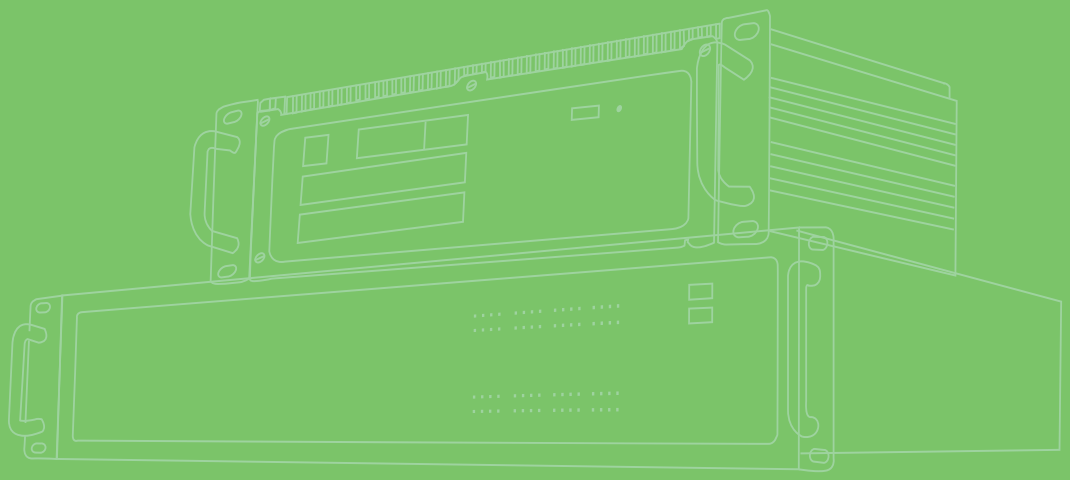

User Manual

ECU-1911

Xscale® PXA-270 520 MHz RTU with 8-ch 16-bit AI,32-ch DI,32-ch DO Embedded Automation Controller

ADVANTECH

Enabling an Intelligent Planet

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Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

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1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Part No. XXXXXXXXXX Edition 1

Printed in China May 2013

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*

Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*

There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*

Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all such - in writing to: support@advantech.com

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work well, or you cannot get it to work according to the user's manual.
    - The equipment has been dropped and damaged.
    - The equipment has obvious signs of breakage.
15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 80° C (176° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

Chapter 1

Overview

This chapter provides an overview of ECU-1911's specifications.

Sections include:

- Introduction
- Features
- Hardware Specifications
- Chassis Dimensions

1.1 Introduction

Advantech's ECU-1911 focuses on RTU monitor application. The ECU-1911 is also a standalone RTU that provides a 16-bit 8-ch A/D converter, 32-ch Relay and 32-ch Digital Input. This controller also supports four serial communication ports and two networking interfaces. You can seamlessly integrate your applications into the ECU-1911 and speed up your system development with this application ready RTU.

The ECU-1911 is a compact controller (CPU module) with XScale PXA270 CPU and Windows CE.NET operating system. ECU-1911 can execute control tasks for various industrial control and automation applications.

The ECU-1911 comes with a Windows CE 5.0 OS offering a pre-build image on board. Microsoft Windows CE is a compact, highly efficient, real-time operating system designed for embedded systems that can shorten your development time and offer a rich networking interface to fulfill your diverse requirements.

Due to the low power consumption, the ECU-1911 doesn't require any fan in the mechanism, giving better reliability. The operating system is installed in the internal flash. Therefore, no extra external HD or CF is required for the operating system and application programs. Besides, ECU-1911 provides an internal CF slot for data storage.

ECU-1911 could operate well under -20°C ~ 70°C, its small size and light weight could fit in industrial robust environment.With these advantage, ECU-1911 is suitable for communication gateway for converting communication protocol, IO control and data storage.

1.2 Features

- Onboard Xscale @ PXA-270 520 MHz CPU
- 1 x RS-232 port
- 3 x RS-485 isolated ports
- 2 x 10/100Base-T RJ-45 ports
- 8-ch 16-bit differential Analog Input
- 32-ch isolated Digital Input
- 32-ch isolated Digital Output
- Built-in Window CE 5.0

1.3 Hardware Specifications

General

- **Power Consumption:** <10 W (Typical)
- **Power Requirements:** 24 V_{DC} (Typical) (10 Min ~ 30 Max V_{DC})
- **OS Support:** Windows CE 5.0

System Hardware

- **CPU:** Xscale @ PXA-270 520MHz
- **Memory:** Onboard 64 MB SDRAM/ 32 MB Flash
- **Storage:** 1 x type I/II Compact Flash slot (Support FAT16 and UP TO 2 GB)

Digital Input

- **Channels:** 32
- **I/O Type:** Sink
- **Wet Contact:**
  - Logic 0: 0 ~ 10 V
  - Logic 1: 19 ~ 30 V
- **Isolation:** 3000 V_{DC}
- **Connector:** Terminal Block (#14 ~ 22 AWG)

Digital Output

- **Channels:** 32
- **I/O Type:** Power Relay Form A
- **Contact Rating:**
  - AC: 5A @ 250 V;
  - DC: 5 A @ 30 V (Resistive Load)
- **Isolation:** 500 VDC
- **Connector:** Terminal Block (#14 ~ 22 AWG)

Analog Input

- **Channels:** 8 differential
- **Resolution:** 16 bits
- **Sampling rate:** 10 Hz/sec (total)
- **Input Impedance:** Voltage: 20 MΩ Current: 120 Ω (Build-in 120 Ω. for Current)
- **Input Range:** 0 ~ 150 mV, 0 ~ 500 mV, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10 V, 0 ~ 15 V, ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V, ±15 V, ±20 mA, 4 ~ 20 mA

Environment

- **Humidity:** 5 ~ 95% @ 40°C (non-condensing)
- **Operating Temperature:** -20 ~ 70°C (-4 ~158°F) @ 5 ~ 85% RH
- **Storage Temperature:** -40 ~ 80°C (-40 ~176°F)

I/O Interface

- **Serial Ports:** 1 x RS-232 with DB9 (RTS,CTS,TX,RX); 3 x RS-485 with Terminal Block connector, Automatic RS-485 data flow
- **LAN:** 2 x 10/100Base-T RJ-45 ports
- **USB Port:** 1 x USB, OpenHCI, Rev. 1.1 compliant

1.4 Chassis Dimensions

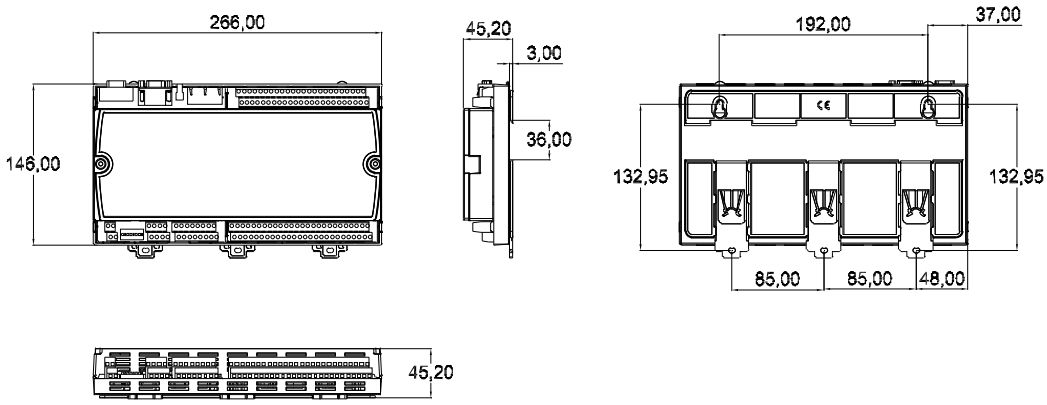


Figure 1.1 ECU-1911 Chassis Dimensions

1.5 Packing List

The accessory package of ECU-1911 contains the following items:

(A) ECU-1911

(B) 10 pcs jumper shorter

(C) M4X6 ST BLK 3PCS

(D) M4X6 ST Ni 2PCS

(E) 1x ROHS LIST

(F) energy solution series Driver and Utility DISC

(G) 1 x warranty card

Chapter 2

Product Specifications

In this chapter, you will be given an Product details of the ECU-1911 hardware specifications.

Sections include:

- **Overview**
- **System Specifications**
- **I/O Interfaces**

2.1 Overview

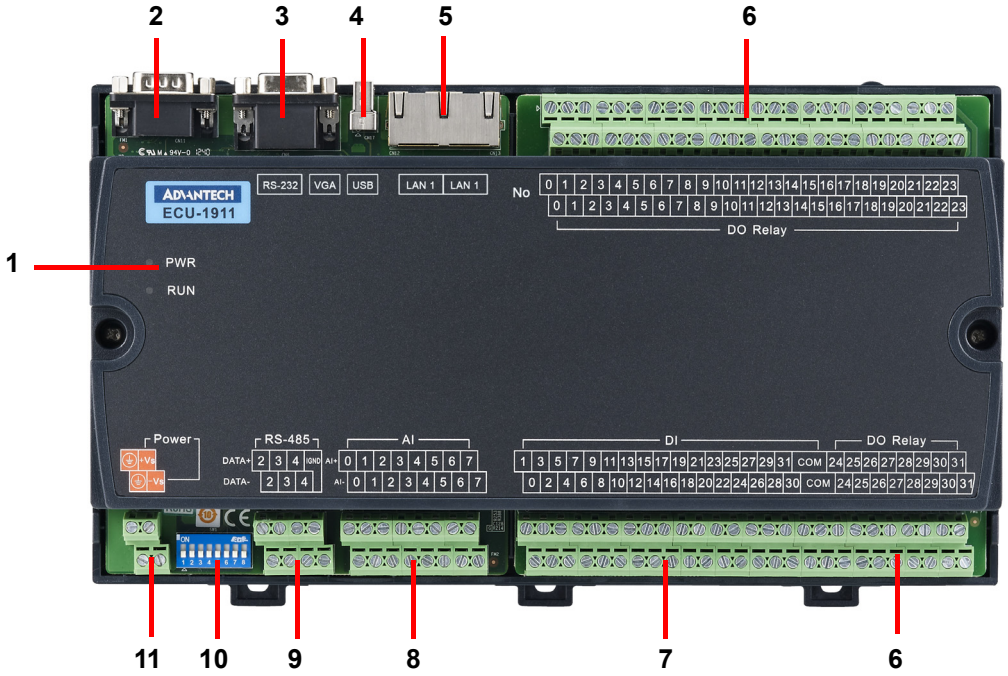


Figure 2.1 ECU-1911 overview

Table 2.1: ECU-1911 Overview List

Item	Description
1	LED
2	RS-232 Serial Port
3	VGA port
4	USB port
5	Networking port
6	Digital output
7	Digital input
8	Analog input
9	RS-485 Serial Port
10	Switch
11	Power

2.2 System Specifications

2.2.1 LED

LEDs to display the power and system run LED status are located on the front panel of ECU-1911, and each of them has its own specific meaning, as shown in the table 2.2.

Figure 2.2 ECU-1911 LED

Table 2.2: ECU-1911 LED Definitions

LED	Color	Status	Description
PWR	Green	On	System power is on
		Off	System power is off
RUN	Green	On	The peripheral equipment is initialized
		Off	The peripheral equipment is on failure

2.2.2 System OS

ECU-1911 comes with a Windows CE 5.0 OS offering a pre-build image on board. Microsoft Windows CE 5.0 is a compact, highly efficient,real-time operating system designed for embedded systems that can shorten your development time and offer networking interface to fulfill your diverse requirements.

2.2.3 System Flash

ECU-1911 comes with 32MB flash on board, The operating system is installed in the internal flash, Your application program will also be stored on the flash

2.2.4 System RAM

ECU-1911 system comes with 64MBSDRAM

The RAM on a Windows CE–based device is divided into two areas: the object store and the program memory.

1. The object store resembles a permanent, virtual RAM disk.
2. The program memory consists of the remaining RAM. Program memory works like the RAM in personal computers — it stores the heaps and stacks for the applications that are running.

If there is not enough available program memory for running your program. You can increase available program memory. To do so, follow these steps:

1. Tap the Start button, tap Settings, and then double-tap System.
2. Tap the Memory tab, move the slider to the left, and then tap OK.

Or if there is not enough object storage memory for saving your file. You can increase storage memory by moving the slider to the right on the step 2.

2.2.5 Real-Time Clock (RTC)

ECU-1911 delivers built-in real-time clock, which programmers can use it in their application programs. When the power is loss, the RTC can still run using the power from battery.

2.2.6 CF Slot for Data Storage

The ECU-1911 has built-in Microsoft Windows CE.NET operating system. The operating system is installed in the flash. Your application program will also be stored on the flash. However, we strongly suggest not saving data to the flash. Repeat reading and writing will serious damage the flash life. ECU-1911 delivers an internal CF slot for data storage. It only supports FAT16, and the CF card size can be up to 2 GB. Refer to figure below for the location of CF slot and how to insert/plug CF. Below is an example image of the ECU-1911.

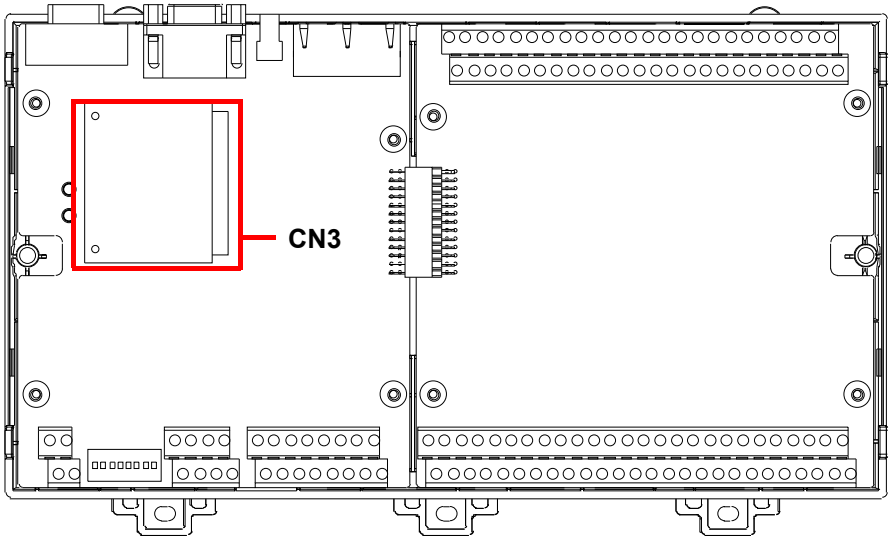


Figure 2.3 CF location (CN3)

2.2.7 VGA Display

The ECU-1911 provides VGA controller for a high resolution interface. It supports 640 x480 @ 16 bpp. The VGA port delivers standard DB-15 connector. Please refer to the figure and the table2.5 VGA port pin assignments.

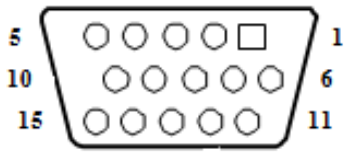


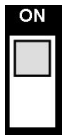
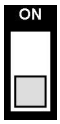
Table 2.3: VGA Adaptor Cable Pin Assignments

Pin	Signal	Description
1	RED	Analog Red Output
2	GREEN	Analog Green Output
3	BLUE	Analog Blue Output
4	N/C	not used
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	VCC	not used
10	GND	Ground
11	N/C	not used
12	N/C	not used
13	H-Sync	Analog Horizontal Sync
14	V-Sync	Analog Vertial Sync
15	N/C	not used

2.2.8 Switch

The ECU-1911 is equipped with Switch connector, the switch is reserved for products controller ID settings, when on site equipped with multiple ECU-1911 devices, customers can read the device ID address through API, to facilitate the on-site customer identification equipment position, switch has to be configured to the different ID address.

