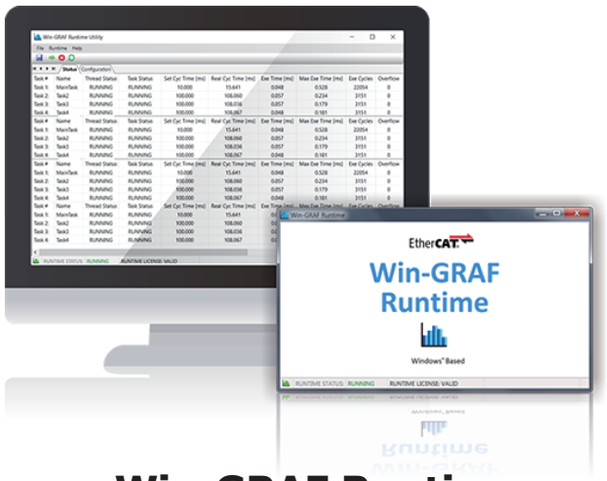


# Win-GRAF Runtime

Windows based SoftPLC Runtime

## Features

- Win-GRAF runtime is a Windows based SoftPLC runtime
- Supports Windows 7, 8, 10, 11
- EtherCAT motion control:
  - Real-time motion control in conjunction with the EtherCAT master PCIe card ECAT-M801
  - PLCopen function blocks for single and multiple axes control
  - Supports all EtherCAT servo/stepper drives with a CiA402 drive profile
  - Control up to 32-axis with 0.5 ms cycle time
- Communication protocol:
  - EtherCAT
  - Modbus TCP/RTU
  - OPC UA server
- Allows third party software integration via shared memory
- HMI driver for eLogger and Indusoft (AVEVA Edge)
- Programming interfaces for C/C++/C#/LabVIEW

## Introduction

The **Win-GRAF Runtime for Windows** is a SoftPLC runtime environment designed for developing and executing SoftPLC applications on a standard/industrial PC with a Windows OS. After the installation of the runtime environment, the Windows PC can be programmed as a PLC using the Win-GRAF workbench.

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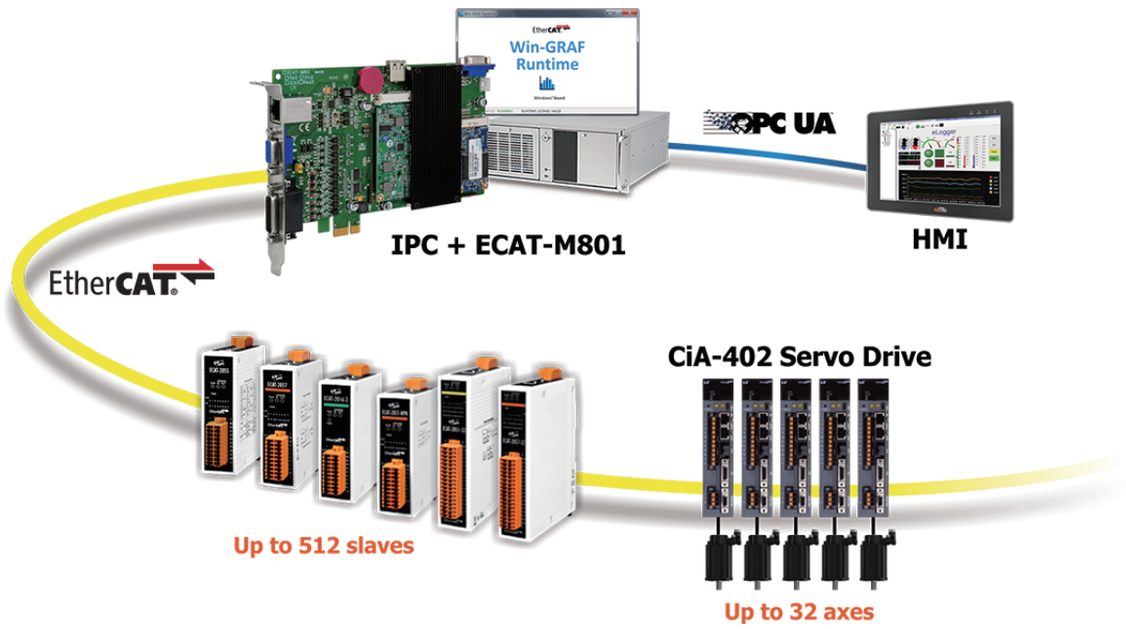
Realtime motion and IO control can be implemented by using the ECAT-M801 series provided by ICPDAS. The ECAT-M801 device is a PCIe card with an integrated real-time EtherCAT master and a multi-axis motion kernel. The motion engine and the EtherCAT master are running on a dedicated processor in a real-time environment to achieve a time-deterministic control of the EtherCAT application. The motion control function blocks are designed according to PLCopen (part 1, 2, 4) and CiA402, are easy to use and greatly reduces learning and development time. The controller can handle up to 512 EtherCAT slaves and up to 32 EtherCAT servo/stepper drives. It supports the implementation of both simple and complex motion control, such as single- and multi-axis movements and interpolation.

