14 Intelligent Edge DAQ Devices

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Introduction

In the Industrial IoT era, companies and government are seeking solutions that can help them to utilize data analytics to raise service levels, create better products, and reduce operational costs. Ideally, the first step is the digitalization of assets such as factory equipment and infrastructure facilities. This means that increasingly more data needs to be acquired and analyzed, and both the volume and diversity of such data from different assets are also increasing. Equipment manufacturers, owners, and maintainers require an easy and reliable way to collect and monitor data from all kinds of field sites.

Advantech's WISE-EdgeLink, Node-RED, and Python edge data acquisition solutions are designed to simplify remote monitoring. These solutions improve service quality by facilitating product care, enabling equipment monitoring, and allow for efficiency and energy consumption analysis. This allows end users to gain insight on usage behavior through the analysis of big data.

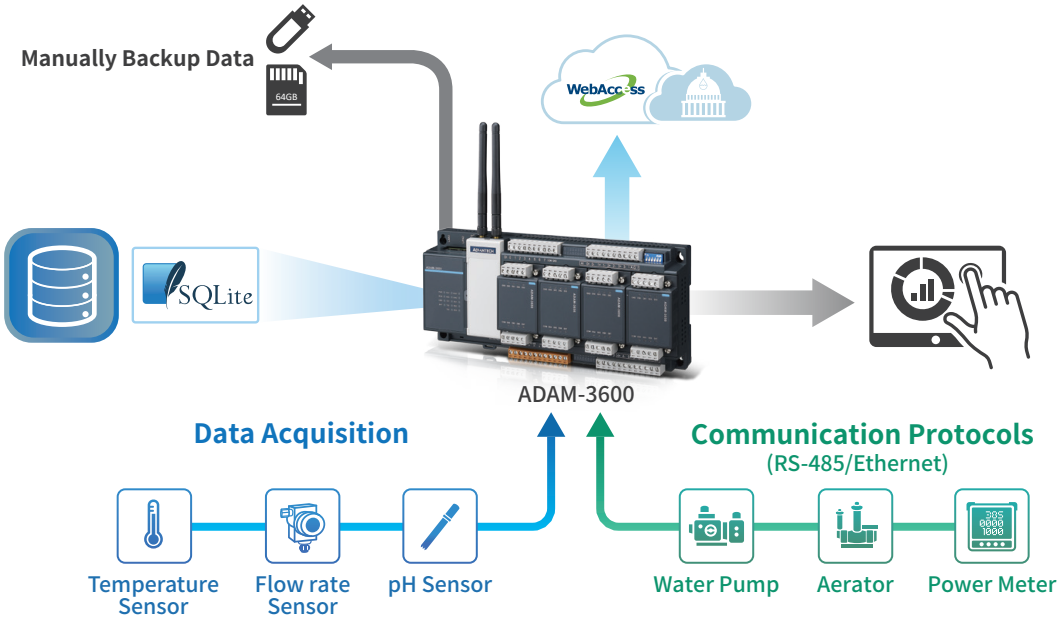
Edge DAQ Solutions

Advantech provides different types of edge data acquisition devices with various data monitoring software to meet all your needs for data management.

ADAM-3600

Intelligent Remote Terminal Units (RTUs)

