



The cMT-CTRL01 IIoT PLC

A Perfect Solution for Industry 4.0

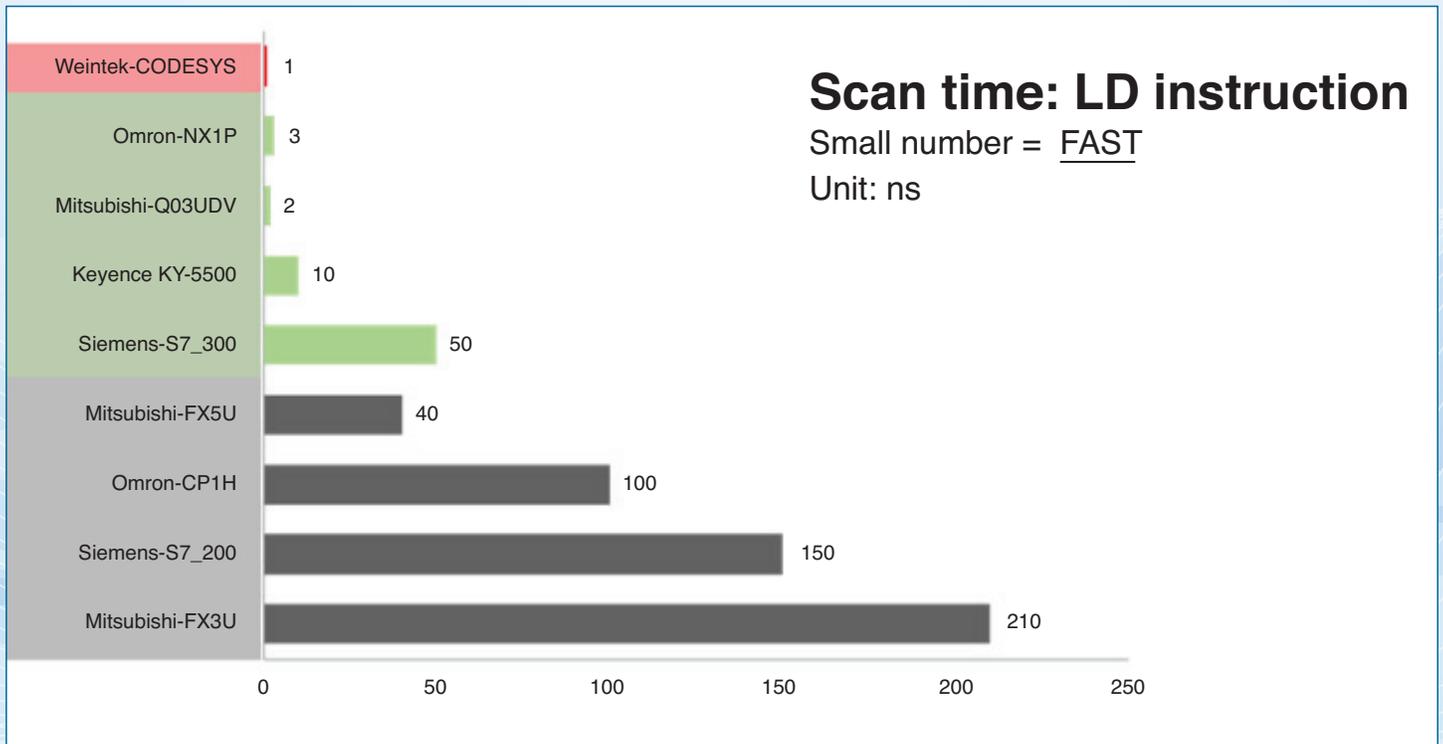
Introduction

The Industrial Internet of Things (IIoT) is both the present and future of manufacturing. Part of the Fourth Industrial Revolution or Industry 4.0, IIoT utilizes smart machines and real-time analysis. IIoT is a network of intelligent devices that monitors, collects, exchanges, and analyzes data. IIoT systems commonly consist of data communication capabilities (such as the Internet or private network), tools that allow the operator to interface with equipment, whether onsite or remotely, and intelligent systems that measure and store information.

The intelligent equipment sends information to the communications structure, where it is used to analyze the status or performance of a machine or entire factory. The information helps

manufacturers improve production, optimize the supply chain, and predict maintenance issues.

