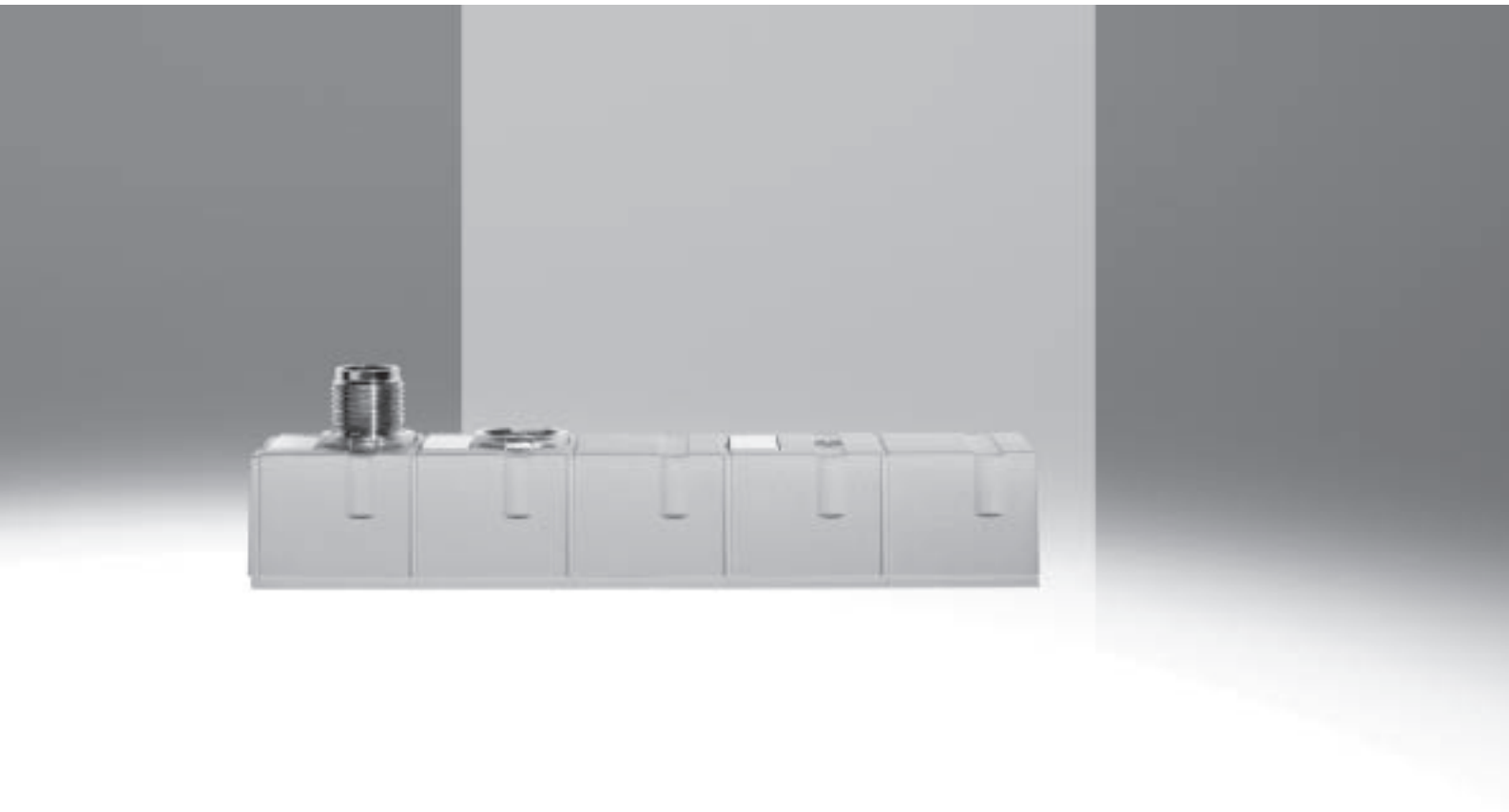
Measuring transducer DADE-MVC



Moving and measuring –
with an accuracy of ±0.1 mm

Info 136

Measuring transducer DADE-MVC: Moving and measuring combined!

Where is the piston rod? This is the critical question for many joining, adhesive and measuring tasks involving pneumatic cylinders. It determines the quality and the process reliability of manufacturing. The answer is simple: the measuring transducer DADE-MVC. Combined with the standard cylinder DNCI it enables movement and measurement – with an accuracy of ±0.1 mm.

Move

Measure

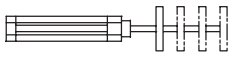
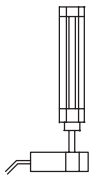
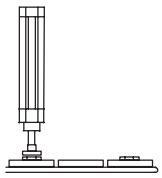
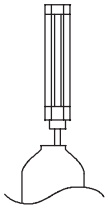
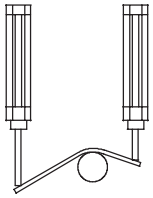
±0.1 mm repetition accuracy

The advantages of the DADE-MVC:

Easy to use
With the DADE-MVC, work steps such as clamping and measuring can be combined, while the pre-assembled cables make child's play of commissioning and installation.

Precise
The MVC converts the sensor signal from the standard cylinder DNCI into an analogue voltage or current signal, using an integrated displacement encoder. With a stroke of 400 mm, a repetition accuracy of ±0.1 mm is guaranteed.

Cost-effective
The combination of the DNCI and DADE-MVC makes sense from the point of view of price as well – particularly in comparison to external displacement encoders which are also more prone to interference.

Further application examples	
Clamping and measuring	
Application of position-dependent adhesive or fluid	
Press-fitting with check of the press-in depth	
Testing surface finishes	
Bending	

Application example

The combination of standard cylinder DNCI and transducer DADE-MVC is used where up-to-date information on the position of the drive must always be available.
Example: A workpiece is braced against a stop, the clamped part is to be checked simultaneously for size.