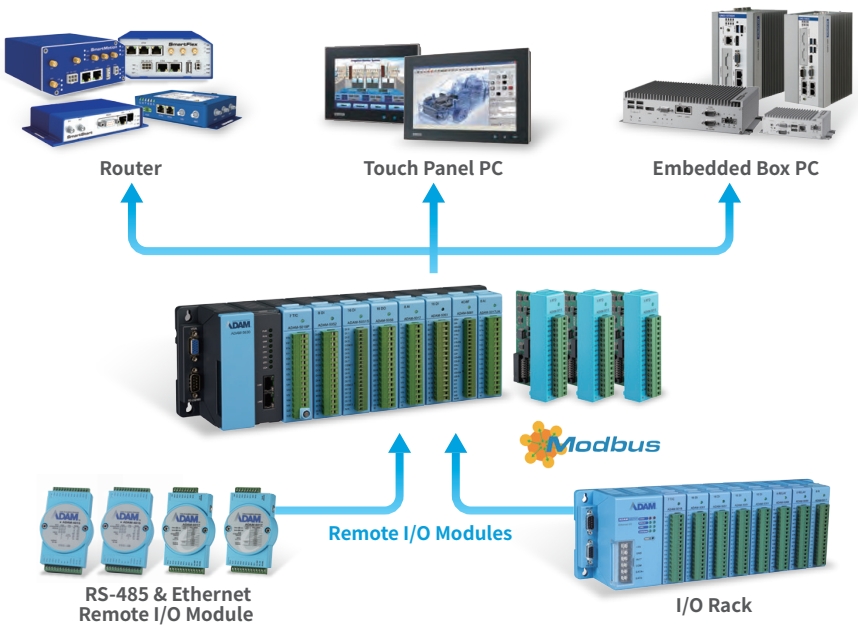
ADAM-3600 is an intelligent remote terminal unit with multiple wireless function capability, multiple I/O selection, wide temperature range, and flexible communication protocols for oil, gas, and water applications.



ADAM-5630

Intelligent Remote Terminal Units (RTUs)

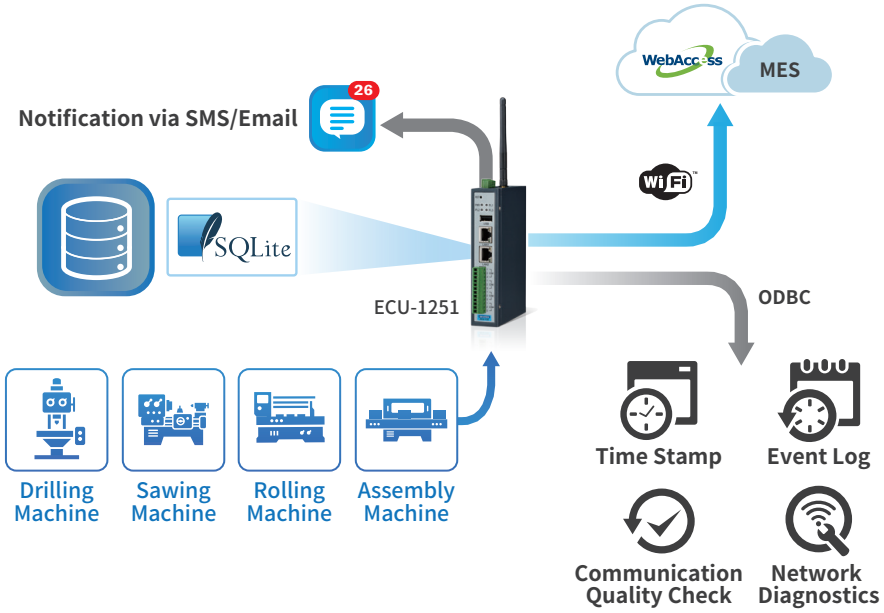
ADAM-5000/485 series is an edge intelligent I/O rack specifically developed for industrial applications to transmit high data rates over long distances. Without a repeater, they can cover a communication distance of up to 100M. They allow remote configuration via Ethernet and eight PCs can simultaneously access the data. They also provides high expansion capability by supporting SNMP, Modbus/RTU and Modbus/TCP functions.



