



WISE-5231
Intelligent Multifunction IoT Controller

Features

- Runs on browsers, no extra software tool is required
- No more programming, Web pages provided for control logic editing
- IF-THEN-ELSE logic rules execution ability
- Support XV-board
- Support DCON or Modbus RTU Slave devices (Up to 32)
- Support Modbus TCP Slave devices (Up to 16)
- SSL/TLS Email sending function supported
- Timer and Schedule functions supported
- Data logger and data files send back function supported
- Active I/O sending function for real-time data transfer
- CGI Command sending and receiving function supported for IP Camera and Network device
- Support Modbus TCP/RTU protocol for SCADA software integration
- SNMP, SNMP Trap, MQTT and DDNS function supported



Introduction

WISE(Web Inside, Smart Engine) is a product series developed by ICP DAS that functions as control units for use in remote logic control and monitoring in various industrial applications. WISE offers a user-friendly and intuitive web site interface that allows users to implement IF-THEN-ELSE control logic on controllers just a few clicks away; no programming is required. With its powerful and easy-to-use features, it will minimize the learning curve, shorten time to market and dramatically reduce the labor and cost spent on system development.

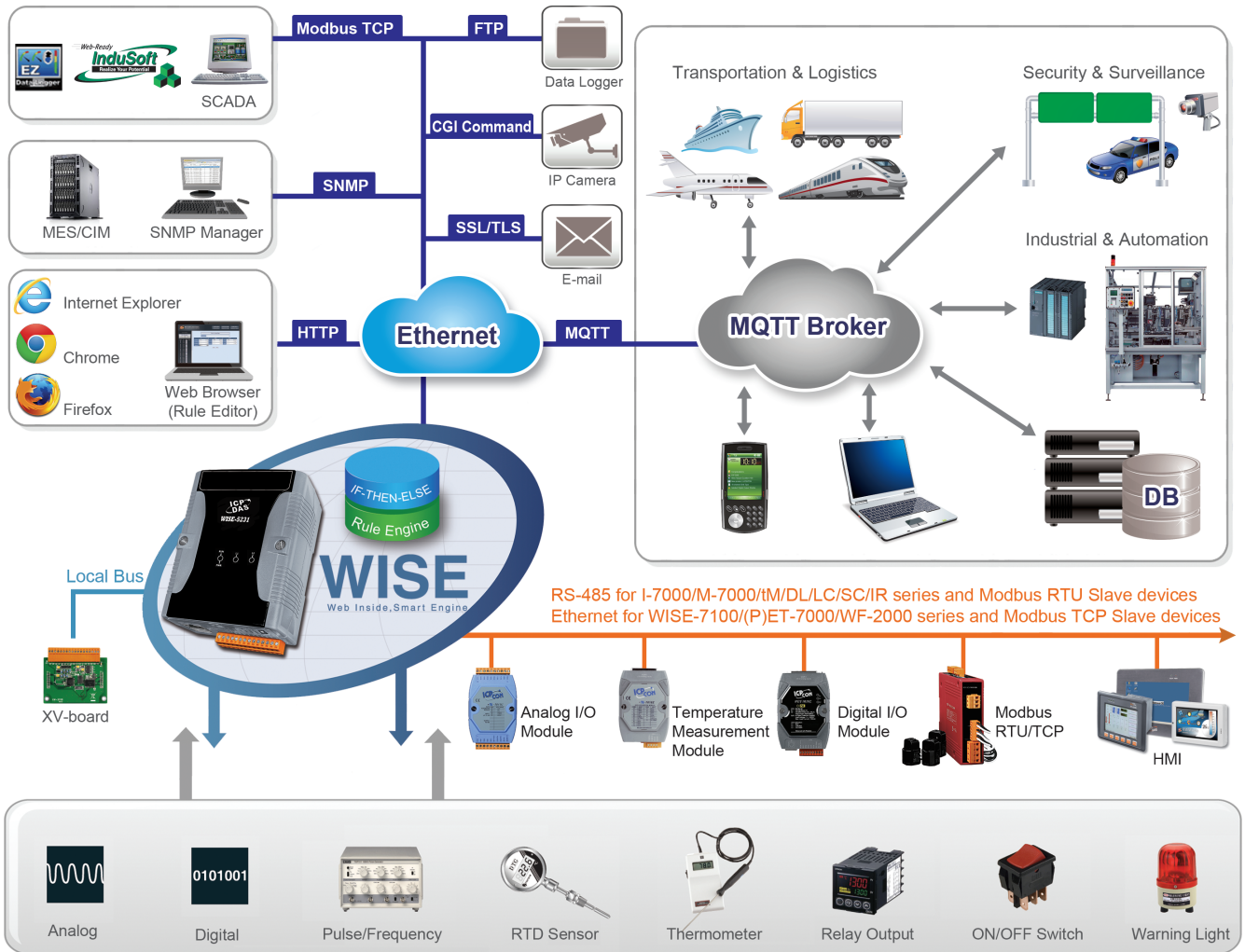
WISE-5231 provides more supports in I/O functions. It allows connections to XV-board; supports DCON I/O modules, Modbus RTU Slave modules and Modbus TCP Slave modules together. The wide range of selection options enables flexibility in I/O module integration to meet the requirements from various applications. WISE-5231 provides Data Logger function to record the I/O channel data by periodic cycle or event trigger. And it allows to send the data files by FTP to the control center. In addition to the CGI command sending function, WISE-5231 now supports the CGI command receiving function that allows the devices (such as IP camera) connected to the network to trigger the operation of IF-THEN-ELSE logic rule of WISE-5231. The well thought-out CGI command functions make WISE-5231 being able to interact with the devices flexibly in the network environment. WISE-5231 also supports SNMP, SNMP Trap, MQTT and DDNS protocols and services. The flexible integration ability with the SCADA and IT software or devices and the reliable ability of real-time I/O logic control and data logger make WISE-5231 the most cost-effective I/O controller in the IoT (Internet of Things) Age.

