Parallel kinematic system EXPT, tripod

Parallel kinematic system EXPT, tripod

Key features

At a glance

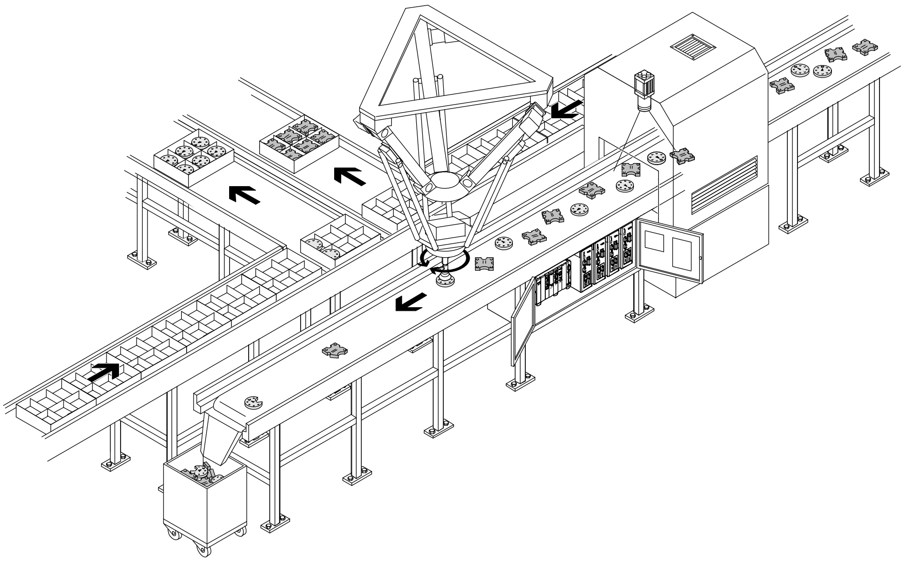
The high-speed handling unit with robot functionality for free movement in three dimensions provides precision in movement and positioning as well as a high dynamic response of up to 150 picks/min.
The highly rigid mechanical design and low moving mass make the parallel delta kinematic system with toothed belt axes up to three times as fast as comparable Cartesian systems.
Three double rods keep the front unit horizontal at all times. The axes and servo motors do not move with the unit.
The parallel kinematic system is suitable for handling loads of up to max. 5 kg.

Typical applications include:
- Picking & placing small parts
- Bonding
- Labelling
- Palletising
- Sorting
- Grouping
- Repositioning and separating

Comparison between parallel kinematic and Cartesian systems

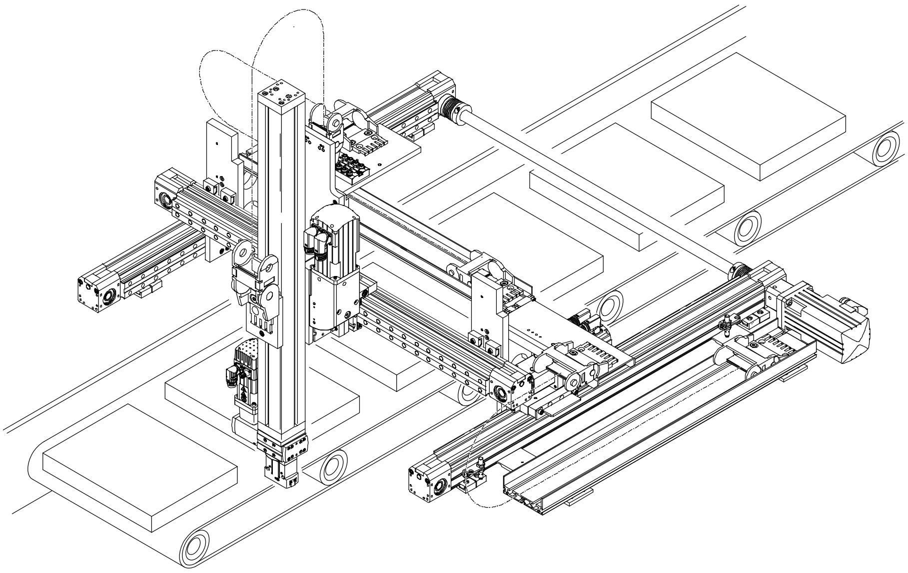
Parallel kinematic system

- Low moving mass – ideal for demanding requirements on dynamic response in three dimensions
- High path accuracy with a range of path profiles, even for highly dynamic operation
- Four sizes with a working space diameter of up to 1200 mm



Cartesian system

- Axes build on one another; the first axis carries all the subsequent axes
- High moving mass, therefore much lower dynamic response
- Rectangular, scalable working space
- Based on standard components
- Flexible designs



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The technology in detail

Parallel kinematic system

1 Mounting frame
2 Mounting bracket for toothed belt axis
3 Motor
4 Connection block
5 Rod pair
6 Interface housing
7 Angle kit ➔ 33
8 Protective conduit ➔ 33
9 Toothed belt axis
10 Tubing holder ➔ 33
11 Front unit for attaching a gripper, etc. ➔ 24

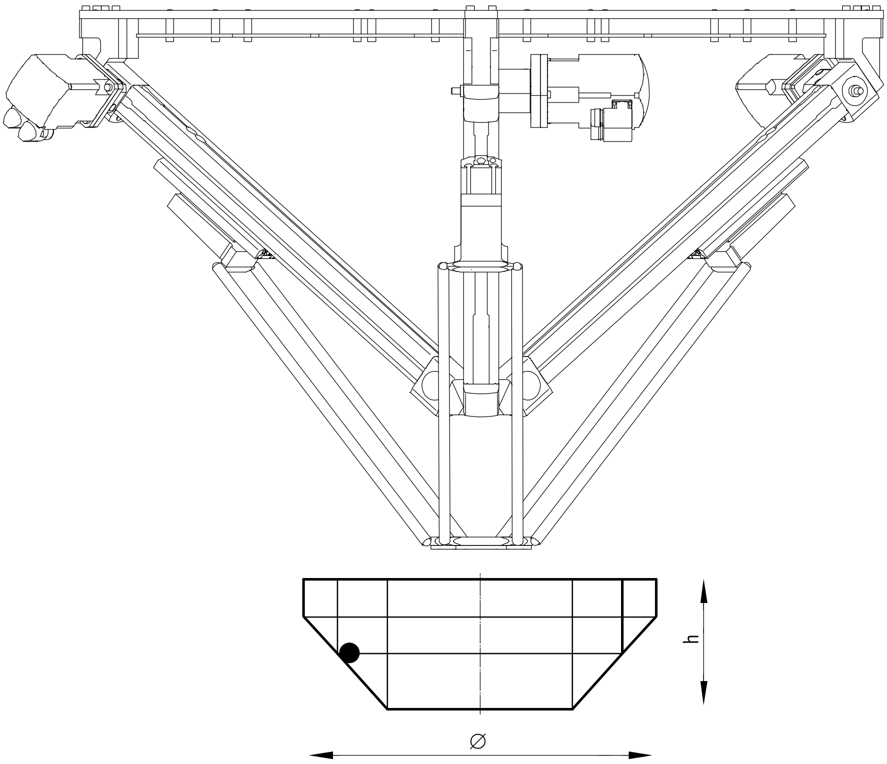
Front unit

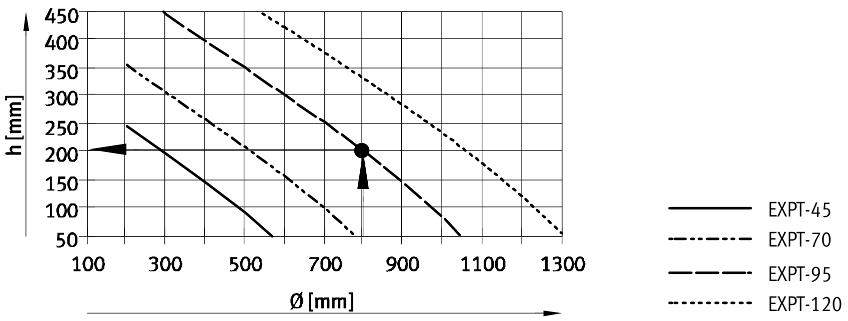
➔ 24

The front unit can optionally be ordered via the modular product system.
It includes a geared motor that enables rotary movement (fourth axis) and is available in two sizes.
The front unit can also be chosen with or without rotary throughfeed, for vacuum or excess pressure.
A range of grippers can be attached to it ➔ 34.

Available working space

There are four sizes available with different working space diameters.
In simplified terms, the possible working space can be described using the shape of a cylinder (➔ drawing).
The more working space required, the smaller its diameter (➔ graph).





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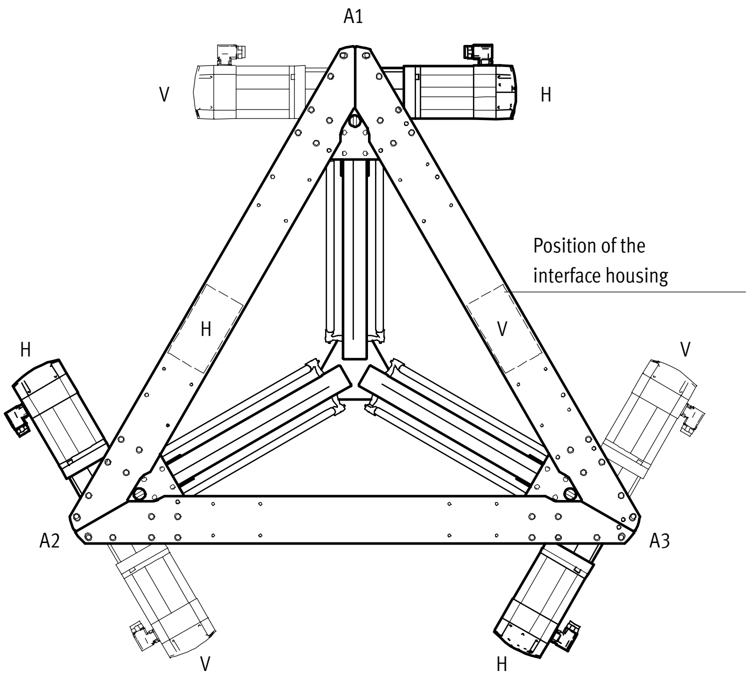
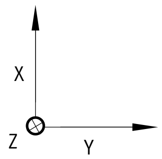
Motor attachment variants

The attachment position of the motors can be individually configured via the modular product system (➔ 30).
The standard motor attachment position corresponds to code HHH (cf. illustration below). This means: A1/A2/A3 rear.
If a motor is to be attached on the front, a 'V' must be specified in the order code for the respective axis.
The position of the interface housing depends on the position of the motor (V or H) on axis A1.

