8, G1/4, G3/8, G1/2, G3/4, Sound pressure level 71 ... 95 dB(A).		Documentation Operating instruct.	

TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
AMTE-M-LH-M5	1205858	Data sheet	5873620	
AMTE-M-LH-G18	1205860	Data sheet	3B950E7	
AMTE-M-LH-G14	1205861	Data sheet	3B91B33	
AMTE-M-LH-G38	1205862	Data sheet	3B950E8	
AMTE-M-LH-G12	1205863	Data sheet	3B91B35	
AMTE-M-LH-G34	1205864	Data sheet	3C28440	

Name	Remarks	Picture	Documentation	Comment
U.....	Connection Thread M5, G1/2, G1/4, G1/8, G3/8, G3/4, G1 Connection Plug nipple PK-3, PK-4 Sound pressure level 65 ... 84 dB(A).		Documentation Operating instruct.	Housing material: Aluminium only.

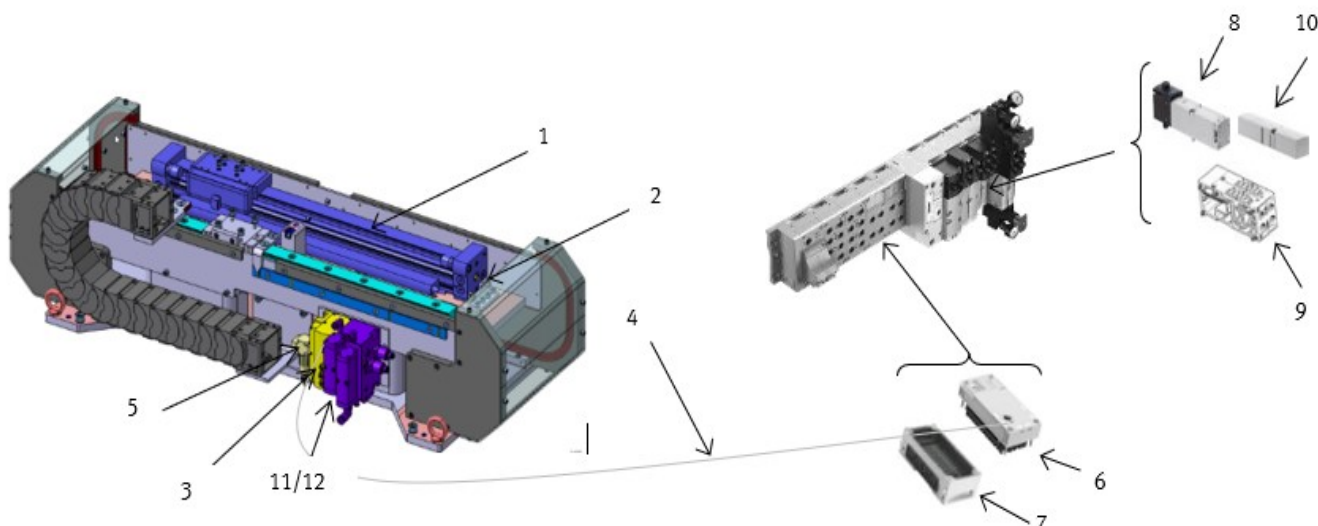
TYPE	Festo TNr	Data sheet	BMW FM No.	Comment
U-1/8-B	6841	Data sheet	3B950E5	
U-1/4-B	6842	Data sheet	3B91B32	
U-3/8-B	6843	Data sheet	3B950E6	
U-1/2-B	6844	Data sheet	5656032	
U-3/4-B	6845	Data sheet	5656033	

9.11 TKB - Components for flexible floor clamping technology

TKB

Note:

To operate the flexible floor clamping technology from standard version V8.x, the relief assembly (pos. 11/12) must be used!



