

I-8024W/I-9024 Module Linux API Reference Manual

V 3.0.0 July 2018



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1. Introduction

The I-8024W/I-9024 is a 14-bit analog output module, which offer 4 single-ended analog output channels. Every channel can be programmed to an individual output range of, ± 10 V or 0 ~ +20 mA.

The I-8024W/I-9024 provide RF immunity level matching that defined by IEC 61000-4-3 standard, together with 4 kV ESD protection as well as 3000 VDC intra-module isolation.

The Slew rate of I-8024W module is about 16 us (62.5 K Hz) from +10 V to -10V.

Features

- 4-channel Voltage or Current Output
- Individual Channel Configuration
- 3000 VDC Intra-module Isolation
- RF Immunity
- 4 kV ESD Protection
- Wide Operating Temperature Range: -25 to +75°C

Applicable Platform table

The following table shows which platform the module applies to.

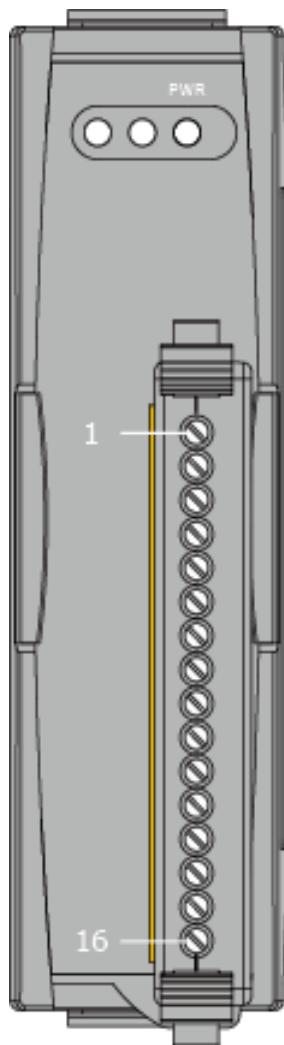
Platform	OS	Module
XPAC	XP-8000(WES)	I-8024W
	XP-8000-Atom (WES)	I-8024W
	XP-8000-WES7 (WES7)	I-8024W
	XP-8000-CE6 (WinCE 6.0)	I-8024W
	XP-8000-Atom-CE6 (WinCE 6.0)	I-8024W
	XP-9000-WES7(WES7)	I-9024
WinPAC	WP-8000 (CE 5.0/7.0)	I-8024W
	WP-9000-CE7 (CE 7.0)	I-9024
LinPAC	LinPAC-8000(Linux kernel 3.2/4.4)	I-8024W
	LinPAC-9000(Linux kernel 3.2/4.4)	I-9024
IPAC	iPAC-8000 (MiniOS7)	I-8024W
	I-8000 (MiniOS7)	I-8024W

1.1. Specifications

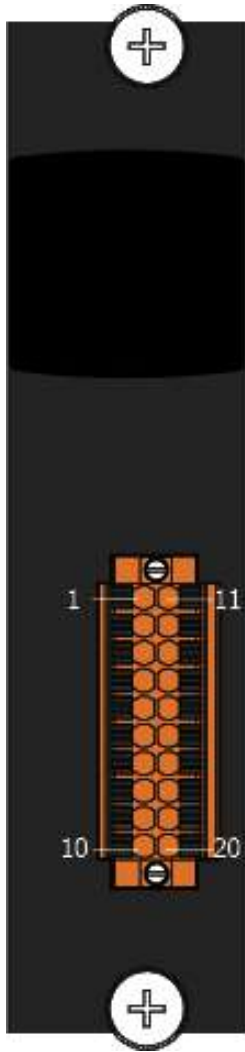
Analog Output		I-8024W	I-9024
Channels		4	
Current Output Wiring		Sink	
Range		+/- 10V, 0 ~ +20 mA	
Resolution		14-bit	
Accuracy	voltage	+/- 0.1% of FSR;	
	current	+/- 0.2% of FSR	
Readback Accuracy		+/-1% of FSR	
Zero Drift	Voltage	+/-30 μ V/ $^{\circ}$ C	
	Current	+/-0.2 μ A/ $^{\circ}$ C	
Span Drift		+/- 20ppm/ $^{\circ}$ C	
Voltage Output Capability		10 V @ 20 mA	
Max Current Load Resistance		External +24V : 1050 Ohms	
LED Indicators			
System LED Indicator		1 LED as Power/Communication Indicator	
Isolation			
Intra-module Isolation, Field to Logic		3000 VDC	
EMS Protection			
ESD (IEC 61000-4-2)		\pm 4 kV Contact for each Terminal	\pm 4 kV Contact for each Terminal \pm 8 kV Air for Random Point
Power			
Power Consumption		2 W Max.	
Mechanical			
Dimensions (L x W x H)		30 mm x 102 mm x 115 mm	144 mm x 31 mm x 134 mm
Environment			
Operating Temperature		-25 ~ +75 $^{\circ}$ C	
Storage Temperature		-30 ~ +80 $^{\circ}$ C	-40 ~ +85 $^{\circ}$ C
Humidity		10 ~ 90% RH, Non-condensing	