Table 2.4: Switch1 Settings

Switch1	Settings	Function
	 1~8	ON—Logic 1
	 1~8	OFF—Logic 0

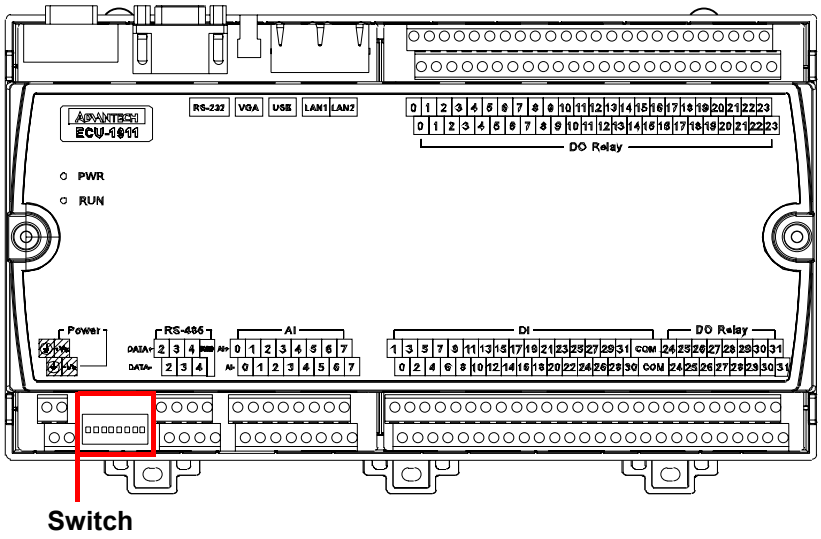


Figure 2.4 Locations of Switch

Note! *Switch 1 ~ 8 site default is off. Switch detailed configuration please refer to the product in the CD Software manual.*

2.2.9 Power Input

The ECU-1911 comes with a Plug-in block 2x2P connector(CN32) that carries 10~30 VDC external power input, can adapt to 24 VDC or 48 VDC power supply. Terminal pins are defined below and shown in the Table 2.6 below.

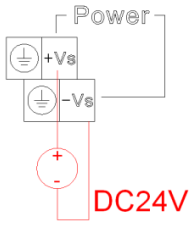


Table 2.5: Power Connector Pin Assignments

Pin	Assignments Description
+Vs	V+ (24 VDC (Typical) (10 Min ~ 30 Max VDC))
-Vs	GND
GND	Field Ground
GND	Field Ground

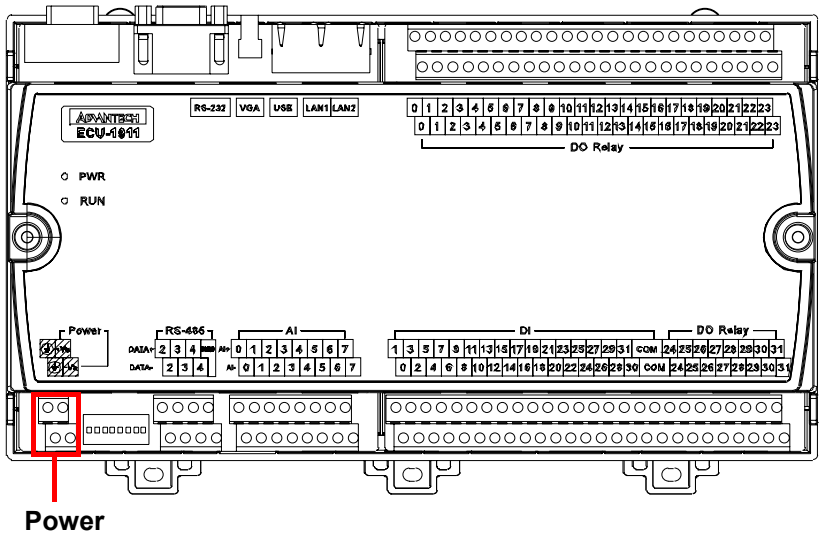


Figure 2.5 Power input location

2.2.10 DiagAnywhere

ECU-1911 support the Advantech DiagAnywhere software, the trial version DiagAnywhere software for the customer including in product CD , with DiagAnywhere software, detailed instructions please download the Advantech's official website:

http://www.advantech.com/products/search.aspx?keyword=DiagAnywhere

The “DiagAnywhere”, an abbreviation of “Diagnostic Anywhere”, is a networking solution for remotely monitoring and controlling other Windows based devices. Currently, the “DiagAnywhere” includes the utility on client side and the server on the other. The main technology is based on Microsoft .NET Framework for the client. For this reason, the PCs for using this solution must have the Microsoft .NET Framework installed for Win32 platform.

2.2.11 Advanced Watchdog Timer

There is a built-in watchdog timer in ECU-1911. Users can utilize the WDT driver with standard WIN32 API to implement the watchdog function in their applications. To use the watchdog driver, firstly user must open it via the name, "WDT1:", then use DeviceIOControl function to access the watchdog hardware. The introduction below includes the definition of DeviceIOControl and its parameters as well as an example.

How to Use the Control Code

There are 6 control codes for the operation codes in the WDT driver.

1. IOCTL _WDT_ENABLE:

Enable the Watchdog timer on your application. By default, if the Watchdogtimer is enabled, the WDT driver will automatically reload the timeout counter after a specified period and your application does not need to trigger the strobe periodically for masking the timeout, unless use

IOCTL_WDT_REBOOT to stop this automatic strobe triggering.

lpInBuffer : unused.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

2. **IOCTL _WDT_DISABLE:**

Disable the Watchdog time on your application.

lpInBuffer : unsed.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

3. **IOCTL_WDT_STROBE:**

Trigger strobe signal to reload watchdog timeout counter. If your application uses IOCTL_WDT_ENABLE to enable the Watchdog first and then sends IOCTL_WDT_REBOOT to the WDT driver, your application must trigger the Watchdog once during the Watchdog timer period. If your application has not triggered at the specified period, the device will reboot automatically.

lpInBuffer: unused.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

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4. IOCTL_WDT_GETTIMEOUT:

Get the Watchdog timeout value.

lpInBuffer: unused.

nInBufferSize: unused.

lpOutBuffer: The DWORD pointer to your Watchdog timeout setting.

The Watchdog timeout setting is just a number. 0 means 2 seconds, 1 means 5 seconds, 2 means 10 seconds, 3 means 15 seconds, 4 means 30 seconds, 5 means 45 seconds, 6 means 60 seconds, 7 means 120 seconds, 8 means 300 seconds, 9 means 600 seconds, 10 means 900 seconds, others means the maximum 1140 seconds. The default setting is 5 seconds. nOutBufferSize: unused.

5. IOCTL_WDT_SETTIMEOUT:

Set the Watchdog timeout value.

lpInBuffer : The DWORD pointer to your Watchdog timeout setting. The Watchdog timeout setting is just a number. 0 means 2 seconds, 1 means 5 seconds, 2 means 10 seconds, 3 means 15 seconds, 4 means 30 seconds, 5 means 45 seconds, 6 means 60 seconds, 7 means 120 seconds, 8 means

300 seconds, 9 means 600 seconds, 10 means 900 seconds, others means the maximum 1140 seconds. The default setting is 5 seconds.

nInBufferSize:.unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

6. IOCTL_WDT_REBOOT:

If you want your application to trigger the Watchdog by itself, please use IOCTL_WDT_REBOOT to notify the WDT driver. Otherwise, the WDT will trigger itself automatically.

lpInBuffer :unused.

nInBufferSize: unused.

lpOutBuffer: unused.

nOutBufferSize: unused.

DeviceIOControl

This function sends a control code directly to a specified device driver, causing the corresponding device to perform the specified operation.

BOOL DeviceIoControl(

HANDLE hDevice,

DWORD dwIoControlCode,

LPVOID lpInBuffer,

DWORD nInBufferSize,

LPVOID lpOutBuffer,

DWORD nOutBufferSize,

LPDWORD lpBytesReturned,

LPOVERLAPPED lpOverlapped);

Parameters:

. hDevice

[in] Handle to the device that is to perform the operation. Call the Create-

File function to obtain a device handle.

. dwIoControlCode

[in] Specifies the control code for the operation. This value identifies the specific operation to be performed and the type of device on which the operation is to be performed. No specific values are defined for the dwIo-ControlCode parameter. However, the writer of a custom device driver can define IOCTL_XXXX control codes, per the CTL_CODE macro.

These control codes can then be advertised, and an application can use these control codes with DeviceIoControl to perform driver specific functions.

. lpInBuffer

[in] Long pointer to a buffer that contains the data required to perform the operation. This parameter can be NULL if the dwIoControlCode parameter specifies an operation that does not require input data.

. nInBufferSize

[in] Size, in bytes, of the buffer pointed to by lpInBuffer.

. lpOutBuffer

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[out] Long pointer to a buffer that receives the output data for the operation.

This parameter can be NULL if the dwIoControlCode parameter

specifies an operation that does not produce output data.

. nOutBufferSize

[in] Size, in bytes, of the buffer pointed to by lpOutBuffer.

. lpBytesReturned

[out] Long pointer to a variable that receives the size, in bytes, of the data stored into the buffer pointed to by lpOutBuffer. The lpBytesReturned parameter cannot be NULL. Even when an operation produces no output data, and lpOutBuffer can be NULL, the DeviceIoControl function makes use of the variable pointed to bylpBytes-Returned. After such an operation, the value of the variable is without meaning.

. lpOverlapped

[in] Ignored; set to NULL.

. Return Values

Nonzero indicates success. Zero indicates failure. To get extended error

information, call GetLastError.

Examples

```
#define IOCTL_WDT_ENABLE
CTL_CODE(FILE_DEVICE_UNKNOWN, 0x900,
METHOD_BUFFERED, FILE_ANY_ACCESS)
#define IOCTL_WDT_DISABLE
CTL_CODE(FILE_DEVICE_UNKNOWN, 0x901,
METHOD_BUFFERED, FILE_ANY_ACCESS)
#define IOCTL_WDT_STROBE
CTL_CODE(FILE_DEVICE_UNKNOWN, 0x902,
METHOD_BUFFERED, FILE_ANY_ACCESS)
#define IOCTL_WDT_GET_TIMEOUT
CTL_CODE(FILE_DEVICE_UNKNOWN, 0x903,
METHOD_BUFFERED, FILE_ANY_ACCESS)
#define IOCTL_WDT_SET_TIMEOUT
CTL_CODE(FILE_DEVICE_UNKNOWN, 0x904,
METHOD_BUFFERED, FILE_ANY_ACCESS)
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#define IOCTL_WDT_REBOOT
CTL_CODE(FILE_DEVICE_UNKNOWN, 0x905,
METHOD_BUFFERED, FILE_ANY_ACCESS)
HANDLE m_hWDT=NULL;
TCHAR szClassName[60];
// assign the WDT driver name
wsprintf(szClassName, TEXT("WDT1:"));
// Open the WDT driver
m_hWDT = CreateFile(szClassName,
GENERIC_READ|GENERIC_WRITE, 0, NULL, OPEN_EXISTING,
```

```
FILE_ATTRIBUTE_NORMAL, NULL);
if ( m_hWDT == INVALID_HANDLE_VALUE ) {
DebugMsg(CString("WDT driver fail"));
return;
}
DWORD dwTemp;
DWORD nIndex=2;
// Set the Watchdog Timer as 10 seconds. Number 2 means 10 sec-
onds.
DeviceIoControl(m_hWDT, IOCTL_WDT_SET_TIMEOUT, &nIndex,
sizeof(nIndex), NULL, 0, &dwTemp, NULL);
// Enable the Watchdog timer
DeviceIoControl(m_hWDT, IOCTL_WDT_ENABLE, NULL, 0, NULL,
0, &dwTemp, NULL);
// Activate timeout reboot
DeviceIoControl(m_hWDT, IOCTL_WDT_REBOOT, NULL, 0, NULL,
0, &dwTemp, NULL);
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While (1) {
// do your job here.
Sleep(8000);
DeviceIoControl(m_hWDT, IOCTL_WDT_STROBE, NULL,0, NULL,
0, &dwTemp, NULL);
}
DeviceIoControl(m_hWDT, IOCTL_WDT_DISABLE, NULL, , NULL,
0, &dwTemp, NULL);
CloseHandle(m_hWDT);
```

2.3 I/O Interfaces

2.3.1 RS-232 Interface (COM1)

The ECU-1911 offers one standard RS-232 serial communication interface port: COM1. Please refer to the figure and table2.7below for COM1 descriptions.

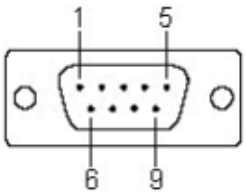


Table 2.6: COM1 Port Pin Definitions

PIN	RS-232
1	DCD
2	RX
3	TX
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

2.3.2 RS-485 Interface (COM2 ~ 4)

The ECU-1911 offers three isolation RS-485 serial communication interface ports: COM2 to COM4.

In RS-485 interface supports auto data flow control functionality: it automatically detects the direction of incoming data and switches its transmission direction accordingly. So no handshaking signal (e.g. RTS signal) is necessary. This lets you conveniently build an RS-485 network with just two wires.

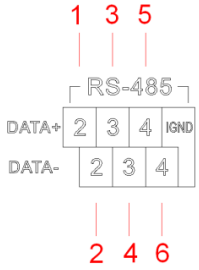


Table 2.7: COM2 ~ 4 Port Pin Definitions

PIN	COM port	RS-485
1	COM2	DATA+
2		DATA-
3	COM3	DATA+
4		DATA-
5	COM4	DATA+
6		DATA-
7	IGND	Isolation GND
8		

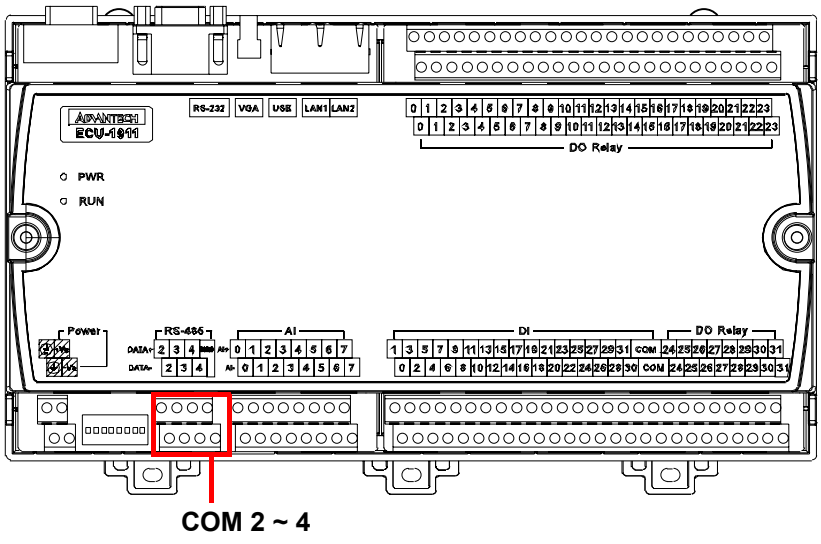


Figure 2.6 COM2 ~ 4 Port location

2.3.3 USB Ports

The ECU-1911 provides one connectors of USB interfaces. The USB interface complies with USB EHCI, Rev. 1.1 compliant. The USB socket is type A socket (mini USB). In order to connect with many other USB devices, ECU-1911 provides external transfer cable to transfer mini USB to standard USB in the accessory. Please refer to the figure and the table2.9 USB port pin assignments.

