ATOLL CONFIX USER GUIDE

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Revision History

Date	Revision	Remarks
18/06/2016	1.1	**First Version Created**
12/10/2016	1.2	• **Atoll Confix Board and its Details** • **Integration of AR501RM with Energy Meters.**
28/12/2016	1.3	• **Latest Confix images.** • **Changed the data format** • **Eliminated the Data Back Header facility** • **Provision to configure 6 Modbus Requests**

Table of Contents

Introduction:

Atoll's "ARxxx"/"ATxxx "are easily configurable remote monitoring and controlling devices.

"ATOLL CONFIX" is the Desk top application provided by Atoll solutions to configure the devices.

Using this application the user can configure the ARxxx /ATxxx Gateways to any server (TCP/IP or HTTP), under HTTP we support both GET and POST methods.

Also the user can configure 3 different types of Modbus requests on the ARxxx/ATxxx Gateways, ARxxx/ATxxx Gateway will read the Modbus data from the externally connected device and will send to the configured server in addition to the Modbus request date time, digital inputs, Analog inputs and digital outputs are also configurable by using the same .

SL NO	Device Type	GSM/PRS	GPS	RS232	RS485	DIGITAL INPUT	DIGITAL OUTPUT	Analog input	External memory
1	AR501RM	Available	NA	NA	Available	Available(4 numbers)	Available(4 numbers)	Available(4 numbers)	Available
2	AR501RM42	Available	NA	NA	Available	Available (4 Numbers)	Available (4 Numbers)	2 – ADC 2 – 4 -20mA	Available
3	AR501R	Available	NA	Available	NA	Available(4 numbers)	Available(4 numbers)	Available(4 numbers)	Available
4	AT501RM	Available	Available	NA	Available	Available(4 numbers)	Available(4 numbers)	Available(4 numbers)	Available
5	AT501R	Available	Available	Available	NA	Available(4 numbers)	Available(4 numbers)	Available(4 numbers)	Available
6	AR301RM	Available	NA	NA	Available	Available(2 numbers)	Available(2 numbers)	NA	Available
7	AR301R	Available	NA	Available	NA	Available(2 numbers)	Available(2 numbers)	NA	Available
8	AT301RM	Available	Available	NA	Available	Available(2 numbers)	Available(2 numbers)	NA	Available
9	AT301R	Available	Available	Available	NA	Available(2 numbers)	Available(2 numbers)	NA	Available
10	AT201R	Available	Available	Available	NA	NA	NA	NA	Available
11	AT20RM	Available	Available	NA	Available	NA	NA	NA	Available
12	AR201R	Available	NA	Available	NA	NA	NA	NA	Available
13	AR201RM	Available	NA	Available	Available	NA	NA	NA	Available

ARxxx/ATxxx version

The prefix AT denotes TRACKING and is always used for the versions where GPS is available whereas AR denotes Remote Monitoring, this version doesn't have GPS.
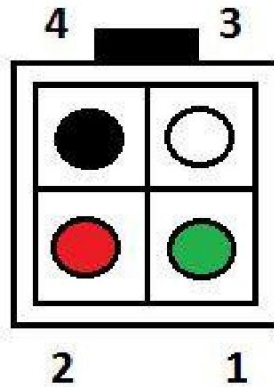

Figure1. (ARXXX)

Figure2.(ATXXX)

PIN OUTS AND CONNECTIONS

PIN OUT FOR AT501/AR501 VERSION

- **4 Pin Micro Fit Connector**

4 Pin Micro Fit Connector			
S.NO	**PIN NUMBER**	**WIRE COLOUR**	**FUNCTION**
1.	1	GREEN	IGNITION
2.	2	RED	+VE POWER
3.	3-4	BLACK	- VE POWER

