

Three-dimensional gantries

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Three-dimensional gantries

Key features

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At a glance

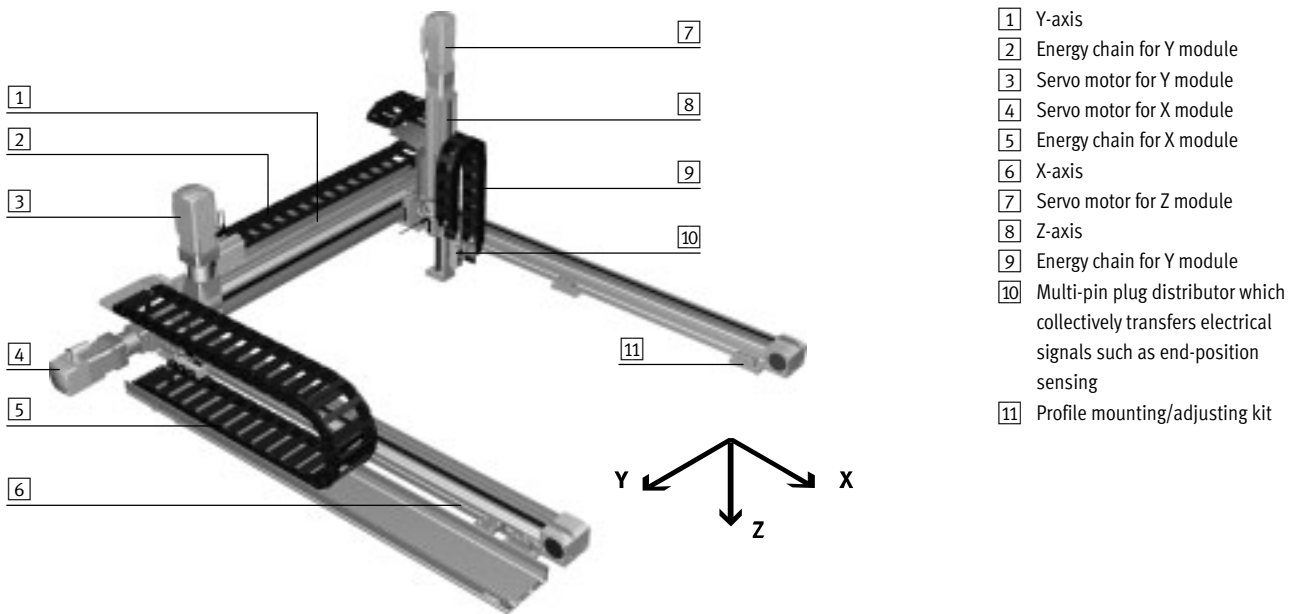
A three-dimensional gantry (YXCR) is an assembly of several axis modules (EHM.../DHMZ) to produce a movement in 3D space.

- Can be used universally for handling light to very heavy workpieces or high payloads
- Especially suitable for very long strokes

- High mechanical rigidity and sturdy design
- Pneumatic and electrical components – freely combinable
- As an electrical solution – freely positionable/any intermediate positions

Range of applications:

- For any movements in 3D space
- Very high requirements for precision and/or very heavy workpieces combined with long strokes



Description of the modules

X module

Structure:

The X module EHMx comprises 2 parallel toothed belt axes which are connected to one another by a connecting shaft. They are powered by a servo motor.

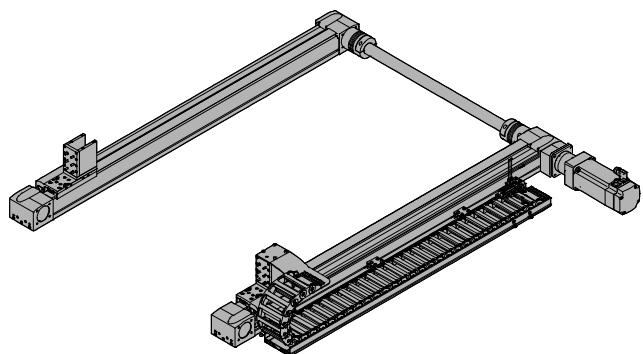
Adapters are installed on the slide of the X-axes to connect the Y module.

The position of the motor and energy chain can be selected using the configurator.

