


Title	Mechanical specification machinery order		
Document type	Technical specification		
Application area	Machinery orders for mechanics		
Document number	KE-S-M-006-EN	Revision	H
Date of release	11.02.2020	Released by	Mr. Krämer
Publisher	Knauf Engineering GmbH Am Bahnhof 7 97346 Iphofen		

Rev.	Date	Created	Released	Description
13	24.06.2014	Florian Hofmann	Thomas Krämer	Released by Mr. Krämer
A	07.10.2015	Florian Hofmann	Thomas Krämer	Motor IE2 change to IE3
B	22.02.2017	Anna Rimer	Thomas Krämer	2.12. Conveyor belts changed to E12/2 V5/V10
C	11.12.2017	Anna Rimer	Thomas Krämer	Pneumatic Aventics added (2.6. changed, appendices added)
D	08.06.2018	Caroline Baierl	Thomas Krämer	2.10: terminal box: cable entry added
E	26.10.2018	Caroline Baierl	Thomas Krämer	2.10: addition terminal box
F	15.02.2019	Christa Papsthard	Thomas Krämer	4. pressurized air pipes
G	30.09.2019	Caroline Baierl	Thomas Krämer	Surface protection motor
H	11.02.2020	Ulrich Löblein	Thomas Krämer	3.6. added - permitted deflection of steel supports / -support layers

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1. In General

1.1. Supplier

The supplier has to take into account the findings made from earlier deliveries to the purchaser. The supplier has to inform the purchaser immediately about any technical innovations becoming known or necessary when the supply section is being manufactured.

1.2. Scope of supply

The ordered scope of supply has to be designed for rough operations and amply dimensioned. It is vital that attention is given to a low outlay on maintenance. The lubrication points have to be fitted to allow for easy access; consideration has to be given to possible insulation.

1.3. Discrepancies

Discrepancies from this list have to be clarified in advance with Knauf Engineering.

2. Constructional design

Unless otherwise agreed, uniformity and related replaceability of accessories such as bearings, drive drums, belts, idlers, buckets, chains, motors and couplings must be ensured when the construction is prepared.

2.1. Fasteners

- Layout of all fasteners according to EN ISO
- Fasteners at least galvanized

2.2. Coupling

- Make Flender; up to 3700Nm Bipex / Elpex-B with taper lock bushing; above 3700Nm N-Eupex, 3-sectioned with taper lock bushing

2.3. Magnetic couplings

- Make Stromag; Type MGL 24 CV, 24VDC or BSD

2.4. Ball bearings

- Make SKF or FAG/INA, other bearings after approval by and consultation with Knauf

2.5. Lubricating nipples

- According to DIN 3404 (flat lubricating nipple), design size: M1 (round head Ø16) others according to prior agreement

2.6. Pneumatic equipment

Make: Festo or Aventics according to the valid product approval lists (see attachment)

- Cylinders in acc. with standard ISO 15552 or ISO 21287 other cylinders according to prior agreement
- All double-acting valves have to be fitted with 2 magnet coils.
- Fit always all pneumatic cylinders with one-way restrictors for exhaust air. Other designs only after consultation with Knauf Engineering.
- Always design end position control according to Knauf standard operating media. Cylinder switches at cylinders only in exceptional cases and after consultation with Knauf!
- Maintenance unit: filter control valve with manual switch-on valve without drip-feed lubricator!
- Proportional pressure control valve: Festo type: MPPE-3-1/2-10-010-B with upstream filter
- Screw connections: Quick Star QS, Standard line
- The function has to be designed for low-oil air (without drip-feed lubricator)
- Polymer sound absorber preferred
- Single valve or valve cluster in acc. with TYP 44 VTSA, ISO 15407-2, overall width: at least 26 mm
- Each valve cluster has its own filter control valve.

2.6.1. Single valve – only make Festo

Individual connector plate with M12 plug:

- Internal control supply air VABS-S4-1S-G14-B-R3
- Connection supply air: QS-G1/4-10

2.6.2. Valve cluster – only make Festo

(upwards from 2 valves) VTSA with multipole connection (Module No. 539 215)

Electrical section

Ordering code 1: 44E-T-P-H

	Code	Description
Electrical control	T	Multipole, CageClamp
Voltage	P	24 V DC
Fixing	H	Top-hat rail

Alternative for small valve cluster (up to 6 valve):

Ordering code 1: 44E-MP2-P

	Code	Description
Electrical control	MP2	Multipolanschluss, Einzelanschluss mit M12, 6-fach
Voltage	P	24 V DC

Unused M12-connections close with „PROT-M12 FS“ Item No. 1560251 by make Phönix Contact

Pneumatic section

Ordering code 2: 44P-V-Y-LSMX

	Code	Description
Supplementary hand operation	V	Hidden (with stop)
End plate - right	Y	End plate with coding cover, internal control supply air
Pneumatic supply - valve cluster	S	Sound absorbers and QS screwed connections
Design of all pneumatic connections	M	QS screwed connections - large
Connection design - supply plates	L	Supply air 1 / exhaust air 3/5 collectively
Supply plate - left	X	Supply plate on the left ahead of interlocking plate 00
Interlocking block type	B	Interlocking plate for 26 mm Size, 2 valve locations, 4 addresses

Given 3 or more interlocking blocks, another supply plate (Code: U) is to be fitted ahead of the end plate. Connection - Feed: QS-G1/2-16

Should the valve cluster TYPE 44 VTSA not have a sufficient flow capacity, then valves based on ISO 5599-1 can be used following consultation with Knauf Engineering.