Hardware Specifications

Model		WISE-5231
System		
CPU		32-bit ARM CPU
Software		Built-in WISE Firmware
microSD Expansion		Built-in one 4 GB microSD card (support up to 32 GB microSDHC card)
RTC (Real Time Clock)		Yes
VGA		Yes
Communication		
Ethernet		RJ-45 x 1, 10/100/1000 Base-TX (Auto-negotiating, Auto MDI/MDI-X)
COM 1		RS-232 (TxD, RxD, GND), non-isolated, Speed: 115200 bps max
COM 2		RS-232 (TxD, RxD, GND), non-isolated, Speed: 115200 bps max.
COM 3		RS-485 (Data+, Data-), non-isolated, Speed: 115200 bps max.
COM 4		RS-485 (Data+, Data-), 2500 VDC isolated, Speed: 115200 bps max.
LED Indicators		
Power LED		Yes (Red)
System LED		Yes (Red, Green)
I/O Module Support		
Local I/O Module		Yes, one XV-board
Remote I/O Module		COM3 can connect to Max.16 DCON or Modbus RTU Slave modules; COM4 can connect to Max.16 DCON or Modbus RTU Slave modules; LAN interface can connect to Max. 16 Modbus TCP Slave modules.
Power Requirements		
Input Range		12 to 48 VDC
Power Consumption		4.8 W
Mechanical		
Dimensions/Installation		91 mm x 132 mm x 52 mm (W x L x H) / DIN-Rail Installation
Environmental		
Temperature		Operating Temperature: -25 °C to +75 °C; Storage Temperature: -30 °C to +80 °C
Humidity		10 to 90% RH, Non-condensing

System Architecture

WISE-5231 System Architecture



WISE-5231 : A perfect concentrator of sensor and I/O modules in the IoT age

Industry 4.0 is based on Internet of Things (IoT) that incorporates the technological concept of communicating and exchanging information between all facilities which brought manufacturing industry to a new era. The WISE-5231 Intelligent IoT Controller developed by ICP DAS is a perfect start point to facilitate the vision of the Smart Factory.

