RIO-2017PG

C Programmable Remote I/O Module

User Guide

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Artila

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Document Amendment History

Revision	Date	Remark
V 1.0	2017 Nov.	Initial

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1. Introduction

RIO-2017PG is an 8-channel analog input remote I/O module that provides programmable input ranges on all channels. This module is an extremely cost-effective solution for industrial measurement and monitoring applications. The analog input channel can be configured as current and voltage and it is auto calibrated and 2500Vrms isolated protecting the module and peripherals from damage due to high input-line voltages. In addition to the analog input, RIO-2017PG also has one relay output.

1.1 Features

- C Programmable Remote Analog Input Module
- One 10/100Mbps Ethernet port
- 8 channels 16-bit A/D with Isolation up to 2500Vrms
- One channel relay output port
- Form A or form B relay with contact rating 30VDC@1A or 125VAC@0.5A
- Support lwIP and BSD socket library
- Support tiny web server
- Windows configuration utility included
- Toolchain: Sourcery CodeBench Lite or Keil from ARM

1.2 Hardware Specification

- **Ethernet:**
  - 10/100Mbps, RJ45
  - Protection: 1500V Magnetic isolation
- **Isolation analog input:**
  - Channel number: 8
  - Input type: Differential input
  - Input mode: Voltage / Current (0~20mA)
  - Resolution: 16-bit
  - Input range:
    - ✓ Unipolar: 0~150mV, 0~500mV, 0~1V, 0~5V, 0~10V
    - ✓ Bipolar: +/- 150mV, +/- 500mV, +/- 1V, +/- 5V, +/- 10V
    - ✓ Current: 0~20mA
  - Input impedance: 20MOhm (voltage), 120Ohm (current)
  - Accuracy: +/- 1% FSR
  - Isolation: 2500VDC

- **Relay output:**
  - Channel number: 1
  - Contact rating: 30VDC@1A or 125VAC@0.5A
- **CPU / Memory:**
  - CPU: NXP LPC1768 Cortex-M3 100MHz
  - Memory: 512KB on-chip Flash, 64KB SRAM
- **Power:**
  - 9~48VDC power input
  - Terminal block
  - Protection: Auto polarity and surge protect
- **Dimension:** 108 x 78 x 25mm (H x W x D)
- **LED Indicators:** Power LED, Ready LED and LAN LED
- **Buzzer:** YES

1.3 Software Specification

- **Protocol Stacks**: IPv4, ICMP, ARP, DHCP, NTP, TCP, UDP, HTTP
- **Device Drivers:** SD / MMC, UART, Real Time Clock, Buzzer, Digital I/O, Ethernet, Watchdog Timer
- **Toolchain**: Sourcery CodeBench Lite or Keil from ARM
- Support lwIP and BSD socket library
- Support tiny web server
- Windows configuration utility included

1.4 Packing List

- RIO-2017PG: Analog Input Remote I/O Module
- Software utility download from Artila Web (http://www.artila.com/download)

1.5 Optional Accessory

- DK-35A (36-DK35A-000): DIN RAIL Mounting Kit
- PWR-12V-1A (31-62100-000): 110~240VAC to 12VDC 1A Power Adaptor

2. Layout


9~48VDC
Power-In
LAN
Relay Output
A/I CH7~8
10/100M
Ethernet
V+ V-
9-48VDC
DO OUT
DO COM
AGND
AIN_8-
AIN_8+
AIN_7-
AIN_7+
Artila
RIO 2017PG
Programmable Remote I/O Module
LAN
Ready
Power
AIN_1+
AIN_1-
AIN_2+
AIN_2-
AIN_3+
AIN_3-
AIN_4+
AIN_4-
AIN_5+
AIN_5-
AIN_6+
AIN_6-
AGND
A/I CH1~6

3. Pin Assignment and Definitions

3.1 Power Connector

Connecting 9~48VDC power line to the Power in terminal block. If the power is properly supplied, the Power LED will keep solid green color and a beep will be heard.

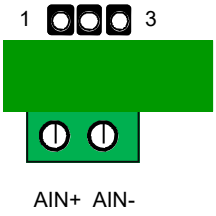
3.2 LED Status

The LED provides the RIO-2017PG operation information. The LED status is described as follow:

- **Power LED:** Power LED keeps ON if power (+9VDC to +48VDC) is correct.
- **Ready LED:** Ready LED keeps ON when RIO-2017PG firmware is ready for operation.
- **LAN LED:** Link and Activity LED will turn ON when the Ethernet cable is connected. When there is network data traffic, this LED will flash.