2.7. Roller chains

- Heavy-duty roller chains based on DIN 8187- European make

2.8. Shaft fixing

- Chain wheels, pulleys, toothed belt pulleys with taper lock bushing fixing or Bikon / KBK mounting sets

2.9. V-belt

- V-belt design according to DIN 7753

2.10. Motors

- Make Siemens (from BG280 insulated BS bearings have to be used); geared motors: Make SEW, stand-alone gears Make Flender or according to prior agreement
- Protective system according to DIN EN 60529 IP54:
5x = Dust protected, x4 = Splashing of water
- Class of insulation: F (155°C) briefly ISO F
- 3 PTC resistors (PTC-thermistors) in coil (Utilization B / 135°C)
- Class of energy efficiency according to IEC standard 60034-30-1: IE3 (High Efficiency) or better; Coil: Standard: 230V / 400V
- If not possible (from approx. 30 kW) or at Y/Δ 400V / 690V
- Surface protection
 - o indoor installation min. corrosivity category C2, NDFT approx. 120-150µm (corresponds to SEW OS1)
 - o outdoor installation min. corrosivity category C4, NDFT approx. 220-270µm (corresponds to SEW OS3)

- Cable gland in terminal box:

Engine power of motor [kW]	Cable gland in terminal box	Material
≤ 7,5	1x M32 + 1x M20	brass nickel-plated or plastic
≤ 15	1x M32 + 1x M20	brass nickel-plated or plastic
≤ 30	1x M50 + 1x M20	brass nickel-plated
≤ 45	1x M50 + 1x M20	brass nickel-plated
≤ 55	1x M63 + 1x M20	brass nickel-plated
≤ 75	1x M63 + 1x M20	brass nickel-plated
90-132	2x M63 + 1x M20	brass nickel-plated
160-315	6x M40 + 1x M20	brass nickel-plated
≥ 355	6x M40 + 2x M20	brass nickel-plated
≥ 400	9x M40 + 2x M20	brass nickel-plated
≥ 630	12x M40 + 2x M20	brass nickel-plated

Info: For engine power from 160 kW or more the protective conductors will be laid outside the housing because of the minimal space.

Specification of cable glands:

The inner diameters of the cable gland have to be maintained. The thread length of the cable glands has to be designed by the motor supplier according to the material's thickness of the terminal box.

Protective system: IP 68, 5bar, 30min / >IP68

Operating temperature: -40 °C to + 100 °C

Material: cable gland: brass nickel-plated or plastic (for ≤ 15kW) with EPDM-seal

Size of cable gland:	inner diameter (free cable duct)
M16	4,5 – 10 mm
M20	6 – 13 mm
M32	13 – 21 mm
M40	16 – 28 mm
M50	21 – 35 mm
M63	34 – 48 mm

2.11. Belt for conveyor

- Quality EP 400/2 3:2 rubber-lined covers, other types according to prior agreement

2.12. Conveyor belts

Make Siegling:

- Conveyor with sliding rails
Type E 12/2 U0/V20 GREEN, 90mm wide (smooth) or
Type E 8/2 U0/V20 AR BLACK 90mm wide (anti slip structure)
- Conveyor with idlers
Type E12/2 V5/V10 STR/GL green

2.13. Chain tensioner

- Mechanical tensioners or Rosta tensioner

2.14. Hydraulic system

Make Bosch or Elutec:

- Identical hydraulic aggregates have to be used.
- For each switching operation one single valve has to be planed.
- Proportional valves are only permitted in exceptional cases and only after consultation with and approval by Knauf Engineering.

2.15. Drive belt

- Make Siegling Type GG14P30 (sanded), GG30E32 (z-connection) or optionally to according to load

2.16. Toothed belt

- Make BRECO or equivalent European branded product

2.17. Bushed conveyor chain for apron conveyors

- According to DIN 8165 Type FV63 with 40mm rollers, both sides of each link with welded-on fastening bracket 30x30x4x40 with drill hole d=8.4mm, division p=63mm, number of links depending on order, length depending on order, chain of the type and design in accordance with existing AB 11.725/05-K2952
- Make: Brandau sprocket chain
- The chain has to be combined with St52 or C45 runners.

2.18. Gratings

- Mesh width: 30x10
- Bearing bar: 40x3

2.19. Lubricants / anchoring materials / connection bolts

- Initial oil filling for gear units and grease for bearing assembly and other lubricants are contained in the scope of supply. (possibly in a separate package).
- Grease for bearings: Make Shell/Fuchs (other makes according to prior agreement)
- Gear oils: Make Shell/Fuchs (other makes according to prior agreement)
- Hydraulic oil: Make Shell/Fuchs (other makes according to prior agreement)
- Anchoring materials, such as tie-down bolts and fastening devices on platforms and foundations, form part of the supplier's scope of supply.

2.20. **Valve for dedusting of filter for dedusting**

Make: RECO Type RECOVTEC

2/2-way membrane valve, closed under pressure

Switch function with electrical 24V magnet valve
with a main membrane and a pre-control membrane

Material of membrane valves: TPE-E

3. **Planning and design specifications**

3.1. **Fans**

- Must be constructed with vibration dampers (vibration-insulated).
- Start of fans via frequency converter, only in exceptional cases against opened flap or vane control when cold.
- Consideration has to be given to a 10% air flow reserve for fans
- Directly coupled with motor (V-belt drive only in special cases and only allowed after consultation with and approval by Knauf Engineering).