1.2. Pin Assignments

I-8024W



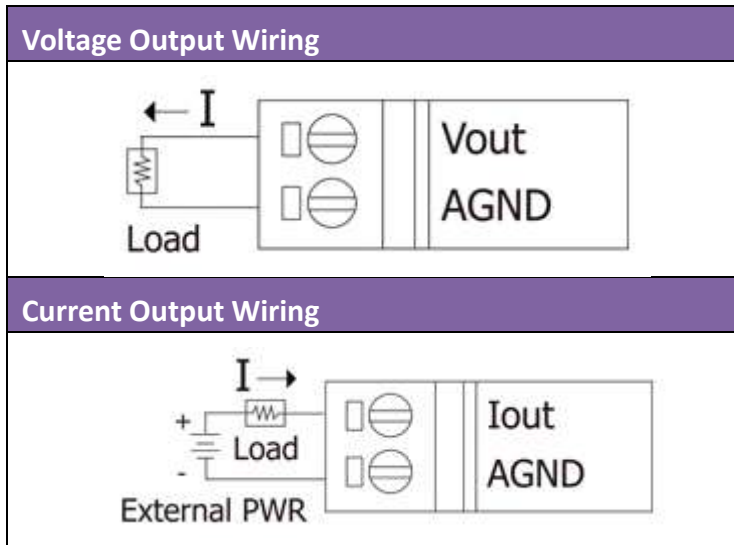
Terminal No.	Pin Assignment
01	Iout0
02	AGND
03	Iout1
04	AGND
05	Iout2
06	AGND
07	Iout3
08	AGND
09	Vout0
10	AGND
11	Vout1
12	AGND
13	Vout2
14	AGND
15	Vout3
16	AGND



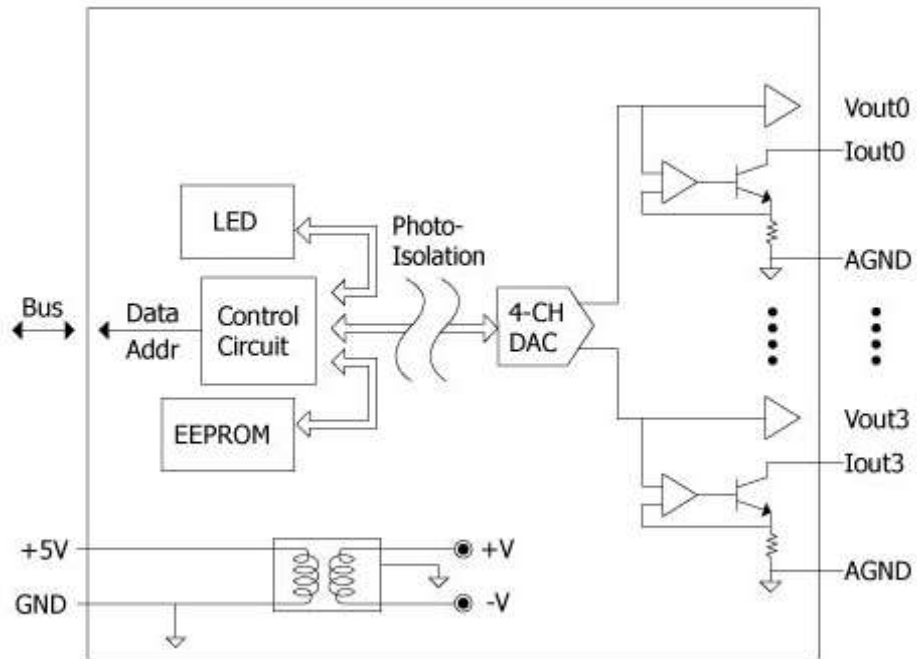
Pin Assignment	Terminal No.	Pin Assignment
VO0	01	I0
AGND	02	AGND
VO1	03	I1
AGND	04	AGND
VO2	05	I2
AGND	06	AGND
VO3	07	I3
AGND	08	AGND
-	09	-
FG	10	FG