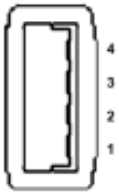


Table 2.8: USB Connector Pin Assignments

Pin	Assignment	Description
1	VBUS	Power(+5V)
2	D-	Data-
3	D+	Data+
4	GND	Ground

2.3.4 LAN: Ethernet Connector

The ECU-1911 is equipped with two Ethernet port which is fully compliant with IEEE 802.3u 10/100Mbpst. The Ethernet port provides a standard RJ-45 with upper left LED indicator on the front side showing Link/Activity (Off: Not Link, Green and Flash: Link and Activity), and lower left LED indicator showing LAN speed (Orange: 100Mbps, Off: 10 Mbps). Refer to figure and the table2.10 below for Ethernet port pin assignment.

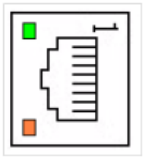


Table 2.9: LAN Connector Pin Assignments

Pin	Assignment	Description
1	TD+	Transmit +
2	TD-	Transmit -
3	RD +	Receive +
4	N/C	not used
5	N/C	not used
6	RD -	Receive -
7	N/C	not used
8	N/C	not used

Note! *The Ethernet port is only used in LAN, not for connection to telecommunication circuits.*

LAN1 Default IP Address: 10.0.0.1

LAN2 Default IP Address: 10.0.0.2

2.3.5 Digital Input/Output

There are thirty-two digital inputs and outputs for ECU-1911.

2.3.5.1 Digital Input

There are thirty-two digital inputs for ECU-1911, Refer to Figure2.6 below for Digital input port pin assignment.

Digital Input

- Channels: 32
- Points per Common: 16
- Type: Sink (Wet Contact)
- Input Voltage Rated Value: 24 VDC
  - For "0" signal: 0 ~ 10 VDC
  - For "1" signal: 19 ~ 30 VDC
- Input Impedance: 6.5 k
- Typical Input Current: 2.8 mA @ 19 VDC (At signal "1")
- Maximum Input Current: 4.6 mA @ 30 VDC
- Input Characteristic Curve: According to IEC 61131-2, type 1

Protection

- Isolation: 3000 VDC (Between channels and backplane bus)
- Over Voltage Protection: ±35 VDC

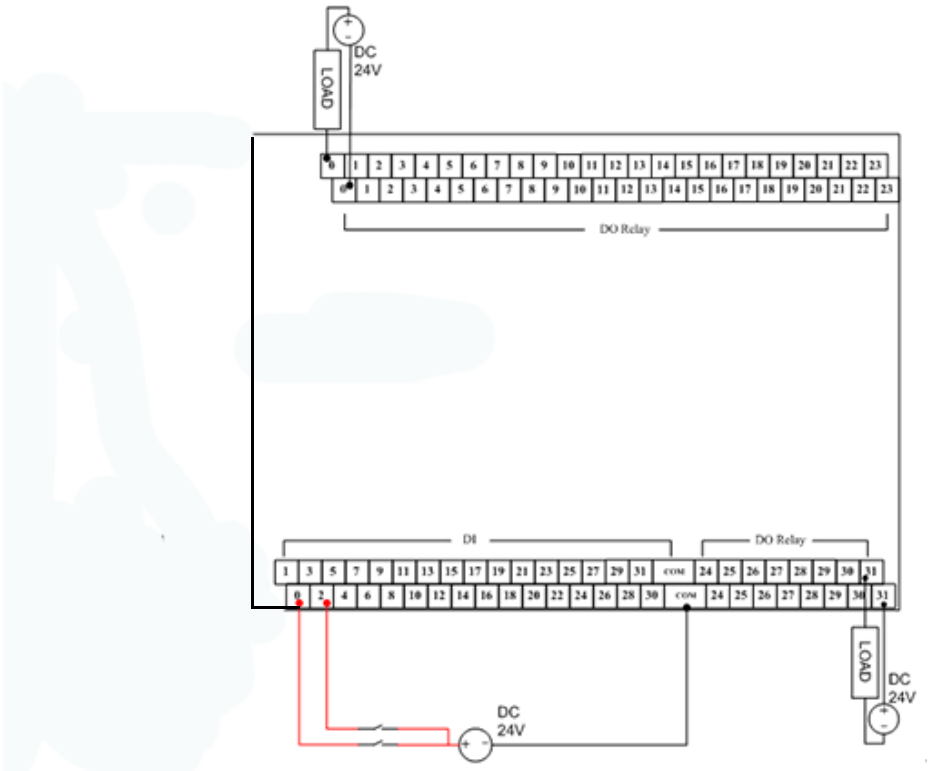


Figure 2.7 Digital input/output pin assignments

The ECU-1911 provides one ways to use digital inputs function, please refer below Figure 2.7 shows how to connect digital input function.

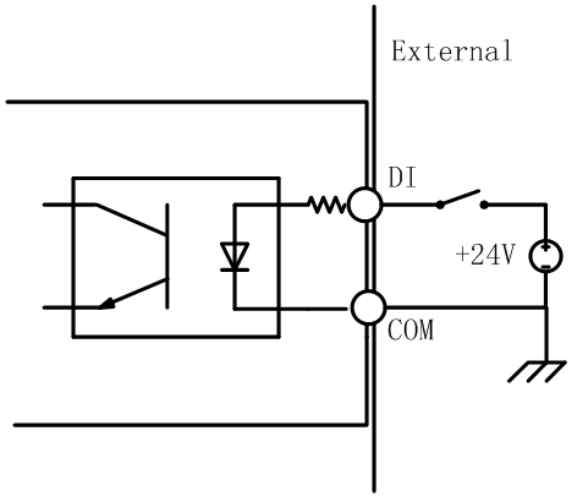


Figure 2.8 Digital input connection (wet contact)

2.3.5.2 Digital Output

ECU-1911 also provides thirty-two digital outputs connection, Refer to figure2.6 for Digital input/output port pin assignment.

Relay Output

- Channels: 32
- Relay Type: Form A (SPST)
- Switching Capacity and Lifetime of the Contact (For Resistive Load)
  - VDE: 30,000 operations (5 A @ 250 V_{AC})
    70,000 operations (5 A @ 30 V_{DC})
  - UL: 60,000 operations (5 A @ 250 V_{AC})
    100,000 operations (5 A @ 30 V_{DC})
  - Mechanism: 20,000,000 operations (no load, 300 operations/minute)
- Breakdown Voltage: 500 VAC (50/60 Hz)
- Contact Resistance: 30 m (maximum)
- Insulation Resistance: 1 G (minimum) at 500 V_{DC}
- Operating Time: 10 ms maximum at rated voltage (excluding bounce time)
- Release Time: 5 ms maximum at rated voltage (excluding bounce time)

Protection

- Isolation: 2,500 V_{DC} (Between channels and backplane bus)

ECU-1911 provides one ways to use digital outputs function, please refer below figure2.8 shows how to connect digital output function.

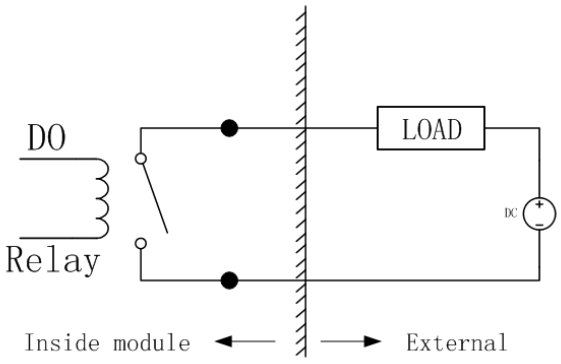


Figure 2.9 Digital output connections (relay contact)

2.3.6 Analog Input

The ECU-1911 include 12-bit plus sign bit; 8-channel analog differential input module that provides programmable input ranges on each channel. It accepts mill volt inputs (0 ~ 150 mV, 0 ~ 500 mV, 0 ~ 1 V, 0 ~ 5 V, 0 ~ 10V,0 ~ 15 V, ±150 mV, ±500mV, ±1 V, ±5 V, ±10 V) and current inputs (0-20 Ma and 4-20 mA); The module provides data to the host microprocessor in engineering units (mV, V or mA) or two's complement format. Its sampling rate 10 Hz/sec. (total) . Each input channel has 3000 VDC of optical isolation between the outside analog input line and the module, protecting the module and peripherals from high input line voltages. Addition- ally, the module uses analog multiplexers with active over-voltage protection. The active protection circuitry assures that signal fidelity is maintained even under fault conditions that would destroy other multiplexers. The jumpers of ECU-1911 are designed for current input, Refer to figure2.6 and table2.8 below for analog input port pin assignment.

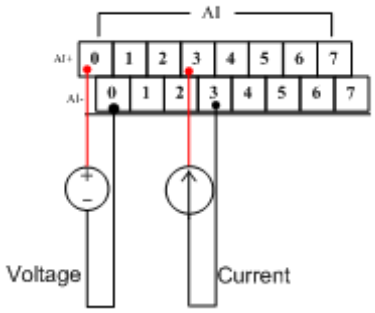
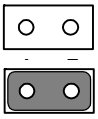


Figure 2.10 Analog input pin assignments

The ECU-1911 can be set for each AI channel input mode (Current or Voltage) through the jumper (CN18 ~ 25), please refer to table2.11 (AI default setting Voltage)

Table 2.10: CN18~25 Jumper Setting AI Mode (Current or Voltage)

Channel	Jummper ON	Jummper OFF
CH0	Current	Voltage
CH1	Current	Voltage
CH2	Current	Voltage
CH3	Current	Voltage
CH4	Current	Voltage
sCH5	Current	Voltage
CH6	Current	Voltage
CH7	Current	Voltage



Jummper OFF

Jummper ON

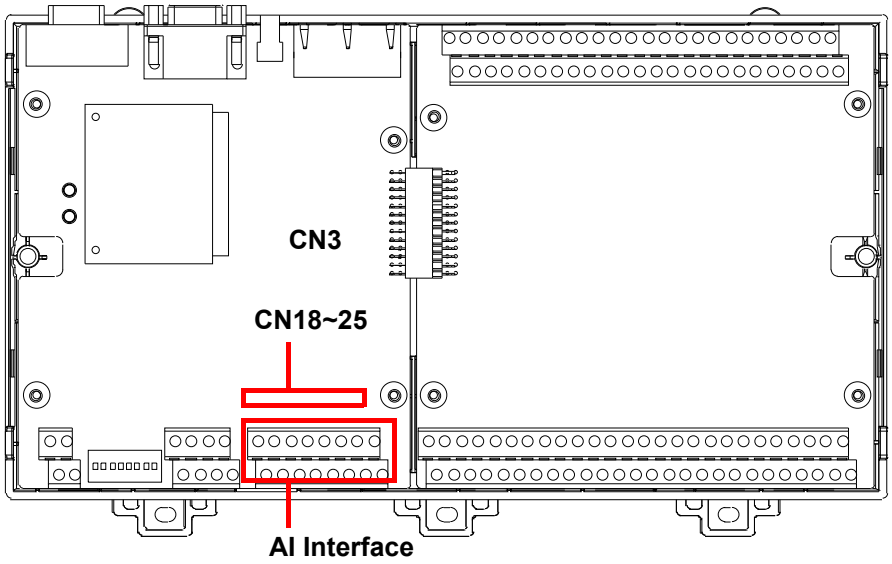


Figure 2.11 Locations of Jumpers (CN18~25) and AI interface

Chapter 3

Initial Setup

This chapter shows how to initialize the ECU-1911.

Sections include:

- Mounting
- Initial Setting
- Install a CompactFlash Card
- Field Wiring

3.1 Mounting

3.1.1 DIN-Rail Mounting

The ECU-1911 can be installed on sites equipped with DIN-Rails.

1. Install ECU-1911 on the DIN-Rail, according to the following location. (Figure 3.1)

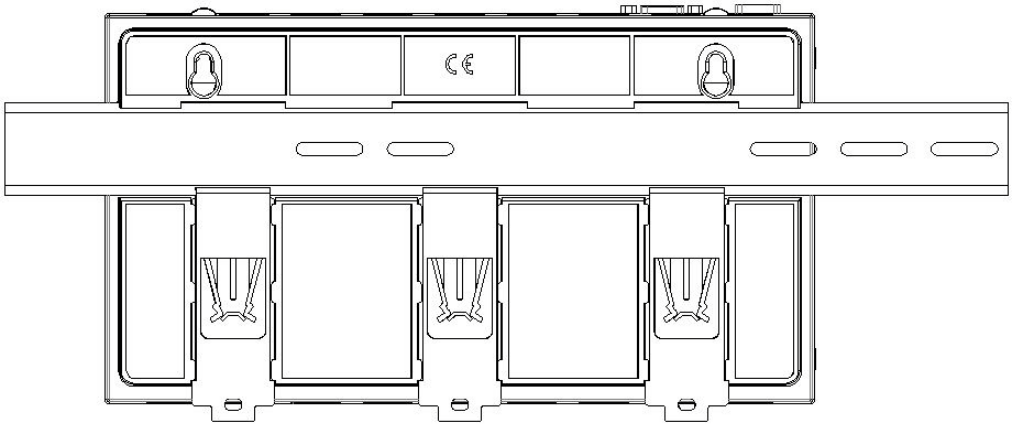


Figure 3.1 DIN-Rail installation Location

2. To push the red arrow 3 small bracket ECU-1911 is fixed on the DIN-Rail.

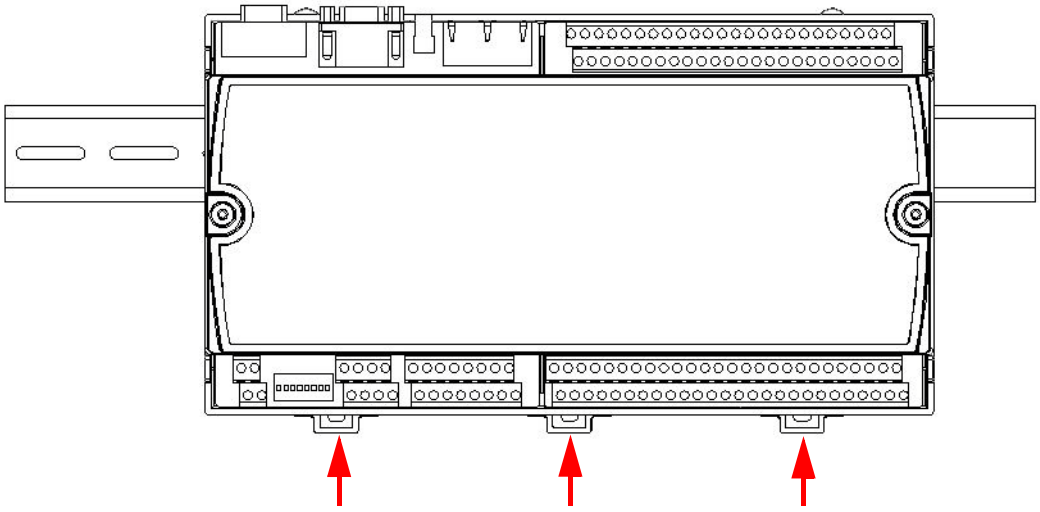


Figure 3.2 Small bracket installation location

3.1.2 Wall Mounting

The ECU-1911 provides the Wall hanging screws for Wall-mount in the accessory.

