

BECKHOFF New Automation Technology

Automation solutions
for the semiconductor industry



New Automation Technology

Beckhoff implements open automation systems using proven PC-based control technology. The main areas that the product range covers are industrial PCs, I/O and fieldbus components, drive technology, automation software, control cabinet-free automation, and hardware for machine vision. Product ranges that can be used as separate components or integrated into a complete and mutually compatible control system are available for all sectors. Our New Automation Technology encompasses universal and industry-independent control and automation solutions that are used worldwide in a large variety of different applications, ranging

from CNC-controlled machine tools to intelligent building control. Since Beckhoff was founded in 1980, developing innovative products and solutions based on PC-based control technology has been the cornerstone of the company's continued success. Many automation technology standards that are taken for given today, such as the EtherCAT fieldbus, were developed by Beckhoff and have had a significant impact on the market.

- Beckhoff's benefits for you:**
- stability of an owner-led family-run business
 - sales and service in customers' local languages in over 75 countries
 - free support
 - high-quality production in Germany
 - investment protection through long-term availability and extended lifecycle management

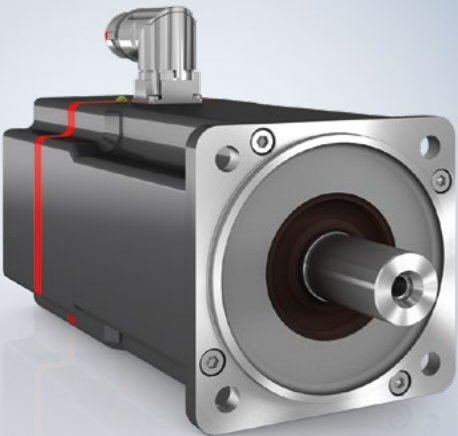
► www.beckhoff.com/company



IPC
We supply panels and industrial PCs for every application – in all performance classes and with the latest technology.



I/O
Use our I/O components to implement your applications with EtherCAT and other common fieldbus systems.



Motion
Our innovative drive technology opens up almost unlimited possibilities for implementing your applications.



Automation
The TwinCAT software platform offers numerous features and function blocks for all automation tasks.



MX-System
Our MX-System bundles together all automation technology innovations into an IP67 modular system.



Vision
This balanced portfolio for machine vision offers complete system integration from a single source.

Automation for the semiconductor industry

From automation and electromobility to communications and AI, many high-growth technologies owe their performance to high-tech chips from the semiconductor industry. Future demand will significantly exceed manufacturers' production capacities. In order to close the gap, existing semiconductor plants must undergo further modernization and new, highly efficient fabs must be built worldwide. High-performance automation technology has a crucial role in fully exploiting the potential for efficiency that the semiconductor industry holds.

PC-based control from Beckhoff is a central control concept for the entire value chain in the

semiconductor industry, from wafer processing in the front end to chip packaging in the back end. Beckhoff also offers integrated automation solutions for electronics assembly. As an integrated control platform, PC-based control is particularly impressive due to its high level of modularity and the versatility it offers.

In terms of hardware, PC-based control uses freely scalable industrial PCs for all control tasks. This includes process control, HMI integration, and motion control as well as any task in robotics, safety and measurement technology or vision and IoT integration. In combination with the modular and real-time-capable TwinCAT software platform

and ultra-fast communication via EtherCAT, PC-based control provides an automation solution for your fabs that is both powerful and future-proof.

► www.beckhoff.com/semiconductor



Beckhoff is a member of various working groups and associations in the semiconductor industry, and is actively involved in the standardization of communication protocols and interfaces.



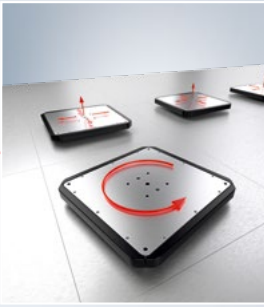
Efficient semiconductor production with Beckhoff



Communication in real time
EtherCAT is by far the fastest communication standard for machine and system control in the semiconductor industry: for the toughest demands on real-time communication in automation technology.



User-friendly operation
HMI functionality via EtherCAT? No problem at all with the integrated automation range from Beckhoff. We have the perfect control panels or panel PCs for you – and can even provide them in your corporate design on request.