- **20 Pin Micro Fit Connector**
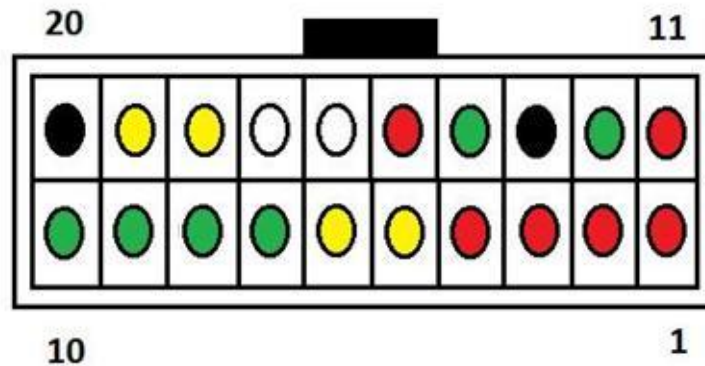
S.NO	PIN NUMBER	WIRE COLOUR	FUNCTION	200 SERIES	300 SERIES	500 SERIES
			20 Pin Micro Fit Connector			
1.	1	RED	DIGITAL OUTPUT		✓	✓
2.	2	RED	DIGITAL OUTPUT		✓	✓
3.	3	RED	DIGITAL OUTPUT			✓
4.	4	RED	DIGITAL OUTPUT			✓
5.	5	YELLOW	DIGITAL INPUT(6-24V)		✓	✓
6.	6	YELLOW	DIGITAL INPUT(6-24V)		✓	✓
7.	18	YELLOW	DIGITAL INPUT(6-24V)			✓
8.	19	YELLOW	DIGITAL INPUT(6-24V)			✓
9.	11	RED	RS232 – TRANSMIT TX/ RS-485(D+) OPTIONAL	✓	✓	✓
10.	12	GREEN	RS232 – RECEIVE RX / RS-485(D-) OPTIONAL	✓	✓	✓
11.	14	GREEN	RS-232 TX DEBUG			✓
12.	15	RED	RS-232 RX DEBUG			✓
13.	7	GREEN	ADC INPUT(0-30V)			✓
14.	8	GREEN	ADC INPUT(0-30V)			✓
15.	9	GREEN	ADC INPUT(0-30V)			✓
16.	10	GREEN	ADC INPUT(0-30V)			✓
17.	13	BLACK	GROUND	✓	✓	✓
18.	20	BLACK	GROUND		✓	✓
19.	16	-	-			✓
20.	17	-	-			✓

NOTE : DIGITAL INPUT RANGES :
LOW STATE - 0 – 6.5V
HIGH STATE - 6.5V – 24V

All the digital outputs are open collector for ARxxx/ATxxx series, so if the user wants to connect a relay at the output the circuit is shown as below.
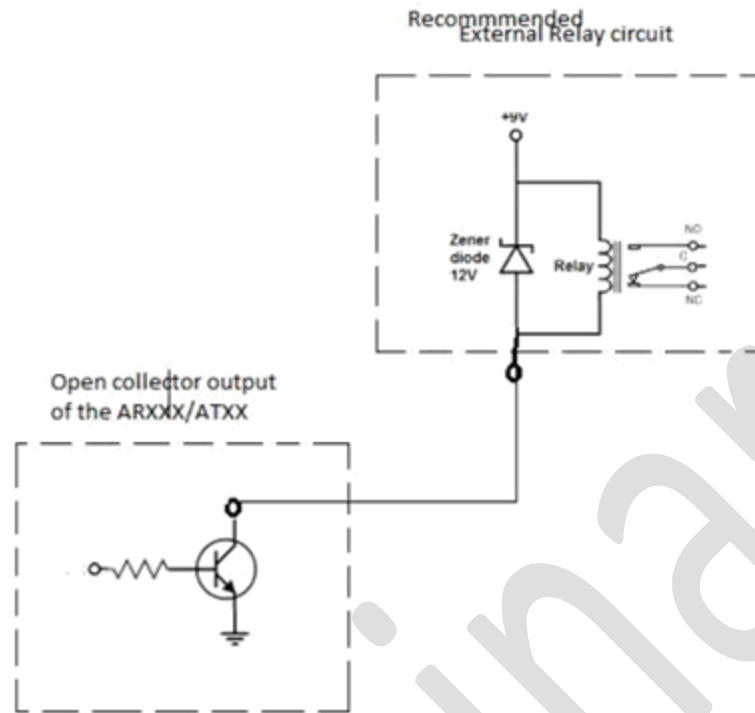
Figure 3

3. Atoll Confix:

ATOLL CONFIX is a simple application developed by Atoll Solutions for the customers to easily configure the ARxxx/ATxxx Gateways. Using this application a user can configure different features on the gateway, such as:

1. Server endpoint (TCP/IP, HTTP POST, HTTP GET).
2. Modbus request (6 different Modbus requests).
3. External UART (configure the external UART (RS232/RS485) for the external devices,).
4. Configurable GPS parameters (latitude, longitude, etc.)
5. Configurable Digital inputs
6. Configurable digital out puts
7. Configurable analog inputs

