ALLNET Media Converter

RS232/422/485/Modbus to Ethernet

ALL-SDS102

USER MANUAL

Contents

1. Quick Start

Double serial port server ALL-SDS102 is used to realize data transparent transmission between TCP/UDP data package and RS232/RS485/RS422 interface. Three in one serial port communicating code, support common RS232/RS485/RS422 serial interfaces.

1.1. Hardware Testing Environment

Connect the COM port of ALL-SDS102 with PC's via serial cable (or USB to serial cable).
Connect network interface between ALL-SDS102 and PC via RJ45 cable.
Then supply power for ALL-SDS102 with our AC adapter
The below picture will show you the connection.

Hardware Connection

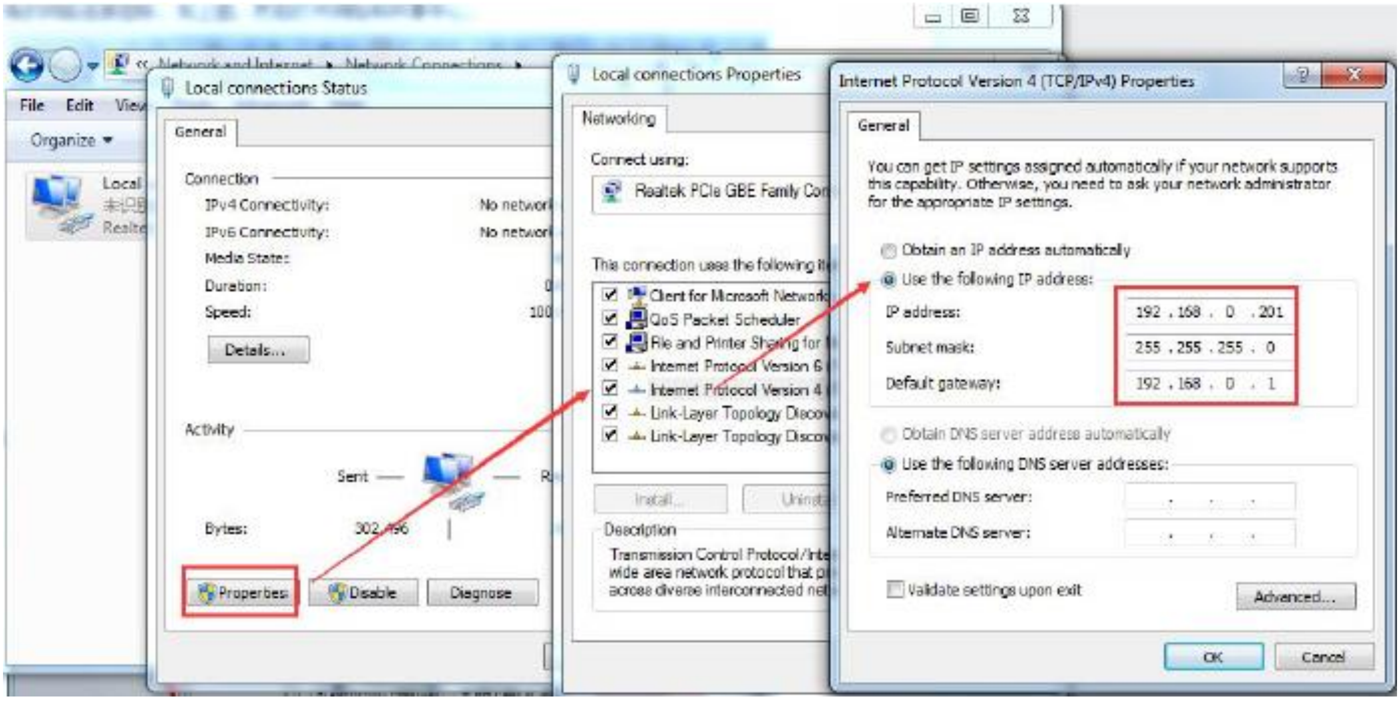
Notes:

- AC adapter and connection cable are provided by ALLNET GmbH Computersysteme
- RS232 is involved, no connection for RS485.
- PCs in above picture is the same one.

1.2. Network Test Environment

Please check PC setting after hardware connection.

1.) Disable PC Firewall and anti-virus software.
2.) Disable the network card nothing to do with testing and just leave one local connection.
3.) As for ALL-SDS102 connect with PC directly, should set static IP for PC, which in the same network segment with ALL-SDS102, like 192.168.0.201.



PC Local Connection Configuration

1.3. Default Parameter

Default parameter is as below:

User name	admin
Password	admin
IP address	192.168.0.7
Subnet mask	255.255.255.0
Default gateway	192.168.0.1
Default work mode of port 1	TCP Server
Default local port of port 1	23
Default work mode of port 2	TCP Server
Default local port of port 2	26
Baud Rate	115200
Parity bit/Data bit/Stop bit	None/8/1

