Handling systems
You need complete systems.
You want reduced complexity.
We are your dependable solutions partner.

→ WE ARE THE ENGINEERS OF PRODUCTIVITY.
Handling systems from Festo: versatile, economical, perfectly fitting. And always highly productive.

Are you looking for the right partner for your new handling system? Festo offers you a diverse range of handling systems for a multitude of applications, from standard solutions for common applications through to customised solutions for your own very specific requirements.

In addition, our ready-to-install systems, software and support services mean less work for you. We support you from the design stage through to installation and commissioning. That allows you to concentrate entirely on your core business and increase your productivity.
The Handling Guide Online – the right handling system in just three steps

The Handling Guide Online is an all-in-one configuration and ordering system. This unique online engineering tool supports you in configuring and requesting your standard handling system. It cuts your engineering time and effort to a minimum and guides you to the right handling system in record time.

Three steps to your handling system:
www.festo.com/handling-guide

1st step:
Choose the type of handling system and enter your application data into the Handling Guide Online. The tool will suggest appropriate handling systems.

2nd step:
Select the most suitable handling system from the list of suggestions. The correctly configured CAD model and the data sheet with all the relevant figures are immediately available for download.

3rd step:
You can use additional options to configure your selected system in accordance with your requirements. Then send your preferred handling system via a single click and your local Festo office will contact you to confirm your request. Festo will deliver a ready-to-install system, including all user documentation in accordance with the EC Machinery Directive, as quickly as possible.

The benefits to you:
• Fast. The right standard handling system in just 20 minutes, including CAD model
• Efficient. The Handling Guide Online cuts your engineering time and effort to a minimum, and you don’t need any detailed product knowledge.
• Intuitive. The Handling Guide Online is very easy to use and features structured prompts for data input.
• Reliable. Immediate access to technical data allows you to plan with certainty.
If you have specialised technical requirements, you can simply send the application data you have entered in the Handling Guide Online to our experts with a single mouse click, and receive a customised offer.

**Standard handling systems**
You configure your handling system directly in the Handling Guide Online.

**Option of ordering directly in the Handling Guide Online**
Once you have entered your data, you will immediately be shown a number of suggested solutions for you to choose from, including the correctly configured CAD model and data sheet.

**Custom-engineered handling systems**
If your requirements go beyond the scope of standard handling systems, our project engineers will plan the project for you – for full flexibility in terms of load, dynamic response, working space and the mechanical system.

**Customised offer from our experts**
You will receive a customised offer based on the data you enter.
Simple and complete: everything from a single source ...

Optimally coordinated hardware, software and services from one supplier: Festo. The complete, worry-free package extends from design engineering and advice on hardware to application-specific commissioning and

Our highly dynamic mechanical systems with integrated energy chain are available in numerous sizes and stroke ranges.

Intelligent compact vision system for optimum quality inspection and conveyor tracking.

Tested frames you can rely on. Designed to match every kinematic system and application, in aluminium or steel.

For centralised control directly in the installation or decentralised control in the control cabinet.

Rotating, gripping or vacuum: you receive lightweight, precise and powerful solutions.

Our experts take care of your handling systems. From commissioning and training to after-sales service, we are there to help.
... all the way to your application process

after-sales service and training. It will enable you to put your handling system to use optimally and quickly, lower your process costs and increase system availability.

System functions
1. Identifying and inspecting parts with regard to position and rotary orientation by the intelligent compact vision system
2. Positioning and gripping speeds in synchronisation with the conveyor belt
3. Exact orientation alignment by the rotary unit during transport
4. Transport at a higher speed and with lower cycle times thanks to motion path smoothing
5. Precise advancing to the deposit position and rapid set down, supported by ejector pulse
6. Complete highly dynamic position control with robotic controller CMXR

System functions
1. The gripper system is positioned exactly above the magazine
2. The Bernoulli gripper removes the wafer from the magazine with virtually no contact
3. The wafer is positioned and checked by the intelligent compact vision system for:
   • Exact position control
   • Quality of the contour and edges
4. The rotary/lifting module rotates and positions the wafer precisely in line with the appropriate track
5. The wafer is placed on the moving conveyor in a specific sequence
6. Complete, highly dynamic position control via robotic controller CMXR

System functions
1. Inspection of workpieces and conveyor tracking by the compact vision system
   • Parts type and quality
   • Position and rotary orientation
2. The parallel kinematic system approaches the exact gripper position in synchronisation with the conveyor
3. The parts are removed from the conveyor by the suction gripper
4. Exact orientation alignment by the axis of rotation during transport
5. Robotic controller CMXR: complete, highly dynamic position control of the parallel kinematic system, processing of object data for the vision system and the palletising function
Overview of the different handling systems

1D handling systems

- Standard
  - Single-axis systems

2D handling systems

- Standard
  - Linear gantries
  - Pick & place
  - Planar surface gantries

- Highly dynamic
  - Linear gantry EXCT
  - Planar surface gantry EXCH

Application-specific solutions (specially tailored)

- Solution with steel frame
- EXCM with special cable routing
- Testing unit
## 2D handling systems

<table>
<thead>
<tr>
<th>Compact</th>
<th>Standard</th>
<th>Highly dynamic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planar surface gantry EXCM</td>
<td>3D gantries</td>
<td>Parallel kinematic system EXPT</td>
</tr>
<tr>
<td>Handling module HSP</td>
<td>Cantilever axes</td>
<td></td>
</tr>
<tr>
<td>Handling module HSW</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## 3D handling systems

<table>
<thead>
<tr>
<th>For cantilever loads</th>
<th>Solution with aluminium frame</th>
<th>For heavy loads</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The system components in detail

### Front Unit

#### Gripper fingers

<table>
<thead>
<tr>
<th>Gripper fingers</th>
<th>Grippers</th>
<th>Vacuum grippers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suction cup-ejector combination</td>
<td>DHPS, HGPD, HGRC/HGWC, DHDS</td>
<td>VAL/LJK, ESG, ESH</td>
</tr>
<tr>
<td>Suction</td>
<td>HGPC, HGPL, DHRS</td>
<td>ESH</td>
</tr>
<tr>
<td>Radial and angle grippers</td>
<td>HGPP, HGPT-B, DHWS</td>
<td>ESH</td>
</tr>
<tr>
<td>Three-point grippers</td>
<td>HGPLE, HGRT</td>
<td>ESH</td>
</tr>
<tr>
<td>Bellows gripper</td>
<td>DHPP, HGPD, DHRS</td>
<td>ESH</td>
</tr>
<tr>
<td>Bernoulli gripper</td>
<td>HGPC, HGPD, DHRS</td>
<td>ESH</td>
</tr>
</tbody>
</table>

#### Vacuum grippers

<table>
<thead>
<tr>
<th>Vacuum grippers</th>
<th>Vacuum generators</th>
<th>Intelligent vacuum generator</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS/VAS-B, ESS/ESV</td>
<td>VN, OVEM</td>
<td>Suction cup-ejector combination</td>
</tr>
</tbody>
</table>


