USER MANUAL

FOR

FIOA-0402-U-16

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SERVICE

If service is required then pack the unit in its original packaging container or, if unavailable, any suitable rigid container. If a substitute container is used, surround the unit with shock absorbing material; damage in shipment is not covered by the warranty. Include a letter with the unit describing the difficulty and Hardware Revision and Software Version. Send to the following address:

Renu Electronics Pvt. Ltd.
Survey No. 2/6,
Baner Road,
Pune-411045

All returns will be tested to verify customer claims of noncompliance with the product warranty. Improper return packaging, which makes verification impossible, will void the warranty. If noncompliance is verified and is not due to customer abuse or the other exceptions described with product warranty, Renu Electronics will, at its option, repair or replace the Product returned to it, freight prepaid, which fail to comply with the foregoing warranty, provided REPL is notified of such noncompliance within the one-year warranty period.

ASSISTANCE

This manual is designed to provide the necessary information for trouble-free installation and operation of your new FIOA Series. However, if you need assistance, please call Renu Electronics Pvt. Ltd. at 91-20-27292840 or visit our web site at www.renuelectronics.com

MANUAL REVISION

If you contact us in reference to this manual, please include the following document number

Name	:	User Manual For FIOA-0402-U-16
Part Number	:	URML414
Document	:	UMAN\FIOA-0402-U-16\0508
Revision	:	0.00

Revision Number	Document Number	Date	Description
Rev 0.00	UMAN\FIOA-0402-U-16\0508	08-05-2008	First Release

Contents

FIOA-0402-U-16 Manual

CH-1 INTRODUCTION

1.1 Purpose of this Manual

The intention of this Operation Manual is to provide a guide for Safe installation, Configuration and operation of FIOA unit.
Read this operation manual thoroughly before installing and operating the FIOA unit.

This document is based on information available at the time of its publication. While efforts have been made to be accurate, the information in this document may not cover all the details or variations in hardware or software. Renu Electronics reserves the right to update information in this publication without prior notice.

1.2 Introduction to FIOA-0402-U-16

FIOA 0402 U-16 is Analog Input Output Model having 4 Universal Analog inputs and 2 Analog outputs. The Analog inputs can be Voltage (0-10V), Current (0 –20 mA, 4 – 20 mA), mV (0 –100 mV, 0 – 50 mV), RTD (PT 100 Alpha1 and Alpha2 constant), Thermocouple (B,R,S,E,J,K,N,T). Each input channel can be configured independently to work as any of the above type as per configuration made in the PRIZM software. The Analog outputs can be Voltage (0 – 10 V) or Current (4 – 20 mA). Output channels also are software configurable to current or voltage. The ADC & DAC resolution is 16 bit.

Unit supports standard Modbus RTU (slave) protocol for communicating with master device.

Internal circuitary (analog, digital and communication) is completely isolated from external power supply of the unit. Also communication section is isolated from the internal circuit.

1.3 Specifications:

1.	Power Supply	:	24 VDC +/- 10%
2.	Number of analog Inputs	:	4
3.	Number of analog outputs	:	2
4.	Analog Inputs	:	Voltage (0-10V), Current (0 –20 mA, 4 – 20 mA), mV (0 –100 mV, 0 – 50 mV), RTD (PT 100 Alpha1 and Alpha2 constant), Thermocouple (Type: B, R, S, E, J, K, N, T)
5.	Analog Outputs	:	Voltage (0 – 10 V) and Current (4 – 20 mA)
6.	Resolution	:	16 Bit
7.	Communication Port	:	1. RJ45: RS232, 2-wire RS485, CMOS 2. Same 2 wire RS485 signals are available on pluggable terminals
8.	I/O Terminals	:	Pluggable terminals.
9.	Operating Temperature	:	$0^{O}C$ to $50^{O}C$
10.	Storage Temperature	:	$-20^{O}C$ to $80^{O}C$
11.	Humidity	:	10% to 90% (Non condensing)
12.	Mounting	:	DIN rail mounting
13.	Dimensions (DIN rail)	:	70 X 100 X 35 mm

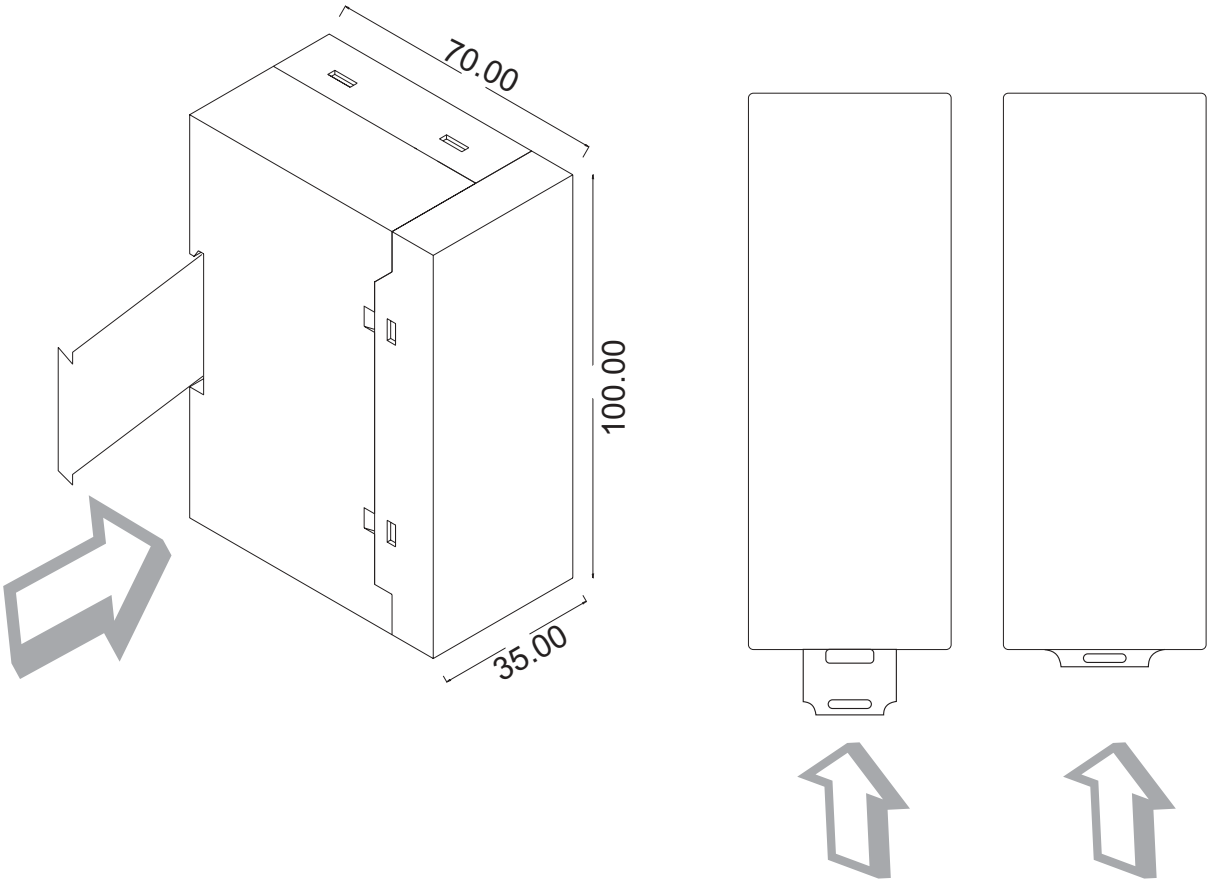
1.4 Power Requirement:

FIOA is a 24VDC powered unit. Power should be applied on the PCB Terminal block on the unit. Power rating is +24VDC +/- 10%; 2.5 Watts max.

CH-2 HARDWARE

2.1 Dimensional details and mounting instructions

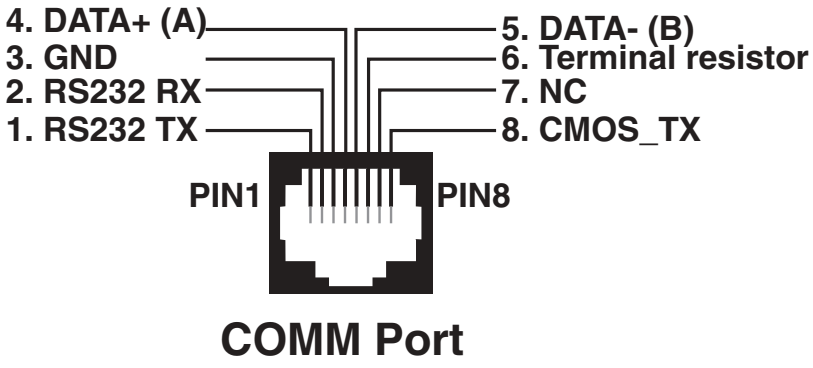
Following sketch shows dimensional details of FIOA with the mounting clamp.