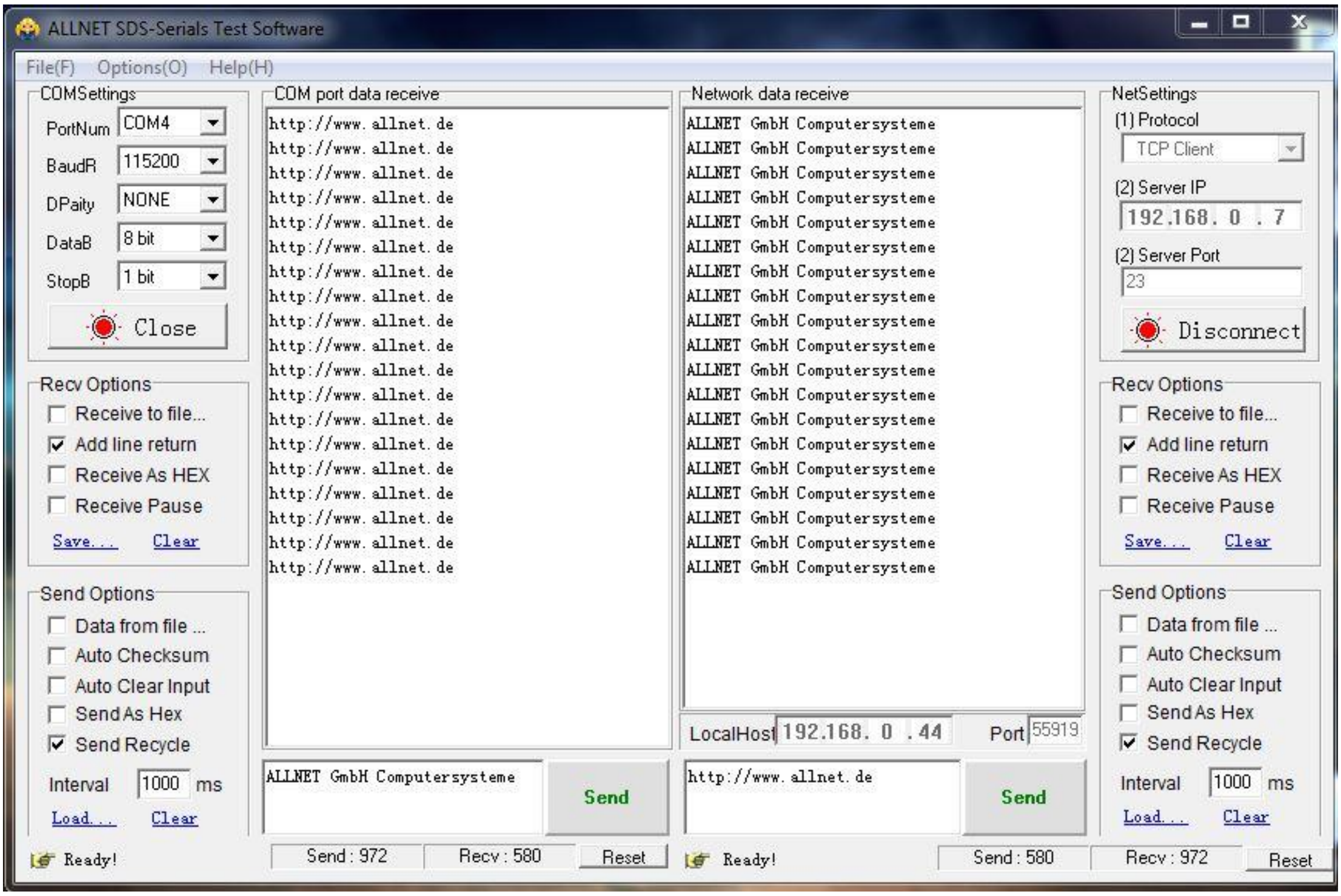
1.4. Data Transmission Test

Data transmission test is based on the default parameters, please refer to the following steps:

1.) Open test software “ALLNET SDS-Serials Test Software.exe”, and do hardware connection according to Chapter 1.1 Hardware Testing Environment.
2.) The right side is Network Settings: TCP Client, IP address: 192.168.0.7, port number: 23, click “Connect” to build TCP connection.
The left side is Serial Settings: Baud Rate: 115200, Parity/Data bit/Stop bit: None/8/1,
Click “Open” to enable the COM.

Then we can test data transmission between COM and network.
Data from serial to network is:
PC COM -> ALL-SDS102 COM -> ALL-SDS102 Ethernet port -> PCs Network;
Data from network to serial is:
PC Network -> ALL-SDS102 Ethernet port -> ALL-SDS102 COM -> PCs COM.

The below picture is for your reference:



Default Parameter Test

2. Overview

2.1. Brief Introduction

ALL-SDS102 is used to transmit data transparently between TCP/UDP data packet and RS232/RS485/RS422 interface. It carries ARM processor, low power, fast speed, high stability and two serial port can work as RS232 or RS485 or RS422 serial interface which comfort to industrial standard.

2.2. Features

1. ARM base on Cortex-M4 kernel, and reliable TCP/IP protocol stack
2. Industrial working temperature range from -40C ~85C
3. Auto-MDI/MDIX,RJ45 port with 10/100Mbps
4. Support TCP server, TCP client, UDP, UDP server and HTTPD client work mode
5. One port corresponding to two socket
6. Support network printing via IP address
7. Function of Modbus gateway, modbus RTU to modbus TCP, modbus multi-host Polling
8. Two serial port, each port can work as RS232 or RS485 or RS422 and work individually
9. Distinguish which serial port connect to device via port number
10. Support virtual serial port and provide corresponding software ALLNET-VCOM
11. Serial baud rate from 600bps to 230.4K bps; Check bit of None, Odd, Even, Mark and Space
12. Support static IP, DHCP/DNS and search devices within network through UDP broadcast.
13. Provide serial and network setting protocol, TCP/IP socket example code such as VB, C++ Delphi, Android, iOS
14. Built-in web page; Customized web page is acceptable
15. Reload button, one key to restore default settings
16. RJ45 with Link/Data indicator light, built-in isolation transformer and 2 KV electromagnetic isolation
17. The global unique MAC address bought from IEEE, also user can define MAC address
18. Upgrade firmware via network
19. Support web port revise (80 by default)
20. Keepalive detects dead links and reconnect rapidly
21. Support account and password, used to page log in and network settings safely
22. Support one channel Web socket, realize bidirectional transparent transmission between web page and serial side

23. Power supply in two mode, DC adapter or 5.08-2 terminal pin

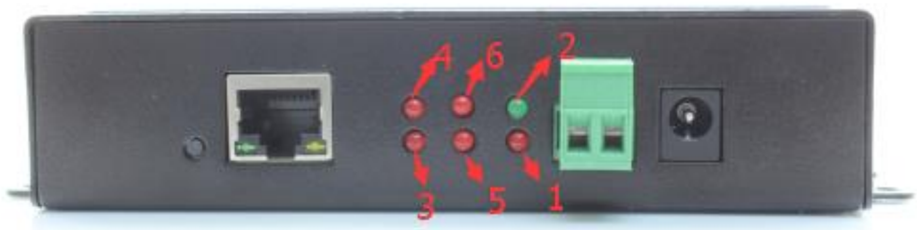
24. Communication indicator light of two serial port: RX/TX

25. UPD broadcast function, can receive/send data to all IP in the same network

2.3. Basic Parameter

Parameter	Value
Input Voltage	DC5～36V
Working Current	90mA@5V
Operating Temp.	-40～+85°C
Power	<1W
Storage Temp.	-45～105°C, 5～95%RH

2.4. Indicators and Dial switch



Indicator	Description
Power (1)	Indicate power. It is on when power is supplied
Work (2)	Indicate working status. It twinkles when ALL-SDS102 works well. If it is on or off for a period, ALL-SDS102 works improperly, you should cut the power and restart.
TX1 (3)	It twinkles when port 1 sends data
RX1 (4)	It twinkles when port 1 receive data
TX2 (5)	It twinkles when port 2 sends data
RX2 (6)	It twinkles when port 2 receive data