Intelligent transport systems
Rigid transport routes and station sequences are a thing of the past with XPlanar from Beckhoff. The intelligent transport system consists of free-floating movers that move dynamically over individually laid XPlanar tiles.



Integrated safety
Thanks to TwinSAFE, no separate control functions are required to implement safety applications. TwinSAFE is future-proof with regard to SEMI S2, S10, and S22, is TÜV-certified, and fulfills all safety requirements.



PC-based control
Instead of conventional PLC systems, Beckhoff relies on a PC-based control system. This powerful control concept uses industrial PCs in combination with TwinCAT automation software.



Integrated measurement technology
Advanced packaging brings new challenges for plant automation in the semiconductor industry. To overcome these, Beckhoff offers highly precise and reliable measurement technology in an I/O format: ELM terminals.



EtherCAT plug-in modules
With the EJ system, Beckhoff offers a plug-in EtherCAT I/O system that is tailor-made for the requirements of the semiconductor industry: It is extremely compact and features an application-specific configuration and integrated functional safety.

EtherCAT: A global standard for the semicon- ductor industry

When Beckhoff launched EtherCAT, the Ethernet technology, in 2003, it set new standards in terms of speed and synchronization precision. This is still true today: EtherCAT is by far the fastest Industrial Ethernet technology and is unchallenged in the market. The synchronization precision is in the nanosecond range. The functional principle is as follows: EtherCAT field devices process the Ethernet frames on the fly. Each device takes the required data and adds more data to the frame as it is forwarded. No switches or hubs are required. Users also benefit from maximum freedom when choosing topology during implementation.

When Beckhoff founded the EtherCAT Technology Group (ETG), they made this open technology a communication standard for real-time requirements in automation technology. This ensures transparency and tailor-made solutions. EtherCAT was declared a SEMI™ standard in 2007. The next milestone was the establishment of a separate Semiconductor Technical Working Group (TWG) within the ETG in 2011. This ensures that the industry always receives up-to-date EtherCAT solutions that are optimized for its requirements.

How you benefit from EtherCAT:

- ultra-fast and reliable communication standard
- permanent compatibility with no version discontinuities despite ongoing development
- innovations for particularly demanding applications:
 - EtherCAT P enables communication and supply voltage in a single line.
 - EtherCAT G with transfer rates of 1 GBit/s and 10 GBit/s



Openness
EtherCAT is an open technology standard that is available to everyone. As the inventor, Beckhoff is by far the largest and most experienced provider of EtherCAT-based control and automation solutions. Both third-party EtherCAT devices and systems that work with other protocols can be integrated into these solutions. This applies without restriction and guarantees maximum design freedom.



Modularity
The origins of the EtherCAT product world lie in the real-time processing of I/O signals. Today, Beckhoff offers a product range that is unparalleled in scope. It covers all the requirements of the semiconductor industry. The range includes fieldbus-independent I/O modules in all performance and protection classes as well as EtherCAT master terminals and box modules.



Safety integration
Effective safety solutions for hardware and software are a must in the semiconductor industry. They can be implemented in an automated and efficient way exclusively with Beckhoff. This is ensured by our TwinSAFE technology in conjunction with the international Safety over EtherCAT standard, which enables real-time transmission of safety-relevant data via the installed EtherCAT network.