Code	Description
HHH	A1/A2/A3 rear
HHV	A3 front; A1/A2 rear
HVH	A2 front; A1/A3 rear
HVV	A2/A3 front; A1 rear
VHH	A1 front; A2/A3 rear
VHV	A1/A3 front; A2 rear
VVH	A1/A2 front; A3 rear
VVV	A1/A2/A3 front



Coordinate system



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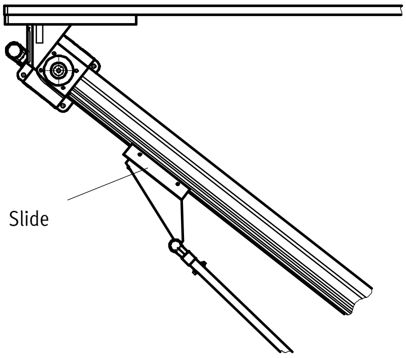
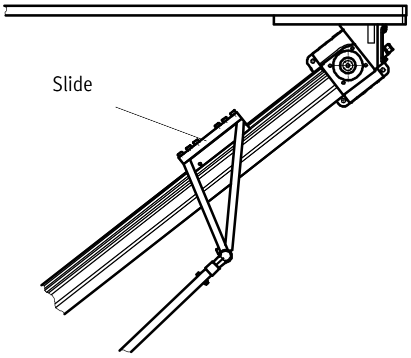
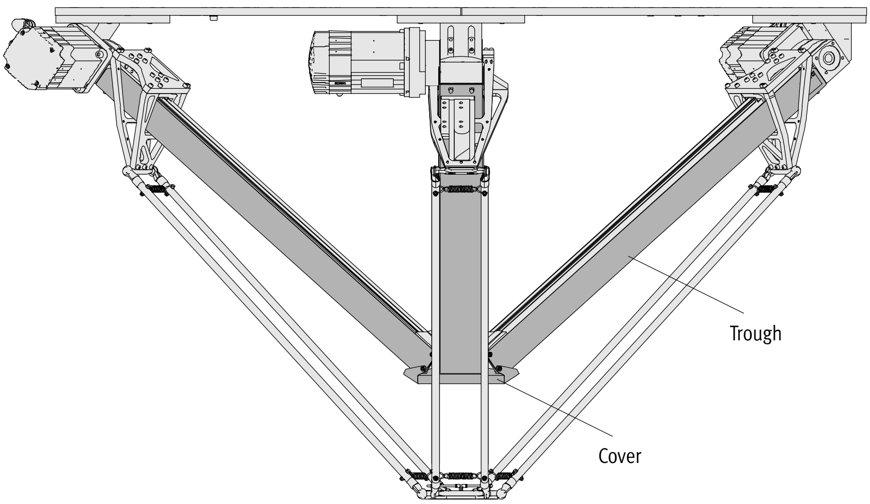
Protection against particles for size 95 and 120

Installation type: Protected version (P8)

Abrasion on the toothed belt can lead to loose particles falling into the working space in the standard design.
If the variant EXPT-...-P8 (➔ 30) is selected, the axes are turned during installation (slide on top). A cover kit EASC-E10 (➔ 33) can be additionally ordered as a separate accessory and fitted; this prevents the particles from entering the working space. They slide downwards into the trough and collect in the cover (see below).

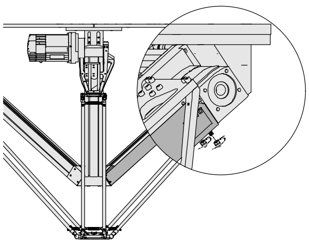
Standard	Protected version (P8)
	

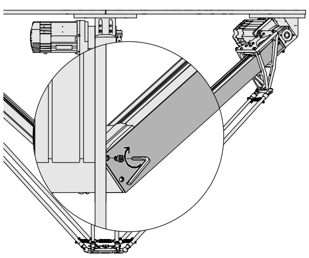
Protected version (feature P8 in the modular product system) with cover kit EASC-E10 (ordered separately as an accessory)



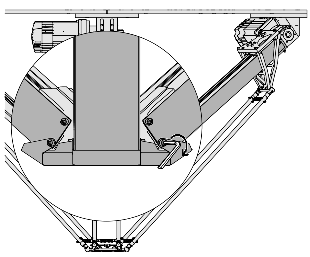
Easy mounting of the cover kit EASC-E10

Mounting of the troughs





Mounting of the cover



Control systems CMCA

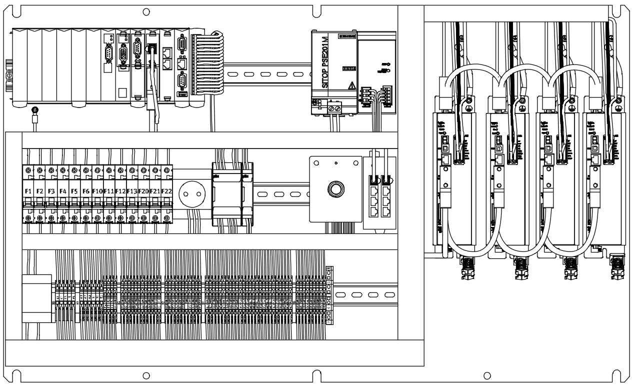
The control system CMCA complements the parallel kinematic system EXPT.
It is available in two versions:

- Mounting plate
- Mounting plate in a control cabinet housing

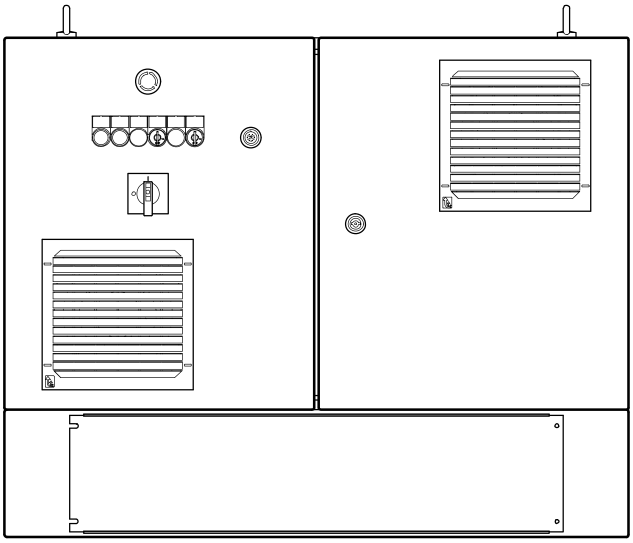
It can be ordered either via the modular product system ➔ 30 or separately ➔ Internet: CMCA

The control system includes the multi-axis controller CMXR and motor controller CMMP required for activation. There is also an integrated safety circuit, which together with the teach pendant CDSA establishes the basic functionality.
The version with the control cabinet housing also features control elements and fans in the door.
The control system CMCA is pre-programmed and already tested together with the relevant parallel kinematic system.

Mounting plate



Mounting plate in the control cabinet housing



Relationship between the order code of the parallel kinematic system EXPT and the control system CMCA

Depending on the configured parallel kinematic system EXPT

- With or without front unit
- Control system variant
- Controller type

The following order codes are available for the control system CMCA.

Allocation table	
Parallel kinematic system EXPT	Control system CMCA
For mounting plate	
EXPT-...-T0-...-C-C1-...	CMCA-K1-C1-A4-C-S1
EXPT-...-T0-...-C-C2-...	CMCA-K1-C2-A4-C-S1
EXPT-...-T1 to T4-...-C-C1-...	CMCA-K1-C1-A5-C-S1
EXPT-...-T1 to T4-...-C-C2-...	CMCA-K1-C2-A5-C-S1
For mounting plate in the control cabinet housing	
EXPT-...-T0-...-CC-C1-...	CMCA-K1-C1-A4-CC-S1
EXPT-...-T0-...-CC-C2-...	CMCA-K1-C2-A4-CC-S1
EXPT-...-T1 to T4-...-CC-C1-...	CMCA-K1-C1-A5-CC-S1
EXPT-...-T1 to T4-...-CC-C2-...	CMCA-K1-C2-A5-CC-S1

Parallel kinematic system EXPT, tripod

Type codes

EXPT	–	70	–	E1	–	T2	–	HHH	–	

Type	
EXPT	Parallel kinematic system

Working space [mm]	
45	∅ 450, H100
70	∅ 700, H100
95	∅ 950, H100
120	∅ 1200, H100

Drive	
E1	DGE-25
E4	EGC-80

Attachment components	
T0	Without rotary drive
T1	Rotary drive, size 8
T2	Rotary drive, size 8 with pneumatic rotary throughfeed
T3	Rotary drive, size 11
T4	Rotary drive, size 11 with pneumatic rotary throughfeed

Motor attachment position	
HHH	A1/A2/A3 rear
HHV	A3 front; A1/A2 rear
HVH	A2 front; A1/A3 rear
HVV	A2/A3 front; A1 rear
VHH	A1 front, A2/A3 rear
VHV	A1/A3 front; A2 rear
VVH	A1/A2 front; A3 rear
VVV	A1/A2/A3 front

Protection against particles	
–	Standard
P8	Protected version

Parallel kinematic system EXPT, tripod

Type codes

→	CC	–	C1	–	B	–	15K	–	S	–	DE

Control system	
–	None
C	Mounting plate
CC	Control cabinet

Multi-axis controller	
–	None
C1	With CMXR C1
C2	With CMXR C2, with integrated PLC

Operator terminal	
–	None
B	With teach pendant CDSA

Cable length	
–	None
5K	5 m
10K	10 m
15K	15 m

Presetting	
–	Standard
S	With calibration

Document language	
DE	German
EN	English
ES	Spanish
FR	French
IT	Italian
RU	Russian
ZH	Chinese

