Intelligent RTU

For Oil & Gas and Water Industry

- Digital oilfields
- Intelligent water grid
- Seamless integration solutions
- Hardware function Introduction
- Software function introduction
- Application scenario
- Product specifications

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Build Digital Oilfields via IoT Solution

iRTU for oil well monitoring

Synchronous acquisition of indicator diagrams and the power of the rod pump, to achieve more accurate diagnosis of working conditions and oil metering.

With the evolution of the era of big data, Internet of Things (IoT) technology is being widely used and its architecture contains cloud computing and intelligent terminals. With oil and gas operations reflected in the production architecture, intelligent terminals are distributed across the oil wells and pipelines. To handle delivery tasks in the field, it can collect the relevant data, and send the information back to the cloud server through wired or wireless transmission. The cloud can be used to accumulate the huge amount of data and conduct high-speed parallel computing, to generate important prevention strategies and solutions.

To date, the process of the oil and gas industry, such asthe collection, transportation, refining, storage, distribution and end use has generally been automated nevertheless, the Internet of things architecture will help the oil and gas industries to enter the next intelligent phase, such as:

Effectively improve the production efficiency of the collection area

Comprehensively monitor the operation of machines and tools, reduce the operation time of inefficient machines and tools, and improve production efficiency.

Monitor the state of the transmission and distribution pipelines

Because transmission and distribution pipelines are located a long way from civilization, their maintenance is more difficult. Therefore, when pipelines leak, the intelligent terminal can monitor the status of the pipes, instantly provide feedback to the monitoring center, and collect all the pipeline information.

Achieve unmanned supervision and control

In the past, workers needed to regularly supervise larger oilfield zones. The use of intelligent terminal unit can effectively identify status of equipment, and greatly reduce costs of man power.

Establish the deployment of resources supply and demand

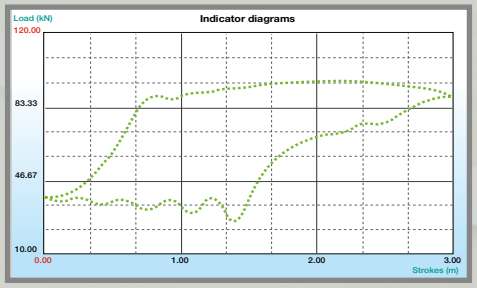
Intelligent terminal unit can collect real-time information of production, to provide the basis for the deployment of resources .

iRTU for pipeline monitoring

Monitor temperature and pressure and other parameters of pipelines, record the instantaneous and cumulative flows, and provide leakage alarms.

iRTU for storage tank monitoring

Monitor the liquid level and reserves in an oil tank, accept the upper system command, and perform supply and demand deployment.



Use indicator diagrams to achieve more accurate diagnosis and oil metering.

WebAccess

Learn more about the operational efficiency and status of the pumping unit with records about the load and stroke of the pumping unit. An intelligent terminal iRTU can upload the indicator diagram to the cloud and analyze the relevant information indicated on the diagram in real time.

Promote Water Supply Automation
Establish an Intelligent Water Grid

iRTU for pump station monitoring

Unmanned stations can effectively improve the efficiency of the water supply, and reduce amount of manpower needed for regular supervision.

A stable, clean and safe water supply depends on the accurate monitoring of water conservation facilities, the use of advanced wireless communication and highly efficient and intelligent terminal equipment to monitor the remote facilities, making local judgments and decisions, using cloud technology to record huge amounts of data to gather data reports, for the sake of applications using standard network technology, comprehensive monitoring and management of water conservation facilities, water pumping stations, water pipelines, water towers and so on, to ensure the normal and efficient operation, and achieve the following objectives:

- Ensure a stable and safe water supply
- Unified management of water production and water use data, to understand the supply and demand situation
- Stable water supply, use the pipe network system to ensure the stability of the existing pipe network pressure
- Use simulation pipe network monitoring systems to understand the changing demand and improve the management of supply.
- Use the SCADA monitoring system to detect the pipeline leakage and loss and reduce the waste of water.