A OPC UA server is part of the PLC runtime and is a secure, open, reliable mechanism for transferring information. OPC UA is used for horizontal communication between machines and vertical communication between the machine and higher-level IT system (SCADA, cloud). All standard OPC UA clients can be directly connected to the PLC application without customization thereby reducing integration or application software development costs.

Programming interfaces and shared memory communication are provided to allow Windows applications to directly and rapidly access the PLC data. This enables the system developer to integrate in house developed or third party Windows software, for instance, HMIs, data gathering and processing applications.

Embedded is a software package for configuration, programming and monitoring the SoftPLC application. In addition extensive programming examples are provided.



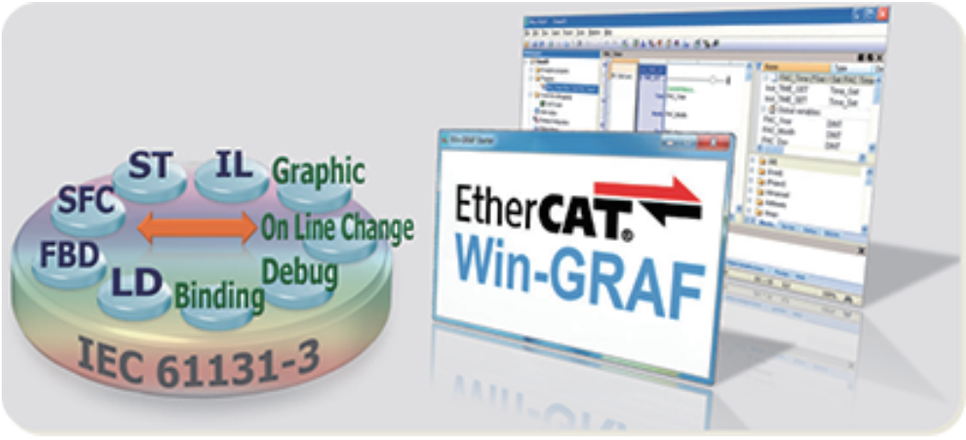

## Specification

| **Software** | |
|---|---|
| OS | SoftPLC runtime for Windows OS |
| Service | • Support of eLogger and Indusoft<br>• Win-GRAF Workbench : Programming environment (not included in the package)<br>• PLCopen : Single axis and coordinated motion<br>• Shared memory DLL for 3rd party software integration<br>• HMI interfaces for eLogger and Indusoft |
| Utility | EtherCAT Utility<br>Runtime configuration software |
| **Interpolation** | |
| Cicular | any 2- or 3-axis |
| Linear | any 2- or 32-axis |
| **Ethernet** | |
| Built-In Web Server | Web Server (eLogger or Indusoft required) |
| Protocol | OPC UA Server<br>TCP, UDP<br>Slave/Master for : Modbus TCP/IP , Modbus RTU, ASCII |
| **EtherCAT** | |
| Protocol | EtherCAT Master (ECAT-M801 required) |
| No. of Axes | Up to 32 axes |
| No. of Slave | Up to 512 slaves |
| Cycle Time | DC cycle time 0.5 ms |