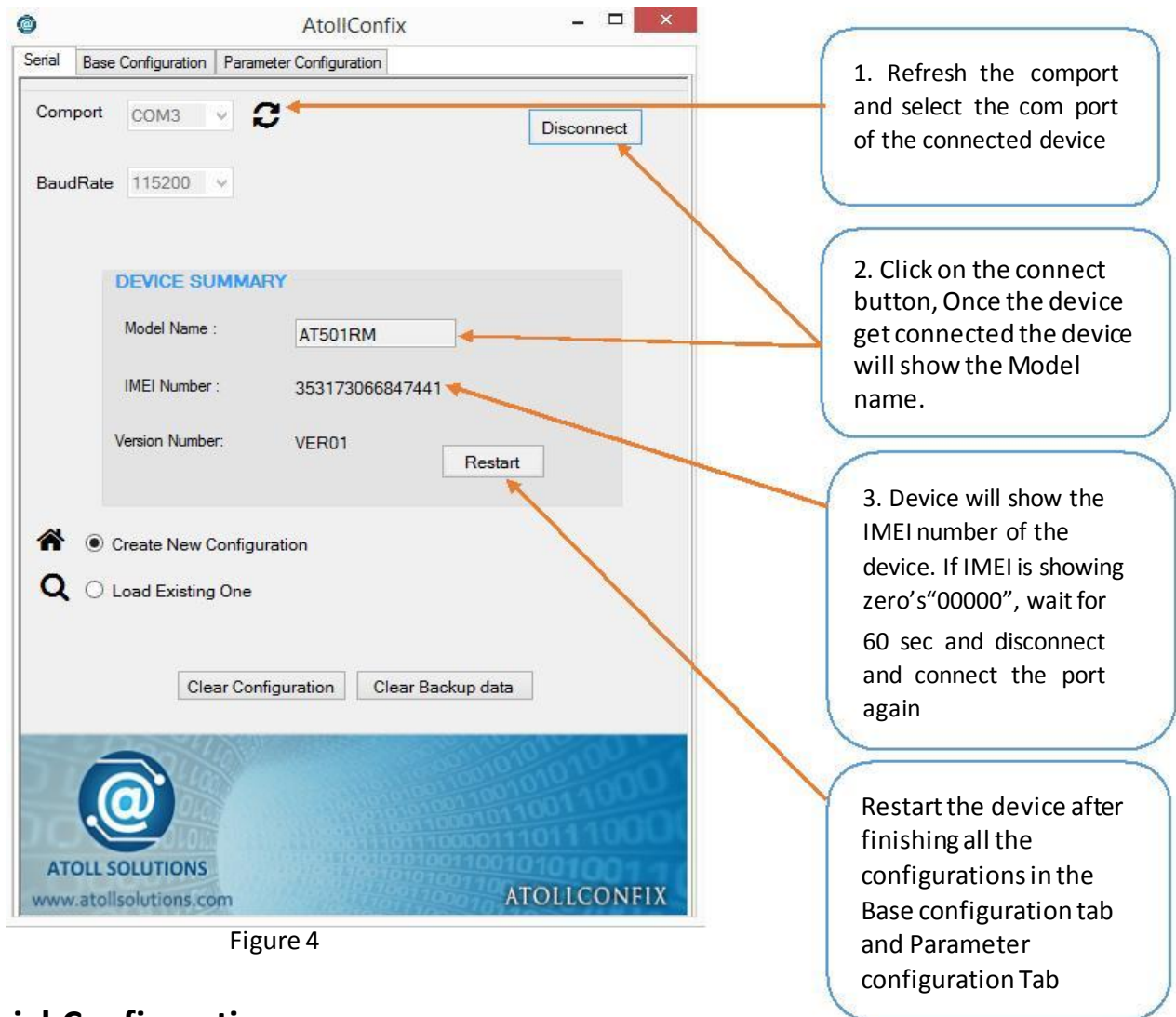The front view of the application will look like below:

1. Refresh the comport and select the com port of the connected device

2. Click on the connect button, Once the device get connected the device will show the Model name.

3. Device will show the IMEI number of the device. If IMEI is showing zero's"00000", wait for 60 sec and disconnect and connect the port again

Restart the device after finishing all the configurations in the Base configuration tab and Parameter configuration Tab

Figure 4

Serial Configuration

STEP1:

Select the appropriate comport, refresh button has provided to check the available comports.

STEP2:

Click on the connect button the Right top corner, if the Gateway is connected it will show the model name (eg:AT 501RM) like as in the image above.
The IMEI will show zero's"00000" if the device is on booting state, in this case the user has to wait for some time (60 sec)and disconnect and connect the comport again.

STEP3.

After the above mentioned steps the user can go to the Base configuration page.

Base Configuration

Figure 5

1. **Message Header:**

    The user can configure the header of the data format the device has to send to the server. Eg :if the user has configured header as "ELMEASURE" all data will be sent with the prefix "ELMEASURE", and the length of the message header should be less than 10 characters.

2. **Device id:**

    The device id is the local id where the user can assign to the individual device and the length of the device id should be less than 10 characters.
    Eg: DEV01

3. Updating Interval:

The user can configure the updating interval of the data to the server in seconds, For eg: if a user want to send the data to the server in every 1minute (60 sec). Then he has to the Updating interval as 0060.

For the HTTP server's minimum updating interval is 30 sec (0030) and for the TCP/IP server's minimum updating interval is 5 sec (0005).

4. Server Selection:

The user should select the type of the server where the gateway is going to integrated. If the server is simple TCP/IP server select the option TCP/IP or if the user has a HTTP server select the option HTTP, under HTTP Atoll CONFIX support's GET and POST method where the user gets to select anyone of the option.

6. Path

Here the user has to configure the path and file name for the end point.
The name and location of the requested resource, under the server document base directory.