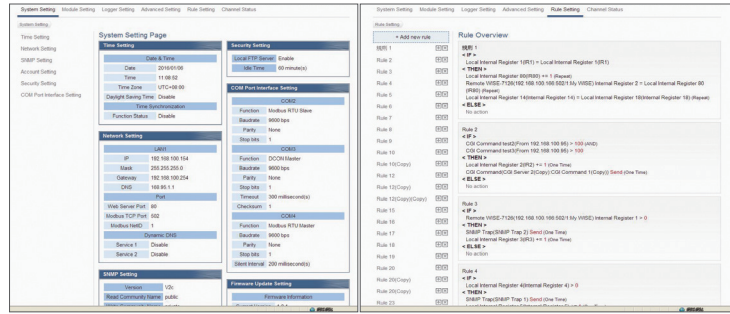
WISE-5231 provides powerful and flexible integration with the I/O modules and sensors at the field side, and also supports various IoT protocols for seamless integration with the SCADA/MIS/MES/IT/Network Management systems to transfer the real-time I/O information from the front-end modules (or sensors) to the back-end management systems. It also features reliable real-time I/O logic control and data logger functions. All of these features make WISE-5231 a perfect concentrator of sensor and I/O modules in the IoT age.

- Support Modbus TCP/RTU Protocol
- Support SNMP (Simple Network Management Protocol)
- Support MQTT (MQ Telemetry Transport) for message publish/subscribe mechanism
- Support FTP Server/Client for the maintenance of data logger files
- Support SSL/TLS authentication Email sending for alarm notification
- Support full CGI command operations - CGI command sending and CGI command receiving
- Support DDNS (Dynamic DNS)

■ Features

■ Simple, easy-to-use, no-programming-required for system development

WISE provides user-friendly Web UI pages for editing control logic on the controllers. To edit control logic, it only requires a browser to connect to the Web server on WISE. No extra software tool installation is needed. WISE enables implementation of logic edition by a few clicks on the mouse to set up and deploy logic rules without writing a single line of code.

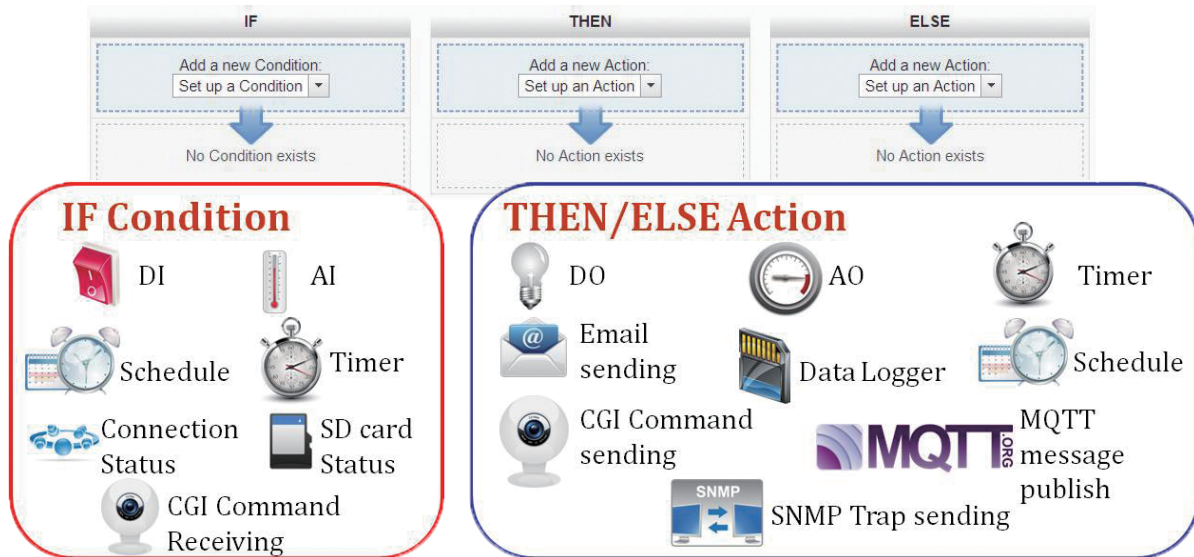


▲ WISE Web User Interface

▲ Click and get done!