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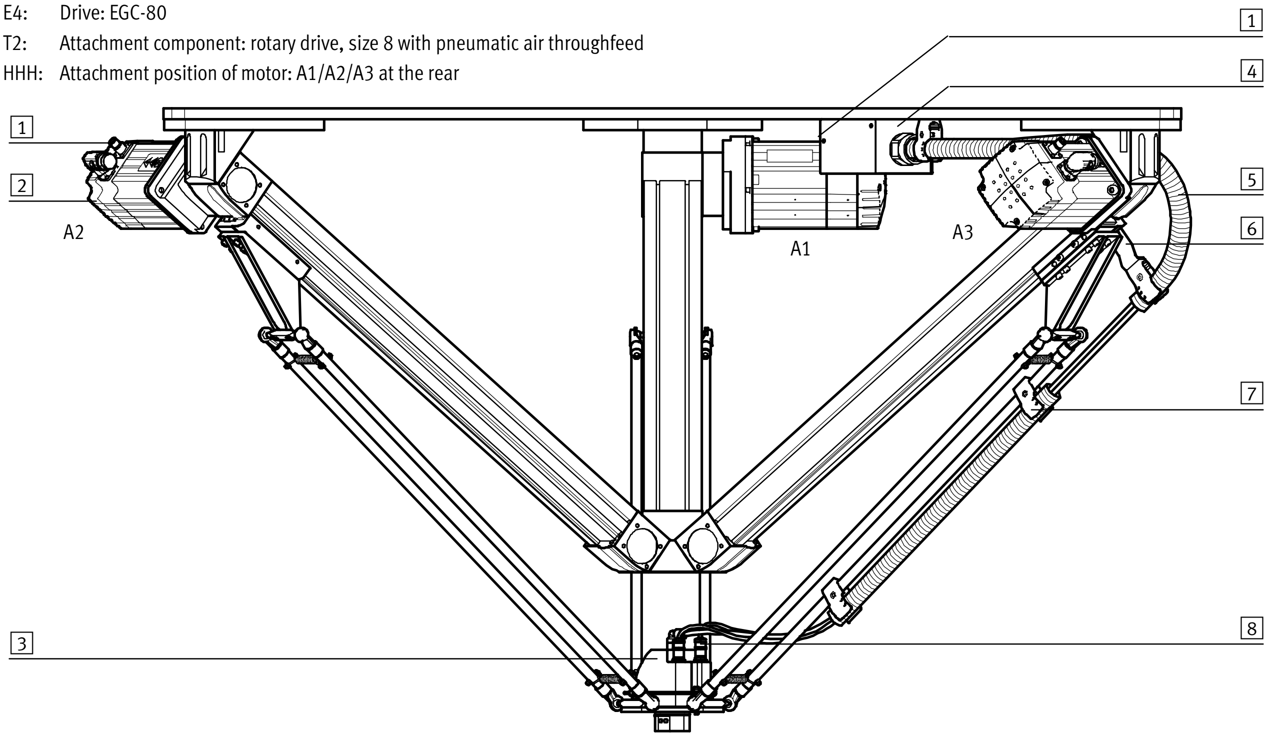
Variant examples

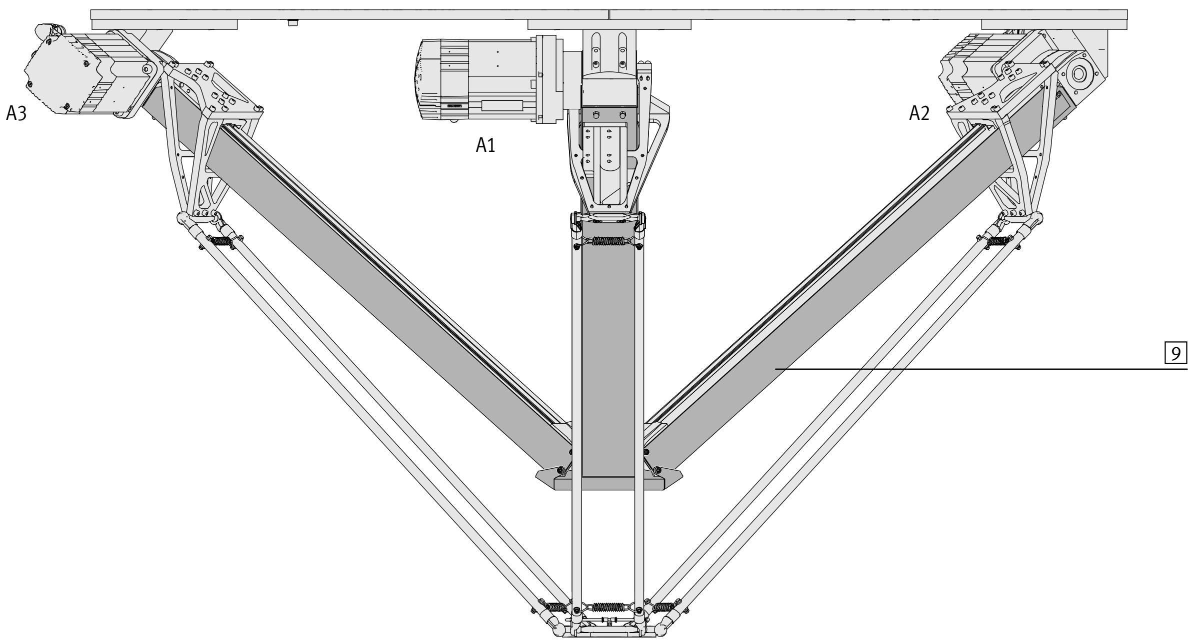
Order code: EXPT-...-E4-T2-HHH-...

E4: Drive: EGC-80
T2: Attachment component: rotary drive, size 8 with pneumatic air throughfeed
HHH: Attachment position of motor: A1/A2/A3 at the rear



Order code: EXPT-...-E4-T0-HVV-P8-... with cover kit EASC-E10-...

E4: Drive: EGC-80
T0: Attachment component: no rotary drive
HVV: Attachment position of motor: A1 at rear, A2/A3 at the front
P8: Protection against particles: protected version
Cover kit EASC-E10 must be ordered separately as an accessory.



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Attachments and accessories			
	Type	Description	→ Page/Internet
1	Connecting cable 5K, 10K, 15K	All required connecting cables/tubing are included loose as part of the delivery. The required cable length can be selected in the modular product system (none, 5 m, 10 m or 15 m)	32
2	Servo motor HHH, HHV, …	The attachment position of the motors can be defined via the modular product system (HHH … VVV). Homing is not required thanks to a multi-turn rotary encoder	–
3	Front unit T0, T1, T2, …	Choose from: • Front unit without rotary drive (T0) • Front unit with rotary drive (T1 to T4)	–
4	Interface housing	Serves as the interface between the parallel kinematic system and the control cabinet, to supply the front unit	–
5	Protective conduit MKG	Is pre-assembled for all variants (T0 to T4), on axis A1	33
6	Angle kit EAHM-E10	Is pre-assembled for all variants (T0 to T4), on axis A1. If required, further angle kits can be ordered as accessories	33
7	Tubing holder EAHM-E10-TH	Is pre-assembled for all variants (T0 to T4), on axis A1. If required, further tubing holders can be ordered as accessories	33
8	Front unit installation	The lines to supply the front unit are already installed between the front unit and the interface housing	–
9	Cover kit EADC-E10	Protects the working space against the ingress of particles. The kit must be fitted by the customer	33

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- Size
45, 70, 95, 120

- www.festo.com

General technical data					
Size		45	70	95	120
Design		Parallel kinematic system			
Motor type		Servo motor			
Mounting position		Horizontal			
Working space					
Nominal diameter	[mm]	450	700	950	1200
Nominal height	[mm]	100	100	100	100
Max. acceleration[1]	[m/s²]	110			
Max. speed[1]	[m/s]	7			
Max. pick rate[1][2]	[picks/min]	150			
Repetition accuracy	[mm]	±0.1			
Positioning accuracy[3]	[mm]	±0.5			
Track precision[3][4]	[mm]	±0.5			
Nominal load[5]					
With min. dynamic response	[kg]	5			
With max. dynamic response	[kg]	1			
Base weight	[kg]	45	47.5	61.5	66

1) When used in combination with motor controller CMMP-AS-C5-3A and multi-axis controller CMXR.
2) In the 12" cycle.
3) Only with calibrated system (order code S).
4) At a speed of ≤0.3 m/s.
5) Nominal load = tool load (accessories attached to the front unit) + payload

Max. process force in Z direction					
Size		45	70	95	120
With working space diameter	[mm]	0	0	0	0
Process force	[N]	1300	1000	1000	850
With working space diameter[6]	[mm]	112.5	175	237.5	300
Process force	[N]	1000	750	750	750

6) The specified values correspond to 25% of the nominal diameter.

Operating and environmental conditions		
Ambient temperature	[°C]	0 ... +40
Storage temperature	[°C]	–10 ... +60
Operating pressure for rod loss detection	[bar]	2 ... 8
Duty cycle[7]	[%]	100
Corrosion resistance class CRC[8]		2

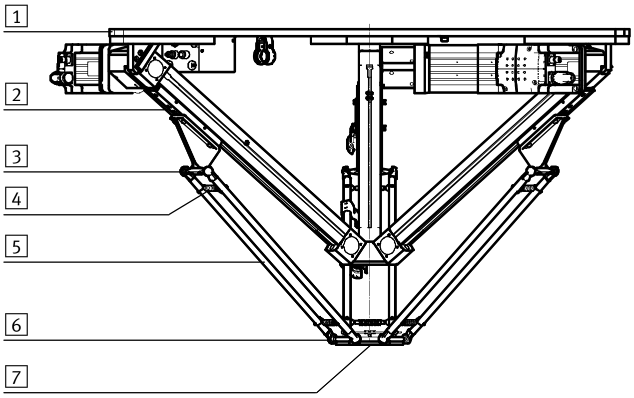
7) When used in combination with motor controller CMMP-AS-C5-3A and multi-axis controller CMXR.
8) Corrosion resistance class 2 according to Festo standard 940 070
Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Parallel kinematic system EXPT, tripod

Technical data

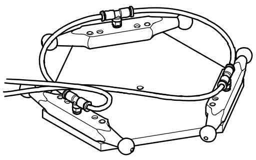
Materials

Sectional view



Parallel kinematic system		
1	Mounting frame	Wrought aluminium alloy
2	Toothed belt axis DGE/EGC	➔ Internet: dge, egc
3	Ball stud	Wrought aluminium alloy
4	Tension spring	High-alloy stainless steel
5	Pair of rods	Plastic, carbon-fibre reinforced
6	Ball cup	Polyamide
	Ball	Ceramic
7	Front unit	Wrought aluminium alloy
–	Note on materials	Contains paint-wetting impairment substances
		Free of copper and PTFE

Rod loss detection

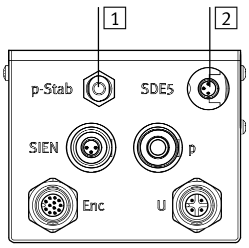


The rod loss detection feature detects detached rods and initiates an emergency stop.

It is realised via permanent compressed air monitoring (pressure switch integrated in the frame of the interface housing)

This is done by pressurising the ball cup connections of the front unit with compressed air at 2 bar (rel.).

Connections on the interface housing:



1 Compressed air supply for rod loss detection.
The compressed air is adjusted to 2 bar in the interface housing.

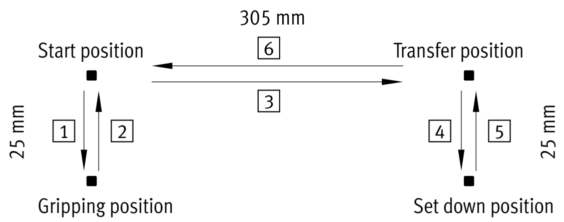
2 Pressure sensor for monitoring rod loss detection.
Connecting cable ➔ 32

Pick rate as a function of nominal load

The characteristic values for dynamic response are determined in so-called 12" cycles. The graph below shows the maximum number of possible cycles as a function of nominal load. It is based on an accuracy of ±0.5 mm.