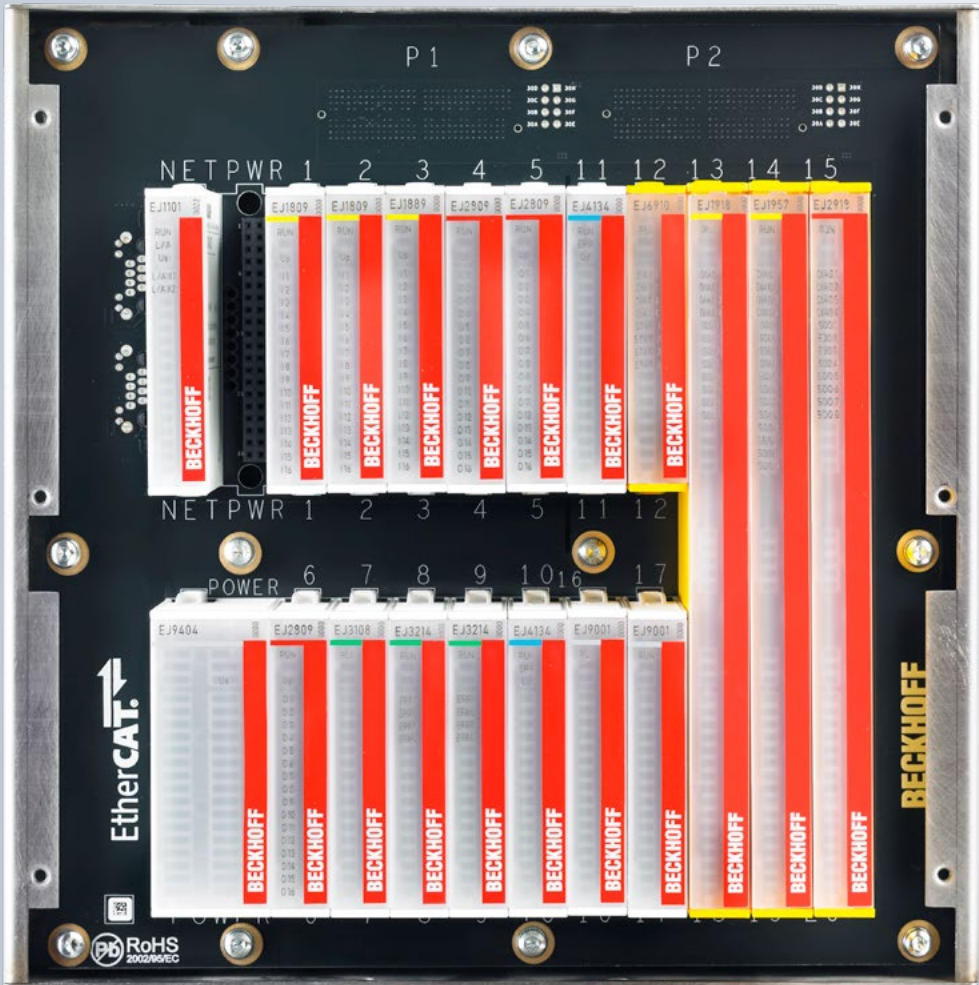
Plug-and-play with EtherCAT plug-in modules

With I/O expertise from Beckhoff, you can automate systems for series production even more efficiently. This is ensured by our EtherCAT plug-in modules from the EJ series. The compact, high-volume I/O modules replace complex and application-specific I/O boards. The EtherCAT modules in the EJ series are designed to be plugged directly onto circuit boards. These distribute signals and electrical voltage to individual, application-specific connectors. Plugging in is quick, saves money, and eliminates the risk of incorrect wiring.

- How you benefit from EtherCAT plug-in modules:**
- simple plug-in method: ideal for large-scale production
 - no more single-wire assembly
 - this reduces costs and sources of error
 - compact design reduces the machine footprint
 - safety and non-safety I/Os combined in the smallest installation space

ID switch for EtherCAT Box modules

With its EtherCAT Box modules, Beckhoff offers an IP67 I/O system. The modules can be mounted directly on the machine. In modular and often dynamic systems such as hot connect groups, individual devices within a network must be uniquely addressed. Products with rotary selection switches make it quick and easy to assign addresses that identify the device within the system. For this reason, a selection of our EtherCAT and EtherCAT P Box modules feature three additional hexadecimal rotary addressing switches. An individual address from 0 to 4095 can thus be set, allowing unique identification regardless of the installation position, as required by some device profiles for certain industries, such as the semiconductor industry.



Power supplies with EtherCAT interface

Beckhoff offers a comprehensive portfolio containing 1- and 3-phase DIN rail power supplies with output currents from 2.5 A to 40 A. Every series wins over customers with consistently high efficiency and low heat loss throughout the range. This has a positive effect on the lifetime and reliability of the power supply units and on machine and system availability. A wide-range input allows these products to be used world-wide. In addition, industries with special requirements such as the semiconductor industry (SEMI F47) can also be served.

Power supplies with an integrated EtherCAT interface also enable monitoring of the DC output and AC input ranges and thus allow the network and system to be monitored – the operating status of the system can be optimally analyzed, and errors can be detected at an early stage.