3.2. **Maintenance doors / inspection openings**

- Execution of maintenance doors and inspection openings must be designed in a way, that they are material and pressure tight (solely at **process design**)
- A mechanically fixed sealing with enough resilience has to be chosen for the sealing system. For process sealing this sealing consists preferably of a gravitated fabric tube filled with woofen stainless steel metal core.
- As a functioning guarantee for the door system at least 500 closures must be assured without any leakage or functional damage.
- The door system is only to be opened by tools.

3.3. **Stairs**

According to DIN EN ISO 14122-3:

- Raised foot-step: 230 – 250 mm
- Step height: max. 200 mm
- Inclination: approx. 38°

If plant components are situated below the stairs, the bottom sides have to be covered with sheet so that the machines are protected against dirt.

3.4. **Railing design**

According to DIN EN ISO 14122-3:

- Form C tubular design h1 = 1100 mm (for silos with inclined roof 1200 mm)
- Support and hand-rail \varnothing 48,3 x 3,6
- Knee board \varnothing 26,9 x 2,6
- Base board FL 100 x 8
- Vertical, fixed ladders according to DIN EN ISO 14122-4

3.5. Loads / Load indication

Minimum operating load (unless otherwise noted)

- Platforms 250 kg/m²
- Connecting pedestrian bridge 150 kg/m²
- Silo roofs without any decompression 300 kg/m²
- Railing - horizontal surfaces 50 kg/m²
- Stairs - horizontal 250 kg/m²
- Silos Negative pressure of 250 mm water column (WC) (25 mbar)

Load indications must include:

- Loads of the machine(s), silos and similar equipment - empty
- Loads of the machine(s), silos and similar equipment under normal operation
- Loads of the machine(s) under special operations (emergency weight) (e.g. installation outside – wind strengths – snow forces)
- With indication of lateral forces both vertically and horizontally including those of the vibrations (frequency) and duration of their stresses.
- Dynamic effects
- Platforms, supports, machine structures subject to vibrations caused by, for instance, fans, crushers and motors are to be designed to stop any resonance vibrations arising.
- The calculated natural frequency must be outside a 50% range on both sides of the operating frequency.
- Thermal effects
- Examination of the supports
- The supplier's scope of services includes a static examination based on empirical values of the supports in the steelwork and on the foundations of heavy machinery, such as rotary kilns, dryers, grate-type conveyor, presses, screening machines, packing machines, transportation equipment, mixers and blowers (plant components with rotational forces).

3.6. Permitted deflection of steel supports / -support layers

- Maximum permitted deflection of all steel supports in the functional steel construction with machine installation: less or equal $l/500$
- for supports without machine loading and without functionality: less or equal $l/300$
- for supports with loads of weighing facilities: less or equal $l/1000$

3.7. Counter flange

- A counter flange incl. fasteners must be delivered with every machine part with a connecting flange larger than 1.000 mm in diameter or edge length.

3.8. Dedusting pipes

- $\leq \text{Ø}300$ mm pipe type JACOB or similar
Pipe wall thickness: 2mm
- $> \text{Ø}300$ mm steel plate welded
Pipe wall thickness: 3mm
- At each suction point a manual shut-off valve must be provided.

3.9. **Belt feeding**

- Sealing of chutes: double sealing system
 - o Manufacturer MARTIN
 - o Type: DOUBLE APRON SEAL
- Impact bars: In feeding area and across the full length of the material chute

4. **Paint / surface coating**

Pre-treatment of all steel parts:	Blasting SA 2 ½
Outside surfaces to be insulated up to 120°C	RAL 7035 light grey, Zinc phosphate grounding on basis of alkyd resin, total layer thickness min. 40µm
Outer surfaces up to 120°C	RAL 1015 light ivory semi-gloss, total layer thickness min. 80µm
Equipment up to 500°C	RAL 9006 white aluminium, high temperature-resistant, total layer of thickness min. 80µm
Protection devices	RAL 1003 safety yellow semi-gloss, total layer of thickness min. 80µm
Safety fences	Frames: RAL 1003 safety yellow semi-gloss, Grates: RAL 9005 black semi-gloss, Total layer thickness min. 80µm
Stainless steel parts	stained and passivated
Pressurized air pipes	RAL 7001 silver grey with blue arrows/labels, total layer thickness min. 80µm; Or galvanized with blue arrows/labels

5. Appendices

5.1. Festo product approval list



Knauf Preferred-List 2017

date of creation
27.04.2017

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Version
1 EN

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consultation with Knauf Engineering.Overview..... 2

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Overview


1.1 Pneumatic drives

1.1.1 Compact cylinders to ISO 21287


Name	Remarks	Picture	Documentation
Compact cylinder ADN	Diameter: 12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125 mm Stroke length: 1 ... 500 mm Force: 51 ... 7363 N Double-acting Fixed/self-adjusting cushioning		Catalogue Documentation

1.1.2 Standard cylinder to ISO 15552

Name	Remarks	Picture	Documentation
Standard cylinder DSBC	Diameter: 32, 40, 50, 63, 80, 100, 125 mm Stroke length: 1 ... 2800 mm Force: 483 ... 7363 N Double-acting Position sensing Fixed/adjustable/self-adjusting cushioning		Catalogue Documentation




