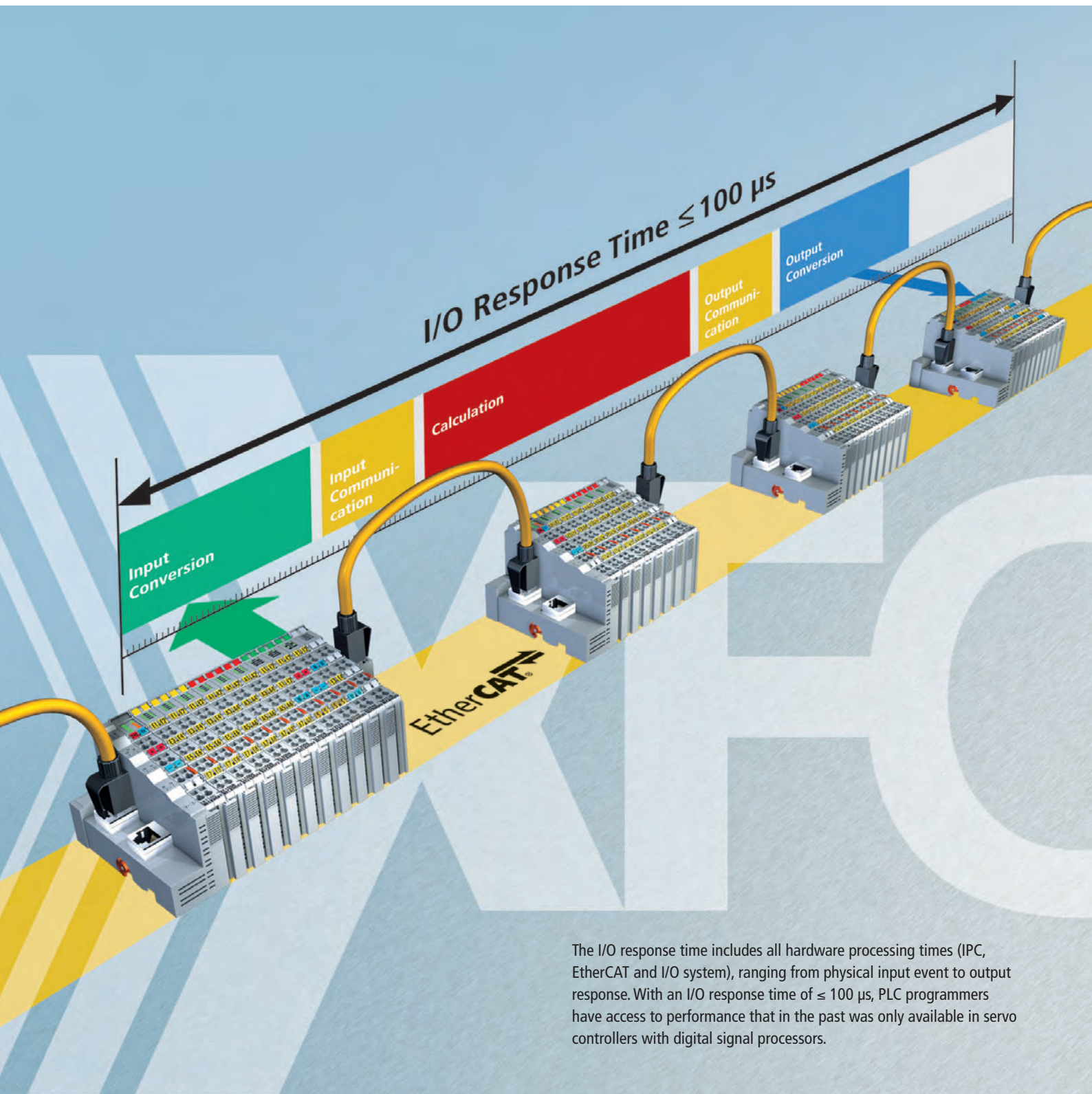


XFC – The new class of Control Performance



The I/O response time includes all hardware processing times (IPC, EtherCAT and I/O system), ranging from physical input event to output response. With an I/O response time of $\leq 100 \mu\text{s}$, PLC programmers have access to performance that in the past was only available in servo controllers with digital signal processors.

With XFC technology (eXtreme Fast Control Technology) Beckhoff presents a new, fast control solution: XFC is based on an optimised control and communication architecture comprising an advanced Industrial PC, ultra-fast I/O terminals with extended real-time characteristics, the EtherCAT high-speed Ethernet system, and the TwinCAT automation software. With XFC it is possible to realise I/O response times $\leq 100 \mu\text{s}$. This technology opens up new process optimisation options for the user that were not possible in the past due to technical limitations.

XFC represents a control technology that enables very fast and highly deterministic responses. It includes all hardware and software components involved in control applications: optimised input and output components that can detect signals with high accuracy or initiate tasks; EtherCAT as very fast communication network; high-performance Industrial PCs; and TwinCAT, the automation software that links all system components.

Not long ago, control cycle times around 10–20 ms were normal. The communications interface was free-running, with corresponding inaccuracy of the determinism associated with responses to process signals. The increased availability of high-performance Industrial PC controllers enabled a reduction in cycle times down to 1–2 ms, i. e. by about a factor of 10. Many special control loops could thus be moved to the central machine controller, resulting in cost savings and greater flexibility in the application of intelligent algorithms.

XFC offers a further reduction of response times by a factor of 10, and enables cycle times of $100 \mu\text{s}$, without having to give up central intelligence and associated high-performance algorithms. XFC also includes additional technologies that not only improve cycle times, but also temporal accuracy and resolution.

Users benefit from entirely new options for enhancing the quality of their machines and reducing response times. Measuring tasks such as preventive maintenance measures, monitoring of idle times or documentation of parts quality can simply be integrated in the machine control without additional, costly special devices.

In a practical automation solution, not everything has to be extremely fast and accurate – many tasks can still be handled with “normal” solutions. XFC technology is therefore fully compatible with existing solutions and can be used simultaneously with the same hardware and software.

XFC: Optimised control and communication architecture for highest performance

TwinCAT – The extreme fast real-time control software

- real-time under Microsoft Windows down to $50 \mu\text{s}$ cycle time
- standard IEC 61131-3 programming in XFC real-time tasks
- Standard features of Windows and TwinCAT are XFC-compliant.

EtherCAT – The extreme fast control communication technology

- 1,000 distributed digital I/Os in $30 \mu\text{s}$
- EtherCAT down to the individual I/O terminals, no sub bus required
- optimised use of standard Ethernet Controllers, e. g. Intel® PC chipset architecture
- advanced real-time feature based on distributed clocks
 - synchronisation
 - time stamping
 - oversampling

EtherCAT Terminals – The extreme fast I/O technology

- full range I/O line for all signal types
- high-speed digital and analog I/Os
- Time stamping and oversampling features allow extreme high timing resolution (down to 10 ns).

IPC – The extreme fast control CPU

- Industrial PC based on high performance real-time motherboards
- compact form factors optimised for control applications

www.beckhoff.com/XFC

www.beckhoff.com/EtherCAT