

## Path Control - Easy to Handle

Handling Technology and Robotics



## Multidimensional material transport and material processing – easy to handle

Product handling forms an important step in the process chain in factory automation. Loading and unloading directly make up the machine's cycle time, and it is for this reason that the motion profile must be fast and, at the same time, gentle on the product and the mechanical system.

The loading drive moves in one dimension if it is positioning a workpiece facing forwards or backwards. It is easy to optimize the positioning time and the process. Multidimensional movement of the workpiece is possible with at least two drives. Here, it is difficult to determine the ideal motion profile so that items can be handed as quickly and yet as reliably as possible. Different points in space often vary and can be reached using different paths. Typical applications are, for instance, pick and place applications, palletizing, transfer handling, secondary packaging, or stacking.

Similar demands are posed by applications where products are processed and refined further, for example, when decorating food items or for on-the-fly processing. The process is stable if material processing can be reproduced with a high level of accuracy.

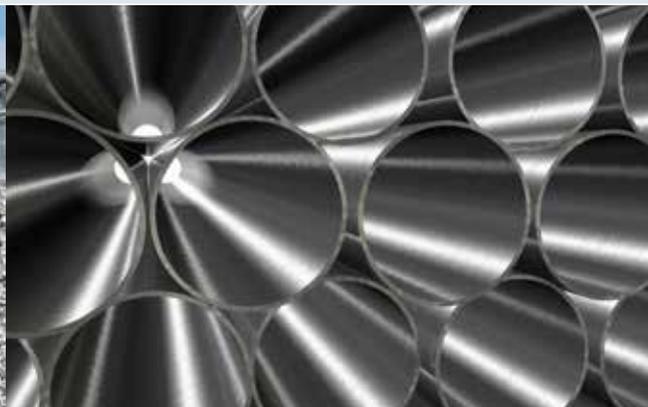
We have developed kinematic modules for CCU and MOVI-PLC® for exactly these application areas. They form the ideal solutions platform that enables easy and optimized path movements on par with individual axis movements.

**Driving the world – with innovative drive solutions for all branches of industry and for every application. Our products and systems can be used in any application – worldwide. Be it in the packaging, automotive, building materials, food and beverage, or metal-processing industry – the decision to use drive technology “made by SEW-EURODRIVE” stands for reliability for both functionality and investment.**





Single-column palletizer for moving drinks crates



## CCU HandlingKinematics: Easy configuration of pick and place systems

If machine sequences are controlled centrally at a higher-level, you can simply use our lower-level motion module for performing path movements. This is where our CCU (Configurable Control Unit) with the directly executable HandlingKinematics application module comes into play.

During startup, you only need to enter the mechanical data and configure the motion parameters once. During production, it is then only necessary to transfer the trajectory positions at the start of the movement to the CCU. The application module coordinates the required path movement in real time. If you define wait points in the

trajectory, the CCU continues the movement only when permitted. During palletizing and stacking, it is often necessary to immediately adapt the target position during runtime. The integrated touch probe function in the CCU is able to make the necessary changes independently and in real time without higher-level controller intervention.

### The HandlingKinematics application module in detail

- The CCU takes over the drive operating modes; the higher-level controller coordinates the process sequence and defines the product data.
- Complete interface to the higher-level controller with up to 20 path points.
- Possibility to simulate sequences and diagnostics without real machines.
- Choose from four programs to select the perfect motion profile for your case: axis/cartesian interpolation, linear interpolation with coordinated/synchronized rotation.
- Choose a mechanical system with up to four degrees of freedom, XYZ and rotation around Z.
- Reproducible path fidelity with BACK-TO-PATH, even after disruption.
- Suitable for static objects and combinable with up to eight further application modules, e.g. for conveyor belts, lifting axes, grippers.
- Wait points can be defined for each path segment.
- Touch probe measurement function and sensor-based positioning.

## Easy parameterization and connection to the higher-level controller

### Configurable Control Unit (CCU)



Parameterizable path control with standardized fieldbus interface.

