A close-up photograph of industrial machinery, likely a manufacturing or testing machine. A vertical strip of white material is being processed. The machine features various metal components, including a large rectangular block with a handle, and several blue cables. In the foreground, a control panel with a touchscreen display is visible, showing a graphical interface with various data points and labels. The background is slightly blurred, showing more of the industrial environment.

New Ethernet I/O module supports Modbus-TCP and EtherNet/IP

Input-output or I/O modules in industrial automation are electronic components that provide isolated network interfaces between various field components and devices (such as sensors, actuators, motor feedback elements, as well as other peripherals supporting data collection) and a PLC, industrial PC (IPC) or other system control. Often, I/Os accept devices' signals to serve data-reporting functions — an increasingly important job in settings targeted for digital-transformation initiatives. I/Os also employ device signals to either directly prompt or spur a controller to adjust, switch on, turn off, open, or close commanded subsystems being monitored.

In fact, some I/O modules are employed to connect multiple systems for coordinated automation of related tasks.

High-performance I/O modules simplify the connection of field components to higher control-system buses; as mentioned, many can also manage timing and control tasks. In some cases, the PLC or other controller's internal time-management resources are employed by the I/O to police data flow and buffer data via the management of data-transfer speeds between devices and controller processor and memory. Select I/O modules can even execute decoding tasks; accept status updates and controller commands; and detect as well as report monitored system issues (often related to a machine's mechanical or physical state) along with data-related communication issues.

Quick refresher on Modbus TCP/IP and EtherNet/IP

As digital communications are core to modern industrial automation, it's no wonder that protocols for these systems abound — and include EtherCAT, DeviceNet, CANopen, and various fieldbus network offerings ... with those employing standard IEEE 802.3-defined Ethernet hardware seeing the highest rates of new adoption.

A vast array of industrial systems and their I/Os employ Ethernet hardware to use:

- EtherNet/IP — with IP standing for Industrial Protocol or
- Modbus TCP/IP ... sometimes called Modbus-TCP or (perhaps confusingly) simply TCP/IP — with TCP standing for Transmission Control Protocol.

The TCP communications standard lets industrial controls and devices exchange communications via packets across a network. Complementing this is IP-based data communications between devices that assigns every device a unique IP address and defines how devices and applications exchange packets. As the main of four TCP/IP layers, a key feature of IP is how it delivers data that's tagged with address and other information for efficient and reliable communications.

Modbus TCP/IP is the Modbus RTU featuring a remote terminal unit (and in turn one of four Modbus protocols) having a TCP interface to employ Ethernet hardware and a primary/secondary architecture. In fact, Modbus is one of the most common and historied protocols for industrial automation — dating to the 1970s and now an open (public domain) protocol. EtherNet/IP is also an open protocol but employing the Common Industrial Protocol (managed by the Open DeviceNet Vendors Association or ODVA) on Ethernet. A complex yet robust protocol, EtherNet/IP is used in both discrete automation and process control.



Supporting Modbus TCP/IP and EtherNet/IP industrial Ethernet protocols, the iR-ETN40R is an expandable Ethernet remote I/O module with 24 digital input channels ... including four high-speed channels — and 16 relay output channels.

Solving common issues with the Weintek iR-ETN40R I/O module

Now, a new iR-ETN40R I/O module from Weintek functions as a combination module to serve more than 90% of the automation market with a compact and affordable Modbus-TCP and EtherNet/IP networking option. In summary, the new iR-ETN40R serves all the functions of:

- One iR-ETN Modbus TCP or Ethernet IP I/O module communication coupler
- Two DQ08-R relay output modules for remote I/Os
- 1.5 DI16-K digital I/O modules
- Four extra high-speed inputs.

In this way, the new module supports efficient and cost-effective automated control implementations.

As mentioned, the iR-ETN40R provides built-in support for MODBUS TCP/IP servers and EtherNet/IP adapters. There are 24 digital inputs and 16 relay outputs built into the I/O module, and it's also possible for design engineers to expand its functionality by adding supplementary analog I/O, digital I/O, temperature modules, and pulse modules. What's more, input and output connectors have a push-in type construction to greatly accelerate and maximize the reliability installation and wiring.

