

Adaptive shape gripper DHEF

FESTO



Adaptive shape gripper DHEF

Key features

At a glance

A vast array of benefits for gripping are combined in a single model:

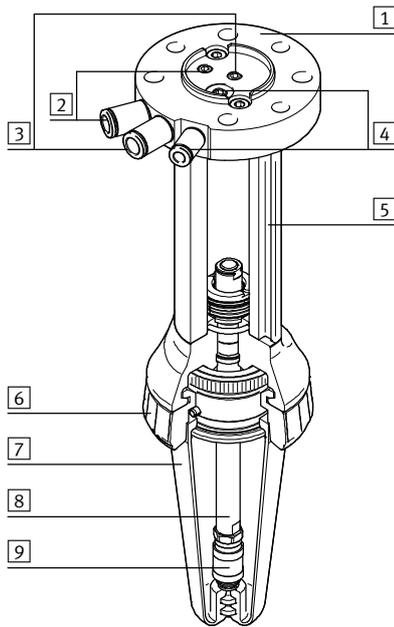
- Gripping of parts that have an undefined shape or an unclear position
- Form-fitting gripping of products with different geometries

- Form-fitting gripping with suction cup effect
- Gentle gripping of delicate products of varying sizes

- Sensor technology:
- Position sensing possible with position transmitters and proximity sensors

- Applications:
- Human-robot collaboration through edgeless gripper
 - Unpacking boxes as well as separating and positioning parts
 - Picking parts and magazining

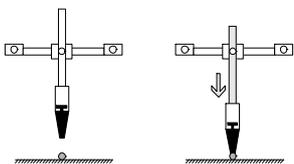
The technology in detail



- 1 Direct mounting via through-hole suitable for DIN ISO 9409-1-50-4-M6 (industrial robots – mechanical interfaces)
- 2 Supply port, retracting
- 3 Supply port, advancing
- 4 Supply port, inverting cap
- 5 T-slot for fastening the sensors (both sides)
- 6 Bayonet lock
- 7 Inverting cap
- 8 Piston rod
- 9 Releasing ring for replacing the inverting cap

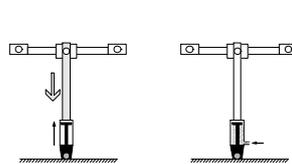
Control variant

Positioning



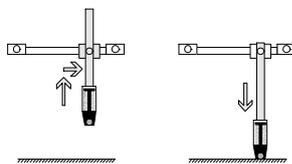
- Move the tip of the inverting cap to the object to be gripped.
- The inverting cap is supplied with 0.07 ... 0.1 bar via a pressure regulator.
- The drive is exhausted.

Gripping



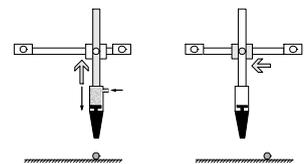
- Press the shape gripper on the object to be gripped until the inverting cap is retracted.
- Pressurise the supply port for retracting in order to hold the object in place.

Moving



- Move to the placement position.

Placing



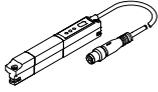
- Exhaust the supply port for retracting.
- The gripped object is released.
- Move the shape gripper away from the object.
- If the shape gripper does not release the object it has gripped, the supply port for advancing will have to be pressurised.

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Key features

Position sensing

With position transmitter SDAT-MHS



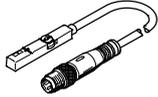
- Analogue position feedback possible
- Analogue output – 4 ... 20 mA

With position transmitter SDAS-MHS



- Choice of two operating modes:
- Two adjustable switching outputs
 - IO-Link®

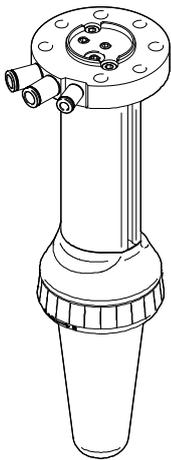
With position transmitter SMAT-8M



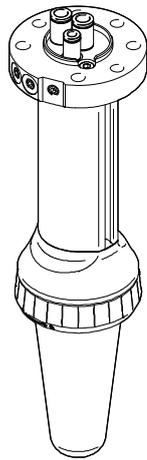
- Analogue position feedback possible
- Analogue output – 0 ... 10 V