ECU-1000 Series

Intelligent communication gateways

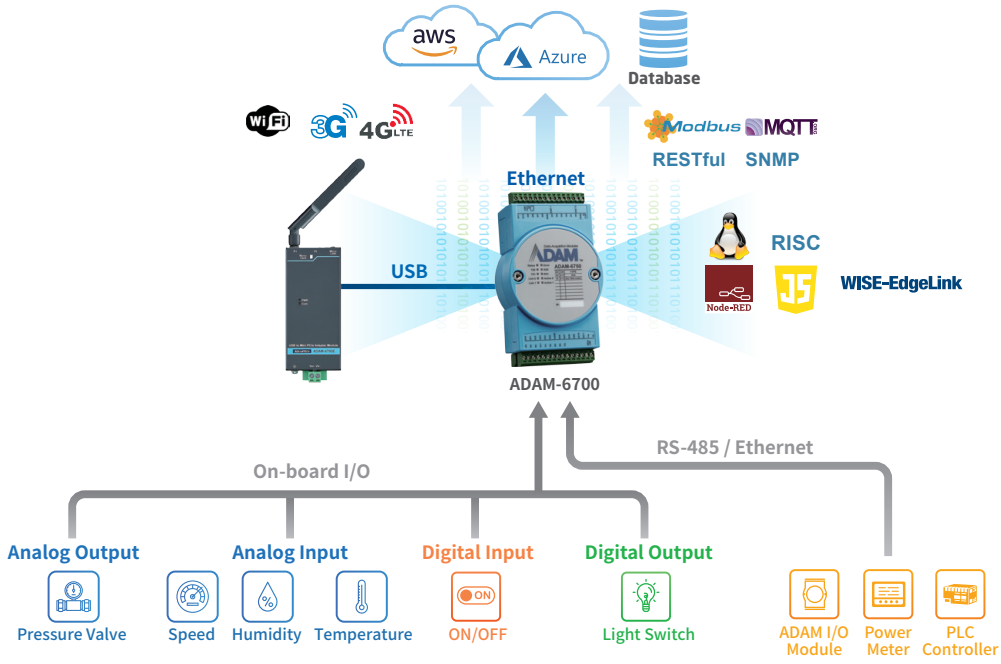
ECU-1000 series is a RISC-based gateway with robust platform design, wireless and Ethernet communication, multiple protocol support and WISE EdgeLink integration. It is especially designed for energy management and equipment monitoring applications related to building, smart manufacturing, and substations.



ADAM-6700

Intelligent IoT I/O gateways

ADAM-6700 is an all-in-one intelligent IoT I/O gateway that provides an integrated solution in the form of a Linux-based gateway capable of performing multiple tasks at the edge. ADAM-6700 is equipped with a range of I/O for comprehensive data acquisition functionality.



Intelligent Remote Terminal Units (RTUs)

Model		ADAM-3600
Description		Intelligent RTU
System	CPU	Cortex A8
	Operating system	Linux RT 3.12
	Programming interface	C (Linux), IEC-61131-3
	Communication protocols	Modbus/RTU, Modbus/TCP, DNP3, IEC-60970-104, OPCUA
	Wireless communication	Cellular, Wi-Fi, Zigbee
Serial Port	Number of ports	3
	Type	1 x RS-232/485, 2 x RS-485
Network Port	Number of channels	2
	Number of independent IP addresses	2
	Speed	10/100 Mbps
	IP specifications	IPv4/IPv6
I/O	Onboard I/O	8 analog inputs, 8 digital inputs, 4 digital outputs
	Expansion slots	4
USB	USB2.0	1
Display Interface	VGA	1
	LED	System, serial, Ethernet, digital I/O, programmable
Storage Interface	SD	1 x SD slot
Operating Temperature		-40~70°C
Certification		CE/FCC
Part Number		ADAM-3600-C2GL1A1E

Expansion Modules

Model	Category	Channel	Part Number
ADAM-3617	Analog input module	4	ADAM-3617-AE
ADAM-3618	Analog input module	4, thermocouple	ADAM-3618-AE
ADAM-3624	Analog output module	4	ADAM-3624-AE
ADAM-3651	Digital input module	8	ADAM-3651-AE
ADAM-3656	Digital output module	8	ADAM-3656-AE
ADAM-3613	Analog input module	4, RTD	ADAM-3613-AE
ADAM-3668	Relay Module	4	ADAM-3668-AE