### Requirements for the CCU

#### HandlingKinematics application module

- DHF41B (PROFIBUS, DeviceNet) or DHR41B (PROFINET, EtherNet/IP, Modbus/TCP) controller with OMC41B memory card.
- T5 technology (T4 for Cartesian gantry).

## Reliable, quick and easy

- Performance guarantee due to encapsulated path control that has been tested and has proven itself time and time again.
- Extremely quick and easy startup of the entire kinematic model using graphical software that is intuitive to use and features a clear diagnostics and monitoring function.
- The cycle time is significantly reduced due to synchronous path control with look-ahead and by-passing of interfering edges while maintaining contour accuracy.



## MOVI-PLC® HandlingKinematics – Easy to configure and adapt

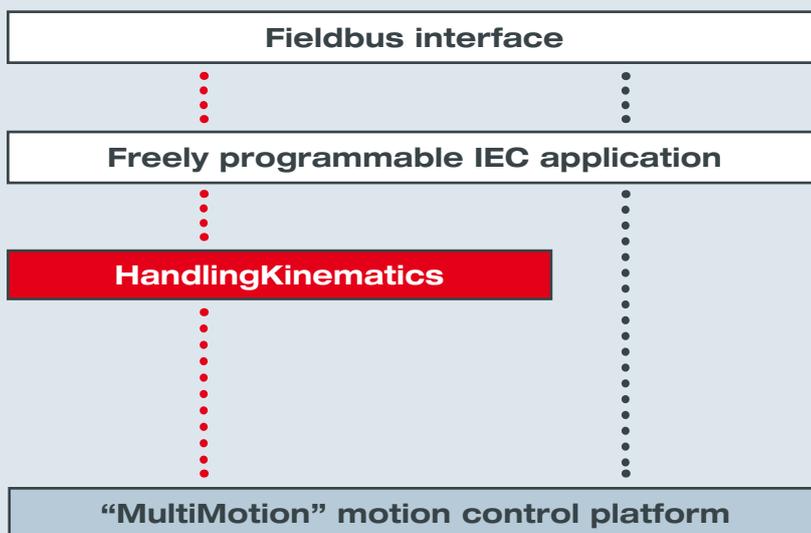
If the CCU HandlingKinematics application module covers all of your functional requirements, but your application requires greater flexibility, you can choose the HandlingKinematics technology module for the freely programmable MOVI-PLC®. It provides exactly the same functionality, the configuration is completely reusable, and even the hardware remains the same. You only require a different memory card to utilize programmable MultiMotion software. Unlimited consistency is our guiding concept because it makes everyday work easier.

### Additional options offered by the HandlingKinematics technology module

- All functions of the HandlingKinematics CCU application module.
- Interpret and scale the resolution of the path points according to your needs.
- Practically any robot can be operated: Select a mechanical system with up to six degrees of freedom XYZABC.
- Amend and modify the fieldbus interface according to your needs: Control the technology module directly or using signals in your MOVI-PLC® program.

## Additional functional adjustments

### MOVI-PLC®



HandlingKinematics technology module with adaptable fieldbus interface and freely programmable MOVI-PLC®.

### Requirements for the MOVI-PLC® HandlingKinematics technology module

- DHE41B, DHF41B, DHR41B MOVI-PLC® “advanced” controller with OMH41B memory card or UHX71B MOVI-PLC® “power” controller with OMH71B memory card.
- T5 technology (T4 for Cartesian gantry) per instance of the technology module.
- Two additional technology points per controller when using the “MultiMotion” motion control platform instead of “MultiMotion Light” (not necessary for pure path control operations).

## Benefit from the MOVI-PLC® as a freely programmable controller

- Increase your efficiency due to the modular machine design. Relocate all sensors and actuators that are relevant for motion to our MOVI-PLC®. Light barriers, proximity switches, vision systems, pneumatic axes are coordinated directly by us.
- Reduce data exchange at runtime to only what is necessary: Place the recipe data for path planning on the MOVI-PLC® in advance.
- Use our MOVI-PLC® “power” controller to monitor the interaction of multiple kinematic chains and a total of 64 drives in a practical manner.
- One software package for everything: Using MultiMotion, operate the master machine, e.g. the packaging machine, and the kinematic module on the same controller.