Advantages of the solution using DADE-MVC:

- What was previously realised in two work steps and with two components is now combined into just one step
- Easy commissioning and handling without software

Standard cylinders DNCI, with measuring transducer DADE

Key features

Components for positioning and measuring using the standard cylinder DNCI

Measuring
with measuring transducer DADE

Measuring transducer
DADE-...
➔ 18

PLC controller
e.g. FEC-...
➔ www.festo.com

Display and control unit
e.g. FED-...
➔ www.festo.com

Positioning
with end-position controller SPC11 or axis controller SPC200

Proportional directional control valve
MPYE-...
➔ www.festo.com

Soft Stop
➔ www.festo.com

Closed loop end-position controller
SPC11-INC

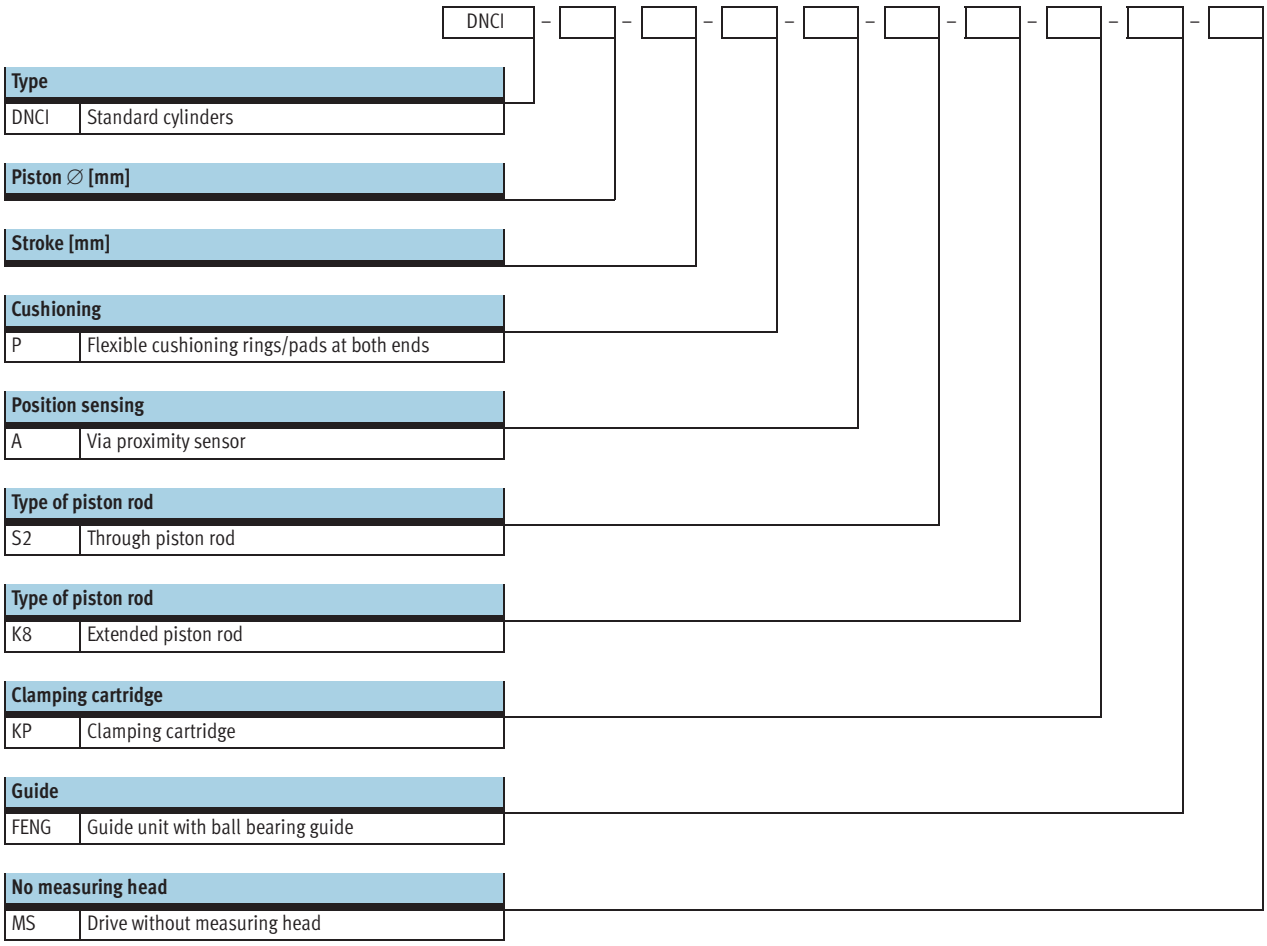
Positioning technology
➔ www.festo.com

Axis interface
SPC-AIF-INC

Axis controller
SPC200

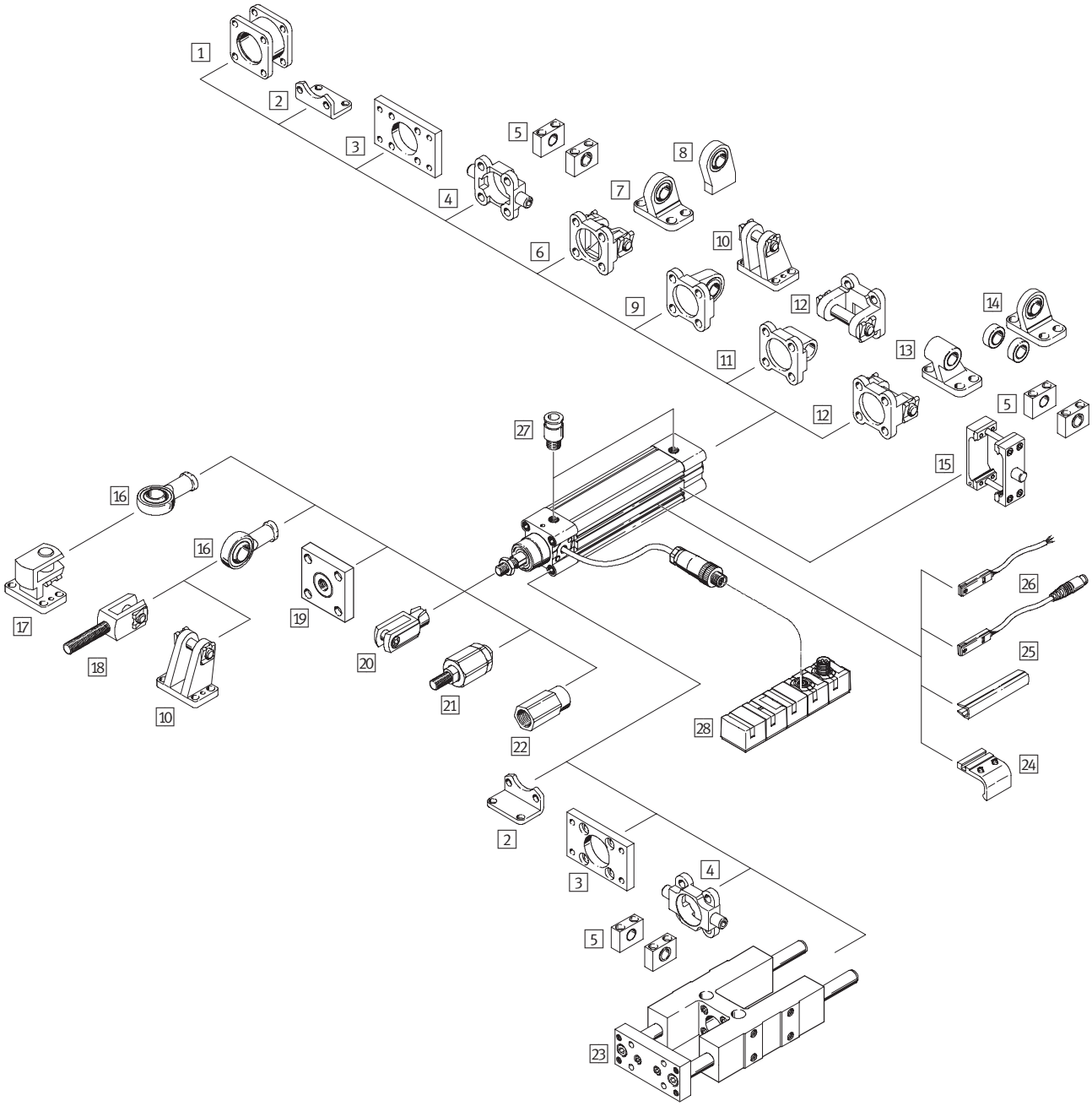
Standard cylinders DNCI, with measuring transducer DADE

Type code



Standard cylinders DNCI, with measuring transducer DADE

Peripherals overview



Accessories			
	Type	**Brief description**	**→ Page**
1	Adapter kit[1)] DPNC	For connecting two cylinders with identical piston ∅ to form a multi-position cylinder	www.festo.com
2	Foot mounting HNC	For mounting the drive on the bearing and end cap	www.festo.com
3	Flange mounting FNC	For mounting the drive on the bearing and end cap	www.festo.com
4	Trunnion mounting ZNCF/CRZNG	For swivelling movements of the drive on the bearing or end caps	www.festo.com
5	Trunnion support LNZG/CRLNZG	–	www.festo.com

Standard cylinders DNCI, with measuring transducer DADE

Peripherals overview

Accessories			
	Type	Brief description	→ Page
6	Swivel flange[1)] SNC	For swivelling movements of the drive on the end cap	www.festo.com
7	Clevis foot mounting[1)] LSNG	With spherical bearing	www.festo.com
8	Clevis foot mounting[1)] LSNSG	Weld-on, with spherical bearing	www.festo.com
