High-performance, sturdy, flexible: the C7015 ultra-compact Industrial PC in an IP 65/67 version
Fanless ultra-compact Industrial PC for direct machine integration in IP 65/67

The C7015 is an inexpensive but powerful IP 65/67 device for direct mounting on the machine. In keeping with the current trend, this space-saving universally mountable Industrial PC hardware is perfectly suited to modern Industrie 4.0 concepts. A wide variety of onboard interfaces enables the networking of machine or plant sections in the cloud or other networks. Moreover, the integrated EtherCAT P connection offers undreamt-of possibilities for the direct connection of actuators and sensors via EtherCAT P Box modules with IP 67 protection. The decentralized solving of complex diagnostic or Condition Monitoring tasks is thus possible. The Beckhoff module motherboard and the housing combination of die-cast zinc and aluminum have been developed in typical Beckhoff style for industrial suitability, long-term availability and reliability. Despite passive cooling, the C7015 is suitable for a temperature range up to +50 °C. On account of its wide variety of interfaces (3 x LAN, 2 x USB, Mini Display Port), 40 GB M.2-SSD with 3D Flash and integrated Intel-Atom® CPU (maximally quad-core) with universal multi-core support for TwinCAT 3, the sturdy Industrial PC can be used for simultaneous, high-performance automation, visualization and communication: from the classic machine controller to modern Industrie 4.0 concepts as an edge device.

www.beckhoff.com/C7015

Product announcement
For availability status of the new products see Beckhoff website at: www.beckhoff.com
Measuring just 82 x 127 x 40 mm and combining high computing performance with a fanless design, the new C6025 IPC is an ideal choice for demanding control applications where green, sustainable IT is also a requirement. It is built around the Intel® Core™ i U processors that deliver Core™ i performance capabilities yet consume significantly less power than other processors of the same series. The 8th Gen Intel® Core™ i U processors used in the C6025 also offer an advantage which is typical of evolving PC technology: higher performance at the same price point. With this new addition, the Beckhoff portfolio of industry-ready and long-term available Industrial PCs now spans five CPU performance classes – from ARM through to Intel® Xeon® – for maximum scalability.

www.beckhoff.com/C60xx
www.beckhoff.com/C6025
An alternative operating system – TwinCAT/BSD – is available for all Beckhoff Industrial PC platforms. TwinCAT/BSD combines the TwinCAT 3 runtime XAR with FreeBSD, an industrially tested and reliable open source operating system. In addition to multi-core support and a small footprint, TwinCAT/BSD with the Beckhoff Package Server offers a simple option for installing TwinCAT 3 functions and FreeBSD applications or updating the entire system. TwinCAT/BSD supports all TC3 functions and additionally enables the use of the modern HTML5-based TwinCAT HMI. The engineering is still carried out with the familiar Microsoft Visual Studio®-based TwinCAT XAE from a Windows development computer. Many well-known Linux programs can also be used with TwinCAT/BSD.

www.beckhoff.com/IPC

New high-performance processors for the CX20xx series

The CX2033 has an AMD Ryzen™ V1202B CPU with 2.3 GHz and 2 cores, while the CX2043 has an AMD Ryzen™ V1807B CPU with 3.35 GHz and 4 cores. In the case of the CX2033 the controller is fanless and has no rotating components. Due to its high power, the CX2043 has a fan with ball bearings and speed monitoring. The AMD Ryzen™ processors combine support for 32-bit and 64-bit operating systems with excellent real-time performance. It is possible to run the many new 64-bit applications yet continue to support existing 32-bit applications and give them a performance boost in the process.

www.beckhoff.com/CX2033
www.beckhoff.com/CX2043

www.beckhoff.com/CX20xx

For availability status of the new products see Beckhoff website at: www.beckhoff.com
The Embedded PCs of the CX7000 series have an ARM Cortex™ M7 single-core processor with 400 MHz. In the basic configuration, they have a slot for a microSD card and an Ethernet interface. As a special feature, the CX7000 series has eight integrated multi-functional inputs as well as four integrated multi-functional outputs.

The CX7000 does not have a fieldbus interface. The CX7080 offers two serial interfaces, one with RS232 and one with RS485 physics. Both serial interfaces are on one D-sub socket of the CX7080.