Analog Input	
Signal Input	Differential
Sampling Rate	10 Hz
Voltage Input	±10 V, ±2.5 V
Input Current	0~20 mA, 4~20 mA
Sensor Input	Thermocouple (type J, K, T, E, R, S, B) RTD (Pt100, Pt1000, Balco 500, Ni 518)
Resolution	16-bit

Analog Output	
Output Voltage	0~10 V
Output Current	0~20 mA, 4~20 mA
Resolution	12-bit

Digital Input	
Input Type	Sink
Rated Voltage	12/24 V_{DC}
Logic “0” Voltage	0~5 V_{DC}
Logic “1” Voltage	11~30 V_{DC}

Digital Output	
Output Type	Open collect
Output Voltage	8~30 V_{DC} @ max 200 mA

Wireless Expansion Modules

96PD-RYUW131

Full/Half-sized mini card, supports 802.11bgn

1750006043 SMA(M) cable, 15 cm

1750000318 2-dBi antenna, 11 cm

96PD-EC25EFA

LTE CAT.4 Module with GNSS (Quectel EC25 series)

1750006264 SMA(F) cable, 15 cm

1750005865 Dipole antenna, 11 cm

Intelligent Remote Terminal Units (RTUs)

Model		ADAM-5630	ADAM-5630E
CPU		Cortex A8 600 MHz	Cortex A8 600 MHz
RAM		512 MB DDR3L	512 MB DDR3L
Flash ROM		–	–
Flash Memory		–	–
Flash Disk		1 GB	1 GB
OS		RT-Linux	RT-Linux
Control Software		Linux C SDK KW Softlogic	Linux C SDK KW Softlogic
Real-time Clock		✓	✓
Watchdog Timer		✓	✓
COM1		RS-232/485	RS-232/485
COM2		RS-485	RS-485
COM3		RS-485	RS-485
COM4		RS-232/485	RS-232/485
I/O Slots		4	8
Power Consumption		8W (for 5630 series only)	
Isolation	Communication	2500 V_{DC} (COM1~COM3) (for 5630 series only)	
	Communication Power	3,000 V_{DC}	
	I/O Module	3,000 V_{DC}	
Diagnosis	Status Display	Power, RUN, Error, BAT, user define (for 5630 series only)	
	Self Test	Yes, while ON	
	Software Diagnosis	✓	
Communication	Interface	RS-232/485	
	Speeds	300 bps ~ 115.2 kbps	
	Max. Distance	4,000 feet (1.2 km)	
	Max. Nodes	32	32
	Protocol	User Defined, Modbus/RTU Modbus/TCP, SNMP	User Defined, Modbus/RTU Modbus/TCP, SNMP
	Remote I/O	Modbus Device	
	Power Requirements	10 ~ +30 V_{DC}	
Environment	Operating Temperature	-20 ~ 70°C	
	Storage Temperature	-25 ~ 85°C (-13 ~ 185°F)	
	Humidity	5 ~ 95%	
Dimensions (mm)		231 x 110 x 75	355 x 110 x 75