9	Swivel flange[1)] SNCS	For swivelling movements of the drive on the end cap, with spherical bearing	www.festo.com
10	Clevis foot mounting[1)] LBG	–	www.festo.com
11	Swivel flange[1)] SNCL	For swivelling movements of the drive on the end cap	www.festo.com
12	Swivel flange[1)] SNCB	For swivelling movements of the drive on the end cap	www.festo.com
13	Clevis foot mounting[1)] LNG/CRLNG	–	www.festo.com
14	Clevis foot mounting[1)] LSN	With spherical bearing	www.festo.com
15	Trunnion mounting kit ZNCM	For swivelling movements of the drive	www.festo.com
16	Rod eye SGS/CRSGS	With spherical bearing	www.festo.com
17	Right-angle clevis foot LQG	–	www.festo.com
18	Rod clevis SGA	With male thread	www.festo.com
19	Coupling piece KSG	For compensating radial deviations	www.festo.com
	Coupling piece KSZ	For cylinders with a non-rotating piston rod to compensate for radial deviations	www.festo.com
20	Rod clevis SG/CRSG	Permits a swivelling movement of the cylinder in one plane	www.festo.com
21	Self-aligning rod coupler FK	For compensating radial and angular deviations	www.festo.com
22	Adapter AD	For a vacuum suction cup	www.festo.com
23	Guide unit FENG	For protecting standard cylinders from torsion at high torque loads	16
24	Mounting kit SMB-8-FENG	For mounting proximity sensors SME/SMT-8 in combination with guide unit FENG	www.festo.com
25	Slot cover ABP-5-S	To protect the sensor cable and keep dirt out of the sensor slots	www.festo.com
26	Proximity sensor SME/SMT-8	Can be integrated in the cylinder profile barrel	www.festo.com
27	Push-in fitting QS	For connecting compressed air tubing with standard external diameters	www.festo.com
28	Measuring transducer DADE-MVC	Converts sensor signals of the standard cylinder DNCI into one voltage signal of 0 ... 10 V and/or current signal of 0 ... 20 mA	18

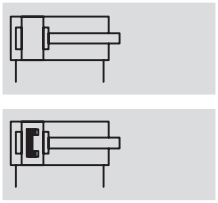
1) Not with variants S2
2) Guide unit FENG-KF must be attached to the piston rod such that backlash is eliminated