Water pump stations are the hub of the water grid

Intelligent terminals can monitor the operational efficiency of pumping stations and the machine's status, establishing a clear water network, and further improve the management efficiency of the water supply and improving people's well-being

iRTU for water pipeline monitoring

Aging pipe networks leak, therefore seriously affecting the water supply making pipeline monitoring a key goal.

iRTU for water treatment plants

Domestic water is based on a specific water treatment process, to ensure that it's clean and safe.

Total Solution to Seamlessly Integrate Cloud and Intelligent RTU

Rapidly integrate information in the cloud, and effectively reduce maintenance costs

The oil, gas and water industries can use cloud technology to remotely monitor the production process, data reporting, online planning, equipment diagnosis and so on, effectively improving efficiency and reducing costs.

Intelligent RTUs can effectively improve system reliability

Intelligent RTUs are responsible for collecting and analyzing local data, reducing the load of center handling data, working with the other devices, taking the initiative to report data, status and provide alarms.

Supports multiple Microsoft operating systems

Scheduling function

Real-time animation display

Seamless communication integration - Wi-Fi / 3G/Zigbee

Adopt reliable and simple distributed wireless communication solutions, to make the Wi-Fi / 3G to integrate with the cloud rapidly, I/O and sensors collect local information in the form of Zigbee with simple low power consumption.

Intelligent- remote maintenance/data security/intelligent control

In the remote and wide ranging oil, gas and water applications site maintenance and updating equipment is extremely costly. Intelligent RTU can perform remote monitoring, operation, maintenance and updates via the Internet. iRTUs can perform update, complete delivery tasks at the site, and upload data to the cloud. iRTU can also communicate with each other, quickly handle I/O correlation and collaborate on emergencies to reduce the loss.

Open cloud computing platform - based on Web information processing

Open cloud version of SCADA configuration software contains a graphics library and real-time database and can support multiple communication protocols, scan the intelligent terminal equipment automatically, provide simple configuration and powerful function for the cloud platform, effectively integrate data and manage field applications.

Supports open communication protocols

Real-time and historical trend analysis

Advanced alarm management functions

iRTU in IoT Era ADAM-3600 Series

The ADAM-3600 is an intelligent iRTU, mainly used in the oil, gas and water industries. Intelligent network nodes in the IoT, can control the downstream field devices to complete delivery tasks, transfer data to upstream devices wired or wirelessly. It is key to connecting devices to the Internet of things architecture. The ADAM-3600 has a high performance and low power processor, adopts 20 local I/O points and wired and wireless communication modes, users can collect, process and distribute the local information. It has a built-in real-time operating system and a real-time database, providing customers with an open interface and supports diverse programming languages.

C series - Open basis intelligent RTU

Supports wide operating temperatures, suitable for outdoor control cabinets

It can be used for outdoor control cabinets and therefore must be able to withstand the heat of summer and the cold of winter. The ADAM-3600 supports an operating temperature range of - 40℃ ~ 70℃. The selected components are industrial grade, and have been tested with the strictest environmental control, to ensure that the products have a long life and, stable working in harsh environments.

A variety of local I/O configurations and flexible expansion

The ADAM-3600 contains a variety of I/O ports and different models provide different local I/O functions. It can provide four expansion slots for multipoint I/O applications and lets users have more rapid and flexible I/O solutions.

Multiple wireless communication solutions

RTU is usually applied to a wide range of monitoring, such as oil fields or oil pipelines. In wide area environments, wired communication often has cost and maintenance problems. The ADAM-3600-C series built-in two PCIe-mini card slots and can support two types of different wireless communication interfaces. The supported wireless communication functions include: GPRS, 3 G, Wi-Fi and Zigbee, users have many choices in the application of wireless communication, and are not restricted by field conditions.

With the Cortex A8 high performance and low power processor, the C series has a built-in real-time operating system and real-time database, it provides a customizable open interface and supports a diverse number of programming languages.