20-pin Connector

1.3. Wire Connections



1.4. Block Diagram



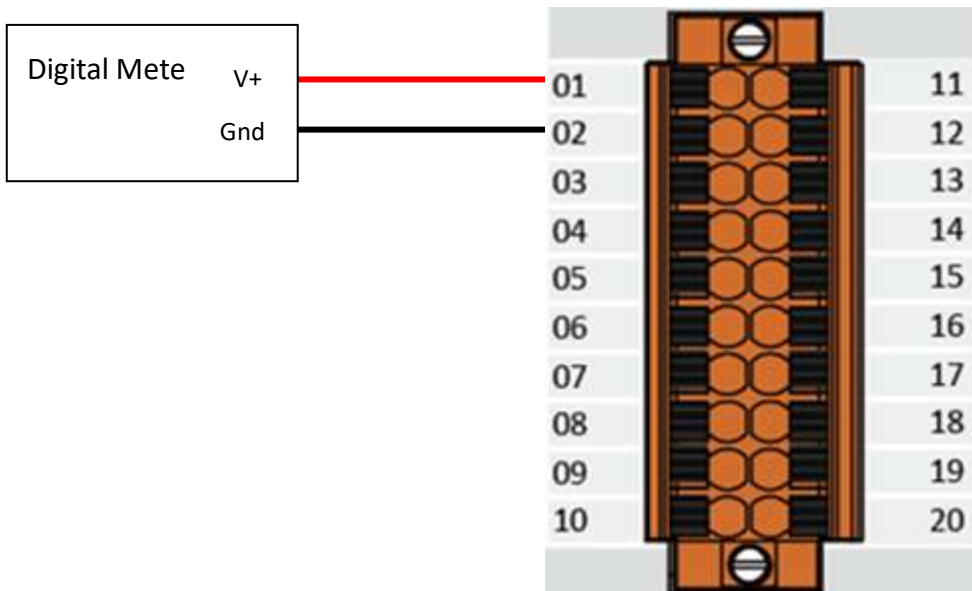
2. Quick Start

ICP DAS provides a range of demo programs for different platforms that can be used to verify the functions of the I-8024W/9024. The source code contained in these programs can also be reused in your own custom programs if needed. The basic configuration information includes:

- The data output for each channel



1. First, user need to download LinPAC SDK, which is includes GNU toolchain, Libraries, header, examples files, etc.
2. Check the power cable, Ethernet cable, VGA monitor, the communication cable between controller and PC has been connected well, and then check the I-8024W/9024 has been plugged in the controller.
3. I-8024 doesn't support Hot plugging, please make sure the module plugged on the host before turn on the PAC.
4. Connect to the device (e.g., Digital Meter) by the Single-ended wiring method, as illustrated below.



5. Next, check the communication between controller and PC is fine, and download the demo program files to the controller.

3. Demo Program

ICP DAS provides a range of demo programs for different platforms that can be used to verify the functions of the module. The source code contained in these programs can also be reused in your own custom programs if needed.