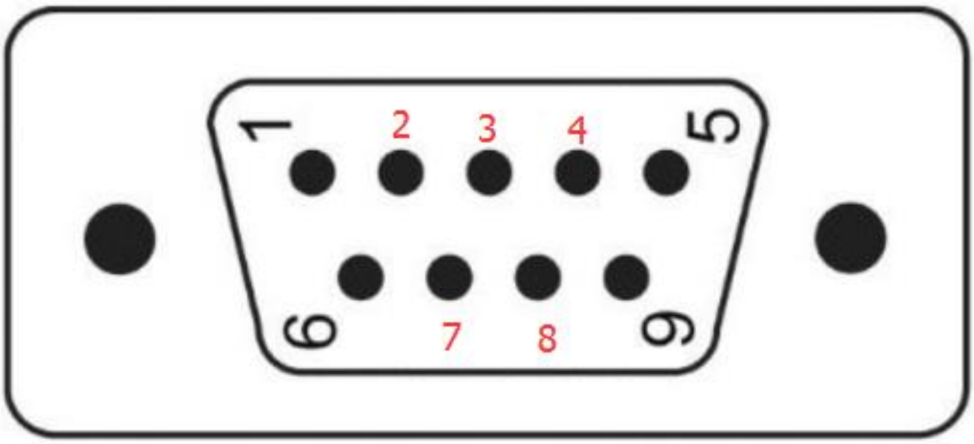
Dial Switch

- For RS232 port, dial switch are down, such as the below picture.

- For RS485 port, dial switch are up, such as the below picture.

- For RS422 port, dial switch on the left are up, dial switch on the light are down.

2.5. DB9 Pin Definition



- For RS232 port, pin definition is as below

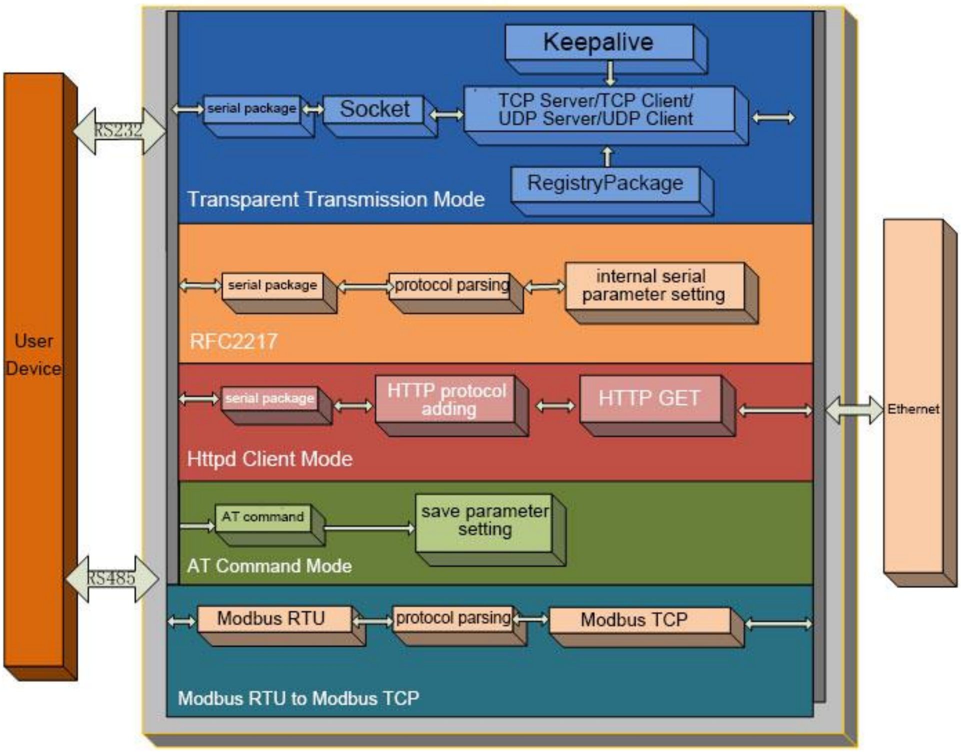
Pin	Definition
2	RX, pin of receives data
3	TX
5	GND
7	RTS
8	CTS

- For RS485 port, pin 3 works as “B(-)”, Pin 7 works as “A+”
- For RS422 port

Pin	Definition
2	RX+, pin of receives data
3	RX-
5	GND
7	TX+
8	TX-

3. Product Function

The following is function diagram of ALL-SDS102



ALL-SDS102 Function Diagram

Each serial port corresponds to two socket: socket A and socket B. Socket B can be opened or closed.