A series - Intelligent Ethernet I/O module

The A series is a web based high density I/O module with same expansion capability as C series. It is built in simple I/O interlock logic editor and data logger function.

Dual network ports communication design

The C series provides two independent network ports, can separate network segments and supports cloud data transmission and remote I/O acquisition, so that intelligent terminals can process real-time data locally and take the initiative to upload the data.

The A series provides daisy-chain configuration and the two network ports, make it easy to wire. The daisy-chain mode of the connected module can effectively reduce the number of required wires and switches.

Use the USB and SD card to update and maintain the module

When updating the data, there's no need to carry a computer to connect to the ADAM–3600 since it can automatically detect the latest firmware version from the USB or SD card, and install and update the software automatically.

Data storage and transmission

In the event that connection to the cloud is lost the ADAM-3600 can store the data on the SD card and USB, therefore won't lose important data.

LED lights

You can directly understand the current state of the module with LED lights so you don't need to connect a computer.

Software Function Introduction

Open basis intelligent RTU

Open system and Value added software

Multiple programming interfaces

Adopt an open real-time Linux system architecture, and run the real-time database. Transmission gives priority to the customizable tag. Data with a simple configuration can be converted instantly within the different communication protocols. And provide the IEC - 61131-3 standard & C/C + + library for the customer to develop programs. This lets users develop programmable logic control in the most convenient way.

Supports open communication protocols

In addition to the standard Modbus communication protocol, it also supports the object DNP3 protocol. DNP3 is an international standard for RTU applications, and can also realize data identification, breakpoint transmission, initiative report and other functions under this protocol users can quickly integrate most of the SCADA system.

Convenient remote project configuration software RTU Project Studio

Provides project configuration software with remote operation. Users can configure all the devices in an offline and group mode, and can automatically conduct remote downloading based on its own code. Users can use this software for remote monitoring, updating the programmable logic and firmware, to save the cost of manpower and materials.

Intelligent communication condition monitoring software iCDManager

Communication is the key function of RTU applications. RTU hardware can monitor the health status of the hardware communication. Users can use the intelligent algorithm to identify the health status of communications lines, remotely monitor the communication quality through the network in group mode, conduct the maintenance in advance, so as to avoid emergency repair caused by temporary failure.

Integrating WebAccess to form a complete solution

WebAccess is an HMI/SCADA monitoring software based on the Internet Explorer browser, the biggest characteristic is that all engineering projects, the database settings, drawings and software management are remotely completed by using a standard browser via the Internet or Intranet. It combines distributed architecture of the monitoring nodes, the redundancy system of monitoring nodes (SCADA Redundancy), the central database server and multi-layer network security structure, to provide the more complete architecture for all kinds of automation applications.

Intelligent Ethernet I/O module

Easy-to-use module for the automation and IT users

RESTful Service - A simple software architecture

In terms of software architecture, companies only provide the interfaces familiar to automation operators, the interface is not only friendly for users with an IT background. The ADAM-3600 provides comprehensive REST Web services implementation, defines the message format with JSON, achieves Internet use with scalable, flexible, cross-platform and cross-language scheme by using the HTTP protocol.

Cross-platform operation mode

The application of the Internet of things and the cloud can be operated through different platforms. The ADAM-3600 supports HTML5, and therefore, the operating state of the module can be set by using mobile phones, tablets and other such devices. The ADAM-3600 also provides Web Configuration, and lets all modules be set from the browser whilst also providing higher security and protection.

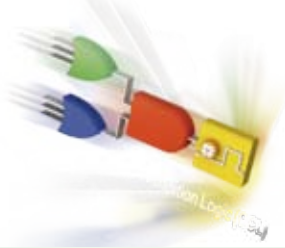
Pre-processing Data before uploading to the cloud

The ADAM-3600A can store the recorded data in its memory card, and regularly upload the data to the cloud. To avoid data loss caused by communication failure, the ADAM-3600A can preliminarily summarize and process the data, such as: Average, Max, Min, Scaling, Filtering , to reduce the data required for transmission and the load of cloud computing.

