

One Cable Automation – the path to plug-and-play automation without control cabinets

EtherCAT P combines ultra-fast communication and power supply in a single cable

With EtherCAT P, Beckhoff is expanding its EtherCAT technology which has become an established global standard. The solution combines ultra-fast EtherCAT communication with 24 V power for the system and peripherals – and optionally with additional power supply capabilities. This means that One Cable Automation (OCA) can now be implemented on the field level, enabling the plug-and-play connection of machines and other equipment ranging from 24 V sensors to 600 V drivers without the need for control cabinets.



EtherCAT P combines the 24 V DC power supply for EtherCAT P slaves and connected sensors and actuators in a single 4-wire standard Ethernet cable. U_S (system and sensor supply voltage) and U_P (peripheral voltage for actuators) are electrically isolated from each other and can supply current of up to 3 A to the connected components.

EtherCAT P – the ideal bus for sensors, actuators, and measurement technology components

With EtherCAT P, the U_S and U_P currents are directly fed into the wires of the 100 Mbit/s line resulting in a highly cost-effective and compact connection. This makes EtherCAT P the ideal bus for sensors, actuators and measurement technology components with benefits for connecting small I/O stations in the terminal box as well as distributed I/O components. Beckhoff developed for EtherCAT P a special M8 connector whose mechanical encoding prevents it from being confused with connectors for standard EtherCAT slaves.

To be able to connect components with higher voltage and/or current needs, a complete EtherCAT P connector family has been designed that covers all appli-

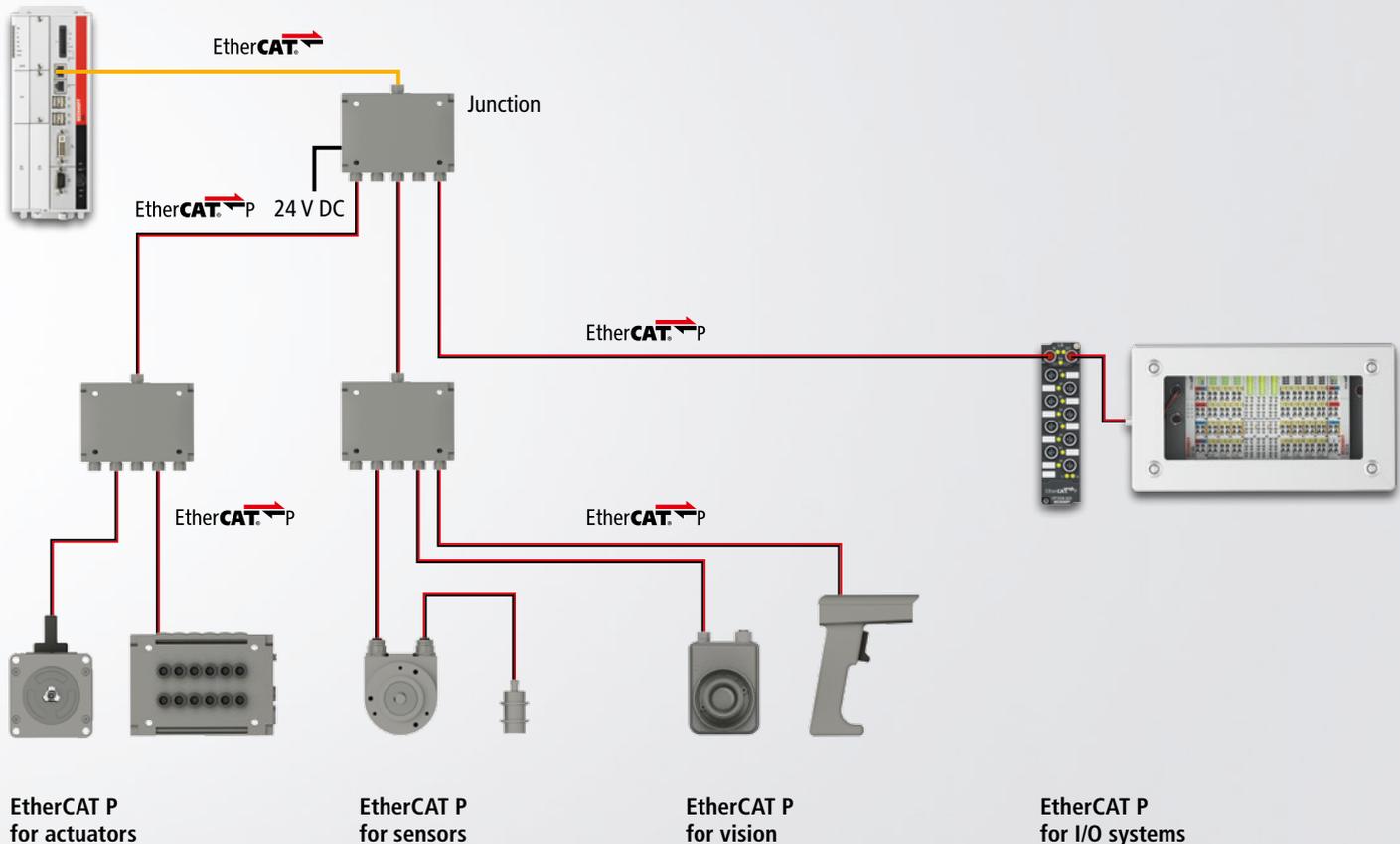
cations up to drives with 400 V AC or 600 V DC and up to 64 A ratings. Thus, the new connectors make it easy to connect all field level components. For I/O applications, the interfaces are available with IP 20 and IP 67 ratings. The system is also suitable for AC and DC motors, actuators, valve terminals and sensors such as proximity switches, light barriers, or rotary encoders. For vision applications you can connect cameras, barcode scanners and 3D scanners.