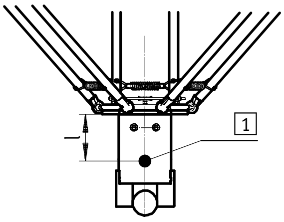
One 12" cycle means:

1. To the gripping position
2. To the start position
3. To the transfer position
4. To the set down position
5. To the transfer position
6. To the start position



n= Cycles per minute
m= Nominal load

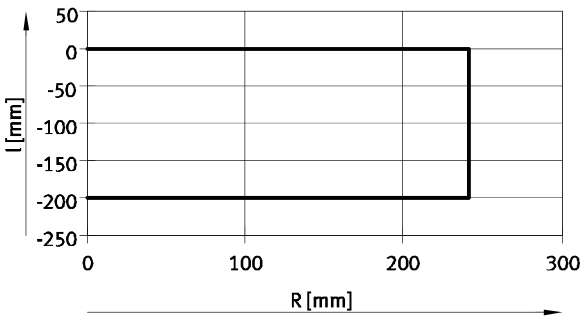
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



[1] Centre of gravity

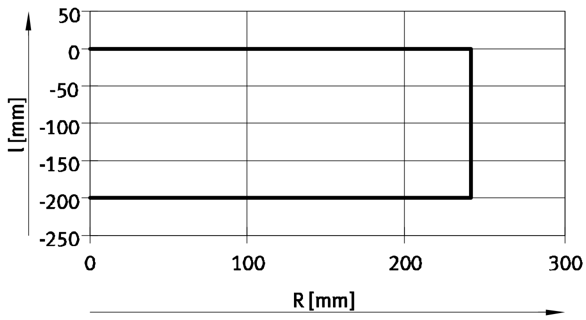
EXPT-45

Nominal load of 0.1 kg



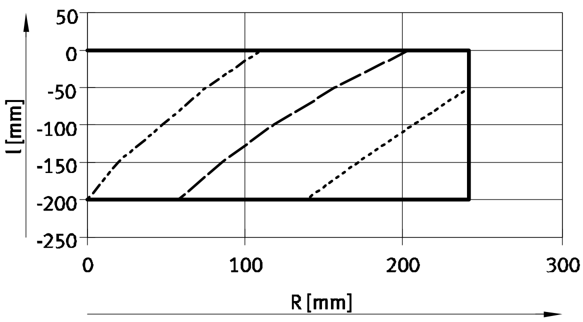
——— a = 0 … 100 m/s^2

Nominal load of 0.5 kg



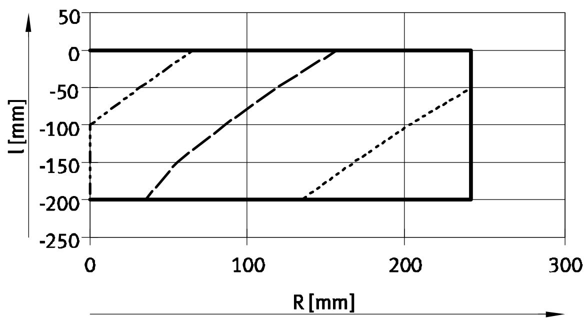
——— a = 0 … 100 m/s^2

Nominal load of 1 kg



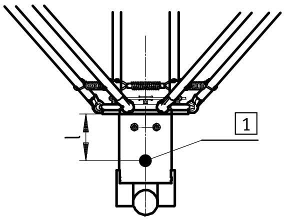
——— a = 0 … 70 m/s^2
-·-·-·- a = 100 m/s^2
— — — a = 90 m/s^2
·········· a = 80 m/s^2

Nominal load of 1.5 kg



——— a = 0 … 50 m/s^2
-·-·-·- a = 80 m/s^2
— — — a = 70 m/s^2
·········· a = 60 m/s^2

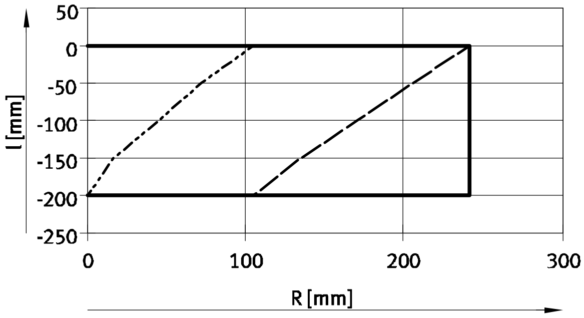
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



1 Centre of gravity

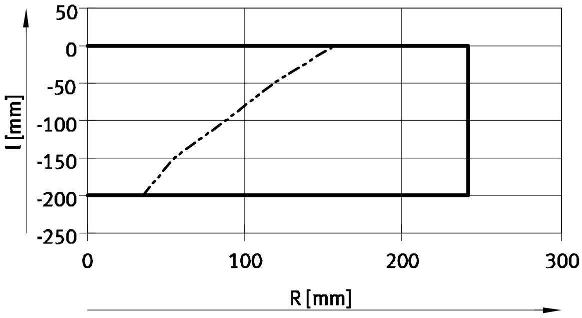
EXPT-45

Nominal load of 2 kg



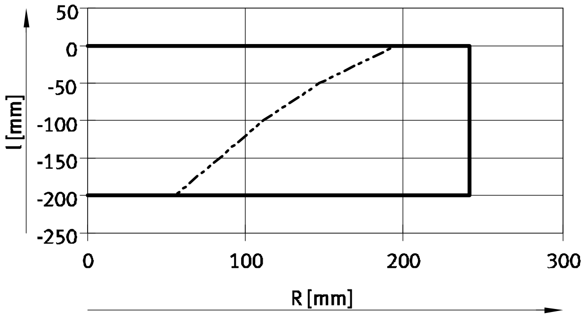
- a = 0 … 40 m/s²
- a = 60 m/s²
- a = 50 m/s²

Nominal load of 3 kg



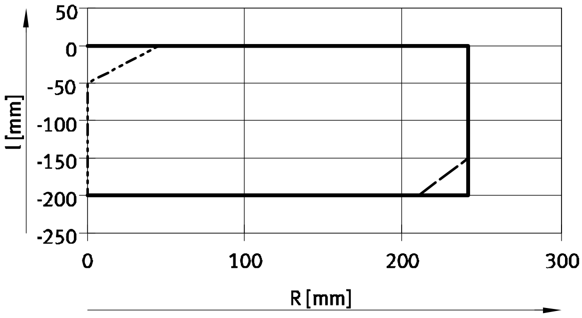
- a = 0 … 30 m/s²
- a = 40 m/s²

Nominal load of 4 kg



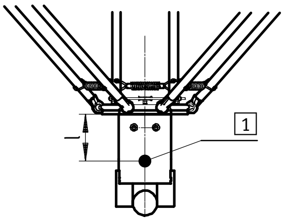
- a = 0 … 20 m/s²
- a = 30 m/s²

Nominal load of 5 kg



- a = 0 … 10 m/s²
- a = 30 m/s²
- a = 20 m/s²

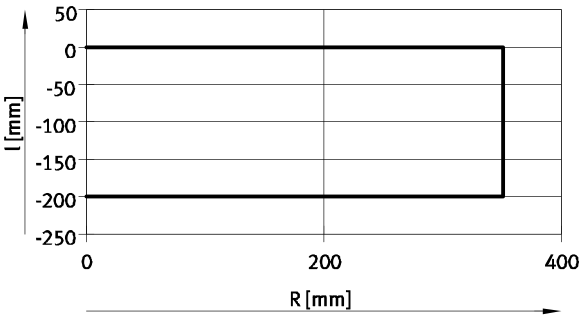
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



[1] Centre of gravity

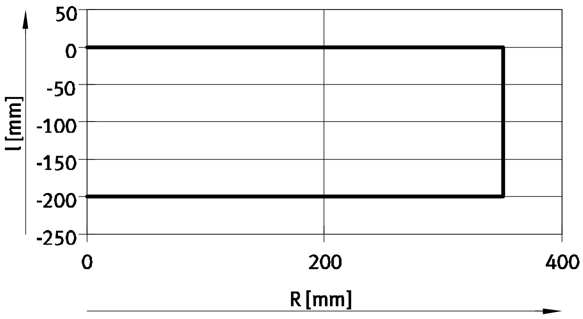
EXPT-70

Nominal load of 0.1 kg



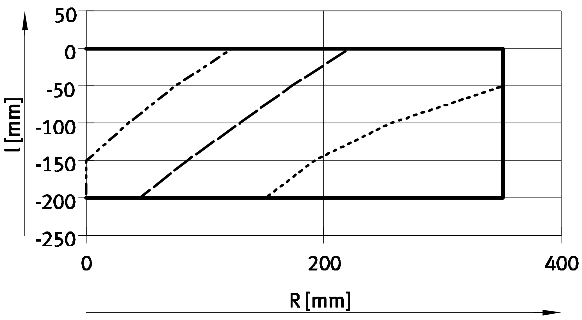
a = 0 ... 100 m/s²

Nominal load of 0.5 kg



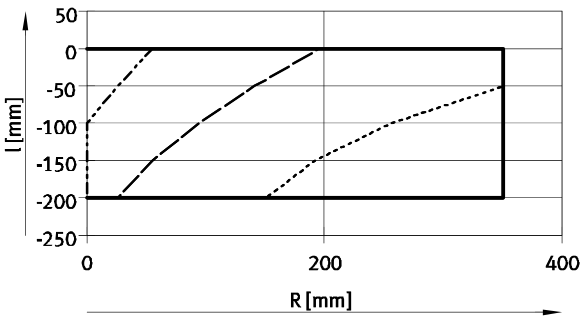
a = 0 ... 100 m/s²

Nominal load of 1 kg



a = 0 ... 70 m/s²
a = 100 m/s²
a = 90 m/s²
a = 80 m/s²

Nominal load of 1.5 kg



a = 0 ... 50 m/s²
a = 80 m/s²
a = 70 m/s²
a = 60 m/s²

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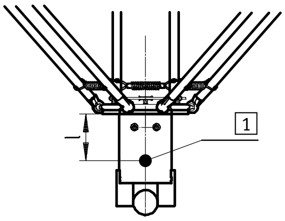
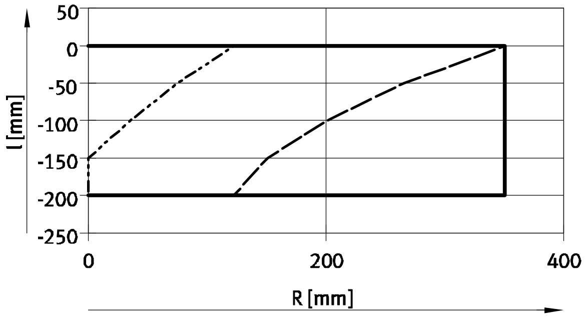
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



