Industry-Leading High Performance EtherCAT Motion Controller

EtherCAT®

What is EtherCAT?

EtherCAT is a real-time Ethernet network protocol, originally developed by Beckhoff. EtherCAT sets new standards for real-time performance and topological flexibility.

Why EtherCAT?

There are several reasons and advantages:

- Exceptional performance
- Flexible topology
- Simple and Robust
- Integrated Safety
- Affordability

KSMC-ECAT is one of the **KSMC® Motion Controller** Series of products and is specialized in working as an EtherCAT master with Motion Controller functionalities. KSMC-ECAT is available on different hardware platforms as shown in Table-1. EM4 is our PC-based product option which uses a Mini-ITX Form Factor Industrial PC (IPC) as the master platform. The EtherCAT master runs on one of the real-time processes managed by RTOS, and controls slave units directly from the x86 platform. EM4 does not need any additional hardware (PCB) to perform master functionalities. The x86 platform becomes the Industrial EtherCAT master controller directly.

Software Package

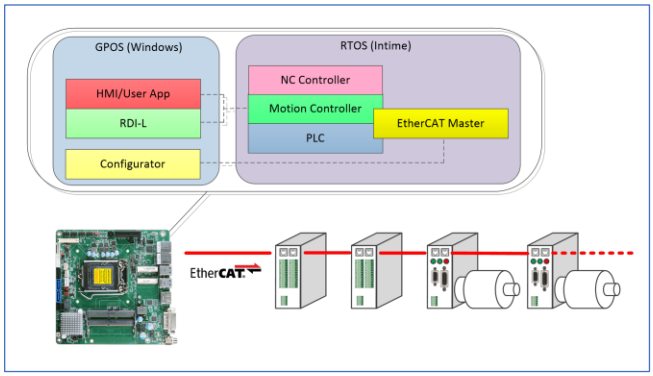
The KSMC-ECAT EM4 is available with optional software to add on top of the Motion Controller.

- EtherCAT Master
- Motion Controller
- PLC (optional)
- NC Controller (optional)
- HMI Builder (optional)
- User Application (optional)

Table-1: ESMC-ECAT Hardware Platform

Name	Type	H/W Platform	Features
EM1	PCB	KSMC-ECAT	EtherCAT Master/Motion Controller
EM2	PCB	LCZIO+SOM	EtherCAT Master/Motion Controller/Vision/Galvano Master
EM3	PCB	ECZIO+SOM	EtherCAT Master/Motion Controller
EM4	PC	X86	EtherCAT Master/Motion Controller/PLC/User Application

Figure-1: Software in KSMC-ECAT - EM4



EtherCAT Master Controller

EtherCAT Master Controller is an in-house developed master motion controller called EE-Master. EE-Maser has Class-A features such as Cyclic PDO, Cable Redundancy, and a Distributed Clock, with many more features. Please refer to the ETG.1500 documents for details on EtherCAT Master.

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Be Flexible and Productive with KSMC-ECAT

SODICK FAMILY

We opened our office in San Jose, CA, in the middle of Silicon Valley, back in 2000 as an R&D subsidiary of Sodick Co., Ltd.

MOTION SPECIALISTS

We have developed several Motion Controllers that have proven its stability, flexibility, and reliability in diverse types of Sodick machines (EDM, MC, 3DP, IMM) for over 20 years.

KSMC® Motion Controllers

- KSMC
- KSMC-SILINK
- KSMC-M4LINK
- KSMC-MALINK
- KSMC-A4
- KSMC-IX
- KSMC-ECAT

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Motion Key Features

- Up to 32 motors
- Up to 8 interpolated axes (export control may apply)
- Up to 4 Coordinate System
- Motion Planner per each Coordinate System
- Motion-Axes association
- PID and Modern Control Theory
- Disturbance Observer and Adaptive Control
- Notch Filter
- User Program (Sequential PLC & Periodic PLC)
- Macro Variables (settings & statuses)
- User Defined I/O Data
- Various Motion Modes (Jog, Spline1/2, CW/CCW/ PVT, Rapid, Handwheel…)
- Small Segment Time (500usec) and PDO cycle (250usec with 32 motors)
- Data Gathering and Plotter

Motion Controller

For over 20 years, our in-house Motion Controllers have been used in more than 50,000 Sodick products. These include Sinker & Wire EDMs, Machining Centers, 3D Printers, and Injection Mold Machines. Our Motion Controller has proven its stability and flexibility with a variety of features and gives users flexibility in axis and motor movement. The KSMC-ECAT EM4 Motion Controller runs on RTOS and controls the motor's position by directly sending the data on the Process Data Object. It also provides a unique scripting program (Sequential PLC and Periodic PLC) that gives more flexibility to users in customizing motor and axis movement.