Name	Remarks	Picture	Documentation
Standard cylinder DSBG	Diameter 32, 40, 50, 63, 80, 100, 125, 160, 200, 250, 320 mm Stroke length 1 ... 2800 mm Force: 483 ... 48255 N Double-acting Position sensing Fixed/adjustable/self-adjusting cushioning		Catalogue Documentation

1.1.3 Round cylinders to DIN ISO 6432

Name	Remarks	Picture	Documentation
Round cylinders DSNU	Diameter: 8, 10, 12, 16, 20, 25 mm (standard) Diameter: 32, 40, 50, 63 mm Stroke length: 1 ... 500 mm Force: 19 ... 1870 N Double-acting Position sensing Fixed/adjustable/self-adjusting cushioning Mounting flange		Catalogue Documentation



1.1.4 Mechanical coupling


Name	Remarks	Picture	Documentation
Linear drives DGC-K	Diameter: 18, 25, 32, 40, 50, 63, 80 mm Stroke length: 1 ... 8500 mm Force: 153 ... 3016 N Position sensing		Catalogue Documentation
Linear drives DGC	Diameter: 8, 12, 18, 25, 32, 40, 50, 63 mm Stroke length: 1 ... 8500 mm Force: 30 ... 1870 N Position sensing Various cushioning options		Catalogue Documentation
Linear drives DGC-HD	Diameter: 18, 25, 40 mm Stroke length: 1 ... 5000 mm Force: 153 ... 754 N Position sensing End position cushioning with shock absorber Recirculating ball bearing guide		Catalogue Documentation

Bemerkung:

- Alle Zylinder sind prinzipiell mit Abluft- Drosselrückschlagventile auszurüsten (siehe 1.4.2).
- Bei doppelwirkenden Zylindern dürfen nur bistabile Ventile eingesetzt werden.


1.2 Electromechanical drives

1.2.1 Linear drives and slides


Name	Remarks	Picture	Documentation
Spindle axes ELGA-BS-KF	Size 70, 80, 120, 150 Max. stroke length 3000 mm Force 300 ... 3000 N Integrated recirculating ball bearing guide		Catalogue Documentation

1.3 Motors and controllers

1.3.1 Stepper motors

Name	Remarks	Picture	Documentation
EMMS-ST stepper motor	Size 28, 42, 57, 87 Holding torque 0.09 ... 8.6 Nm Voltage 24 ... 72 V DC Nominal current 1.4 ... 9.5 A Suitable motor cable Suitable motor flange		Catalogue Documentation


1.3.2 Gear units


Name	Remarks	Picture	Documentation
Gear units EMGA	Low backlash planetary gear unit for electromechanical drives Gear ratio $i = 3$ and 5 , in stock Life-time lubrication Degree of protection: IP54		Catalogue Documentation



1.4 Valves


1.4.1 Standards based directional control valves

Name	Remarks	Picture	Documentation
Standard valves VSVA, plug-in	Connection G1/8, ISO size 18mm (02); G1/4, ISO size 26mm (01), ISO size 42mm (1), ISO size 52mm (2) Flow rate 500 ... 2900 l/min Voltage 24 V DC, 110 V AC Sub-base valve - Solenoid actuated, pilot actuated Manifold sub-bases Intermediate pressure regulator plates. Flow control plates Vertical pressure shut-off plates Vertical supply plates 90°-connection plates Individual sub-bases.		Catalogue Documentation

Name	Remarks	Picture	Documentation
Standard valves to ISO 5599-1	Connection G1/4, ISO1; G3/8, ISO2; G1/2, ISO3; G3/4, ISO4 Flow 1 200 ... 6 000 l/min Voltage Sub-base valve - Electrically actuated, piloted - Pneumatically actuated Sub-bases Manifold sub-bases Throttle plates Intermediate pressure regulator plates.		Catalogue Documentation

Note: - Use only, if flow of VSVA or VTSA is insufficient.
 - For double-acting cylinders only bistable valves may be used.


1.4.2 One-way flow control valves

Name	Remarks	Picture	Documentation
GRxA, GRxZ	Connection M3, M5, G 1/8, G 1/4, G 3/8, G 1/2, also available with NPT thread Plug connector 3, 4, 6, 8, 10, 12 mm Flow rate 0 ... 1,400 l/min Non-return and flow control valve.		Catalogue Documentation


Note: All cylinders are to be fitted with control valves exhaust air



1.4.3 Proportional valves

Name	Remarks	Picture	Documentation
Proportional-pressure regulators VPPM	Connection G1/8, G1/4, G1/2 Flow rate: 380 ... 7000 l/min. 3-way proportional pressure regulators Choice of 3 regulator settings (fast, universal, precise) Display available as option		Catalogue Documentation

1.4.4 Sub-bases


Name	Remarks	Picture	Documentation
Sub-bases to ISO 5599-2			Catalogue Documentation

Sub-bases in detail:

VABS-S4-2S-G18-B-R3	541070	Sub-base 18mm
VABS-S4-1S-G14-B-R3	541069	Sub-base 26mm
VABS-S2-1S-G38-B-R3	546104	Sub-base 42mm
VABS-S2-2S-G12-B-R3	555645	Sub-base 52mm

Note: - Only as a single valve. Above use valve terminal VTSA (see 1.3)
 - For double-acting cylinders only bistable valves may be used