[1] Centre of gravity

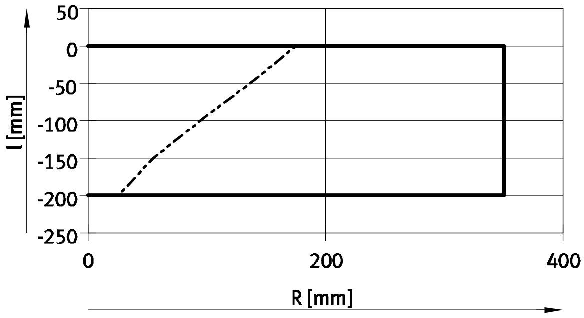
EXPT-70

Nominal load of 2 kg



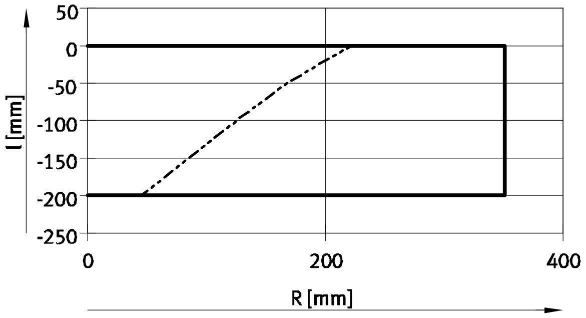
a = 0 … 40 m/s²
a = 60 m/s²
a = 50 m/s²

Nominal load of 3 kg



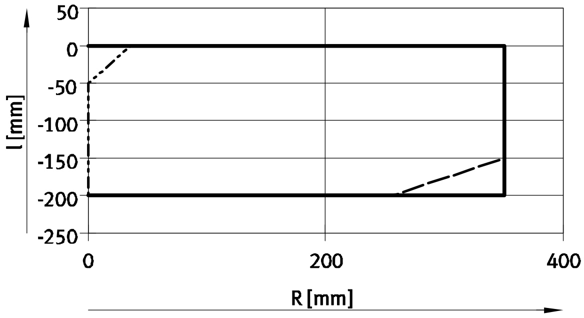
a = 0 … 30 m/s²
a = 40 m/s²

Nominal load of 4 kg



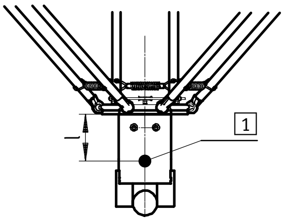
a = 0 … 20 m/s²
a = 30 m/s²

Nominal load of 5 kg



a = 0 … 10 m/s²
a = 30 m/s²
a = 20 m/s²

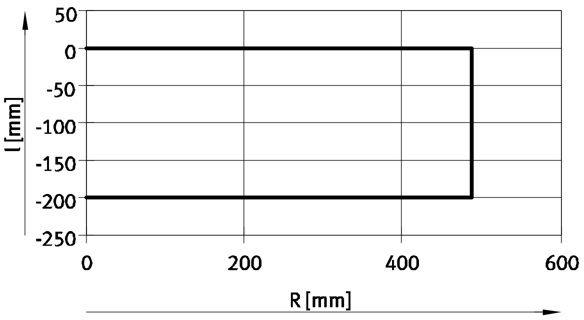
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



1 Centre of gravity

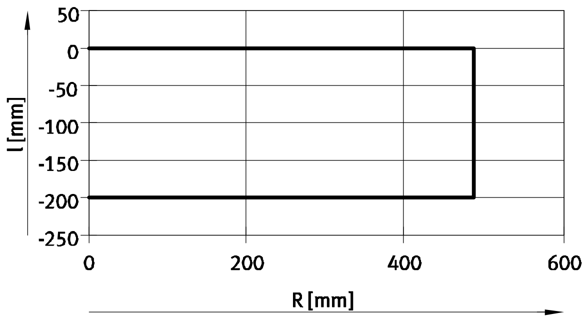
EXPT-95

Nominal load of 0.1 kg



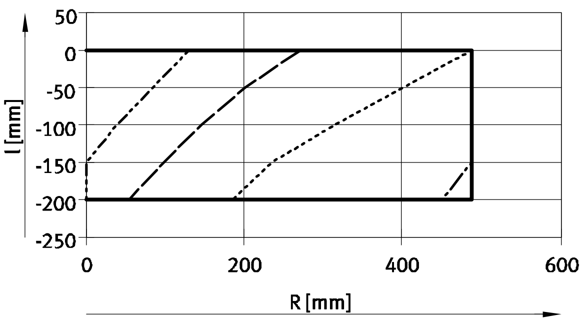
a = 0 … 100 m/s²

Nominal load of 0.5 kg



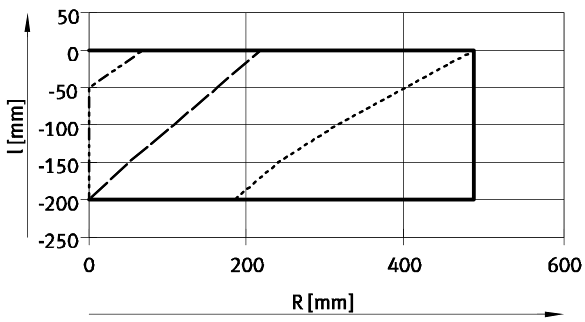
a = 0 … 100 m/s²

Nominal load of 1 kg



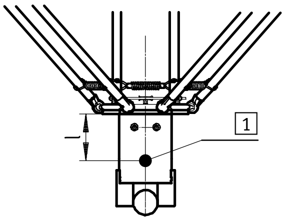
a = 0 … 60 m/s²
a = 100 m/s²
a = 90 m/s²
a = 80 m/s²
a = 70 m/s²

Nominal load of 1.5 kg



a = 0 … 50 m/s²
a = 80 m/s²
a = 70 m/s²
a = 60 m/s²

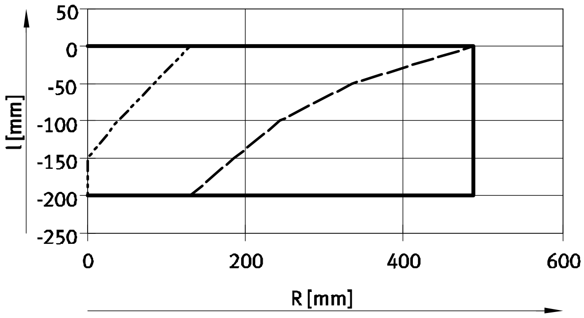
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



[1] Centre of gravity

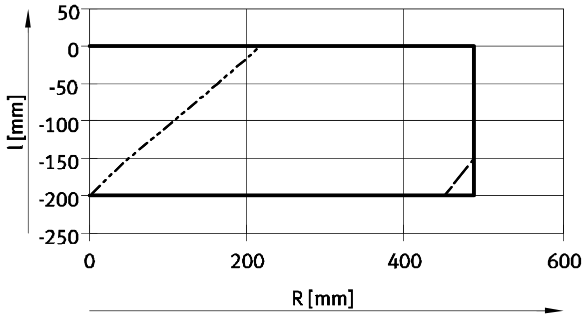
EXPT-95

Nominal load of 2 kg



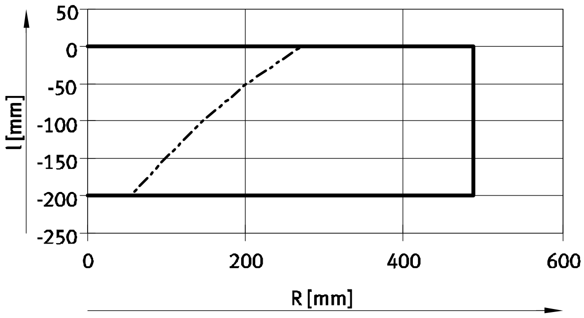
- a = 0 ... 40 m/s^2 (solid line)
- a = 60 m/s^2 (dash-dot line)
- a = 50 m/s^2 (dashed line)

Nominal load of 3 kg



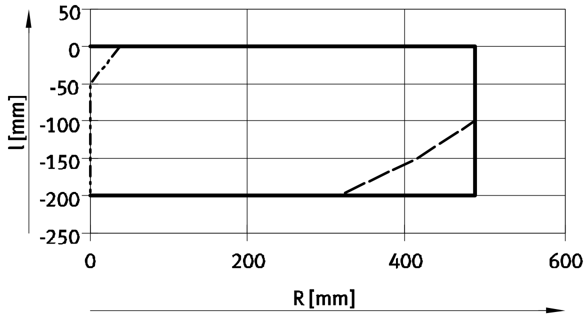
- a = 0 ... 20 m/s^2 (solid line)
- a = 40 m/s^2 (dash-dot line)
- a = 30 m/s^2 (dashed line)

Nominal load of 4 kg



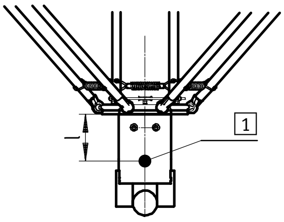
- a = 0 ... 20 m/s^2 (solid line)
- a = 30 m/s^2 (dash-dot line)

Nominal load of 5 kg



- a = 0 ... 10 m/s^2 (solid line)
- a = 30 m/s^2 (dash-dot line)
- a = 20 m/s^2 (dashed line)

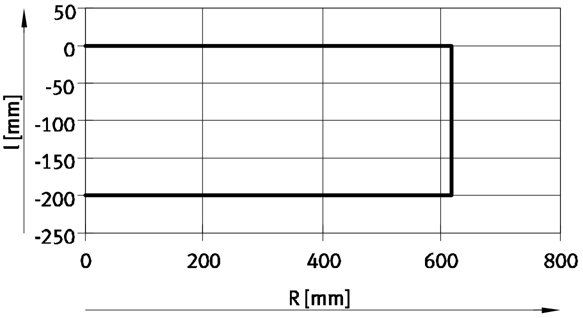
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



[1] Centre of gravity

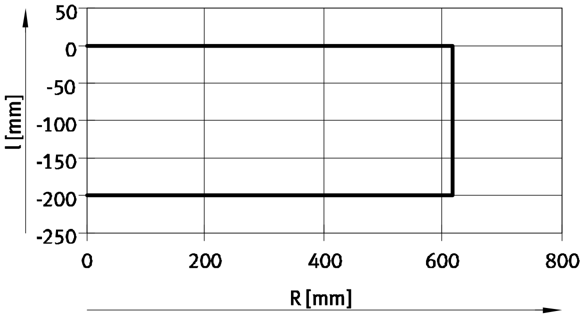
EXPT-120

Nominal load of 0.1 kg



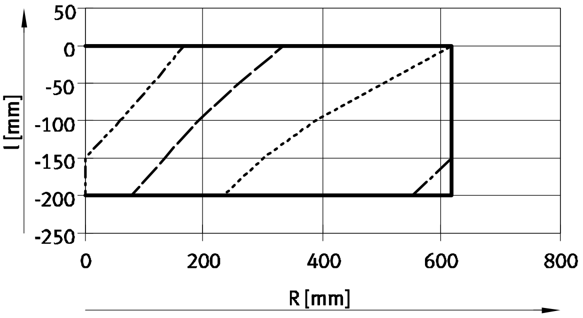
a = 0 … 100 m/s^2

Nominal load of 0.5 kg



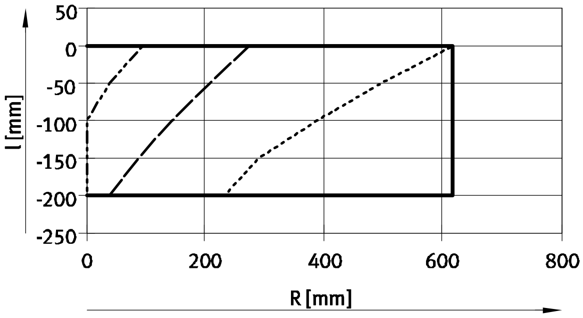
a = 0 … 100 m/s^2

Nominal load of 1 kg



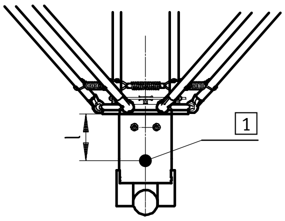
a = 0 … 60 m/s^2
a = 100 m/s^2
a = 90 m/s^2
a = 80 m/s^2
a = 70 m/s^2