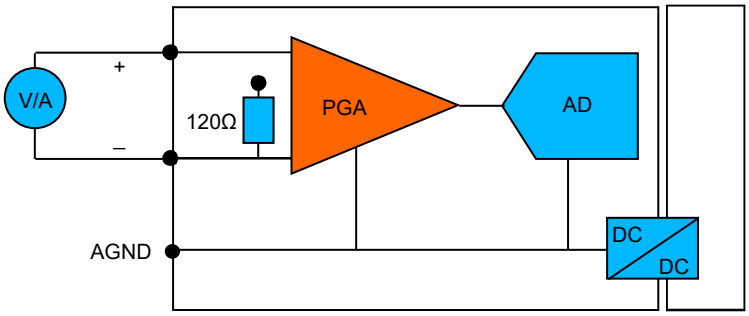
3.3 Input Mode Selection Jumper (JP4 ~ JP11)

To configure the voltage or current input, users need to open the metal case to set the jumper to proper position.



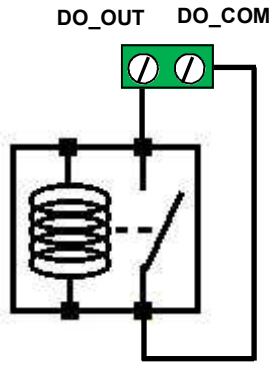
Voltage Input: Short 1-2 (Default setting)

Current Input: Short 2-3 (a 120Ohm resistor in shunt with +/-)



3.4 Relay Output Connector (DO_OUT, DO_COM)

The relay provides normal open output as shown. It can switch voltage source up to 30VDC@1A or 125VAC@0.5A.



3.5 Factory Default Settings

- **IP Address**: 192.168.2.127
- **Netmask**: 255.255.255.0
- **Relay output**: Normal open

4. Manager Utility Software

Manager Utility is a software provided by Artila that is used to configure and test devices though networking. Please install “Manager Utility” on PC before start up RIO-2017PG.

4.1 Download Manager Utility

You may visit Artila website: http://www.artila.com/, click “Download”

Select “RIO/RIO-2017PG” at Download page that shows the product series.
http://www.artila.com/download/RIO/RIO-2017PG/

You may also go for RIO-2017PG product page at “Remote I/O”

click “resource button”  to download Artila Manager utility

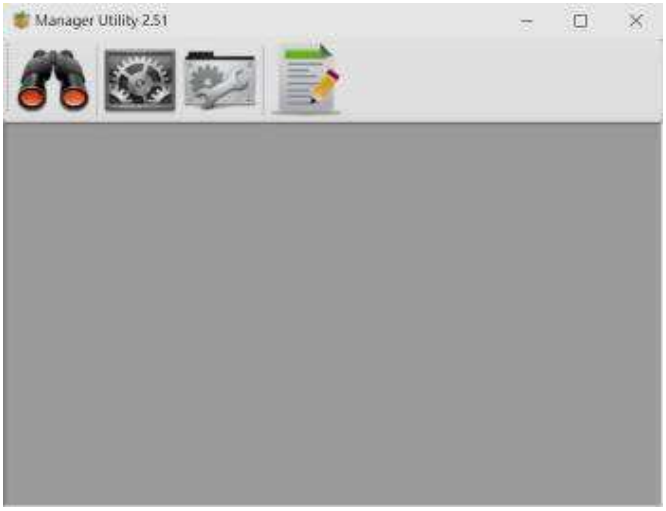
4.2 Manager Utility Installation and Execution

Install Manager Utility in your Windows-based computer and run the software.

4.3 Start-Up Manager Utility

After completed Installation of Manager Utility, you may see an icon  on PC.