The following elements are located on the motor side:

- Energy chain
- Multi-pin plug distributor for proximity sensor (if sensor package has been selected)

Sample image:



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Description of the modules

Y module

Structure:

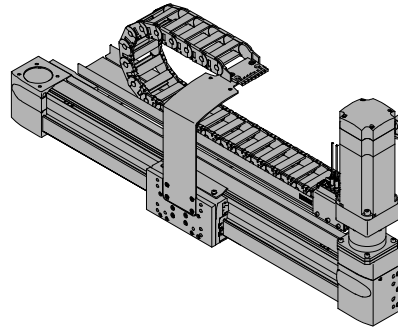
The Y module EHYM comprises a linear axis which is powered by a servo motor. Adapters are installed on the slide of the Y-axis to connect the Z module.

The position of the motor and energy chain is dependent on the position of the motor on the X module.

The following elements are located on the motor side:

- Energy chain
- Multi-pin plug distributor for proximity sensor (if sensor package has been selected)

Sample image:



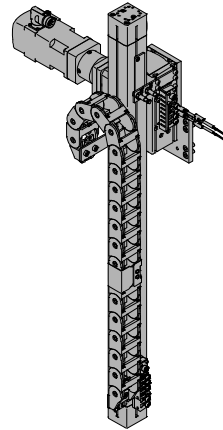
Z module

Structure:

The Z module EHMZ comprises an electric drive, the DHMZ comprises a pneumatic drive. In both variants, an energy chain is attached as a cable guide.

The Z module can be selected using the configurator, depending on the application.

Sample image:



Dispatch options

Fully assembled:

The 3D gantry is fully assembled. All cables and tubing are installed and connected. The system is already set up on delivery, but must be adapted

to the particular mounting surface during installation. Note evenness → table below.

Partially assembled:

The 3D gantry is delivered partially assembled. This means that all three axis modules (X-/Y-/Z-axis) are assembled, each with an optional motor. The partially assembled system must be completed by the customer. Help

can be found in the assembly instructions provided. Optional accessories (→ page 9) are enclosed. Note evenness → table below.

System overview ¹⁾				
Size	YXCR-1	YXCR-2	YXCR-3	YXCR-4
Max. working stroke	X: 1900 mm Y: 1900 mm Z: 50 mm	X: 3000 mm Y: 2000 mm Z: 800 mm	X: 3000 mm Y: 2000 mm Z: 800 mm	X: 3000 mm Y: 2000 mm Z: 800 mm
Max. payload	Dependent on the selected dynamic response			
Required evenness of the mounting surface	≤ 0.1 mm/m			
Mounting position	Horizontal			

¹⁾ Drive package depending on configuration selected.

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Configurator: Handling Guide Online (HGO)

Selecting a handling system

Planning complex handling systems takes a lot of time. You can use the "Handling Guide Online" (HGO) configurator to design a customised handling system for your application in just a few steps.

You can choose from the following systems:

- Single-axis system
- 2D linear gantry
- 2D planar surface gantry
- 3D gantry

Benefits:

- Automatic selection of all relevant components
- Automatic design and calculation of workload
- Quote created automatically
- CAD model available immediately
- Fully automated processing
- You can order fully assembled or unassembled systems through the online shop
- Lots of possible options

Single-axis system



Single-axis movement
Single-axis module as a complete system.
Easy to connect to your own front unit.

☐ Animation

2D linear gantry



Movements in 2D in the vertical working space:
Linear gantries as complete systems.
Combining electric and pneumatic axes is possible.

☐ Animation

2D planar surface gantry



Movements in 2D in the horizontal working space:
Planar surface gantries as complete systems.
Combining electric axes.
Easy to connect to your own Z-unit.

☐ Animation

3D gantry



Movements in 3D:
Three-dimensional gantries as complete systems.
Combining electric and pneumatic axes is possible.