✓: supported, – : not supported, △ : optional

Intelligent Communication Gateways






Model		ECU-1050TL	ECU-1051TL	ECU-1251TL	ECU-1251D	ECU-1252	ECU-150
Description		Industrial communication gateway	Industrial communication gateway	Industrial communication gateway	Industrial communication gateway	Industrial communication gateway	Industrial communication gateway
System	CPU	Cortex A8 600MHz	Cortex A8 600MHz	Cortex A8 800MHz	Cortex A8 600MHz	Cortex A9 600MHz	Cortex A53 1.3G
	Operating System	Linux Kernel 4.9	Linux Kernel 4.9	Linux Kernel 4.9	Linux Kernel 4.9	Linux Kernel 4.9	Linux Kernel 4.9
	Programming Interface	Linux C, Phython	Linux C, Phython	Linux C, Phython	Linux C, Phython	Linux C, Phython	Linux C, Phython
	Wireless Communication Protocols	Modbus/RTU, Modbus/TCP, IEC-60870-101/104	Modbus/RTU, Modbus/TCP, IEC-60870-101/104	Modbus/RTU, Modbus/TCP, IEC-60870-101/104	Modbus/RTU, Modbus/TCP, IEC-60870-101/104	Modbus/RTU, Modbus/TCP, IEC-60870-101/104	Modbus/RTU, Modbus/TCP, IEC-60870-101/104
	Wireless Communication	GRPS, 3G,4G, LTE, Wi-Fi	GRPS, 3G,4G, LTE, Wi-Fi	GRPS, 3G,4G, LTE, Wi-Fi	GRPS, 3G,4G, LTE, Wi-Fi	GRPS, 3G,4G, LTE, Wi-Fi	GRPS, 3G,4G,5G LTE, Wi-Fi
	Special Functions	Monitoring, data identification, breakpoint transmission, initiative reporting	Monitoring, data identification, breakpoint transmission, initiative reporting	Monitoring, data identification, breakpoint transmission, initiative reporting	Monitoring, data identification, breakpoint transmission, initiative reporting	Monitoring, data identification, breakpoint transmission, initiative reporting	Monitoring, data identification, breakpoint transmission, initiative reporting
Serial Port	Number of Ports	–	2	4	2	2	2
	Type	–	RS-232/485	RS-232/485	RS-232/485	RS-232/485	RS-232/485
CAN Port	Number of Ports	–	–	–	–	2	–
DI/O	Number of Ports	–	–	–	4DI/4DO	–	–
Network Port	Number of Channels	1	2	2	2	2	2
	Independent IP Number	1	2	2	2	2	2
	Speed	10/100 Mbps	10/100 Mbps	10/100 Mbps	10/100 Mbps	1x100/1x1000	10/100/1000 Mbps
	IP Specifications	IPv4/IPv6	IPv4/IPv6	IPv4/IPv6	IPv4/IPv6	IPv4/IPv6	IPv4/IPv6
I/O	SIM Card Slot	2	2	1	2	1	1
	Expansion Slots	2 x mini-pcie	1 x mini-pcie	1 x mini-pcie	1 x mini-pcie	1 x mini-pcie	1 x mini-pcie
USB	USB2.0	2	1 (ECU-1051TL-R10AB)	1	1	–	1
Display Interface	LED	PWR/Serial/Prog/ LAN	PWR/Serial/Prog/ LAN	PWR/Serial/Prog/ LAN	PWR/Serial/Prog/ LAN	PWR/Serial/Prog/ LAN	PWR/Serial/Prog/ LAN
Storage Interface	SD	1 x micro SD slot	1 x micro SD slot	1 x micro SD slot	1 x micro SD slot	1 x micro SD slot	1 x micro SD slot
Industry Communication Protocol		Modbus/ IEC-60870-104/BACnet IP/DNP3					
PLC Support		Siemens/Allen-Bradley/Schneider/Mitsubishi/Omron/Honeywell/Yokogawa/Delta/Panasonic					
Data Logger		Realtime data logger					
Programing Support		Linux C, Web service API					
Operating Temperature		-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C	-40 ~ 70°C
Certification		CE/FCC	CE/FCC	CE/FCC	CE/FCC	CE/FCC	CE/FCC
Part Number		ECU-1050TL-R10AAE	ECU-1051TL-R10AAE ECU-1051TL-R10AB	ECU-1251TL-R10AAE	ECU-1251D-R10AA	ECU-1252TL-R22AA	ECU-150-12A

✓: supported, – : not supported, △ : optional

Wireless Expansion Modules

96PD-RYUW131

Full/Half-sized mini card, supports 802.11bgn

1750006043 SMA(M) cable, 15 cm

1750000318 2-dBi antenna, 11 cm

96PD-EC25EFA

LTE CAT.4 Module with GNSS (Quectel EC25 series)