Standard cylinders DNCI, with measuring transducer DADE

Technical data

FESTO

Function



- Ø - Diameter
  32 ... 63 mm
- l - Stroke length
  10 ... 2,000 mm

General technical data					
Piston ∅		32	40	50	63
Constructional design		Piston			
		Piston rod			
		Profile barrel			
Mode of operation		Double-acting			
Cushioning		Flexible cushioning rings/pads at both ends			
Position sensing		Integrated displacement encoder			
		For proximity sensor[1)]			
Measuring principle (displacement encoder)		Digital			
Type of mounting		Foot mounting			
Stroke	[mm]	10 ... 2,000			
Torsion protection/Guide[3)]		Guide rod with yoke, with ball bearing guide			
Stroke	[mm]	100 ... 500			
Piston rod extension	[mm]	1 ... 500			
Pneumatic connection		G1⁄8	G1⁄4	G1⁄4	G3⁄8
Electrical connection		Cable with 8-pin plug, round type M12			
Cable length	[m]	1.5			

1) Not included in the scope of delivery, can be ordered as an option
3) Guide unit FENG-KF must be ordered as an option and will be supplied attached, the max. stroke is reduced

Forces [N] and impact energy [Nm]				
Piston ∅	32	40	50	63
Theoretical force at 6 bar advancing	483	754	1,178	1,870
Theoretical force at 6 bar retracting	415	633	990	1,682
Impact energy at end positions	0.1	0.2	0.2	0.5

Permissible impact velocity:

$$v_{perm.} = \sqrt{\frac{2 \times E_{perm.}}{m_{dead} + m_{load}}}$$

Maximum permissible load:

$$m_{load} = \frac{2 \times E_{perm.}}{v^2} - m_{dead}$$

- Note

This data represents the maximum values that can be achieved. Values fluctuate in practice relative to the size of the effective load. Allowance must also be made for the limits of the cushioning capacity of the drive and the permissible impact energy.

Standard cylinders DNCI, with measuring transducer DADE

Technical data

Operating and environmental conditions		
Operating pressure	[bar]	0.6 ... 12
Operating medium[2)]		Compressed air, filtered and unlubricated, filter unit 5 µm
Ambient temperature[3)]	[°C]	–20 ... +80
Vibration resistance		To DIN/IEC 68 Parts 2 – 6, severity level 2
Continuous shock resistance		To DIN/IEC 68 Parts 2 – 82, severity level 2
CE symbol (declaration of conformance)		In accordance with EU EMC Directive
Protection class (displacement encoder)		IP65 to IEC 60 529
Corrosion resistance class CRC[4)]		1

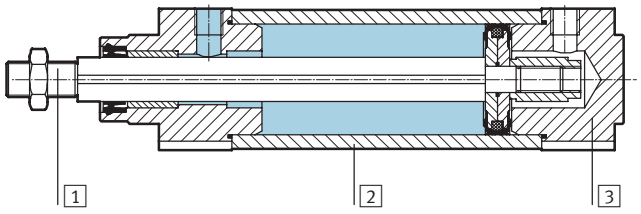
2) The proportional directional control valve MPYE used requires the characteristic values
3) Note operating range of proximity sensors
4) Corrosion resistance class 1 according to Festo standard 940 070
Components requiring low corrosion resistance. Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers.

Weights [g] with displacement encoder					
Piston ∅		32	40	50	63
Basic drive DNCI-...					
	Product weight with 0 mm stroke	521	853	1,319	1,914
	Additional weight per 10 mm stroke	30	44	62	71
	Moving load with 0 mm stroke	95	175	316	383
	Additional weight per 10 mm stroke	8	14	23	23
Drive with through piston rod DNCI-...-S2					
	Product weight with 0 mm stroke	586	981	1,553	2,165
	Additional weight per 10 mm stroke	39	60	87	96
	Moving load with 0 mm stroke	155	164	297	364
	Additional weight per 10 mm stroke	17	30	48	48
Additional weight with extended piston rod K8					
	Additional weight per 10 mm stroke	8	14	23	23
Additional weight with clamping cartridge KP					
	Product weight	234	394	700	1,147
Additional weight with guide unit FENG-...					
	Product weight with 0 mm stroke	1,530	2,370	4,030	5,410
	Additional weight per 10 mm stroke	18	32	50	62

Materials

Sectional view

Standard cylinders		
1	Piston rod	High-alloy steel
2	Cylinder barrel	Anodised aluminium
3	Bearing/end caps	Die-cast aluminium
–	Dynamic seals	Polyurethane TPE-U
–	Static seals	Nitrile rubber
–	Lubricant	Klüberplex BE31-102
Displacement encoder		
–	Sensor housing	Polyacetate
–	Cable sheath	Polyurethane
–	Plug housing	Polybuteneterephthalate
–	Wall mounting plate	Polyacetate
–	Screws for mounting plate	Steel



Standard cylinders DNCI, with measuring transducer DADE

Technical data

Electrical data, displacement encoder		
Measuring accuracy	[mm]	±(0.07±0.02/m)
Resolution	[mm]	0.02
Max. speed of travel	[m/s]	1.5
Ambient temperature	[°C]	–20 ... +80
Max. temperature coefficient	[ppm/°K]	30
Protection class		IP65
CE symbol (declaration of conformance)		In accordance with EU EMC Directive
Max. permitted magnetic disruption field at 100 mm interval from the sensor[1)]	[kA/m]	10
Output signal		Analogue
Electrical connection		Cable with 8-pin plug, round type M12
Cable length	[m]	1.5

1) See also mounting conditions

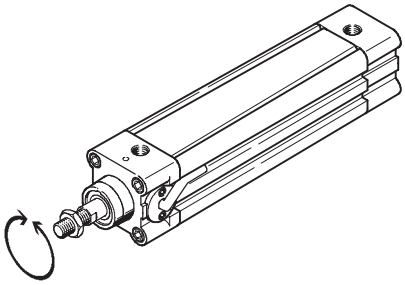
Standard cylinders DNCI, with measuring transducer DADE

Technical data

Torques and lateral forces

The piston rod must not absorb any torque. We therefore recommend that an external guide FENG-KF be used with the drive DNCI. The guide unit is delivered installed.