2.2 Communication Port

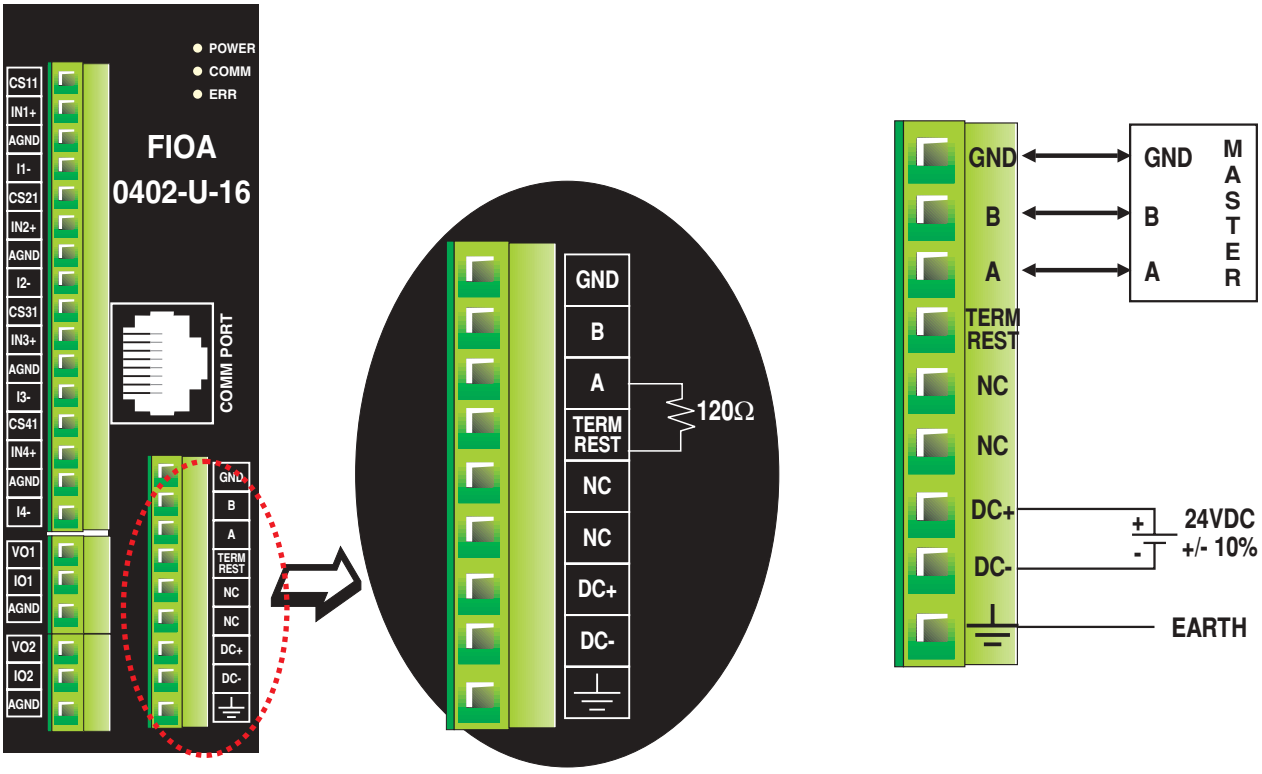
The RJ 45 COM Port has RS 232, RS 485 (two wire) and CMOS logic signals on its pins. This port can be used to download the configuration in the unit from the PRIZM software as well as for communication with any Modbus Master device. Same two wire RS 485 signals are provided on the terminal block for communication with Modbus Master Device.

Pinouts of RJ connector is as shown below:



COMM Port

2 Wire RS485 connections on terminal block:



For using internal termination resistor (120 Ohm), short "B" and "TERM REST"

2.3 Communication parameters and Modbus tag definitions:

Unit supports standard Modbus RTU (slave) protocol for communicating with master device.

Driver: Modbus RTU (slave)
Baud Rate: 9.6K, 19.2K, 57.6K OR 115.2K (Software Configurable)
Stop Bit: 1
No. of data bits: 8
Parity: Odd, Even OR None (Software Configurable)
Station ID: 1 to 255 (Software Configurable)

The following dedicated modbus registers are assigned to analog inputs:

SR. No.	Analog Inputs	MODBUS Tag.
1.	INPUT 1	40001
2.	INPUT 2	40002
3.	INPUT 3	40003
4.	INPUT 4	40004

The following dedicated modbus registers are assigned to analog oututs:

SR. No.	Analog Outputs	MODBUS Tag.
1.	OUTPUT 1	40065
2.	OUTPUT 2	40066

2.4 Configuration:

FIOA 0402-U-16 requires PRIZM 32 software to configure analog input and outputs.
For downloading configuration use RJ COM Port of the unit.

CH-3 GETTING STARTED

3.1 Starting Prizm32 software:

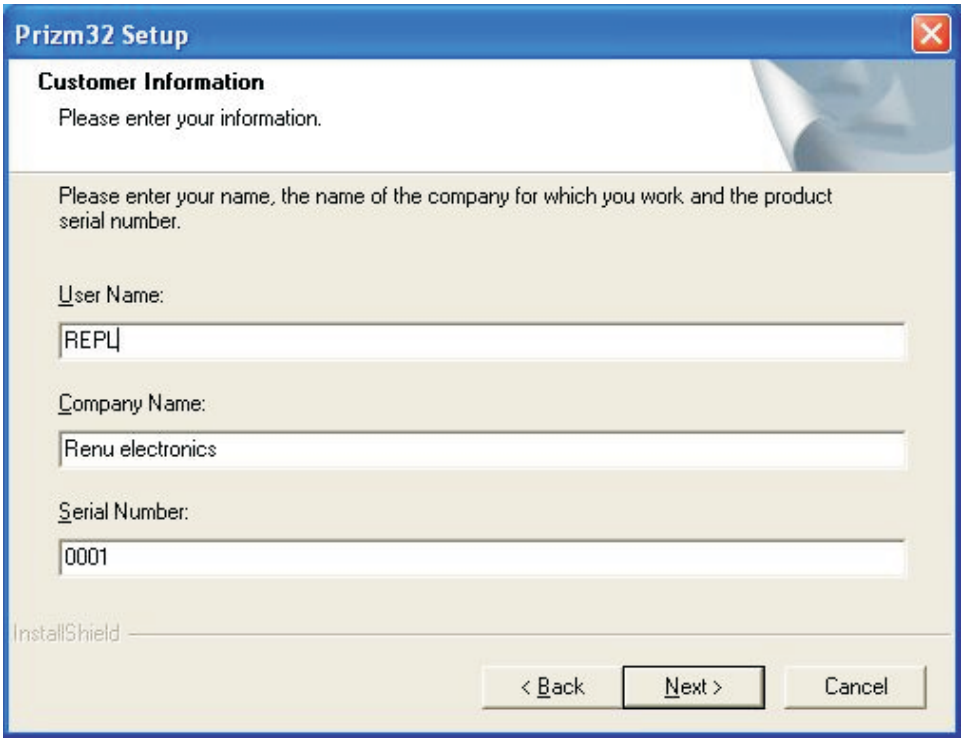
3.1.1 Installing Prizm32 Software

System requirements for installing Prizm32 on your PC:

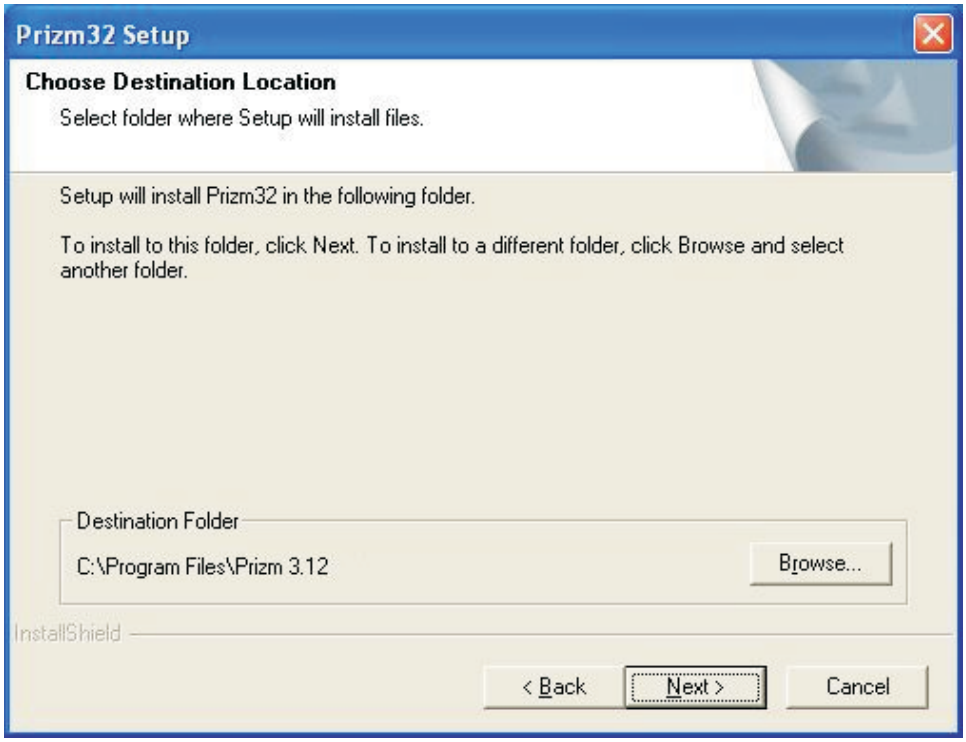
Windows Version	:	Microsoft® Windows 2000 or higher
Processor	:	266 MHz Pentium® II or higher Pentium-compatible CPU
Hard disk Space	:	150 MB free memory space
Serial Mouse	:	Microsoft® mouse or compatible pointing device
RAM	:	At least 64 megabytes (MB) of RAM; more memory generally improves responsiveness
Display resolution	:	800 X 600 with 24 bit true color
Serial Port	:	One Serial Port for Downloading Required

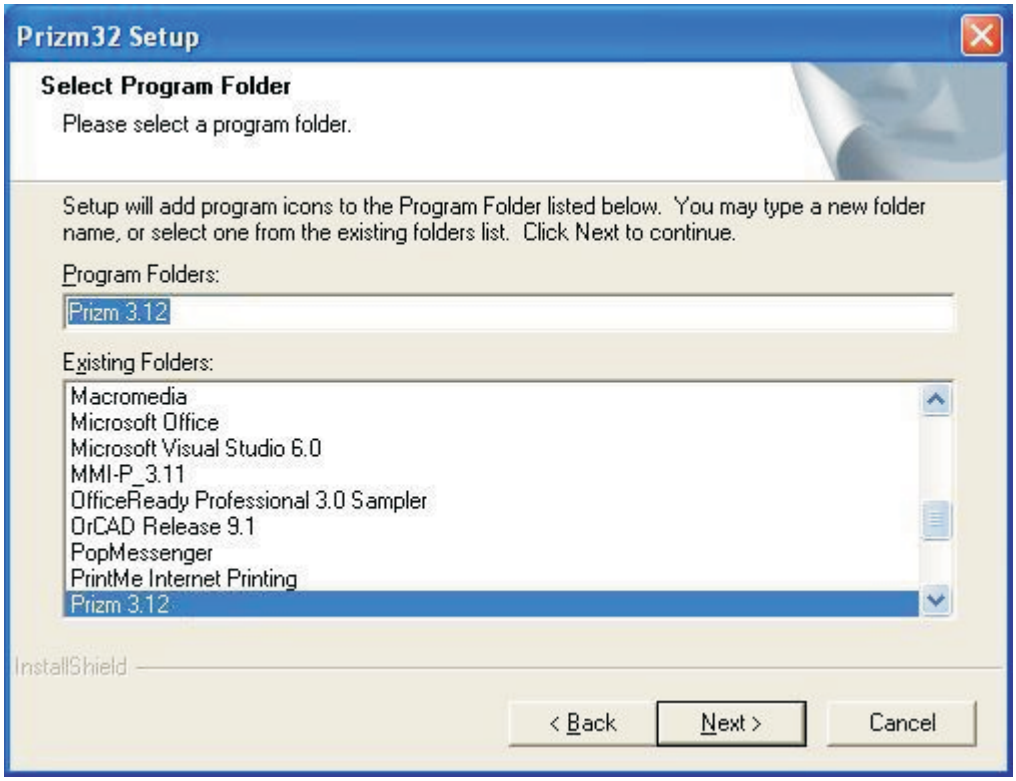
To install Prizm32 Software:
1. Open Microsoft® Windows.
2. Select Run and Pop up window appears. Type the path for installing the Setup.
This will install Prizm32 Setup Software.
3. When you click on OK, Welcome window appears on the screen. Click on Next.

4. Enter user name and company name.



5. Select the destination folder where Setup will install the files.





7. Installation starts. A dialog box indicating the status of progress of installation will display. A screen is displayed to inform you when installation is completed.
This procedure installs Prizm32 Software in Start Menu (in selected folder).

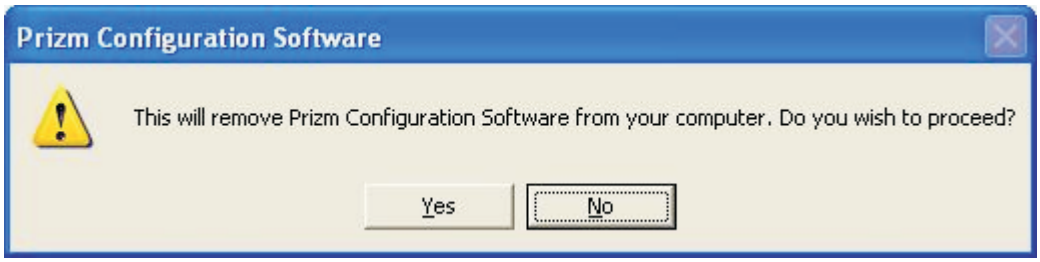
3.1.2 Steps for starting Prizm32 Software

1. In Windows click the Start button.
2. Select Programs.
3. Select Prizm32.
4. Select New Application either from Tool station or from File Menu.
5. Select the product by clicking on picture of the product in the list.
6. Select model from model list.
7. Set configuration parameters for analog inputs, outputs and communication port settings.

3.1.3 Uninstalling Prizm32 Software

1. In Windows click the Start button.
2. Select Programs.
3. Select Prizm32.
4. Select Uninstall Prizm32.

Following screen will display. The screen will ask you for the confirmation for uninstalling Prizm32.