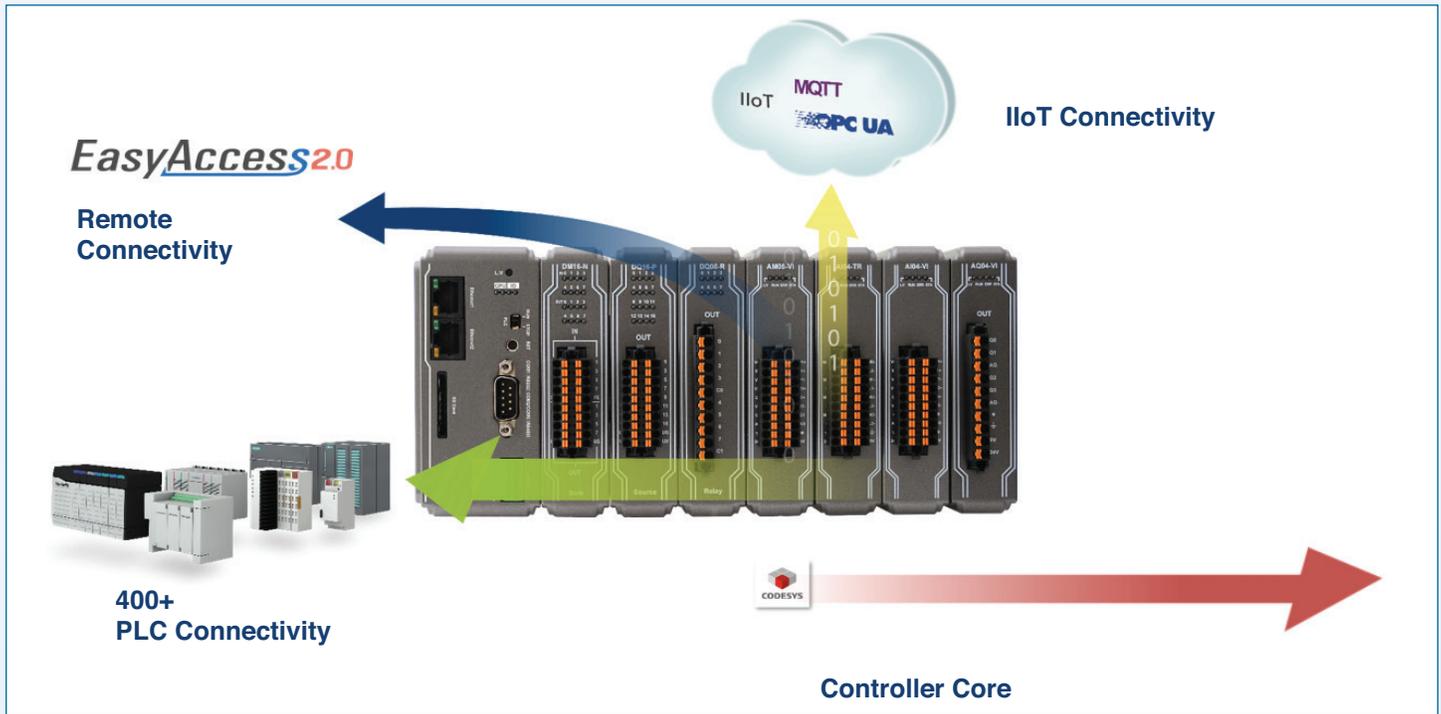
The next generation of Programmable Logic Controllers (PLCs) must have powerful peripheral connectivity to fulfill IIoT demands. Responding to this trend, Weintek has integrated CODESYS and the IIoT Gateway into the cMT-CTRL01 IIoT Programmable Logic Controller. Today, the data in the device connected to the cMT-CTRL01 can be published to the IIoT system. The cMT-CTRL01 features IIoT gateway protocol translation and EasyAccess remote access service. This paper describes the challenges faced by OEMs and system integrators when choosing an automation control system in the IIoT architecture and how the cMT-CTRL01 meets those challenges.



The speed at which the cMT-CTRL01 executes Load (LD) instructions and MOVE (MOV) instructions is comparable to that of other industrial PLCs.



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The cMT-CTRL01 offers IloT Gateway protocol translation and EasyAccess remote access service. EasyAccess 2.0 – exclusively designed for Weintek products – provides remote access and enables operators to manage the cMT-CTRL01 from anywhere in the world.