## MOVI-PLC® Kinematics – Easy programming of special paths

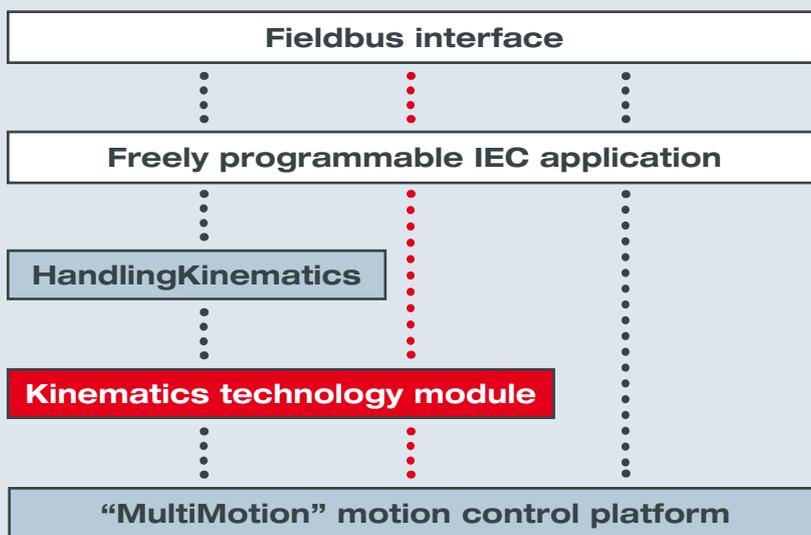
If your functional requirements go beyond those offered by the encapsulated HandlingKinematics module, then go one step further and use the Kinematics technology module at its core. In this case, individual motion segments are programmed explicitly. Example motion sequences are included in program templates and can be tested straightaway.

### The Kinematics technology module in detail

- Fine-tuned access to all motion parameters in each path segment.
- Extensive options for entering circle segments.
- All coordinate systems can be used for control (also axis/world/piece coordinate systems) and it is possible to toggle between them even during motion.
- Multiple kinematic instances can be synchronized on the same workpiece.
- Master/slave relations can be implemented, e.g. motion of the robot along the CAM profile or path progression as a function of a MultiMotion axis.
- Basic G-code import for motion control along the CAD contour.

## Maximum functionality and flexibility

### MOVI-PLC®



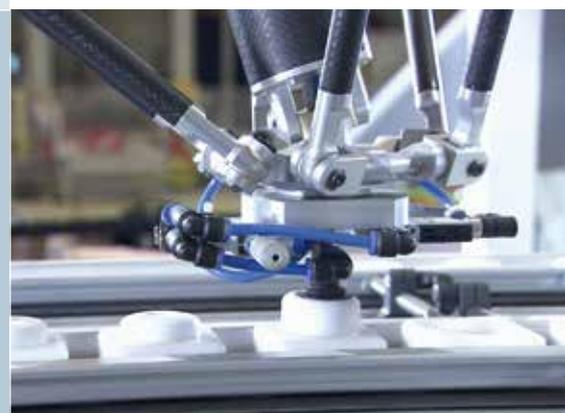
Freely programmable Kinematics technology module with maximum range of functions that can be flexibly combined with other modules

### Requirements for the MOVI-PLC® Kinematics technology module

- DHE41B, DHF41B, DHR41B MOVI-PLC® “advanced” controller with OMH41B memory card or UHX71B MOVI-PLC® “power” controller with OMH71B memory card.
- Technology per instance of the technology module:
  - T2** Homing, jog, target operating modes
  - T3** Additional 2D linear/circular interpolation
  - T4** Additional 3D linear/circular interpolation
  - + 1T** Use of world/workpiece coordinate system, e.g. for variable pallet positions or tracking.
  - + 1T** Mechanical system is not a Cartesian gantry
- Two additional technology points per controller when using the “MultiMotion” motion control platform instead of “MultiMotion Light” (not necessary for pure path control operations).