Handlingsysteme_en_V04.indd 10
23.06.15 15:29
### Rotary and swivel modules

<table>
<thead>
<tr>
<th>DRRD</th>
<th>DSM-B</th>
<th>ERMB</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRRD with Z1</td>
<td>DSM-T</td>
<td></td>
</tr>
<tr>
<td>DRRD with E..</td>
<td>DSM-HD</td>
<td>ERMO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Function combinations

<table>
<thead>
<tr>
<th>EHMB</th>
<th>HGDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRRD with Z1</td>
<td>DSL-B</td>
</tr>
<tr>
<td>DHTG</td>
<td></td>
</tr>
</tbody>
</table>
The system components in detail

**Pneumatic components**

<table>
<thead>
<tr>
<th>Cylinders with piston rod</th>
<th>Guide units</th>
<th>Rodless cylinders</th>
<th>Slide</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADN</td>
<td>DFM</td>
<td>DGC-GF</td>
<td>DGSL</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DGC-KF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DGC-HD</td>
<td></td>
</tr>
</tbody>
</table>

**Servopneumatic components**

<table>
<thead>
<tr>
<th>Drives with piston rod and displacement encoder</th>
<th>Rodless drives with integrated displacement encoder</th>
</tr>
</thead>
<tbody>
<tr>
<td>DNCl</td>
<td>DGI</td>
</tr>
<tr>
<td>DDPC</td>
<td>DDLI</td>
</tr>
</tbody>
</table>

**Valve terminals**

<table>
<thead>
<tr>
<th>Valve terminals</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPA</td>
</tr>
<tr>
<td>CPX-MPA</td>
</tr>
<tr>
<td>CPV</td>
</tr>
<tr>
<td>VTSA</td>
</tr>
</tbody>
</table>

**Valves**

<table>
<thead>
<tr>
<th>Valves</th>
</tr>
</thead>
<tbody>
<tr>
<td>VUVG</td>
</tr>
</tbody>
</table>

**Position controllers and end-position controllers**

<table>
<thead>
<tr>
<th>Position controllers and end-position controllers</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPX-CMAX</td>
</tr>
<tr>
<td>CPX-CMPX</td>
</tr>
</tbody>
</table>

**Proportional valve**

<table>
<thead>
<tr>
<th>Proportional valve</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPWP</td>
</tr>
</tbody>
</table>

**Sub-base**

<table>
<thead>
<tr>
<th>Sub-base</th>
</tr>
</thead>
<tbody>
<tr>
<td>VABP</td>
</tr>
</tbody>
</table>

[www.festo.com/catalogue/]
# Electric components

<table>
<thead>
<tr>
<th>Gantry axes and guide axes</th>
<th>M</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGC-TB/BS-KF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGC-FA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELGA-TB-G</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELGA-TB-RF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELFA-RF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELGA-TB/BS-KF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGC-HD-TB/BS-KF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELGR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELGG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EGSK/EGSP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGE-ZR/BS/FA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGE-RF</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cylinders and cantilever axes</th>
<th>M</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPCO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ESBF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNCE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DNCE/FENG</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DGEA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Slide</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGSL</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo and stepper motors</th>
<th>M</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMMS/E-AS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMMS-ST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gear units</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMGA/EMGB</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Axial and parallel kits</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAMM-U</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Servo and stepper motor controllers</th>
<th>M</th>
<th>M</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMM-AS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMMS-ST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMMO-ST</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Overview of standardised peripherals

### Motion control

#### Controllers

<table>
<thead>
<tr>
<th>Low-cost controllers</th>
<th>Modular controllers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated controller</td>
<td>CODESYS controller</td>
</tr>
<tr>
<td>CDPX</td>
<td>CPX-CEC-C1</td>
</tr>
<tr>
<td></td>
<td>CODESYS controller</td>
</tr>
<tr>
<td></td>
<td>CECX-X-C1</td>
</tr>
</tbody>
</table>

#### Motion controllers

<table>
<thead>
<tr>
<th>Motion controller</th>
<th>Motion controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPX-CEC-M1</td>
<td>CECX-X-M1</td>
</tr>
</tbody>
</table>

#### Robotics controllers

<table>
<thead>
<tr>
<th>Robotics</th>
<th>Robotics + PLC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMXR-C1</td>
<td>CMXR-C2</td>
</tr>
</tbody>
</table>
## Complete solutions and software

<table>
<thead>
<tr>
<th>Control cabinet</th>
<th>Compact vision systems</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control package CMCA for highly dynamic handling systems</td>
<td>CODESYS</td>
<td>Handling Guide Online: select, configure</td>
</tr>
<tr>
<td>Control packages for your specific handling system</td>
<td>SBOx-Q</td>
<td>PositioningDrives: select</td>
</tr>
<tr>
<td></td>
<td>CODESYS</td>
<td>Festo Configuration Tool (FCT): configure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application-specific programming</td>
</tr>
</tbody>
</table>
Typical examples of standardised handling systems

**Standard handling systems**

- Palletising
- Pick & place

**Highly dynamic handling systems**

- Loading and unloading
- End line packaging

**Small-scale handling systems**

- Applying labels
- Feeding
Standard: single-axis systems

The single-axis system with its high mechanical rigidity and sturdy design is ideal for long, one-dimensional strokes and large loads. The linear axis is powered by a servo motor. A matching motor and motor controller package from Festo, as well as many other options, round off the ready-to-install complete system.

- High mechanical rigidity and sturdy design
- Process reliability thanks to the use of tried and tested drives/axes
- Ready-to-install complete systems, including energy chains for cables and tubing as well as matching motor and motor controller package
- Available in different sizes and variants
- Extremely simple and time-saving: automatic design and configuration with the Handling Guide Online

Range of applications
- For any single-axis movement
- Ideal for long gantry strokes and heavy loads

Single-axis system YXCS: designed using standard modules – can be configured using the Handling Guide Online.
In this example: Y: ECG 120

For specialised requirements: with individually selected axis
<table>
<thead>
<tr>
<th>Size</th>
<th>Possible axes</th>
<th>Max. working stroke (mm)</th>
<th>Max. payload</th>
<th>Mounting position</th>
</tr>
</thead>
<tbody>
<tr>
<td>YXCS (Standard)</td>
<td>EGC-50-TB-KF</td>
<td>1900</td>
<td></td>
<td>Horizontal</td>
</tr>
<tr>
<td></td>
<td>EGC-80-TB-KF</td>
<td>3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EGC-120-TB-KF</td>
<td>3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EGC-185-TB-KF</td>
<td>3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EGC-HD-125-TB-KF</td>
<td>3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EGC-HD-160-TB-KF</td>
<td>3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>EGC-HD-220-TB-KF</td>
<td>3000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialised requirements</td>
<td>Customised on request</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drive package depends on configuration selected

Configure your system yourself → [www.festo.com/handling-guide](http://www.festo.com/handling-guide)
Standard: linear gantries

Linear gantry YXCL: for vertical movements in 2D. The linear gantry combines two axis modules for 2D vertical motion. High mechanical rigidity makes it reliable and precise, even with very long strokes of up to 3000 mm in the Y direction. Different sizes and variants make the YXCL suitable for a great variety of applications.