Supply ports

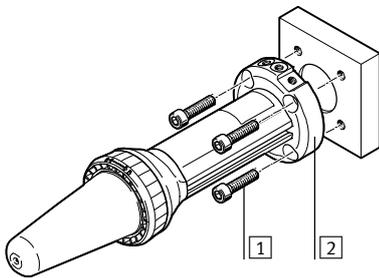
From the side



From above



Mounting options



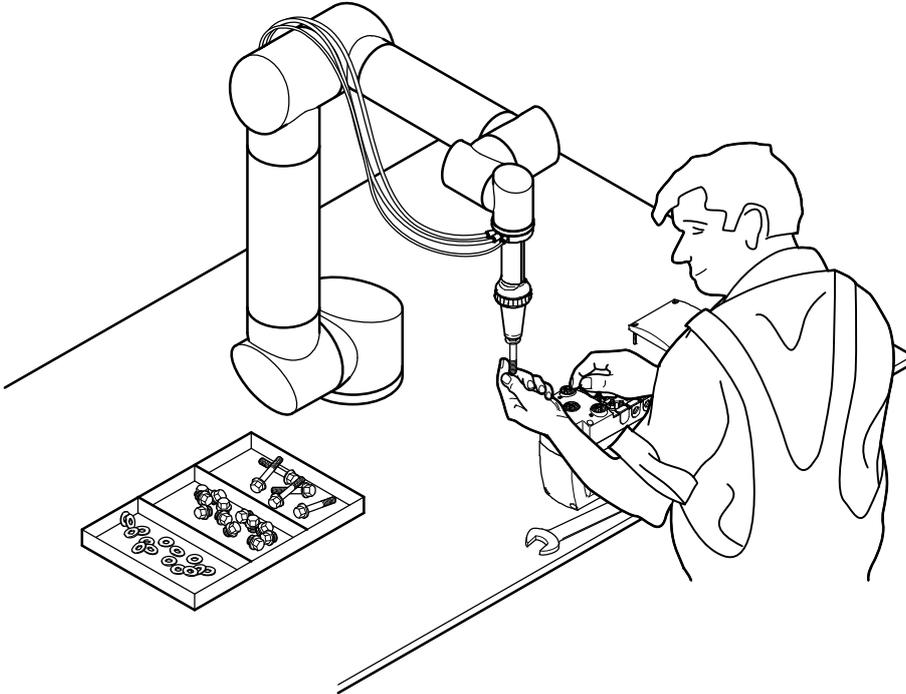
- 1 Retaining screws
- 2 Direct mounting via through-hole suitable for DIN ISO 9409-1 - 50-4-M6 (industrial robots – mechanical interfaces)