For example, in the URL http://www.nowhere123.com/docs/index.html,

The path and file name for the resource to be located is
"/docs/index.html". So path should configure as "/docs/index.html"
for the above URL

6. IP address/Host name

Configure the IP address or the Host name of the server where to the data has to be sent.
For example, in the URL
http://www.nowhere123.com/docs/index.html,
www.nowhere123.com is the host name for the above URL.

7. Port

Port number of the server, For TCP/IP user has to set the listening port, in case of HTTP server's generally port number is 80.

8. APN

Access point name for the network provider, for eg: if the user is using airtel SIM card the APN has to set as "airtelgprs.com", for vodaphone APN is "www".

The parameter APN will vary depend upon the network provider.

9. Mobile number:

User can set 3 different mobile numbers as the registered numbers

The ARxxx/ATxxx Device will accept incoming messages from only configured mobile numbers, the user may need to configure this mobile numbers, to change the IP address and port, or to control the digital output via SMS.

10. GPS

Click on the GPS check box to enable the GPS features.

11. Data backup

Click on the Data backup check box to enable the data backup in case of GPRS network error or server connection loss.

In case of any GPRS connectivity failure, the device will store the data in the device itself and will send the data as below.

12. UART configuration

The user can configure the following properties of the Modbus UART (except the data bit, the data bit is hard coded as 8 bit)

- Baud rate
- Parity
- Stop bit

The user has to configure the above the parameters when the external Modbus device is interfaced with the ARxxx/ATxxx Gateway.

13. **Modbus Request**.

Using ATOLL CONFIX the user can configure 6 different Modbus requests,

Using this application the maximum number of registers to read in a single request will be less than 60.

If a user need only single Modbus request, keep the parameter "no_Reg_rd" as "0000"for the reaming requests.

It is must to configure the following 5 parameters for a Modbus request.

- **Slave id** (Slave id or station id of the Modbus device 0-99).
- **Function code** (Function code to read the Modbus request).
  The function code should be "03" for reading holding registers,"04"to read input registers.
- **Start_add**(Starting address of the register to read(relative address)).
- **no_Reg_rd**(number of registers to read, the value should be less than 60).
- **Timeout** (time out for the Modbus communication in seconds).

If the Modbus communication is success, the device will send the Modbus reply as a parameter in the string otherwise if the Modbus communication is failure then instead of the Modbus data at the string Gateway will send ERROR.

Once the user configures all the above parameter user can update the values in to the ARxxx/ATxxx gateway by clicking on the update button then the application will show the update status as successfully updated or Retry.

After updating the basic parameter the user can move in to the parameter configuration Tab, where we have list of all possible parameters the gateway can send to the server.

14. **Additional Header** Check Box allows User to configure additional Header and its value In addition with the standard headers of GET or POST request.

For Eg. If the User wishes to send extra Header Name "Authentication" and its Value as "#$123456" he needs to first enable the Additional Header check box and fill the Header Name and Values.

15. **Update**

Click on the update button after configuring all above parameters, the update status will show as successfully updated, the user should retry in case of failure.

STEP 4.

Parameter Configuration:

Figure 6

The user can select which all parameters he wants to send from the gateway to the server in the configured interval from the parameter tab.

After selecting the list of parameter user should update the values into the Gateway by clicking the update button. And the update status should come as successful.

Also the user have the provision to save the existing configuration in the local PC with a specific file name, if the user wants to reload this configuration in future. This part is explained under Reload an existing configuration.

Once the User finishes all the above configurations, the user should RESTART the device by clicking Restart button on the Serial Tab (First Tab).

Example data format:

All parameters are in the format of parameter1=parameter1 value&parameter2=parameter2 value&parameter3=parameter3 value

The below data format is an example of data packet received at the server when a user configured the gateway(ARXXX/ATXXX) to a particular server and enabled all the parameters at the Parameter configuration tab like as above (Figure 6).

```
header=ELMEASURE&id=DEV01&imei=353173066847441&time=13:06:2016,16:44:23&di1=1
&di2=1&di3=1&di4=1&do1=0&do2=0&do3=0&do4=0&ai1=11&ai2=11&ai3=11&ai4=11&modbus
1=0102000000010304&modbus2=0102000000010304&modbus3=MODBUS3_ERROR&modbus4=MODBU
S4_ERROR&modbus5=MODBUS5_ERROR&modbus6=MODBUS6_ERROR&mcc=404&mnc=45&cellid=1F8
7&ver=001&battery=3.97&pwrstatus=1&gsmver=10.00.188&gsmsig=30&end=0
```