1750006264 SMA(F) cable, 15 cm

1750005865 Dipole antenna, 11 cm

Intelligent IoT I/O Gateways



Model		ADAM-6750	ADAM-6717	ADAM-6760D
CPU		ARM Cortex-A8 32-Bit 1GHz		
Memory		NAND flash 512MB		
RAM		DDR3L 512MB		
External Storage		microSD (Optional)		
OS		Real-time Linux V3.12		
Programming		Node-Red(Graphic programming environment based on javascript),Linux C		
Operation Temperature		-40 ~ 70°C		
Interface	RS-485	2	2	2
	LAN	2	2	2
	USB	1 x USB type A, 1 x Micro USB		
Digital Input	Channel	12	5	8
	Type	Dry contact Logic 0: open Logic 1: closed to GND Wet contact logic 0: 0 ~ 3 V_{DC} logic 1: 10 ~ 30 V_{DC}	Dry contact Logic 0: open Logic 1: closed to GND Wet contact logic 0: 0 ~ 3 V_{DC} logic 1: 10 ~ 30 V_{DC}	Dry contact Logic 0: open Logic 1: closed to GND Wet contact logic 0: 0 ~ 3 V_{DC} logic 1: 10 ~ 30 V_{DC}
	Counter Input	3kHZ	–	3kHz
Digital Output	Channel	12	4	–
	Voltage	Sink 30 V_{DC}, 0.1A max. per channel	Sink 30 V_{DC}, 0.1A max. per channel	Sink 30 V_{DC}, 0.1A max. per channel
	Pulse Output	3kHz	–	–
Analog Input	Channel	–	8	–
	Sampling Rate	100 Hz (total)		
Relay Output	Channel	–	–	8
	Contact Rating (Resistive Load)	–	–	30 V_{DC} @ 1 A
Dimensions (W x L x H)		70 x 122 x 38 mm		

Model	ADAM-6700E			
Description	USB to MiniPCIe adaptor module	Accessories	Type	Part Number	Description
Sim Card Slot	1 x Nano SIM card slot		Wall-mount kit	1960094069N001	Wall-mount kit for ADAM-6700E 432C
USB Port	Micro-B USB		USB molding cable	96PD-YH3874	USB molding cable, 90Degree
MiniPCIe Slot	Wi-Fi/3G/4G		Wi-Fi 2.4G	96PD-RYUW131	2.4GHz Wi-Fi full/half size Mini PCIe card
Power Input	10 ~ 30 V_{DC}		LTE-Cat4/3G	96PD-EC25EFA	Quectel 4G(Cat.4), miniPCIe, Europe, EMEA, South Korea, Thailand, India (Manufacturer P/N: EC25EFA-MINIPCIE)
Operating Temperature	-20 °C ~ 70 °C			96PD-EC20CEFAG	Quectel 4G(Cat.4) R2.1, miniPCIe, China (Manufacturer P/N: EC20CEFAG-MINIPCIE)

✓: supported, – : not supported, △ : optional

Intelligent IoT I/O Gateways



Model		ADAM-6715	ADAM-6718	ADAM-6724
CPU		ARM Cortex-A8 32-Bit 1GHz		
Memory		NAND flash 512MB		
RAM		DDR3L 512MB		
External Storage		microSD (Optional)		
OS		Real-time Linux V3.12		
Programming		Node-Red (Graphic programming environment based on Javascript), Linux C		
Operation Temperature		-40 ~ 70°C		
Interface	RS-485	2	2	2
	LAN	2	2	2
	USB	1 x USB type A, 1 x Micro USB		
Digital input	Channel	4	4	5
	Type	Dry contact Logic 0: open Logic 1: closed to GND Wet contact logic 0: 0 ~ 3 V_{DC} logic 1: 10 ~ 30 V_{DC}	Dry contact Logic 0: open Logic 1: closed to GND Wet contact logic 0: 0 ~ 3 V_{DC} logic 1: 10 ~ 30 V_{DC}	Dry contact Logic 0: open Logic 1: closed to GND Wet contact logic 0: 0 ~ 3 V_{DC} logic 1: 10 ~ 30 V_{DC}
Digital Output	Channel	4	7	6
	Voltage	Sink 30 V_{DC}, 0.1A max. per channel	Sink 30 V_{DC}, 0.1A max. per channel	Sink 30 V_{DC}, 0.1A max. per channel
	Pulse Output	3kHz	–	–
RTD	Channel	6	–	–
	Type	Pt100, Pt1000	–	–
Thermocouple	Channel	–	7	–
	Type	–	J, K, T, E, R, S, B type	–
Analog Output	Channel	–	–	3
	Type	–	–	Voltage,Current
Analog Input	Channel	–	–	3
	Type	–	–	Voltage,Current
Dimensions (W x L x H)		70 x 122 x 38 mm		