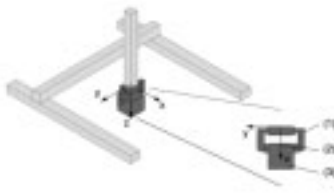
☐ Animation

Entering the application data

- Payload
- Drive system of the axis
- Distance from the centre of the load
- Working stroke
- Reference cycle

Payload

Find your handling solution in a few steps



Definition of payload
(1) Mass
(2) Vibration
(3) Centre of gravity
(4) Working stroke

Specify the characteristic values of the payload

Payload (horizontal and vertical) kg

Distance from the centre of the load

	X	Y	Z
	100 mm	100 mm	100 mm

Working stroke (vertical movement only) ☐ No ☒ Yes

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Result of calculation

You will be offered a selection of calculated systems based on the application data you entered.

The following are available immediately:

- CAD model
- Technical data for the selected system
- Price information

Result of calculation

Find your traveling partner in a few steps.

Size	System output	System overload	Displacement accuracy (m)
1	YG20-1	77 %	0.15mm
2	YG20-2	77 %	0.15mm
3	YG20-3	76 %	0.15mm
4	YG20-4	77 %	0.15mm
5	YG20-5	76 %	0.15mm

n = 10 of 10 : 0

3D quality YG20-3: 01

Drive module	Clear width	Motor type	Motor position	Motor controller	Maximal voltage phase	Cable overload	Drive overload	Brake overload
1 module motor/controller YG20-01	0.1	Servo motor (SMB-A5)	Left	CU645-01	1-phase	25 %	2 %	0 %
2 module motor/controller (3) YG20-02	0.1	Servo motor (SMB-A5)	Left	CU645-01	1-phase	25 %	0 %	0 %
2 module Controller unit motor YG20-01	0.1	Servo motor (SMB-A5)	Right	CU645-01	1-phase	0 %	40 %	77 %

Notes:
 The calculator is based on the following requirements:

- Operating pressure 1 bar
- Motor and motor controller 1000rpm
- No turning or intermediate allow load and

System overview

You will be given an overview of the whole system.

You will also have the following options:

- Request price
- Send request
- Add to basket

Your handling solution

For more information, contact:

Your selected system overview

Characteristics	Value
Working time	10 years
Material	Ti6Al4V
Subsystem motion	No
Drive system of the Z-axis	Electric servo position
Drive system of the Y-axis	Electric servo position
Drive system of the X-axis	Electric servo position
Working stroke in X direction	200mm
Working stroke in Y direction	200mm
Working stroke in Z direction	200mm
Motor position control X axis	1 μs
Motor position control Y axis	1 μs
Manual interface	30 position or CANopen integrated
AC 1 phase	200V
AC 3 phase	400V
Travel velocity 1 in Z direction	30mm/s
Travel acceleration 1 in Z direction	200mm/s²
Travel acceleration 2 in Z direction	200mm/s²
Travel velocity 1 in X direction	30mm/s
Traveltime	10s

Grid preview

3D model of the robot system showing the Z-axis, Y-axis, and X-axis.

Your tool size:

Tool size: 100mm

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Standard components within the handling system

The handling system comprises a number of tried and tested standard components from Festo. Different components are used depending on the configuration. The single axes installed will be displayed in the HGO configurator on the “Result of calculation” page.

Result of calculation
Find your handling solution in a few steps

Select the appropriate system and continue with the configuration:

No.	System design
☐ 1	YXC3-2
☐ 2	YXC3-3
☐ 3	YXC3-4
☐ 4	YXC3-5
☐ 5	YXC3-6

3D gantry YXC3-3: #1

Drive module	Gear ratio	Motor type
X module toothed belt axis EGC-HD	8:1	Servo motor ENMS-A2
Y module toothed belt axis EGC-HD-TB	8:1	Servo motor ENMS-A2
Z module Cantilever axis DGSL	8:1	Servo motor ENMS-A2

Drives/axes

X-axis

Toothed belt axis EGC-TB-KF



- Electrical
- Rigid, closed profile
- Recirculating ball bearing guide for high loads and torques
- High dynamic response and minimum vibration

Y-axis

Toothed belt axis EGC-TB-KF



- Electrical
- Rigid, closed profile
- Recirculating ball bearing guide for high loads and torques
- High dynamic response and minimum vibration

Toothed belt axis EGC-HD-TB



- Electrical
- Flat drive unit with rigid, closed profile
- Duo guide rail
- For maximum loads and torques, high feed forces and speeds and long service life

Z-axis

Mini slide DGSL



- Pneumatic
- Flat design
- High load capacity
- High dynamic response
- Easy adjustment of end positions