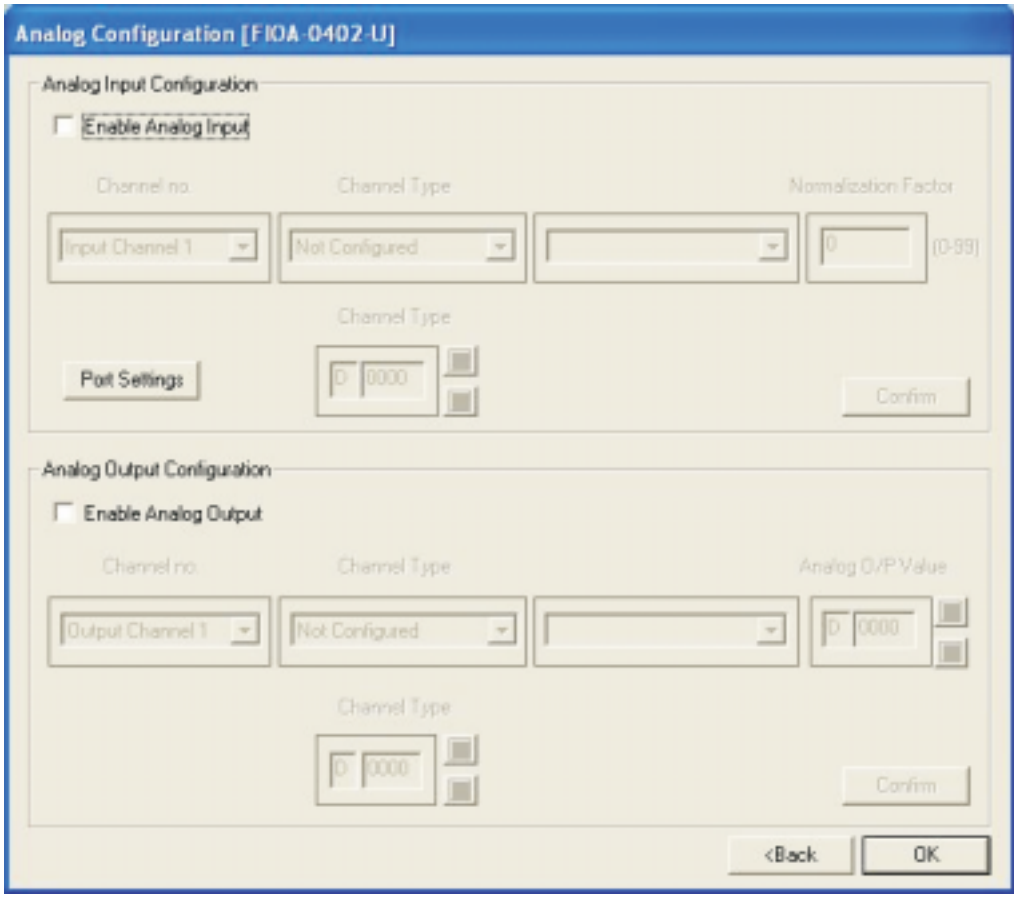


7. When you click Yes button, it will uninstall Prizm configuration from your computer.
If you want to install Prizm32 again you have to follow the steps explained in section 3.3.1.

3.2 Configuration of the unit:

1. When you launch Prizm32 setup software and select FIOA unit as shown below:

2. Select model from model list. Press “Next”. This will give you a analog I/O configuration wizard as shown below:



Analog Input Configuration

Enable Analog Input: Check this check box to enable the selection of Analog Input channel.

Channel no: Channel number depends on the selection of FIOA model. Here user can configure 4 input channels as selected FIOA model has 4 inputs.

Channel Type: Here selected model supports Universal inputs, so channel types are Thermocouple, mV, mA, RTD and Voltage.

Each input channel can be configured independently as any of the input channel type.

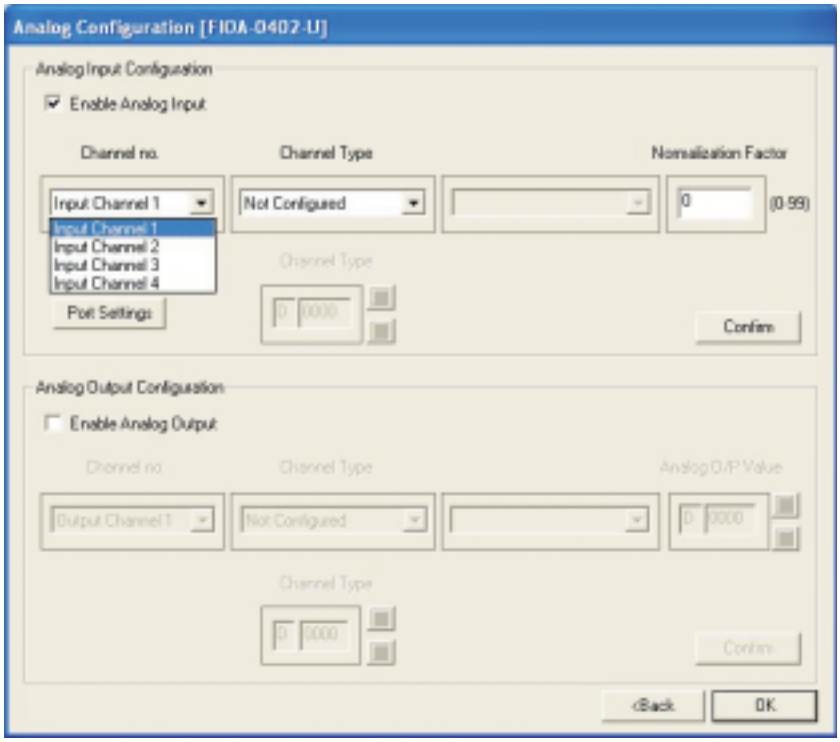
Analog Output Configuration

Enable Analog Output: Check this check box to enable the selection of Analog Output channel.

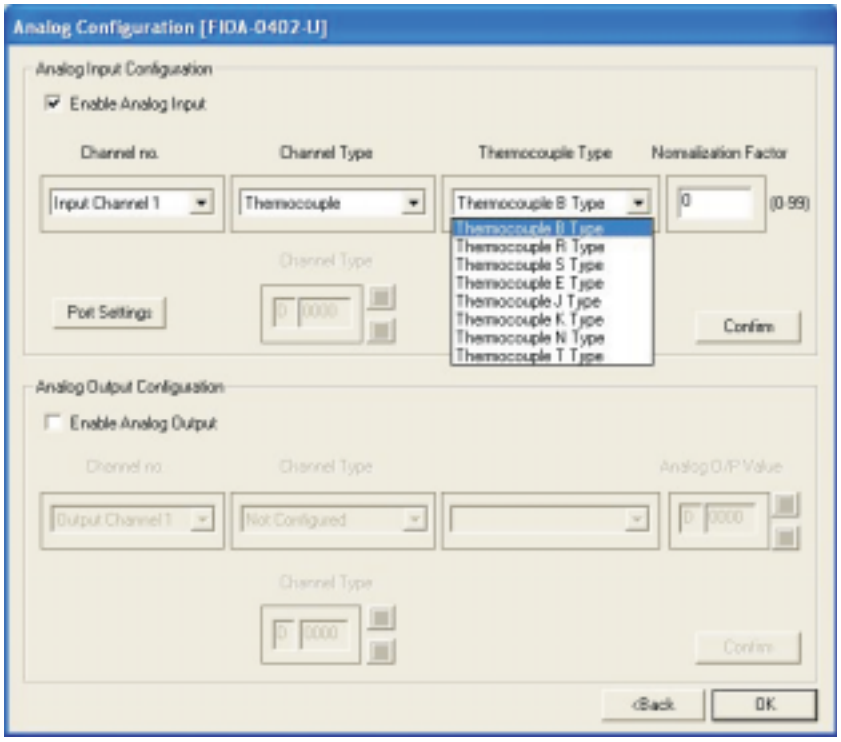
Channel no: Channel number depends on the selection of FIOA model. Here user can configure 2 output channels as selected FIOA model has 2 outputs.

Channel Type: Channel types are mA and Voltage.
Each output channel can be configured independently as any of the output channel type.

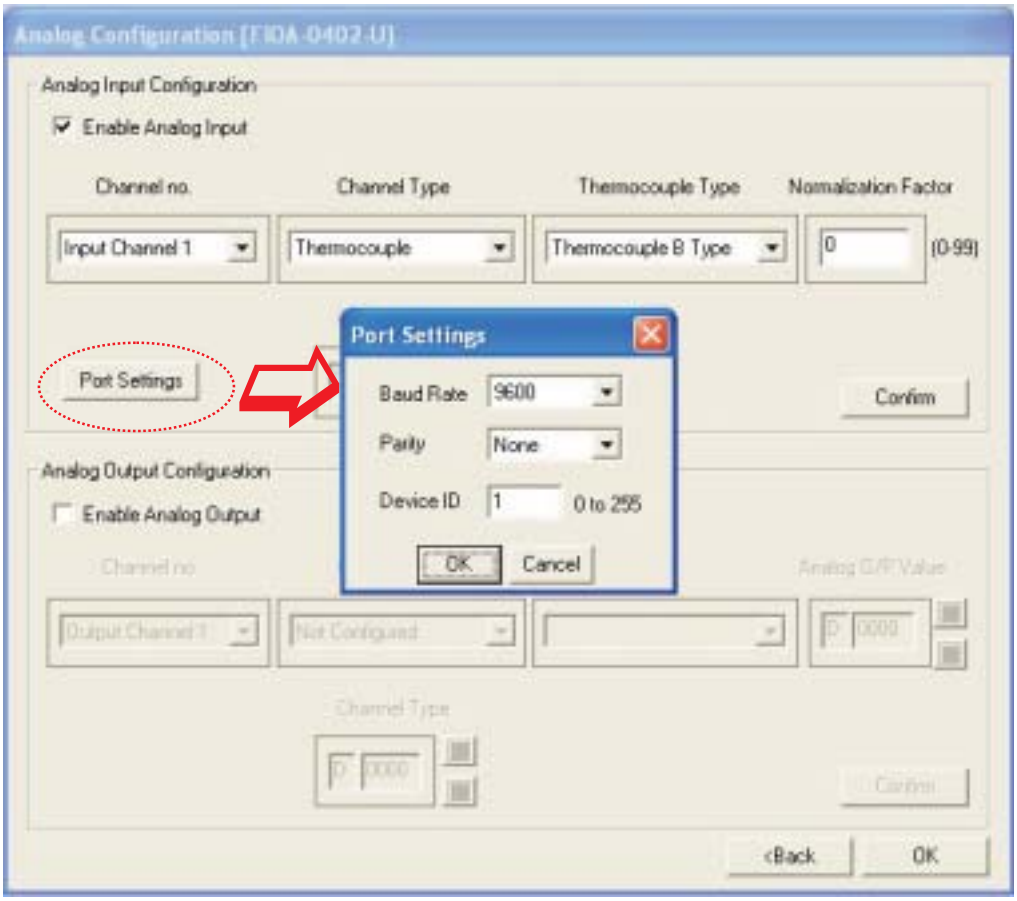
3. The Analog Input and Output channel configuration is shown in the following screen:



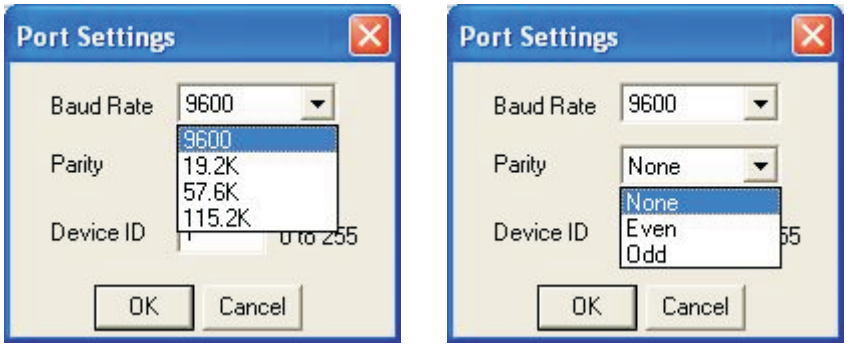
4. If Thermocouple is selected as Channel type, then Thermocouple types are as shown below.



5. To configure particular channel select Channel number, Channel type, channel subtype, normalization factor (0 to 99) and click on Confirm button. The selected channel will be configured.
6. Normalization factor can be selected for each channel independently.
7. Follow the same procedure for configuring Analog Output channel.
8. Also define communication parameter settings. This is done by clicking the “Port Setting” button on the wizard as shown below:



9. For communicating with master device; Baud rate and parity can select as shown below:



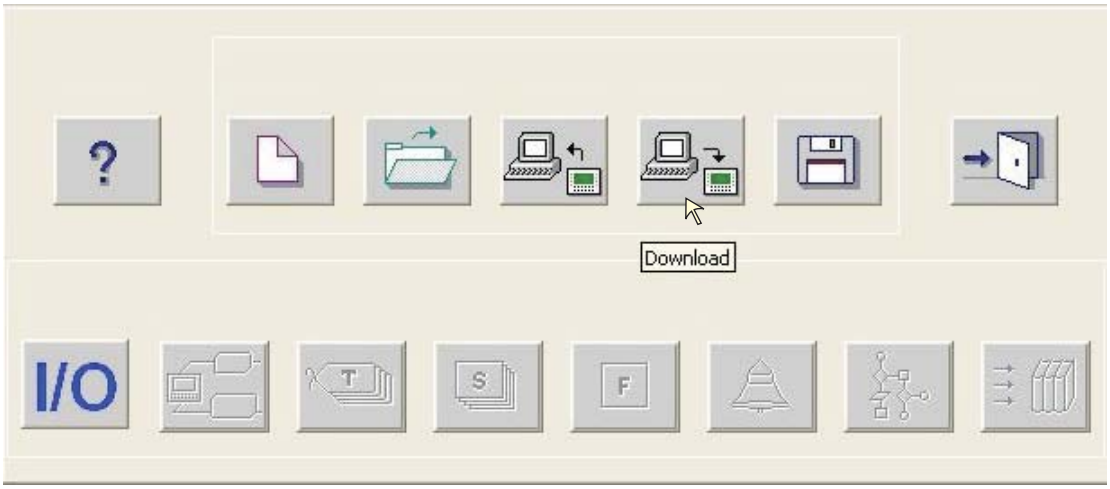
This completes the configuration of FIOA unit in Prizm32 software.
These configuration settings can be saved as “*.pzm” file so that we can use the same configuration next time.

3.3 Configuration Downloading procedure:

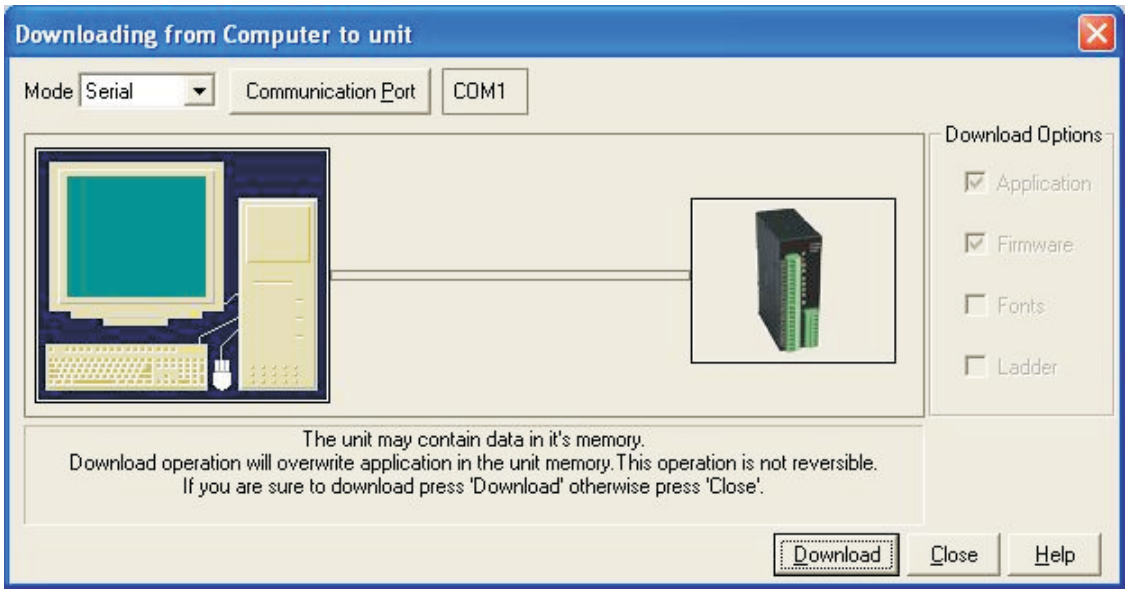
3.3.1 Prizm32 software configuration for downloading:

To download the configuration into the unit; follow the below given steps:

1. Press “Download” icon on the screen as shown below:



2. When user press “Download” icon from toolstation window; following screen will apprear:



Communication Port – This is used to define communication port for downloading. By default Com1 is selected.

Click “Download” button to start download. By default; this task will complete application and firmware downloading.

During download operation following error may be occur -

1. Unit is not responding.

This error indicates that no communication has been etablished with unit. Please check cable connection before you start downloading again.

2. Selected model is not matching with unit connected on IBM port.

This is product mismatch error. Please check you have defined correct model in application configuration.

3.3.2 FIOA hardware configuration for downloading:

Follow the below given steps for downloading the application and firmware in the FIOA unit.

1. Remove communication cables from any master device.
2. Connect the IBM programming cable from PC to unit's RJ45 COM Port.
   (You may use RS 232 signals for communicating with PC.)
3. Power ON the FIOA unit.
4. Wait for 10 Seconds. The ERR led will glow. This means the unit is in Configuration Download mode.
5. Configure the input / output channel in the I/O configuration wizard of PRIZM software.
6. Press "Download" button in the Prizm32 software.
7. Prizm software will download the application and firmware in the unit.
8. After the firmware is downloaded connect the unit to Modbus master device.