- High mechanical rigidity and sturdy design
- With matching Festo motor and motor controller package
- User-friendly assembly and installation, even during servicing
- Extremely simple and time-saving: automatic design and configuration with the Handling Guide Online

Range of applications
- Ideal for long gantry strokes and heavy loads
- Frequently used in feeding or loading applications

Linear gantry YXCL: designed using standard modules – can be configured using the Handling Guide Online. In this example: Y: EGC-120; Z: EGC-80

For specialised requirements: standardised solutions from the multi-axis modular system
The ready-to-install complete system is delivered assembled and tested. Routing of tubing and cables through energy chains ensures outstanding operational and process reliability.

<table>
<thead>
<tr>
<th>Size</th>
<th>Y-axis</th>
<th>Z-axis</th>
<th>Max. working stroke (mm)</th>
<th>Max. payload</th>
<th>Mounting position</th>
</tr>
</thead>
<tbody>
<tr>
<td>YXCL-1</td>
<td>• EGC-50-TB-KF</td>
<td>• EGSL-35</td>
<td>Y: 1900</td>
<td>Z: 50</td>
<td>Dependent on the selected dynamic response</td>
</tr>
<tr>
<td>(standard)</td>
<td>• EGC-50 / 70-TB/BS-KF</td>
<td>• EGSL-35</td>
<td></td>
<td></td>
<td>Horizontal</td>
</tr>
<tr>
<td>Specialised</td>
<td>• ELGA-70-TB/BS-KF/RF</td>
<td>• DGSL-8/10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>requirements</td>
<td>• DGC(1)-18-KF</td>
<td>• DFG-12 / 18-KF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YXCL-2</td>
<td>• EGC-80-TB-KF</td>
<td>• EGSL-45 / 55</td>
<td>Y: 3000</td>
<td>Z: 200</td>
<td></td>
</tr>
<tr>
<td>(standard)</td>
<td>• EGC-HD-125-TB-KF</td>
<td>• DGEA-18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialised</td>
<td>• ELGA-70/80-TB/BS-KF/RF</td>
<td>• EGC-70-BS-KF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>requirements</td>
<td>• DGC(1)-20-KF</td>
<td>• DGSL-12 / 16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YXCL-3</td>
<td>• EGC-120-TB-KF</td>
<td>• EGSL-75</td>
<td>Y: 3000</td>
<td>Z: 800</td>
<td></td>
</tr>
<tr>
<td>(standard)</td>
<td>• EGC-HD-160-TB-KF</td>
<td>• DGEA-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialised</td>
<td>• ELGA-80/120-TB/BS-KF/RF</td>
<td>• EGC-80-BS-KF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>requirements</td>
<td>• DGC(1)-30-KF</td>
<td>• DGSL-20 / 25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>YXCL-4</td>
<td>• EGC-120-TB-KF</td>
<td>• EGSL-75</td>
<td>Y: 3000</td>
<td>Z: 800</td>
<td></td>
</tr>
<tr>
<td>(standard)</td>
<td>• EGC-HD-160-TB-KF</td>
<td>• DGEA-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialised</td>
<td>• ELGA-120/180-TB/BS-KF/RF</td>
<td>• EGC-120-BS-KF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>requirements</td>
<td>• DGC(1)-40-KF</td>
<td>• DGSL-20 / 25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drive package depends on configuration selected

Configure your system yourself ➔ [www.festo.com/handling-guide](http://www.festo.com/handling-guide)
Highly dynamic: linear gantry EXCT

The Cartesian high-speed pick and place handling system offers maximum dynamic response with over 90 picks/min, high flexibility and a compact design. As a complete solution, it is the most dynamic alternative to conventional solutions with free movement. The corresponding control package ensures precise

- High dynamic response thanks to low moving mass and inertia of the Z-axis: for precision positioning with high acceleration and deceleration, as well as minimal vibration
- Flexible working space: through scaleable strokes along the Y- and Z-axes
- Universal: front unit interface for mechanical or vacuum-assisted rotating and gripping solutions
- Integrated energy chain concept for easy and safe installation, even in the event of subsequent modification or expansion
- Minimum space required due to compact design: simple and safe assembly, minimal installation effort thanks to an integrated energy chain concept on the Y- and Z-axes

Range of applications:
- For fast processes with high cycle rates
- Frequent placing and packaging
point-to-point or path-controlled movements in the vertical plane. All in all, it is an excellent system thanks not only to low purchase costs but also to low operating costs, as the low moving mass reduces energy consumption. Reliable series components and reduced vibrations contribute to a long service life.

The kinematic chain:
- 2 stationary servo motors $M_1$ and $M_2$
- 1 rotating toothed belt ZR
- 1 very rigid Y-axis, 1 rigid yet lightweight Z-axis

The kinematics in detail:
- Superposition of the two motors enables the front panel to move along the Y- and Z-axes
- Both motors together ensure maximum acceleration and speed for exclusive movement of the front panel along the Y- or Z-axis

Pick rate as a function of the payload and horizontal stroke
- The specified cycle rate refers to a double stroke
- Gripping and waiting times are not taken into consideration
- Double stroke cycle [mm]

<table>
<thead>
<tr>
<th>Size</th>
<th>L1</th>
<th>L2</th>
<th>Y Working space (reference stroke in mm)</th>
<th>Z Working space (reference stroke in mm)</th>
<th>Max. acceleration (m/s$^2$)</th>
<th>Max. speed (m/s)</th>
<th>Max. payload (kg)</th>
<th>Repetition accuracy (mm)</th>
<th>Absolute accuracy (mm)</th>
<th>Contour accuracy (mm) (0.5 m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCT-15-..</td>
<td>326</td>
<td>361.5</td>
<td>500</td>
<td>100</td>
<td>50</td>
<td>5</td>
<td>1.5</td>
<td>± 0.1</td>
<td>± 0.5</td>
<td>± 0.5</td>
</tr>
<tr>
<td>EXCT-30-..</td>
<td>443.5</td>
<td>454</td>
<td>1000</td>
<td>500</td>
<td>50</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCT-100-..</td>
<td>455.5</td>
<td>511</td>
<td>1500</td>
<td>500</td>
<td>30</td>
<td>4</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Standard: planar surface gantries

The planar surface gantry YXCF is an assembly of several axis modules to produce a movement in 2D space.

- Can be used universally for handling light to heavy workpieces or high payloads
- Especially suitable for very long strokes
- High mechanical rigidity and sturdy design
- Pneumatic and electric components – freely combinable
- As an electrical solution – freely positionable/any intermediate positions

Range of applications:
- For any movements in 2D space
- For very high requirements in terms of precision and/or very heavy workpieces, even with long strokes

Linear gantry YXCF: designed using standard modules – can be configured using the Handling Guide Online.