Nominal load of 1.5 kg



a = 0 … 50 m/s^2
a = 80 m/s^2
a = 70 m/s^2
a = 60 m/s^2

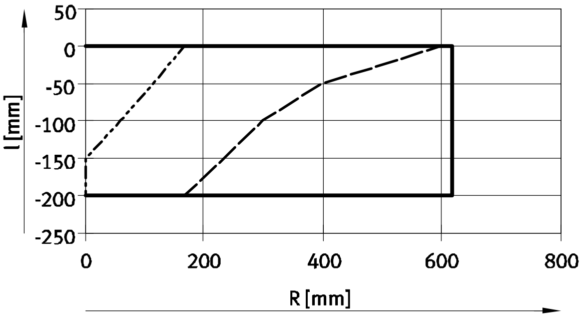
Max. acceleration a as a function of the position in the working space R and distance l from the centre of gravity of the nominal load m to the front unit



[1] Centre of gravity

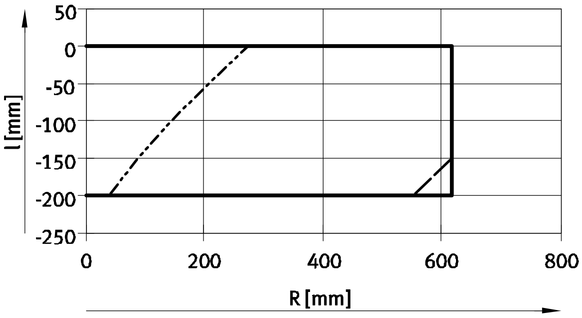
EXPT-120

Nominal load of 2 kg



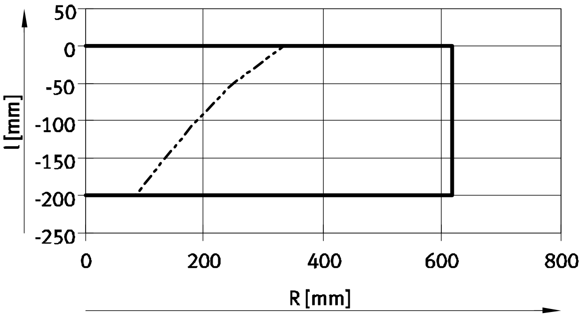
a = 0 ... 40 m/s^2
a = 60 m/s^2
a = 50 m/s^2

Nominal load of 3 kg



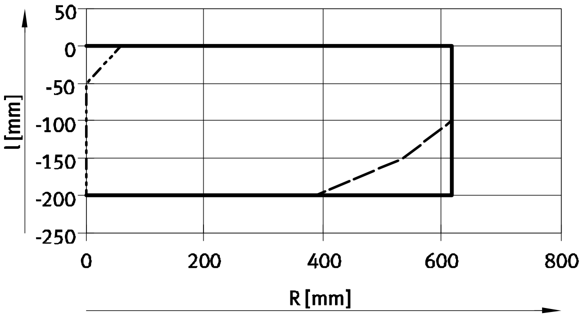
a = 0 ... 20 m/s^2
a = 40 m/s^2
a = 30 m/s^2

Nominal load of 4 kg



a = 0 ... 20 m/s^2
a = 30 m/s^2

Nominal load of 5 kg



a = 0 ... 10 m/s^2
a = 30 m/s^2
a = 20 m/s^2

FESTO

Requirements for the frame

The positioning and path accuracy depends to a large extent on the frame design.
The following influences must therefore be taken into consideration:

- Frame rigidity
- Mass of frame
- Mass of parallel kinematic system
- Start-up frequency caused by dynamic operation of the parallel kinematic system
  - Cycles per minute
  - Dynamic settings for acceleration and jerk

Maximum forces occur if two axes accelerate in the opposite direction to the third and result in horizontal movement of the nominal load.
The frame must be designed so that the maximum forces that can occur as a result of the parallel kinematic system can be absorbed with the necessary degree of certainty.

The guide value for the first natural frequency is specified to be at least 16 Hz for the complete system.

At maximum dynamic response for the axes, the following forces act on the corner bracket and therefore on the mounting in the frame.

Size		45	70	95	120
Vertical force	[N]	±250	±290	±325	±475
Horizontal force	[N]	±145	±150	±200	±215

Mounting options on the frame

The parallel kinematic system must always be mounted in the area of the corner bracket of the mounting frame.
Ensure that the corner bracket area has a torsionally rigid, flat bearing surface.

The bearing surface must meet the following minimum requirements in order to achieve the positioning accuracy:
- Flatness = 0.05 mm
- Parallelism = 0.5 mm

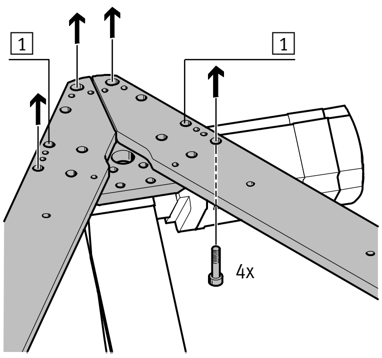
Since the distance between slots is 40 mm in the 80x80 profile, the holes in the corner brackets have been positioned so that the profile can be mounted in various positions.

Since the homing settings of the axis are lost when the motor is dismounted, it is recommended to use mounting holes that do not require the motor to be removed.
The holes [1] are not accessible, depending on the attachment position of the motor.

Direct mounting via screws

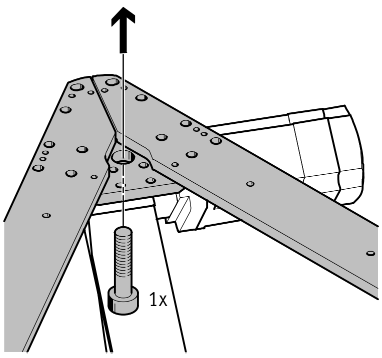
Screws M8x…

Via at least 4 screws (M8) per corner bracket directly on the frame. These 4 screws should be placed as far apart as possible to ensure a torsionally rigid connection.



Screws M20x…

Via 1 screw (M20) per corner bracket directly on the frame. There is a central hole on each corner for this purpose.



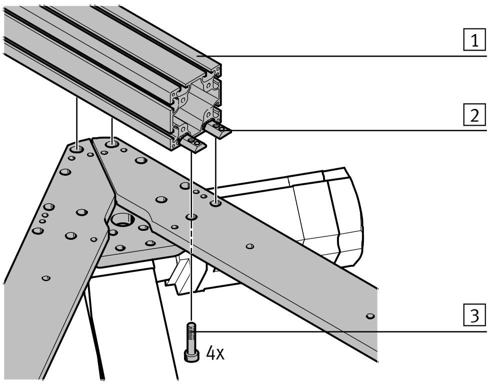
FESTO

Mounting options on the frame

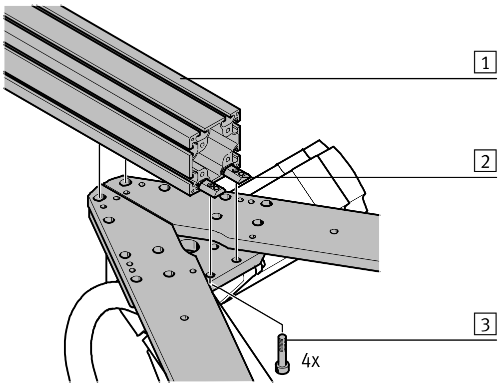
Mounting via slot nuts – parallel to the mounting frame

1 Profile (e.g. HMBS-80/80)
2 Slot nut (e.g. NST-HMV-8-2-M8)
3 Screws (e.g. M8x35)

Example 1



Example 2



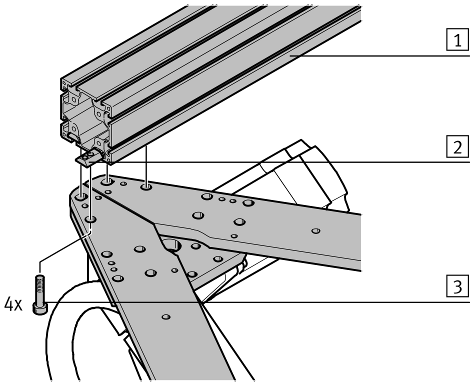
Mounting via slot nuts – at right angles to the mounting frame

1 Profile (e.g. HMBS-80/80)
2 Slot nut (e.g. NST-HMV-8-2-M8)
3 Screws (e.g. M8x35)
4 Angle bracket

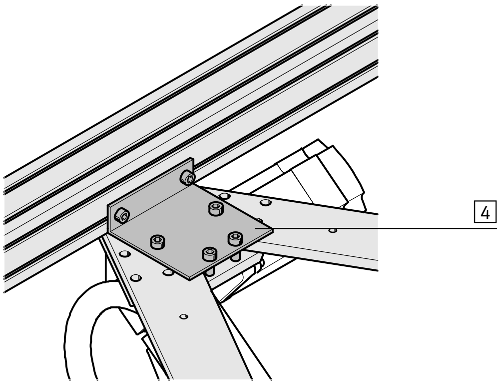
The additional angle brackets in the following examples are required in order to increase the torsional rigidity and the bearing surface.