3.1. Socket A Communication

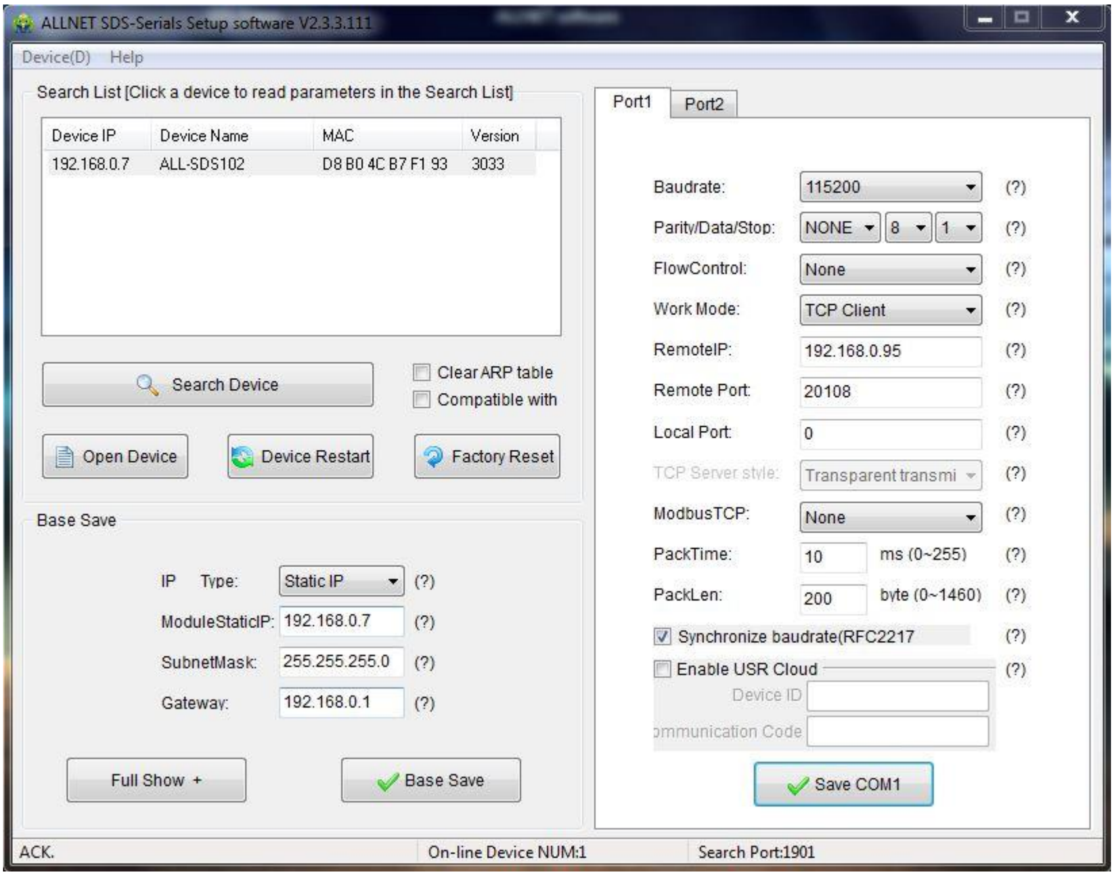
3.1.1. TCP Client Model

4.1.1 TCP Client Mode

1) Different from UDP mode, in this mode, connection has status of disconnection and remaining. Connection is still remained although ALL-SDS102 does not send data.

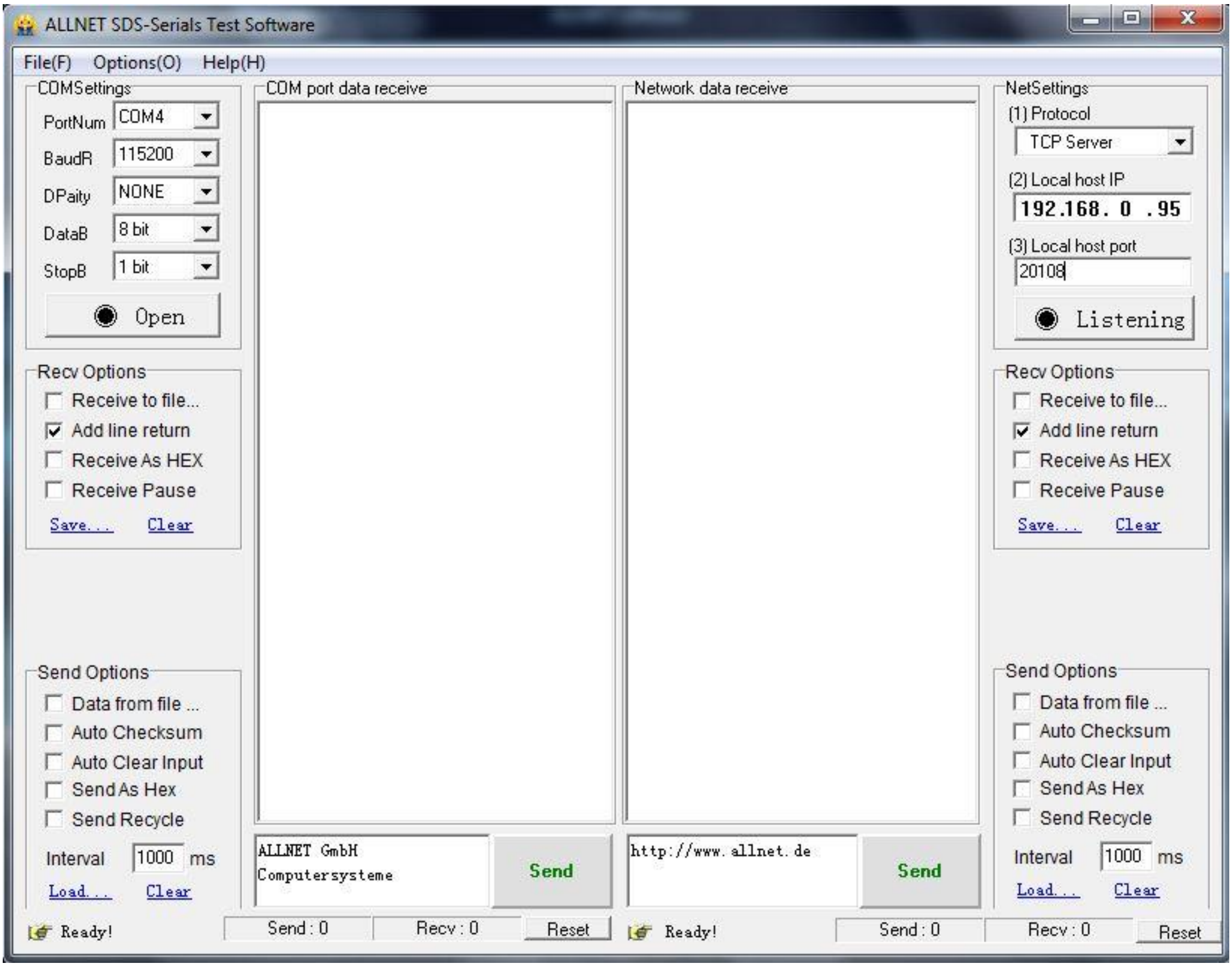
2) Identify disconnects. After connection built, it sends keepalive searching packet every 15 seconds. Once there is an interrupt, it can be detected rapidly then make ALL-SDS102 disconnect from former connection and reconnect.
3) It will connect to same source port when ALL-SDS102 try to connect server and local port is not "0".
4) It supports USR Synchronous baud rate (Similar RCF2217), which can revise ALL-SDS102's serial parameter as baud rate accordingly. This function should be combined with ALLNET-VCOM.
5) Under the same LAN, ALL-SDS102 must be in the same network segment then can communicate. If not, ALL-SDS102 must be set with right one.
6) Support USR Cloud.
7) Support Modbus TCP function.
8) ALL-SDS102 work as TCP Client, it connects to TCP server, Destination IP and port should be cared. The IP can be device with same LAN, also can be different LAN or cross public network. If it connects to server cross public network, the server should have public IP.
9) ALL-SDS102 work under TCP Client, It connects to the target IP/Port automatically, will not accept other connection request.
10) As TCP Client, need to set USR-N510's local port number to be "0 then it can visit server with randomized port number, so that it can solve unsuccessful re-connection in case server judge connection status abnormally and shield ALL-SDS102 re-connection request.
11) Test Example

A. Open "ALLNET SDS-Serials Setup software.exe" software.
Set ALL-SDS102 as TCP Client, Destination IP: 192.168.0.95. Destination port: 20108.
Click "Save COM1", and search ALL-SDS102.
Then check if the parameters are correct when ALL-SDS102 is found.