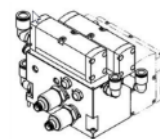
Individual parts for a sliding carriage

Pos.	Number/	Type (Festo)	Part No. (Festo)	Designation	BMW FM No.
1	1	DGCI-32-450-KF-Q	544427	Linear drive	6420822
2	1	HPC-32	533669	Foot mounting	5868806
	1	MUC-32	531754	Profile fastening	5868807
	2	NPQM-D-G18-Q8-P10	558663	Push-in fitting	5868759
3	1	VPWP-6-L-5-Q-10-E-F	589268	Prop. Flow control valve	6420823
4	1	KVI-CP-3-WS-WD-8	540331	Connection cable	6420824
5	1	MS4-LF-1/8-C-U-M	527695	Filter unit - 5µm	
	1	ESK-1/8-1/8	151520	Double nipple	6420826

+ Addition to an existing CPX-VTSA-F ProfiNet valve terminal

Pos.	Number/	Type (Festo)	Part No. (Festo)	Designation	BMW FM No.
6	1	CPX-CMAX-C1-1	548932	Axle controller	6420829
7	1	CPX-M-GE-V	550206	Interlinking block	5677165
	1	NEFC-M12G5-0.3-U1G5	547432	Adapter	-
8	1	VSVA-B-M52-MZD-A1-1T1L	539159	5/2-way valve, monostable, mech. spring	5749289
9	1	VABV-S4-2HS-G14-2T2	546211	Linking plate for 2 bistable valves	5677178
10	1	VABB-S4-1-WT	539212	Reserve space (cover) 26 mm	5677184

Note: when using the 2-channel relief module (part no. 5377417/ item 12), item 8 is required twice.
Position 10 is cancelled!

Relief assembly ELBG-CS-...

Note: Only for use in the V8.x standard.

Pos.	Quantity	Type (Festo)	Part No. (Festo)	Designation	BMW FM No.
11	1	ELBG-CS-B	5377419	Relief module 1-channel	6265400
12	1	ELBG-CS-SPBA	5270417	Relief module 2-channel	6265401

Weight: 3400 gr.

Pressure range: 0 - 10 bar

Consisting of

Quantity	Type (Festo)	Part No. (Festo)	Designation
2	VSPA-B-M52-M-A1	546717	Pneumatic valve
2	NPQM-L-G14-Q10-P10	558713	Push-in L-fitting
1	HB-1/8-QS-6	153449	Non-return valve
1	HAB-1/8	184586	Manual override
1	NPQH-LL-G18-Q8-P10	578265	L-long push-in fitting
2	NPQM-L-G18-Q8-P10	558710	Push-in L-fitting
2	AMTE-M-H-G18	1206622	Silencer
2	B-1/8	3568	Blanking plug used by TNR 5377419
2	SPBA-P2R-G18-2P-M12-0,25x	8000210	Pressure switch used by TNR 5370417

Note: When using the pressure relief module, the two pneumatic diagrams and the instructions in the application note for the pressure relief module must be observed! (see standard documents V8.x)

9.12 TKB - Expansion cylinder/ cooling water retraction cylinder for the cooling water control panel RIP

Type (Festo)	Part No. (Festo)	Designation	BMW FM No.
D-63X2-32SA	186651	Expansion cylinder	6420581



(Symbolic image similar)

9.13 Function-specific systems

→ Only after consultation with the BMW technical department.

Name	Remarks	Picture	Documentation	Comment
Servo press kits YJKP	Pressing force 0.8 ... 17 kN Max. Payload 19.5 ... 95 kg Max. Feed speed 250 mm/s Accuracy FS of force measurement +/- 0.25 %		Documentation Operating instruct.	Only in consultation with BMW
MCS ® transport system Multi Carrier System	MCS®-Guide for download (PDF)		LINK	Only in consultation with BMW
Balancer YHBP-... Part no.: 8087218	Stroke range 100 mm ... 1,990 mm Mass load 25 kg ... 999 kg		Documentation Operating instruct.	Only in consultation with BMW

10 Service and Support from Festo

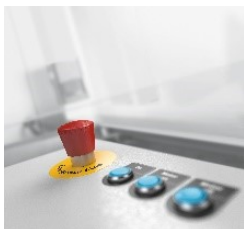
10.1 Safety

Laws and directives are in force to ensure the safety of machines which interact with human beings- e.g. the EC machinery directive (ECMD).