## Benefit from high-end motion control and automation

- Solve complex tasks quickly and easily: For example, one command suffices if you want to completely move or rotate a palletizing template. Our MOVI-PLC® does it fully automatically.
- You do not have to wait until objects are stationary but can instead pick them while the system is running at full speed, and place them on moving conveyor belts using TRACKING. The workpiece position follows the signal of an external encoder or a camera for instance.
- Process and refine your products further while moving at full speed using freely shapeable movement paths. Use our path control for plotting, cutting, painting, and more.
- Effortlessly move large workpieces using several synchronized robots with sensor-guided path correction.
- One software with numerous possibilities: material processing, packaging, stacking and complete machine automation with unlimited flexibility and consistency with only one controller.

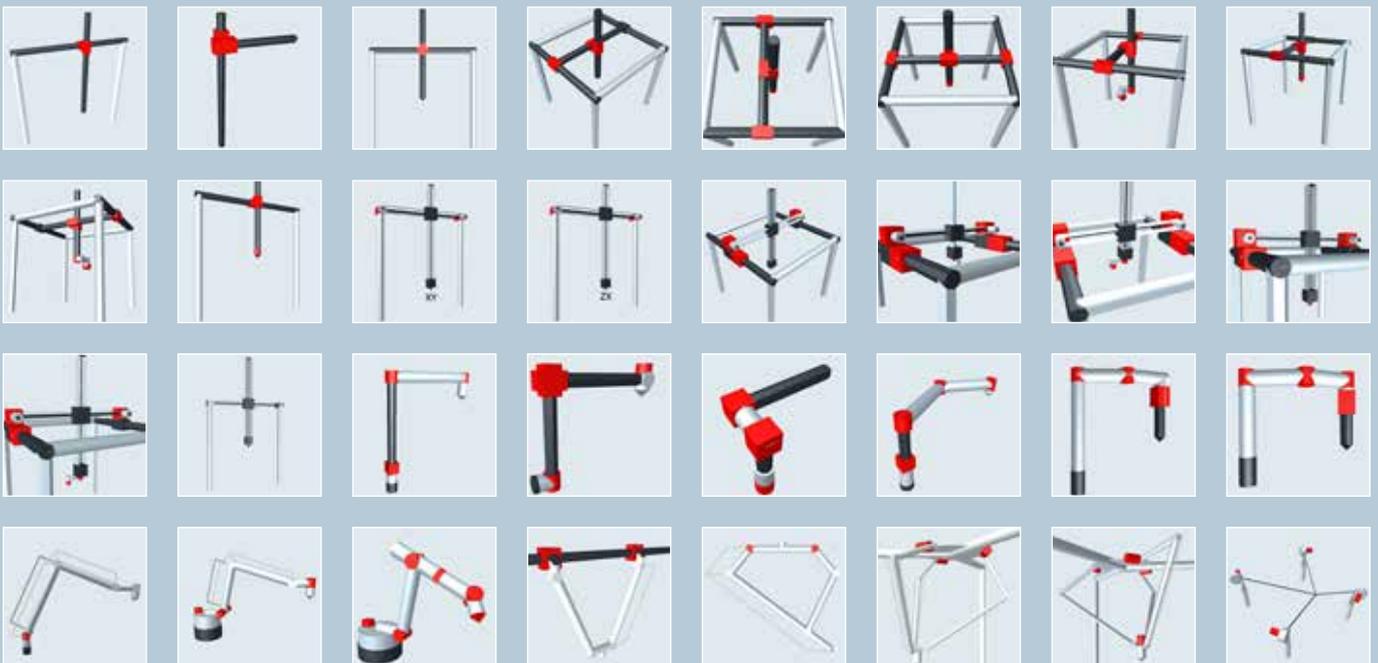


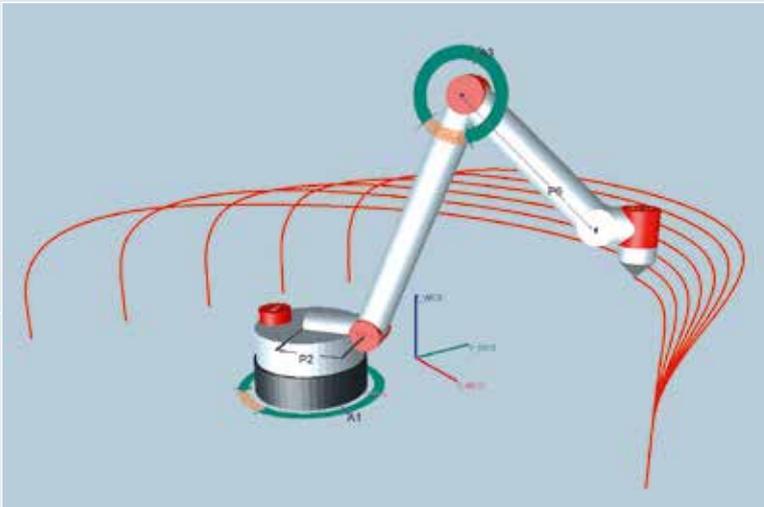
You determine the mechanical system –  
We provide optimum movement

You know which axis arrangement in your machine is best for the application at hand.  
We make sure that graphic configuration and control of your mechanical system is child's  
play.

**There are several dozen different kinematic models available in numerous variants  
for you to choose from:**

- Cartesian gantry
- Roller gantry
- SCARA
- Delta
- Tripod
- Quadropod
- Hexapod
- Articulated
- Mixed
- User





Integrated 3D simulation for startup and diagnostics with automatic adoption and display of real configuration data

The integrated MotionStudio 3D simulation shows you your exact configuration without you having to make any other entries. It is a crucial tool because path control can only correctly navigate through space when dimensions, zero points and directions of movement correspond with the real machine. You will never want to

**You can't find exactly the right model for your mechanical system?**

No problem. If you can sketch it, we can move it. SEW-EURODRIVE creates the right modules – or you can implement your special kinematic

miss this function again if you have already used the simulation function during programming at the office (with or without real axes). Virtual startup helps to prevent collisions and machine damage, and can speed up real startup considerably.

models in specially designed modules. Based on the dynamic modeling of your mechanical system, we also offer support on request in the selection of suitable drive technology.

**Requirements for 3D simulation:**

- MotionStudio
- OMC41B/OMH41B/OMH71B memory card for development/startup with 10 additional technology points for all instances carried out on the controller.
- 30 minute test duration without additional technology points.