The permissible static and dynamic characteristic load values with and without attached guide➔ Volume 1 (standard cylinder DNC)
The permissible static and dynamic characteristic load values with and without attached guide as well as with regard to the technical data of the variants (S2, S8, S9)
➔ www.festo.com under standard cylinder DNC



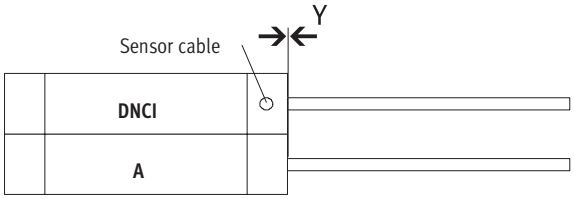
Mounting conditions

When mounting a drive A with magnet (for position sensing), in addition to a standard cylinder DNCI, the following conditions must be observed:

X Minimum distance between the drives
Y Offset between the drives on the bearing cap

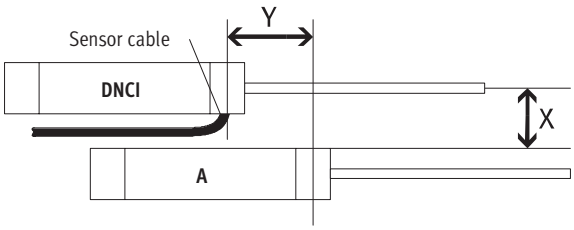
Parallel assembly

If the offset Y = 0 mm, the drives can be assembled directly next to one another.



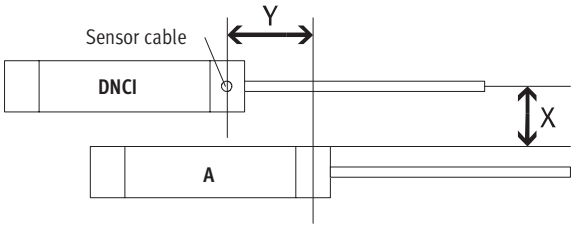
Offset assembly, cable outlet between the drives

If the offset Y > 0 mm and the cable outlet is between the drives, the distance from X > 70 mm must be observed.



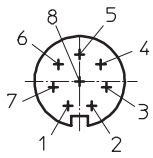
Offset assembly, cable outlet upwards or downwards

If the offset Y > 0 mm and the cable outlet is up or down, the distance from X > 60 mm must be observed.



Pin assignment of plug, view of plug

Pin	Function	Colour
1	5 V	black
2	GND	brown
3	sin+	red
4	sin–	orange
5	cos–	green
6	cos+	yellow
7	Screening	Screening
8	–	–

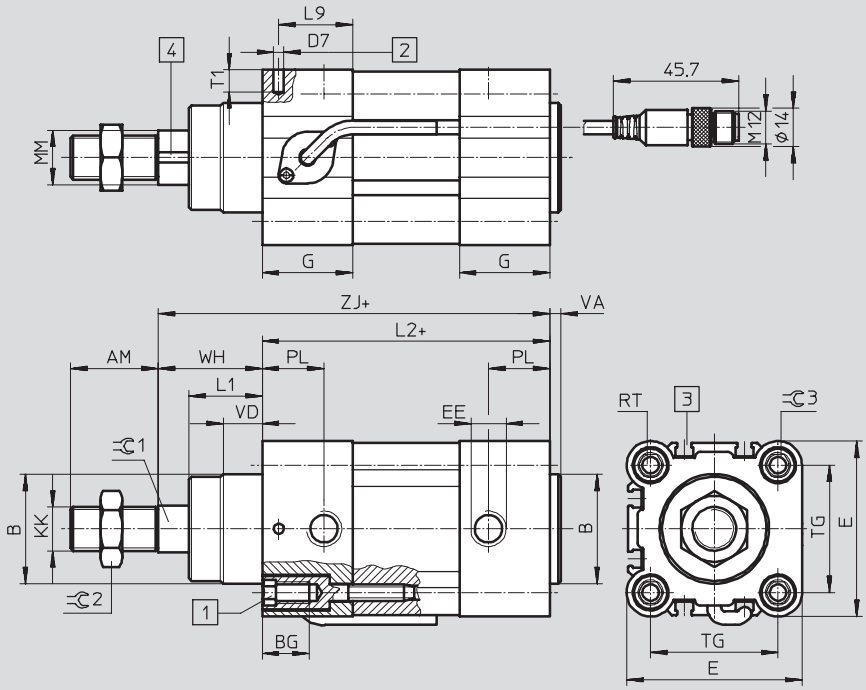


Standard cylinders DNCI, with measuring transducer DADE

Technical data

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**

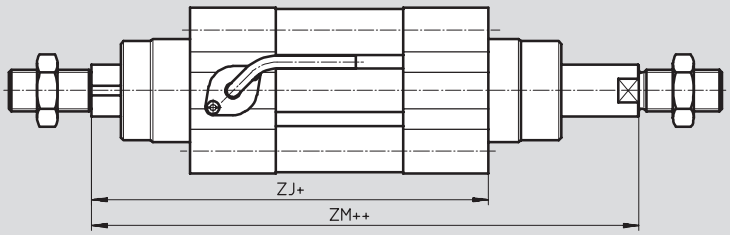
Basic version



1 Socket head screw with female thread for mounting attachments
2 Hole for securing the earthing self-tapping M4 screw according to DIN 7500
3 Sensor slot for proximity sensor SME/SMT-8
4 Magnetic measuring band