Example 1

Profile mounting

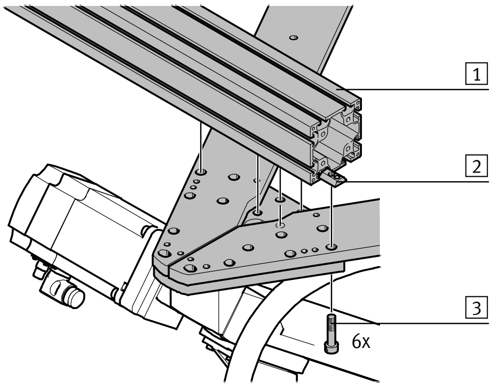


Angle bracket mounting

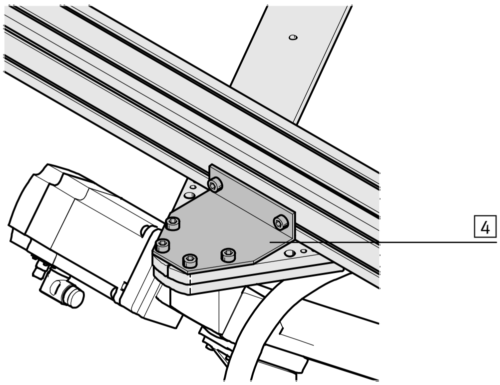


Example 2

Profile mounting



Angle bracket mounting



Parallel kinematic system EXPT, tripod
Technical data

Technical data – Front unit
EXPT-…-T…

Mechanical data					
Type		EXPT-…-			
		T1	T2	T3	T4
Design		Electromechanical rotary module			
		–	With rotary throughfeed	–	With rotary throughfeed
Motor type		Servo motor			
Size		8	8	11	11
Rotation angle		Infinite			
Pneumatic connection		–	G1⁄8	–	G1⁄8
Nominal width	[mm]	–	4	–	4
Standard nominal flow rate	[l/min]	–	350	–	350
Gear ratio		30:1			
Repetition accuracy	[°]	±0.01			
Max. output speed	[rpm]	200			
Nominal torque	[Nm]	0.75	0.75	1.8	1.8
Peak torque	[Nm]	1.8	1.8	4.5	4.5
Max. axial force	[N]	200	200	300	300
Max. pull-out torque, static	[Nm]	15	15	40	40
Perm. mass moment of inertia of load	[kgm^2]	0.0026	0.0026	0.006	0.006
Mounting position		Any			
Load mass for EXPT	[g]	640	690	850	900

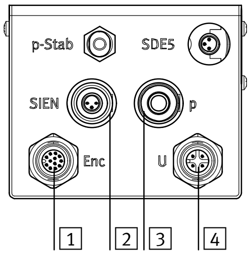
Electrical data					
Type		EXPT-…-			
		T1	T2	T3	T4
Nominal voltage	[V AC]	230			
Nominal current	[A]	0.31	0.31	0.74	0.74
Peak current	[A]	0.61	0.61	1.5	1.5
Rated output	[W]	9.2	9.2	22.1	22.1
Duty cycle	[%]	100			
Measuring system[1)]		Encoder			

1) Homing required

Operating and environmental conditions					
Type		EXPT-…-			
		T1	T2	T3	T4
Operating pressure	[bar]	–	–0.9 … +10	–	–0.9 … +10
Ambient temperature	[°C]	0 … 40			
Degree of protection		IP40			
Note on materials		RoHS compliant			
Corrosion resistance class CRC[1)]		2			

1) Corrosion resistance class 2 according to Festo standard 940070
Components subject to moderate corrosion stress. Externally visible parts with primarily decorative surface requirements which are in direct contact with a normal industrial environment or media such as coolants or lubricating agents.

Connections on the interface housing:

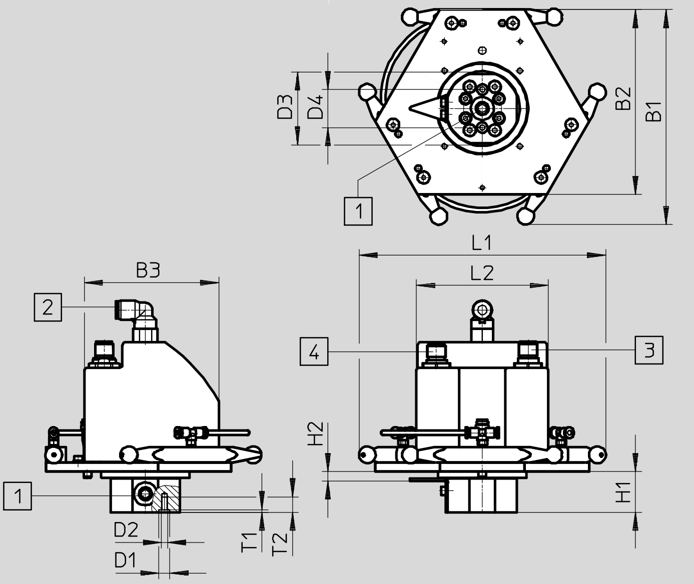


Connection for:
1 Encoder cable → 32
2 Sensor for rotary motion → 32
3 Supply port for pneumatic rotary through-feed
4 Motor cable → 32

Dimensions

Download CAD data → www.festo.com

Front unit

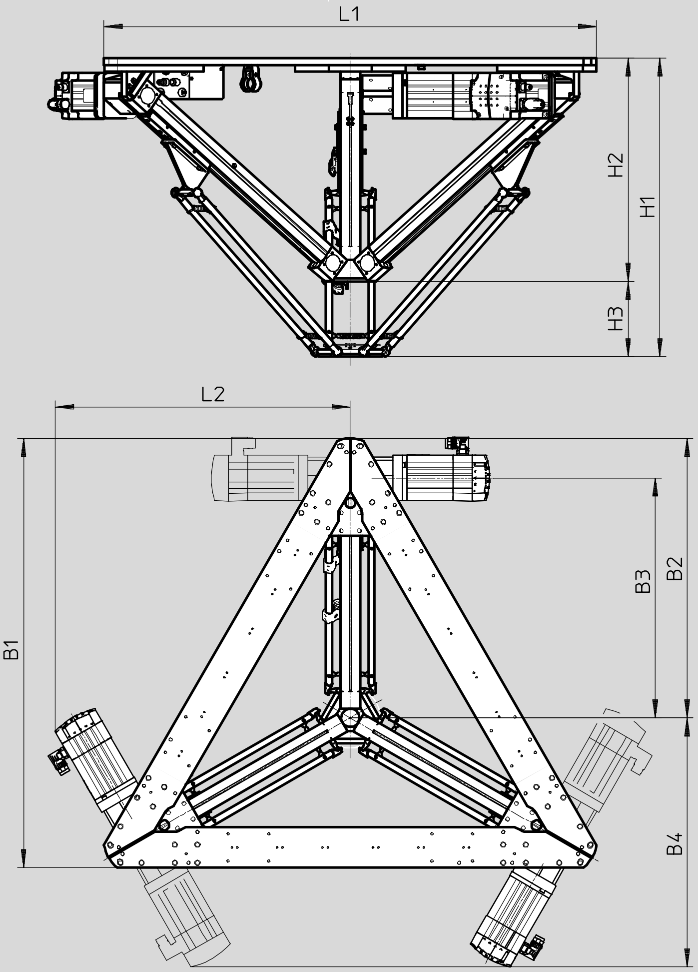


1 Supply port outlet
2 Supply port rotary throughfeed
3 Connection for motor cable
4 Connection for encoder cable

Type	B1	B2	B3	D1 ∅ H7	D2	D3 ∅	D4 ∅	H1	H2 +1	L1	L2	T1	T2
EXPT-...	141	122	88	7	M4	48	25	27	6	162	86	1.6	10

Dimensions Download CAD data ➔ **www.festo.com**

Parallel kinematic system

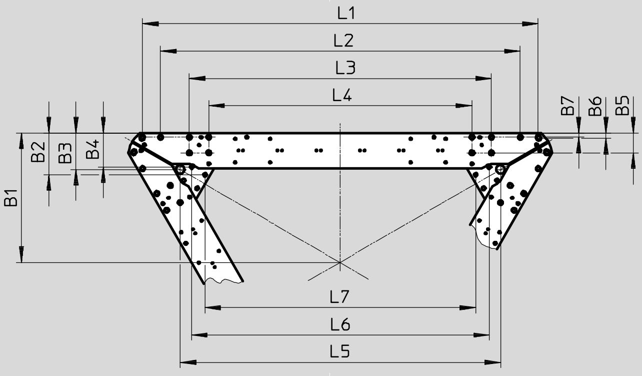


Type	B1	B2	B3	B4	H1	H2	H3	L1	L2
EXPT-45	947	617	530	549	659	493	166	1088	652
EXPT-70	1077	703	622	590	727	561	166	1238	727
EXPT-95	1213	794	705	626	827	636	191	1394	803
EXPT-120	1355	888	800	672	944	710	234	1558	885

Dimensions

Download CAD data → www.festo.com

Mounting holes on the mounting frame

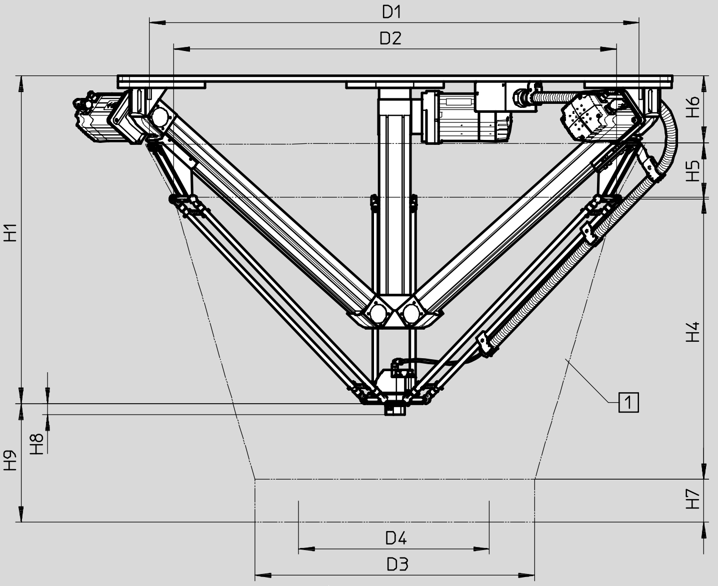


Type	B1	B2	B3	B4	B5	B6	B7
EXPT-45	330.8	107.2	93.5	87.2	51	12.3	11
EXPT-70	374.1	107.2	93.5	87.2	51	12.3	11
EXPT-95	419.3	107.2	93.5	87.2	51	12.3	11
EXPT-120	466.6	107.2	93.5	87.2	51	12.3	11

Type	L1	L2	L3	L4	L5	L6	L7
EXPT-45	1017	923	775.4	675.4	822	794	694.6
EXPT-70	1167.1	1073.1	925.5	825.5	972.1	914	844.7
EXPT-95	1323.7	1229.7	1082.1	982.1	1128.7	1070.6	1001.3
EXPT-120	1487.5	1393.5	1245.9	1145.9	1292.5	1234.4	1165.1

Dimensions Download CAD data ➔ **www.festo.com**

Interference contour within the nominal operating area



1 Interference contour
D3 Diameter of interference contour
D4 Diameter of nominal operating area
H7 Height of nominal operating area
H9 Distance from bottom edge of gripper plate to base of nominal operating area

Note

The distance specification for the working space refers to the bottom edge of the gripper plate. With the variants T1 to T4, the working space is extended downwards by the dimension H8. The same applies to attached gripper systems, where the reference point is always shifted by the height of the gripper system. Additional dimensions for laying the motor cables and tubing are not taken into account in the interference contour.