## SEW-EURODRIVE is right there for you:

### Argentina

Tel. +54 3327 4572-84  
Fax +54 3327 4572-21  
sewar@sew-eurodrive.com.ar

### Australia

Tel. +61 3 9933-1000  
Fax +61 3 9933-1003  
enquires@sew-eurodrive.com.au

### Austria

Tel. +43 1 617 55 00-0  
Fax +43 1 617 55 00-30  
sew@sew-eurodrive.at

### Belarus

Tel. +375 17 298 47 56  
Fax +375 17 298 47 54  
sales@sew.by

### Belgium

Tel. +32 16 386-311  
Fax +32 16 386-336  
info@sew-eurodrive.be

### Brazil

Tel. +19 3835-8000  
sew@sew.com.br

### Canada

Tel. +1 905 791-1553  
Fax +1 905 791-2999  
marketing@sew-eurodrive.ca

### Chile

Tel. +56 2 2757 7000  
Fax +56 2 2757 7001  
ventas@sew-eurodrive.cl

### China

Tel. +86 22 25322612  
Fax +86 22 25323273  
info@sew-eurodrive.cn

### Colombia

Tel. +57 1 54750-50  
Fax +57 1 54750-44  
sew@sew-eurodrive.com.co

### Czech Republic

Tel. +420 255 709 601  
Fax +420 235 350 613  
sew@sew-eurodrive.cz

### Denmark

Tel. +45 43 9585-00  
Fax +45 43 9585-09  
sew@sew-eurodrive.dk

### Finland

Tel. +358 201 589-300  
Fax +358 3 7806-211  
sew@sew.fi

### France

Tel. +33 3 88 73 67 00  
Fax +33 3 88 73 66 00  
sew@usocome.com

### Great Britain

Tel. +44 1924 893-855  
Fax +44 1924 893-702  
info@sew-eurodrive.co.uk

### Hong Kong

Tel. +852 36902200  
Fax +852 36902211  
contact@sew-eurodrive.hk

### Hungary

Tel. +36 1 437 06-58  
Fax +36 1 437 06-50  
office@sew-eurodrive.hu

### India

Tel. +91 265 3045200  
Fax +91 265 3045300  
marketing@seweurodriveindia.com

### Italy

Tel. +39 02 96 9801  
Fax +39 02 96 980 999  
sewit@sew-eurodrive.it

### Ivory Coast

Tel. +225 21 21 81 05  
Fax +225 21 25 30 47  
info@sew-eurodrive.ci

### Japan

Tel. +81 538 373811  
Fax +81 538 373814  
sewjapan@sew-eurodrive.co.jp

### Kazakhstan

Tel. +7 727 238 1404  
Fax +7 727 243 2696  
sew@sew-eurodrive.kz

### Malaysia

Tel. +60 7 3549409  
Fax +60 7 3541404  
sales@sew-eurodrive.com.my

### Mexico

Tel. +52 442 1030-300  
Fax +52 442 1030-301  
scmexico@seweurodrive.com.mx

### Mongolia

Tel. +976 77109997  
Fax +976 77109997  
sew@sew-eurodrive.mn

### Morocco

Tel. +212 523 32 27 80/81  
Fax +212 523 32 27 89  
sew@sew-eurodrive.ma

### Netherlands

Tel. +31 10 4463-700  
Fax +31 10 4155-552  
info@sew-eurodrive.nl

### New Zealand

Tel. +64 9 2745627  
Fax +64 9 2740165  
sales@sew-eurodrive.co.nz

### Norway

Tel. +47 69 241-020  
Fax +47 69 241-040  
sew@sew-eurodrive.no

### Paraguay

Tel. +595 991 519695  
Fax +595 21 3285539  
sew-py@sew-eurodrive.com.py

### Peru

Tel. +51 1 3495280  
Fax +51 1 3493002  
sewperu@sew-eurodrive.com.pe

### Poland

Tel. +48 42 676 53 00  
Fax +48 42 676 53 49  
sew@sew-eurodrive.pl

### Portugal

Tel. +351 231 20 9670  
Fax +351 231 20 3685  
infosew@sew-eurodrive.pt

### Russia

Tel. +7 812 3332522  
Fax +7 812 3332523  
sew@sew-eurodrive.ru

### Singapore

Tel. +65 68621701  
Fax +65 68612827  
sewsingapore@sew-eurodrive.com

### Slovakia

Tel. +421 2 33595 202  
Fax +421 2 33595 200  
sew@sew-eurodrive.sk

### South Africa

Tel. +27 11 248 7000  
Fax +27 11 248 7289  
info@sew.co.za

### South Korea

Tel. +82 31 492-8051  
Fax +82 31 492-8056  
master.korea@sew-eurodrive.com

### Spain

Tel. +34 94 4318470  
Fax +34 94 4318471  
sew.spain@sew-eurodrive.es

### Sweden

Tel. +46 36 3442 00  
Fax +46 36 3442 80  