EtherCAT P simplifies system wiring

The fundamental idea of EtherCAT P is to simplify the system wiring by reducing the number of connectors on automation components and devices. The one-cable solution, which is highly scalable according to individual power requirements, can be deployed on the entire field level. For 24 V applications, a standard Ethernet cable can be used. For higher voltages and currents, EtherCAT P is integrated into the respective power supply line. Beckhoff offers a wide range of cables and connectors for these applications.

Eliminating separate power lines reduces the cost of materials and assembly as well as the risk of installation errors. It also minimizes the space requirements

EtherCAT master



EtherCAT P provides connectivity across the entire field level with an efficient one-cable solution.

for cable routes, in control cabinets, and in the machine itself. Other benefits include smaller and more clearly arranged cable runs as well as smaller sensors and actuators. This gives machine manufacturers more design options while minimizing hardware and system costs through a convenient, tool-assisted system layout.

Flexible topology through power supply forwarding

Engineers benefit from the same flexible choice of topologies they are well familiar with from EtherCAT. Linear, star and tree structures can be freely combined to achieve the most cost-effective and efficient system layout. Unlike with classic Power over Ethernet (PoE), EtherCAT P users can also be cascaded and supplied by a single feed-in device. The cascading of EtherCAT P devices is limited only by the voltage drop, but this can be remedied with additional power feed-in points.