Click it to execute Manager Utility. It shows the home page as following:



 : Broadcast Search and device configuration

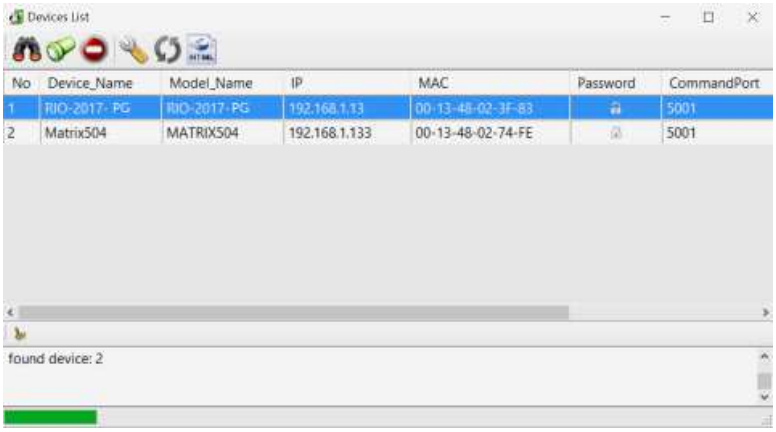
 : Modbus test (NOT Available for RIO-XXXXPG series)

 : Modbus user define test (NOT Available for RIO-XXXXPG series)

 : Log (NOT Available for RIO-XXXXPG series)

4.4 Broadcast Search

Start-up the Manager utility software and click telescope icon  to search the device: RIO-2017PG in the network.



4.5 Configure the device

Double-click the device: RIO-2017PG at previous figure, it will go to “Configure Device” page

Command Button:


: Device firmware upgrade


: Device Reboot


: Set device to default setting (device will reboot)

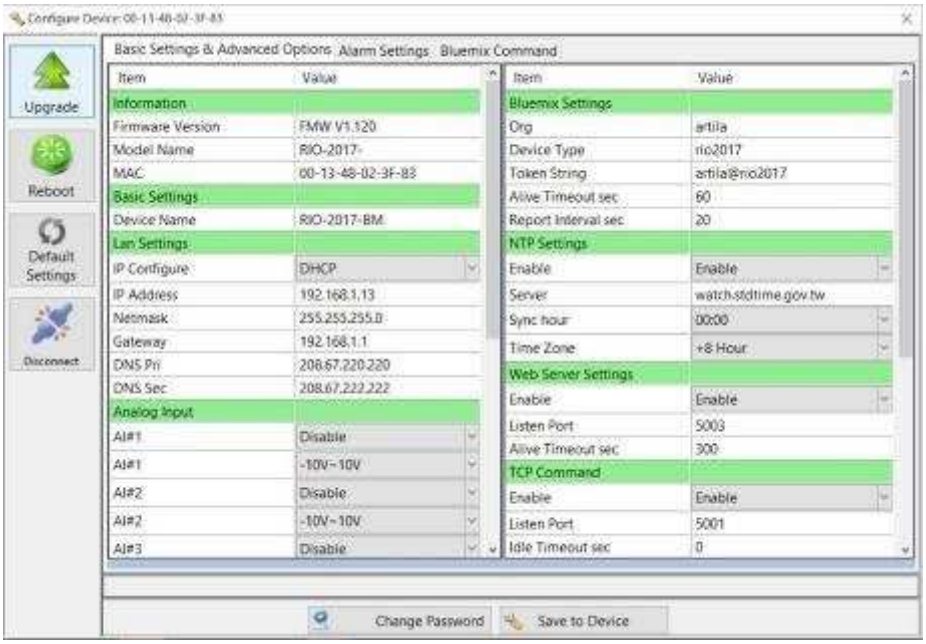

: Disconnect networking

: Password setting (Default: NO password)

4.6 Basic Settings & Advanced Options

User can upgrade firmware, reboot/disconnect device, set to default settting, change device name/password and other basic setting easily via remote operating.

After configured, be sure to press “Save to Device” to save all settings.



- **Device Name:** user configurable device name
- **IP Configure:** Static IP or DHCP
- **Analog Input / AI#:** Analog input range setting
- **DO Power on Value / DO#:** Digital Output setting

- **NTP Settings**

  Clock Synchronization setting

- **TCP Command**
  - Enable: Enable or Disable TCP command port
  - Listen Port: TCP command port number
  - Idle Timeout sec: disconnect connection while no data on line and time out occur
  - Alive Timeout sec: disconnect connection while no data on line, time out and no response to Ack signal

- **Accessible IP Settings**

  Access control setting. Let user configure the IP address and Netmask range and masters only with these IP address can access the device.