If anything wrong in the Modbus communication instead of the Modbus data the device will send Modbus error message as below (the portions are highlighted).

```
Header=ELMEASURE&id=DEV01&imei=353173066847441&time=13:06:2016,16:44:23&di1=1
&di2=1&di3=1&di4=1&do1=0&do2=0&do3=0&do4=0&ai1=11&ai2=11&ai3=11&ai4=11&modbus
1=MODBUS1_ERROR&modbus2=MODBUS2_ERROR&modbus3=MODBUS3_ERROR
&modbus4=MODBUS4_ERROR&modbus5=MODBUS5_ERROR&modbus6=MODBUS6_ERROR&mcc=404&mnc
=45&cellid=1F87&ver=001&battery=3.97&pwrstatus=1&gsmve r=10.00.188&gsmsig=30&end=0*
```

Modbus example:

If user wants to interface an external Modbus device with the ARxxx/ATxxx by using the application ATOLL CONFIX the user should have the following details of the external device(for eg: energy meter):

1. **UART configuration**

The user should be clear about the following properties of the UART

- **Baud rate**(The user should configure the baud rate of the external Modbus device in Base configuration tab under Modbus UART)

- **Data bit**(The data bit of the ARxxx/ATxxx devices are hardcoded to '8', in this case please keep the data bit of the external device as '8")

- **Parity**(The user should configure the parity of the external Modbus device in Base configuration tab under Modbus UART)

- **Stop bit**(The user should configure the stop bit for the external Modbus device in Base configuration tab under Modbus UART)

2. **Configure Modbus request:**

The user is allowed to configure 6 different types Modbus request. In order to set a Modbus request the user should be clear about the following parameter of the Modbus device.

- **Slave id/station code** for the mod bus device.

- **Function code** for the register to read**.**

- **Starting address of the register**(from which address onwards the user want to read the Modbus data)

- **Number of registers to read**(Number of registers to read from the starting address onwards)

- **Modbus timeout** (Modbus operation timeout in sec).

Note: The maximum number of registers can read by a single Modbus request is restricted to 60 so in case a user who needs more than 60 registers, for example if a user needs to read first 90 registers from address 0x0000 onwards, the user should read the first 60 registers using the first Modbus request and the remaining 30 registers by configuring the second Modbus request(but the starting address of the second Modbus request should the register address for the 61th register , e.g. (0x003D).In case of Modbus communication error instead of the Modbus data the device will send the ERROR string.