Scalable industrial PCs with long-term availability

Powerful industrial PCs running TwinCAT form the central platform for PC-based control. You can select the right control system for your application from our extensive portfolio of control cabinet, embedded, and panel PCs. Choose from all performance classes – from single-core to multi-core and many-core – plus all connection types, a range of display sizes, and various form factors and protection ratings. We use standard CPUs and the latest processor technology to offer you maximum-performance control systems that will also provide you with the best possible equipment for future, computationally intensive tasks. Thanks to the scalability of our industrial PC portfolio,

however, you can also select the right device for lower-performance applications – meaning you only pay for the performance you actually need. Since all our industrial PCs are manufactured in our own production facilities using motherboards and scalable standard components made in house, the highest standards of quality and long-term availability are guaranteed. For instance, while individual PC series may be equipped with new processor generations over the years, the housing design remains unchanged and TwinCAT can be easily ported from an old device to a new one. This offers investment protection and ensures maximum availability.

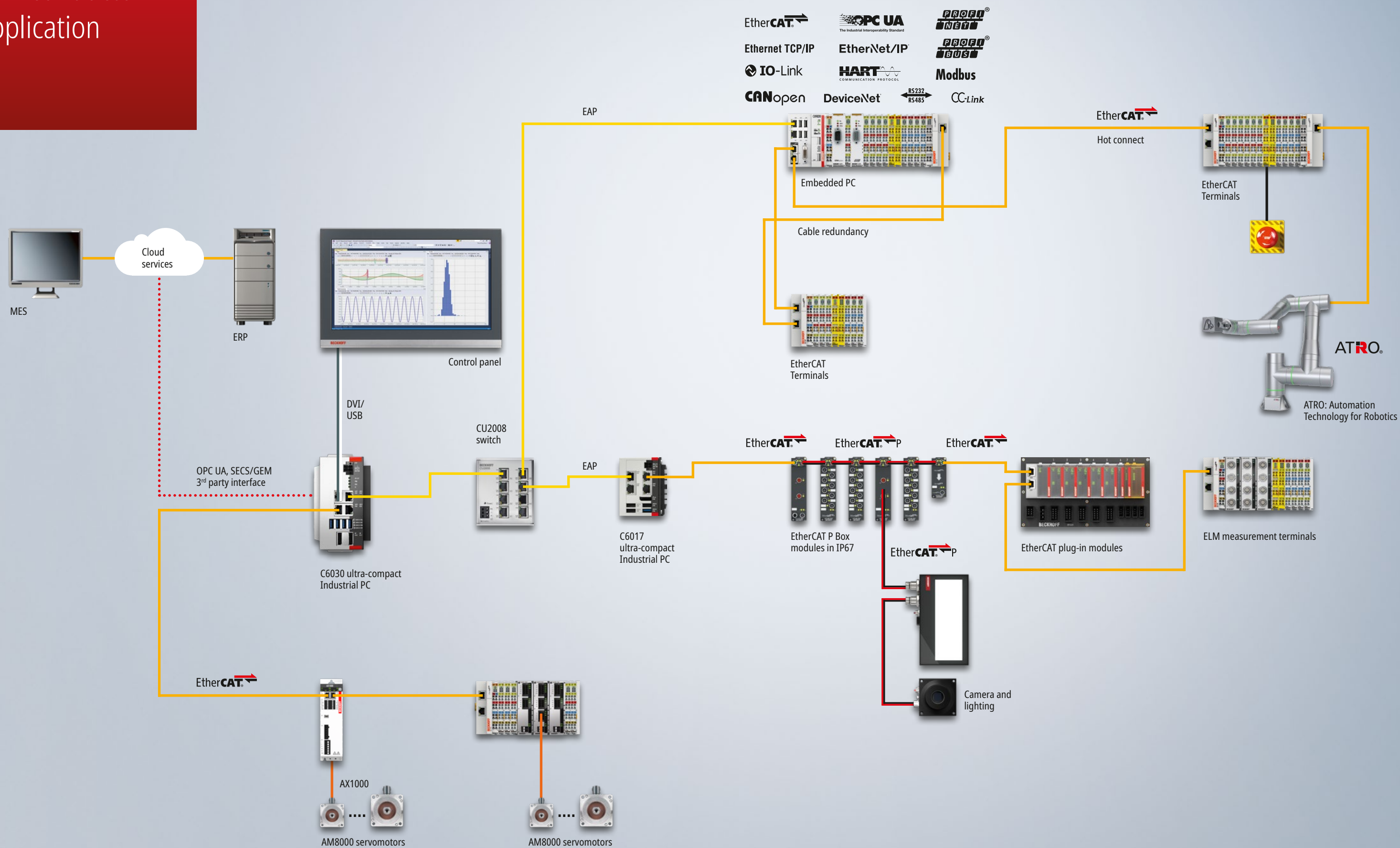


Model	Processor
C6920-0000	Intel® Pentium® M
C6920-0010	Intel® Core™2 Duo
C6920-0020	Intel® Core™2 Duo
C6920-0030	Intel® Core™2 Duo
C6920-0040	3rd generation Intel® Core™ i7
C6920-0050	4th generation Intel® Core™ i7
C6920-0060	7th generation Intel® Core™ i7
C6920-0070	9th generation Intel® Core™ i7
C6920-0080	11th generation Intel® Core™ i7

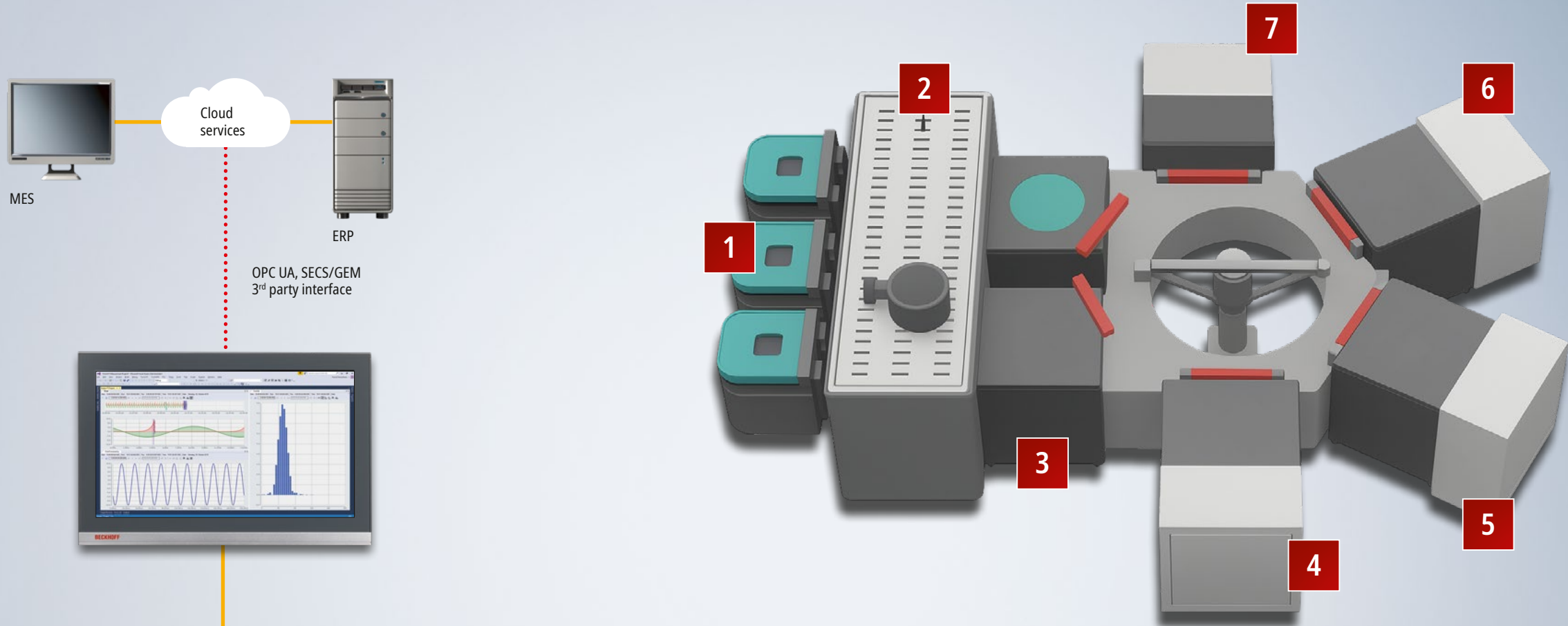
Year	Model
2005	C6920-0000
2007	C6920-0010
2009	C6920-0020
2010	C6920-0030
2012	C6920-0040
2014	C6920-0050
2017	C6920-0060
2020	C6920-0070
2023	C6920-0080