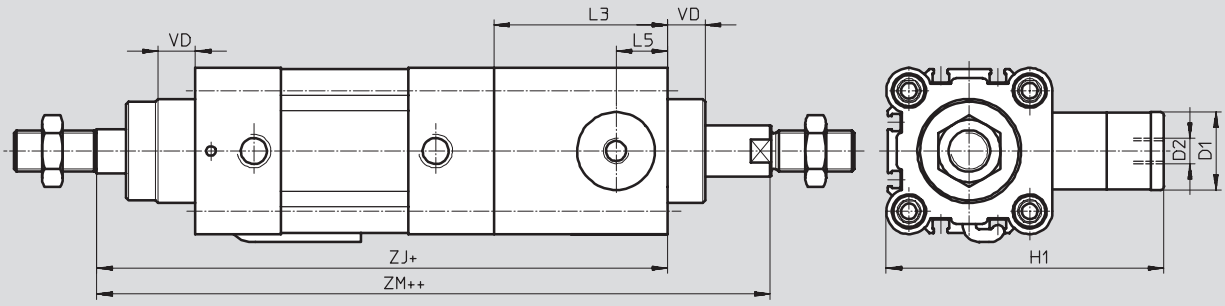
\+ = plus stroke length
++ = plus 2x stroke length

S2 – Through piston rod

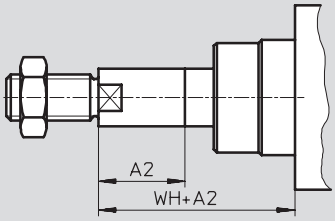


\+ = plus stroke length
++ = plus 2x stroke length

S2 / KP – Through piston rod with clamping cartridge



K8 – Extended piston rod



Standard cylinders DNCI, with measuring transducer DADE

Technical data

∅ [mm]	AM	A2 max.	B ∅ d11	BG	D1 ∅ f9	D2	D7 ∅	E	EE	G	H1
32	22	500	30	16	20	M5	3.7	45	G1⁄8	28	67
40	24	500	35	16	24	G1⁄8	3.7	54	G1⁄4	33	88
50	32	500	40	17	30	G1⁄8	3.7	64	G1⁄4	33	107
63	32	500	45	17	38	G1⁄8	3.7	75	G3⁄8	40.5	123

∅ [mm]	KK	L1	L2	L3	L5	L9	MM ∅ f8	PL	RT	T1	TG
32	M10x1.25	18	94	45	14	22.5	12	15.6	M6	8	32.5
40	M12x1.25	21.3	105	53	16	27	16	14	M6	8	38
50	M16x1.5	26.8	106	67	20	27	20	14	M8	8	46.5
63	M16x1.5	27	121	76	24	33	20	17	M8	8	56.5

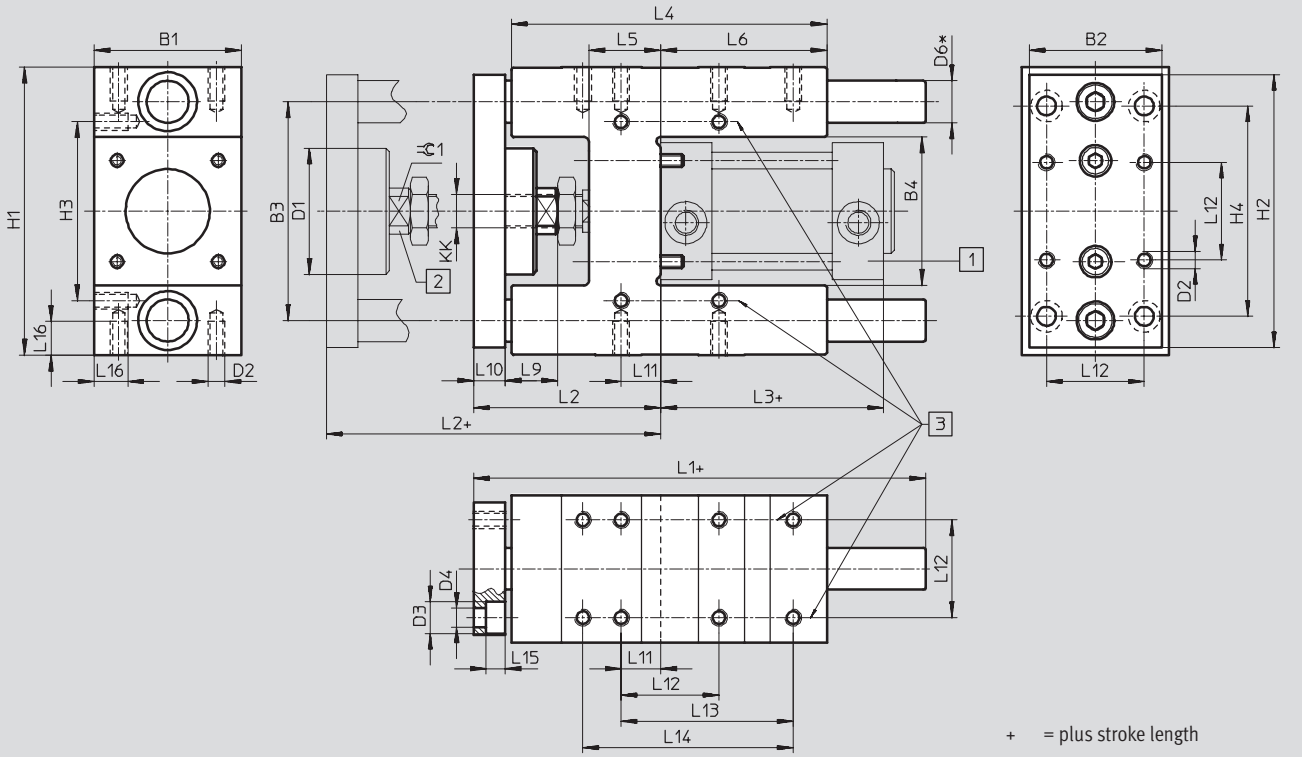
∅ [mm]	PI	VD	WH	ZJ		ZM		⌀1	⌀2	⌀3
					KP		KP			
32	4	10	26	120	165	148	193	10	16	6
40	4	10.8	30	135	188	167	220	13	18	6
50	4	14.3	37	143	210	183	250	17	24	8
63	4	14.5	37	158	234	199	275	17	24	8