✓: supported, – : not supported, △ : optional

Modular I/O Systems




Model		☞ ADAM-5000/485	☞ ADAM-5000E	☞ ADAM-5000L/TCP	☞ ADAM-5000/TCP
CPU		80188	80188	RISC CPU	
RAM		–	–	4 MB	
Flash ROM (User AP)		–	–	512 KB	
Flash Memory (Data Storage)		–	–	–	
Flash Disk		–	–	–	
OS		–	–	Real-time OS	
Timer BIOS		–	–	–	
Real-time Clock		–	–	–	
Watchdog Timer		Yes			
I/O Slots		4	8	4	8
Power Consumption		3 W		4.0 W	5.0 W
Isolation	Communication	2,500 V_{DC}	3,000 V_{DC}	RS-485: 1,500 V_{DC}	
	Communication Power	3,000 V_{DC}			
	I/O Module	3,000 V_{DC}			
Diagnosis	Status Display	Power, CPU, Communication		Power, CPU, Error Diagnostic, Communication	
	Self Test	Yes, while ON			
	Software Diagnosis	✓			
Communication	Interface	RS-232/485 (2-wire)	RS-232/485 (2-wire)	Ethernet	
	Speeds (bps)	1,200, 2,400, 4,800, 9,600, 19.2 K, 38.4 K, 57.6 K, 115.2 K	1,200, 2,400, 4,800, 9,600, 19.2 K, 38.4 K, 57.6 K, 115.2 K	10 M, 100 M	
	Max. Distance	4,000 feet (1.2 km)	4,000 feet (1.2 km)	100 m without repeater	
	Data Format	Advantech protocol: N, 8, 1 Modbus protocol: N, 8, 1 N, 8, 2 E, 8, 1 O, 8, 1	Advantech protocol: N, 8, 1 Modbus protocol: N, 8, 1 N, 8, 2 E, 8, 1	TCP/IP	
	Max. Nodes	128	128	Depend on IP address	
	Protocols	ADAM ASCII/Modbus Protocol	ADAM ASCII/Modbus Protocol	Modbus/TCP	
	Remote I/O	–	–	20 nodes Modbus devices	
	Power Requirements	+10 ~ +30 V_{DC}			
Environment	Operating Temperature	-10 ~ 70°C (14 ~ 158°F)			
	Storage Temperature	-25 ~ 85°C (-13 ~ 185°F)			
	Humidity	5 ~ 95%			
Dimensions (mm)		231 x 110 x 75	355 x 110 x 75	231 x 110 x 75	355 x 110 x 75

✓: supported, – : not supported, △ : optional

Analog Input/Output Modules





Model		ADAM-5013	ADAM-5017	ADAM-5017P	ADAM-5017UH	ADAM-5018
Analog Input	Resolution	16-bit	16-bit	16-bit	12-bit	16-bit
	Input Channel	3	8	8	8	7
	Sampling Rate	10 (total*)	10 (total*)	10 (total*)	200K**	10 (total*)
	Voltage Input	–	±150 mV, ±500 mV ±1 V, ±5 V, ±10 V	±150 mV, ±500 mV ±15V, ±10V, ±5 V, ±1 V 0 ~ 150mV, 0 ~ 500mV 0 ~ 1V, 0 ~ 5V, 0 ~ 10V 0 ~ 15V	±10 V, 0 ~ 10 V	±15 mV, ±50 mV ±100 mV, ±500 mV ±1 V, ±2.5 V
	Current Input	–	±20 mA	±20 mA, 4 ~ 20mA	0 ~ 20 mA, 4 ~ 20 mA	±20 mA
	Direct Sensor Input	Pt or Ni RTD	–	–	–	J, K, T, E, R, S, B
Isolation		3,000 V_{DC}	3,000 V_{DC}	3,000 V_{DC}	3,000 V_{DC}	3,000 V_{DC}