1. Screw the wall hanging screws on the wall (according to the size of the red box).

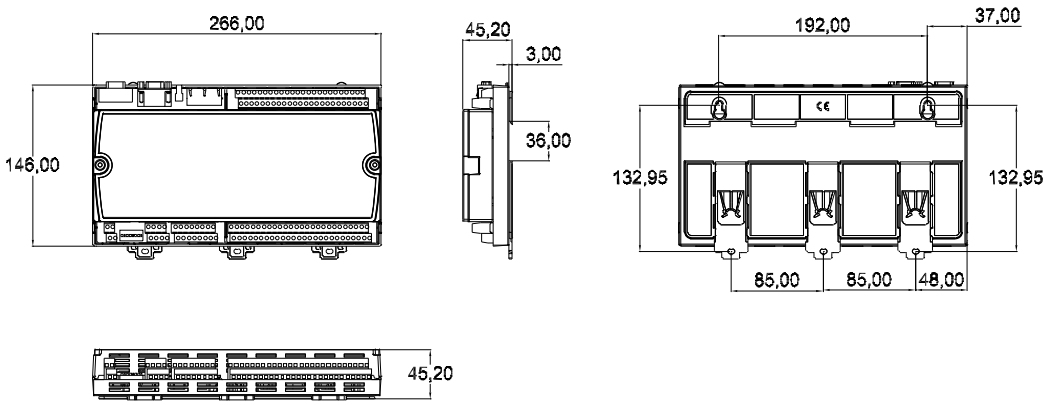
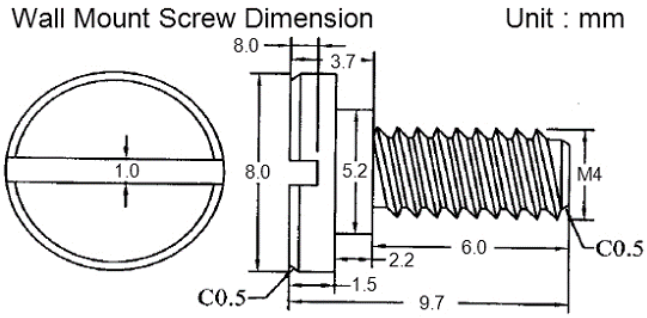


Figure 3.3 ECU-1911 Wall-mount installation size



2. Hang the ECU-1911 on the wall screw device. (According to the location of the red circle)

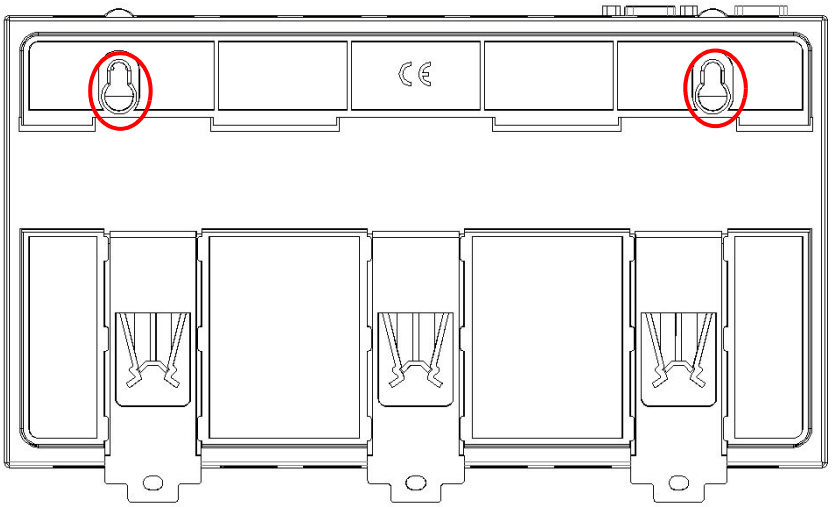


Figure 3.4 ECU-1911 Wall-mount installation location

3. Fix the ECU-1911 in the wall with the lock wall of the screw (in the accessory). (According to the location of the red circle).

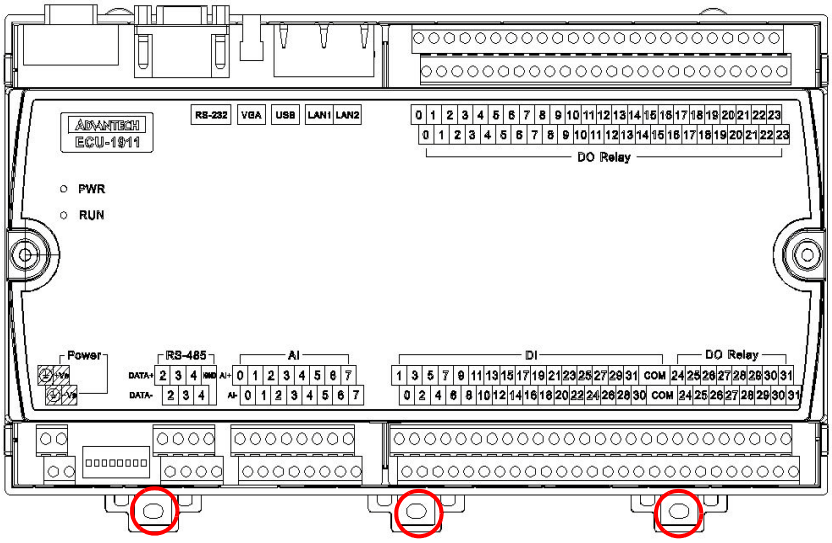
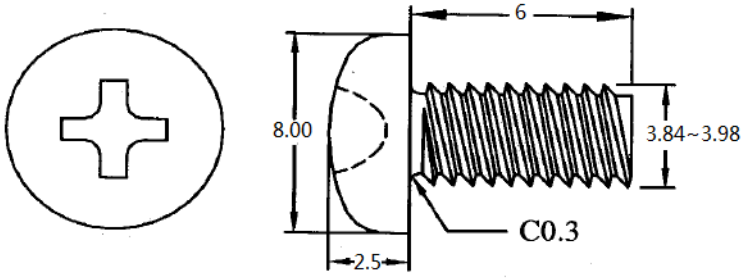


Figure 3.5 ECU-1911 Wall-mount fix installation location

The lock wall of the screw Dimension unit: mm



3.2 Initial Setting

3.2.1 AI Mode Setting

To open the chassis, please follow the steps below:

1. Remove all power and signal connections.
2. Remove the screws shown below (red circle).

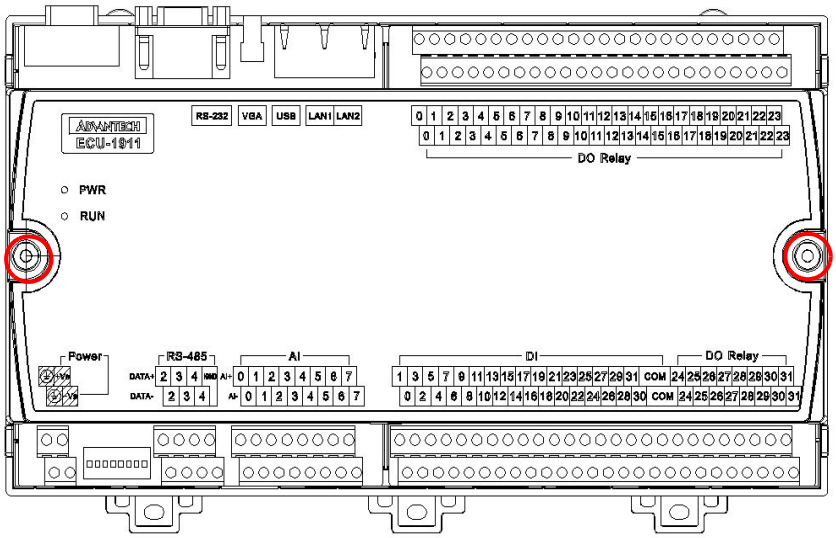


Figure 3.6 ECU-1911 top view location

3. Remove the top-cover.
4. You can set each AI channel input mode (Current or Voltage) through the jumper (CN18 ~ 25), refer to Chapter 2.3.6.

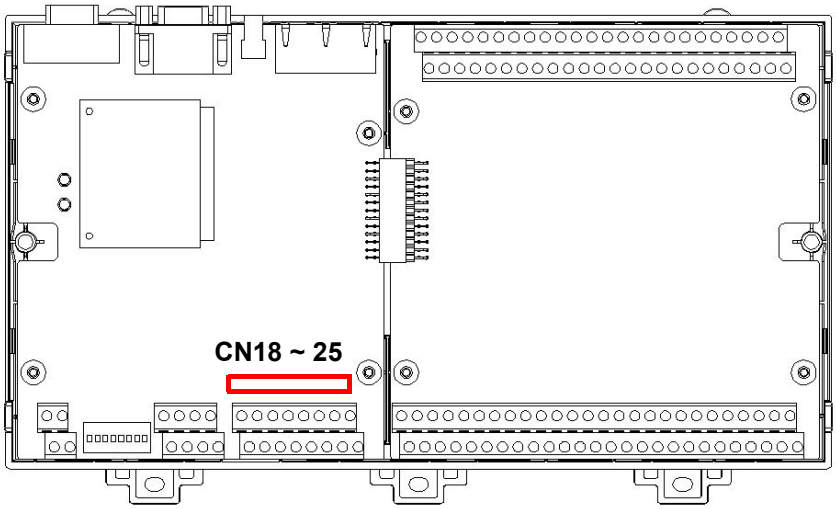


Figure 3.7 Jumper location (CN18 ~ 25)

3.2.2 Device ID Setting

You can according to the actual condition of field by adjusting the switch state of Device ID (refer to Chapter 2.2.8).

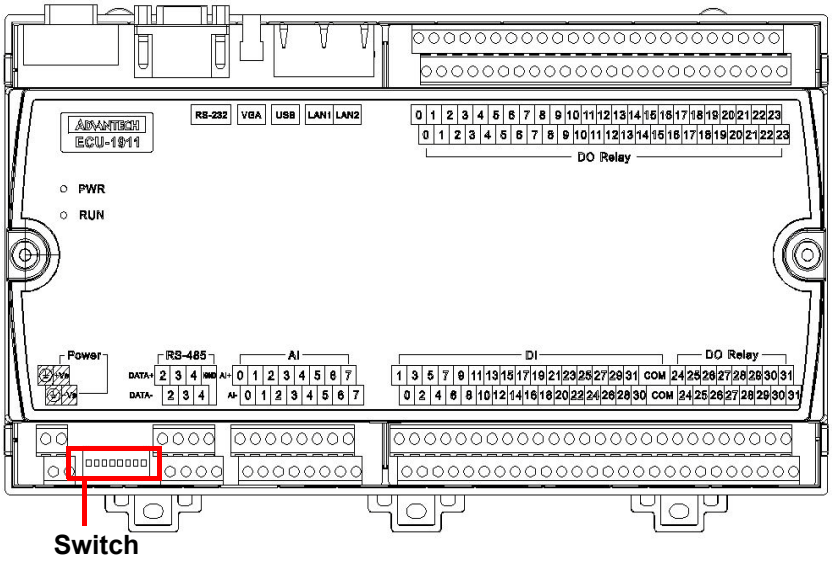


Figure 3.8 Switch location

3.3 Install a CompactFlash Card

ECU-1911 provides 1 CompactFlash Card slots, to install the cards:

1. Please follow 3.2.1 to open the chassis.
2. Insert the card at the location (CN3) shown below.

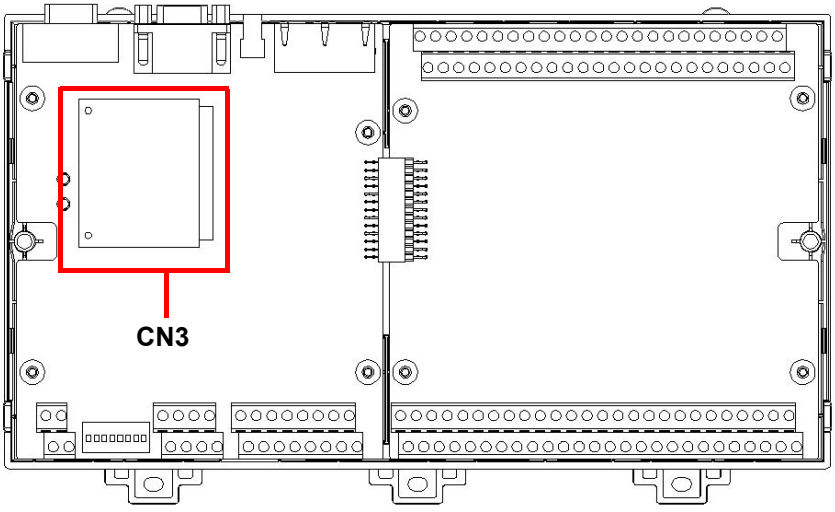


Figure 3.9 CompactFlash card slot location (CN3)

3. Cover up-cover, screw on screw.

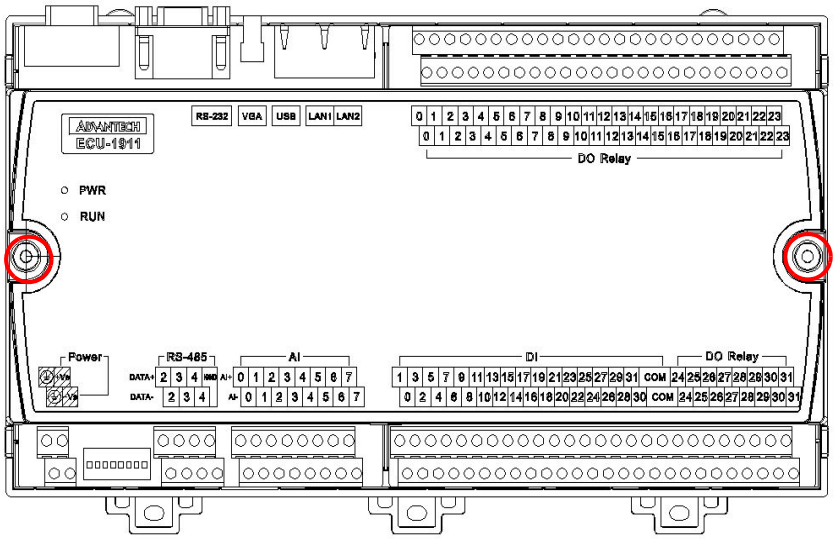


Figure 3.10 Screw UP-cover

3.4 Field Wiring

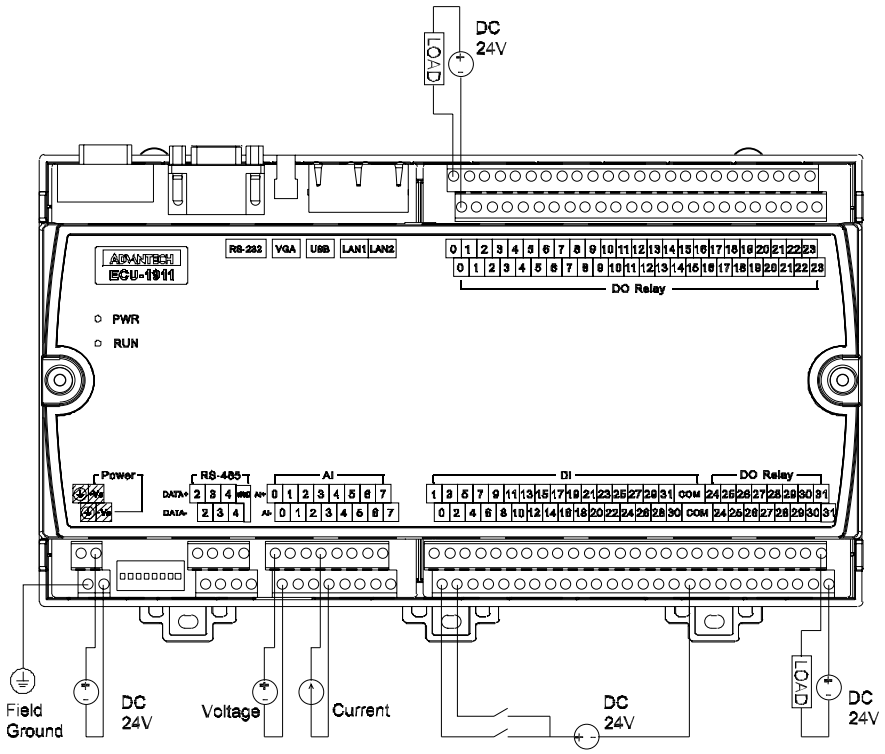


Figure 3.11 ECU-1911 Field wiring signal

According to the map location allocation field wiring, wiring order:

1. According to the Chapter 2.2.9 link power.
2. Connecting the VGA display.
3. Connecting I/O interface: LAN, USB, COM port, DI/O, AI.
4. ECU-1911 controller ID settings.