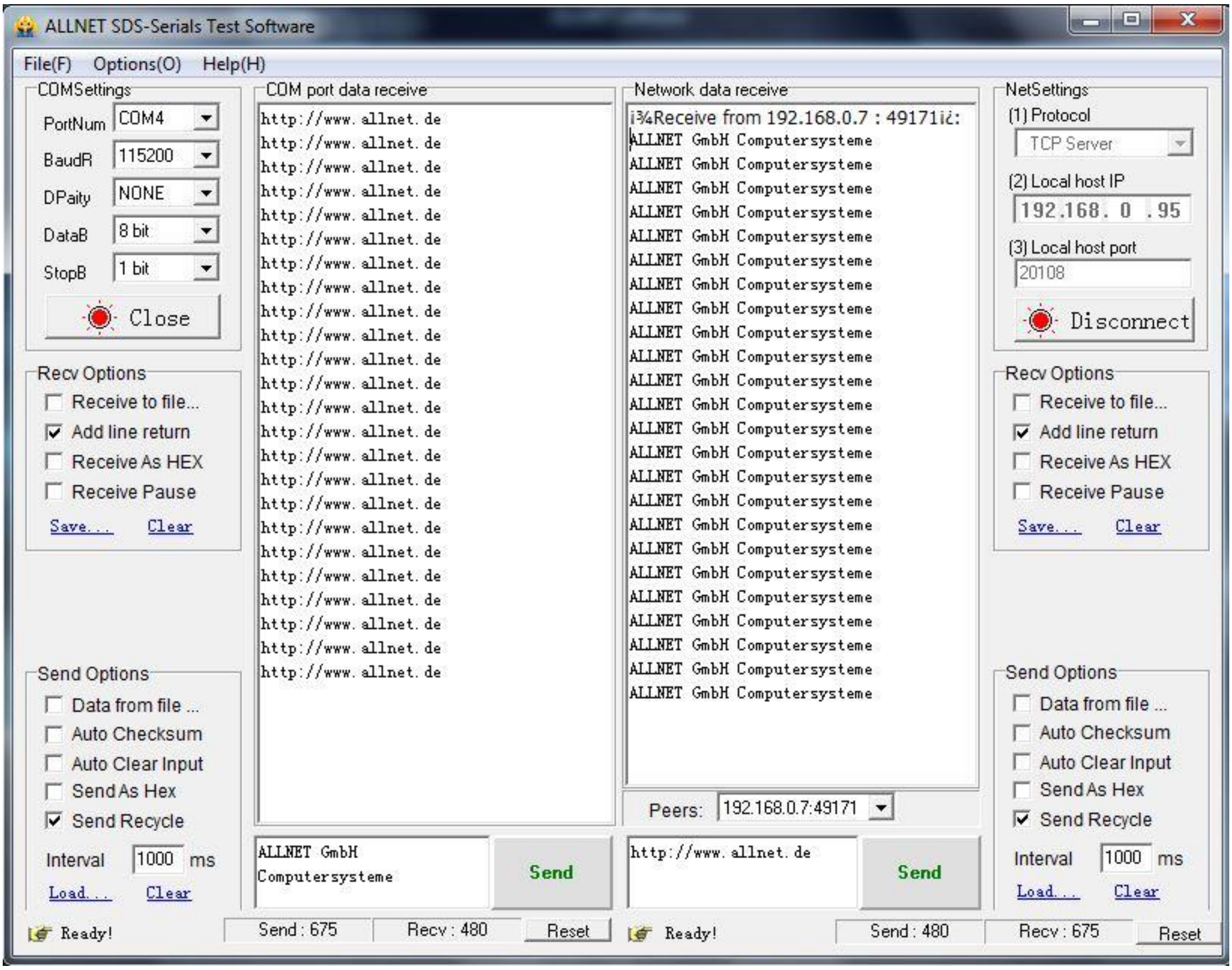
Configuration

B. Open “ALLNET SDS-Serials Test Software.exe” software:
   Need to connect to PC’s TCP Server, its IP: 192.168.0.95, Port number: 20108, Click “Listening”



TCP Client Test Screenshot

C. ALLNET SDS-Serials Test Software.exe:
Configure serial parameter. Click to open the port. Test software network part shows connection message: 192.168.0.7:49171 (port# assigned randomly). Click “send”, you can gain data from each side.