■ IF-THEN-ELSE logic rules execution ability

WISE controller features an IF-THEN-ELSE logic rule engine; it offers IF-THEN-ELSE rules for users to set up the logic content. After completing rule edition and downloading rules to the WISE, the rule engine will loop execute the rules in accordance with the execution order under specific conditions.



▲ The function overview of IF-THEN-ELSE rule engine

■ Real-time alarm notification via SSL Email

WISE supports SSL Email sending function for real-time message notification operation. The message sending action can be added to the logic edition as part of logic control to provide real-time message notification to the related personnel when an event occurs.



▲ SSL Email Sending function

■ CGI Command sending & receiving for surveillance system integration

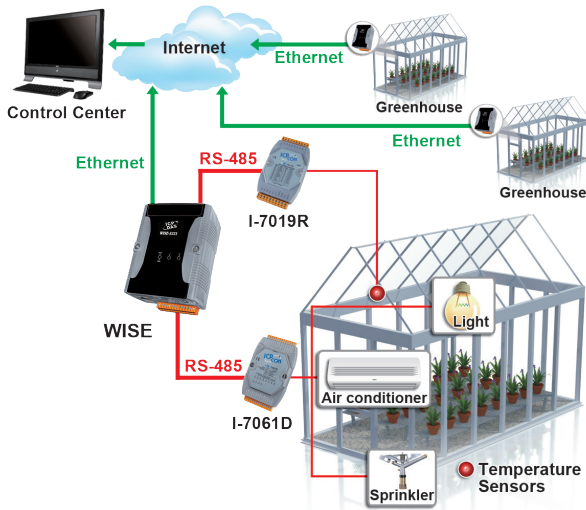
WISE supports full CGI command operations - CGI command sending and CGI command receiving. The CGI command sending action can be added to the logic edition as part of logic control in response to specific events. The CGI command receiving function enables WISE to receive the CGI commands from others network devices. The content of CGI command received can be used in IF condition statements to trigger the THEN/ELSE actions.



▲ CGI Command Sending function

Active I/O sending mechanism

In addition to the Modbus TCP/RTU slave function that enables SCADA system to poll the I/O channel data of the WISE, now WISE provides "Active I/O sending" mechanism (Modbus TCP master, SNMP Trap and MQTT publish). Based on the "Active I/O sending", WISE allows to send the I/O channel data of the controller actively to SCADA/IT system by event trigger (change of the I/O channel data) or periodic cycle. This function will improve the efficiency of the data communication between WISE and SCADA/IT system.



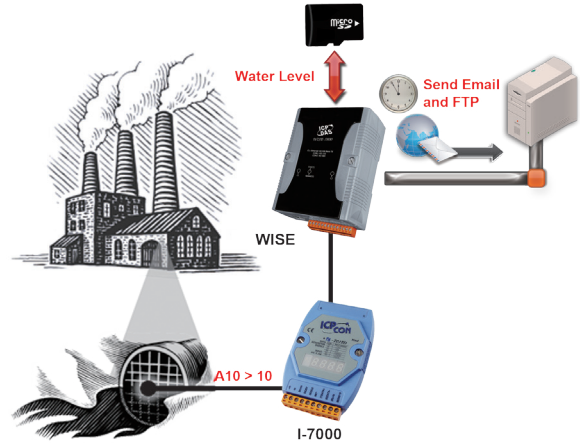
▲ Active I/O sending mechanism

Provide Timer and Schedule operation

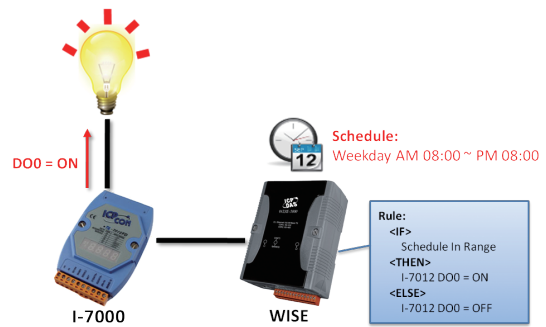
WISE features Timer and Schedule functions: It allows user to schedule specific date or time for control logic execution, or perform specific tasks such as time delay. With calendar user interface provided, Schedule setting can be more efficient and flexible.

