

User Manual

Version 1.0.0 October 2017

Accelerometer Data Logger



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Important Information

Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for a period of one year, beginning from the date of delivery to the original purchaser.

Warning

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Contact us

If you encounter any problems while operating this device, feel free to contact us via mail at: service@icpdas.com. We guarantee to respond within 2 working days.

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1. Introduction



Vibration Signal Measurement

In recent years, in the trend of rapid growing in intelligent factory, automatic, unmanned, and intelligent equipment would be the main trend in the future. The vibration detection of equipment could prevent the loss caused by the damage of equipment. We should let factory manager could do maintenance and repair to prevent the equipment from being out of order more and more which leads taking repairing in large scale by maintenance and repair first and decrease the production efficiency.

IEPE acceleration sensor in current market is often used in detection of vibration signal in station bearing, and often needs to take extra driver module. In this way, cost down is made, and the uncertain results of measuring is increased much more. Besides, the sampling range of acceleration recorder often seen in market could not meet with the range of detection in vibration if station bearing. In order to make the factory to achieve the best benefits, ICP DAS

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have Accelerometer Data Logger, AR-200/AR-400.

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1.1 Features

- ◆ 2 or 4 simultaneous, 16-bit resolution ADC
- Support 2 or 4 IEPE input , and built-in 3 mA excitation current
- ◆ AR-200 support sample rate: 200kHz 、100kHz 、50kHz
- ◆ AR-400 support sample rate: 125kHz 、100kHz 、50kHz
- ◆ Max. Recording time : 120 seconds
- ◆ Dynamic range : +/- 10V
- Flexible trigger modes: Push button trigger
 Schedule trigger
 analog threshold trigger
 digital input trigger and utility remote trigger
- Supports 4 to 32 GB micro SDHC type flash
- Provide 2-ch DI and 1-ch Relay
- Provide LED indicators
- Contains LED indicator on RJ-45 for Ethernet status.
- ◆ 4 kV Contact ESD protection for any terminal
- Wide range of power input (+10 ~ +30 VDC) and operating temperature (-25 ~ +75 $^{\circ}$ C).
- RoHS design

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1.2 Specification

Module	AR-200	AR-400			
Analog Input Interface					
Channels	2 (simultaneous sampling)	4 (simultaneous sampling)			
ADC Resolution	16 bit				
Sample rate (kHz)	50, 100, 200	50, 100, 125			
Dynamic range	+/- 10V				
IEPE	3 mA				
Trigger mode	Push button trigger Schedule trigger Ar	nalog threshold trigger 🕥			
	Digital input trigger Utility Remote trigger				
Connector	BNC				
Digital Input Interface					
Channels	2, Dry Contact: Source x 1, Wet Contact: S	Sink or Source x 1			
Dry Contact Level	Off Voltage Level : Open, On Voltage Leve	I : Close to GND			
Wet Contact Level	Off Voltage Level : +4 VDC max., On Voltage Level : +10 VDC to +50 VDC				
Digital Output Interface					
Channels	1, Power Relay, Form A x 1				
Contact Rating	AC: 125 V@0.6A DC: 30V@2A, 110V@0.	6A			
Ethernet Interface					
Controller	10/100Base-TX Ethernet Controller (Auto-	negotiating, Auto_MDIX)			
Connector	RJ-45 with LED indicator				
SD Card Interface					
Storage Media	Micro SDHC type flash – support 4 to 32 C	βB			
Recording Format	Binary				
LED Indicator					
LED indicator	PWR LED, DAQ LED, SD LED				
Power					
Power supply	Unregulated +10 ~ +30 VDC				
Protection	Power reverse polarity protection, Over-vo	Itage brown-out protection			
Power Consumption	4.3W				
Mechanical					
Installation	Wall Mount				

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Dimensions	197 mm x 139 mm x 57 mm (W x L x H)
Environment	
Operating Temp.	-25 ~ 75 ℃
Storage Temp.	-30 ~ 80 °C
Humidity	10 ~ 90% RH, non-condensing

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2. Getting Started

Appearance



NO.	Descriptions
1	Terminal block
2	Ethernet Port with RJ-45 connector
3	Init. DIP-switches
4	Push button
5	Micro SD slot
6	LED indicators
7	BNC connector

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Wiring and Pin Assignment



NO.	Name	Descriptions	
1	F.G	Power	
2	GND	+10 ~ +30	
3	+Vs	VDC	
4	RL.NO	Delay	
5	RL.COM	Relay	
6	D-		
7	D+	K3-400	
8	ISO.GND		
9	DI	DI	
10	DI.COM		





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2.1 LED Indicator

The accelerometer data logger provides three LED indicators, including indicators for power status, DAQ status and memory card status. The Following is an overview of the purpose and function of each LED indicator together with a description.