Integration of remote module with the IoT requirements

Graphic Condition Logic (GCL) – A simple and useful logic control function

A signal input is often accompanied by another signal output, the complicated programming and expensive controllers are the intermediaries during the input and output of the signal. We can use ADAM–3600's built-in logic functions and simple graphical interface to control the module logically, non-programming users can easily use it and perform the cross-module tasks, to greatly save the costs related to the controller.



More intelligent and simple module maintenance

Firmware equipment with the ADAM module will also be updated. The ADAM-3600-A is widely used in the same system, updating and maintaining each device is difficult, but we can use the Group Configuration to update Firmware and Webpages for more than one module at the same time, so as to reduce the load for field engineers.

Real-time Oil Well Monitoring System with iRTU

System Introduction

In recent years, the rapid development of information technology has popularized calculator technology, control technology and network communication technology, therefore, establishing the costs of the remote monitoring system is no longer unattainable. Exploiting oil and gas fields needs to use the wide-area remote monitoring system, to monitor the output efficiency of oil and gas and the operation condition of machines and tools.

System Requirements

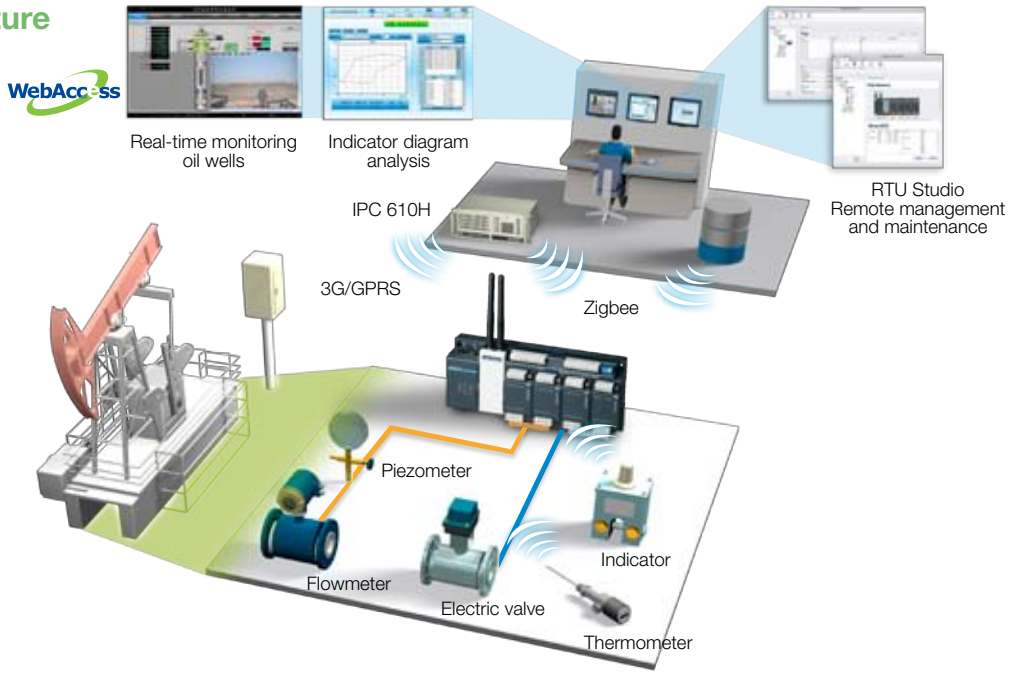
- Measure and record the oil temperature, sleeve temperature, oil pressure, flow velocity and other parameters of the pump unit, read and store the information of the indicator, and upload it to the center. In addition, Zigbee needs to be connected to the wireless temperature and pressure and other sensors in the field.
- Easy installation and maintenance. When the different wellheads have different monitoring requirements it's easy to adjust them.
- Oil well production information must be able to correspond to the state parameters of machines and tools, to diagnose the operation efficiency of wellhead, and provide the basis for the deployment of upper system.
- Events must have their own time scale, to provide the basis for subsequent reviews and improvements.
- Remotely monitor the system status and upgrade the software functions.