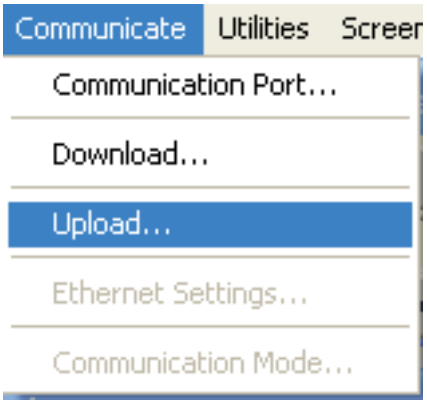
#Note:

1. For downloading the configuration you must remove communication cables from any master device.
2. Once the unit is turned 'ON', ERR Led goes 'ON' only after 10 seconds.
3. Press Download only when ERR Led is 'ON'.
4. If Download is pressed before turning 'ON' the ERR Led, you will have to restart the unit.
5. At power 'ON' if there is no PLC communication from the Master till 10 seconds, the unit will still enter into the Configuration download mode, which is indicated by glowing ERR Led. But if any frame from master arrives, unit will enter in to PLC communication mode switching 'off' the ERR Led.
6. 'ERR' LED turns OFF after 5 minutes of the power ON; even if there is no any download and no frame from Modbus master

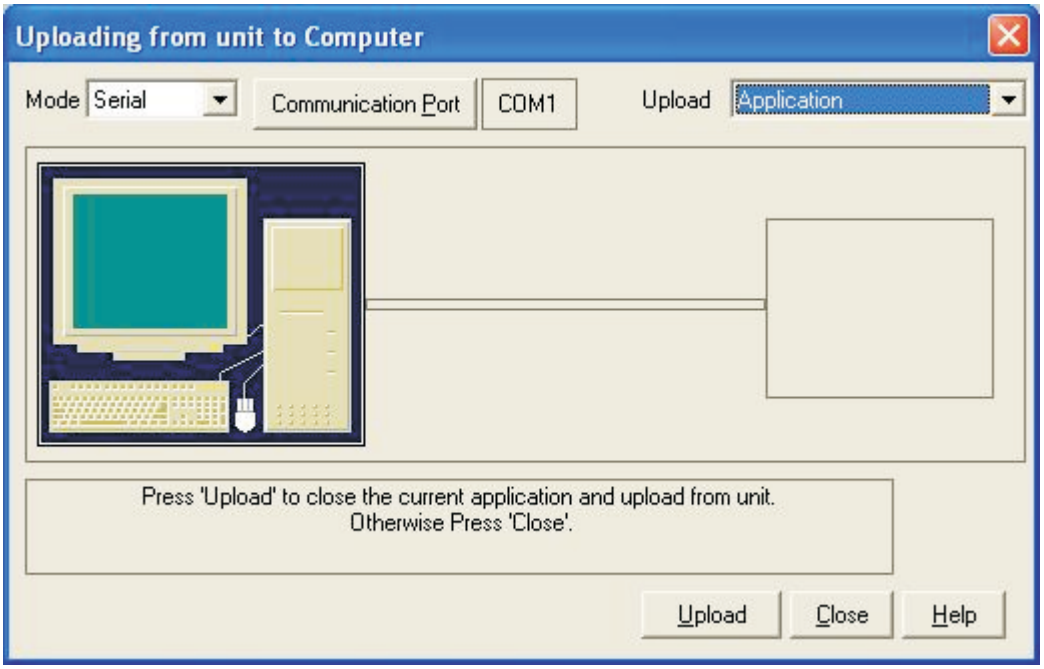
3.4 Upload:

An application can be uploaded from the FIOA unit. To upload an application first select the appropriate communication port for your computer by choosing **"Communicate | Communication Port"** menu option. Attach a computer to FIOA cable. From the **"Communicate"** menu, click on the **"Upload..."** selection.

OR



In the Upload dialog, check the **"Application"** button and press the **"Upload"** button to begin uploading the application.



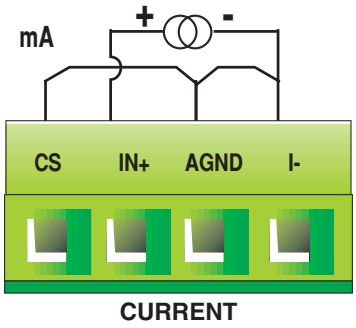
Thus the application upload can be performed.

For uploading, hardware configuration is same as that for the downloading configuration of the unit.

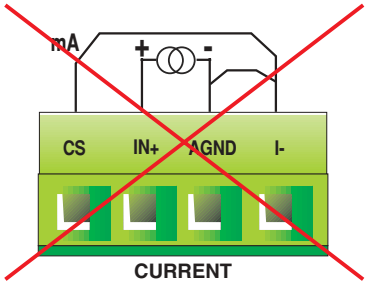
CH-4 WIRING DIAGRAM

4.1 Analog Inputs:

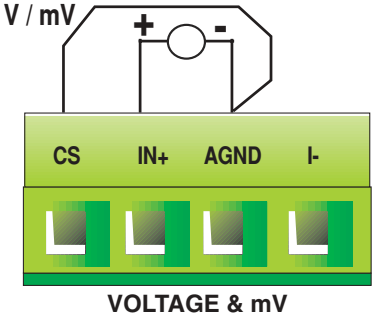
1. Current Input Connections:



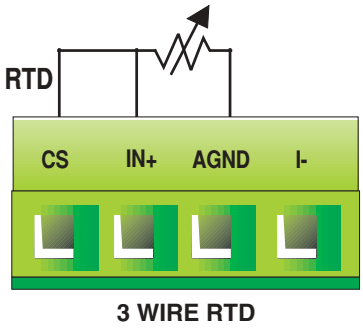
Improper connection for current mode:



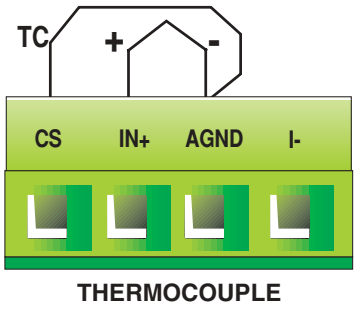
2. Voltage Input Connections:



3. RTD Input Connections:

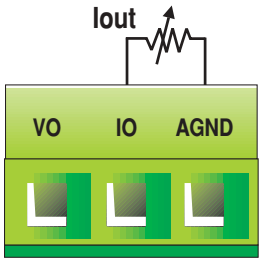


4. Thermocouple Input Connections:

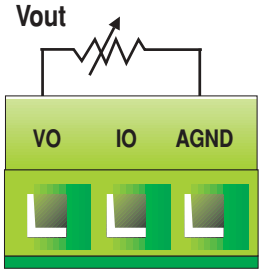


4.2 Analog Outputs:

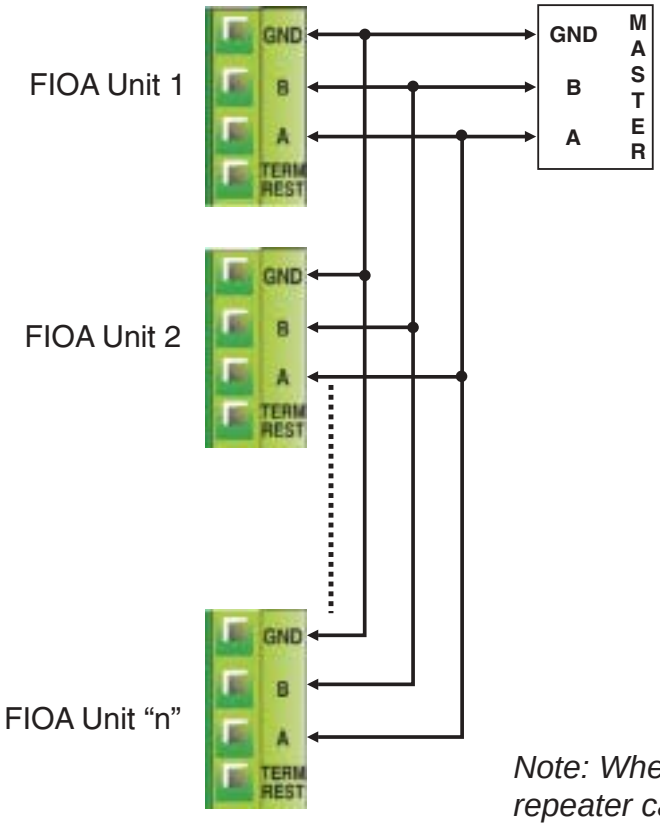
1. Current Output Connections:



2. Voltage Output Connections:



4.3 Multidropping Connection:



Note: Where "n" is upto 32. Connecting one repeater can increase it to 64 and so on.