In this example:
X: EGC-120;
Y: EGC-HD-160

For specialised requirements: standardised solutions from the multi-axis modular system
Planar surface gantry with electric Y-axis (as an example)
<table>
<thead>
<tr>
<th>Size</th>
<th>X-axis</th>
<th>Y-axis</th>
<th>Max. working stroke [mm]</th>
<th>Max. payload</th>
<th>Mounting position</th>
</tr>
</thead>
<tbody>
<tr>
<td>YXCF-1 (standard)</td>
<td>• EGC-50-TB-KF</td>
<td>• EGC-50-TB-KF</td>
<td>X: 1900</td>
<td>Y: 1900</td>
<td>Horizontal</td>
</tr>
<tr>
<td>Specialised requirements</td>
<td>• EGC-50/70/80-TB-KF</td>
<td>• EGC-50/70/80-TB-KF/RF</td>
<td>X: 5000</td>
<td>Y: 1000</td>
<td>Depend on the selected dynamic response</td>
</tr>
<tr>
<td>Specialised requirements</td>
<td>• EGC-80-TB-KF</td>
<td>• EGC-80-TB-KF</td>
<td>X: 8500</td>
<td>Y: 1500</td>
<td></td>
</tr>
<tr>
<td>Specialised requirements</td>
<td>• EGC-80-/120-TB-KF</td>
<td>• EGC-120-TB-KF</td>
<td>X: 8500</td>
<td>Y: 2000</td>
<td></td>
</tr>
<tr>
<td>Specialised requirements</td>
<td>• EGC-185-TB-KF</td>
<td>• EGC-185-TB-KF</td>
<td>X: 8500</td>
<td>Y: 2000</td>
<td></td>
</tr>
</tbody>
</table>

Drive package depends on the configuration selected.

Configure your system yourself → [www.festo.com/handling-guide](http://www.festo.com/handling-guide)
Maximum dynamic response with up to 100 picks/min and optimum utilisation of the installation space is what characterises the Cartesian high-speed handling system with robotic functionality. The XY planar surface gantry, which is extremely compact and flat, has an excellent installation space to working space ratio.

Highly dynamic: linear gantry EXCH

- Integrated energy chain concept for easy and safe installation, even in the event of subsequent modification or expansion
- Universal: front unit interface for mechanical or vacuum-assisted rotating and gripping solutions.
- Large rectangular working space: scaleable along the X- and Y-axes. For example, for handling up to 10 solar wafers
- 30% more efficient due to a lower moving mass: drive for positioning the front panel is omitted

- Optional additional motion: the front panel accommodates the Z-axis or rotary/lifting module for free movement in space (3D).
- Extremely flat: perfect for small assembly or test cells and a clear overview of the system
- Low centre of gravity: minimal overshoot, enhanced positioning accuracy and reduced demands on the frame

Range of applications:
- For high dynamic response in a rectangular installation space
- Packaging and sorting
It also has a suitable frame and control package for precise point-to-point or path-controlled movements. The H-gantry is a genuine, cost-effective alternative to robotic systems with delta kinematics – economical, with a long service life and low power consumption.

### Maximum working space and installation space

![Diagram of maximum working space and installation space]

<table>
<thead>
<tr>
<th>Size</th>
<th>X stroke (mm)</th>
<th>Y stroke (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>Rated load for max. dynamic response (kg)</th>
<th>Max. acceleration (m/s²)</th>
<th>Max. speed (m/s)</th>
<th>Repetition accuracy (mm)</th>
<th>Absolute accuracy (mm)</th>
<th>Contour accuracy (mm) (±0.5 m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCH-40 Standard: 500, 750, 1000, 1500</td>
<td>Standard: 400, 500, 750, 1000</td>
<td>X stroke: 382</td>
<td>Y stroke: 360</td>
<td>4</td>
<td>Horizontal mounting position: 50</td>
<td>Horizontal mounting position: 5</td>
<td>±0.1</td>
<td>±0.5</td>
<td>±0.5</td>
<td></td>
</tr>
<tr>
<td>On request: 200...2000</td>
<td>On request: 200...1000</td>
<td></td>
<td></td>
<td></td>
<td>Vertical: 30</td>
<td>Vertical: 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On request: 500...2500</td>
<td>On request: 500...1500</td>
<td></td>
<td></td>
<td></td>
<td>Vertical: 30</td>
<td>Vertical: 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Optional additional movement
The front panel accommodates the Z-axis or rotary-linear module for free movement in space (3D).
Compact: planar surface gantry EXCM

Wherever every millimetre counts: the compact gantry EXCM. High functionality meets an extremely compact design for maximised working space coverage. The parallel kinematic drive concept ensures low moving mass, and the drive and controller package is pre-parameterised for easy commissioning.

- Flat and compact for optimum use of space
- High payload
- Festo plug and work including pre-parameterisation
- Perfectly matched and pre-parameterised drive and controller package
- Configurable in length and width

Operational principle
The EXCM can advance to any position within its working space. The rotating toothed belt, driven by fixed motors, moves the slide within a two-dimensional area.

Drive and controller package
Supplied as standard: the functional drive and controller package in IP20 for Festo plug and work. The encoder allows closed-loop servo operation.
Maximum working space and installation space

The kinematic chain:
- 2 stationary servo motors M₁ and M₂
- 1 rotating toothed belt ZR
- 2 very rigid X-axes, 1 very rigid Y-axis

The kinematics in detail:
- Superposition of the two motors enables the front panel to move along the X- and Y-axes
- Both motors together ensure maximum acceleration and speed for exclusive movement of the front panel along the X- or Y-axis

<table>
<thead>
<tr>
<th>Size</th>
<th>X stroke (mm)</th>
<th>Y stroke (mm)</th>
<th>A (mm)</th>
<th>B (mm)</th>
<th>Max. speed (m/s)</th>
<th>Max. acceleration (m/s²)</th>
<th>Repetition accuracy (mm)</th>
<th>Motor</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXCM-10</td>
<td>150, 260, 300, 460, 700</td>
<td>110</td>
<td>X stroke + 100</td>
<td>230</td>
<td>0.3</td>
<td>3</td>
<td>± 0.1</td>
<td>Stepper motors</td>
</tr>
<tr>
<td>EXCM-30</td>
<td>90...700</td>
<td>Standard: 100, 150, 200, 300, 400, 500</td>
<td>110, 160, 210, 260, 310, 360</td>
<td>X stroke + 133</td>
<td>± 0.5</td>
<td>10</td>
<td>± 0.05</td>
<td></td>
</tr>
</tbody>
</table>
Standard: pick & place unit DHSP

Pick & place systems comprise two yoke drives with a combination of slides and cantilever axes.

- High mechanical rigidity and sturdy design
- Pneumatic and electric components – freely combinable
- As an electrical solution – freely positionable

Range of applications
- Payload up to 6 kg
- Stroke ranges up to 400 mm
- For applications where the gripper unit needs to be retracted from the area of activity.

Pick & place variants
(as an example)

Pneumatic pick & place unit
DGSL/DGSL

Electr./pneum. pick & place unit
DGSL/EGSL

Electric pick & place unit
EGSL/EGSL
Compact: handling modules

With their extremely short cycle times, these compact and cost-effective function modules are ideal for automatic feeding and removal of small parts in very tight spaces. This is achieved by a force guided swivel and linear motion sequence, forming a complete pick & place cycle.