1.4.5 Sub-bases


Name	Remarks	Picture	Documentation
Sub-bases to ISO 15407-2			Catalogue Documentation



1.5 Valve terminals

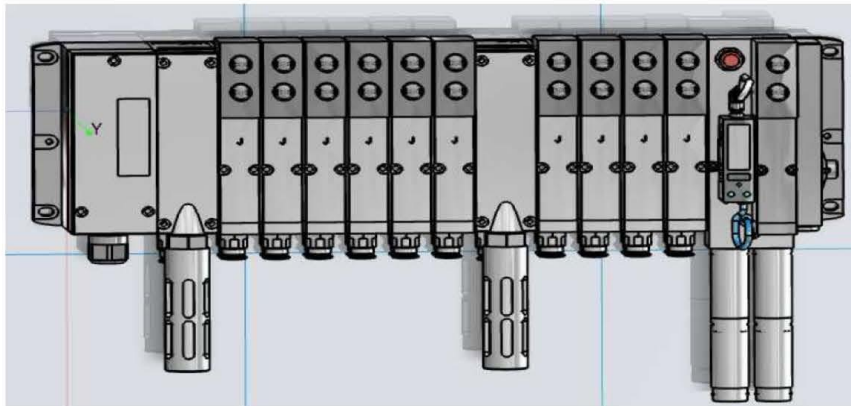
1.5.1 Valve terminals VTSA, ISO 15407-2, ISO 5599-2

Name	Remarks	Picture	Documentation
VTSA with CPX terminal	Control via fieldbus or control block Max. 32 valve positions/max. 32 solenoid coils Max. 10 electrical modules - Digital inputs/outputs - Analogue inputs/outputs - Parameterisation of inputs and outputs - Convenient, integrated diagnostics - Preventive maintenance concepts Connecting thread: G.		Catalogue Documentation

Name	Remarks	Picture	Documentation
VTSA with multi-pin plug connection	Controlled via multi-pin plug Max. 32 valve positions/max. 32 solenoid coils Connection technology: - 37-pin Sub-D - Terminal strip - 19-pin round plug connector Connecting thread G.		Catalogue Documentation

Preferred Configuration (Example) overview for Valve terminal VTSA with multi-pin plug connection

#539215
 44E-T-P-D-H
 44P-V-Y-LSMX-3BUBBL-10|VBWVWBWI+10B5T





Configuration overview for valve terminal VTSA with multipole connection

Order code 1 Valve terminal, electrical part:

44E-T-P-D-H

Order code 2 Valve terminal, pneumatic part:

44P-V-Y-LSMX-3BUBBL-10|VBWV|BWI + 10B5T

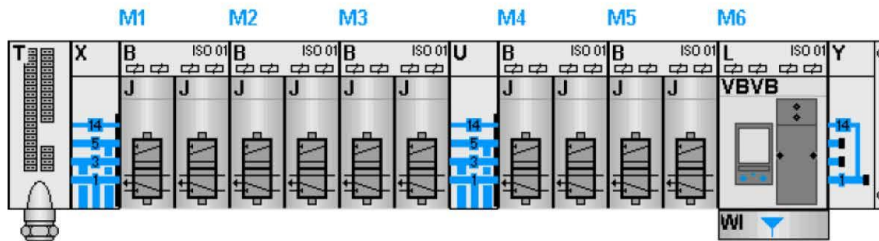
Valve terminal VTSA with multi-pin plug connection

Select features: My favourites

44E-T-P-D-H

44P-V-Y-LSMX-3BUBBL-10|VBWV|BWI + 10B5T

Basic configuration	Module position	Valve position	Accessories	Overview
Basic configuration, electrics				
Valve terminal, electrical part	44E Valve terminal, VTSA, with electrical multi-pin connection terminal box			
Electrical actuation	T Multiple connector plate, Cage-Clamp			
Voltage	P 24 V DC			
UL certification	Without			
Explosion protection	Without			
Basic configuration, pneumatics				
Valve terminal, pneumatic part	44P Valve terminal, VTSA, modular manifold sub-base valves to ISO 15407-2, ISO 5599-2			
Manual override	V Covered			
End plate, right	Y Right-hand end plate, internal pilot air supply			
Port configuration for air supply plates	L Normal operation: supply air 1 / exhaust air 3/5 common (reverse operation: exhaust air 1 / supply air 3/5 common)			
Pneumatic supply valve terminal *	S Connectors and silencers			
* New value: U				
Alternative silencer *	Standard			
* New feature				
Fitting variants *	Metal fitting with plastic releasing ring, type QS			





Basic configuration electrics	
Feature	Value
Valve terminal, electrical part	44E Valve terminal, VTSA, with electrical multi-pin connection/terminal box
Electrical actuation	T Multiple connector plate, CageClamp
Voltage	P 24 V DC
UL certification	Without
Explosion protection	Without

Basic configuration, pneumatics	
Feature	Value
Valve terminal, pneumatic part	44P Valve terminal, VTSA, modular manifold sub-base valves to ISO 15407-2, ISO 5599-2
Manual override	V Covered
End plate, right	Y Right-hand end plate, internal pilot air supply
Port configuration for air supply plates	L Normal operation: supply air 1 / exhaust air 3/5 common /reverse operation: exhaust air 1 / supply air 3/5 common
Pneumatic supply valve terminal	S Connectors and silencers
Alternative silencer	Standard
Fitting variants	Metal fitting with plastic releasing ring, type QS
Configuration of all pneumatic ports	M Fittings, large
Outlet direction of all working ports	Straight
Air supply plate, left	X Supply plate to the left upstream of manifold sub-base 1
Exhaust for pressure build-up, left	Without
Reverse operation	Without