Adaptive shape gripper DHEF

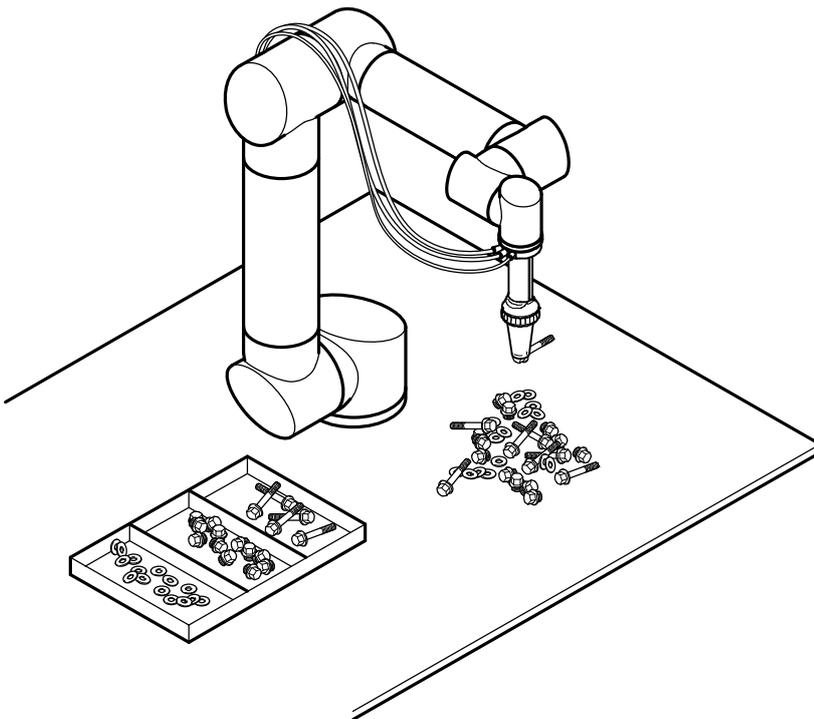
Key features

Application examples

Human-robot collaboration



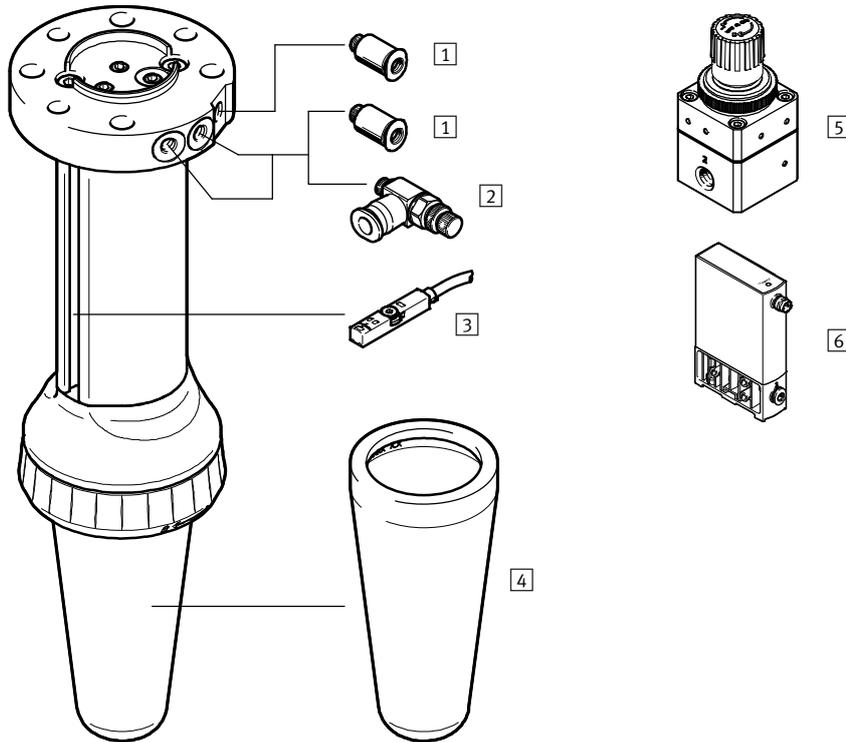
Picking parts



Adaptive shape gripper DHEF

Peripherals overview

Peripherals overview



Accessories		
Type	Description	→ Page/Internet
1	Push-in fitting QSM, QSMLV	For connecting compressed air tubing with standard outside diameters 12
2	One-way flow control valve GRLA	For speed regulation 11
3	Proximity sensor SMT-8	For position sensing 11
	Position transmitter SDAT, SMAT, SDAS	For detecting the current position 12
4	Inverting cap DHAS	Included in the scope of delivery of the shape gripper; can be reordered as an accessory 11
5	Precision pressure regulator LRP	For manually regulating the operating pressure of the inverting cap 11
6	Proportional-pressure regulator VEAB	For electronically regulating the operating pressure of the inverting cap 11

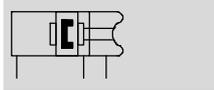
Adaptive shape gripper DHEF

Type codes

		DHEF	-	20	-	A
Type						
DHEF	Adaptive shape gripper					
Size						
20	20 mm					
Position sensing						
A	Via proximity sensor					

Adaptive shape gripper DHEF

Technical data

 Function
 Double-acting
 DHEF...A

 Size
 20 mm

 Stroke
 66 mm

 www.festo.com
 Note

The technical data is valid for the following conditions:

- Gripped object: steel ball
- Diameter: 30 mm
- Weight: 390 g
- Smooth, lathed surface

The values may differ if another type of gripped object is used.