Festo's solutions for safety functions can help to ensure the safety of your system.

After the risk assessment has been carried out, Festo supports you with technical safety measures:

- Safety sensors on the input level
- Safety controls on the processing level (logic)
- Protective measures on the output level



 **Safety**



10.2 Festo Energy Saving Services

High energy prices, rising cost pressure and a growing awareness of climate protection undoubtedly made industrial energy efficiency a key business challenge for you. Festo's Energy Saving Services to DIN EN ISO 11011 offer you a customized range of services for identifying and optimally exploiting potential compressed air savings, both systematically and sustainably.



 **Energy Saving Services**

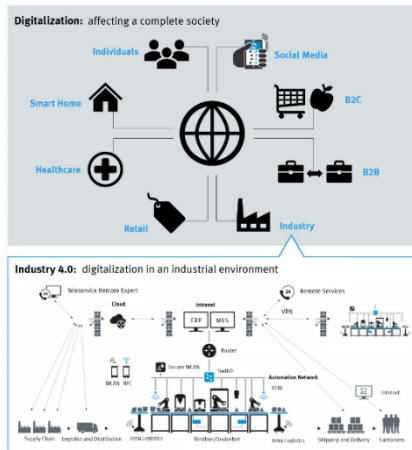


10.3 Getting ready for digital transformation

Preparing you for a changing working environment

Digitalization and new technical opportunities are affecting many companies, in general, but in particular their employees. New competencies – either technical, organizational, or interpersonal – that were, until now, of less relevance are becoming increasingly important. We help you and your employees to be productive in a new, more complex working environment, and are well-prepared to serve as a companion for your digital transformation.

10.3.1 Core elements of digitalization and Industry 4.0



[a Industry 4.0](#)



Digital transformation: Let our experience guide you

Digital transformation is the path you must follow to be prepared for Industry 4.0.

We are the perfect partner to walk beside you and guide you down this path. We know your vulnerabilities and challenges because we have already experienced them first-hand in our own daily business, the planning and operation of our [a Scharnhausen Technology Plant](#), Germany. There, many facets of Industry 4.0 are already in use.

Our own application expertise and digital know-how are strongly incorporated into our training and consulting offers and will fully prepare you for the digital transformation.

10.3.2 App World

The App World is a Festo portal for selling apps, cloud products and other software libraries. It allows you as a customer to purchase directly online and view the relevant apps for your hardware via your Product Key.

The benefits to you:

- Log in with your existing Festo login at App World.
- Order and receive your digital product or license immediately.
- View your App World order history - quickly, conveniently and transparently.



[a App World](#)

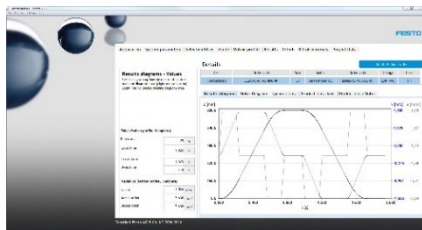


10.4 Conceptualization and design

Smart engineering means using digitalization and online engineering tools to reach your goal more quickly. Festo helps you find the right products, taking into consideration all relevant standards and directives and transfers CAD/ECAD data directly to your plans. This helps you to avoid under or overdimensioning and to plan efficiently and reliably.

10.4.1 Positioning Drive – planning electric actuators

Find the optimum actuator package, quickly and reliably: PositioningDrives calculates a suitable combination of electric axis, electric motor and motor controller from a few pieces of application data. It returns all relevant data right up to the bill of materials and documentation for the chosen combination. This prevents sizing errors and results in a significant improvement in the industrial energy efficiency of the system.