NC Code Parser and Executor (MaCH)

To control CNC machines, NC programs are widely used. NC program syntax was developed by EIA in the early 1960s and was standardized by the ISO in 1980 as RS274D / ISO6980. In KSMC-ECAT EM4, there are optional modules named "MaCH" that are available to turn the system into NC controller. These modules are tightly coupled with the Motion Controller.

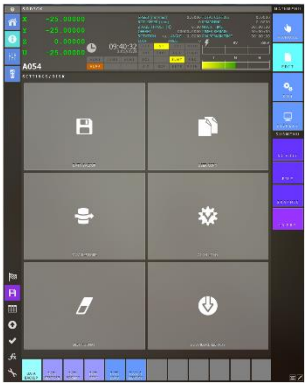
PLC

The Programmable Logic Control (PLC) language is standardized by the IEC (IEC 61131-3). This specifies the syntax and semantics of a unified suite of programming languages for programmable controllers. This suite consists of two textual languages, Instruction List (IL) and Structured Text (ST), and two graphical languages, Ladder Diagram (LD) and Function Block Diagram (FBD). Additionally, a set of graphical and equivalent textual elements named Sequential Function Chart (SFC) is defined for structuring the internal organization of programmable controller programs and function blocks. Configuration elements are provided which support the installation of programmable controller programs into controller systems.

KSMC-ECAT EM4 provides the capability and flexibility in programming motion by supporting the standardized PLC.

Proven Stability and Reliability with Sodick machines over 20 years

HMI Development Tool (SmART)

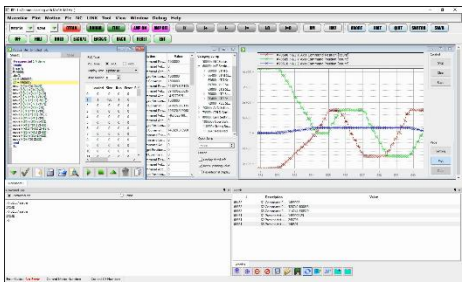


Development of an HMI is a time-consuming task. To help users develop the HMI faster and easier, we provide an HMI development tool that provides an effortless way to develop the HMI without coding. This suite of software includes SmART-B, SmART-I, and SmART-L. SmART-B is an HMI design tool that saves information of visual elements, such as buttons and labels, into an XML. SmART-I reads the XML and creates the components at runtime. SmART-L provides support for multiple languages. For more information about SmART, please refer to the SmART manuals.

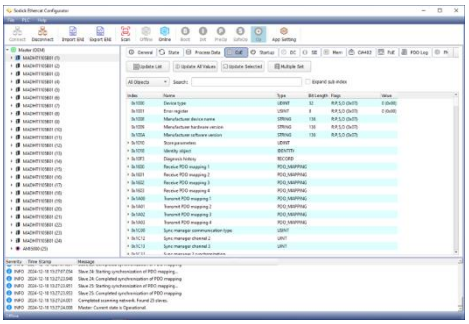
RDI-L

Customizing motion control according to the user's requirements is critical and important. For example, move the X-axis to a given position at a given velocity, but the axis velocity and acceleration should not go above the max value set by parameters. For the X-axis motor to follow the reference and command positions, the gains (position/velocity/current) must be well tuned. RDI-L (Realtime Debugging Interface for Link products) helps with these customizations. RDI-L features include:

- Setting parameters.
- Data Gathering & Plotting.
- Monitoring Statuses (Watch Windows).
- Edit/Download/Upload/Run PLC programs.
- Gain Tuning in different motion patterns.
- Firmware Update.
- Execute NC programs.



EtherCAT Master Configurator



EtherCAT configurator creates a complete network configuration (ENI – EtherCAT Network Information) from the standardized slave description files (ESI – EtherCAT Slave Information). It provides access to the process data and generates logical modules on the selected EtherCAT master, which enables an immediate diagnosis and signal test. Please refer to the EtherCAT Master Configuration Tool manual for more details.

TURNKEY SOLUTION

Give us detailed requirements & specifications and rest assured we can help with your developmental needs.

TECHNICAL SUPPORT

For any questions or inquiries, please contact us.

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