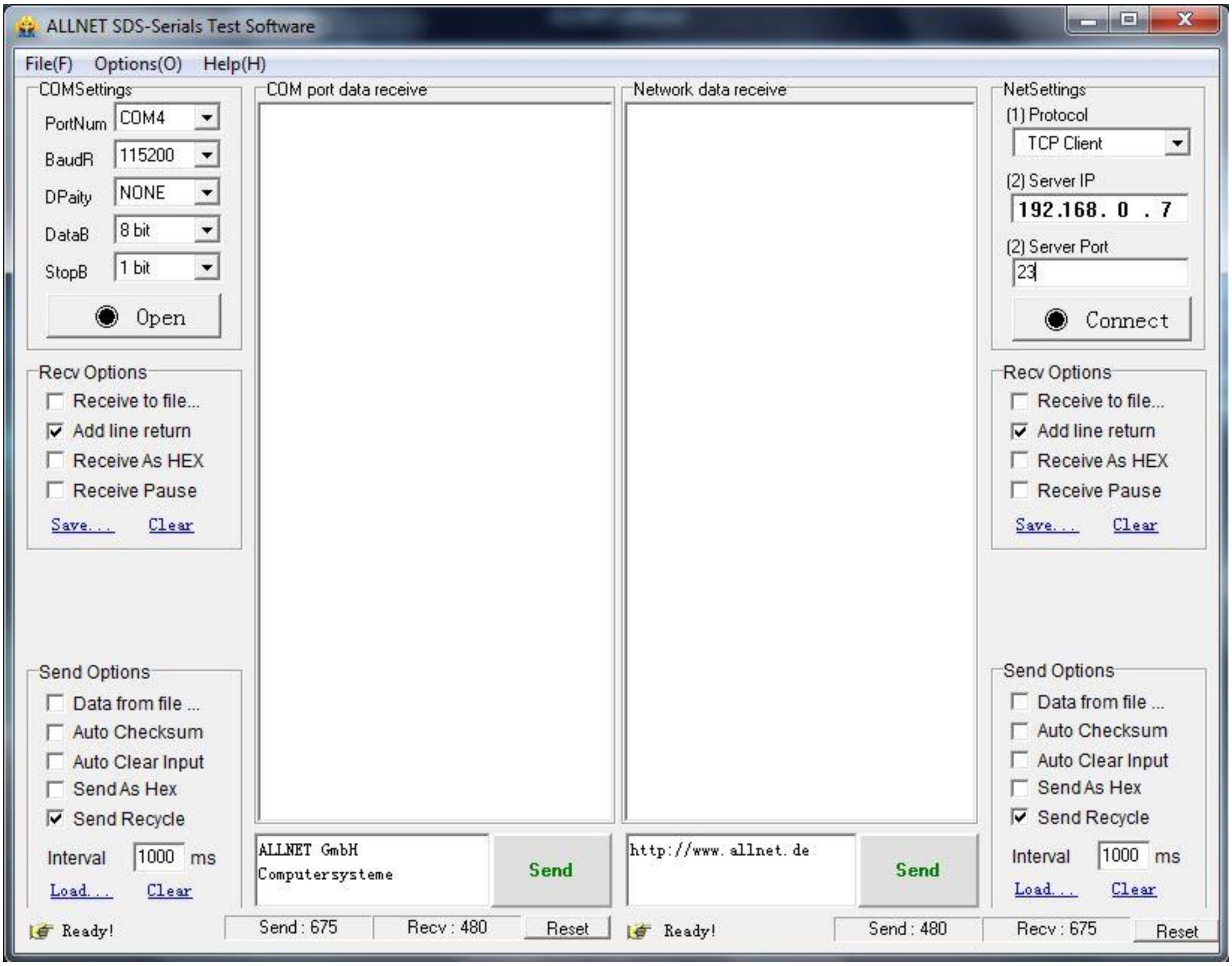
TCP Client Software Configuration

3.1.2. TCP Server Mode

1) Different from UDP, in this mode, connection has status of disconnection and remaining. Connection is still remained although ALL-SDS102 does not send data.
2) ALL-SDS102 listens to local port set firstly, respond and build connection when there is a connection request. Serial port will send data to all client which connected with ALL-SDS102 at the same time once serial port received data.
3) It supports USR Synchronous baud rate (Similar RCF2217), which can revise ALL-SDS102 serial parameter as baud rate accordingly. This function should be combined with ALLNET-VCOM.
4) It support 8 clients connections at max. (32 clients will be improved in the following.)
5) Support Modbus TCP function.
6) Under TCP Server mode, ALL-SDS102 listens to local port actively and will not monitor connected IP and port. When the 9th client is connected, the oldest one will be ticked.
7) Test Example

A. Set ALL-SDS102 as TCP Server Mode, local port 23, same as default.

B. Open " ALLNET SDS-Serials Test Software.exe" Software, on the side of NetSettings:
   Protocol: TCP Client
   Server IP/Port: the same value as the default parameter of ALL-SDS102
C. Click "Connect" to test data transmission.