Four of the iR-ETN40R's digital inputs can be configured as high-speed inputs for advanced applications. These inputs can be configured to work for four high-speed (20 kHz) counters. Otherwise, they can also be configured to work for two 10-kHz A/B phase encoders. The latter is often useful in discrete industrial automation applications.



⚡ The standard Ethernet receptacle on the module face allows for the connection of a Modbus TCP/IP server or EtherNet/IP adapter. Upper slots I and II both allow 12 digital inputs for 24 total (four high speed); lower slots I and II both allow eight relay outputs for 16 total.



⚡ The new iR-ETN40R module combines the connectivity and networking capabilities of ten separate components. Input and output connectors have a push-in type construction to maximize wiring.

iR-ETN40R digital output			
Total Outputs	16		
Output logic	Relay		
Output voltage	250VAC/30DC		
Output current	2A per channel (Max 8A)		
Response time	10 msec		
Isolation	Yes, electromagnetic isolation		
iR-ETN40R digital output			
Total number of inputs	24		
Isolation	Yes — optical isolation		
General input	Number of inputs	20	
	Input logic	Sink or Source	
	Logic 1 input voltage	15~28 VDC	
	Logic 0 input voltage	0~5 VDC	
	Response time	OFF -> ON	5 msec
		ON -> OFF	1 msec
High-speed input	Input Impedance	5.6 KΩ	
	Number of inputs	4	
	Input logic	Sink	
	Logic 1 input voltage	15~28 VDC	
	Logic 0 input voltage	0~5 VDC	
	Maximum input frequency	20KHz	
	Input Impedance	3 KΩ	



The Weintek iR-ETN40R features optical isolation to protect its low-voltage circuits from the voltages of connected devices as well as potentially problematic field wiring and any ground loops or transient voltages there.

Special Weintek iR-ETN40R I/O module control capabilities

To support advanced automation functions, the Weintek I/O module also features several capabilities not combined in other offerings on the market.

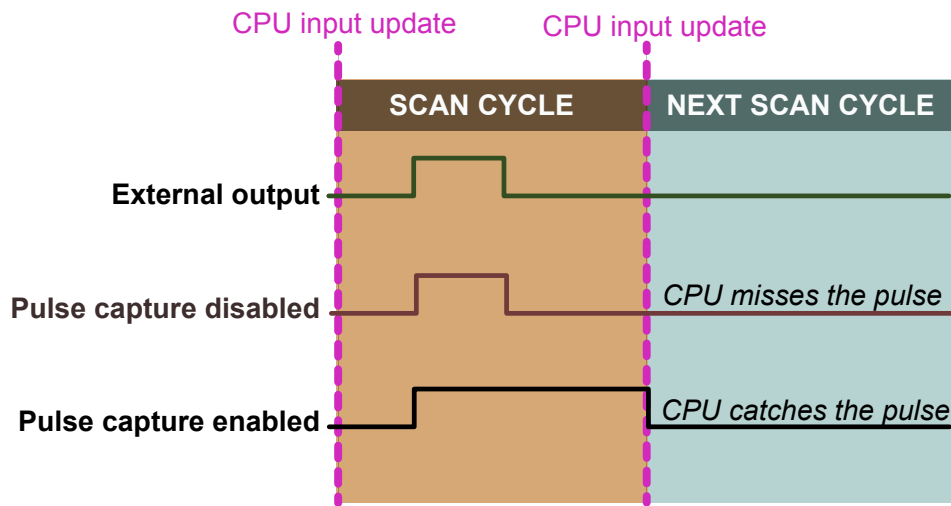
Exclusive feature — emergency stop function: The iR-ETN40R module accepts the designation of an input for emergency stops. When this preselected input receives a signal, all outputs are immediately stopped. Such a function is useful for automated installations that feature an emergency stop button to let plant personnel concurrently deactivate (among other things) all outputs by depressing an e-stop button on the connected machinery.