User can find the related files in the product CD or below website:

http://www.icpdas.com/root/product/solutions/pac/linpac/linpac-8000_download.html

4. API References

API naming table

The following table describes the platforms and in which the product series included and the different part of function name.

Detailed information related to individual functions can be found in the following sections.

Platform	Product included	API prefix characters
Linux	I-8024W	"I8024W_" + function name
	I-9024	"I9024_" + function name

The following table lists the functions provided in LinPAC SDK - libi8k.a for Linux platform.

Function	Description
I8024_Initial	Used to initialize the module
I8024_VoltageOut	This function makes I-8024W/I-9024 modules to output the voltage of specified floating-point value in the specified channel and slot.
I8024_CurrentOut	This function makes I-8024W/I-9024 modules to output the current of specified floating-point value in the specified channel and slot.
I8024_VoltageOut_Hex	This function makes I-8024W/I-9024 modules to output the specified voltage value in HEX format in the specified channel and slot.
I8024_CurrentOut_Hex	This function makes I-8024W/I-9024 modules to output the specified current value in HEX format in the specified channel and slot.

4.1. I8024_Initial

This function is used to initialize the module, and must be called at least once before using any other function.

Syntax

```
void I8024_Initial(  
    int Slot  
);
```

Parameters

slot [in]

specifies the slot number (1 ~ 8).

Return Values

Refer to Appendix A: “Error Code” for more details.

Examples

[C]

```
int slot;  
  
I8024W_Init(slot);
```

4.2. I8024_VoltageOut

This function makes the module output a voltage value of specified floating-point.

Syntax

```
void I8024_VoltageOut(  
    int slot,  
    int ch,  
    float fData  
);
```

Parameter

slot [in]

specifies the slot number (1 ~ 8).

ch [in]

Specifies the channel number(0 to 3).

fData[in]

Specifies the analog output value in float format (Voltage range: -10 ~ +10V).

Return Values

None

Examples

[C]

```
int slot , ch ;  
float data ;  
  
I8024_VoltageOut(slot, ch, data);
```

4.3. I8024_CurrentOut

This function makes the module to output a current value of specified floating-point.

Syntax

```
void I8024_CurrentOut(  
    int slot,  
    int ch,  
    float fData  
);
```

Parameter

slot [in]

specifies the slot number (1 ~ 8).

ch [in]

Specifies the channel number(0 to 3).

fData[in]

Specifies the analog output value in float format (Current range: 0 ~ + 20 mA).

Return Values

None

Examples

[C]

```
int slot , ch ;  
float data;  
  
I8024_CurrentOut(slot, ch, data);
```

4.4. I8024_VoltageOut_Hex

This function makes the module to output the specified voltage value in HEX format.

Syntax

```
void I8024_VoltageOut_Hex(  
    int slot,  
    int ch,  
    int hData  
);
```

Parameter

slot [in]

specifies the slot number (1 ~ 8).

ch [in]

Specifies the channel number(0 to 3).

hData [in]

Specifies the analog output value in hexadecimal format (8000h ~ 7FFFh).

Return Values

None

Examples

[C]

```
int slot, ch, data;  
  
I8024_VoltageOut_Hex(slot, ch, data);
```


4.5. I8024_CurrentOut_Hex

This function makes the module to output the specified current value in HEX format.

Syntax

```
void I8024_CurrentOut_Hex(  
    int slot,  
    int ch,  
    int hData  
);
```

Parameter

slot [in]

specifies the slot number (1 ~ 8).

ch [in]

Specifies the channel number(0 to 3).

data [in]

Specifies the analog output value in hexadecimal format (0h ~ 7FFFh).

Return Values

None

Examples

[C]

```
int slot, ch, data;  
I8024_CurrentOut_Hex(slot, ch, data);
```

Appendix A. Error Code

Error Code	Definition	Description
0	NoError	This indicates that there have been no errors
-1	ID_ERROR	There was a problem with the module ID

Appendix B. Revision History

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description
1.0.1	January 2018	Initial issue
3.0.0	July 2018	<ul style="list-style-type: none">• Added content for the I-9024 module• Modify library , demo path• Added WP-9000 , ippc-wes7 library , demo path• Modify API References