Data Logger operation

With the microSD card, WISE provides Data Logger function to real-time record the I/O channel data of the controller and sends the data files automatically by FTP to the control center for further administration management or data analysis.



▲ Data Logger function



▲ Schedule function

Connection ability to a variety of sensors and devices

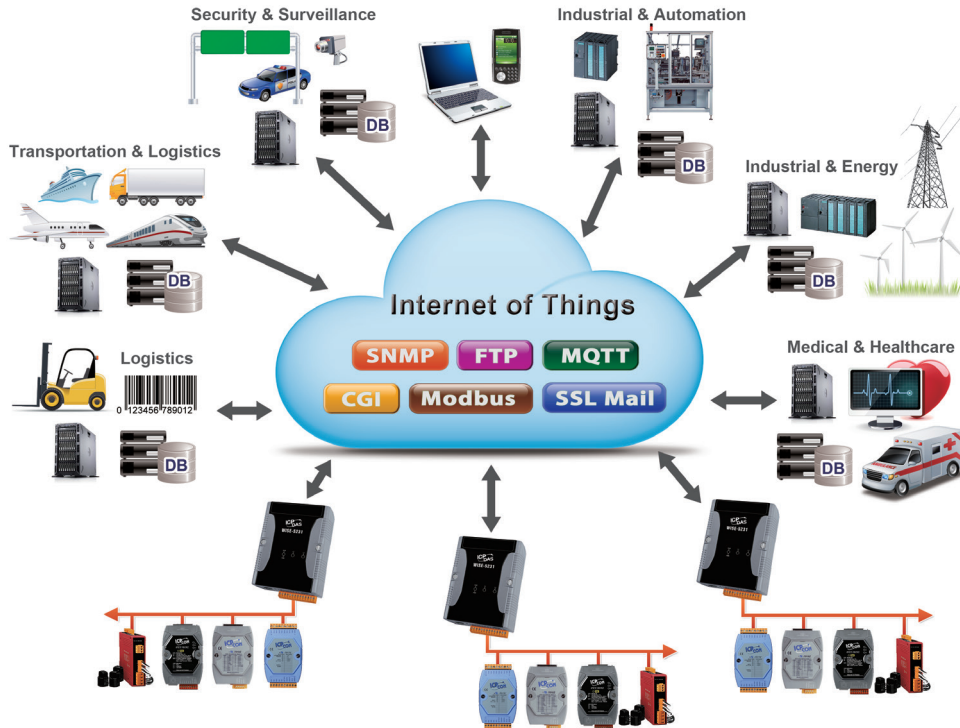
WISE Controller allows to connect with sensors and devices that support Modbus TCP/RTU protocol for I/O monitoring. The ability to connect with Modbus TCP/RTU slave devices enables the flexibility and scalability for system implementation and allows to meet various requirements of the applications from the clients.



▲ Connect to a variety of sensors and devices

A variety of protocols supported for integration with SCADA/IT/IoT System

WISE supports various communication protocols to perform real-time monitoring and control of the controllers. The Modbus TCP/RTU protocol of WISE allows sharing I/O channel and system data with the SCADA system. WISE also support the SNMP, CGI, FTP and MQTT protocols for easy integration with the IT/MIS/MES/Facility management /Network management system. The flexible integration ability with the SCADA and IT system make WISE the most cost-effective I/O controller in the IoT (Internet of Things) applications.