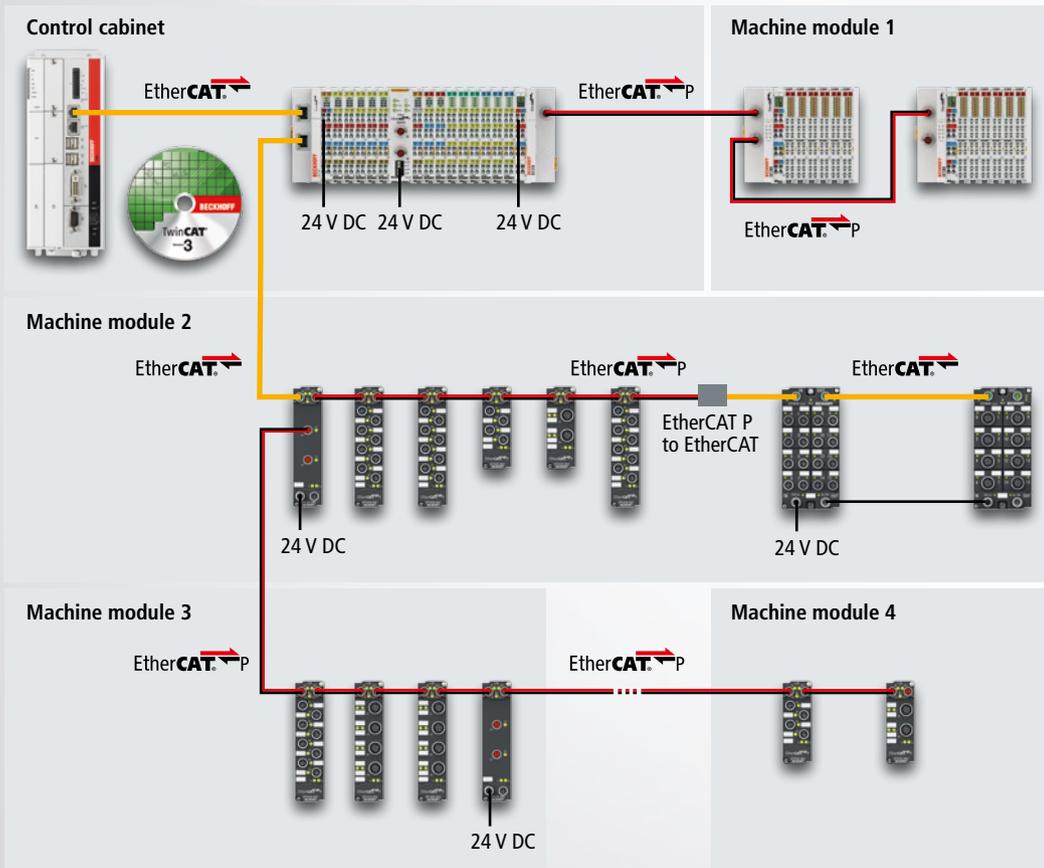
To build custom EtherCAT P topologies, many infrastructure and I/O components with IP 20 and IP 67 ratings are already available. Since with EtherCAT P distances of 50 meters and more can be bridged, even widely distributed machine

modules can be easily linked. A seamless transition from an EtherCAT to an EtherCAT P network is also possible. Reversely, system and peripherals voltage on an EtherCAT P network can be blocked with a simple adapter to run EtherCAT devices with their own power supply.

To design or plan a machine, the individual users and cable lengths can be configured with a special TwinCAT design tool. Since the system knows the data of all users, it can also take the individual devices' power consumption over time into account. For example, if for logical reasons two actuators never switch at the same time, they never require full power at the same time. This produces additional potential savings with regard to the feed-ins and power supply units required.

One Cable Automation for the field level

EtherCAT P was developed to enable One Cable Automation across the field level. With its simpler system cabling, it makes machine designs much less complex and reduces engineering and production costs considerably. Automation components, distributed terminal boxes and even individual machine modules