DAQ_ST	SD_ST	Description
Flash (Slow, 500ms)	OFF	ldle
Flash (Fast, 100ms)	OFF	Acquiring data
ON	Flash (Fast, 100ms)	Saving dataFormatting SD card
Flash (Slow, 500ms)	Flash (Slow, 500ms)	Do not detect SD cardIllegal File System
	Bootloader mode	
Flash (Fast, 100ms)	Flash (Fast, 100ms)	Updating FW

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2.2 Push Button

The Accelerometer Data Logger provide flexible trigger modes, one of them is Push button. The user should keep pressed button at least one second and then released button to start sampling data. Before the sampling time has elapsed, the user can keep pressed button at least one second to stop sampling data. The user can configure sampling rate and sampling time by configuration tool (AR_Tool). About the more information of trigger modes, please refer to the user's manual.

The factory default sampling rate and sampling time:

AR-200: 200 KHZ, 30 seconds AR-400: 125 KHZ, 30 seconds



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2.3 Init. DIP Switch

The Accelerometer Data Logger provide an Init. Dip switch, default in [AP]. The user can switch to [BOOT] and re-power on. The device will turn into Bootloader mode and wait for update firmware.

The Firmware Update utility, FW_Update_Tool_v3.xx.exe (where x denotes the utility version) can be obtained from companion CD or our FTP site:

CD:\ar\utility\fw_update_tool\

ftp://ftp.icpdas.com/pub/cd/ar/utility/fw_update_tool/



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3. AR_Tool Utility

ICP DAS provides a configuration tool, AR_Tool utility, to configure the accelerometer data logger. AR_Tool is divided into three functions, Basic settings, Module information and Advanced settings. The following is an overview of AR_Tool.

	-	AR_Tool v1.00	otting				- 🗆 X
		Network card	: IP: [192.168.77.88]	Connection: [乙太網路]	Card: [Intel(R) Et	hernet Connection I2	17-V] 🗸
		Name	Alias	IP	Mask	Gateway	MAC
		AR-400 /	AR-400 Alias	192.168.255.100	255.255.0.0	192.168.255.254	00:0D:E0:16:A0:00
Basic Settings							
Madula		Q Search	n Network Se	ettings RTC Calib	ration	🚿 Connect	DisConnect
Iviodule		Information Firmware Vers	sion : N/A Status	: N/A	SD C	ard: Mercury	battery:
Information	1	Trigger Mode	Micro SD Card Dow	nload List Remote Tric	ager System Loc		
		- ☑ Schedule	Trigger	······	Push Bu	tton & DI Trigger —	
Advanced Settings		Sample Rate Start : DAQ Time: Add Delete	e (KHZ): 125 ✓ 23:50 ÷ 5 ÷ Sec.	Start Rate Tim	e Sample Three Sample Upper b	Rate (KHZ): 125 shold Trigger (±10000 Rate (KHZ): 125 ound: 10000 Lov wnload to Dev.	DAQ Time: 60 ÷ DAQ Time: 60 ÷ Ver bound: -10000 ÷ Upload from Dev.

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3.1 Basic Settings

The Basic Settings section provides the ability to set or adjust basic settings for the accelerometer data logger, including the network, RTC calibration, and device search, etc.

3.1.1 Device Search



3.1.2 Network Settings

🛞 AR_Tool v1.(00						- 🗆 X	
Connectio	n Setting							
Network ca	ard : IP: [192.168.77.8	38] Connection: [乙)	太網路] Card	d: [Intel(R) Eth	ernet Conne	ction I21	7-V] ~	
Name	Alias	IP	М	ask	Gateway		MAC	
AR-400	AR-400 Alias	192.168.2 N	letworkSetting				– 🗆 X	
			Name: A	R-400	MAG	:: 00:0	D:E0:16:A0:00	
			Alias:	AR-400 Al	as			
	1 Pre	ess button	10.	192 1	68 255	100		Network Setting X
			IF.	172 . 1	. 255	. 100	2 Droce OK	Network Setting OK !!
Q Sea	arch Networl	< Settings F	Mask:	255 _ 2	55.0	. 0	5 Press OK	
			Gateway:	192 1	68 0	254	ОК	確定
			Guteway.	1.72 . 1		. 234		
			2	Vetwork S	ettings			
			-					