▲ A variety of protocols supported for SCADA/IT/IoT System

Software Specifications

Function		Description
User-friendly and intuitive web site interface	Browser	<ul style="list-style-type: none"> ● Runs on browsers, no extra software tool is required ● No more programming, Web pages provided for control logic editing and system parameters setting
Various options for easy I/O module integration	Local side	<ul style="list-style-type: none"> ● Support XV-board
	Remote side	<ul style="list-style-type: none"> ● Support DCON or Modbus RTU Slave devices (Up to 32) ● Support Modbus TCP Slave devices (Up to 16)
Intelligent Logic operation and data logger ability at field sites	IF-THEN-ELSE Logic operation	<ul style="list-style-type: none"> ● Provide IF-THEN-ELSE logic rule editing, and the ability for IF-THEN-ELSE logic rules execution
	I/O channel monitoring and control	<ul style="list-style-type: none"> ● Offers various options for I/O channel settings; for example: deadband setting for AI signals, linear scale setting, temperature degree in Celsius or Fahrenheit setting, power on value setting for DO channel, pulse output setting and DI counter setting, etc
	Timer	<ul style="list-style-type: none"> ● Perform the timing function. The status of Timer can be included in IF condition statements to trigger the THEN/ELSE actions
	Schedule	<ul style="list-style-type: none"> ● Perform the prescheduled routine tasks. The status of Schedule can be included in IF condition statements to trigger the THEN/ELSE actions. "Calendar" and "Weekly repeat" schedule setting UI are provided.
	Email	<ul style="list-style-type: none"> ● Execute Email message sending. The SSL/TLS authentication is provided
	CGI Command	<ul style="list-style-type: none"> ● Perform CGI command sending and receiving functions. The content of CGI command receiving can be used in IF condition statements to trigger the THEN/ELSE actions
	Data Logger	<ul style="list-style-type: none"> ● Perform Data Logger function to real-time record the I/O channel data of the controller by Period or Event Trigger operation
	Internal Register	<ul style="list-style-type: none"> ● Work as a variable to hold the temporary value, and provide the basic mathematical operation.
Various protocols for seamless integration with SCADA/MIS/ MES/IT/ Network Management systems	Real-Time I/O channel data	<ul style="list-style-type: none"> ● Support Modbus TCP/RTU protocol for SCADA system ● Support SNMP and MQTT protocols for the integration with MIS/MES/IT/Network Management systems ● CGI Command sending and receiving function supported for the integration with IP Camera and Network devices. ● Active I/O sending mechanism supported
	Historical I/O channel data files	<ul style="list-style-type: none"> ● FTP Server/Client ability for the maintenance of data logger files and the data logger files automatically send back operation ● Provide data recovery mechanism so that when experiences network disconnection, the data log files will be kept in WISE, and be recovered after the network is resumed ● Provide alarm notification mechanism so that when microSD card is damaged, the data log file will be stored in WISE to ensure zero data loss of the data logger
	Communication Service	<ul style="list-style-type: none"> ● DDNS (Dynamic DNS) service supported

I/O Module Support

Local I/O Expansion (XV-board)