Load an existing configuration from PC

To load an existing configuration from PC, Click on the button "Load existing one" on the serial Tab and browse the existing configuration, then click on the update button to update the device.
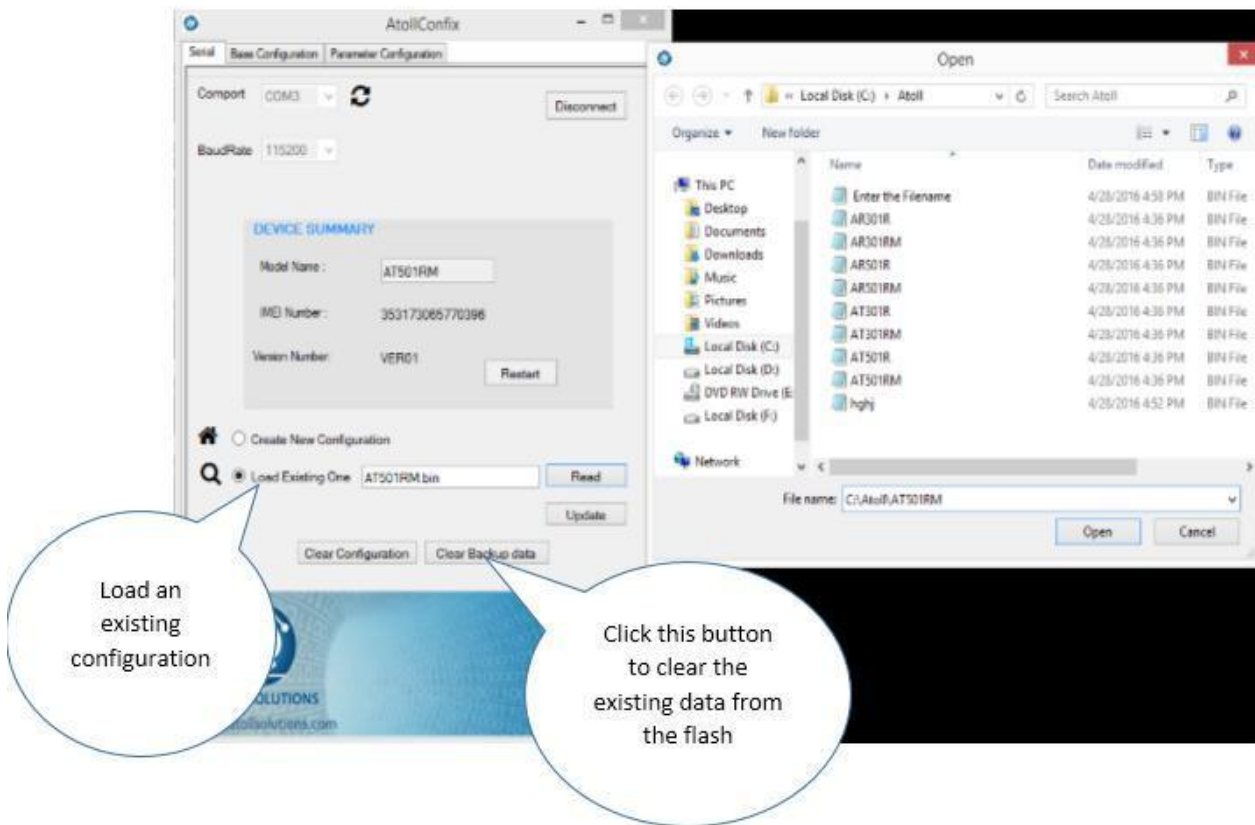
# 4. ATOLL CONFIX BOARD
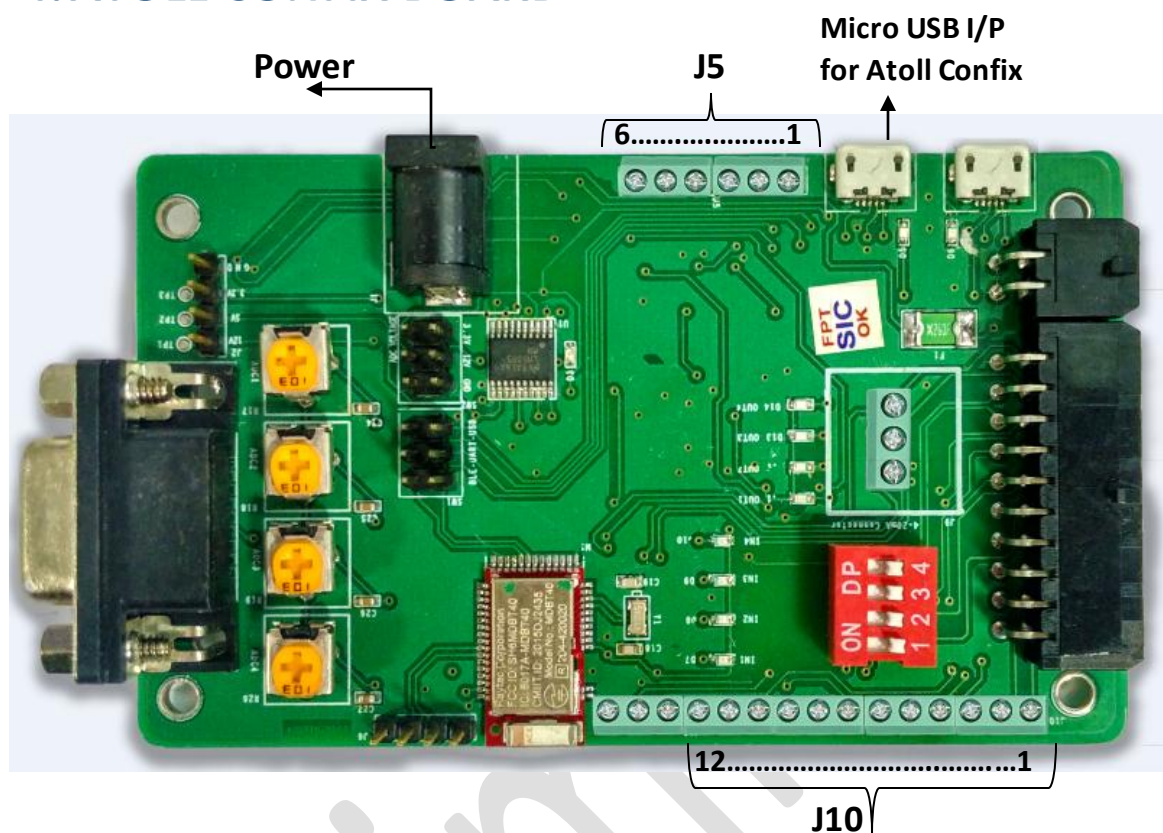
4.1 PIN OUT FEATURES

Pin out Description for J5 Connector

Pin Number	Pin Description
1	3.3 V - Vcc
2	NA
3	NA
4	RS232 Tx / RS485-DATA(+)
5	RS232 Rx / RS485-DATA(-)
6	GND

Pin out Description for J10 Connector

Pin Number	Pin Description
1	OUT 1
2	OUT 2
3	OUT 3
4	OUT 4
5	INPUT 1
6	INPUT 2
7	INPUT 3
8	INPUT 4
9	ADC IN 1
10	ADC IN 2
11	ADC IN 3
12	ADC IN 4