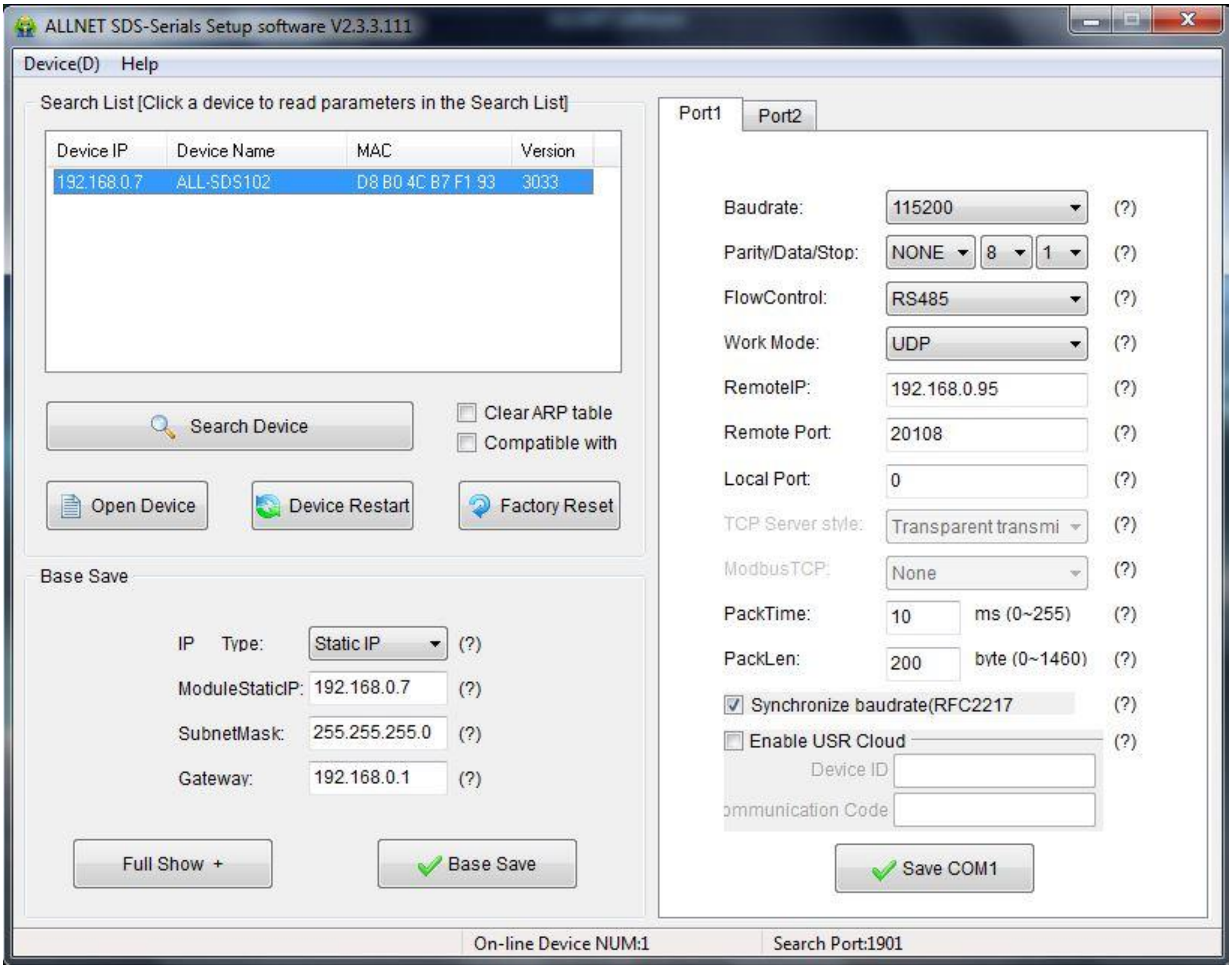
TCP Server Test Screenshot

3.1.3. UDP Client Mode

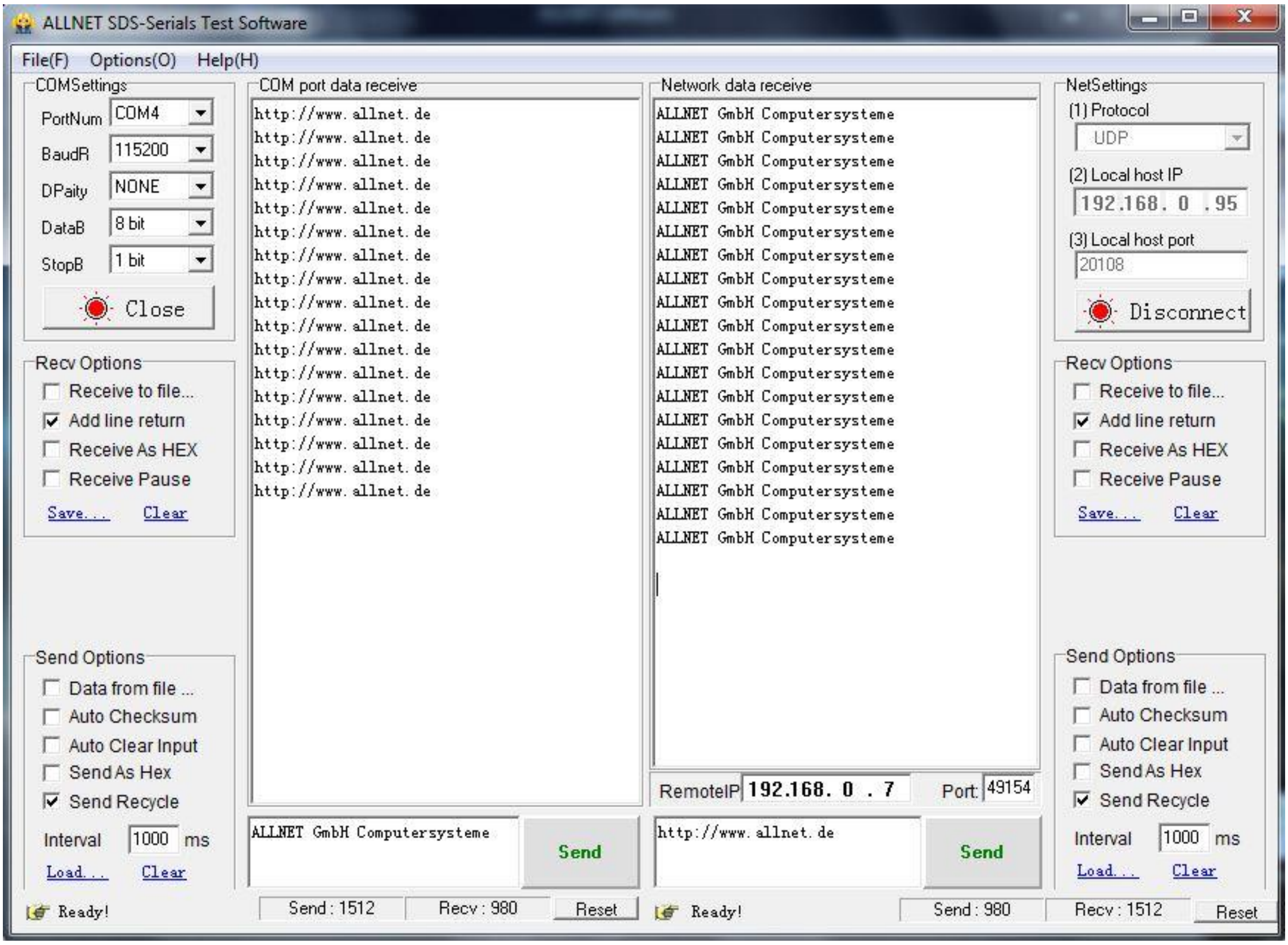
1) It subjects to UDP protocol, no connection, just only sending data.
2) ALL-SDS102 only communicate with destination port of IP. Otherwise, the data cannot be received.
3) Under this mode, destination Address is 255.255.255.255, then it can make UDP broadcast and receive broadcast data. Broadcast within segment as 192.168.0.255, it can be sent but cannot be received currently.
4) Under UDP Client/ UDP Server mode, host PC allow data length 1460 bytes at max to ALL-SDS102.
5) Test Example

   A. Open ALLNET SDS-Serials Setup Software: build a UDP firstly. PC's IP is 192.168.0.95. Port to be listened is 20108.

B. Open ALLNET SDS-Serials Test Software: set ALL-SDS102 as UDP Client, destination port: 20108.
C. Click "Send" at serial side. Remote IP and port becomes ALL-SDS102's after receiving the data.
D. Then click "Send" in network part and send data to COM.