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3.1.3 RTC Calibration

😵 AR_Tool v1.00					- 🗆 🗙	:
- Connection Set	ting					
Network card :	IP: [192.168.77.88] Cor	nnection: [乙太網路]	Card: [Intel(R) Et	hernet Connection I	217-V] ~	
Name Al	lias	IP	Mask	Gateway	MAC	1
AR-400 AR	R-400 Alias	192.168.255.100	255.255.0.0	192.168.0.254	00:0D:E0:16:A0:00	
Q Search	Network Settir	1 Pres	s RTC Calibra	RTC Calibration RTC Calibration	n OK !!	×
				DeviceTime = 2 2 Show Re	2017-08-16 17:35:57 esult 確定	

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3.2 Module Information

Module information show several status of the accelerometer data logger, including firmware version, Micro SD card status, and battery stastus, etc.

Q Search Net	work Settings RTC Calibr	ration	Connect 🖉 DisCo	onnect
formation rmware Version : N/A	Status : N/A	SD Card :	Mercury battery :	
0.0.1		27.0 C 11	de i	
Q Search	Network Settings	RIC Calibration	Connect	S DisCon
Information				

Parameter	Description
Firmware Version	『N/A』: Disconnect with module
	^r vx.xx
Status	『N/A』: disconnect with module
	${^{\!$
	『Saving Data』:Writing data to Micro SD card
	[『] DAQ (Push Button)』: Push button trigger detected
	[『] DAQ (Schedule)』: Schedule trigger detected
	『DAQ (Threshold)』:Analog threshold trigger detected
	『DAQ (Remote)』:Remote trigger detected
	『DAQ (DI)』:DI trigger detected
SD Card	😂 : Detect Micro SD card
	🥯 : Do not detect Micro SD card
Mercury battery	😂 : Normal
	● : Low battery

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3.3 Advanced Settings

3.3.1 Trigger Mode

The accelerometer data logger provide five trigger mode, including Push button trigger Schedule trigger
Analog threshold trigger and Digital input trigger. The user can configure sampling rate, sampling time and other parameters of trigger mode.

Trigger Mode Micro SD Card	Downlo	ad List	Remot	e Trigge	r SystemLog
Schedule Trigger		Start	Rate	Time	Push Button & DI Trigger ^ Sample Rate (KHZ): 125 ∨ DAQ Time: 60 ♀
Sample Rate (KHZ): 125 ~	137 138	22:40 22:50	100 100	5 5	Threshold Trigger (±10000 mV)
Start : 23:50 📮	139	23:00	100	5	Sample Rate (KHZ): 125 V DAQ Time: 60 🔅
DAQ Time: 5 🔹 Sec.	140	23:20	125	5	Upper bound: 10000 🗘 Lower bound: -10000 🗘
🕞 Add 🥜 Modify	142 143	23:30 23:40	125 125	5 5	📥 Download to Dev. 🐴 Upload from Dev.
Delete	▶ 144	23:50	125	5	y 🚺 Save File 📄 Load File
					i\

A. Schedule Trigger Mode

2	Schedule Trigger				•	_
			Start	Rate	Time	^
	Sample Rate (KHZ): 50 🗸	137	22:40	100	5	
0		138	22:50	100	5	
3	Start: 00:00 🗧	139	23:00	100	5	
-		140	23:10	100	5	
(4)	DAQ Time: 5 📑 Sec.	141	23:20	125	5	
Ā		142	23:30	125	5	
9	Add / Modify	143	23:40	125	5	
	🔵 🖨 Delete	144	23:50	125	5	•
0	6					

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The following is an overview of the parameters that can be found on the $\[$ Schedule Trigger Mode $\]$, together with a description of each.

NO.	Parameter	Description	
1	Enable Trigger Mode	If checked, it means enable this trigger mode	
2	Sample Pate(KH7)	AR-200 : 200kHz, 100kHz, 50kHz	
2		AR-400 : 125kHz, 100kHz, 50kHz	
3	Start	Set schedule's start time:00:00~23:59	
4	DAQ Time	Set DAQ time : 1~120 seconds	
5	Add	Add a new schedule	
6	Modify	Modify schedule	
7	Delete	Delete schedule	
8	Number of schedules	1~144 , at least 10 minutes between 2 schedules	
Matai			

Note:

- Just only one trigger mode between Schedule Trigger mode and Threshold Trigger mode can be enabled at the same time.
- Factory default enable Threshold Trigger mode.