System Description

When using the open system architecture of the ADAM-3600, two types of wireless communication (3G and Zigbee) can be installed, to collect the wireless sensor data in the field and remotely communicate with the cloud. The ADAM - 3600 with an I/O outgoing line at the top and bottom, is especially designed for control cabinet installation, the front has marks and lights, which can be used to identify the state and detect the faults. Four small expansion slots can be installed between the sites, to meet different needs. The internal open architecture of the ADAM–3600 is easy to program and maintain and customers can process the data in the RTU whilst also remotely transmitting data for large amounts of data analysis.

The ADAM-3600 includes iRTU Studio which customers can use to perform remote configuration, upgrades and updates, to save manpower and material resources.

System Architecture



Smart Water Grid and Pump Station Monitoring

System Introduction

Under the impetus of Internet of things technology, water supplies will be equipped with an intelligent water network. Water pumping stations are the most important node in a water network, the booster pumping station can influence the public water, the drainage pumping station can ensure normal drainage during flood season to protect people from the floods. With the rising costs of life and an increase in areas of water, the supervision of the water pumping station must rely on science and technology, to reduce the inspection cycle or achieve unmanned control. By installing the water network information system, the relevant department can see the operating status of the pump station, and can also record the efficiency parameters to provide the basis for equipment maintenance, and significantly increase management efficiency.

System Requirements

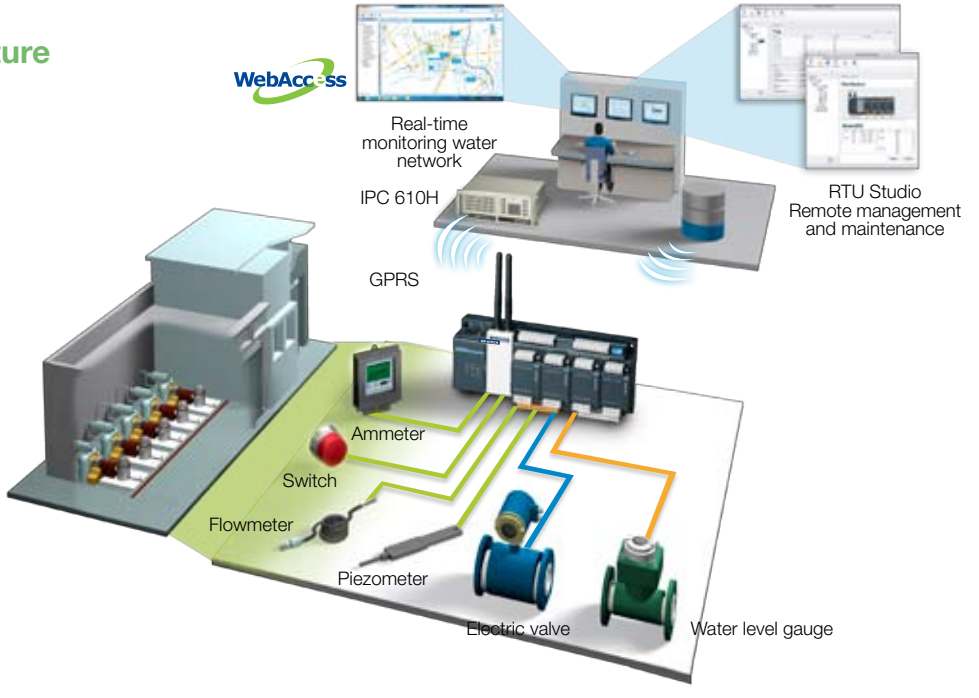
- Transmit the data via the GPRS, upload the data to the monitoring center on a regular basis.
- The event must have its own time scale with a second level calibration mechanism.
- When triggering the event, multi-center reporting must be supported.
- Secure data during abnormal communication, must replenish and report data during restoring the communication.
- Can remotely monitor the system status and upgrade the software functions.