Mini slide EGSL



- Electrical
- Compact design
- High load capacity
- High dynamic response
- Easy adjustment of end positions

Toothed belt axis EGC-TB-KF



- Electrical
- Rigid, closed profile
- Recirculating ball bearing guide for high loads and torques
- High dynamic response and minimum vibration
- Small toothed disc diameter

Cantilever axis DGEA



- Electrical
- High rigidity
- High load capacity
- High dynamic response

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Drives/axes

Z-axis

Spindle axis EGC-BS-KF



- Electrical
- Rigid, closed profile
- Recirculating ball bearing guide for high loads and torques
- High dynamic response and minimum vibration
- Various spindle pitches

Possible axis combinations ¹⁾			
Size	X module	Y module	Z module
YXCR-1	• Toothed belt axis EGC-50-TB-KF	• Toothed belt axis EGC-50-TB-KF	• Mini slide pneumatic: DGSL-6 • electrical: EGSL-35
YXCR-2	• Toothed belt axis EGC-80-TB-KF	• Toothed belt axis EGC-80-TB-KF • Toothed belt axis with heavy-duty guide EGC-HD-125-TB	• Mini slide pneumatic: DGSL-12/16 • electrical: EGSL-45/55 • Cantilever axis DGEA-18 • Spindle axis EGC-70-BS-KF
YXCR-3	• Toothed belt axis EGC-120-TB-KF	• Toothed belt axis EGC-120-TB-KF • Toothed belt axis with heavy-duty guide EGC-HD-160-TB	• Mini slide pneumatic: DGSL-20/25 • electrical: EGSL-75 • Cantilever axis DGEA-25/40 • Spindle axis EGC-80-BS-KF
YXCR-4	• Toothed belt axis EGC-185-TB-KF	• Toothed belt axis EGC-185-TB-KF • Toothed belt axis with heavy-duty guide EGC-HD-220-TB	• Cantilever axis DGEA-40 • Spindle axis EGC-120-BS-KF

1) Drive package depending on configuration selected.

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Standard components within the handling system

The handling system comprises a number of tried and tested standard components from Festo. Different components are used depending on the configuration. You can alter the scope and design of the drive package in the HGO configurator on the “System configuration” page.



Motors and controllers

Servo motors EMMS-AS



- Dynamic, brushless, permanently excited servo motor
 - Digital absolute displacement encoder, single-turn or multi-turn
 - With optional brake
- Options:
- With or without brake
 - Type of encoder: single-turn or multi-turn

Gear unit EMGA



- Low-backlash planetary gear unit
- Gear ratio
 $i = 3$ and 5
- Life-time lubrication

Stepper motors EMMS-ST



- 2-phase hybrid technology
- Step angle 1.8°
- With optional brake

Motor controller CMMP-AS for servo motor



- Complete integration of all components for controller and power section, including USB interface
- Integrated brake chopper
- Integrated EMC filters
- Automatic activation for a brake

Options:

- Safety function: safe torque off (STO)/category 4, Performance Level e
- Additional digital inputs and outputs

Options:

- Fieldbus interface
 - CANopen
 - DeviceNet
 - EtherCAT
 - EtherNet/IP
 - PROFIBUS DP
 - PROFINET

Motor controller CMMS-ST for stepper motor



- Complete integration of all components for controller and power section, including RS232 interface
- Integrated brake chopper
- Integrated EMC filters
- Automatic activation for a brake

Options:

- Safety function: safe torque off (STO)/category 3, Performance Level d

Options:

- Fieldbus interface
 - CANopen
 - DeviceNet
 - PROFIBUS DP

Three-dimensional gantries

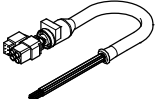
Ordering data – Accessories

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Module/motor combinations

We recommend that the 3D gantry is operated with the proposed motors from Festo. These precisely match the mechanical system. When using third-party motors, it is essential that the technical limits are observed.