E-bus or K-bus terminals can be attached as required; the CX70xx automatically recognises the type of I/O system connected during the start-up phase. The control system is programmed with TwinCAT 3 via the Ethernet interface.

www.beckhoff.com/CX7000

We reserve the right to make technical changes.
EtherCAT G: Ultimate I/O Performance

Beckhoff presents EtherCAT G for use in high-performance machines and highly complex applications. As a continuation of the EtherCAT success principle, speeds of 1 Gbit/s or 10 Gbit/s are now available. The transmission rate of 100 Mbit/s currently used by EtherCAT can thus be increased by a factor of 100. Both performance steps can be regarded as system-compliant supplements to the EtherCAT technology. The branch concept enables the integration of 100 Mbit/s EtherCAT segments and reduces the lead times in large networks through the parallel processing of the segments.

Branch Controller

- Branch controller system
- optimises propagation delay
- integration of 100 Mbit/s EtherCAT segments

EK1400 | EtherCAT G Coupler

The EtherCAT G Coupler connects EtherCAT with the EtherCAT Terminals (ELxxxx). One station consists of an EK1400 coupler, any number of EtherCAT Terminals and an EL9011 bus end cap or an EK1110 EtherCAT extension. The coupler can be used as an EtherCAT G branch controller.

▶ www.beckhoff.com/EK1400

News | I/O

Product announcement

For availability status of the new products see Beckhoff website at: www.beckhoff.com
The EtherCAT G branch controllers enable transparent conversion of transmission rates of EtherCAT G and EtherCAT. The CU1418 connects eight EtherCAT segments to an EtherCAT G network.

www.beckhoff.com/CU1418
Current transformers for power measurement

EL3446 | Real power values despite separate measurements
The EL3446 EtherCAT Terminal enables the measurement of all relevant electrical data of the supply network and carries out simple preevaluation:
- true power measurement data despite distributed measurement
- includes calculation of apparent, active and reactive power components
- based on the EtherCAT distributed clocks system
- one-time voltage measurement with synchronization via DC

www.beckhoff.com/EL3446

ELX3158 | 8-channel analog input terminal 0/4…20 mA, single-ended, 16 bit, Ex i
The product range of ELX terminals is continuously being expanded. The ELX3158 analog input terminal allows the direct connection of intrinsically safe field devices located in hazardous areas classified Zone 0/20 or 1/21. It supplies measuring transducers located in the field and transmits their analog measuring signals electrically isolated to the automation device.

www.beckhoff.com/ELX3158

Product announcement
For availability status of the new products see Beckhoff website at: www.beckhoff.com
With the SCT current transformers, Beckhoff completes the energy measurement chain from recording the physical measured value to data transmission in the cloud. The portfolio of the new current transformers covers all relevant applications: for currents from 1 to 5,000 A and with versions as ring-type current transformers for new installations or split-core current transformers for flexible retrofitting.

The SCT current transformers offer the possibility of implementing reliable power sensors directly in the field as an integral component of PC-based control technology. Two concepts can be selected, each highly scalable via different designs and performance classes and therefore suitable for a wide variety of applications. The SCT series is extremely diverse, ranging from cost-effective 3-phase transformer sets for building technology to standard industrial transformers for mechanical engineering and solutions for test benches with particularly high accuracy requirements.

www.beckhoff.com/SCTxxxx
Flying Motion: **XPlanar**

XPlanar opens up new degrees of flexibility in mechanical engineering, because the system combines the individual arrangement of the tiles with the multi-dimensional positioning capability of the movers on six axes. On top of that, the contact-free process is absolutely noiseless without mechanical abrasion and without the release of particles. All surfaces are smooth, easy to clean and can be coated to meet all application-specific requirements. The number of movers and tiles is freely selectable.

► www.beckhoff.com/xplanar

**XPlanar mover:**
- passive component
- no electronics
- no mechanics
- easy to clean

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**The planar principle:**
A planar mover incorporating permanent magnets levitates above planar modules that generate a magnetic field and detect the mover position.
XPlanar tile:
- highly integrated
- flexible use
- simple implementation

XPlanar floor:
- needs-based layout
- choice of surface finishes
- no wear

EtherCAT G:
high-performance fieldbus with 1 Gbit/s

Lifting, lowering, weighing: variable in height by up to 5 mm.

Wall and ceiling travel: vertical and upside down.

Carries loads of up to 6 kg – even more in a group.