[Positioning Drives](#)



10.4.2 Handling Guide Online – sizing industrial robots

Configure the right industrial robot, from a single-axis solution to a 3D gantry, quickly and easily with the Handling Guide Online. All you have to do is enter the axis definition, payload, etc. and in just 20 minutes you have a perfect, ready-to-order systems. We supply it together with CAD data and commissioning files, ready to install or partially assembled.

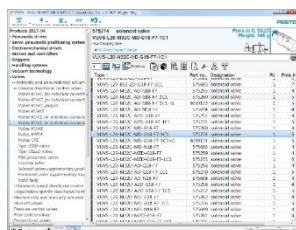


[Handling Guide Online](#)



10.4.3 Quick Search Plus – finding product information quickly

The digital version of the complete catalogue: this smart software brings all of Festo's online tools and Window tools under one roof. You'll receive online access to all product information together with CAD data, marking of the core product range components, etc. The shopping cart and our tools for selection and sizing are just a click away. This is supported in Windows 7 and higher.

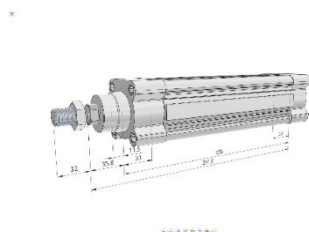


[Quick Search Plus \(Download\)](#)



10.4.4 CAD Data

You can find the respective CAD data and CAD models for the products directly in the catalogue. Simply click on the CAD icon and select the file in the desired format. The practical insert function lets you transfer models online to your CAD system directly without buffering. For this, Java Runtime Environment 6 or higher must be installed on the local computer and the CAD system must be running.



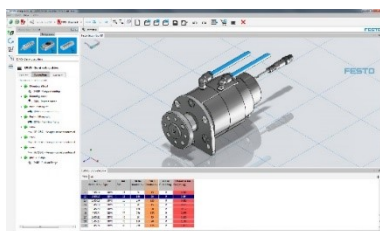
[CAD Data](#)



10.4.5 Festo Design Tool 3D – configuring modules

Quick, reliable, automated generation and ordering of product modules in your CAD format

With this 3D product configurator, you build modules from Festo products quickly, intuitively and without faults in your CAD format. This ensures that components and accessories are compatible, work with clear bills of materials, and end up with clear documentation. At the end you can also order the module directly and, if desired, fully pre-assembled. The tool generates a separate order code for this.

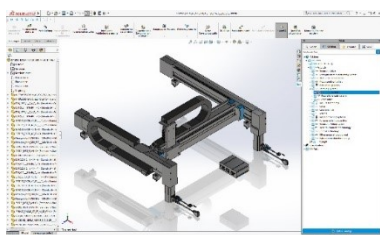


[Festo Design Tool 3D](#)



10.4.6 Festo PARTdataManager – all CAD data in 2D/3D

With this comprehensive standalone tool, you have 2D and 3D models for more than 33,000 products at your fingertips quickly and easily – in 45 CAD formats, with interfaces to current design programs. This works with a simple full-text search as well as with a geometric search based on an imported 3D model. The PARTdataManger can be used with and without a connection to the product catalogue on DVD. The integrated online update function ensures that you are always up to date.



[Festo PARTdataManager](#)



10.4.7 EPLAN-Macros

Design and document circuit diagrams quickly and easily

We provide EPLAN macros for more than 38,000 of our products in 21 languages for creating electrical engineering circuit diagrams in the CAE software EPLAN Electric P8 and fluid engineering circuit diagrams in EPLAN Fluid.