Module	
Feature	Value
Type of manifold block	B Manifold sub-base for size 26 mm (01), 2 valve positions, 4 addresses
Compressed air supply/duct separation	U Supply plate
Type of manifold block	L Manifold sub-base for size 26 mm (01), 2 valve positions, 4 addresses, with 2 blanking plugs in port 4, for vacuum block
Valve position	J 5/2 way double solenoid valve
Valve position	VB Vacuum block with ejector pulse and adjustable air saving function (plate for 2 valve positions, sensor SDE3 with display and M12 connection)


Electrical accessories	
Feature	Value
User documentation	D User documentation, German
Assembly instructions	Without
H - H-rail mounting	1 pcs

Pneumatic accessories	
Feature	Value
Mounting bracket	Without
B - Inscription label holder for valves	10 pcs
T - Inscription label holders for manifold blocks	5 pcs
Connecting cable for pressure switch	Without
Connecting cable for valve	Without
Electrical accessories for soft-start valve	Without


- Note:**
- For 3 or more manifold blocks, install additional supply plate (code: U) in front of the end plate on the right.
 - Connection infeed: QS-G1 / 2-16.
 - For double-acting cylinders, only bistable valves may be used.

1.6 Sensors

1.6.1 For T-slot


Name	Remarks	Picture	Documentation
SMT-8M-A	Voltage: 5 ... 30 V DC Cable length: 0.1 ... 30 m Plug connection: M8, M12 Electric Contactless PNP, NPN		Catalogue Documentation

1.6.2 For round groove

Name	Remarks	Picture	Documentation
SME-10M	Voltage: 24 V DC Connection plug M8, M12 Electric With reed contact		Catalogue Documentation

1.7 Compressed air preparation

1.7.1 D series, metal design


Name	Remarks	Picture	Documentation
Service unit combinations without lubricators	Size MINI, MIDI, MAXI Port G1/8, G1/4, G3/8, G1/2, G3/4 Flow rate 550 ... 6000 l/min Pressure regulation range 0.5 ... 12 bar Grade of filtration 40µ		Catalogue Documentation

1.7.2 D series, metal design


Name	Remarks	Picture	Documentation
LFR, LFRS	Size MICRO, MINI, MIDI, MAXI Port M5, M7, G1/8, G1/4, G3/8, G1/2, G3/4, G1, QS4, QS6, also available with NPT thread Pressure 0.5 ... 7 bar, 0.5 ... 12 bar Flow rate 110 ... 11000 l/min Pressure gauge - With pressure gauge - Without pressure gauge Grade of filtration 40 µm, 5 µm Condensate drain - Manual - Semi-automatic - Fully automatic Plastic bowl with metal bowl guard.		Catalogue Documentation

1.8 Pneumatic fittings system

1.8.1 Standard O.D. tubing


Name	Remarks	Picture	Documentation
PUN, PUN-DUO	Outside diameter: 3 ... 16 mm Internal diameter: 2.1 ... 11 mm Temperature-dependent operating pressure: -0.95 ... 10 bar Ambient temperature: -35 ... 60° C Operating medium - Compressed air - Vacuum		Catalogue Documentation

1.8.2 Push-in fittings

Name	Remarks	Picture	Documentation
Push-in fittings QS, standard series	Port R1/8, R1/4, R1/2, R3/8, G1/8, G1/4, G1/2, G3/8, G3/4 For outside tubing diameter 4, 6, 8, 10, 12, 16, 22 mm Threaded port - G thread with sealing ring - R thread with PTFE coating Suitable for vacuum Push-in fittings Push-in connectors Push-in bulkhead connectors Push-in caps Push-in connectors with push-in sleeves Blanking plugs Multiple distributors Push-in bulkhead fittings.		Catalogue Documentation


1.8.3 Couplings

Name	Remarks	Picture	Documentation
Quick coupling sockets KD	Connection M3, M5, G 1/8, G 1/4, G 3/8, G 1/2 Diameter 2, 3, 4, 6, 9, 13 mm Threaded connection - Metric thread with sealing ring - G thread with sealing ring Shut-off on one side Shut-off on both sides Safety coupling to ISO 4414.		Catalogue Documentation

Name	Remarks	Picture	Documentation
Coupling plug KS	Connection M3, M5, G 1/8, G 1/4, G 3/8, G 1/2 Diameter 2, 3, 4, 6, 9, 13 mm Threaded connection - Metric thread with sealing ring - G thread with sealing ring Shut-off on one side Shut-off on both sides Safety coupling to ISO 4414.		Catalogue Documentation


1.9 Other pneumatic equipment

1.9.1 Silencers


Name	Remarks	Picture	Documentation
U	Threaded connection M5, G1/2, G1/4, G1/8, G3/8, G3/4, G1 Barbed connector connection PK-3, PK-4 Noise level 65 ... 84 dB(A).		Catalogue Documentation