## Applications

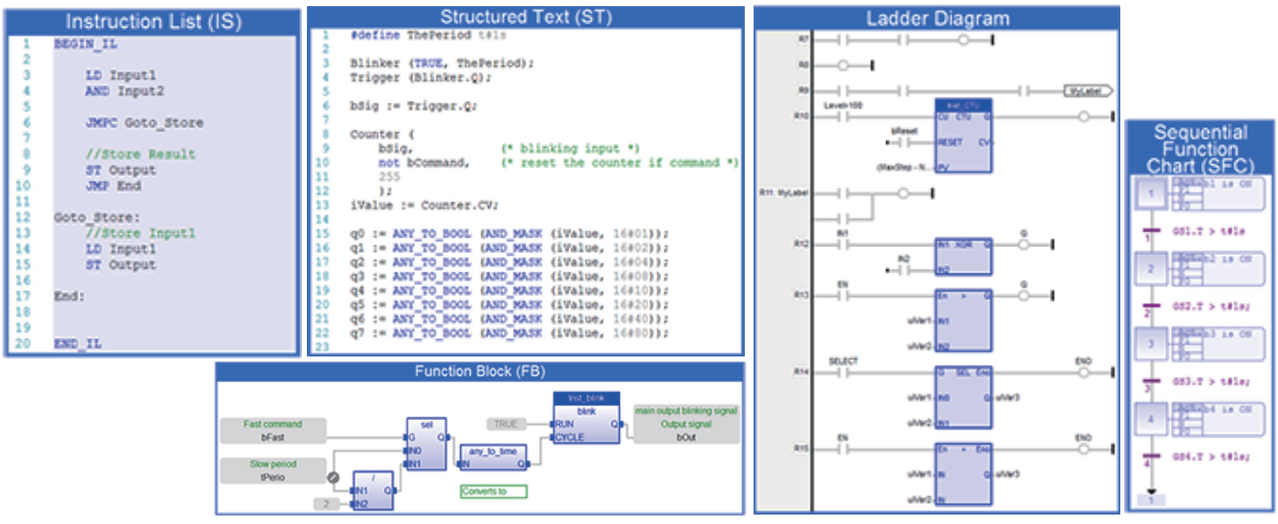
### Logic Programming

Win-GRAF workbench is a programming software from ICPDAS developed according to the international standard IEC 61131 and aimed at achieving compatibility and reusability.




**Feature:**

- Conforming to the five programming languages as define by the IEC 61131-3 standard
  - SFC (Sequential Function Chart)
  - ST (Structured Text)
  - FBD (Function Block Diagram)
  - LD (Ladder Diagram)
  - IL (Instruction List)

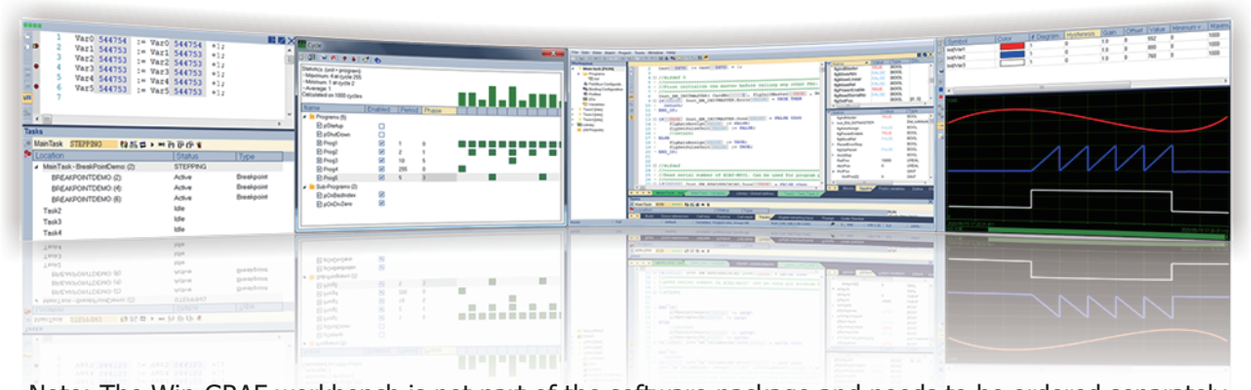



- Several programming languages can be used in the same application project
- Includes functions for converting an existing program into another programming language
- Supports project comparison for comparing two project versions
- Multitasking programming with priority settings
- Extensive libraries significantly simplifying PLC applications
- Supports creation of user libraries
- Integrated fieldbus support
- Comprehensive online help

**Workbench Tools**

Simulation and diagnostic tools are included for application development and testing:

- Configuration, programming, debugging and diagnostic tools to assist you throughout the development of your projects.
- PLC application variables monitoring:
  - The current values are shown in the workbench next to the variables in the programming and variable editor in real time.
  - Watch window for monitoring variable values and task status.
  - Variable visualization in a time graph (soft-scope, dashboards). For example software oscilloscope provides tuning and diagnostics capabilities by displaying the values of one or more variables over time.
- Online debugging tools: Breakpoints, step by step debugging and recipe control
- Cycle time optimization: A task may run several programs. The workbench allows you to set the execution order, the period and phase of each program.
- Control Panel: Graphic objects are available for creating a simple graphic user interface for testing and simulation purpose.
- Network tools for setting up the Modbus master/slave and OPC UA server.
- HMI integration: Programming interfaces for the HMI software eLogger and Indusoft



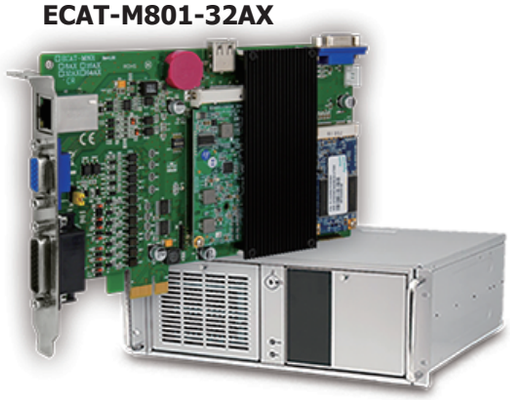
Note: The Win-GRAF workbench is not part of the software package and needs to be ordered separately.