The Role of CODESYS

The CODESYS Group is the manufacturer of CODESYS (Controller Development System), the leading hardware-independent IEC 61131-3 automation software for developing and engineering controller applications. The International Electrotechnical Committee's IEC 61131-3 is the first real endeavor to standardize programming languages for industrial automation. IEC 61131-3 is the third part of the IEC 61131 family and is a specification of the syntax and semantics of a unified suite of programming languages including the overall software model and a structuring language. The third part provides the only global standard for industrial control programming. It harmonizes the way people design and operate industrial controls by standardizing the programming interface. A standard programming interface allows people with different backgrounds and skills to create different elements of a program during different stages of the software lifecycle: specification, design, implementation, testing, installation, and maintenance yet all pieces adhere to a common structure and work together harmoniously.

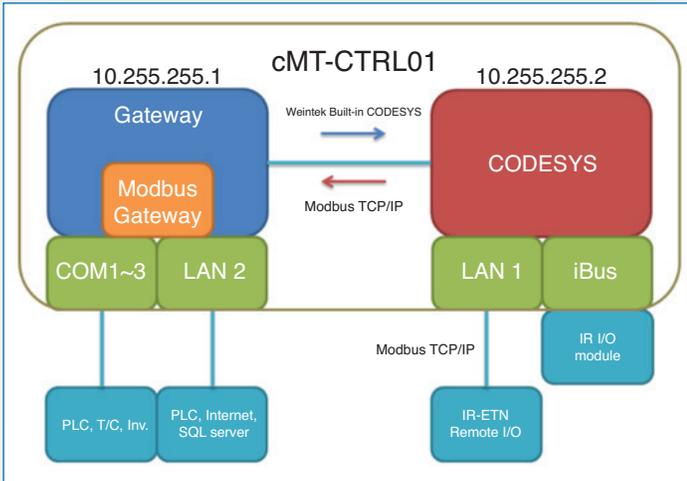
IEC 61131-3 defines, as a minimum set, the basic programming elements, syntactic and semantic rules for the most commonly

used programming languages. This includes the graphical languages Ladder Diagram (LD) and Functional Block Diagram (FBD), and the textual languages Instruction List (IL) and Structured Text (ST), as well as the Sequential Function Chart (SFC) language, used to structure the internal organization of a program. Via decomposition into logical elements, modularization and modern software techniques, each program is structured, increasing its re-usability, reducing errors and increasing programming and user efficiency. In compliance with IEC 61131-3, Weintek's cMT-CTRL01 supports multiple languages.

The CODESYS open standard works for programmable logic controller setup and provides adaptation to different system requirements and environments. Features include data monitoring, scanning, tracing, and debugging. It allows configuration of popular fieldbus systems, I/O modules, or drives (e.g. for Modbus TCP). This makes CODESYS a valuable tool for the implementation of automation solutions. CODESYS is a globally established platform that is widely used. End users employ CODESYS for successful creation of simple and sophisticated automation applications for industrial controllers that are used in factories, mobile machines, power and building automation systems, as well as many other areas.



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The cMT-CTRL01 is equipped with dual Ethernet ports: one for CODESYS running controller logic and the other for an IIoT gateway; alternatively, both ports can be used for the IIoT gateway.

Modular Design and Performance

The Weintek cMT controller offers PLC functionality and CODESYS programmability. Automated machines and installations rely on remote sensors, motion axes, switches and actuating devices, and production data to function. Collecting inputs and sending outputs to these peripheral data nodes are I/O modules. Remote I/O (sometimes abbreviated RIO or RI/O) usually takes the form of standalone hardware that collects the signals from field devices to feed back to a PLC (or rack into which a PLC is mounted), PAC, PC, or another controller. The digital and analog signals on the iR-ETN Remote I/O can be transferred to the cMT-CTRL01 immediately via Modbus TCP/IP protocol.

The cMT-CTRL01 works with iR Series I/O modules that can be flexibly added to expand the system as the application may require. The motion control module can output high-speed pulses to control a servo/step motor and receive pulses from an encoder, with applications in packaging machines, measurement systems, printing machines, tension control, conveyor systems, and other positioning control applications.

The controller integrates high-performance gateway with CODESYS PLC controller system on an innovative architecture in which a dual-core, 1-GHz CPU runs two independent operating systems. It is able to not only provide IIoT connectivity but also run controller logic and the two systems run independently without mutual interference. The cMT-CTRL01 delivers dependable and deterministic program execution. In terms of speed, its execution of Load (LD) instructions — to load information from memory — and

MOVE (MOV) instructions — to move information from operand to register — is comparable to that of other industrial PLCs.