1.10 Process automation

1.10.1 Ball valves and ball valve units

Name	Remarks	Picture	Documentation
Ball valves and ball valve actuator units VZBC	Size DN15 ... DN100 Flow rate 19.4 ... 1414 m³/h Flange hole pattern to ISO 5211 ATEX certification		Catalogue Documentation

Specification: - Pre-assembled unit consisting: ball valve (brass, stainless steel), flange and drive unit
 - Solenoid valve VSNB, - Socket MSSD-C, - Exhaust throttle valve GRE, - L push-in fitting

Name	Remarks	Picture	Documentation
Ball valve drive units VZPR	Port Rp 1/4, Rp 3/8, Rp 1/2, Rp 3/4, Rp1, Rp1 1/4, Rp1 1/2, Rp2, Rp2 1/2 Flow rate 100 ... 8900 l/min Electric and pneumatic actuation Ball valve with drive Namur port pattern, VDI/VDE 3845 Corrosion and acid-resistant designs 2-way on-off valve		Catalogue Documentation


5.2. Aventics product approval list





1 Overview Pneumatic- items

1.1 Pneumatic drives

1.1.1 Compact cylinders ISO 21287

Designation	Catalog- link	Comment	Picture
Compact cylinder, CCI ISO 21287	Compact cylinder CCI	<ul style="list-style-type: none"> ▶ connections: M5 - G 1/8 ▶ double acting ▶ magnetic piston ▶ cushioning elastic ▶ piston rod: internal thread ▶ ATEX optional Ø16- 100	

1.1.2 Norm cylinders ISO 15552

Designation	Catalog- link	Comment	Picture
Profile cylinder, PRA ISO 15552	ISO 15552 Series PRA	<ul style="list-style-type: none"> ▶ connections: G 1/8 - G 1/2 ▶ double acting ▶ magnetic piston ▶ cushioning pneumatically, adjustable ▶ piston rod: external thread ▶ ATEX optional Ø32- 125	
Tie rod cylinder, TRB ISO 15552	ISO 15552 Series TRB	<ul style="list-style-type: none"> ▶ connections: G 1/8 - G 1/2 ▶ double acting ▶ magnetic piston ▶ cushioning pneumatically, adjustable ▶ piston rod: external thread ▶ ATEX optional Ø32- 125	

Comment: All cylinders can be configured.

example.: through piston rod, internal- external thread, cushioning adjustable/ elastic, ATEX: For double acting cylinders only double solenoid valves may be used.

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 Vorsitzender des Aufsichtsrats: Dr. Cletus von Pichler,

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1.2 Valves

1.2.1 Valves, ISO, 15407-1/2 / 5599 – 1/2

Designation	Catalog-link	Comment	Picture
ISO 15407-1, series CD01-PA ISO 01: 26 mm	CD01 - PA	<ul style="list-style-type: none"> ▶ ISO 15407-1, 26 mm ▶ identical like basic valve series CD01-PI ▶ conversion by swapping contact bridge ▶ Qn = 700-1010 NL/min ▶ operating pressure: -0,95 – 16 bar ▶ panel connector ▶ compressed air connection: base plate ISO 15407 ▶ electrical connection: plug M12x1, form C ▶ Voltage: 12, 24V DC, 24, 110, 230 V AC ▶ single and double solenoid ▶ technical accessories 	
ISO 15407-2, series CD01-PI ISO 01: 26 mm	CD01 - PI	<ul style="list-style-type: none"> ▶ ISO 15407-2, 26 mm ▶ Qn = 650- 4800 l/min ▶ operating pressure: -0,95 – 16 bar ▶ panel connector ▶ compressed air connection: base plate ISO 15407 ▶ electrical connection: ISO 15407-2 ▶ Voltage: 24V DC, ▶ single and double solenoid ▶ technical accessories 	
ISO 5599-1, series 581 ISO 1: 42 mm ISO 2: 52 mm ISO 3: 65 mm ISO 4: 76 mm	581 ISO - 1 581 ISO - 2 581 ISO - 3 581 ISO - 4	<ul style="list-style-type: none"> ▶ ISO 5599-1, 42, 52,65, 76 mm ▶ Qn = 950- 6000 l/min ▶ operating pressure: -0,95 – 16 bar ▶ panel connector ▶ compressed air connection base plate ISO 5599 ▶ electrical connection: plug M12x1, form C, form B industrial, form A ▶ Voltage: 12, 24, 48 V DC, 24, 110, 230 V AC ▶ single and double solenoid ▶ integrated throttle valve ▶ technical accessories 	
ISO 5599-2, series CD10/20-PI ISO 1: 42mm ISO 2: 52mm	ISO 5599 CD10	<ul style="list-style-type: none"> ▶ ISO 5599-2, 42, 52 mm ▶ Qn = 950- 2700 l/min ▶ operating pressure: -0,95 – 10 bar ▶ panel connector ▶ compressed air connection base plate ISO 5599 ▶ electrical connection: ISO 5599-2 ▶ Voltage: 24 V DC ▶ single and double solenoid ▶ integrated throttle valve ▶ technical accessories 	
ISO base plates ISO 01: 26 mm ISO 1: 42 mm ISO 2: 52 mm ISO 3: 65 mm ISO 4: 76 mm	ISO base plates	<ul style="list-style-type: none"> ▶ ISO 15407-1, ISO 5599-1 ▶ frame size: ISO 01 - ISO 4 ▶ compressed air connection: ISO 01: D4, D6, D8, G 1/8 ▶ ISO 1-4: G1/4 - G 1, ▶ reverse pressure injection possible 	