Standard cylinders DNCI, with measuring transducer DADE

Technical data

Dimensions Download CAD data ➔ **www.festo.com/en/engineering**

Guide unit FENG-KF



Standard cylinders DNCI, with measuring transducer DADE

Technical data

For ∅ [mm]	B1 -0.3	B2	B3 ±0.2	B4 ±0.3	D1 ∅	D2	D3 ∅	D4 ∅	D6 ∅ h6	H1
32	50	45	74	50.5	44	M6	11	6.6	12	$97_{-0.4}$
40	58	54	87	58.5	44	M6	11	6.6	16	$115_{-0.4}$
50	70	63	104	70.5	60	M8	15	9	20	$137_{-0.5}$
63	85	80	119	85.5	60	M8	15	9	20	$152_{-0.5}$

For ∅ [mm]	H2	H3 ±0.2	H4 ±0.2	KK	L1	L2	L3	L4	L5	L6
32	90	61	78	M10x1.25	155	67_{+5}	94	125	24	76
40	110	69	84	M12x1.25	170	75_{+5}	105	140	28	81
50	130	85	100	M16x1	188	89_{+10}	106	150	34	79
63	145	100	105	M16x1	220	89_{+10}	121	182	34	111

For ∅ [mm]	L9	L10	L11	L12 ±0.2	L13 ±0.2	L14 ±0.2	L15	L16	⌀1
32	20	12	4.3	32.5	70.3	78	6.5	12	15
40	22	12	11	38	84	–	6.5	14	15
50	25	15	18.8	46.5	81.8	100	9	16	19
63	25	15	15.3	56.5	105	–	9	16	19

Standard cylinders DNCI, with measuring transducer DADE

Ordering data – Modular products

FESTO

M Mandatory data

Module No.	Function	Piston ∅	Stroke	Cushioning	Position sensing
535 411 535 412 535 413 535 414	DNCI	32 40 50 63	10 ... 2,000	P	A
Order example					
535 411	**DNCI** –	**32** –	**100** –	**P** –	**A** –

Ordering table

	Piston ∅	32	40	50	63	Condi-tions	Code		Enter code
M	Module No.	**535 411**	**535 412**	**535 413**	**535 414**				
	Function	Standard cylinder with integrated displacement encoder, non-rotating piston rod					**DNCI**		DNCI
	Piston ∅ [mm]	32	40	50	63		**-...**		
	Stroke [mm]	10 ... 2,000					**-...**		
	Cushioning	Flexible cushioning rings/pads at both ends					**-P**		-P
↓	Position sensing	Via proximity sensor					**-A**		-A

Transfer order code

	DNCI	–		–		–	P	–	A	–

Standard cylinders DNCI, with measuring transducer DADE

Ordering data – Modular products

FESTO

[0] Options				
Type of piston rod	**Piston rod extended at front**	**Clamping unit**	**Guide**	**Measuring head**
S2	...K8	KP	FENG	MS
–	–	–	–	–

Ordering table

Piston ∅		32	40	50	63	Condi-tions	Code		Enter code
[0]	Type of piston rod	Through piston rod					**-S2**		
	Piston rod extended [mm]	1 ... 500				[2]	**-...K8**		
	Clamping unit	Clamping cartridge				[3]	**-KP**		
	Guide	Guide unit with ball bearing guide on the sensor head side				[4]	**-FENG**		
	Measuring head	No measuring head					**-MS**		

[2] **K8** In combination with piston rod type S2, the piston rod is only extended at the front (the side facing the measuring head)

[3] **K9** Only with piston rod type S2

[4] **FENG** Maximum stroke length 500 mm

Transfer order code

– | | – | | – | | – | | – | | – | |

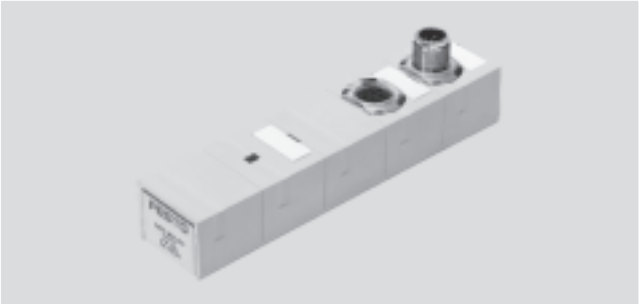
New

Standard cylinder DNCI, with transducer DADE

Technical data

Measuring transducer
DADE-MVC-010
DADE-MVC-420

The transducer converts sensor signals of the DNCI standard cylinder into a voltage signal of 0 ... 10 V or a current signal of 0 ... 20 mA. These signals can be evaluated by a PLC with an appropriate signal input.



General Technical data		
Type of mounting		Via through holes
Mounting position		Any
Repetition accuracy in relation to effective stroke	≤ 400	±0.1 mm
	≤ 750	±0.2 mm
	≤ 1,200	±0.3 mm
	≤ 1,600	±0.4 mm
	≤ 2,000	±0.5 mm
Protection against short circuit		Yes
Protection against polarity reversal		Yes
Diagnostic function		Display via LED

General electrical data		
Analogue output	[V]	0 ... 10 (as per EN 61131-2)
	[mA]	0 ... 20 (as per EN 61131-2)
Nominal operating voltage	[V DC]	24 ±25%
Residual ripple	[V_{pp}]	4 (at 50 Hz)
Current consumption at nominal operating voltage	[mA]	20 ... 30
Switching logic at outputs		PNP
Switching logic at inputs		PNP
Debounce time at inputs	[ms]	3
Linearity error FS		0,2%

Operating and environmental conditions		
Ambient temperature	[°C]	0 ... 55
Protection class		IP65
Relative air humidity		95% non-condensing
CE symbol (see conformity declaration)		As per EU EMC directive
Corrosion resistance class CRC[1)]		1
Product weight	[g]	128
Note on material for housing		Polybutylene terephthalate

1) Corrosion resistance class 1 as per Festo standard 940 070
Components requiring low corrosion resistance Transport and storage protection. Parts that do not have primarily decorative surface requirements, e.g. in internal areas that are not visible or behind covers