Remote Access Made Easy

Traditionally, operators in remote locations could not remotely access HMIs and PLCs for troubleshooting, maintaining, or reconfiguring the machines because establishing communications was difficult. The cMT-CTRL01 offers IIoT Gateway protocol translation and EasyAccess remote access service. EasyAccess 2.0 — which is exclusively designed for Weintek's products — provides remote access and enables operators to manage the cMT-CTRL01 from anywhere in the world. With EasyAccess 2.0, it becomes straightforward to monitor and troubleshoot PLCs that are at a remote location as long as the Internet connection is available. EasyAccess 2.0 already manages network settings and addresses security issues, so authorized users out of the plant can access machines as if they were on the local network. Users can update the cMT-CTRL01's CODESYS project and monitor its operation status, thus reducing maintenance costs. With EasyAccess 2.0 push notification, users receive immediate notification about the operation errors on their portable devices for quick troubleshooting.

Most people have used instant messaging software such as Skype, Whatsapp, Line, or Wechat to instantly communicate with friends, wherever they are, online without asking for their IP addresses. EasyAccess 2.0 is as easy to use as instant messaging software. There is no need to memorize the HMI's IP address or spend time on router setup, complicated port mapping configuration, and detailed network layer investigation when encountering abnormal connections. Any abnormal situation of a cMT-CTRL01 can be instantly diagnosed. Moreover, the EasyAccess 2.0 application and its web management system offer a secure communication mechanism — 128-bit SSL, a standard commonly used in online banking. This encryption mechanism protects data and also ensures the reliability of data transmission. EasyAccess 2.0 uses VPN, which establishes a virtual private tunnel over the public Internet to securely access the internal network.

Integrating Devices from Different Vendors

In EasyBuilder Pro software, the IIoT gateway supports the protocols used by more than 300 major brands of PLCs, making it possible to connect with a wide array of peripheral devices. The Codesys controller logic and the IIoT gateway can exchange data



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through MODBUS TCP/IP Gateway. For example, the Codesys controller logic can access data from the IIoT gateway using Modbus TCP master to poll out data. In addition, the cMT-CTRL01 supports data sampling and event log functions, and associated historical data can be stored into SD cards or synchronized to SQL database servers; therefore, the cMT-CTRL01 can be an automation control datacenter.

IIoT Features and Applications

A cMT-CTRL01 is equipped with dual Ethernet ports: one Ethernet port for CODESYS running controller logic and the other port for an IIoT gateway. Alternatively, both ports can be used for the IIoT gateway. The cMT-CTRL01 plays a key role in the IIoT as a communications gateway. It supports IIoT protocol standards OPC UA and MQTT. The data in the device connected to the cMT-CTRL01 can be uploaded to the IIoT datacenter. Operators receive notifications on their mobile phone, wherever they may be, enabling them to monitor and control a machine via software.

The cMT-CTRL01's architecture can flexibly suit diverse applications. These include packaging, injection, extrusion, filling, sealing, assembly, machinery, printing, measuring systems, and general manufacturing in the food, textile, and plastics industry. It is a cross-generation IIoT PLC that integrates IT and OT systems.

About Weintek

Before becoming the best-selling HMI manufacturer worldwide, Weintek debuted the industry's first full-color, widescreen HMIs in 2009: the MT8070iH (7") and MT8100i (10"). By 2013 the 7" and 10" 16:9 touch screen had become an industry standard as evidenced through its adoption by almost all other HMI

manufacturers. The same year, Weintek jumped ahead and released their second generation of 7" and 10" touch screens, the iE series, which were fully compatible with their predecessor while boasting faster processors, more intuitive software, and better displays.

Weintek, not limited to the conventional HMI architecture and familiar with presenting industry-first features in their HMIs, realized the utility and popularity of the tablet PC in more markets than consumer goods. This led to the introduction of the Cloud HMI series known as the cMT Series. The cMT series flawlessly integrates with tablets, phones, and remote PCs with its built-in features, creating an unprecedented HMI designer, integrator, and operator experience.

With the success of their cloud-based cMT series HMIs, Weintek found their cloud capabilities could greatly benefit customers in another product line. Thus, in 2019 Weintek introduced the cMT-CTRL01: an IIoT Controller, designed to meet the needs of Industry 4.0 and its use of the cloud with MQTT and OPC UA functionality while utilizing a built-in VPN connection, CODESYS, and over 300 communication protocols.

In addition to continuously pushing the boundaries in their R&D department while developing patented, industry-first products, Weintek also invests heavily in advanced manufacturing and reliability testing equipment for those products. All materials, from capacitors and resistors to the LCD display and touch panels, are rigorously tested in-house before and after production with comprehensive testing procedures to verify they meet Weintek's strict quality standards. Weintek also maintains ISO:9001 Quality Standards and RoHS Certification for all products.

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