System Description

The open system architecture of the ADAM-3600 can easily build a GPRS remote communication system, the integrated I/O can be used to monitor the current, voltage & frequency and start/stop state of the pump, pressure and flow of inlet and outlet, water level, outlet water quality and inlet valve. The built-in real-time Linux operating system of the ADAM-3600 can be used to calibrate the time via a LAN or GPS, to make the data or events to have precise time. The ADAM-3600 is also equipped with an SD card, which can store the data, and will not lose the information during disrupted communication, and can replace the data and send it to the center when communication is restored.

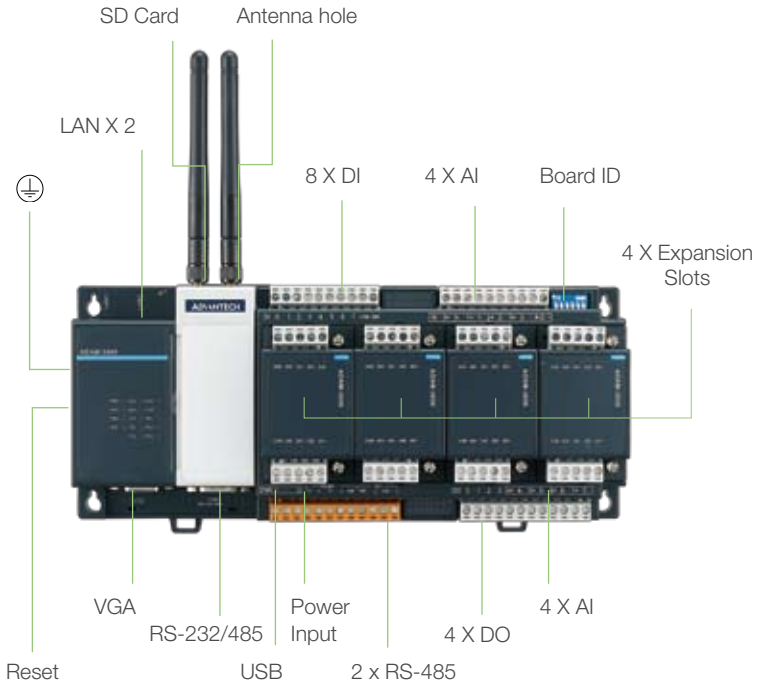
The ADAM-3600 includes iRTU Studio so can perform remote configuration, upgrades and updates, to save manpower and materials.

System Architecture



Specification

Open basis intelligent RTU



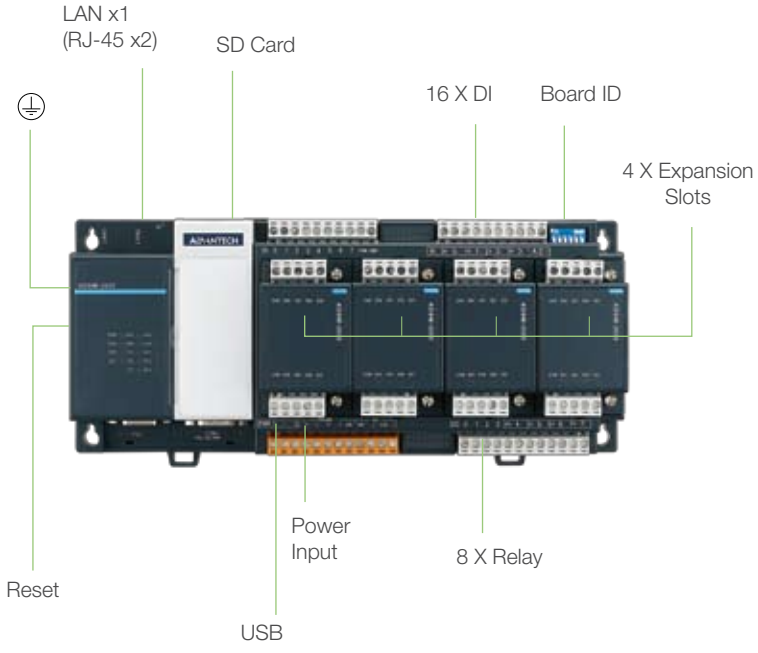
Description		Open basis intelligent RTU
System	CPU	Cortex A8
	Operating system	Linux RT 3.12
	Programming interface	C (Linux) IEC-61131-3
	Communication protocol	Modbus/RTU, Modbus/TCP, DNP3
	Wireless communication	Optional GPRS / 3 G/Wi-Fi/ Zigbee communication
	Special function	monitoring (iCDManager), data identification, breakpoint transmission, initiative report
Serial port	COM1	RS-232/485
	COM2/COM3	RS-485
Network Port	Channel number	2
	Independent IP number	2
	Speed	10/100M
	IP specifications	IPv4/IPv6
USB	USB2.0	1
Display Interface	VGA	1
	LED	System/Serial/ Ethernet/DI/ DO/ Prog
Storage Interface	SD	1
Operating Temperature		-40~70℃
Certification		CE/FCC/C1D2
Model		ADAM-3600-C2GL1AE