Note! *In order to avoid short circuit, please use the wire buzzer for ECU-1911 field wiring.*

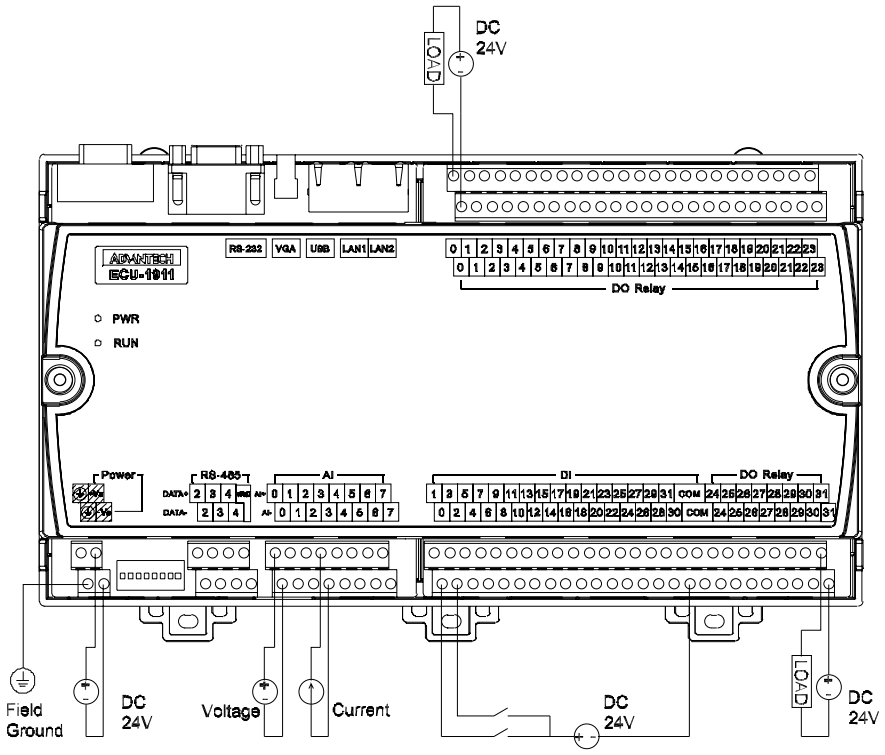
Chapter 4

Device Configuration

The ECU-1911 provides customers Utility software, convenient for customers to verify performance products before using.

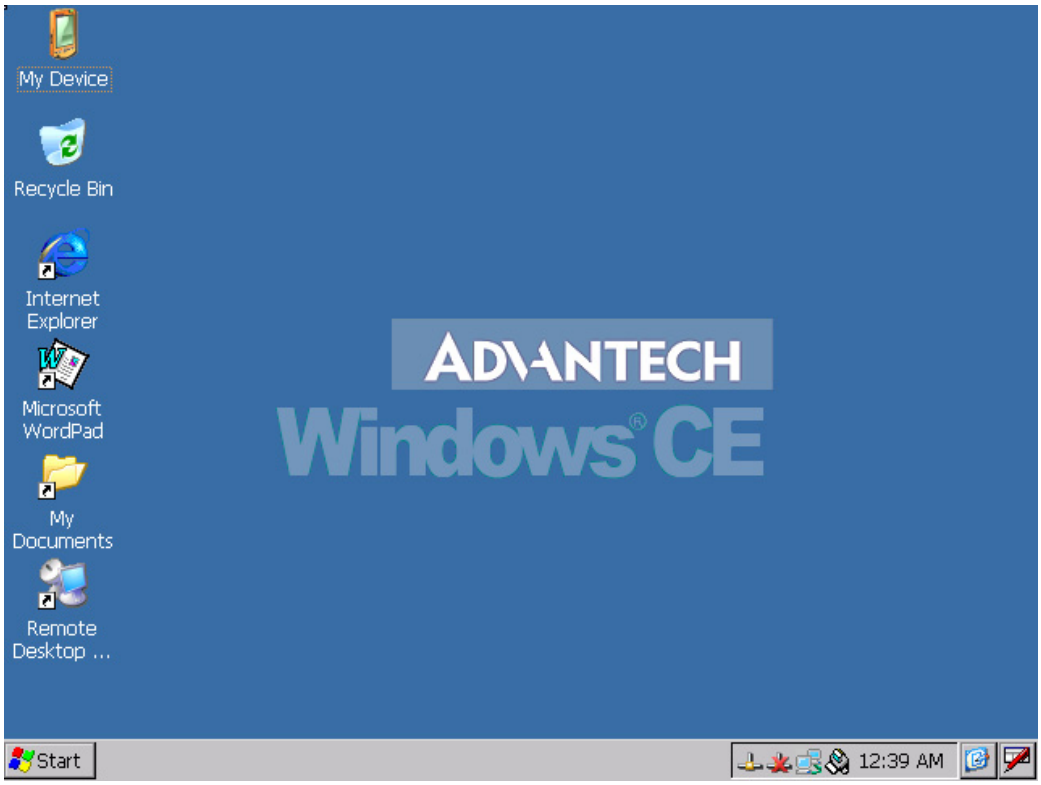
4.1 Signal Connections

The ECU-1911 DI/DO/AI Channel Connections as the following figure.

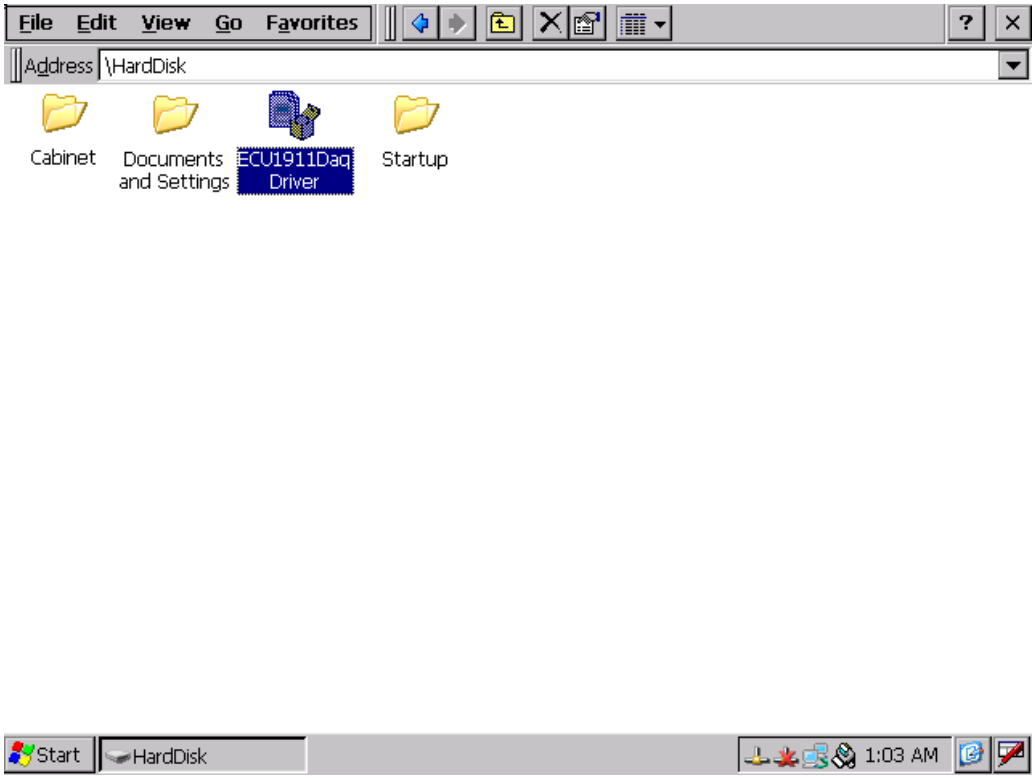


4.2 Device DAQ Driver Installation

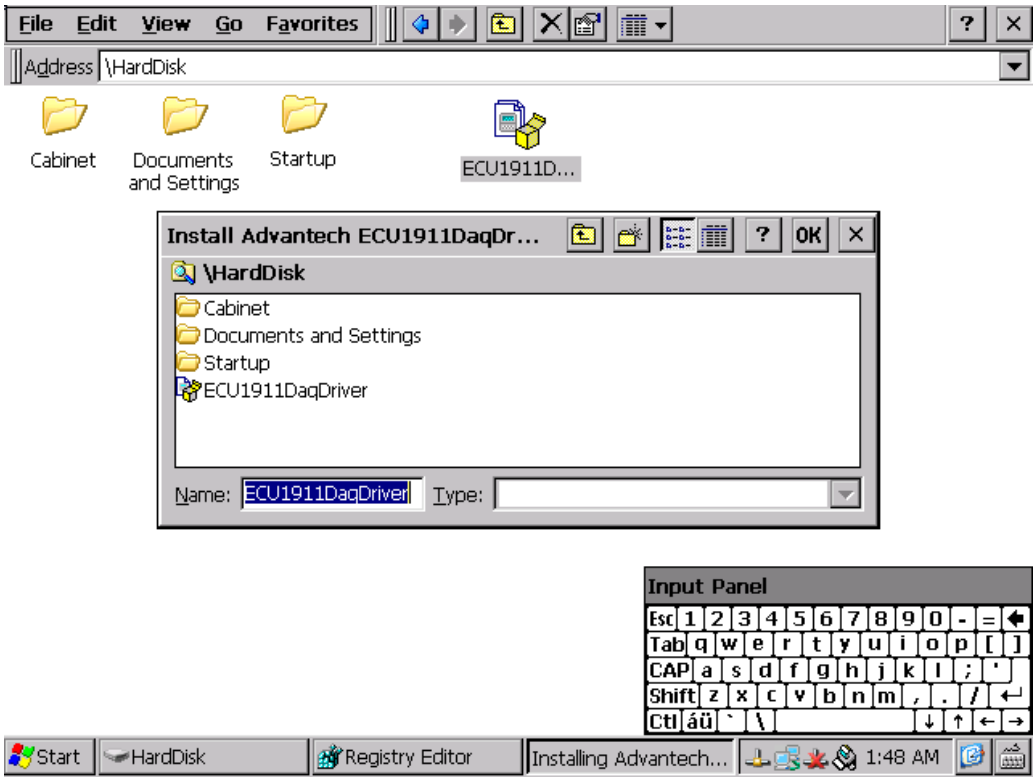
1. Turn on your device and connect a VGA monitor to it. Windows CE will load in about 30 seconds.



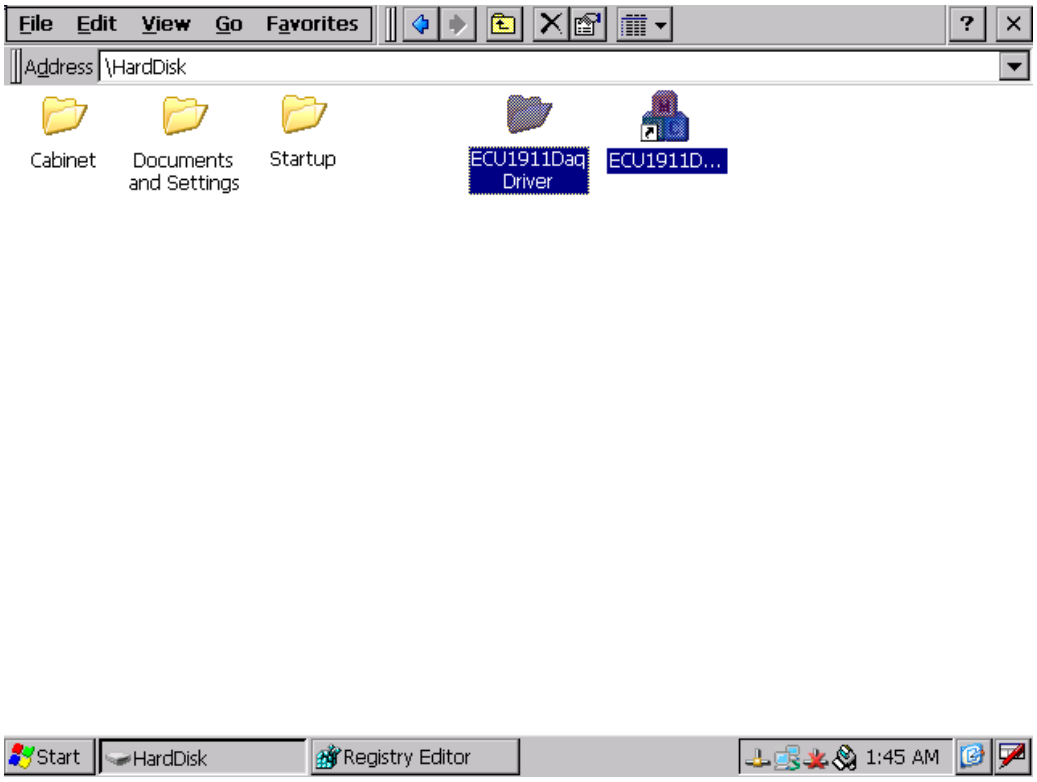
2. Copy the setup file "ECU1911DaqDriver.cab" to the device "\HardDisk" .