Individual macros in the EPLAN Data Portal

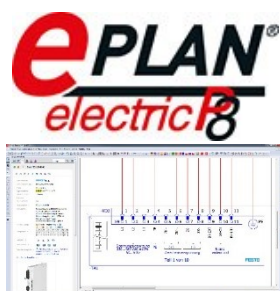
Individual macros for Festo products can be conveniently found in the EPLAN Data Portal using the relevant part number or type code:

[a Festo products in the EPLAN Data Portal](#)

Complete EPLAN projects for complex products

The manual documentation of a complex product like a valve manifold is time consuming and can lead to mistakes. To simplify and speed up this process, Festo provides a web service that automatically generates a correctly configured EPLAN project from the individual configuration of a product, the order code:

[a Schematic Solutions in the Festo App World](#)

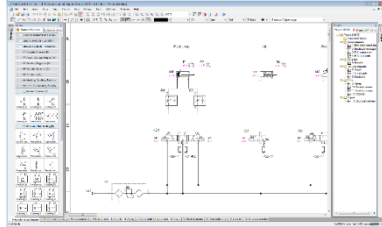


[a EPLAN-Macros](#)



10.4.8 FluidDraw – creating circuit diagrams in a smart way

The indispensable design software for electrical and pneumatic circuit diagrams: FluidDraw makes it easier to plan complete systems and implement individual components. You access the Festo catalogue and your own imported databases and work with DIN-compliant symbol libraries, evaluation functions and assembly drawings. The result is reliable, complete and standardized circuit diagrams.



 **FluidDraw**



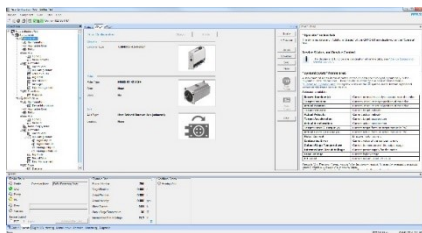
10.5 Assembly and commissioning

When it comes to assembly and commissioning, our software tools, ready-to-use complete solutions and local service specialists ensure our components and systems will fit in seamlessly with your overall system.

10.5.1 Festo Configuration Tool – parameterizing components

The Festo Configuration Tool FCT provides a clear visualization of all the actuators in a system. With our configuration and commissioning software, you can move axis system step by step or in sequences, write individual records to the positioning set table using the teach-in method and apply trace functions. FCT runs offline in the office as well as online directly on the machine for parameterizing positioning options and for diagnostics.

You will find product-specific plug-ins with the product.

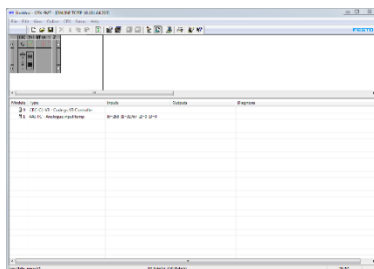


 **Festo Configuration Tool (FCT)**



10.5.2 Festo Maintenance Tool FMT – configuring CPX modules

The easiest way to perform commissioning, configuration and extended diagnostics of CPX valve manifolds is with the CPX-FMT. When using Industrial Ethernet fieldbus nodes such as EtherNet/IP, PROFINET, and Modbus/TCP, the Maintenance Tool communicates directly with the CPX terminal. With classic fieldbuses, the software is connected to the CPX terminal via a USB adapter (type NEFC-M12G5-0,3-U1G5).

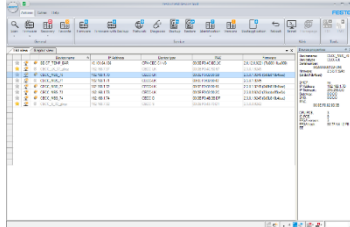


 **Festo Maintenance Tool (Download)**



10.5.3 Festo Field Device Tool – setting up field devices

The multi-tool for service and commissioning: the Festo Field Device Tool is our practical tool software with various functions for all Ethernet-based field devices from Festo, including CPX control blocks with related valve manifolds, controllers CECC and motor controllers, and camera systems. It enables you to find all Festo devices in the network, and to easily and conveniently check and update the firmware.



[Festo Field Device Tool \(Download\)](#)



10.6 Operation and modernization

We're there to offer support whenever you need us online or in person. This applies to all phases, from engineering to operation and beyond. We listen to you and we help you to keep your processes running optimally and without downtimes. When it matters most, we provide help quickly.