Wireless solutions

	Advantech part number	Description
Wi-Fi	EWM-W150H01E	Half-size mini card, Support 802.11bgn
	1750006043	SMA(M) cable, 15cm
3G/ GPRS	EWM-C109F601E	6-band HSPA Cellular Module with SIM holder
	1750006264	SMA(F) cable, 15cm

Category		RTU Built-in I/O	RTU Built-in I/O
Model		ADAM-3600-C	ADAM-3600-A
Analog Input	Channel number	8, differential	-
	Sampling rate (Sec)	10	
	Voltage input	+/- 10V, +/- 2.5V	
	Current input	0-20 mA, 4~20mA	
	Sensor input		
	Resolution	16-bit	
Analog Output	Channel number	-	-
	Voltage output		
	Current output		
	Resolution		
Digital Input	Channel number	8	16
	Input type	Sink	Sink
	Rated voltage	12/24VDC	VDC
	Logic "0" voltage	0~5VDC	0~5VDC
	Logic "1" voltage	11~30VDC	11~30VDC
Digital Output	Channel number	4	8
	Output type	Open Collect	Relay A type
	Output voltage	DC:8~30V@max 200mA	AC: 250V@5A / DC: 30V@3A
Part Number		ADAM-3600-C2GL1AE	ADAM-3600-A1FN0AE

Intelligent Ethernet I/O Module



Description		Intelligent Ethernet I/O Module
System	CPU	Cortex M4
	Operating system	-
	Programming interface	Simple graphical programming (Graphical Condition Logic, GCL)
	Communication protocol	Modbus/TCP, RESTful
	Wireless communication	-
	Special function	Data Logger
Network Port	Channel number	2
	Independent IP number	1
	Speed	10/100M
	IP specifications	IPv4
	Daisy Chain	Yes
USB	USB2.0	1
Display Interface	LED	System/ Ethernet/DI/ DO/
Storage Interface	SD	1
Operating Temperature		-40~70˚C
Certification		CE/FCC
Model		ADAM-3600-A1FN0AE

Analog Input Module	Analog Input Module	Analog Output Module	Digital Input Module	Digital Output Module	Digital Output Module
ADAM-3617	ADAM-3618	ADAM-3622	ADAM-3651	ADAM-3656	ADAM-3664
4, differential	4, differential				
10	10				
+/- 10V, +/- 2.5V					
0-20 mA, 4~20mA					
	Thermocouple (Type J,K,T,E,R,S,B)				
16-bit	16-bit				
		2	-	-	
		0~10V			
		0-20 mA, 4~20mA			
		12-bit			
			8		
			Sink		
			12/24VDC		
			0~5VDC		
			11~30VDC		
				8	4
				Open Collect	Relay A type
				DC:8~30V@max 200mA	AC: 250V@5A / DC: 30V@3A
ADAM-3617-AE	ADAM-3618-AE	ADAM-3622-AE	ADAM-3651-AE	ADAM-3656-AE	ADAM-3664-AE

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