Module	Motor
X module	
EHM-EGC-50-TB-KF	EMMS-AS-40-M-LS-...
EHM-EGC-80-TB-KF	EMMS-AS-70-M-LS-...
EHM-EGC-120-TB-KF	EMMS-AS-100-M-HS-...
EHM-EGC-185-TB-KF	EMMS-AS-140-L-HS-...
Y module	
EHM-...-EGC-50-TB-KF	EMMS-AS-40-M-LS-...
EHM-...-EGC-80-TB-KF	EMMS-AS-70-S-LS-...
EHM-...-EGC-120-TB-KF	EMMS-AS-100-S-HS-...
EHM-...-EGC-125-TB-HD	EMMS-AS-70-S-LS-...
EHM-...-EGC-160-TB-HD	EMMS-AS-100-S-HS-...
EHM-...-EGC-185-TB-KF	EMMS-AS-100-S-HS-...
EHM-...-EGC-220-TB-HD	EMMS-AS-140-S-HS-...
Z module	
EHMZ-DGEA-18-TB-KF	EMMS-AS-55-S-LS-...
EHMZ-DGEA-25-TB-KF	EMMS-AS-70-S-LS-...
EHMZ-DGEA-40-TB-KF	EMMS-AS-100-S-HS-...
EHMZ-EGC-70-BK-KF	EMMS-AS-55-S-LS-...
EHMZ-EGC-80-BK-KF	EMMS-AS-70-S-LS-...
EHMZ-EGC-120-BK-KF	EMMS-AS-100-S-HS-...
EHMZ-EGSL-35-BK-KF	EMMS-ST-28-L-...
EHMZ-EGSL-45-BK-KF	EMMS-AS-40-M-LS-...
EHMZ-EGSL-55-BK-KF	EMMS-AS-55-S-LS-...
EHMZ-EGSL-75-BK-KF	EMMS-AS-70-S-LS-...

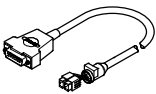
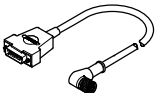
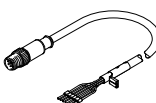
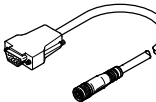
Designation	Description	Cable length	Part No.	Type
For servo motor				
Motor cable ¹⁾				
	For servo motor EMMS-AS-40-M-LS-.../ EMMS-AS-55-S-LS-...	5 m	550306	NEBM-T1G8-E-5-Q7N-LE8
		10 m	550307	NEBM-T1G8-E-10-Q7N-LE8
		15 m	550308	NEBM-T1G8-E-15-Q7N-LE8
Motor cable ¹⁾				
	For servo motor EMMS-AS-70-S-LS-.../ EMMS-AS-70-M-LS-.../EMMS-AS-100-S-HS-.../ EMMS-AS-100-M-HS-.../EMMS-AS-140-S-HS-.../ EMMS-AS-140-L-HS-...	5 m	550310	NEBM-M23G8-E-5-Q9N-LE8
		10 m	550311	NEBM-M23G8-E-10-Q9N-LE8
		15 m	550312	NEBM-M23G8-E-15-Q9N-LE8

1) Cables especially suitable for the motor controller and motor.
Degree of protection to IP65 (in assembled state)

Three-dimensional gantries

Ordering data – Accessories

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Designation	Description	Cable length	Part No.	Type
For servo motor				
Encoder cable ¹⁾				
	• For servo motor EMMS-AS-40-M-LS-.../ EMMS-AS-55-S-LS-...	5 m	550314	NEBM-T1G8-E-5-N-S1G15
		10 m	550315	NEBM-T1G8-E-10-N-S1G15
		15 m	550316	NEBM-T1G8-E-15-N-S1G15
Encoder cable ¹⁾				
	• For servo motor EMMS-AS-70-S-LS-.../ EMMS-AS-70-M-LS-.../EMMS-AS-100-S-HS-.../ EMMS-AS-100-M-HS-.../EMMS-AS-140-S-HS-.../ EMMS-AS-140-L-HS-...	5 m	550318	NEBM-M12W8-E-5-N-S1G15
		10 m	550319	NEBM-M12W8-E-10-N-S1G15
		15 m	550320	NEBM-M12W8-E-15-N-S1G15
For stepper motor				
Motor cable ¹⁾				
	• For stepper motor EMMS-ST-28-L-...	1.5 m	1449600	NEBM-SM12G8-E-1.5-Q5-LE6
		2.5 m	1449601	NEBM-SM12G8-E-2.5-Q5-LE6
		5 m	1449602	NEBM-SM12G8-E-5-Q5-LE6
		7 m	1449603	NEBM-SM12G8-E-7-Q5-LE6
		10 m	1449604	NEBM-SM12G8-E-10-Q5-LE6
Encoder cable ¹⁾				
	• For stepper motor EMMS-ST-28-L-...	5 m	550748	NEBM-M12G8-E-5-S1G9
		10 m	550749	NEBM-M12G8-E-10-S1G9
		15 m	550750	NEBM-M12G8-E-15-S1G9