4.4 Data Output format for analog inputs:

For Voltage (0 to 10V)

Voltage Input	Count
0V	0
2.5V	16384
5V	32768
7.5V	49152
10V	65535

For Milivolt (0 to 100mV)

mV Input	Count
0mV	0
25mV	16384
50mV	32768
75mV	49152
100mV	65535

Milivolt (0 to 50mV)

mV Input	Count
0mV	0
12.5mV	16384
25mV	32768
37.5mV	49152
50mV	65535

For Current (0 to 20mA)

Current Input	Count
0mA	0
5mA	16384
10mA	32768
15mA	49152
20mA	65535

current (4 to 20mA)

Voltage Input	Count
4mA	0
8mA	16384
12mA	32768
16mA	49152
20mA	65535

For RTD & Thermocouple

Output data will be in multiple of 10 of the actual temperature in degrees. It will be in the **SIGNED INTEGER** format.

For Example: If temperature is 23.4 ^{O}C, data will be 234. AND
If temperature is -57.1 ^{O}C, data will be -571.

#Note: Selecting unsigned integer format at Modbus master will give wrong readings for the negative temperature range.

4.5 Data entry format for analog outputs:

For Analog output, enter the digital count for respective output register and observe the current & voltage output on multimeter. It should be as per following table.

1. For Current (4 to 20 mA)

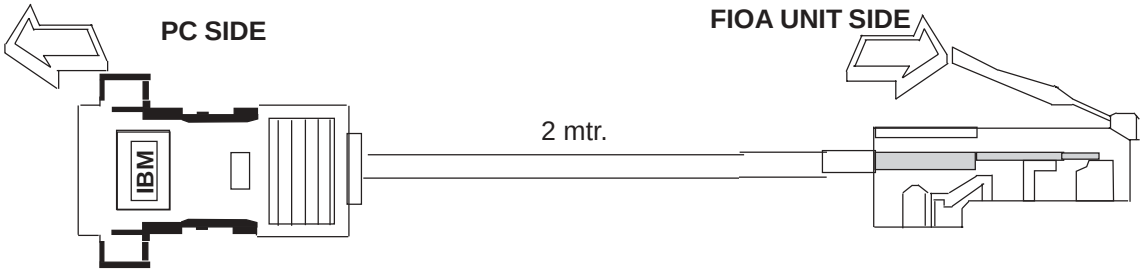
Entered count	Current output
0	4mA
16384	8mA
32768	12mA
49152	16mA
65535	20mA

2. For Voltage (0 to 10 V)

Entered count	Voltage output
0	0V
16384	2.5V
32768	5V
49152	7.5V
65535	10V

CH-5 CABLE DIAGRAM

5.1 IBM cable for downloading configuration:



DB9 FEMALE (RS232)

SIGNALS	Pin #
	1
RXD	2
TXD	3
	4
SG	5
	6
	7
	8
	9

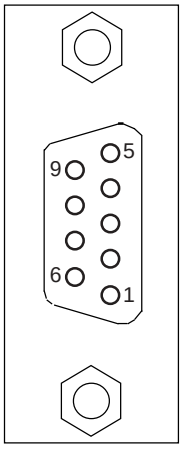
Shield Wire

Shield Wire

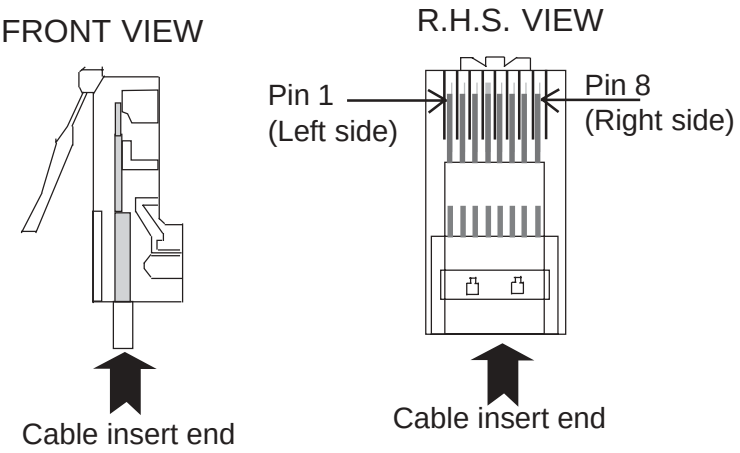
RJ45 CONNECTOR (RS232)

Pin #	SIGNALS
1	TXD
2	RXD
3	SG
4	
5	
6	
7	
8	

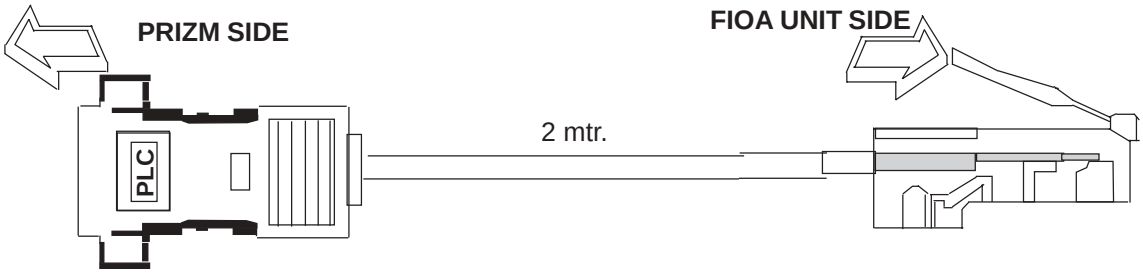
DB9 FEMALE PINOUTS



RJ45 CONNECTOR PINOUTS



5.2 Modbus master (PRIZM unit) to FIOA unit (2 Wire RS485):



DB9 MALE (RS485)

SIGNALS	Pin #
TX+	1
	2
	3
RX+	4
SG	5
	6
	7
TX-	8
RX-	9

Shield Wire

A

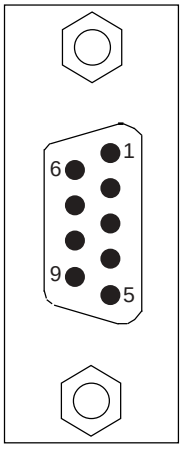
B

Shield Wire

RJ45 CONNECTOR (RS485)

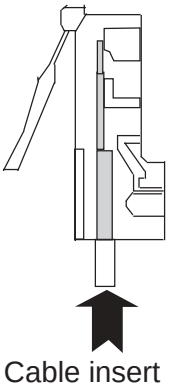
Pin #	SIGNALS
1	
2	
3	SG
4	A
5	B
6	
7	
8	

DB9 MALE PINOUTS



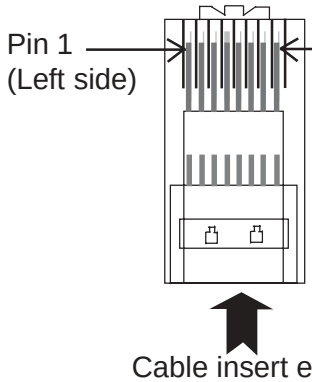
RJ45 CONNECTOR PINOUTS

FRONT VIEW



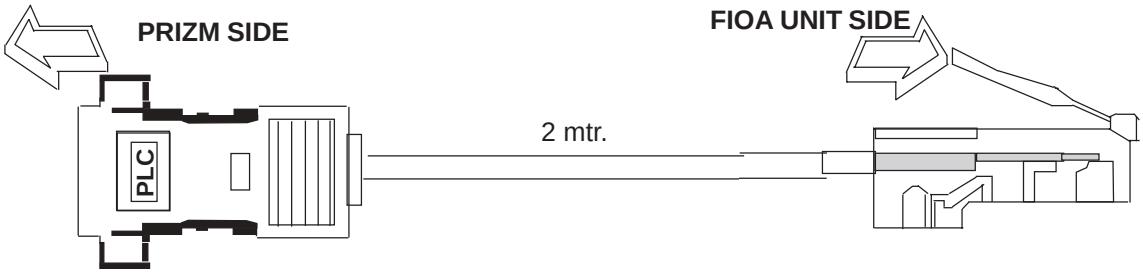
Cable insert end

R.H.S. VIEW



Cable insert end

5.3 Modbus master (PRIZM unit) to FIOA unit (RS232):



DB9 MALE (RS232)