Sharp-edged gripped objects can affect the service life of the inverting cap.



General technical data

Design	Inverting cap
	Force pilot operated motion sequence
Inverting cap version	Standard
Mode of operation	Double-acting
Gripper function	Adaptive
Guidance	Basic guide
Stroke [mm]	66
Pneumatic connection	M5
Max. operating frequency [Hz]	1
Position sensing	For proximity sensor and position transmitter
Type of mounting	To ISO 9409
Mounting position	Optional
Diameter to be gripped [mm]	12 ... 38
Permissible lateral dynamic force with max. cantilever load [N]	2.3
Mass moment of inertia [kgcm ²]	1.29
Guide value for payload [kg]	1

Operating and environmental conditions

Operating pressure of drive [bar]	1 ... 8
Operating medium	Compressed air to ISO 8573-1:2010 [7:4:4]
Note on operating/pilot medium	Lubricated operation not possible
Ambient temperature ¹⁾ [°C]	0 ... +60
Corrosion resistance class CRC ²⁾	2
Operating pressure of cap [bar]	0.07 ... 0.1
Nominal pressure of cap [bar]	0.08
Burst pressure of cap [bar]	0.3
Recommended min. flow rate for pressure regulator ³⁾ [l/min]	10

1) Note operating range of proximity sensors

2) Corrosion resistance class CRC 2 to Festo standard FN 940070.

Moderate corrosion stress. Internal applications in which condensation can occur. External visible parts with primarily decorative surface requirements which are in direct contact with the surrounding industrial environment.

3) Theoretical guide value during operation at nominal pressure (6 bar) without an object being gripped.

The inverting cap must not be overstretched during gripping and has to be checked for every gripping application. It may be necessary to restrict the speeds.

Adaptive shape gripper DHEF

Technical data

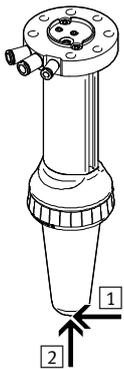
Weights [g]	
Product weight	475
Inverting cap	18
Moving mass without inverting cap	60

Materials	
Housing	Anodised aluminium
Inverting cap	VMQ (silicone)
Bayonet lock	Polyamide
Note on materials	Contains PWIS (paint-wetting impairment substances) RoHS-compliant

Forces and impact energy		
Drive force at 6 bar		
Retracting	[N]	158
Advancing	[N]	189
Contact force on the gripped object ¹⁾	[N]	20
Max. holding forces		
Parallel to the gripper axis	[N]	26
Perpendicular to the gripper axis	[N]	45
Max. impact energy in the end positions	[J]	0.1

1) In unpressurised state

Holding force



- 1 Holding force perpendicular to the gripper axis
- 2 Holding force parallel to the gripper axis

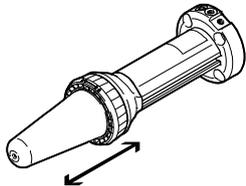
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Technical data

Max. speeds [mm/s]	
Without gripped object	290
For picking up gripped object	120 ¹⁾

1) The shape gripper must be restricted

Retracting and advancing times [ms]

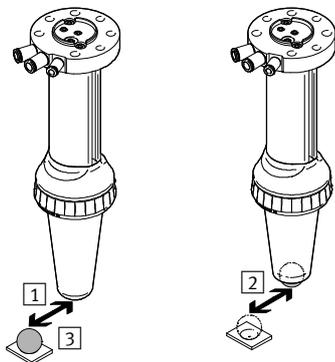


The specified retracting and advancing times [ms] are valid for the following conditions:

- Operating pressure of 6 bar
- Horizontal mounting position
- Without gripped object

Retracting	290
Advancing	270

Pick-up and placement tolerances [mm]