B. Push Button & DI Trigger Mode



The following is an overview of the parameters that can be found on the _ Push Button & DI Trigger Mode _ , together with a description of each.

NO.	Parameter	Description
1	Sample Rate(KHZ)	AR-200 : 200kHz, 100kHz, 50kHz AR-400 : 125kHz, 100kHz, 50kHz
2	DAQ Time	Set DAQ time : 1~120 seconds

Note:

- The user should keep pressed button at least one second and then released button to start sampling data. Before the sampling time has elapsed, the user can keep pressed button at least one second to stop sampling data.
- Factory default: AR-200: 200kHz, 30 seconds ; AR-400: 125kHz, 30 seconds

C. Threshold Trigger Mode



The following is an overview of the parameters that can be found on the $\[\]$ Threshold Trigger Mode $\[\]$, together with a description of each.

NO.	Parameter	Description	
1	Enable Trigger Mode	If checked, it means enable this trigger mode	
2	Sample Pate/KUZ)	AR-200 : 200kHz, 100kHz, 50kHz	
2		AR-400 : 125kHz, 100kHz, 50kHz	
3	DAQ Time	Set DAQ time : 1~120 seconds	
4	Upper bound	Threshold's upper bound: +/- 10000 mV	
5	Lower bound	Threshold's lower bound: +/- 10000 mV	

Note:

1. Just only one trigger mode between Schedule Trigger mode and Threshold Trigger mode can be enabled at the same time.

2. Factory default enable Threshold Trigger mode.

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D. Download/Upload Parameters



NO.	Parameter	Description	
1	Download to Dev.	Write trigger mode settings to device	
2	Upload From Dev.	Read trigger mode settings from device	
3	Save File	User can save trigger mode settings to a file(*.ini)	
4	Load File	User can load trigger mode settings from a file(*.ini)	

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3.3.2 Micro SD Card

All sampling files saved in Micro SD card have the ".AR" file name extension. AR_Tool will help the user to convert those files to text file or excel file.

Trigger Mode Micro SD Card Dov	vnloa List Remote Trigger Syste	m Log
Drive Select : Remote Drive ~	AR-LOG 20170817.TXT (4.0KB) -720170818.TXT (5.0KB)	Download ✓ xls □ csv ✓ txt
Format SD Card : GO !	□ □ 20170817 □ □ 190000.AR (1972.0KB) □ □ 191000.AR (1972.0KB)	Open Folder
Delete Old File :		Delete Auto Delete :
Uesd (MB): 255 (3 %)		
Total (MB) : 7,673		Selected : 5 Converted : 0

The following is an overview of the parameters that can be found on the $\[\]$ Download/Upload Parameters $\]$, together with a description of each.

NO.	Parameter	Description
1	Drive Select	It will show all removable storage devices on PC. If utility connected with module, it will have an option $\[\ \ \ \ \ \ \ \ \ \ \ \ \$
2	Format	This function can format memory card selected by $^{\!$
3	Delete Old File	If module is so low on storage that it can't save data. This function can delete old files and then save data. Factory default : Disabled this function Disable, it will not save data. Enable, it will auto delete old files.
4	Storage	It will show total storage of memory card and how much storage memory card used.

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5	File List	It will show all *.AR files and log files in memory card.
6	Convert / Download [©] Convert _: It will convert selected *.AR files [©] Download _: It will download *.AR files an selected in file list.	
7	File Type	Set file type that *.AR files will be converted
8	Open Folder	It will open folder that save *.AR files.
9	Auto Delete	It will delete file automatically when file download completed.
Α	Delete	The user can delete selected files in file list manually.

The naming rules of sampling file is shown below:

It used sampling date as file folder, sampling tile as file name.