SIGNALS	Pin #
	1
TXD	2
RXD	3
	4
SG	5
	6
	7
	8
	9

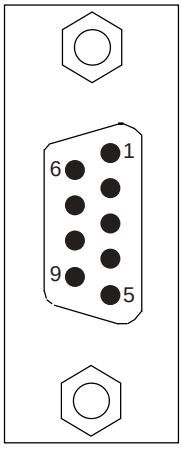
Shield Wire

Shield Wire

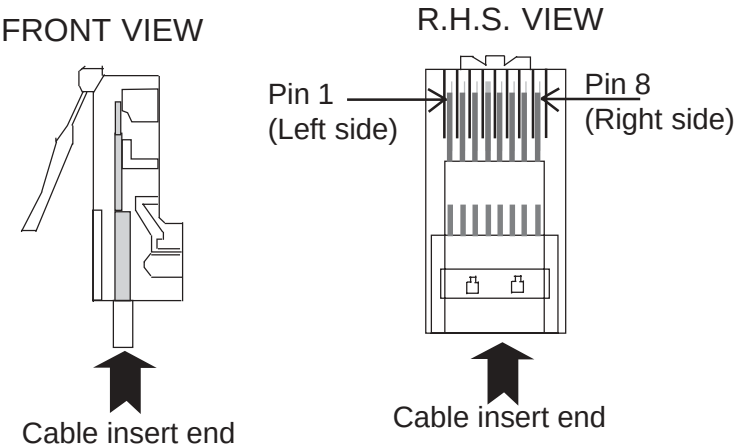
RJ45 CONNECTOR (RS232)

Pin #	SIGNALS
1	TXD
2	RXD
3	SG
4	
5	
6	
7	
8	

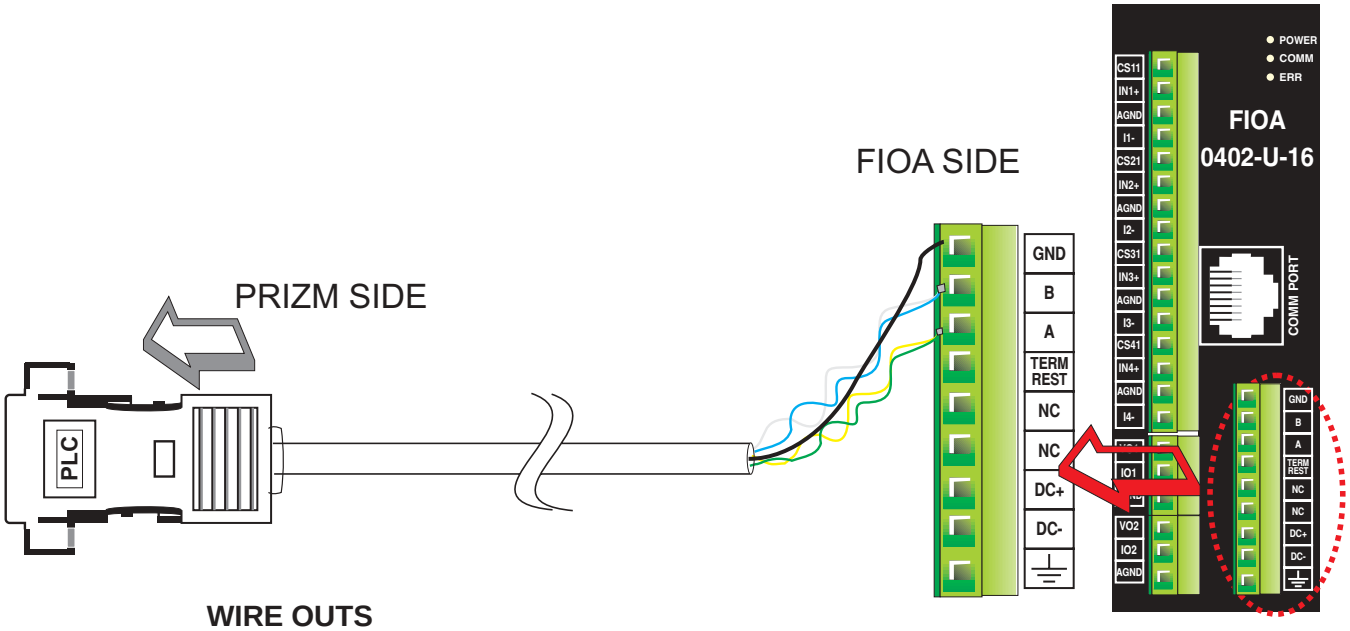
DB9 MALE PINOUTS



RJ45 CONNECTOR PINOUTS

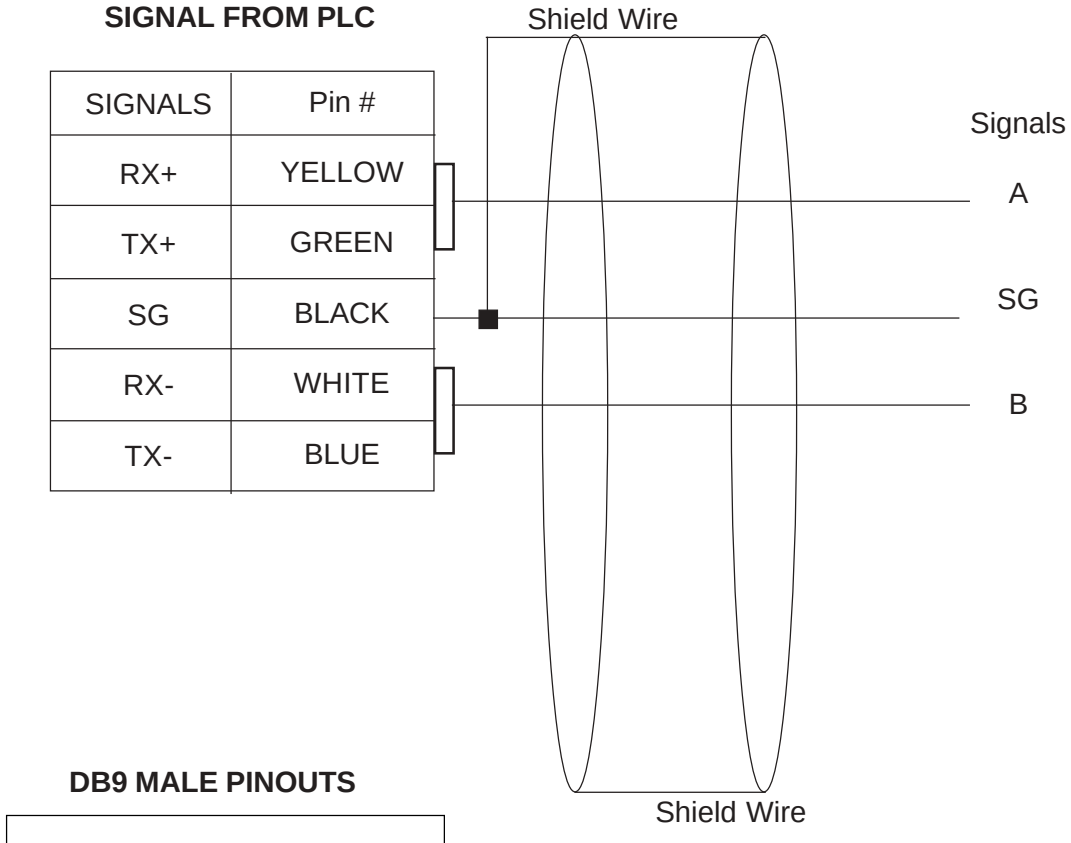


5.4 Modbus master (PRIZM unit) to FIOA unit (2 Wire RS485):



WIRE OUTS
SIGNAL FROM PLC

SIGNALS	Pin #
RX+	YELLOW
TX+	GREEN
SG	BLACK
RX-	WHITE
TX-	BLUE



DB9 MALE PINOUTS