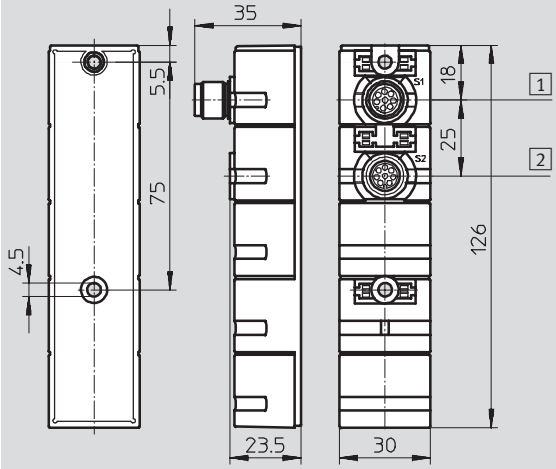
Standard cylinder DNCI, with transducer DADE

Technical data

FESTO

Dimensions

Download CAD data ➔ **www.festo.com/en/engineering**

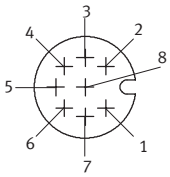


1 PLC interface:
8-pin M12, male

2 Measuring system interface:
8-pin M12, female

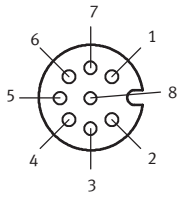
Pin allocation

PLC interface



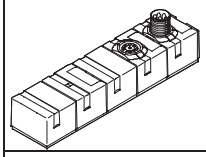
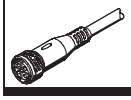
Pin	Function	Cable colour
1	24 V	white
2	Measured signal (analogue)	brown
3	Reference output	green
4	0 V measured signal	yellow
5	Reference input	grey
6	Calibration input	pink
7	Ready output	blue
8	0 V power supply and inputs/ outputs	red

Measuring system interface



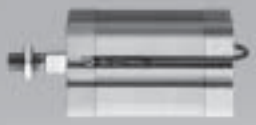
Pin	Function
1	Ub
2	0 V
3	Signal sine +
4	Signal sine -
5	Signal cosine -
6	Signal cosine +
7	Screening / earth
8	–

Ordering data

		Description	Part No.	Type
Measuring transducer				
	With voltage signal	0 ... 10 V	**542 117**	**DADE-MVC-010**
	With current signal	0 ... 20 mA	**542 118**	**DADE-MVC-420**
Accessories				
	Plug socket with cable	Connecting cable to PLC (length 2 m)	**525 616**	**SIM-M12-8GD-2-PU**
		Connecting cable to PLC (length 5 m)	**525 618**	**SIM-M12-8GD-5-PU**

Products and services – everything from a single source

Products incorporating new ideas are created when enthusiasm for technology and efficiency come together. Tailor-made service goes without saying when the customer is the focus of attention.



Pneumatic and electrical drives

- Pneumatic cylinders
- Semi-rotary drives
- Handling modules
- Servopneumatic positioning systems
- Electromechanical drives
- Positioning controllers and controllers

Valves and valve terminals

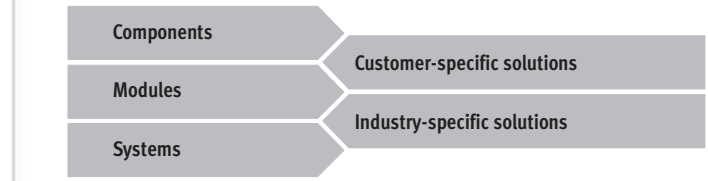
- Standard valves
- Universal and application-optimised valves
- Manually and mechanically actuated valves
- Shut-off, pressure control and flow control valves
- Proportional valves
- Safety valves

Fieldbus systems/ electrical peripherals

- Fieldbus Direct
- Installation system CP/CPI
- Modular electrical terminal CPX

Compressed air preparation

- Service unit combinations
- Filter regulators
- Filters
- Pressure regulators
- Lubricators
- On-off and soft-start valves
- Dryers
- Pressure amplifiers
- Accessories for compressed air preparation



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Engineering – for greater speed in the development process

- CAD models
- 14 engineering tools
- Digital catalogue
- FluidDRAW®
- More than 1,000 technical consultants and project engineers worldwide
- Technical hotlines

Supply chain – for greater speed in the procurement process

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- Online order tracking
- Euro special manufacturing service
- Logistics optimisation

Gripping and vacuum technology

- Vacuum generators
- Vacuum grippers
- Vacuum security valves
- Vacuum accessories
- Standard grippers
- Micro grippers
- Precision grippers
- Heavy-duty grippers

Sensors and monitoring units

- Proximity sensors
- Pressure and flow sensors
- Display and operating units
- Inductive and optical proximity sensors
- Displacement encoders for positioning cylinders
- Optical orientation detection and quality inspection

Controllers/bus systems

- Pneumatic and electropneumatic controllers
- Programmable logic controllers
- Fieldbus systems and accessories
- Timers/counters
- Software for visualisation and data acquisition
- Display and operating units

Accessories

- Pipes
- Tubing
- Pipe connectors and fittings
- Electrical connection technology
- Silencers
- Reservoirs
- Air guns

All in all, 100% product and service quality

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- Prepack
- Preassembly
- Turnkey pneumatics
- Handling solutions

Operation – for greater speed in the operational process

- Spare parts service
- Energy saving service
- Compressed air consumption analysis
- Compressed air quality analysis
- Customer service

What must be observed when using Festo components?

Specified limit values for technical data and any specific instructions must be adhered to by the user in order to ensure recommended operating conditions.
When pneumatic components are used, the user shall ensure that they are operated using correctly prepared compressed air without aggressive media.
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- The ambient conditions and conditions of use or the operating medium differ from the specified technical data.
- The product is to perform a safety function.
- A risk or safety analysis is required.
- You are unsure about the product's suitability for use in the planned application.
- You are unsure about the product's suitability for use in safety-oriented applications.

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