  User can setup three IP Address / Netmask (Maximum)

- **DHCP Options**
  - LinkDown Renew sec: Setting the time period while device linkdow. after then, it will renew IP automatically.
  - Continue Discover: While device fails to get IP,

    OFF: back to default setting (static IP)

    ON: Keep-on discover

5. Install Software Toolchain

The ToolChain, Sourcery CodeBench Lite ARM EABI Release is available at: http://www.mentor.com/embedded-software/sourcery-tools/sourcery-codebench/editions/lite-edition/.

Configure the environment to add the path of the toolchain. After installing toolchain, a new path will be added to Windows Environment i.e. ***Sourcery_CodeBench_Lite_for_ARM_EABI\bin***

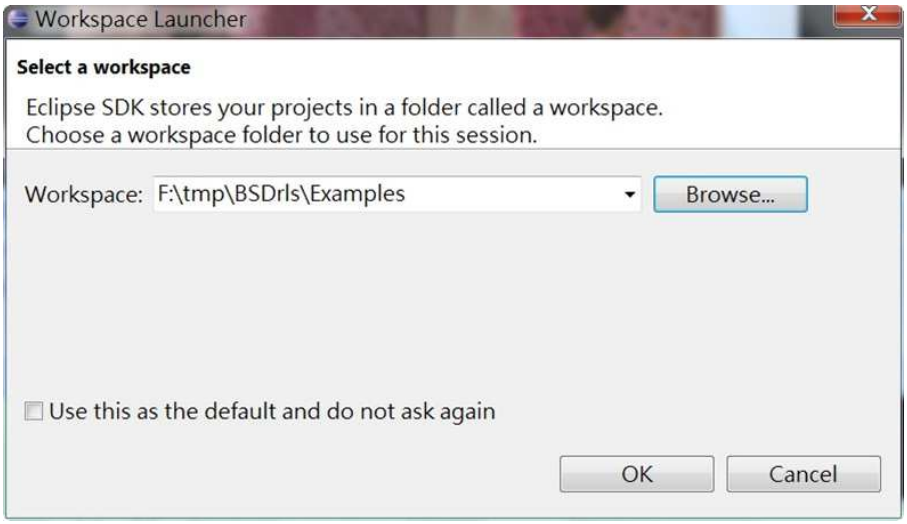
Restart the computer to make the new environment effective. After installation, you can test toolchain as follow:

6. Install Eclipse IDE

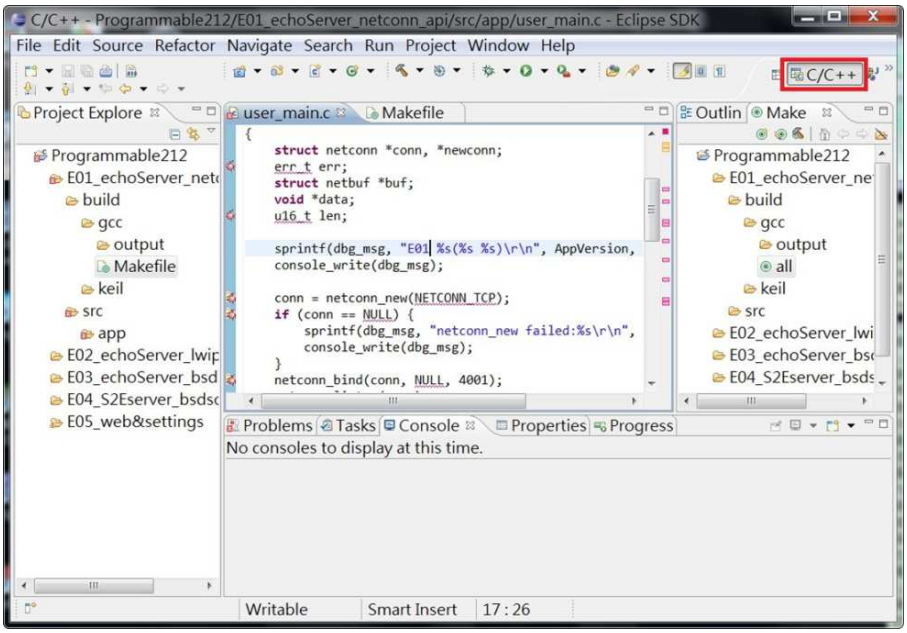
If you are interesting in using IDE to develop your program, the eclipse IDE is available at http://www.eclipse.org/downloads/ for your use.
Suggest to choose C / C++ compiler as option.