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3.3.3 Download List

The user can download multiple files from accelerometer data logger, and can see download status at this tab.

rigge	r Mode Micro SD Card D	ownload List	Remote Trigger System Lo)g
No.	File		Status	
1	20170821\010000.AR (3939.0	OKB)	Completed	
2	20170821\011000.AR (3951.0	OKB)	Completed	
3	20170821\012000.AR (4935.0	OKB)	Completed	
4	20170821\013000.AR (4931.0	OKB)	Completed	
5	20170821\014000.AR (4934.0	OKB)	Downloading	
6	20170821\015000.AR (4934.0	OKB)	ldle	
7	20170821\020000.AR (1970.0	OKB)	Idle	
8	20170821\021000.AR (1972.0	OKB)	Idle	

The following is an overview of the parameters that can be found on the $\[\]$ Download List $\[\]$, together with a description of each.

NO.	Parameter	Description
1	File List	Show download status of each files
2	Progress Bar	Show download progress

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3.3.4 Remote Trigger

Accelerometer data logger provide remote trigger function. The user can sampling data and download data directly via AR_Tool.



The following is an overview of the parameters that can be found on the $\[\]$ System Log $_{\[\]}$, together with a description of each.

NO.	Parameter	Description	
4	Sample Rate(KHZ)	AR-200 : 200kHz, 100kHz, 50kHz	
		AR-400 : 125kHz, 100kHz, 50kHz	
2	DAQ Time Set DAQ time : 1~120 seconds		
3	Start	Start sampling data	
4	Stop	Stop sampling data	
5	Channel	Select desired channel.	
6	File Type	Select file type that *.AR files will be converted.	
7	Download	It will download selected channel's data.	
8	Progress Bar	Show sampling progress and download progress	
9	Open Folder	It will open folder that save *.AR files.	

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3.3.5 System Log

System Log show 200 recant system events, including boot-up time, sampling mode, sampling time, and so on.

1		•	2
Trigger Mode Micro SD (Card Download List Remote Trigger System Log		
Date time	Event	^	
2017-08-21 04:20:00	Schedule - Start; Rate:50 kHZ		
2017-08-21 04:20:05	Schedule - End; Rate:50 kHZ		
2017-08-21 04:20:05	SD Card (Start Writing)		
2017-08-21 04:20:08	SD Card (Stop Writing)		
2017-08-21 04:30:00	Schedule - Start; Rate:50 kHZ		
2017-08-21 04:30:05	Schedule - End; Rate:50 kHZ		
2017-08-21 04:30:05	SD Card (Start Writing)		L
2017-08-21 04:30:08	SD Card (Stop Writing)		
2017-08-21 04:40:00	Schedule - Start; Rate:100 kHZ	~	🌮 Update
<		>	

The following is an overview of the parameters that can be found on the "System Log_{\parallel} , together with a description of each.

NO.	Parameter	Description	
1	Event list	Show system events.	
2	Update	Update to the latest system events.	

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Appendix A. Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
1.0.0	September 2017	Initial issue

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Appendix B. Firmware Update

This chapter provides a way to update the latest firmware of accelerometer data logger.

Step 1: Get Firmware_Update_Tool utility

The Firmware Update utility, FW_Update_Tool_v3.xx.exe (where x denotes the utility version) can be obtained from companion CD or our FTP site:

CD:\ar\utility\fw_update_tool\

ftp://ftp.icpdas.com/pub/cd/ar/utility/fw_update_tool/

Step 2: Adjust Init. dip switch

Set Init. Dip switch to 『BOOT』



Step 3: Into Bootloader mode

Re-power up,

and confirm that DAQ_ST led and SD_ST led are fast flashing.



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Step 4: Start Update

FW_Update_Tool v3.00 - X
1. Download Interface [192.168.77.88] [乙太網路] [Intel(R) Ethemet Connection I217-V] 、
IP Address: 192 - 168 - 77 - 1 2 Assign IP address for AR Series
2. Firmware Path
D:\FW_Update_Tool\firmware.fw
Browser
-3. Firmware Update Click "Update" button to start firmware updating!!
Update
FW_Update_Tool v3.00 - X
1. Download Interface
[192.168.77.88] [乙太網路] [Intel(R) Ethernet Connection I217-V] -
IP Address: 192 _ 168 _ 77 _ 1
2. Firmware Path D:\FW_Update_Tool\&R-400v100.fw 3 Select *.fw file
Browser AR-400v100.fw
3. Finnware Update Click "Update" button to start firmware updating!!

Update 5 Start Update 単心: AR-400v100.fw 開設(の) 取消

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3. Firmware Update Click "Update" b	3. Firmware Update Click "Update" button to start firmware updating!!		
LAS .		Update OK	
	Programming.		

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