4.2 How to use an Atoll Confix Board to configure the ARxxx/ATxxx Series?

PC Running with Atoll CONFIX   Atoll Configuration board   Atoll Gateway
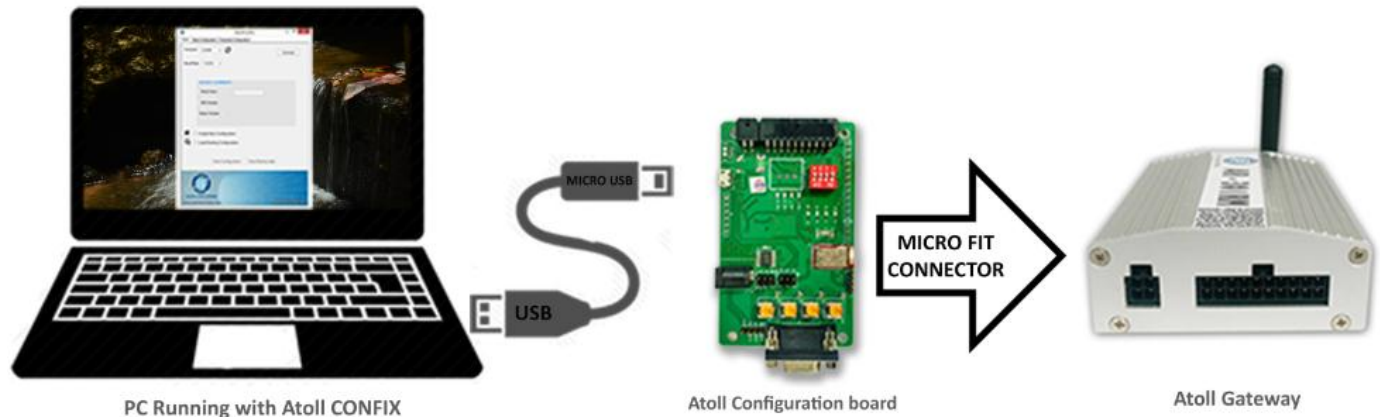
Step 1:

Insert a SIM Card, which is enabled with GPRS connectivity.

Step 2:

Connect ARxxx or ATxxx series Gateway with the configuration board using 20 and 4 pin connectors.

Step 3:

Connect the Configuration Board with the local PC using Micro USB Cable.

Step 4:

Power up the Configuration Board with the 12 V supply (This will automatically power up ARxxx/ATxxx series Gateway).

Step 5:

Open the application Atoll Confix from the PC and select the assigned COM port for Silicon Labs CP210 USB to UART Bridge.

NOTE: Please note that the application Atoll Confix and the driver for Silicon Labs CP210 USB to UART Bridge has installed in the PC.

Driver is available in www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx

5. An Example: How to Integrate RS485 based Modbus (RTU) Energy Meter with Atoll's AR501RM using ATOLL CONFIX?

In this particular example we have used ELMEASURE Little Genius 5110 - 3 Phase Energy meter, which supports RS485 based Modbus RTU communication. Following are the register address details for the above mentioned Energy meter:

Sl.No.	Parameter	Data type	Address
1	Watts Total	float	40101
2	Watts R phase	float	40103
3	Watts Y phase	float	40105
4	Watts B phase	float	40107
5	VAR Total	float	40109
6	VAR R phase	float	40111
7	VAR Y phase	float	40113
8	VAR B phase	float	40115
9	PF Ave. (Inst.)	float	40117
10	PF R phase	float	40119
11	PF Y phase	float	40121

23

Sl.No.	Parameter	Data type	Address
12	PF B phase	float	40123
13	VA total	float	40125
14	VA R phase	float	40127
15	VA Y phase	float	40129
16	VA B phase	float	40131
17	VLL average	float	40133
18	Vry phase	float	40135
19	Vyb phase	float	40137
20	Vbr phase	float	40139
21	VLN average	float	40141
22	V R phase	float	40143
23	V Y phase	float	40145
24	V B phase	float	40147
25	Current Total	float	40149
26	Current R phase	float	40151
27	Current Y phase	float	40153
28	Current B phase	float	40155
29	Frequency	float	40157
30	Wh Received	float	40159
31	Load Hours Received	Unsigned long	40217

From the above mentioned register details, we can read the parameters as per customers requirement. Elmeasure Little Genius 5110 Meter addresses 32 Bit Registers, hence the decoding mechanism may vary for different meters.

For 32 bit register decoding mechanism , visit the link mentioned below:

www6.uniovi.es/~antonio/uned/ieee754/IEEE-754hex32.html

Here in this example we are going to read following 3 parameters such as:

1) R Phase Voltage (40142, 40143).
2) R Phase Current (40150, 40151).
3) Frequency (40156, 40157).

Configuration of the Modbus Register Address is explained below:

Slave ID and Function code of ELMEASURE Little Genius 5110 - 3 Phase Energy meter is 01 and 03 respectively.

Since we have to read the above mentioned parameters, we can split the Modbus requests into 2 [Modbus Request 1 and Modbus Request 2].

For Modbus Request 1, we are going to read R Phase Voltage and R Phase Current that is from register address 40142 to 40152 (10 Registers).