**EtherCAT and Motion Control**

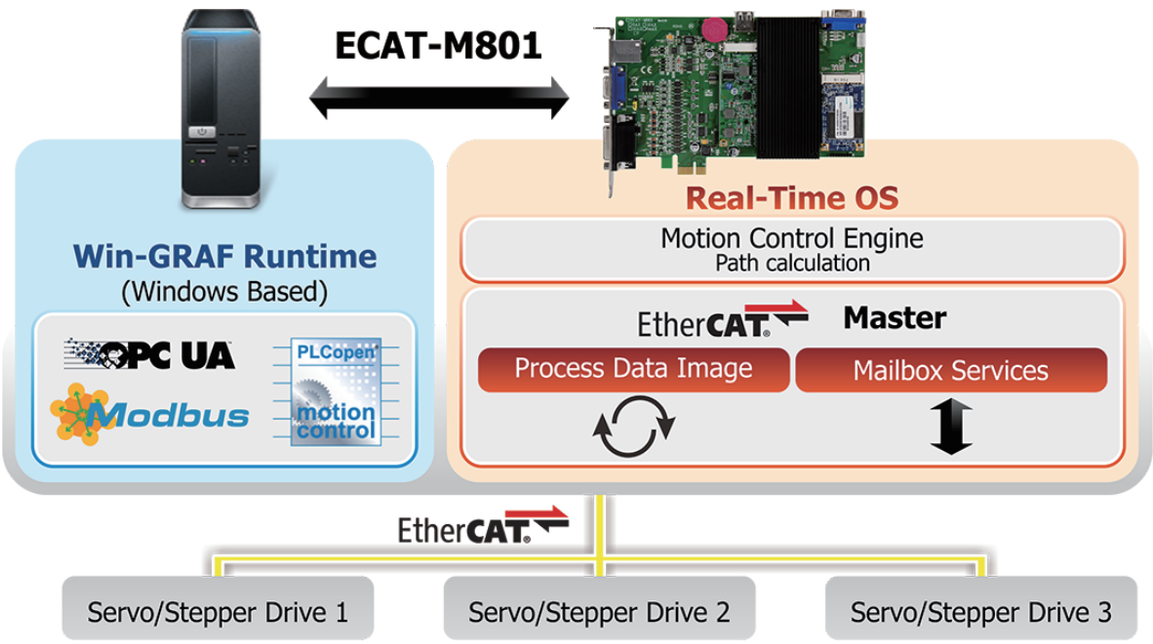
EtherCAT and motion control functionality are only supported together with the ECAT-M801 PCI express card.

The EtherCAT communication and motion control are being processed by a dedicates processor inside the ECAT-M801.