Start Your First Project

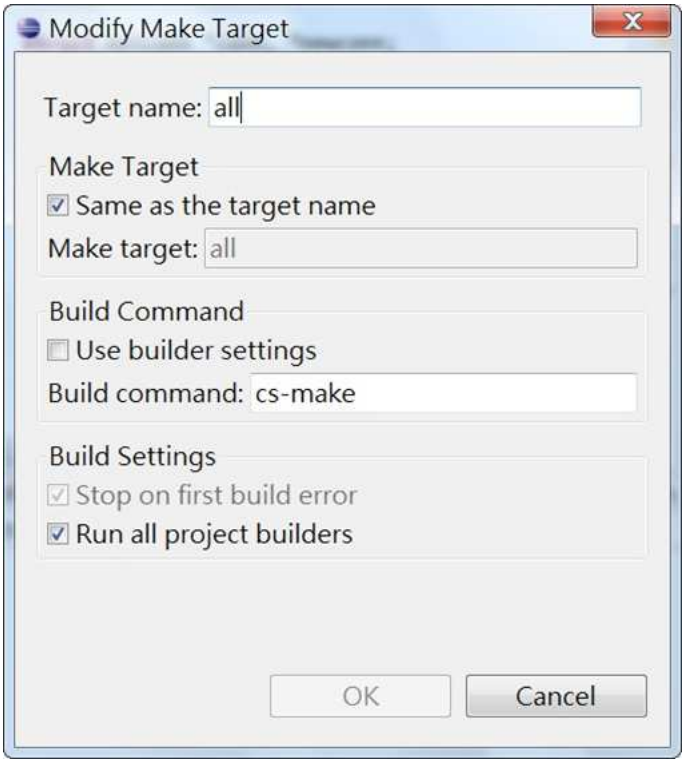
Run eclipse and select a workspace: BSDrls\Examples. You can find the path of the example program on Artila FTP with path: **BSDrls\Examples**



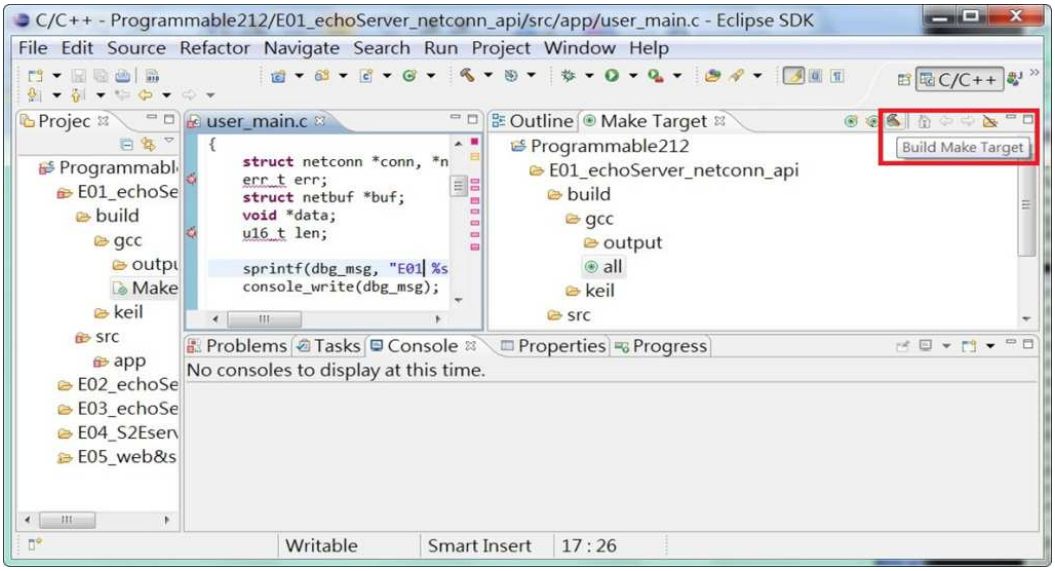
Choose C/C++ in the Workbench.



Modify the make file to compile the program as follow:



Use make file to build target.



Once project is built, you will find the target execution file ***user_main.aff*** is generated and available at:

E01_echoServer_netconn_api\build\gcc\output