*Sampling rate value depends on used channel number.
Example: Using 5 channels on ADAM-5017, sampling rate for each used channel will be 10/5 = 2 samples/second.
**The sampling rate varies with the controller.






Model		ADAM-5018P	ADAM-5024	ADAM-5050	ADAM-5051 ADAM-5051D ADAM-5051S	ADAM-5052	ADAM-5053S
Analog Input	Resolution	16-bit	–	–	–	–	–
	Input Channel	7	–	–	–	–	–
	Sampling Rate	10 (total*)	–	–	–	–	–
	Voltage Input	±15 mV, ±50 mV ±100 mV, ±500 mV ±1 V, ±2.5 V	–	–	–	–	–
	Current Input	4 ~ 20 mA	–	–	–	–	–
	Direct Sensor Input	J, K, T, E, R, S, B	–	–	–	–	–
Analog Output	Output Channels	–	4	–	–	–	–
	Resolution	–	12 bit	–	–	–	–
	Voltage Output	–	0 ~ 10 V	–	–	–	–
	Current Output	–	0 ~ 20 mA 4 ~ 20 mA	–	–	–	–
Digital Input and Digital Output	Digital Input Channels	–	–	16 DI/O (bit-wise selectable)	16 (ADAM-5051) 16w/LED (5051D/5051S)	8	32
	Digital Output Channels	–	–		–	–	–
Isolation		3,000 V_{DC}	3,000 V_{DC}	–	2,500 V_{DC} (5051S)	5,000 V_{RMS}	2,500 V_{DC}

*Sampling rate value depends on used channel number.
Example: Using 6 channels on ADAM-5017, sampling rate for each used channel will be 12/6 = 2 samples/second.
✓: supported, – : not supported, △ : optional

Digital Input/Output Modules





Model		ADAM-5055S	ADAM-5056 ADAM-5056D	ADAM-5056S ADAM-5056SO	ADAM-5057S	ADAM-5060
Digital Input and Digital Output	Digital Input Channels	8 w/LED	–	–	–	–
	Digital Output Channels	8 w/LED	16 (ADAM-5056) 16 w/LED (ADAM-5056D)	16 w/LED	32	6 relay (2 form A/4 form C)
Isolation		2,500 V_{DC}	–	2,500 V_{DC}	2,500 V_{DC}	–






Model		ADAM-5069	ADAM-5080	ADAM-5081	ADAM-5090 ADAM-5091	ADAM-5191	ADAM-5192
Digital Input and Digital Output	Digital Input Channels	–	–	–	–	–	–
	Digital Output Channels	8 power relay (form A)	–	–	–	–	–
Counter (32-bit)	Channels	–	4	4/8	–	–	–
	Input Frequency	–	0.3 ~ 1000 Hz max. (frequency mode) 5000 Hz max. (counter mode)	5 Hz ~ 1 MHz max. (frequency mode) 1 MHz max. (counter mode)	–	–	–
	Mode	–	Frequency, Up/ Down Counter, Bi-direction Counter	Frequency, Counter (Up/Down, Bi-direction, Up, A/B Phase)	–	–	–
Communication	Channels	–	–	–	4	4 (ADAM-5630 only)	2
	Type	–	–	–	RS-232/422/485	RS-232/422/485	LAN (ADAM-5630 only)
Isolation		–	1,000 V_{RMS}	2,500 V_{DC}	–	1,000 V_{DC}	–

✓: supported, – : not supported, △ : optional