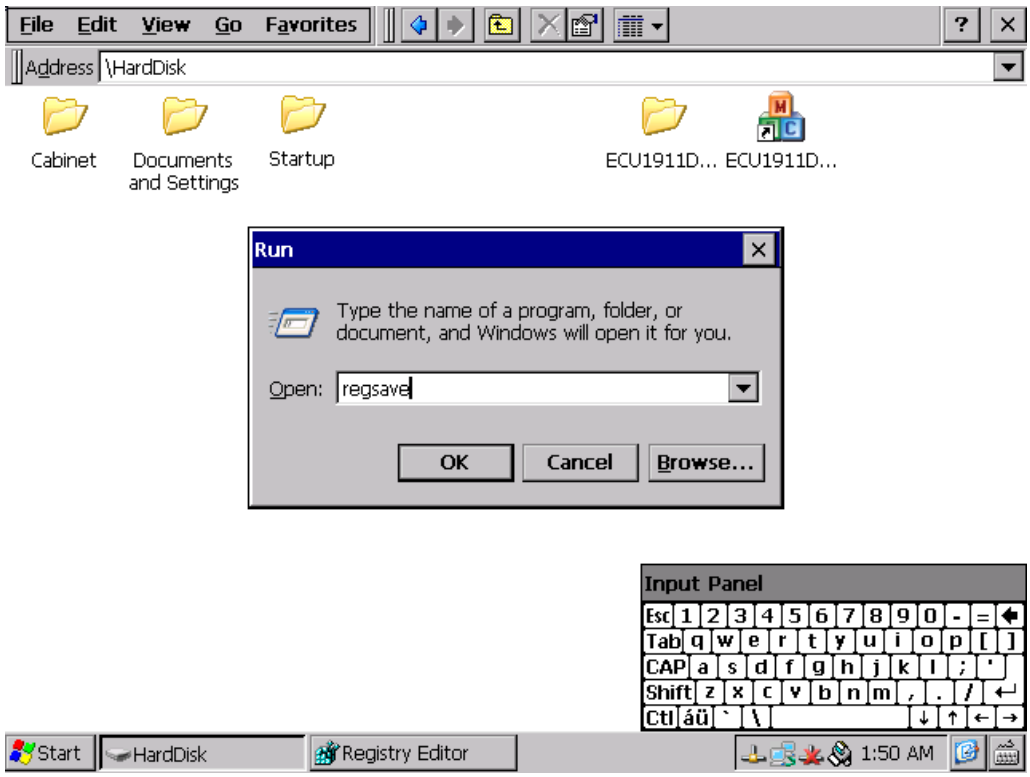
3. Double click "ECU1911DaqDriver.cab" to install the driver and utility.



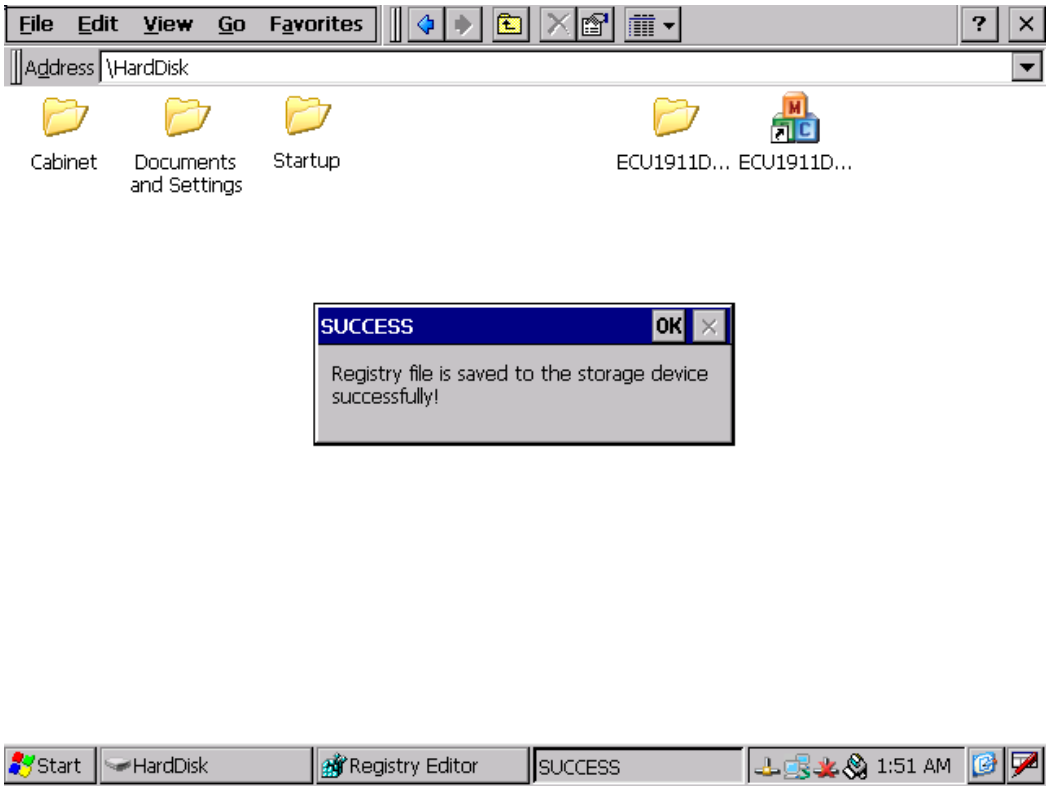
4. Press the **OK** button to continue. There will be a folder named "ECU1911DaqDriver" and a shortcut for utility named "ECU1911DaqUtility".



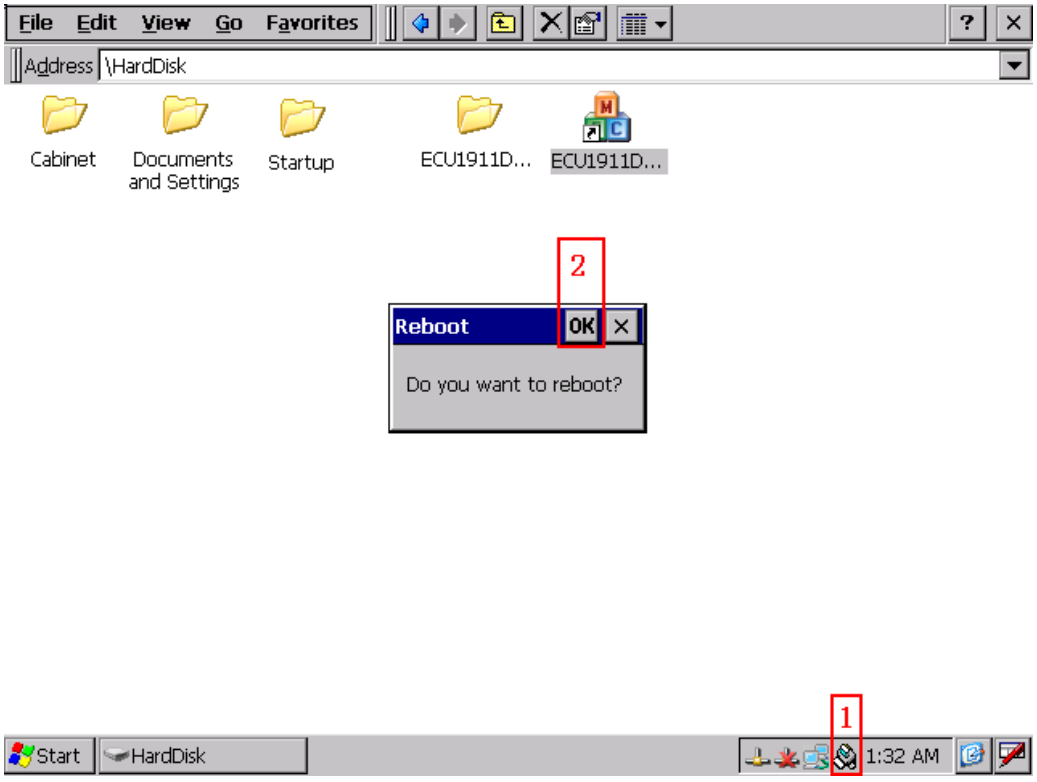
5. Open the "Run" dialog from Start>>Run... and input "regsave".



6. Press "OK".If the registry file is saved successfully you will get the following message box.

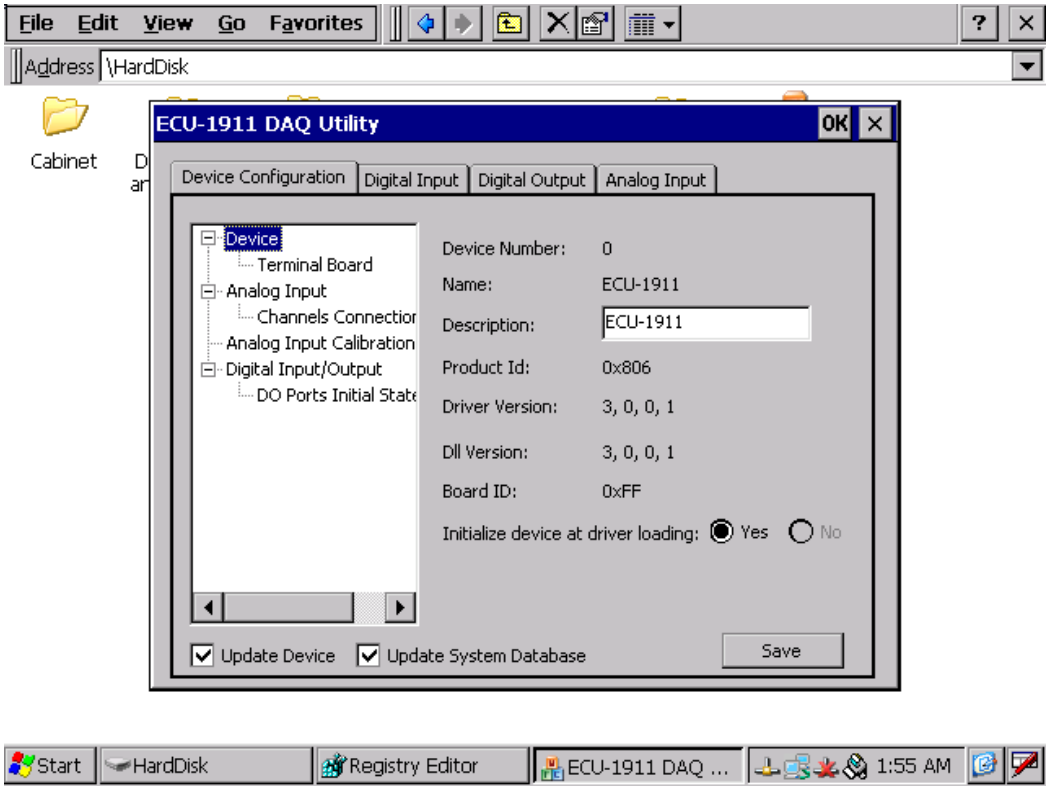


7. Reboot the device.
   1). Click reboot utility icon.
   2). Press the "OK" .



8. After rebooting you can access "ECU1911Daq Utility" from "Start->Programs->Advantech->ECU1911Daq Utility"

9. Now you can run the “ECU1911DaqUtility” to test the IO function.

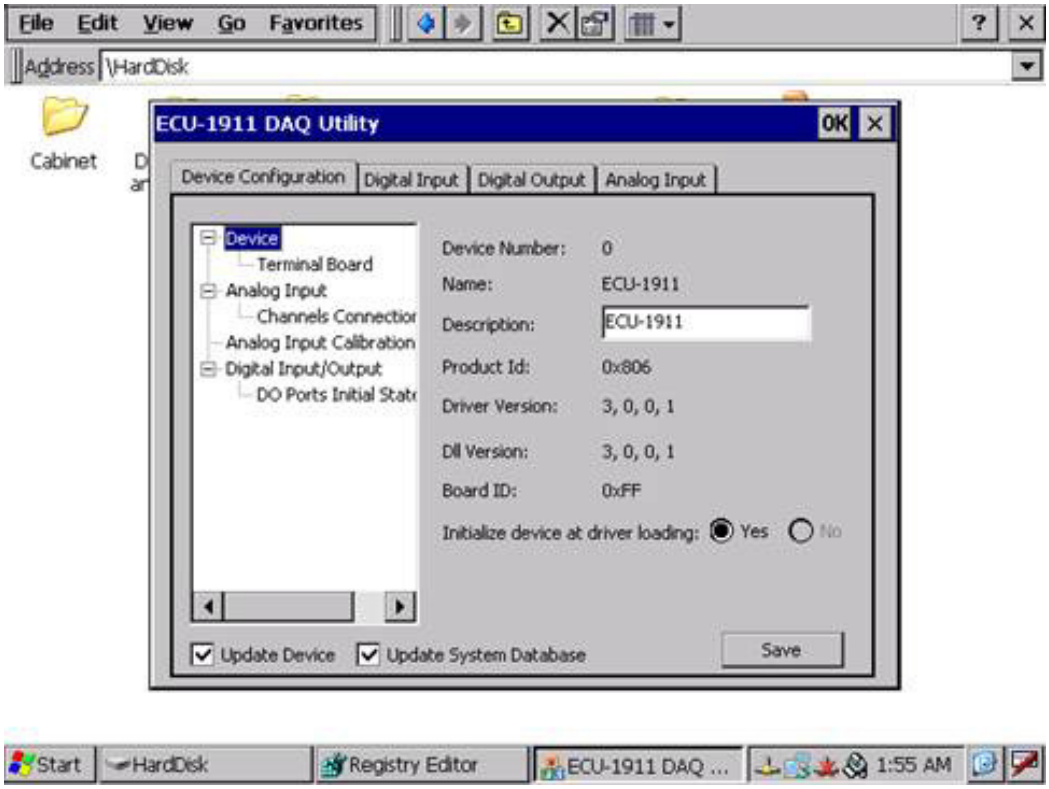


4.3 Device Configuring

The DAQ Driver provides device setting dialog box that allows you to configure your device, and later stores your settings on the system registry. These settings will be used when you call the DAQNavi SDK to manipulate functions of device. Device Configuration assists to use Advantech DAQ cards more efficiently and easily.

Use ECU-1911 DAQ Utility

You can access “ECU1911Daq Utility” from “Start->Programs->Advantech->ECU1911Daq Utility” and open it.

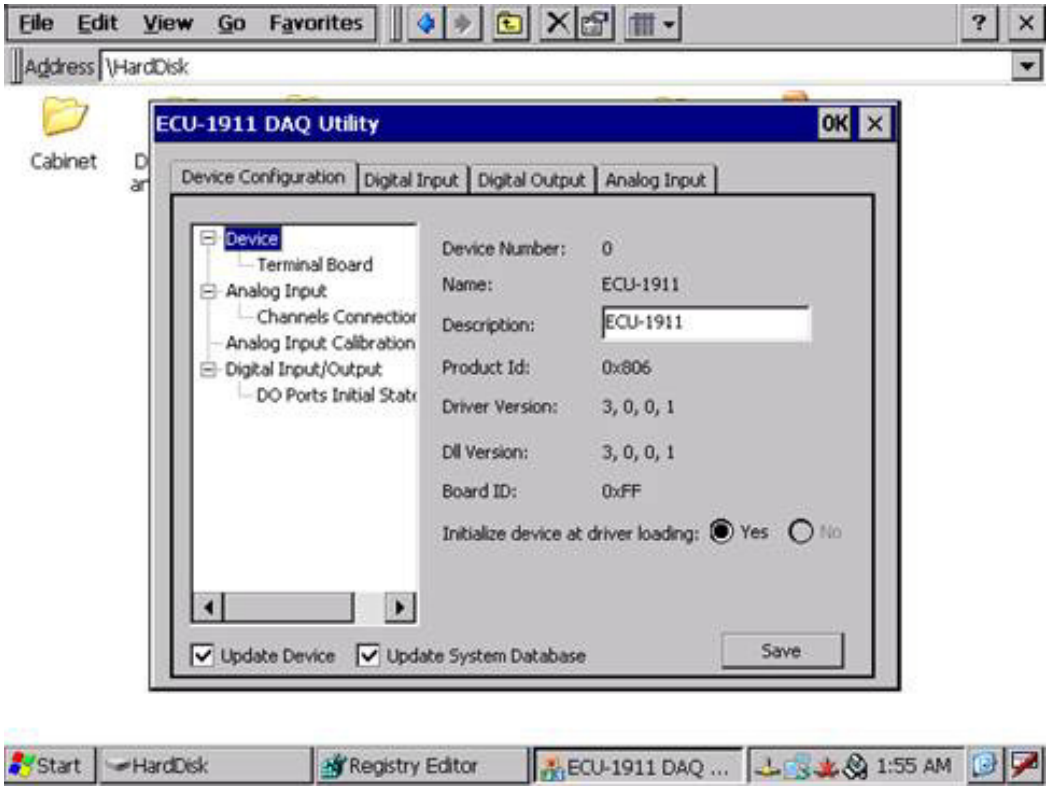


On the device setting dialog box, you can change default settings of Device, Analog Input, Digital Input/Output functions.