1) Cables especially suitable for the motor controller and motor.
Degree of protection to IP65 (in assembled state)

Possible cable and tube lengths

- Cables and tubing are selected so that the length specified when ordering will be the minimum connection length from the energy chain output.
- Cables and tubing are only available in fixed lengths as stated in the table below. This can mean that the cable plug connectors of the different cables do not end at the same point.

Length	1 m	2 m	5 m	7 m	10 m
Motor cable	–	■	■	■	■
Encoder cable	–	■	■	■	■
Multi-pin plug connecting cable	–	■	■	■	■
Tubing (for DHMZ only)	■	■	■	–	–

Three-dimensional gantries

Ordering data – Accessories

FESTO

Standard components within the handling system

The handling system comprises a number of tried and tested standard components from Festo. Different components are used depending on the configuration. You can alter the scope and design of the accessories in the HGO configurator on the “System configuration” page.

System configuration
with programming module in 3-line step

Mechanical system

Mounting: ☐ Multiple mounting ☒ As standard

Electrical system

Electrical cable length from supply chain output: m

Additional multi-pin programming module: ☐ Yes ☒ No

Pneumatics

Number of additional tubes:

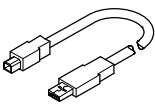
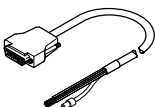
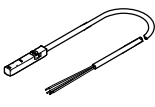
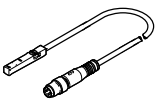
Additional diameter of additional tubes for transport:

Maximum cable length from energy chain output: m

Assembly

Mounting method: ☐ Complete assembly ☒ Unassembled

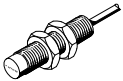
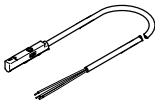
Ordering data (optional):

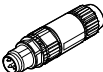
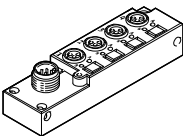
Designation	Description	Cable length	Part No.	Type
Programming cable				
	High-speed USB 2.0 connecting cable	1.8 m	1501332	NEBC-U1G4-K-1.8-N-U2G4
Control cable				
	For I/O interface to any controller	2.5 m	552254	NEBC-S1G25-K-2.5-N-LE26
Proximity sensor (inductive) for sensing the position of the slide on the X-/Z-axis				
	Cable with open end			
	For toothed belt axis EGC-TB	PNP, N/C contact	7.5 m	551391 SIES-8M-PO-24V-K-7,5-OE
	For spindle axis EGC-BS	PNP, N/O contact	7.5 m	551386 SIES-8M-PS-24V-K-7,5-OE
	For mini slide EGSL	NPN, N/C contact	7.5 m	551401 SIES-8M-NO-24V-K-7,5-OE
	For DC voltage	NPN, N/O contact	7.5 m	551396 SIES-8M-NS-24V-K-7,5-OE
	Included if “Festo sensor package” is selected:			
	2 pieces			
Proximity sensor (inductive) for sensing the position of the slide on the Y-axis				
	Cable with plug			
	For toothed belt axis EGC-TB, EGC-HD-TB	PNP, N/C contact	0.3	551392 SIES-8M-PO-24V-K-0,3-M8D
		PNP, N/C contact	2.5	551393 SIES-8M-PO-24V-K-2,5-M8D
	For DC voltage	PNP, N/O contact	0.3	551387 SIES-8M-PS-24V-K-0,3-M8D
		PNP, N/O contact	2.5	551388 SIES-8M-PS-24V-K-2,5-M8D
	Included if “Festo sensor package” is selected:	NPN, N/C contact	0.3	551402 SIES-8M-NO-24V-K-0,3-M8D
		NPN, N/C contact	2.5	551403 SIES-8M-NO-24V-K-2,5-M8D
	2 pieces	NPN, N/O contact	0.3	551397 SIES-8M-NS-24V-K-0,3-M8D
		NPN, N/O contact	2.5	551398 SIES-8M-NS-24V-K-2,5-M8D