- 1 Pick-up tolerance
- 2 Placement tolerance
- 3 Object to be gripped

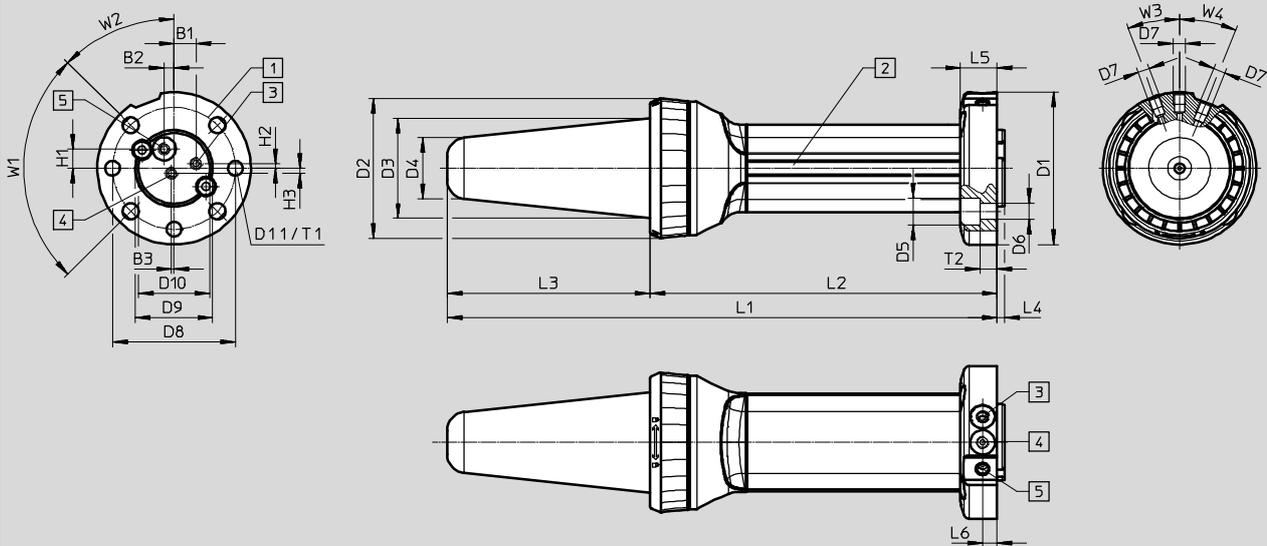
Pick-up tolerance	±4
Placement tolerance	±2

Adaptive shape gripper DHEF

Technical data

Dimensions

Download CAD data → www.festo.com



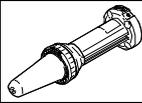
- 1 Mechanical interface/mounting flange suitable for DIN ISO 9409-1-50-4-M6 (industrial robots – mechanical interfaces)
- 2 T-slot for fastening the sensors (both sides)
- 3 Supply port, retracting
- 4 Supply port, advancing
- 5 Supply port, inverting cap

Size	B1	B2	B3	D1	D2	D3	D4	D5	D6	D7
[mm]				∅	∅	∅	∅	∅	∅	∅
20	9	4	1	62.5	57.5	41	25	11	6.6	M5

Size	D8	D9	D10	D11	H1	H2	H3	L1	L2	L3
[mm]	∅	∅	∅	∅	H8					
20	50	31.5	29	6	8	2	2	224	141.5	82.5

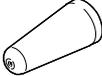
Size	L4	L5	L6	T1	T2	W1	W2	W3	W4
[mm]									
20	3	15	6	8.5	7	90°	45°	20°	22°

Ordering data

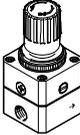
	Part no.	Type
	8092533	DHEF-20-A

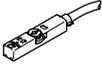
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Accessories

Ordering data – Inverting caps					
	Description	Weight [g]	Material	Part no.	Type
	Spare part for the adaptive shape gripper	18	VMQ (silicone)	8097634	DHAS-GA-B22-S

Ordering data – One-way flow control valves				Technical data → Internet: grla	
	Connection		Material	Part no.	Type
	Thread	For tubing O.D.			
	M5	3	Metal design	193137	GRLA-M5-QS-3-D
		4		193138	GRLA-M5-QS-4-D