For safety stops and emergency stops, a mushroom-head e-stop button is directly wired to a digital input from the iR-ETN40R coupler. That allows any input signal generated by the e-stop to transmit into the coupler without being handled by a PLC. This in turn imparts direct control over all actuators from the iR-ETN40R coupler for a faster and more effective emergency-stop function.

iR-ETN40R communication interface specifications		
No. of Ports	1	
Data Transfer Rate	10/100 Mbps	
Data Transfer Medium	4x2 twisted pair copper cable; category 3 (10 Mbps), category 5 (100 Mbps)	
Distance Between Stations	100m between hub/switch and Bus Coupler or between Bus Coupler and Bus Coupler	
Protocol	Modbus TCP, EtherNet/IP adapter	
Max. Number of TCP/IP Connections	8 connections	
Network to Logic Isolation	Yes	
iR-ETN40R expansion I/O module		
Number of bus terminals	Depends on power consumption (Please see relevant information in datasheet)	
Digital input point	Max. 224 (including 23 built-in points and the max. allowable number is 248 points)	
Digital output point	Max. 112 (including 16 built-in points and the max. allowable number is 128 points).	
Analog input channel	Max. 64	
Analog output channel	Max. 64	
iR-ETN40R indicators		
ENET	Green	Device status indicator
	Red	Device error indicator
IO	Green	Module status indicator
	Red	Module error indicator



The Weintek iR-ETN40R features optical isolation to protect its low-voltage circuits from the voltages of connected devices as well as potentially problematic field wiring and any ground loops or transient voltages there.



Even signals of short duration are registered by the module with a pulse-capture function.

Exclusive feature — pulse capture: The module’s pulse-capture feature ensures that all high-speed pulse signals of a duration shorter than one CPU scan cycle are held until the next scan cycle — so that no pulses are ever missed. It’s akin to how regular cameras can’t capture clear pictures of a car racing at high speed but speed cameras can.

Exclusive feature — quick generation of description files: Engineers can use Weintek EasyRemoteIO software to connect to an iR-ETN40R being programmed and then generate a description file needed for I/O configuration. These files can then be quickly imported by other software to complete configuration with ease. EasyRemoteIO software can generate files for EasyBuilder Pro HMI programming as well as PLCopen eXtensible Markup Language XML files and EDS files for EtherNet/IP scanner devices.



Shown here are the front and back of the iR-ETN40R. Notice the molded channel to allow DIN-rail mounting.

Pulse capture seeks to seize narrow pulse-width inputs into the coupler and slow them down to ensure the following CPU scan will “see” them.

iR-ETN40R general specifications		
Power and efficiency	Power Supply	24 VDC (-15% to +20%)
	Power dissipation	Nominal 255 mA at 24VDC
	Current for internal bus	Max 2A at 5VDC
	Current consumption	520mA at 5VDC
	Electrical isolation	Logic to field power isolation — Yes
	Backup fuse	≤1.6A Self-recovery
Dimensions and construction	PCB coating	Yes
	Enclosure	Plastic
	Dimensions (W x H x D)	64 x 109 x 81 mm
	Weight	About 0.27 kg
	Mount	35-mm DIN rail mounting
Acceptable environmental conditions and IP rating	Housing protection	IP20
	Storage temperature	-20° ~ 70°C (-4° ~ 158°F)
	Operating temperature	-10° ~ 60°C (14° ~ 140°F)
	Relative humidity	10% ~ 90% (non-condensing)
Certification	EMC immunity	Conforms to EN 55023: 2012+AC: 2013, Class A as well as: EN 61000-6-4: 2007+A1:2011 EN 55024: 2010+A1: 2015 EN 61000-6-2:2005



A main benefit of the iR-ETN40R is its compactness.

More about Weintek

Based in Taipei, Taiwan, Weintek develops, designs, and manufactures practical HMI and connectivity solutions for the new IIoT era. With over 25 years of experience in the industry, Weintek aims to provide quality, customizable solutions that fulfill industrial automation requirements while maintaining customer satisfaction with on-demand customer service. For more information, visit www.weintek.com.