**ECAT-M801-32AX**



**IPC**




**EtherCAT Master Properties:**

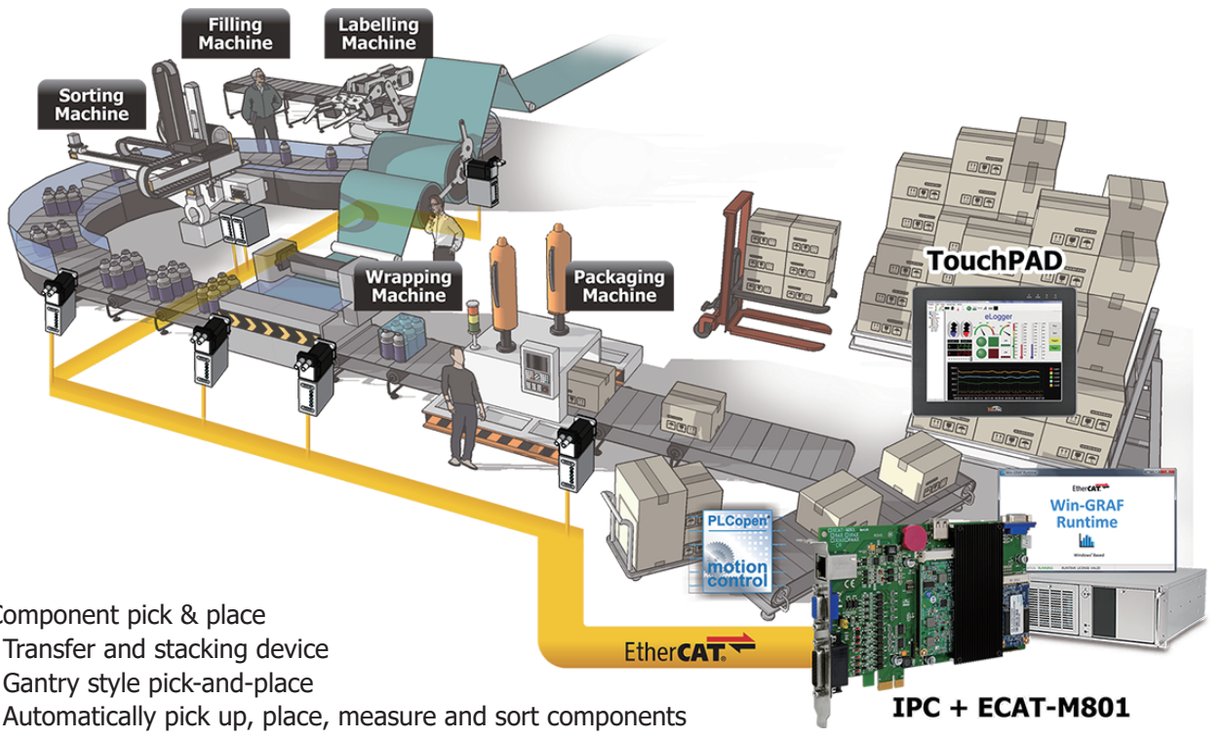
- Deterministic and fast cycle time (0.5ms)
- Process Data (PDO) communication: DC and free-run mode
- Mailbox communication: CAN over EtherCAT (CoE); utilizing the well known CANopen protocol
- The EtherCAT master recognizes any standard EtherCAT slave (ICPDAS and 3rd party slave systems).

**EtherCAT Utility:**
ICPDAS developed for the Windows OS a EtherCAT configuration utility to conveniently setup the EtherCAT network in a short period of time without requiring detailed knowledge of the EtherCAT protocol. It minimizes configuration and maintenance burdens on system developers and users.

Key features:
- Detect any slave in the EtherCAT network (ICPDAS and 3rd party)
- Scans the network and automatically creates a network information file (ENI).
- Assists in motion control configuration
- Supports single and multi-axis motion simulation and testing. Servo/Stepper drives and I/O points can be directly controlled via the utility.
- Allows complete EtherCAT motion and I/O configuration and function evaluation

**Motion Control:**
- Supports all EtherCAT slaves with a CiA402 Drive Profile
- Time deterministic motion control: EtherCAT cycle time of 0.5 ms
- Up to 32 axes
- Complete integration of motion and logic sequence
- Motion functions (command types):
  - Standard PLCopen Function Blocks as defined in the technical specification (part 1, part 2 and part 4) plus ICPDAS defined motion Function Blocks
  - Single axis motion control: point-to-point
  - Interpolation motion control: Controls max 32 axes synchronously
  - Linear and circular interpolation
  - Virtual axes programming
- Supported CiA402 Drive Profiles
  - Profile velocity (PV)
  - Profile position (PP)
  - Homing (HM)
  - Cyclic synchronous velocity (CSV)
  - Cyclic synchronous position (CSP)

## Applications




- Component pick & place
  - Transfer and stacking device
  - Gantry style pick-and-place
  - Automatically pick up, place, measure and sort components
- Conveyor system
  - Positioning of work pieces on the conveyor
  - Carrying and transferring equipment
  - Product inspection
  - In-line palletizer
  - Label machine
- Warehousing
  - Automated storage and retrieval systems
  - Automatically store and retrieve pallets from a storage cabinet
- Part assembly system
  1. Precision spot welding machine
  2. Sealing, gluing, bonding application
     - Adding glue to surfaces to join parts
     - Sealing: Spreading sealant to mating faces of parts
     - Dispenser: Spreading adhesive agent
- Cutting, grinding and pressing applications
- Manufacture of semi conductors
  1. IC inspections
  2. IC Chip mounting and assembly
     - Pick components up and place them onto the printed circuit board
  3. Camera inspection:
     - Checking with moving camera
     - Multi point check with a camera.

## Ordering Information

| | |
|---|---|
| **Win-GRAF Runtime Windows based** | Windows based SoftPLC Runtime with one USB Dongle |