Handling module HSP

Technical data
Variants and options can be found in the Festo online catalogue.

Handling module HSW

Technical data
Variants and options can be found in the Festo online catalogue.

<table>
<thead>
<tr>
<th>Drive system</th>
<th>Pneumatic/electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payload</td>
<td>0 ... 1.6 kg</td>
</tr>
<tr>
<td>Stroke</td>
<td>Y: 52 ... 170 mm, Z: 20 ... 70 mm</td>
</tr>
<tr>
<td>Z (effective linear stroke)</td>
<td>15 ... 25 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Precision stroke adjustment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>±8 ... 20 mm</td>
</tr>
<tr>
<td>Z</td>
<td>±10 ... ±20 mm</td>
</tr>
</tbody>
</table>

Wait position
Optional

Accuracy
±0.02 mm

*) The wait position enables the picker to pull back from the working area.

Technical data
Variants and options can be found in the Festo online catalogue.

Drive system
Pneumatic

<table>
<thead>
<tr>
<th>Payload</th>
<th>0 ... 1.6 kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. linear stroke at 90° swivel angle</td>
<td>90 ... 175 mm</td>
</tr>
<tr>
<td>Working stroke</td>
<td>9 ... 35 mm</td>
</tr>
<tr>
<td>Min. cycle time</td>
<td>0.6 ... 1.0 s</td>
</tr>
<tr>
<td>Repetition accuracy</td>
<td>±0.02 mm</td>
</tr>
<tr>
<td>Wait position</td>
<td>Max. 2</td>
</tr>
<tr>
<td>Repetition accuracy, wait position</td>
<td>± 1 mm</td>
</tr>
</tbody>
</table>
Standard: cantilever axes

Movements in 3D: a cantilever system is made up of 2 parallel drives, combined with a pick & place unit. They feature high mechanical rigidity and a sturdy design.

• Pneumatic and electric components – freely combinable
• As an electrical solution – freely positionable/any intermediate positions

Range of applications:
Cantilevers are the best 3-axis solution for movements in 3D space where three-dimensional gantries are too big or the handling unit needs to be retracted from the area of activity
• When the working space must remain freely accessible and must not be blocked by the handling system
• Long strokes up to 3 m in the horizontal plane
• High requirements for system rigidity

Specialised requirements:
standardised solutions from the multi-axis modular system
Cantilever axis with EGC/DGEA/DFM and front unit ERMB
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DHSA-4/6/10</td>
<td>EGC-185-TB/BS-KF</td>
<td>EGC-120-TB/BS-KF</td>
<td>EGSL-75</td>
<td>X: 5000</td>
<td>Y: 800</td>
<td>Up to 10</td>
</tr>
<tr>
<td>Specialised</td>
<td>EGC-220-HD-BS-KF</td>
<td>EGC-185-TB/BS-KF</td>
<td>DGEA-25/40</td>
<td>Y: 800</td>
<td>Z: 400</td>
<td>Horizontal</td>
</tr>
<tr>
<td>requirements*</td>
<td>EGC-220-HD-TB-KF</td>
<td>EGC-160-HD-TB/BS-KF</td>
<td>DNCE-63 with FENG</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EGC-125-HD-TB-KF</td>
<td>EGC-120-BS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EGC-220-HD-TB/BS-KF</td>
<td>DGSL-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHSA-15</td>
<td>EGC-220-HD-BS-KF</td>
<td>EGC-120-TB/BS-KF</td>
<td>DGEA-60</td>
<td>X: 5000</td>
<td>Y: 800</td>
<td>Up to 15</td>
</tr>
<tr>
<td>Specialised</td>
<td>EGC-220-HD-TB-KF</td>
<td>EGC-185-TB/BS-KF</td>
<td>DNCE-63 with FENG</td>
<td>Y: 800</td>
<td>Z: 400</td>
<td>Horizontal</td>
</tr>
<tr>
<td>requirements*</td>
<td>EGC-220-HD-TB/BS-KF</td>
<td>EGC-160-HD-TB-KF</td>
<td>EGC-120-BS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EGC-125-HD-TB-KF</td>
<td>DGSL-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHSA-25/50</td>
<td>EGC-220-HD-BS-KF</td>
<td>EGC-120-TB/BS-KF</td>
<td>DNCE-63 with FENG</td>
<td>X: 5000</td>
<td>Y: 800</td>
<td>Up to 50</td>
</tr>
<tr>
<td>requirements*</td>
<td>EGC-220-HD-TB/BS-KF</td>
<td>EGC-160-HD-TB-KF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>EGC-125-HD-TB-KF</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drive package depends on the configuration selected

*Y-axis and Z-axis in yoke or slide operation, as required
Standard: three-dimensional gantries

Three-dimensional gantry YXCR: for three-dimensional movements in a space. Ideal for very long strokes of up to 3000 mm in the X direction, even with heavy loads: the three-dimensional gantry YXCR. The combination of several axis modules can be used anywhere for light to heavy workpieces or large payloads. High mechanical

- Extremely precise with a high load capacity, even with very long strokes
- With matching Festo motor and motor controller package, and energy chain
- Extremely simple and time-saving: automatic design and configuration with the Handling Guide Online

Range of applications:
- For any movements in 3D space
- Can be used universally for handling light to heavy workpieces or high payloads
- Very high requirements for precision and/or very heavy workpieces combined with long strokes

For specialised requirements: standardised solutions from the multi-axis modular system

Three-dimensional gantry YXCL from standard modules – can be configured using the Handling Guide Online.

In this example:
X: EGC-120
Y: EGC-120
Z: EGC-80
rigidity and a sturdy design make it reliable and precise. Pneumatic and electric components can be freely combined. Different sizes and variants make the YXCR suitable for a great variety of applications. The ready-to-install complete system in various sizes and versions is delivered assembled and tested.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>YXCR-1</td>
<td>• EGC-50-TB-KF</td>
<td>• EGC-50-TB-KF</td>
<td>• EGSL-35</td>
<td>X: 1900</td>
<td>Y: 1900</td>
<td>Z: 50</td>
</tr>
<tr>
<td></td>
<td>Specialised requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• EGC-50/70-TB-KF</td>
<td>• EGC-50/70/BS-KF</td>
<td>• EGSL-35</td>
<td>X: 5000</td>
<td>Y: 1000</td>
<td>Z: 80</td>
</tr>
<tr>
<td></td>
<td>• ELGA-70-TB-RF</td>
<td>• ELGA-70-TB/BS-KF/RF</td>
<td>• DGEA-18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DGCI-18-KF</td>
<td>• DWSL-6/8/10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DGC-12/18-KF</td>
<td>• DFM-12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specialised requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• EGC-80-TB-KF</td>
<td>• EGC-80-TB-KF</td>
<td>• EGSL-45/55</td>
<td>X: 8500</td>
<td>Y: 1500</td>
<td>Z: 1000</td>
</tr>
<tr>
<td></td>
<td>• ELGA-70-TB-RF</td>
<td>• ELGA-70-TB/BS-KF/RF</td>
<td>• DGEA-18</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DGCI-12/16</td>
<td>• DWSL-12/16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• DFM-16/20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specialised requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ELGA-80/120-TB-KF/RF</td>
<td>• ELGA-80/120-TB/BS-KF/RF</td>
<td>• DGEA-25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DGCI-40/63-KF</td>
<td>• DWSL-20/25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DGC-40-KF</td>
<td>• DFM-25/32/40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Specialised requirements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DGCI-63-KF</td>
<td>• DWSL-50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• DFM-50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Drive package depends on the configuration selected