Tilting by 5° for transporting and handling liquids.

Special planar modules for rotating movers by 360° – increased flexibility.

We reserve the right to make technical changes.
Smart servo drive with integrated output stage

The integrated AMI812x servo drive combines servomotor, output stage and fieldbus connection in a space-saving design and supports the principle of machines without control cabinets in an unparalleled way. The bundling of the individual components results in a connection level with all interfaces directly on the servo drive, eliminating the need for a separate I/O level.

Connections of the AMI812x
- M12-Powerinterface for electronic and performance
- M8 bus interface for EtherCAT for simple cascading of the topology
- M8 I/O interface for direct connection of two sensors or actuators

www.beckhoff.com/AMI81xx

XTS Hygienic | Advantage for hygienically demanding environments
The fully encapsulated mechatronic transport system, XTS Hygienic combines the advantages of rotary and linear drive systems for demanding environmental conditions. With a matching set of only a few components, the most diverse applications in the food and pharmaceutical industries can be realised.

A key benefit is the compact design and flexible modular system of the motor modules. As central components of the mechatronic system, they can also be quickly mounted and dismounted. The connection of the modules is particularly simple due to the lateral plug contacts for power and communication transmission. The electronic connection contacts can be fed out with or without a supply cable. The power supply points or the number of power supplies can be adjusted without dismounting the motor modules.

www.beckhoff.com/XTS-hygienic
The TwinCAT Analytics product family describes a complete workflow from the acquisition of data to its communication and historization to its analysis and visualization in web-based dashboards. The new One-Click Dashboard feature increases engineering efficiency by automatically generating the web-based analysis interface.

www.beckhoff.com/Analytics

Seamless integration of NI™ hardware and software in Beckhoff’s open control technology

The TwinCAT Engineering TE3700 Beckhoff I/O VIs for LabVIEW™ provides usable VIs in LabVIEW™ that enable the convenient configuration of Beckhoff EtherCAT terminals on the LabVIEW™ EtherCAT master. The TwinCAT 3 function TF3710 Interface for LabVIEW™ provides VIs for LabVIEW™ that enable ADS communication to TwinCAT 3 and TwinCAT 2 runtimes. In addition, a VI is included for the temporal synchronization of LabVIEW™ and TwinCAT via the NTP protocol.

www.beckhoff.com/TE3700
www.beckhoff.com/TF3710

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TwinCAT Machine Learning: Scalable, open and in real time

Machine learning for all areas of automation
Beckhoff now offers a machine learning (ML) solution that is seamlessly integrated into TwinCAT 3. Building on established standards, it brings to ML applications the advantages of system openness familiar from PC-based control. In addition, the TwinCAT solution supports machine learning in real time, allowing it to handle demanding tasks like complex motion control. Its capabilities provide machine builders with an optimum foundation for enhancing machine performance.

The fundamental idea with machine learning is to no longer follow the classic engineering route of designing solutions for specific tasks and then turning these solutions into algorithms, but to enable the desired algorithms to be learned from model process data instead.

For data collection, various proven TwinCAT products are available such as e.g. TC3 Database Server TF6420 or TC3 Scope Server TF3300. Training is performed in established frameworks such as MATLAB®, TensorFlow, PyTorch, SciKit-learn, a.o. A trained model can be easily imported into the TwinCAT runtime in a standardised format (ONNX).

In automation technology, this opens up new possibilities as well as optimisation potential in such areas as predictive maintenance and process control, anomaly detection, collaborative robotics, automated quality control, and machine optimisation.

▶ www.beckhoff.com/machine-learning

For availability status of the new products see Beckhoff website at: www.beckhoff.com
TwinCAT Cloud Engineering: for all instances and controls

PC-based control offers a central, open and comprehensive machine control platform ideal for delivering highly efficient, IoT-based automation strategies. It enables machines, plants and production lines to be connected in ways that unlock their full efficiency potential across entire processes. In this context, TwinCAT Cloud Engineering adds a new dimension by providing users with an easy means of engineering TwinCAT instances and controllers in the cloud.

The key benefits of TwinCAT Cloud Engineering:
- instantiation and operation as a virtual machine in the cloud
- direct access through the Beckhoff website
- simple, secure access to control hardware
- all the benefits of the TwinCAT architecture
- simplified collaboration
- a choice of user models

www.beckhoff.com/cloud-engineering