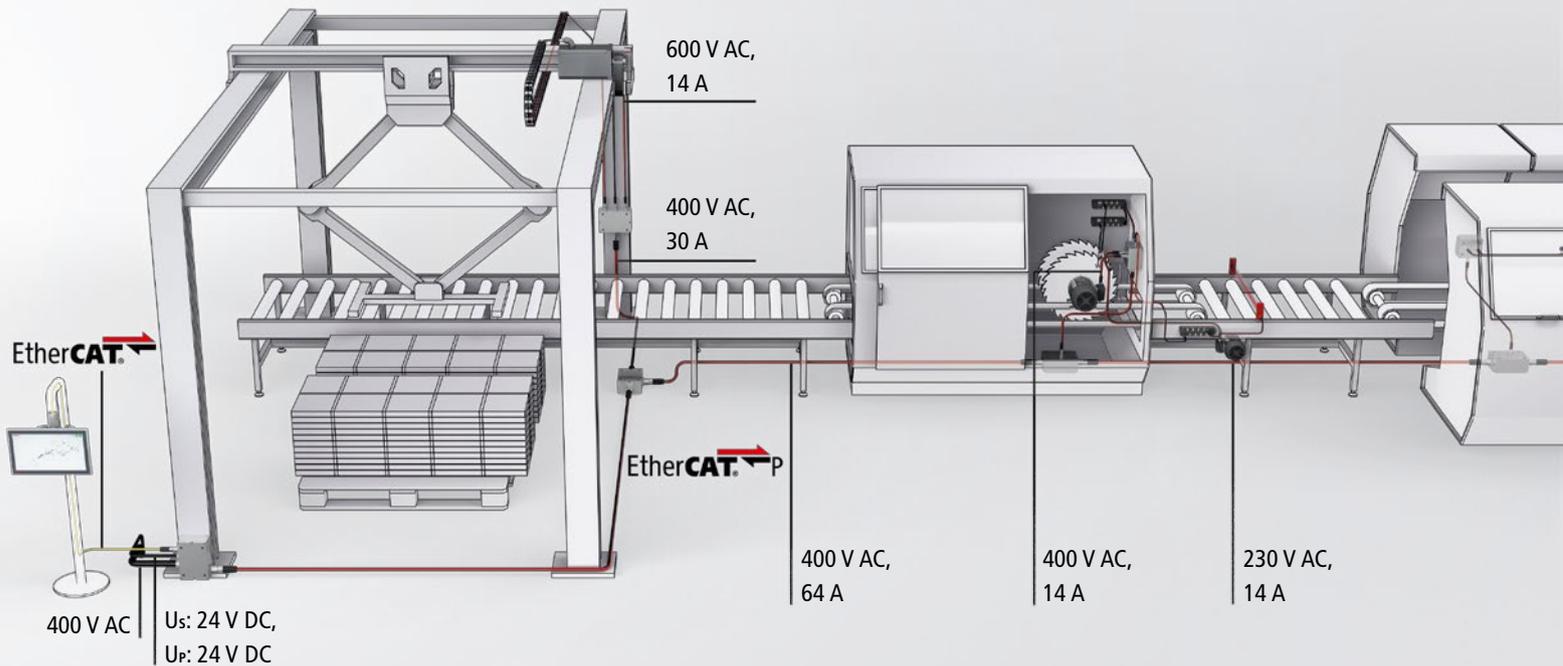


With numerous EtherCAT P components in IP 20 and IP 67 protection ratings already being available, users can implement the best-possible network topology for their application.

EtherCAT P: Highlights and benefits

EtherCAT is an open industrial Ethernet technology developed by Beckhoff that has been an international IEC and SEMI standard since 2007. The advanced EtherCAT P technology, which was recently introduced and has already been disclosed via the EtherCAT Technology Group (ETG) in the proven way, is fully compatible with traditional EtherCAT. As a result, the outstanding characteristics of EtherCAT such as 100 Mbit/s full-duplex communication down to the sensor or actuator, data processing on the fly, highly accurate synchronization with distributed clocks, and cycle times of less than 100 μ s, will continue to be available without restrictions. Additional EtherCAT P-specific benefits include:

- EtherCAT + 2 \times 24 V DC/3 A over only one 4-wire cable
- Power supply forwarding to connected devices
- Scalable connector family from 24 V DC to 600 V DC and 64 A
- Freedom and flexibility in topology selection through cascability
- Outstanding EtherCAT performance with low connection costs
- Reduced hardware and installation costs
- Fewer sources of errors and minimized wiring cost
- Optimized space utilization for cable tracks, control cabinets and machines
- Elimination of separate power supply lines makes smaller sensors and actuators possible



With its EtherCAT P cabling for various performance classes of automation components, One Cable Automation provides the optimal foundation for modular plant and machine design.

and robots receive their power and their control signals over a single cable. Large control cabinets, previously unavoidable, can be reduced in size or even eliminated. As a result, modular machine and system concepts can now be implemented with lower assembly and startup costs, reduced footprints, and maximized flexibility.

Pluggable automation will deliver maximum efficiency in the future. As EtherCAT P connectors for various power requirements become established as a standard, the idea of industrial connector strips for 24 V and higher power classes is not farfetched, but a viable solution. Machine designers could distribute such strips with great flexibility and at low cost in an machine or installation according to the individual application requirements. Such a plug-and-play design which requires only the insertion of a matching EtherCAT cable would make it easy to connect all required sensors and actuators as well as distribution boxes and standalone machine modules.



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Further information:

www.beckhoff.com/EtherCATP