Configure your system yourself ➔ www.festo.com/handling-guide
Highly dynamic: parallel kinematic system EXPT

The high-speed handling system with robotic functionality for free movement in space provides precision in movement and positioning, combined with high dynamic response up to 150 picks/min. The control package with robotic controller, together with the extremely rigid pyramid structure, ensures high path and positioning accuracy. It is perfect for pick & place applications, sorting and palletising tasks, as well as bonding applica-

- **Highly dynamic and precise movement:** Accurately adjusted, powerful servo motors, coordinated with a robotic controller for free movement in 3D. Configurable motor position for optimum installation
- **Minimal moving mass:** CFK rods connect the front panel to the rigid axes, the drives convert their performance directly into dynamic response
- **Rod loss detection:** Any detachment of the rods is detected by the pneumatic circuit. That minimises the risk of damage to the parallel kinematic system in the event of a fault
- **Standardised front panel:** Interface for easy connection of gripper and vacuum solutions from Festo
- **Pre-assembled installation concept:** Line and tubing guide for a durable solution with maximum dynamic response; flexible expansion possible
- **High rigidity:** The pyramid shape results in a closed mechanical chain for maximum precision and process reliability, e.g. for joining applications and inserting operations
- **Rotary drive with high power density:** Precise, highly dynamic and infinite rotation with a low dead weight

Range of applications:
- High-speed pick & place
- In tracking applications with assembly
- Joining and press fitting
tions. All in all, the parallel kinematic system is excellent thanks not only to low purchase costs but also to low operating costs, as the low moving mass reduces energy consumption. Reliable series components and reduced vibrations contribute to a long service life and extended maintenance intervals.

Maximum working space and installation space

![Diagram of the parallel kinematic system]

Diameter of the cylindrical working space at working height = 100 mm

Pick rate as a function of the payload

- The specified cycle rate refers to a double stroke in a 12" cycle
- Gripping and waiting times are not taken into consideration
- Double stroke cycle [mm]

![Graph showing pick rate versus payload]

Technical data for parallel kinematic system EXPT

<table>
<thead>
<tr>
<th>Size</th>
<th>Diameter A (mm)</th>
<th>B (mm)</th>
<th>C (mm)</th>
<th>D (mm)</th>
<th>Max. acceleration (m/s²)</th>
<th>Max. speed (m/s)</th>
<th>Repetition accuracy (mm)</th>
<th>Absolute accuracy (mm)</th>
<th>Contour accuracy (mm)</th>
<th>Payload at max. dynamic response (kg) **</th>
<th>Max. payload (kg) **</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPT-45</td>
<td>450</td>
<td>1086</td>
<td>947</td>
<td>658</td>
<td>110</td>
<td>7</td>
<td>±0.1</td>
<td>±0.5</td>
<td>±0.3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>EXPT-70</td>
<td>700</td>
<td>1238</td>
<td>1077</td>
<td>726</td>
<td>100</td>
<td>7</td>
<td>±0.1</td>
<td>±0.5</td>
<td>±0.3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>EXPT-95</td>
<td>950</td>
<td>1392</td>
<td>1213</td>
<td>828</td>
<td>90</td>
<td>6</td>
<td>±0.1</td>
<td>±0.5</td>
<td>±0.3</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>EXPT-120</td>
<td>1200</td>
<td>1556</td>
<td>1335</td>
<td>947</td>
<td>80</td>
<td>5</td>
<td>±0.1</td>
<td>±0.5</td>
<td>±0.3</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Technical data for axis of rotation (4th axis)

<table>
<thead>
<tr>
<th>Size</th>
<th>Max. torque (Nm)</th>
<th>Nominal torque (Nm)</th>
<th>Max. rotary speed (rpm)</th>
<th>Nominal rotary speed (rpm)</th>
<th>Repetition accuracy (°)</th>
<th>Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.8</td>
<td>0.75</td>
<td>200</td>
<td>117</td>
<td>0.5</td>
<td>0.78</td>
</tr>
<tr>
<td>2</td>
<td>4.5</td>
<td>1.8</td>
<td>200</td>
<td>117</td>
<td>0.5</td>
<td>1.05</td>
</tr>
</tbody>
</table>

* With working height = 100 mm
** Including front unit (rotary/gripping/vacuum solution, axis of rotation)
Customised solutions – specially tailored

From gripper systems ...

Gripping workpiece carriers for the immersion bath

Main components:
- Gripping: HGPT-63
- Gripper fingers: Special design

Technical specifications:
- Sturdy thanks to T-slot guide
- External guides for accommodating large torques due to the mounting position and extra-long gripper fingers
- Specific mechanical, pneumatic and electrical interface for the three-dimensional gantry system

Vacuum gripping system for thin plates

Main components:
- Gripping: ESS
- Control: OVEM, CPX-MPA

Technical specifications:
- Multiple, variably controllable vacuum circuits
- Centring function
- Workpieces of varying sizes require multiple suction grippers with ISV suction valves ("intelligent shut-off valves") in the peripheral area
- Specific mechanical, pneumatic and electrical interface for the customer’s handling system
... to modified standard handling systems and cell solutions ...

**Screwdriver station**

**Main components:**
- Z-axes: EGC-80-BS
- Y-axes: EGC-120-TB

**Technical specifications:**
- Moving mass per Z-axis: 15 kg aluminium frame
- Two screwdriver modules in one unit
- Compact design
- Drive axes are also guide axes

**Pneumatic parts transfer station**

**Main components:**
- Gripping: non-Festo product
- Infeed axis: DFM-12
- Z-axis: DGC-25
- Rotation: DRRD-63
- Control: CPX-MPA

**Technical specifications:**
- Workpiece load per side: 1 kg
- Handling unit with aluminium frame for fast integration into the customer's production line
- Transfer station completely pneumatically pre-installed
Customised solutions – specially tailored

... and reproducible applications ...