Comment: ISO- Valves can be ordered in different sizes (ISO 1- 4). It can be individually selected between the thread connections below or sideways

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1.2.2 Check-choke valves

Designation	Catalog-link	Comment	Picture
Check-choke valves series CC02	Series CC02	<ul style="list-style-type: none"> ▶ Qn = 85 - 1960 l/min ▶ direction of throttle: 2 → 1 ▶ exhaust air throttling ▶ push-in fitting – external thread 	

Comment: The direction of throttle can be chosen individually. Push in fitting for tube: ø4- 12mm.
 Screw in sizes G1/8 – G3/8

1.2.3 E/P pressure regulators

Designation	Catalog-link	Comment	Picture
EP- pressure regulators ED02, ED05, ED07, ED12	ED 02 – 120 l/min ED 05 – 1000 l/min ED 07 – 1300l/min ED 12 – 2600 l/min series DRP G034 - G200 8000 l/min – 14.000 l/min	<ul style="list-style-type: none"> ▶ Qn= 2600 l/min ▶ electrical connection, plug M12, 5-pin ▶ signal connection: in and output, socket, M12, 5-pin 	

Comment: The selection depends on the flow and control range. The plug-in size can be chosen individually.
 For some models, serial control is possible.


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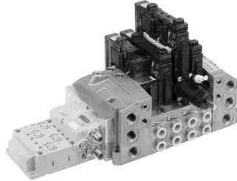


1.3 Valve System

1.3.1 Series AV03 / AV05

Designation	Catalog-link	Comment	Picture
Valve system series AV03/ AV05	AV03 AV05 AES	<ul style="list-style-type: none"> ▶ Qn: AV03: 300 l/min, AV05: 700 l/min pressure: -0,90 – 10 bar ▶ electrical connection: <ul style="list-style-type: none"> - multipole D-Sub 25, 44-pin - field bus with E/A- function (series AES) ▶ supported field bus connections: PROFINET IO, EtherCAT, EtherNET/IP, POWERLINK, PROFIBUS DP, CANopen, DeviceNet, ▶ operating Voltage: 24 V DC 	

1.3.2 Valve system CD-PI: ISO 15407-2 & 5599-2

Designation	Catalog-link	Comment	Picture
Valve system series CD01-PI	CD01 PI	<ul style="list-style-type: none"> ▶ ISO 15407-2, 26 mm, ISO 5599-2, 42, 52 mm ▶ Qn Max. = 1010-2700 l/min ▶ electrical connection: multipole-plug, D-Sub 25/ 37- pin, M23, 19-pin, direct field bus: series BDC (protocols: AS-I, Profibus DP, EtherCAT, CANopen, DeviceNet, Sercos III) field bus with E/A-function: AES (protocols: PROFINET IO, EtherCAT, EtherNET/IP, POWERLINK, PROFIBUS DP, CANopen, DeviceNet) ▶ operating Voltage: 24 V DC 	

Comment: The valve systems are configurable, versions and functions can be different.
 After successful configuration in the online catalog, a unique material number is generated.


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1.4 Compressed air preparation

1.4.1 Maintenance unit AS


Designation	Catalog-link	Comment	Picture
Maintenance units series: AS1/2/3/5 Depending on the required flow	AS1 -1000 l/min AS2 -2700 l/min AS3 -5200 l/min AS5 -14500 l/min	<ul style="list-style-type: none"> ▶ G 1/4 - G 1 ▶ up to 14500 l/min ▶ lockable ▶ for padlocks ▶ with pressure gauge ▶ suitable for ATEX 	

1.5 Pneumatic connection technologies

1.5.1 Tubing

Designation	Catalog-link	Comment	Picture
Plastic tubing series TU1 Polyester polyurethane Polyether polyurethane Polyvinyl chloride Polytetrafluorethylene Polyamide Polyethylene Flamex	Tubing	<ul style="list-style-type: none"> ▶ Ø 3 - 26 mm ▶ Max. working pressure at 20°C: 9- 26 bar 	

1.5.2 Push-In fittings

Designation	Catalog-link	Comment	Picture
Pneumatic connection: QR1- S - synthetic QR2- S - synthetic QR2- C - stainless steel QR2- F - heat resistant	QR1S QR2S QR2C QR2F	<ul style="list-style-type: none"> ▶ a lot of options ▶ internal/ external thread ▶ M5 - G 1/2 ▶ push in ▶ Ø 4 - Ø16 	

Comment: Polyester polyurethane can also be chosen as duo plastic tubing.
 Fittings with threads or push in.

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1.5.3 Coupling

Designation	Catalog-link	Comment	Picture
Coupling series CP1	CP - 1	Different connection sizes ▶ NW 2,7 - 7,2 mm	

Comment: The connection coupling can be chosen between different connection sizes
 The connection size depends on the used implementation:

- Versions:
- ▶ snap coupling
 - ▶ coupling plug
 - ▶ safety clutch
 - ▶ multi clutch (suitable for bulkhead installation)

1.5.4 Silencer

Designation	Catalog-link	Comment	Picture
Silencer series SI1 Exhaust cap series SI1	SI - 1	▶ sintered bronze ▶ polyethylene ▶ stainless steel ▶ metal mesh Connection size: M5- M22x1,5 G1/8 – G1	

Comment: Material and design are depending on the application.

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