For Modbus Request 2, we are going to read Frequency that is 40156 to 40157(2 registers).

Following are the steps which shows as to how a user can Integrate AR501RM with Modbus Based Energy Meter [RTU]?

Step 1:

Connect the Atoll Confix board with the AR501RM Gateway with the help of 4 Pin connector and 20 Pin connector.

Step 2:

Connect the Atoll Confix board to the Local PC with the help of micro USB cable and resume the application tool "Atoll Confix".

Step 3:

Power up the Energy Meter as well as the Atoll Confix Board.

Step 4:

Select the desired COM port on the application tool and click on the "Connect" button. Please note that after clicking on the "connect" button this tool will display Device Summary details.

Step 5:

Click on the Base configuration tab. Configure and update the server parameters as well as the Modbus Requests.

For more information: www.youtube.com/watch?v=x1JDCA2ultg

Step 6:

Click on the Parameter configuration tab. Configure and update the required parameters that needs to be pushed to server along with Modbus Reply for the configured requests in base configuration.

For more information: www.youtube.com/watch?v=x1JDCA2ultg

Step 7:

Data received at the server:

```
header=ELMEASURE&id=DEV01&imei=353173066847441&time=13:06:2016,16:44:23&di1=1
&di2=1&di3=1&di4=1&do1=0&do2=0&do3=0&do4=0&ai1=11&ai2=11&ai3=11&ai4=11&modbus
1=6507594300000000000000000000000000000000&modbus2=5e024842&modbus3=MODBUS3_
ERROR&modbus4=MODBUS4_ERROR&modbus5=MODBUS5_ERROR&modbus6=MODBUS6_ERROR&mcc=
404&mnc=45&cellid=1F87&ver=001&battery=3.97&pwrstatus=1&gsmver=10.00.188&gsmsig=30
&end=0*
```

R phase Voltage

R Phase Current

Frequency

```
header=ELMEASURE&id=DEV01&imei=353173066847441&time=13:06:2016,16:44:23&di1=1
&di2=1&di3=1&di4=1&do1=0&do2=0&do3=0&do4=0&ai1=11&ai2=11&ai3=11&ai4=11&modbus
1=6507594300000000000000000000000000000000&modbus2=5e024842&modbus3=MODBUS3_
ERROR&modbus4=MODBUS4_ERROR&modbus5=MODBUS5_ERROR&modbus6=MODBUS6_ERROR&mcc=
404&mnc=45&cellid=1F87&ver=001&battery=3.97&pwrstatus=1&gsmver=10.00.188&gsmsig=30
&end=0*
```

```
header=ELMEASURE&id=DEV01&imei=353173066847441&time=13:06:2016,16:44:23&di1=1
&di2=1&di3=1&di4=1&do1=0&do2=0&do3=0&do4=0&ai1=11&ai2=11&ai3=11&ai4=11&modbus
1=6507594300000000000000000000000000000000&modbus2=5e024842&modbus3=MODBUS3_
ERROR&modbus4=MODBUS4_ERROR&modbus5=MODBUS5_ERROR&modbus6=MODBUS6_ERROR&mcc=
404&mnc=45&cellid=1F87&ver=001&battery=3.97&pwrstatus=1&gsmver=10.00.188&gsmsig=30
&end=0*
```

```
header=ELMEASURE&id=DEV01&imei=353173066847441&time=13:06:2016,16:44:23&di1=1
&di2=1&di3=1&di4=1&do1=0&do2=0&do3=0&do4=0&ai1=11&ai2=11&ai3=11&ai4=11&modbus
1=6507594300000000000000000000000000000000&modbus2=5e024842&modbus3=MODBUS3_
ERROR&modbus4=MODBUS4_ERROR&modbus5=MODBUS5_ERROR&modbus6=MODBUS6_ERROR&mcc=
404&mnc=45&cellid=1F87&ver=001&battery=3.97&pwrstatus=1&gsmver=10.00.188&gsmsig=30
&end=0
```

6. Legal Notice

6.1 Customer Support:

Atoll Solutions are excited to offer our customers an easy "out of box" experience by providing board support package, software demos, user manuals and other electro mechanical documentation to get our products up and running. We also provide further electronic (email, wiki and discussion forum) support for evaluation of our modules using corresponding Atoll boards.

Customer product development support is not part of standard offering from Atoll Solutions. If customers are interested, Atoll can offer product development services around Atoll Gateways.

6.2 Usage Restriction:

Atoll products are excellent starting point for customer's applications development. But, selection and usage of Atoll Solutions products for a particular application is responsibility of customers. In order to minimize risks associated with customer applications, the customer must use adequate design and operating safeguards to minimize inherent or procedural hazards.

Atoll Solutions products are not intended for use in life support Solutions and appliances, nuclear Solutions or Solutions where malfunction can reasonably be expected to result in personal injury, death or severe property or environmental damage. Any use of products by the customer for such purposes are at the customer's own risk.