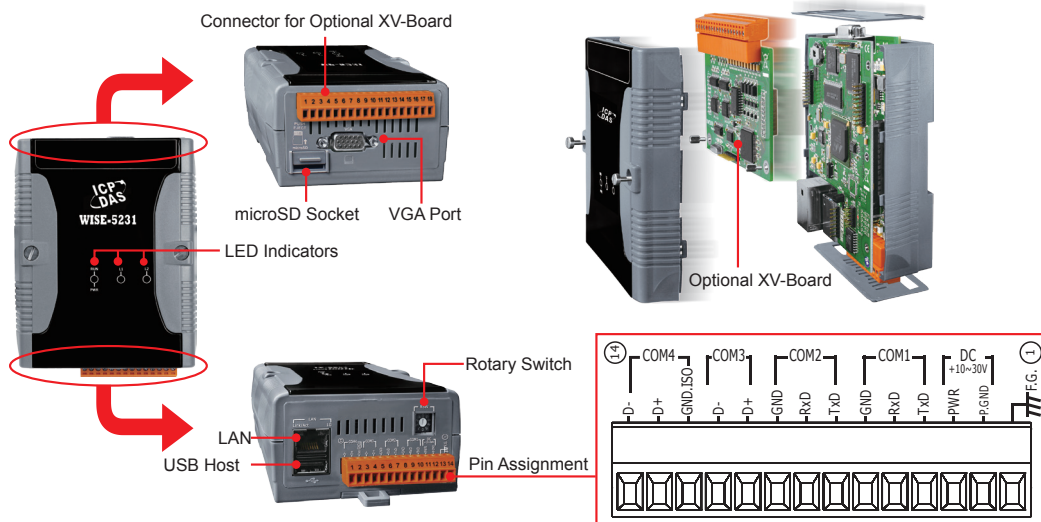
AI, AO, DI, DO XV-board

Model Name	DI	DO	AI (16-bit)		AO (12-bit)	
			Ch	Range	Ch	Range
XV107, XV107A	8	8	-	-	-	-
XV110	16	-	-	-	-	-
XV111, XV111A	-	16	-	-	-	-
XV116	5	2 Signal Relay 4 Power Relay	-	-	-	-
XV306	4	4(Relay)	4	$\pm 1\text{ V}, \pm 2.5\text{ V}, \pm 5\text{ V}, \pm 10\text{ V},$ $\pm 20\text{ mA}, 0 \sim 20\text{ mA}, 4 \sim 20\text{ mA}$	-	-
XV307	4	4(Relay)	-	-	2	$0\text{ V} \sim +5\text{ V}, \pm 5\text{ V}, 0\text{ V} \sim +10\text{ V}, \pm 10\text{ V},$ $0\text{ mA} \sim +20\text{ mA}, +4\text{ mA} \sim +20\text{ mA}$
XV308	DI+DO=8		8	$\pm 1\text{ V}, \pm 2.5\text{ V}, \pm 5\text{ V}, \pm 10\text{ V},$ $\pm 20\text{ mA}, 0 \sim 20\text{ mA}, 4 \sim 20\text{ mA}$	-	-
XV310	4	4	4	$\pm 1\text{ V}, \pm 2.5\text{ V}, \pm 5\text{ V}, \pm 10\text{ V},$ $\pm 20\text{ mA}, 0 \sim 20\text{ mA}, 4 \sim 20\text{ mA}$	2	$0\text{ V} \sim +5\text{ V}, \pm 5\text{ V}, 0\text{ V} \sim +10\text{ V}, \pm 10\text{ V},$ $0\text{ mA} \sim +20\text{ mA}, +4\text{ mA} \sim +20\text{ mA}$

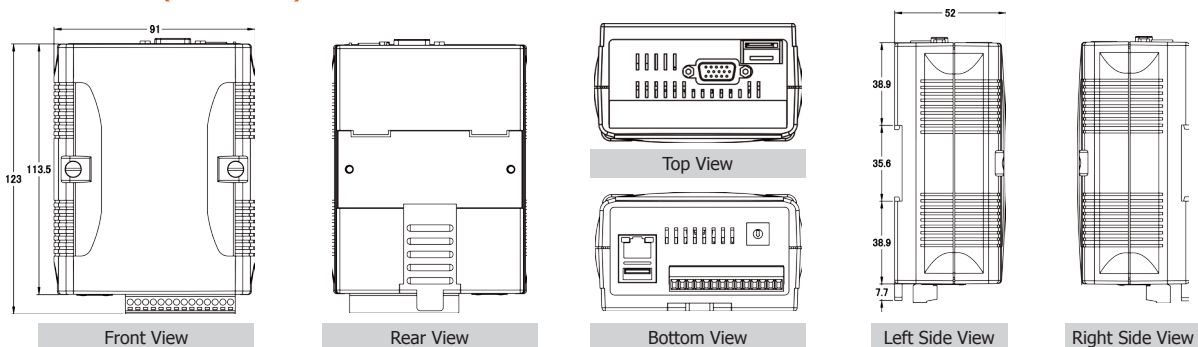
Remote I/O Expansion Modules

DCON Module	ICP DAS I-7000/DL series module
Modbus RTU Slave Module	ICP DAS M-7000/tM/DL/LC/SC/IR series module and Modbus RTU Slave module
Modbus TCP Slave Module	ICP DAS WISE-7100/(P)ET-7000/WF-2000 series module and Modbus TCP Slave module

Appearance



Dimensions (Unit:mm)



Ordering Information

WISE-5231	Intelligent Multifunction IoT Controller
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Accessories

NS-205 CR	Unmanaged 5-Port Industrial Ethernet Switch (RoHS)
MDR-20-24 CR	24V/1A, 24 W Power Supply with DIN-Rail Mounting (RoHS)
DIN-KA52F CR	24V/1.04A, 25 W Power Supply with DIN-Rail Mounting (RoHS)