**Modular gripping system with ELGG toothed belt drive**

**Main components:**
- Gripping: ELGG-35/45/55
- Pneumatic drive: ADN-25
- Electric drive: EMMS-AS/ST

**Technical specifications:**
- Large stroke range thanks to a wide selection of linear drives
- Large strokes up to 300 mm per gripper finger
- Payload up to approx. 10 kg
- Variable for electric and pneumatic drive technology
- Simple and modular
- High level of flexibility thanks to individual gripper-finger attachments
- Force and position control options

**Gantry solution with flexible vacuum gripping frames**

**Main components:**
- Gripping: ESS-20-CN, VN-10
- Workpiece detection: ADN-20
- Z-axis: DGEA-40
- Y-axis: EGC-120-TB

**Technical specifications:**
- Repositioning thin workpieces/materials such as cardboard, plastic and metal sheets, etc.
- Stack detection by means of simple sensors
- Reliable stacking guaranteed thanks to extensive gripping tests prior to the project
... to complex, large-scale projects

Double gantry system

Main components:
- Z-axis: non-Festo product
- Y-axis: EGC-120-TB

Technical specifications:
- Workpiece load: 30 kg per gantry
- Steel frame: 8 metres long, 3 metres high
- Integration of non-Festo products, e.g. vertical gear rack axes
- Special requirements such as clamping unit, central lubrication
- Specific interface for customer's gripping system and motor mounting

Automatic loading for machine tools

Main components:
- Gripper: HGPL-40
- X-axis: EGC-120-BS
- Y-axis: DGE-63-ZR, special design

Technical specifications:
- Optimally adapted to the customer requirements in terms of mechanical system, control technology and costs
- Design and simulation of mechanical kinematics
- Tailored for full integration in the system
- Consideration of ambient conditions: wiper rings, central lubrication port, safety measures
- Open interface for customer-specific motors
Industry-specific solutions – specially tailored

For machine tool construction

- Independent control of the pressing process when sawing wooden planks of different thicknesses
- Fast and flexible
- One system for position and force control, freely programmable

Tool magazine

- Slim solution adapted to the machine tool for expanding the internal magazine
- Version for different tool sizes
- Delivery as subsystem with adapted interfaces
- Open interface for customer-specific motors

For woodworking

Woodworking machine

- Safety functions integrated into the system: emergency off and "Board fed in" signal for locking the system
- Clear error diagnostics
For laboratory automation

Liquid handling
• Compact, fast and lightweight: loading and unloading for semi-automated laboratory processes
• Placing vials in a rack
• Data matrix code ensures correct placement
• Planar surface gantry EXCM moves a microwell plate to the dosing head
• The dosing head removes the gene assay from the glass bottle and pipettes it into the microwell plate.
• While the handling system exchanges the microwell plates, the dosing head moves to the cleaning station
• Optional: feeding a buffer solution from the reservoir using VODA fluid valves

For small parts assembly and electronics manufacturing

Handling solution for small parts assembly
• Electrically driven axes and systems are the key to flexible production processes and a broad manufacturing spectrum.
• Ready-to-install solutions from the individual component to the handling unit, in accordance with EC Machinery Directive
• Mounting, installing and testing in accordance with customer standards
• Voltageless systems in ESD-safe design, from the energy chains to the functional earth
Industry-specific solutions – specially tailored

For end line packaging (secondary and tertiary packaging)

Palletising solution
- Made up of standard electric and pneumatic components, such as coordinated handling axes, vacuum grippers, motors
- Standardised control cabinet CMCA with controller and robotic controller and built-in safety functions
- Steel frame

Label picker
- Flexible solution
- Compact design
- Highly dynamic response, 60 cycles per minute
- No heat restrictions, even at full duty cycle
- With fieldbus or stand-alone system
- Significant cost benefits compared to an electric cylinder with a servo motor

The package height is measured upstream of the station using an analogue distance sensor and transmitted directly to the positioning axis.

Ideal when functions such as pushing and sorting are used in conveyor technology.
For the automotive industry

Feed systems from the automotive modular system
- Feed systems for body-in-white parts
- Specific system types simplify project engineering and planning
- Local factory regulations can be implemented simply and easily thanks to coordinated interfaces
- Compliance with standards, directives, new product releases and specific requirements in the automotive environment
- Specific drive series EGC/DGC for cost-effective management of replacement parts and flexible design options

Servopneumatic modular balancer system
- Different loads can be predefined and taught in automatically
- Use of standard cylinders. The friction of the entire system and the mechanical structure are no longer relevant for the actuating force.
- Position is held even if the load changes
- Intuitive control through patented, ergonomic, pneumatic handle
- The control has a standardised user interface for easy selection of the operating modes
Standardised peripherals – frames

Standard steel frames

Frames (LP-ST) for linear gantries up to 6 m long and 2.5 m high
Floor mounting with levelling feet
Interface with the handling system, unmachined, adjustment on the handling system
Transport lug permanently welded, optional ring lugs
Reinforcing brace for optimum application of force

Standard aluminium frames

Frames (LP-AL) for linear gantries up to 6 m long and 2 m high
Direct connection without additional mounting bracket
Simple cross-bracing with profile material
Typical connecting component: cross brace/main profile
Floor mounting with levelling feet
Frames (RP-ST) for three-dimensional gantries up to 2 m wide, 3 m long and 1.5 m high
Standardised peripherals – vision sensors, compact vision systems and Checkbox

Vision sensors SBSI-B/-Q
Simple applications
For simple vision system applications – even without expert knowledge. The new vision sensors are available as:
- Object sensors SBSI-Q for simple quality inspection
- High-performance code readers SBSI-B for reading 1D/2D codes.
The lens system with various focal lengths is built in, as is lighting in different colours.

Compact vision systems SBO...-Q/-M
Demanding requirements
The tried and tested intelligent compact vision systems SBO...-Q are unsurpassed when it comes to part inspection and position sensing in industrial environments. And they effortlessly inspect even a great variety of part types. SBO...-M supports diagnostics of fast processes.

Checkbox Compact CHB-C
Optimum inspection of workpieces in rapid conveying technology
For contactless checking of the position and quality of small parts e.g. screws, springs, bolts, as they pass through on a conveyor belt.

Reading 2D codes
The code reader scans the data matrix code and can also check its quality in accordance with ISO 15415 or AIM DPM 2006.

Position and rotary orientation detection
The SBO...-Q determines the position and the rotary orientation of any part so that it can be processed flexibly and smoothly by handling systems.

Position and quality inspection of internal poles
The Checkbox CHB-C checks the internal poles and controls the entire infeed process.
# Standardised peripherals – controllers

<table>
<thead>
<tr>
<th>Module</th>
<th>Compact controller</th>
<th>Integrated controller</th>
<th>CPX terminal</th>
<th>Modular controller</th>
<th>Robotic controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller CECC-D</td>
<td>CODESYS controller in CPX</td>
<td>CODESYS controller CPX-CEC-C1</td>
<td>Motion controller CPX-CEC-M1</td>
<td>Modular controller CECX-X-C1</td>
<td>Robotic controller CMXR-C1</td>
</tr>
<tr>
<td>CECC-LK</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CODESYS controller</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in CPX</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CODESYS controller CPX-CEC-M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motion controller CPX-CEC-M1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1: Single axis</td>
<td></td>
<td></td>
<td>M1: Interpolation (2D)</td>
<td>Single axis (ptp asynchronous)</td>
<td>Interpolation (2.5D)</td>
</tr>
<tr>
<td>(ptp, asynchronous)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single axis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Robotics (3D)</td>
</tr>
<tr>
<td>(ptp, asynchronous)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C1: Single axis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Robotics (3D)</td>
</tr>
<tr>
<td>(ptp asynchronous)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interpolation (2.5D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robotics (3D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robotics (3D)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Functionality**

- **ptp = point-to-point**
- **4 axes**
- **8 axes**
- **6 axes interpolated, maximum 3 of these basic axes, 1 orientation axis.**
- **Another 16 axes possible via the integrated CODESYS-PLC.**

**Maximum number of permissible axes**

- **4 axes**
- **8 axes**
- **6 axes interpolated, maximum 3 of these basic axes, 1 orientation axis.**
- **Another 16 axes possible via the integrated CODESYS-PLC.**
Standardised peripherals – control cabinets for standard handling systems

Festo control cabinets for control systems provide protection for control components for single-axis and multi-axis systems.