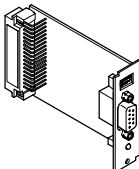
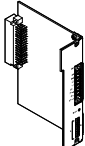
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Ordering data – Accessories

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Designation	Description	Cable length	Part No.	Type
Proximity sensor (inductive) for sensing the position of the slide on the Z-axis				
	Cable with open end			
	• For cantilever axis DGEA	PNP, N/C contact	2.5 m	150398 SIEN-M8NB-PO-K-L
	• For DC voltage	PNP, N/O contact	2.5 m	150394 SIEN-M8NB-PS-K-L
	Included if "Festo sensor package" is selected:	NPN, N/C contact	2.5 m	150396 SIEN-M8NB-NO-K-L
	• 2 pieces	NPN, N/O contact	2.5 m	150392 SIEN-M8NB-NS-K-L
Proximity sensor (magneto-resistive) for sensing the position of the slide on the Z-axis				
	Cable with open end			
	• For mini slide DGSL	PNP, N/O contact	2.5 m	551373 SMT-10M-PS-24V-E-2,5-L-OE
	• For DC voltage	NPN, N/O contact	2.5 m	551377 SMT-10M-NS-24V-E-2,5-L-OE
	Included if "Festo sensor package" is selected:			
	• 2 pieces			

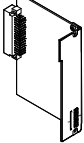
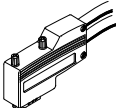
Designation	Description	Cable length	Part No.	Type
Plug socket with cable				
	• Connection between multi-pin plug distributor and control cabinet	5 m	525618	SIM-M12-8GD-5-PU
		10 m	570008	SIM-M12-8GD-10-PU
Plug connector				
	• For connection to the multi-pin plug distributor	–	562024	NECU-S-M8G3-HX
Multi-pin plug distributor				
	• With the help of the multi-pin plug distributor, electrical signals such as end-position sensing can be collectively transferred Options: – 4 individual connections – 6 individual connections	–	574586	NEDU-L4R1-M8G3L-M12G8
			574587	NEDU-L6R1-M8G3L-M12G8

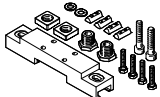
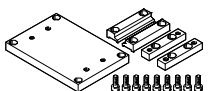
Designation	Description	Part No.	Type
Interface			
	For additional I/Os	567855	CAMC-D-8E8A
	For DeviceNet	547451	CAMC-DN
	For EtherCAT	567856	CAMC-EC
	For EtherNet/IP	1911917	CAMC-F-EP
	For PROFINET RT	1911916	CAMC-F-PN
	For PROFIBUS DP	547450	CAMC-PB
Safety module			
	For safe torque off (STO)	1501330	CAMC-G-S1

Three-dimensional gantries

Ordering data – Accessories

FESTO

Designation	Description	Part No.	Type
Switch module			
	If the safety module CAMC-G-S1 is not used, the switch module is absolutely essential for operating of the motor controller CMMP-AS-...-M3	1501329	CAMC-DS-M1
Bus connection			
	For DeviceNet interface	525635	FBSD-KL-2X5POL
Plug connector			
	For CANopen interface	533783	FBS-SUB-9-WS-CO-K
	For PROFIBUS interface	533780	FBS-SUB-9-WS-PB-K

Designation	Description	Part No.	Type
Adjusting kit			
	• Used to mount the handling system on the bearing surface • Can be used to compensate any unevenness in the bearing surface	EHMY-...-EGC-50-TB-KF	8047565 EADC-E15-50-E7
		EHMY-...-EGC-80-TB-KF	8047566 EADC-E15-80-E7
		EHMY-...-EGC-120-TB-KF	8047567 EADC-E15-120-E7
		EHMY-...-EGC-185-TB-KF	8047568 EADC-E15-185-E7
Profile mounting			
	• Used to mount the handling system on the bearing surface • It is not height-adjustable	-	

Three-dimensional gantries

Programming aid

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FCT software – Festo Configuration Tool

Software platform for electric drives from Festo

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