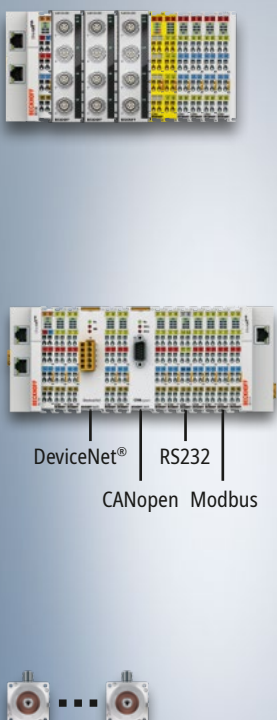
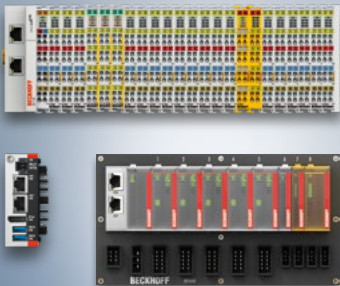
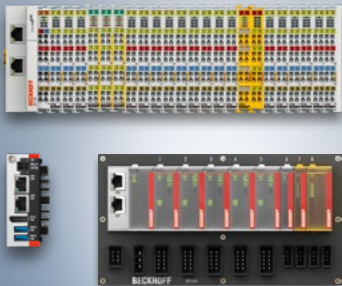
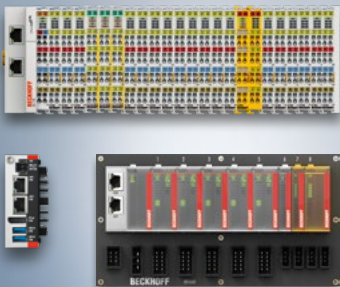
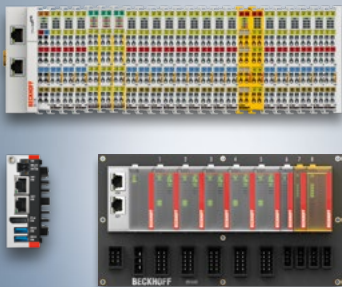