Whether systems for simple control tasks or complex control of highly dynamic motion such as that of the parallel kinematic system, they are designed and built specifically for your application and contain the latest products and technologies.

Of course, the special requirements of your industry such as hygiene regulations are also taken into account.

Take advantage of our specialists' many years of experience and know-how and describe your project requirements to us. We will take care of the rest.

Control cabinets for special requirements

• Control system for 1...31 axes
• Design conforms to:
  – EN 60204-1
  – ATEX zone 1 and 21 (fully pneumatic)
  – ATEX zone 2 and 22 (electric and electro-pneumatic)
  – UL-508A
  – EN ISO 13849

Documentation for your safety

Complete documentation that can be quickly integrated into your plant documentation:

– Assembly drawings
– Bill of materials
– Circuit diagrams (EPLAN/Promis)
– Operating instructions for components
Standardised peripherals – control package CMCA for highly dynamic handling systems

All in one with the CMCA, which is both a robotic controller and motor controller, complete with harmonised safety concept. It rounds off the ready-to-install solution package for all advanced handling systems. This makes even the most complex handling extremely easy: you can get a ready-to-install system using just one part number. The system is delivered together with the selected kinematics and basic parameterisation for the entire system.

CMCA offers complete control functionality for demanding applications, either in a control cabinet or on a mounting plate.
- 3D path control, optionally available with integrated PLC
- Programming system CODESYS
- Activation of up to 4 axes

• Easy integration into the customer’s safety hierarchy
• Standard solution at an attractive price
• Space-saving: precise fit with the frame of the respective kinematics
• Complete system has a user-friendly and maintenance-friendly design

Supported kinematic systems for demanding and highly dynamic handling tasks:
- Parallel kinematic system EXPT
- Planar surface gantry EXCH
- Linear gantry EXCT

Supported Cartesian systems for easier handling tasks:
- 3D gantries
- Cantilever gantries
- Linear gantries
- Pick & place

Features and options
- Complete system for immediate operation – Festo plug & work
- Pre-programmed basic projects
- Safe stop SS1 in automatic mode with PL d
- Additional digital inputs and outputs optional
- Protection class IP54

Compact vision system SBOx-Q

Teach pendant CDSA with teach-in function
Safety@Festo
As partners for safety we realise that quality has many aspects. One of these is handling machines safely. Using safety-orientated electrical engineering and control technology from Festo provides you with the security of implementing safety measures in compliance with the EC Machinery Directive.

Safety concept
Safe stop SS1 according to EN 60204-1 in automatic mode with PL "d", category 3

Case 1 – Stopping true-to-path within the application-specific target time \( t_v \):
After stopping the kinematics, the controller enable function is deactivated via the CANopen Drive Bus \( 3 \) (= brake applied).

After \( t_v \), the dual-channel safety circuit \( 4 \) is activated – deactivation of the output stage enable and of the supply voltage for the output stage drivers.

Case 2 – True-to-path reduction of speed within the target time, followed by an unregulated stop:
After \( t_v \), the controller enable function is deactivated via the CANopen Drive Bus \( 3 \) (= brake applied). The dual-channel safety circuit \( 4 \) is activated at the same time, see case 1, despite the residual speed of the kinematics.

The speed is then further reduced to a stop, but without path control so that the specified path position can be exited in certain circumstances.

Emergency stop
When an emergency stop \( 1 \) is triggered and the signal is transferred to the controller \( 2 \), the command to reduce speed true-to-path is transmitted from the controller to the motor controller via the CANopen Drive Bus \( 3 \).
Standardised peripherals – servopneumatics

For a customised solution, handling technology makes use of the extensive, modular drive system of servopneumatics.
Standardised peripherals – servopneumatics

One of many possible system variants: linear gantry comprising DGCI, DNCI, DSMI (schematic electrical and pneumatic connection)
Services

All-round service for axis systems

Complete peace of mind
The complete, worry-free package extends from hardware advice to commissioning to after-sales service and training.
The services can be customised to meet your precise needs.

Professional service
The services are performed by trained, professional personnel. That gives you reliability in your planning and ensures that your handling system will be in productive use in a very short time. It also frees up your own staff.

Services at a glance

Commissioning
- For reliable operation: checking the wiring, connections, motion paths and energy chains
- For optimum path travel: configuring and parameterising the axes
- For maximum performance: optimising the control parameters and homing
- For tested safety: activating the axes in test mode
- For secure knowledge: data backup and documentation
- For safe operation: instructing the machine operators, e.g. on error diagnostics and elimination of errors or on changing the position values

Application programming
- Adjusting/expanding the parameterisation of system components
- Programming in Festo Teach Language (FTL) and CODESYS
- Creating the visualisation
- Integrating additional components
- Connecting to the master controller

Technical training
- Fundamentals of handling automation
- Motion control solution
- Maintenance and service of specific handling systems

Maintenance and service
- Checking the components' condition and wear
- Replacement of the wearing parts if necessary
- Software/firmware updates
- Other services as agreed
After-Sales Service – worldwide

The production industry is focussed on economy of operation and 100\% system availability. Another reason to opt for the highest possible reliability. And that’s what our services are designed to do. They are available in 176 countries around the world and can be completely integrated into your Total Productive Maintenance system (TPM).

**Technical hotline**
Guaranteed availability via telephone or e-mail.

**Spare parts service**
Available for you online at any time: comprehensive lists of spare parts with all consumables and wearing parts.

**Repair service**
We repair complex components and modules. If needed, we can also carry out express repairs.

**24-hour emergency service**
No waiting times for registered customers: you will receive urgently required parts within a few hours by express courier. Exception: order-specific parts.

**After-sales service on-site**
Professional inspection, maintenance, repairs and commissioning directly on your system.

**Modular service contracts**
For preventive maintenance, but also provide effective support in an emergency.

**Other services for efficient system operation**

**Festo Energy Saving Services**
help system operators determine their savings potential with regard to compressed air and help them utilise this to the full. The result: cost and energy savings of up to 60\% and increased productivity.

**Condition monitoring service**
Monitor critical processes continuously and prevent expensive, unplanned machine downtime. Festo specialists will develop an individually designed condition monitoring solution for your system and will help you implement it.

Would you like to learn more about our services? Ask our specialists!
Maximum productivity is a question of ambition
Do you share this attitude? We will be glad to help you achieve this goal – through our four outstanding qualities:
• Security • Efficiency • Simplicity • Competency

We are the engineers of productivity.

Discover new dimensions for your company:
⇒ www.festo.com/whyfesto