Ordering data – Pressure regulators			Technical data → Internet: pressure regulators	
		Pressure regulation range [bar]	Part no.	Type
Precision pressure regulator				
	<ul style="list-style-type: none"> For regulating the operating pressure of the inverting cap Manual 	0.05 ... 0.7	159500	LRP-1/4-0,7
Proportional-pressure regulator				
	<ul style="list-style-type: none"> For regulating the operating pressure of the inverting cap Electronic 	Voltage type, 0 ... 10 V	0.001 ... 0.2	8046301 VEAB-L-26-D12-Q4-V1-1R1
		Current type, 4 ... 20 mA	0.001 ... 0.2	8046302 VEAB-L-26-D12-Q4-A4-1R1

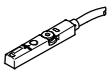
Ordering data – Proximity sensors for T-slot, magnetostrictive					Technical data → Internet: smt	
	Type of mounting	Switching output	Electrical connection	Cable length [m]	Part no.	Type
N/O contact						
	Insertable in the slot from above, flush with the cylinder profile, short design	PNP	Cable, 3-wire	2.5	574335	SMT-8M-A-PS-24V-E-2,5-OE
			Plug M8x1, 3-pin	0.3	574334	SMT-8M-A-PS-24V-E-0,3-M8D
		NPN	Cable, 3-wire	2.5	574338	SMT-8M-A-NS-24V-E-2,5-OE
			Plug M8x1, 3-pin	0.3	574339	SMT-8M-A-NS-24V-E-0,3-M8D

Ordering data – Connecting cables				Technical data → Internet: nebu	
	Electrical connection, left	Electrical connection, right	Cable length [m]	Part no.	Type
	Straight socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541333	NEBU-M8G3-K-2.5-LE3
			5	541334	NEBU-M8G3-K-5-LE3
	Angled socket, M8x1, 3-pin	Cable, open end, 3-wire	2.5	541338	NEBU-M8W3-K-2.5-LE3
			5	541341	NEBU-M8W3-K-5-LE3

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Accessories

Ordering data – Position transmitters for T-slot						Technical data → Internet: position transmitters	
Position measuring range	Analogue output		Type of mounting	Electrical connection	Cable length [m]	Part no.	Type
	[V]	[mA]					
 0 ... 50	–	4 ... 20	Insertable in the slot from above	Plug connector M8x1, 4-pin, in-line	0.3	1531265	SDAT-MHS-M50-1L-SA-E-0.3-M8
 0 ... 40	0 ... 10	–	Insertable in the slot from above	Plug connector M8x1, 4-pin, in-line	0.3	553744	SMAT-8M-U-E-0,3-M8D

Ordering data – Position transmitters for T-slot						Technical data → Internet: sdas	
Position measuring range	Description	Type of mounting	Electrical connection	Cable length [m]	Part no.	Type	
 ≤ 52	Choice of two operating modes: • Two adjustable switching outputs • IO-Link®	Insertable in the slot from above	Plug connector M8x1, 4-pin, in-line	0.3	8063974	SDAS-MHS-M40-1L-PNLK-PN-E-0.3-M8	
			Cable, open end	2.5	8063975	SDAS-MHS-M40-1L-PNLK-PN-E-2.5-LE	

Ordering data – Connecting cables				Technical data → Internet: nebu	
Electrical connection, left	Electrical connection, right	Cable length [m]	Part no.	Type	
 Straight socket, M8x1, 4-pin	Cable, open end, 4-wire	2.5	541342	NEBU-M8G4-K-2.5-LE4	
		5	541343	NEBU-M8G4-K-5-LE4	
 Angled socket, M8x1, 4-pin	Cable, open end, 4-wire	2.5	541344	NEBU-M8W4-K-2.5-LE4	
		5	541345	NEBU-M8W4-K-5-LE4	

Ordering data – Push-in fittings					Technical data → Internet: push-in fittings	
Connection	Nominal width [mm]	Tubing O.D. [mm]	Weight/piece [g]	Part no.	Type	PU ¹⁾
Male thread with internal hexagon						
 M5	1.9	3	3.2	153313	QSM-M5-3-I	10
	2.5	4	3	153315	QSM-M5-4-I	
	2.6	6	4.4	153317	QSM-M5-6-I	
Male thread with internal hexagon, rotatable						
 M5	1.7	3	5.1	130830	QSMLV-M5-3-I	10
	1.8	4	5.0	130831	QSMLV-M5-4-I	

1) Packaging unit