With the corresponding check box checked, you can click the "Save" button to apply the device setting to the device or store them in the system registry. if both the "Update Device" and the "Update System Database” are unchecked, the device setting will be lost once the dialog is closed.

4.3.1 Device Descriptions Configuration

Device Configuration: Select "Device" tab to configure device.



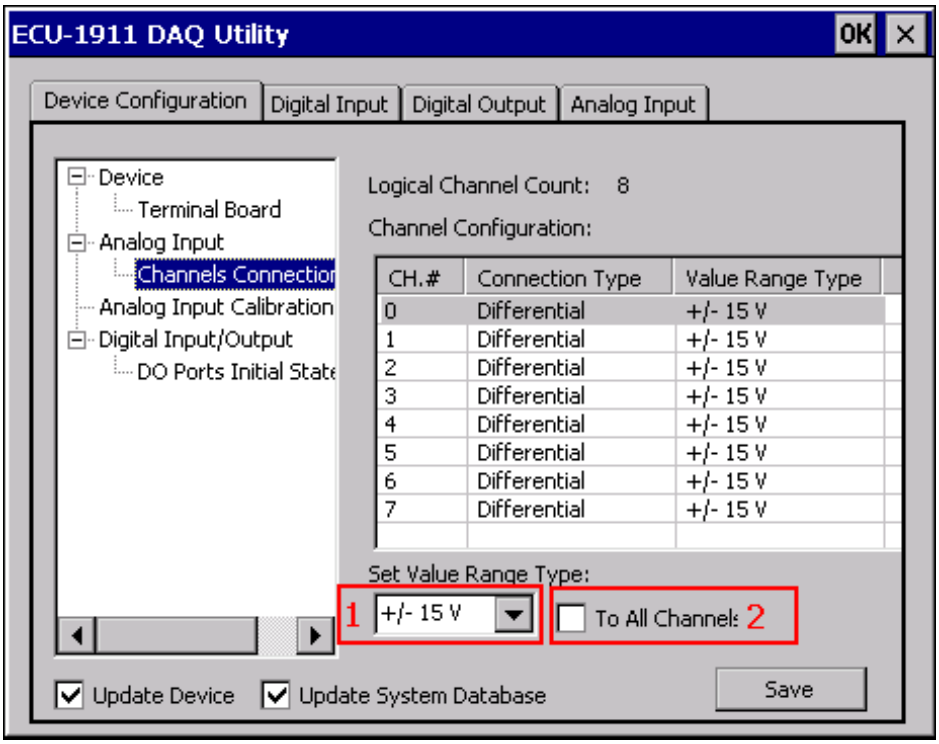
Item 1: Set device descriptions.

You can set the device description according to the actual need, to distinguish between field devices to facilitate.

Note! *If you hope keep these changes after power off, press "Save" button and run "regsave" from Command Prompt (Refer to step 5-6 in chapter 4.2).*

4.3.2 Analog Input Configuration

Select "Analog Input" tab to configure analog input.



Item 1: Select ComboBox to set value range type for each channel.

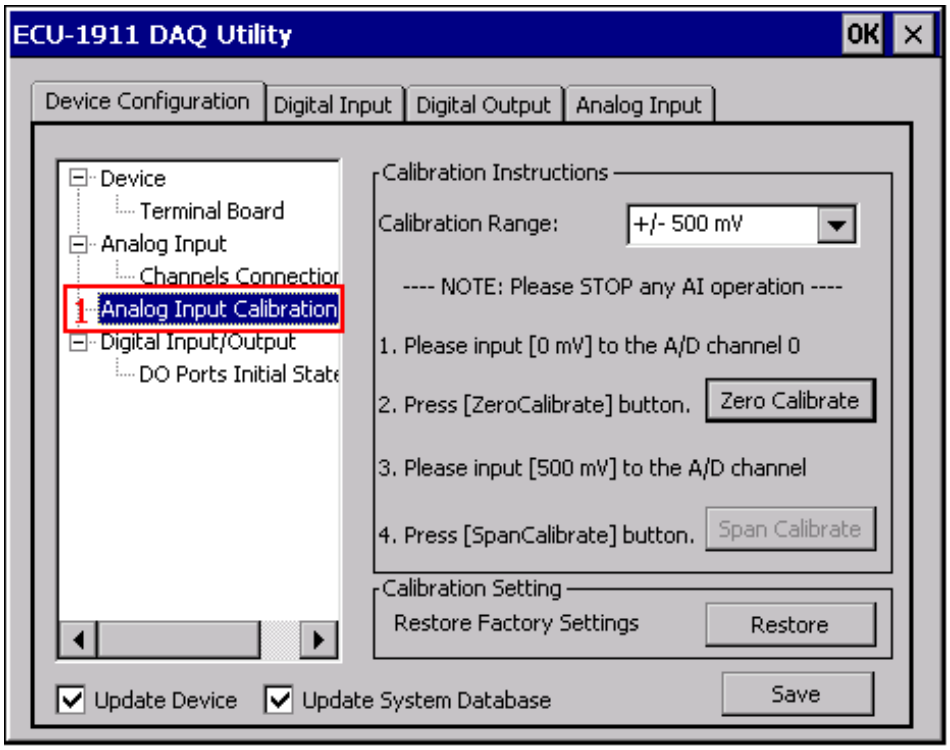
Item 2: Check the checkbox to configure all channels with the same value range type.

Note! *If you hope keep these changes after power off, press "Save" button and run "regsave" from Command Prompt (Refer to step5-6 in chapter 4.2).*

4.3.3 Device Calibration

Note! *The ECU-1911 has been calibrated at the factory for initial use. You are not required to calibrate the ECU-1911 in normal conditions. However, If in other conditions users need to calibrate the ECU-1911, users can follow the process list below. To perform a satisfactory calibration, users need a 4-1/2 digit stable, low noise standard DC voltage source for the calibration process. It is important that the accuracy after calibration depends on the DC source's accuracy.*

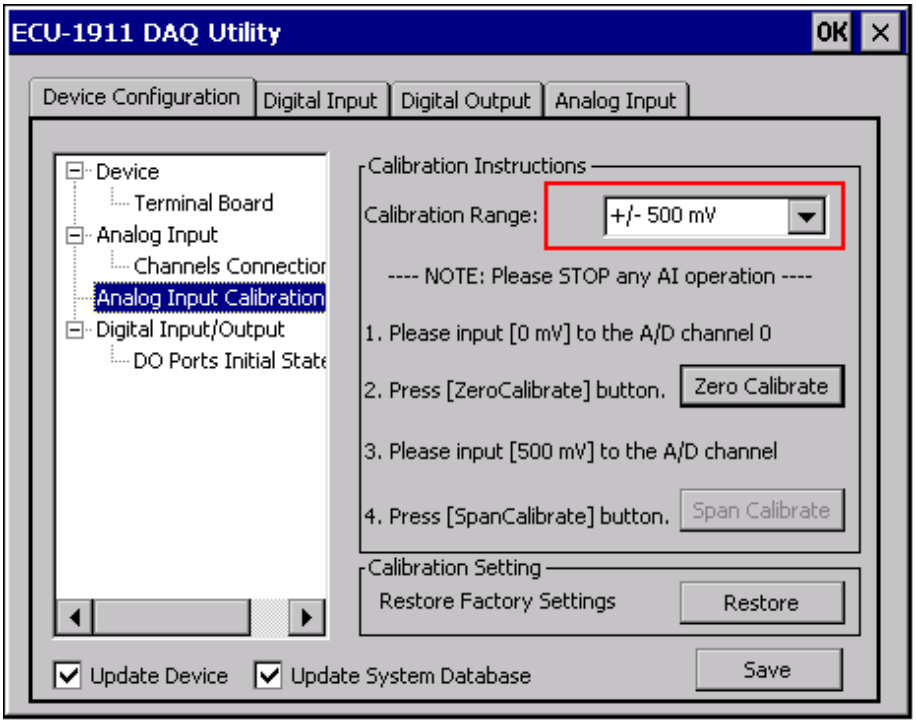
Click the “Analog Input Calibration” tab in configuration dialog box and follow the Calibration Instructions to finish your calibration.



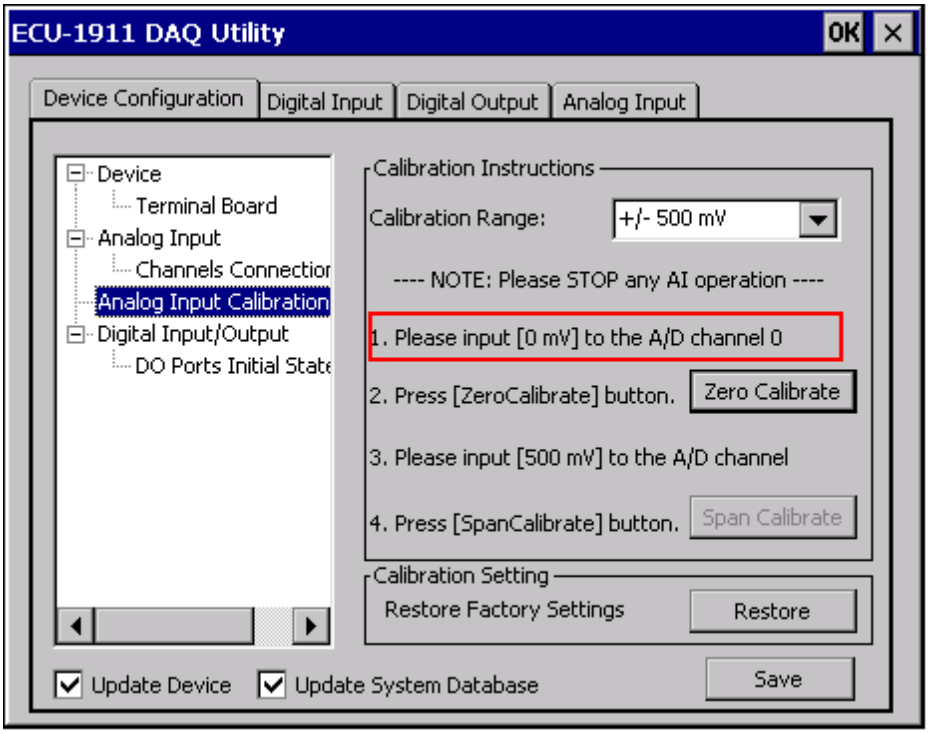
Item1: Display Analog Input Calibration (A/D Calibration).

A/D calibration Wizard

1. Please select Calibration Range

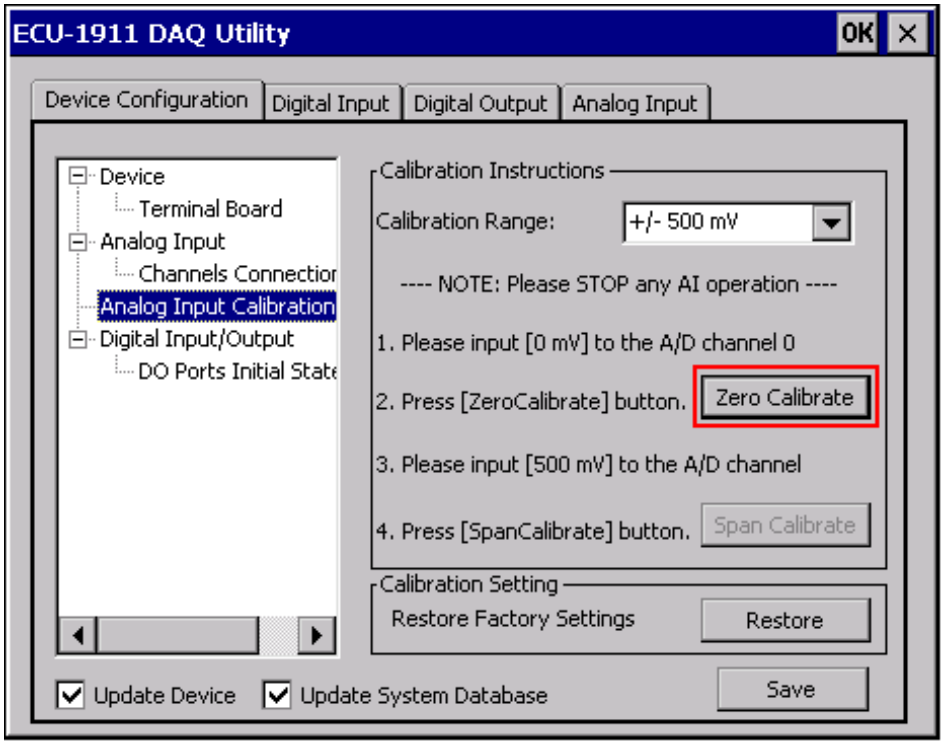


2. Please follow the Calibration Instructions 1 to input voltage or current to channel 0.



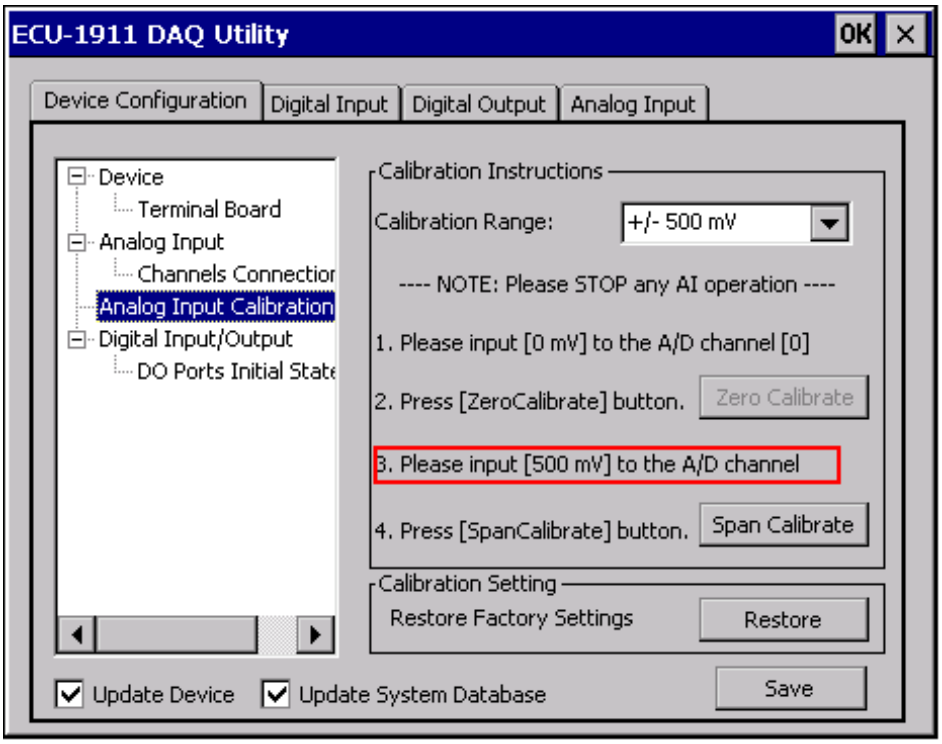
Note! *It is important that the accuracy after calibration depends on the DC source's accuracy.*