Modular port-
folio for any
semiconductor
application



Control components for a deposition system



1	Loadport	2	EFEM and aligners	3	Loadlock	4	Chamber 1	5	Chamber 2
									
6	Chamber 3	7	Chamber 4						
									

Our references



Fabmatics, Germany

Beckhoff technology used for automated handling of wafers

► www.fabmatics.com



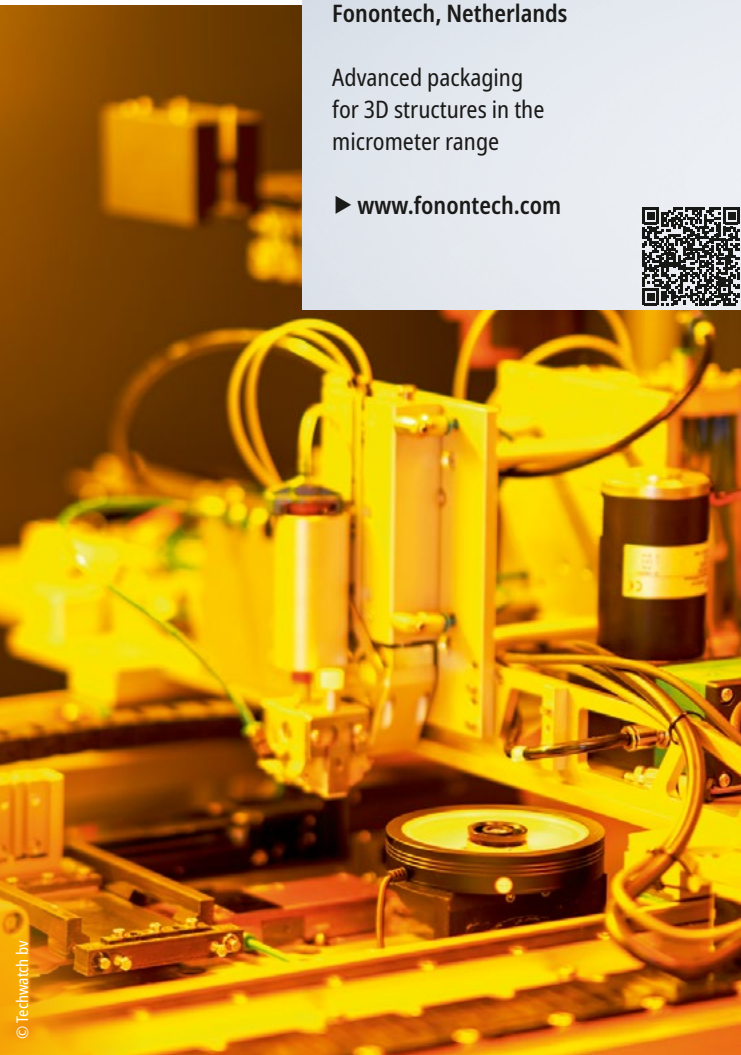


Agnitron, USA

Flexible MOCVD system uses PC-based control as a modular machine basis

► www.agnitron.com





Fonontech, Netherlands

Advanced packaging for 3D structures in the micrometer range

► www.fonontech.com



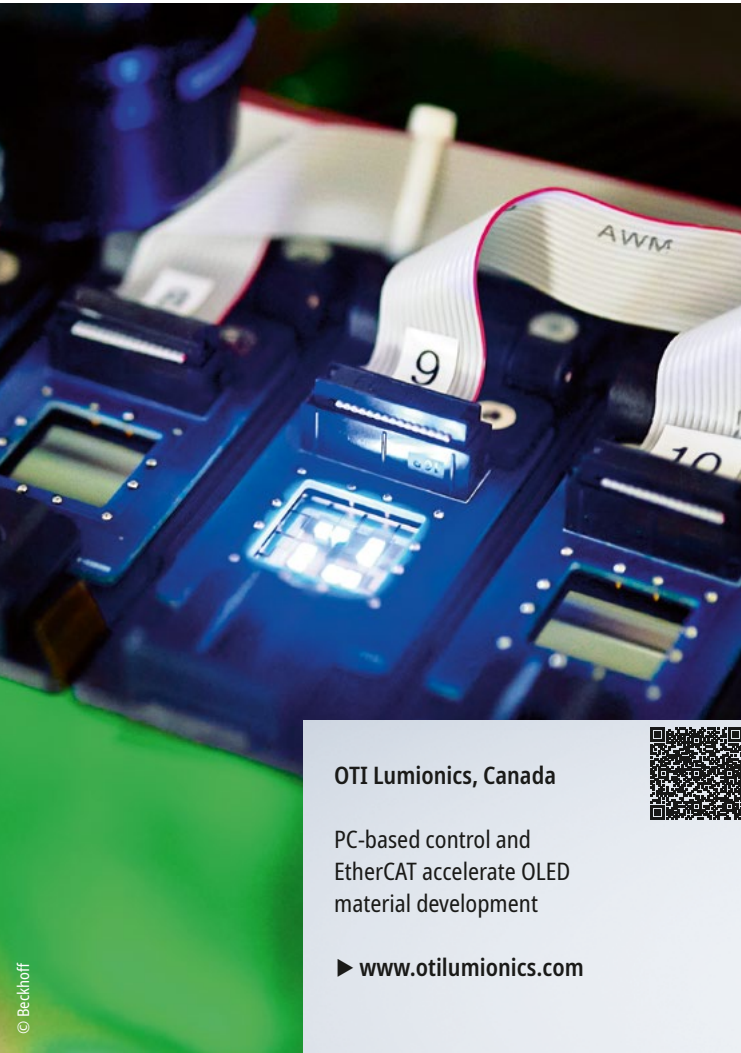


Jingsheng Mechanical & Electrical, China

Flexible automation of single-crystal growth furnaces increases competitiveness

► www.jsjd.cc





OTI Lumionics, Canada

PC-based control and EtherCAT accelerate OLED material development

► www.otilumionics.com



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MULTIBEAM
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ASMPT enabling the digital world

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