info@sew-eurodrive.se

### Switzerland

Tel. +41 61 41717-17  
Fax +41 61 41717-00  
info@imhof-sew.ch

### Tanzania

Tel. +255 22 277 5780  
Fax +255 22 277 5788  
uroos@sew.co.tz

### Thailand

Tel. +66 38 454281  
Fax +66 38 454288  
sewthailand@sew-eurodrive.com

### Turkey

Tel. +90 262 999 1000-04  
Fax +90 262 999 1009  
sew@sew-eurodrive.com.tr

### Ukraine

Tel. +380 56 370 3211  
Fax +380 56 372 2078  
sew@sew-eurodrive.ua

### Uruguay

Tel. +598 2 2118189  
Fax +598 2 2118190  
sewuy@sew-eurodrive.com.uy

### USA

Tel. +1 864 439-7537  
Fax +1 864 439-7830  
cslyman@seweurodrive.com

### Venezuela

Tel. +58 241 832-9804  
Fax +58 241 838-6275  
ventas@sew-eurodrive.com.ve

## How we're driving the world



**SEW-EURODRIVE**  
Driving the world

Fast. Up-to-date. Online: [www.driveworld.de/en](http://www.driveworld.de/en)

ClimatePartner  
climate neutral  
print product

**SEW**  
**EURODRIVE**

SEW-EURODRIVE GmbH & Co KG  
P.O.Box 30 23  
76642 Bruchsal/Germany  
Tel. +49 7251 75-0  
Fax +49 7251 75-1970  
sew@sew-eurodrive.com

→ [www.sew-eurodrive.com](http://www.sew-eurodrive.com)

## Path control – Easy introduction guide

### CCU HandlingKinematics

(see pages 4-5)

#### Which application requires a solution?

- Handling
  Stacking  
 \_\_\_\_\_

#### How are the trajectories defined?

Number of path points: \_\_\_\_\_ (start + max. 20)

- Wait points  Yes  
 Touch probe  Yes  
 Stationary pick and place  Yes

#### What degree of freedom do the kinematic models require?

- X  Y  Z  
 Tool rotation around the Z-axis

### MOVI-PLC® HandlingKinematics

(see pages 6-7)

#### What data is exchanged between the higher-level PLC and the MOVI-PLC®?

- High-resolution positions (>1 WORD per coordinate)  
 \_\_\_\_\_

#### Which automation tasks will the MOVI-PLC® be performing??

- Recipe management (e.g. path points)  
 \_\_\_\_\_

#### Which sensor technology will be connected to the MOVI-PLC®?

- Light barrier  Camera  \_\_\_\_\_

### MOVI-PLC® Kinematics

(see pages 8-9)

#### Which transformations are variable during the runtime?

\_\_\_\_\_

#### In which coordinate systems should path control take place?

\_\_\_\_\_

#### Is synchronized movement of several kinematic models or, for example, CAM required?

\_\_\_\_\_

\_\_\_\_\_

### Mechanical system and kinematics selection

(see pages 10-11)

#### How many drives are there in the mechanical system?

- 2  3  4  5  6  7  8

#### How are the drives and joints arranged?

(sketch on the rear)

\_\_\_\_\_

\_\_\_\_\_

#### Which kinematic model (page 10) matches your mechanical system?

Line no. \_\_\_\_\_

Column no. \_\_\_\_\_

## Your application solution requirements Using path control from SEW-EURODRIVE

Family name / first name

Department / function

Company

Street name / house number

Telephone

Fax

ZIP code / town

Email

Your sketch of the mechanical system/application

Please send this page by fax to the Technical Office near you.  
You can find contact addresses on the rear page of the folder or  
on the Internet at [www.sew-eurodrive.com](http://www.sew-eurodrive.com).

**SEW**  
**EURODRIVE**

SEW-EURODRIVE GmbH & Co KG  
P.O.Box 30 23  
76642 Bruchsal/Germany  
Tel. +49 7251 75-0  
Fax +49 7251 75-1970  
sew@sew-eurodrive.com

→ [www.sew-eurodrive.com](http://www.sew-eurodrive.com)