3. Press [ZeroCalibrate] button



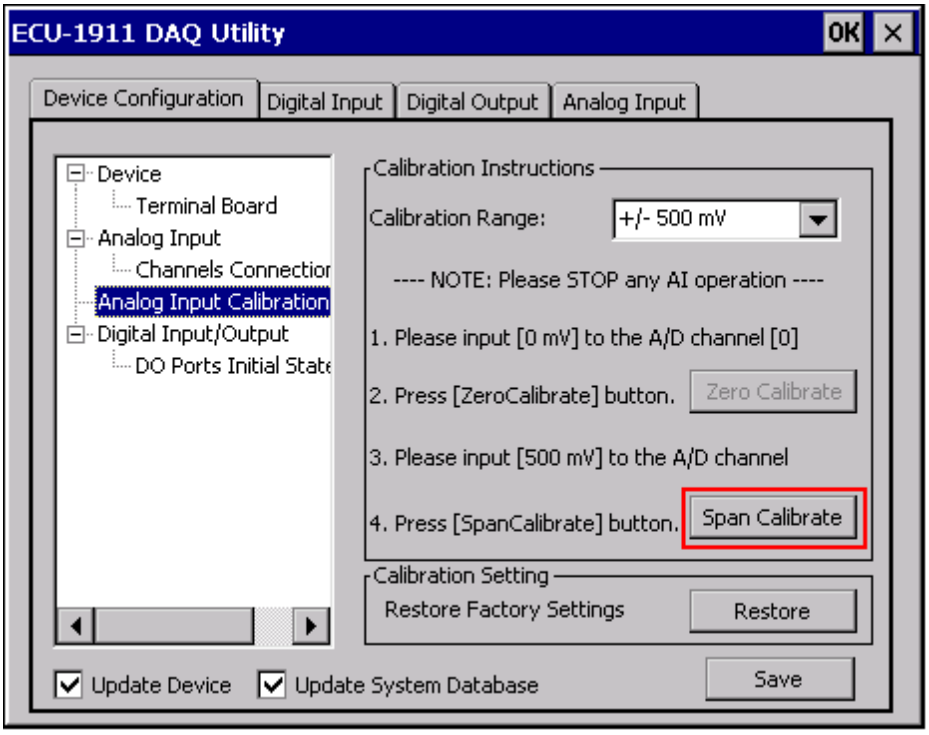
Note! *If success, you will get this message "Zero Calibrate Successed!".If failed, you will get message like this "Zero Calibrate Timeout !"If you get failed please repeat step2.*

4. Please follow the Calibration Instructions 3 to input voltage or current to channel 0.



Note! *It is important that the accuracy after calibration depends on the DC source's accuracy.*

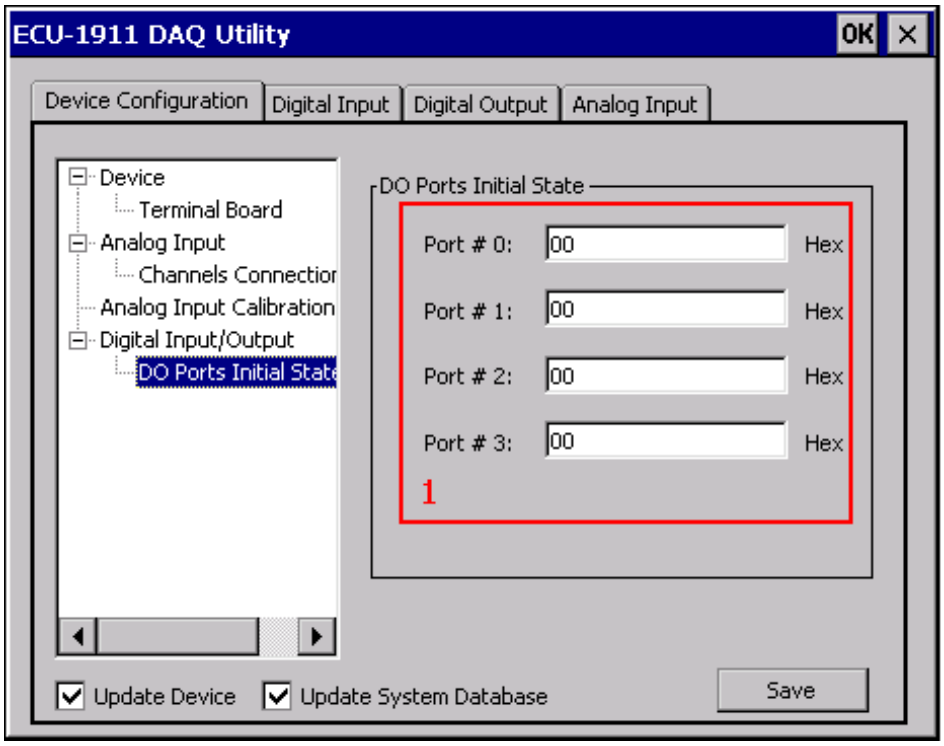
5. Press [SpanCalibrate] button.



Note! *If success, you will get this message "Span Calibrate Successed!".If failed, you will get message like this "Span Calibrate Timeout !" If you get failed please repeat step4.*

4.3.4 Digital Input/Output Configuration

Select "Digital Input/Output" tab to configure digital input or digital output.



Item 1: Set the each DO port's initial status when you open ECU1911 DAQ driver.

Note! *If you hope keep these changes after power off, press "Save" button and run "regsave" from Command Prompt (Refer to Step 5-6 in chapter 4.2).*

4.4 Device Test

You can select Device Test to open ECU-1911 device test dialog box in ECU-1911 DAQ Utility.

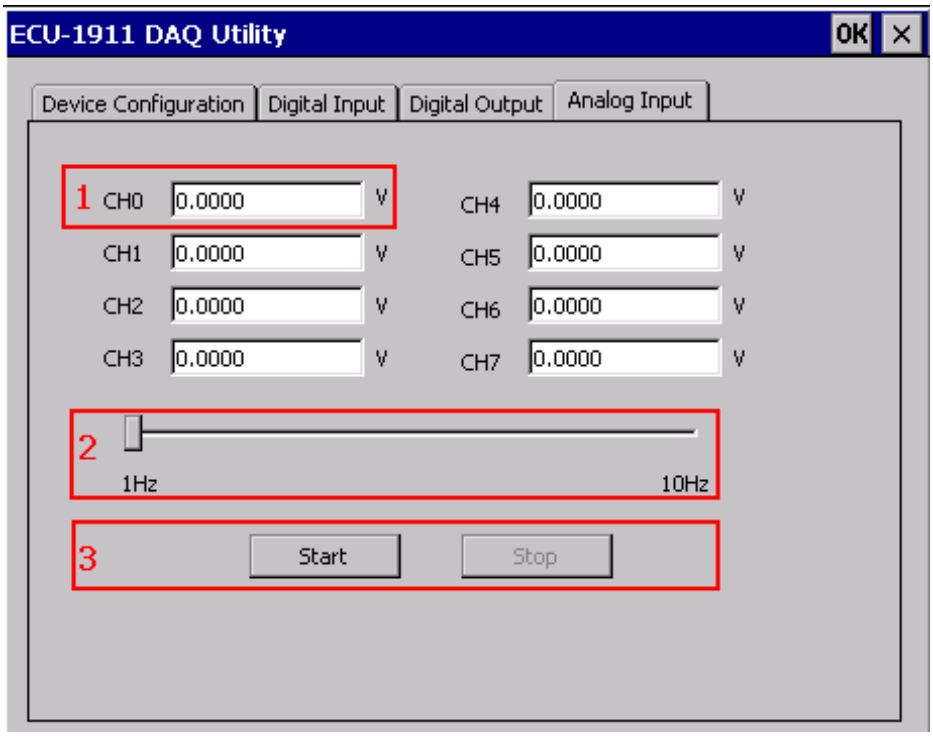
Users can select different tabs to test various functions of ECU-1911.

Analog Input Test

Digital Input/Output Test

4.4.1 Analog Input Test:

Click the "Analog Input" tab in the "ECU-1911 DAQ Utility" dialog box. All the AI physical channels of the device will be listed on the left. Values of AI channels are updated periodically. Users are able to edit the value range of AI channels at any time by clicking the value range type in the list.



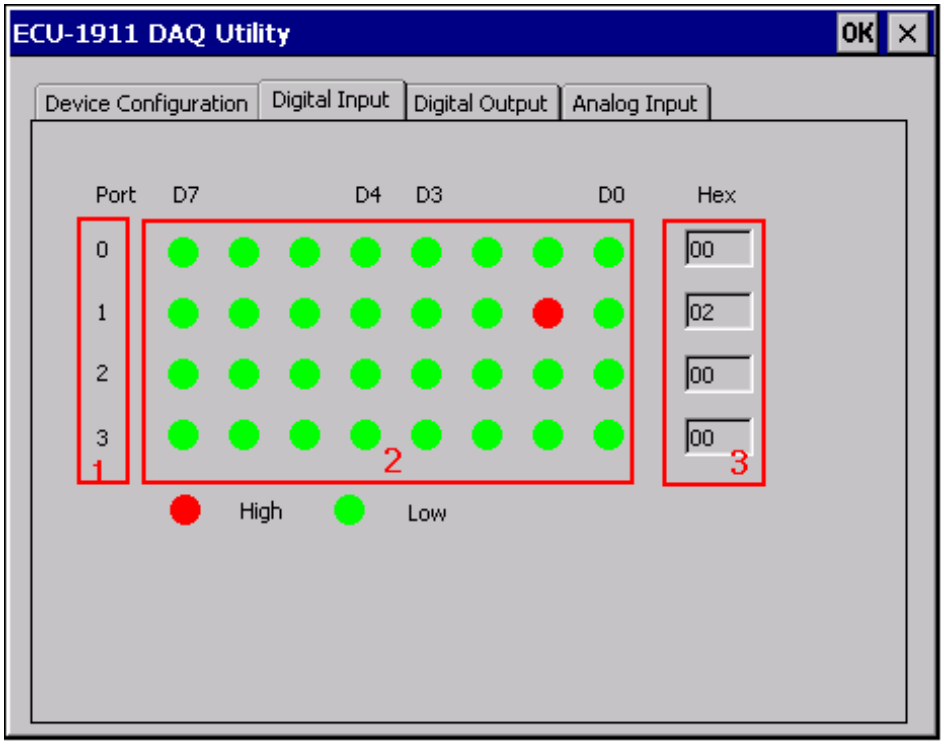
Item 1: Shows the sample data of a corresponding analog input channel. The user can select the value range type in the "Device Configuration" tab.

Item 2: Configure the sampling rate (1 Hz ~ 10 Hz) on the slider bar .

Item 3: "Start/Stop" button is used to start or stop analog input.

4.4.2 Digital Input Test

Click the “Digital Input” tab in the “ECU-1911 DAQ Utility” dialog box. All DI ports of the device will be listed. The values of DI port are updated automatically.



Item 1: Shows the port number of a corresponding group of lights on the right.

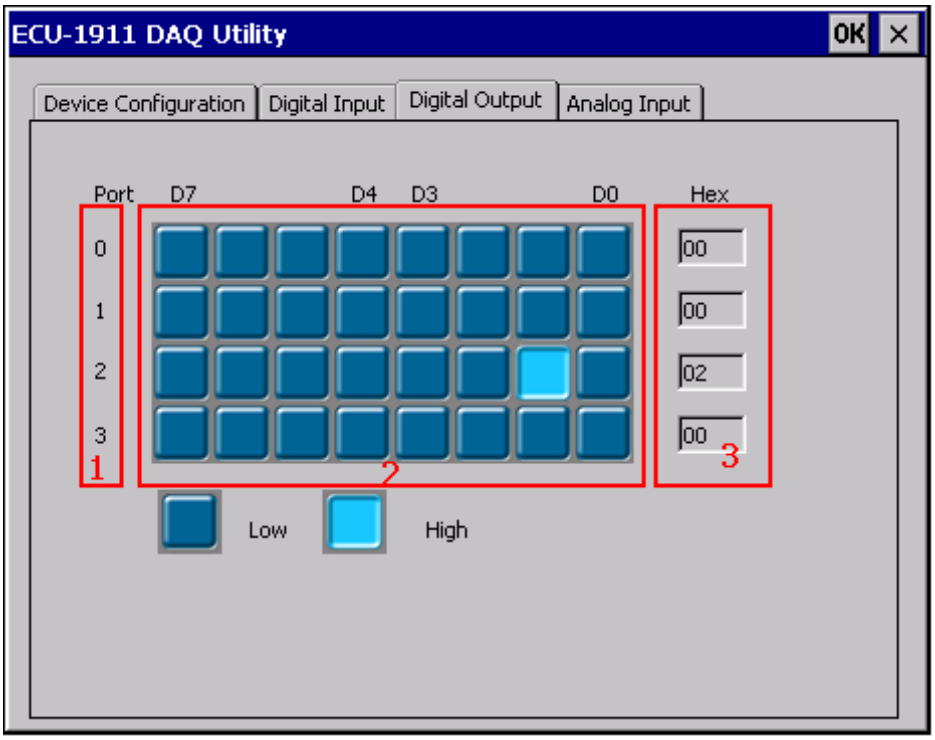
Item 2: Shows input status of the ports.

Item 3: Shows the hexadecimal port value of a corresponding group of lights on the left.

Example: The second point in port1(the red one) correspond to DI9 on device.

4.4.3 Digital Output Test

Click the DO tab in the Device Test dialog box to bring it up to front of the screen. These pages will present all DO ports of devices in a list. Users could flip the state of bit by clicking the buttons and editing the hex value of DO port.



Item 1: Shows the port number of a corresponding group of buttons on the right.

Item 2: The user can click the button to output a value to corresponding channel, then this zone can show output state of the ports.

Item 3: Shows the hexadecimal port value of a corresponding group of buttons on the left.

Example: The second point in port2(the light one) correspond to DO17 on device.

4.5 DAQNavi Examples

DAQNavi examples included in DAQNavi SDK package is programming examples, aiming to help you get started developing an application with DAQNavi SDK. You can modify the example code and save it in an application. Also you can use the examples to develop a new application.

Examples for DAQNavi SDK are in the System disk\Advantech\DAQNavi\Examples directory. For detailed information about DAQNavi examples, please refer to DAQNavi SDK manual. DAQNavi SDK provides two kinds of examples: DAQNavi Class Library Examples and DAQNavi Control Examples.

Here is the list of the examples supported by ECU-1911:

Table 4.1: DAQNavi Examples List

Examples	Description
AI_Instant	Retrieves data of several AI channel inputs through Instant method.
DI_Instant	Reads a DI port input repeatedly through Instant method and shows the result.
DO_Instant	Writes the output state value of a DO port according to the hex value input by the user through Instant method

Note! *ECU-1911 detailed configuration please refer to the product DVD.*

Disk: \ECU-1911\ECU-1911 Software Manual\ECU-1911 User Interface Manual.

Chapter 5

Error Handling and Diagnostics

5.1 Error Handling and Diagnostics

The OS on the device ECU-1911 must be recovered when you meet following case.

1. The OS Windows CE can not boot up.
2. The directory named “HardDisk” (or those files in that) disappeared after OS boot up.
3. The “HardDisk” directory can not be written when it's not full.

To recover the OS, follow these steps:

1. Power off the device ECU-1911.
2. Copy image file “nk.nbl” to CF card (FAT16 format).
3. Insert the CF card to device ECU-1911.
4. Power on.
5. Wait until update process complete.
6. New OS image will be loaded when update complete about 3 minutes.
7. You must reinstall the ECU1911 DAQ driver by following the software user manual.
8. Delete the image file “nk.nbl” in CF card.
9. ECU-1911 is restored to the default state

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