Type	D1 ±5	D2 ±5	D3 ±5	D4	H1	H4	H5
EXPT-45	950	860	620	450	659	500	117
EXPT-70	1120	1035	870	700	727	614	117
EXPT-95	1400	1260	1120	950	827	760	141
EXPT-120	1590	1440	1370	1200	944	907	141

Type	H6	H7	H8			H9
			EXPT-...-T0	EXPT-...-T1/T2	EXPT-...-T3/T4	
EXPT-45	180	100	0	27	28.5	234
EXPT-70	180	100	0	27	28.5	286
EXPT-95	170	100	0	27	28.5	357
EXPT-120	170	100	0	27	28.5	397

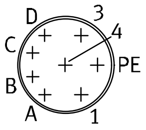
Parallel kinematic system EXPT, tripod

Technical data

Pin allocations

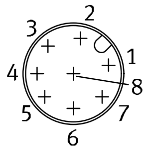
Axis motor

Motor



PIN	Function
1	Phase U
PE	PE (protective earth)
3	Phase W
4	Phase V
A	Temperature sensor M_T+
B	Temperature sensor M_T–
C	Holding brake BR+
D	Holding brake BR–

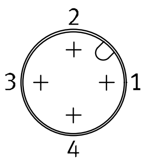
Encoder



PIN	Function
1	–SENS
2	+SENS
3	DATA
4	DATA/
5	0 V
6	CLOCK/
7	CLOCK
8	up

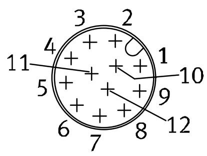
Front unit motor

Motor



PIN	Function
1	U
2	V
3	W
4	PE

Encoder



PIN	Function
1	A
2	A\
3	B
4	B\
5	Z
6	Z\
7	U
8	V
9	W
10	GND
11	5 V
12	Screening

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Ordering table

	Size		45	70	95	120	Condi-tions	Code		Entry code
M	Module No.		**569797**	**569798**	**569799**	**569800**				
	Product type		EXPT series T					**EXPT**		EXPT
	Working space	[mm]	450	–				**-45**		
		[mm]	–	700	–			**-70**		
		[mm]	–		950	–		**-95**		
		[mm]	–			1200		**-120**		
	Drive		DGE-25		–			**-E1**		
			–		EGC-80			**-E4**		
	Attachment components		Without rotary drive					**-T0**		
			Rotary drive, size 8					**-T1**		
			Rotary drive, size 8 with pneum. air throughfeed					**-T2**		
			Rotary drive, size 11					**-T3**		
			Rotary drive, size 11 with pneum. air throughfeed					**-T4**		
	Motor attachment position		A1/A2/A3 rear					**-HHH**		
			A3 front, A1/A2 rear					**-HHV**		
			A2 front, A1/A3 rear					**-HVH**		
			A2/A3 front, A1 rear					**-HVV**		
			A1 front, A2/A3 rear					**-VHH**		
			A1/A3 front, A2 rear					**-VHV**		
			A1/A2 front, A3 rear					**-VVH**		
			A1/A2/A3 front					**-VVV**		
O	Protection against particles		Standard							
			–		Protected version			**-P8**		

M Mandatory data
O Options

Transfer order code

	EXPT	–		–		–		–		–	

Parallel kinematic system EXPT, tripod

Ordering data – Modular products

Ordering table

	Size	45	70	95	120	Condi-tions	Code		Entry code
[O]	Control system	None							
		Mounting plate				[1]	**-C**		
		Control cabinet				[1]	**-CC**		
	Multi-axis controller	None							
		With CMXR-C1					**-C1**		
		With CMXR-C2, with integrated PLC					**-C2**		
	Operator terminal	None							
		With teach pendant CDSA					**-B**		
	Cable length	None							
		5 m				[2]	**-5K**		
		10 m				[2]	**-10K**		
		15 m					**-15K**		
	Presetting	Standard							
		With calibration					**-S**		
[M]	Document language	German					**-DE**		
		English					**-EN**		
		Spanish					**-ES**		
		French					**-FR**		
		Italian					**-IT**		
		Russian					**-RU**		
		Chinese					**-ZH**		

[1] If no control system (mounting plate (C) or control cabinet (CC)) is selected, there will be no motor controller included in the scope of delivery for the parallel kinematic system EXPT.

[2] The motor and encoder cables for the rotary drive (attachment components) are always 15 m long, regardless of the specification in the modular product system.

Note

To order a parallel kinematic system, please get in touch with your local Festo contact.

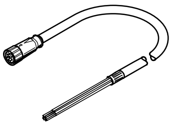
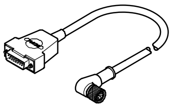
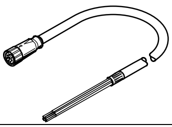
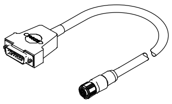
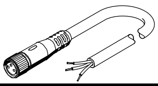
The parallel kinematic system may only be commissioned by a specially trained technician (robotics specialist).

The following knowledge is required:
- Specialist knowledge of robotics and CODESYS
- Knowledge of handling motor controllers CMMP and multi-axis controllers CMXR
- Knowledge of handling parallel kinematic systems

[M] Mandatory data
[O] Options

Transfer order code

– [ ] – [ ] – [ ] – [ ] – [ ] – [ ]

Ordering data			
	Cable length [m]	Part No.	Type
Connection from axis motor to motor controller in the control cabinet			
	Motor cable NEBM		
	5	**550310**	**NEBM-M23G6-E-5-N-LE7**
	10	**550311**	**NEBM-M23G6-E-10-N-LE7**
	15	**550312**	**NEBM-M23G6-E-15-N-LE7**
	X length[1]	**550313**	**NEBM-M23G6-E- -N-LE7**
	Encoder cable NEBM		
	5	**550318**	**NEBM-M12W8-E-5-N-S1G15**
	10	**550319**	**NEBM-M12W8-E-10-N-S1G15**
	15	**550320**	**NEBM-M12W8-E-15-N-S1G15**
	X length[1]	**550321**	**NEBM-M12W8-E- -N-S1G15**
Connection from interface housing to the motor controller in the control cabinet			
	Motor cable NEBM		
	15	**571907**	**NEBM-M12G4-RS-15-N-LE4**
	Encoder cable NEBM		
	15	**571915**	**NEBM-M12G12-RS-15-N-S1G15**
Connecting cable NEBU for rod loss detection or reference sensor of the rotary drive			
	5	**541334**	**NEBU-M8G3-K-5-LE3**
	10	**541332**	**NEBU-M8G3-K-10-LE3**
	15	**575986**	**NEBU-M8G3-K-15-LE3**

1) Max. 25 m

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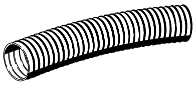
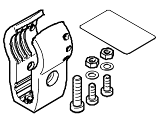
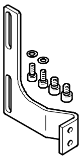
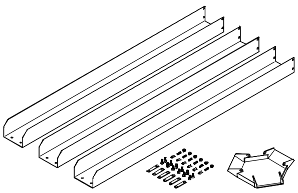
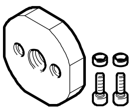
Ordering data	For size	Description	Part No.	Type
Protective conduit MKG				
	45 … 120	2 m are required per axis	**3156318**	**MKG-23-PG-29-B**
Tubing holder EAHM				
	45 … 120	For attaching the protective conduit	**3506553**	**EAHM-E10-TH-W29**
Angle kit EAHM				
	45 … 120	For attaching the tubing holder to the connection block	**2075203**	**EAHM-E10-AK**
			2075842	**EAHM-E10-AK-P8**[1]

1) In combination with the variant EXPT-…-P8

Ordering data	For size	Description	Part No.	Type
Cover kit EASC-E10				
	95	• Protects the working space against the ingress of particles • Can only be fitted in conjunction with the variant EXPT-…-P8	**3790894**	**EASC-E10-95**
	120		**3790896**	**EASC-E10-120**
Adapter kit EAHA				
	45 … 120	For suction gripper ESG-(retainer size 2)	**1574224**	**EAHA-R2-M12P**
		For suction gripper ESG-(retainer size 3 and 4)	**1574227**	**EAHA-R2-M14P**

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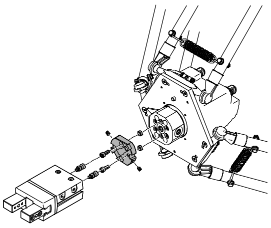
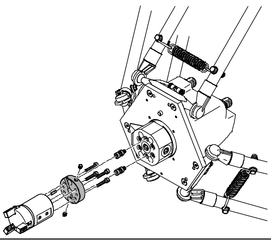
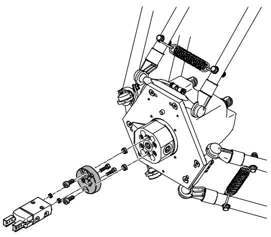
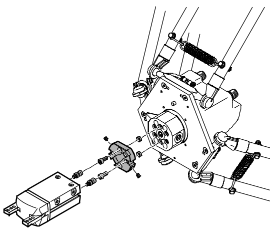
Adapter kit
DHAA, HAPG

Materials:
Wrought aluminium alloy
Free of copper and PTFE
RoHS compliant

> **Note**
> The kit includes the individual mounting interface as well as the necessary mounting material.

Gripper combinations with adapter kit — Download CAD data ➔ **www.festo.com**

Gripper	Size	Adapter kit	
		Part No.	Type
Parallel gripper			
	DHPS, standard		
	6	**187566**	**HAPG-SD2-12**
	10	**184477**	**HAPG-SD2-1**
	16	**184478**	**HAPG-SD2-2**
	HGPT-B, heavy-duty		
	16	**564958**	**DHAA-G-Q5-12-B8-16**
	20	**564955**	**DHAA-G-Q5-16-B8-20**
	25	**537181**	**HAPG-SD2-25**
	HGPL, heavy-duty with long stroke		
	14-40, 14-60, 14-80	**537310**	**HAPG-SD2-31**
	HGPC		
	12	**542671**	**HAPG-SD2-41**
	16	**542668**	**HAPG-SD2-42**
	HGPD, sealed		
	16	**564958**	**DHAA-G-Q5-12-B8-16**
	20	**564955**	**DHAA-G-Q5-16-B8-20**
	25	**537181**	**HAPG-SD2-25**
Three-point gripper			
	DHDS, standard		
	16	**187567**	**HAPG-SD2-13**
	HGDT, heavy-duty		
	25	**542439**	**HAPG-SD2-32**
Radial gripper			
	DHRS, standard		
	10	**187566**	**HAPG-SD2-12**
	16	**184477**	**HAPG-SD2-1**
	25	**184478**	**HAPG-SD2-2**
	HGRT, heavy-duty		
	16	**1273999**	**DHAA-G-Q5-16-B11-16**
	HGRC		
	12	**542671**	**HAPG-SD2-41**
	16	**542668**	**HAPG-SD2-42**
Angle gripper			
	DHWS, standard		
	10	**187566**	**HAPG-SD2-12**
	16	**184477**	**HAPG-SD2-1**
	25	**184478**	**HAPG-SD2-2**
	HGWC		
	12	**542671**	**HAPG-SD2-41**
	16	**542668**	**HAPG-SD2-42**