10.6.1 Maintenance service

Our specialists ensure optimal operation of your machines by inspecting your system for damage and wear and providing competent maintenance – from replacing compressed air filters to changing toothed belts – in accordance with DIN 31051.

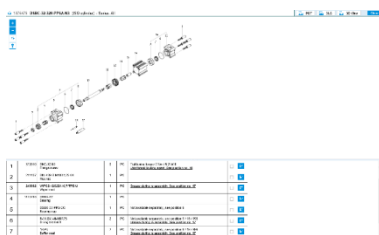


[Maintenance Management](#)



10.6.2 Spare parts for Festo products

The quick way to find the right spare part: use the part number, order code, type, Product Key or scanned data matrix code to go straight to the part you are looking for. You will then see all the available spare parts in the smart spare parts catalogue and can place the part you need in the shopping cart. Interactive close-up views help during the selection process. We also provide repair and installation instructions as well as an overview of the matching accessory.



[Spare parts](#)



10.6.3 Festo Service2See! - Simple self-help video tutorials

Watch and understand: on your YouTube channel “Festo Service” you will find practical and intuitive step-by-step instructions on frequently requested topics such as repairs, configuration, commissioning, and modifications. The videos are the perfect complement to our technical hotline, since a picture says a thousand words, particularly a moving picture. And they are available around the clock!

Useful hints about the tools you need, how to use them, and how much time you can expect to spend are included along with illustrated comparisons that refer you to typical fault sources. Ideally, you should have a tablet or smartphone handy so that you can watch the correct sequence directly at the machine.



 **Service2See**



10.7 Online Shop

Efficient purchasing in the Festo Online Shop

The user-friendly product selection process guides you to the right product quickly and reliably. Practical filter functions, intuitive operation and the valuable information in the selection aid make selecting products especially easy. A visual representation at product level shows the recommended accessories.

As a registered customer, you can see prices and availability, can conveniently access the data from previous orders, import bills of materials, share carts and easily download documents such as order confirmations, delivery notes, and invoices. Thanks to seamless order and shipment tracking, you'll have all delivery dates in view at all times, including orders outside the Online Shop.

Especially beneficial: the Festo Online Shop is fully mobile and compatible with all devices, allowing you to select and order required products directly from any smartphone or template.

You can unlock all the features of the Festo Online Shop through a simple registration process. This gives you access to the complete product portfolio and useful information, tools, and services.



 **Ordering in the Online Shop**



10.8 Festo Didactic

Festo Didactic is a world leader in technical education and development – whether with equipment for technical training centres or with training and consultation for industrial companies.

10.8.1 Learning systems for education and science

Festo Didactic learning systems are used worldwide by schools and universities, industry-wide institutes and companies to train the specialists of tomorrow.

With our portfolio, we cover all the equipment for efficient learning and guaranteed learning success – from simple simulation software to individual training packages. From the modular learning factory to the fully equipped training centre.

Our range of equipment covers the wide spectrum of automation: pneumatics, electro-pneumatics, hydraulics, electro-hydraulics, electronics, electrical engineering, sensor technology, robotics, CNC technology, PLC and fieldbus technology as well as mechatronics, production and process engineering.



a Learning Systems



10.8.2 Training and Consulting for industrial companies

Festo Didactic has over 40 years of experience in the field of training and 20 years of experience in process optimisation.

Whether in open seminars, in-house training courses, workshops or corporate business games we focus on practical learning with real products and industry-oriented learning systems. Using the right formats and methods, our experts teach the latest learning material on the topics of people, technology and organisation. The portfolio ranges from general technical education and teacher training to the training and development of technicians and engineers.

For process optimisation purposes, we track – together with the customer – the whole information and product route through the customer's business – always with the aim of efficiently organising the whole process. Our consultants develop, accompany and evaluate the necessary changes so that the customer can then take over the process and continue to manage it on its own.



a Training and Consulting