UDP Client Software Configuration

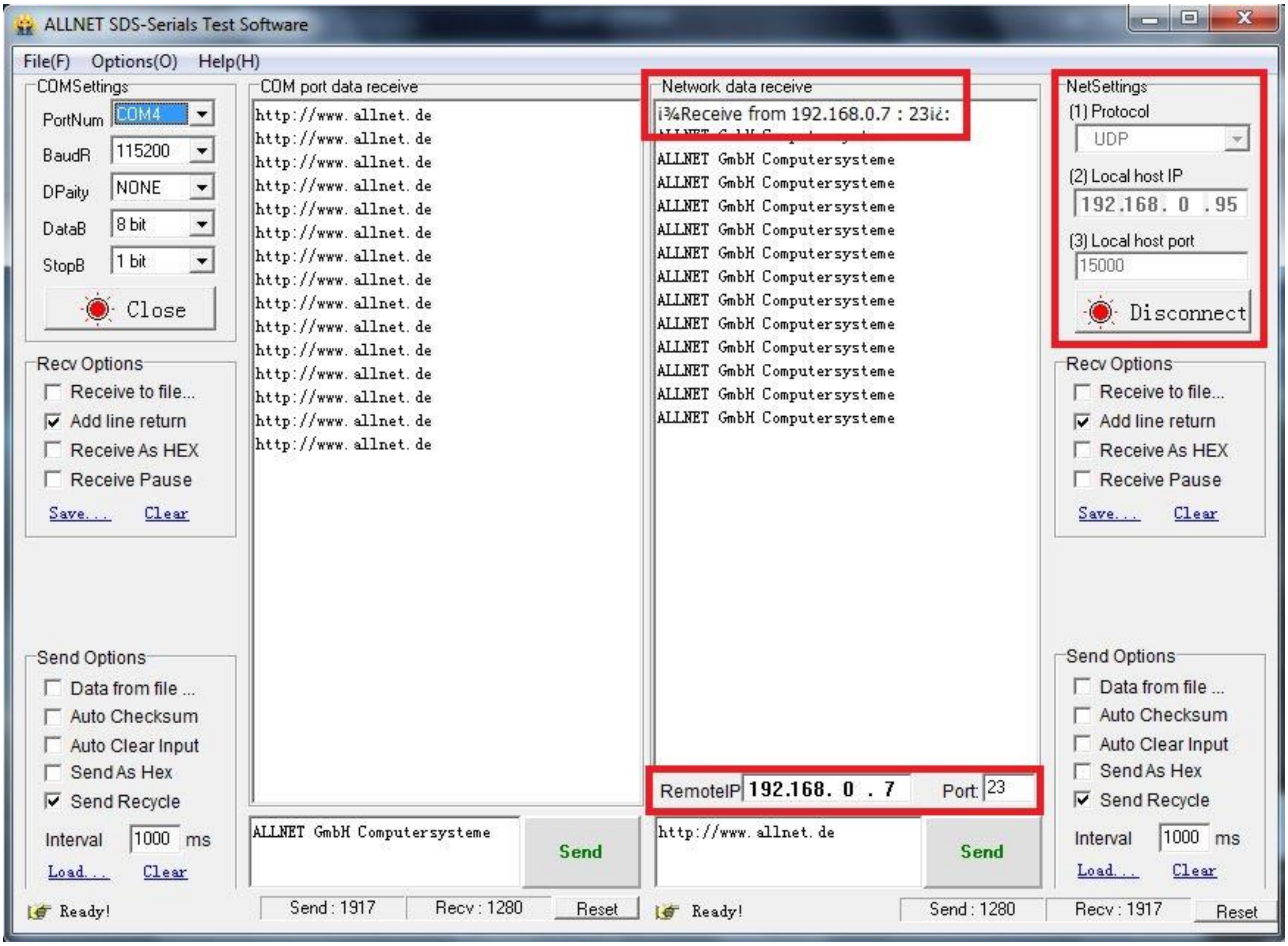


UDP Client Testing Screenshot

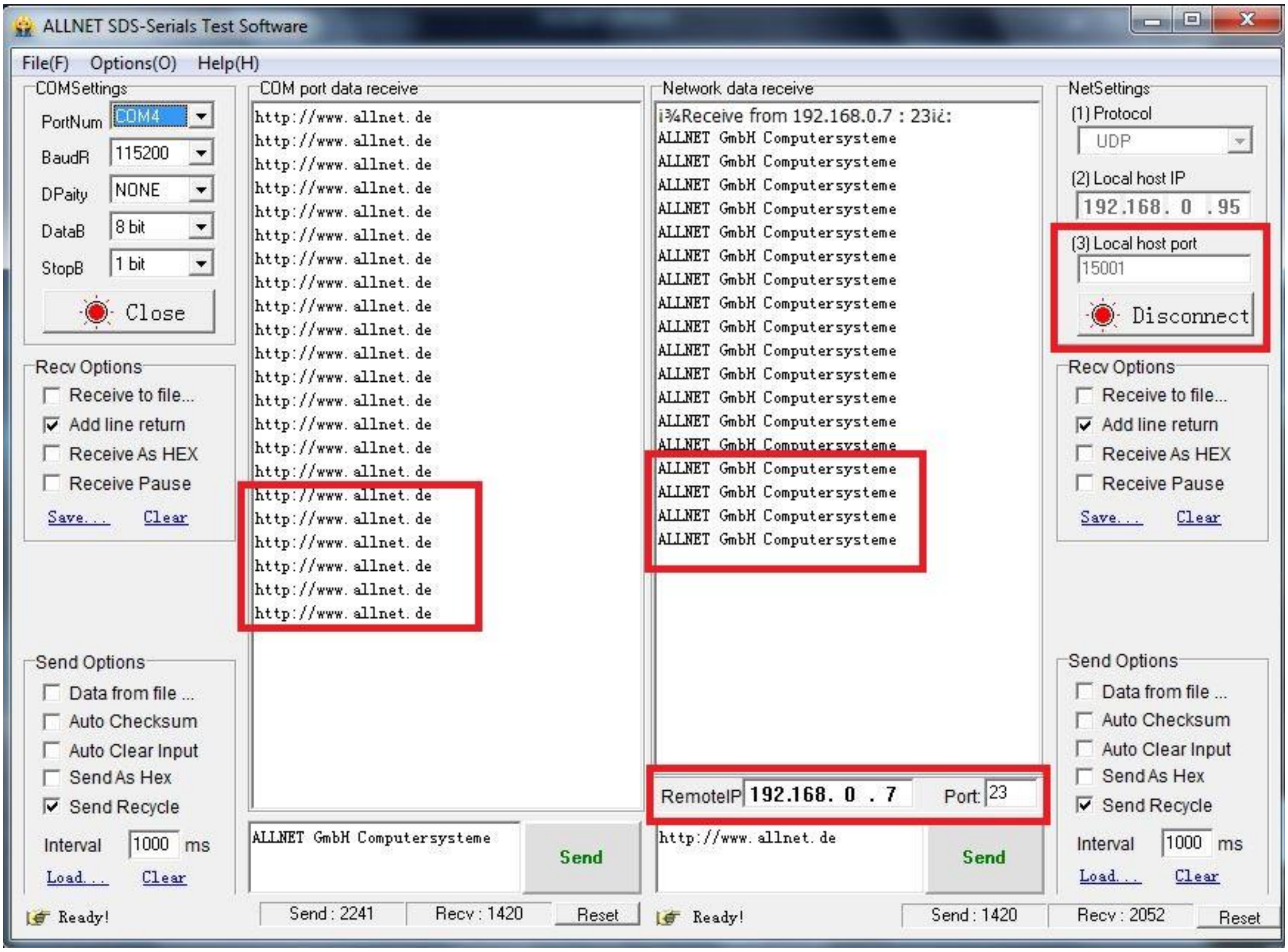
3.1.4. UDP Server Mode

1) Base on normal UDP, it doesn't verify source IP address. Every time ALL-SDS102 receive one UDP data packet, it changes destination IP to where data comes and it sends the data to the IP and port which communicate latest.
2) Test Example

A. Open “ALLNET SDS-Serials Setup” Software: Set ALL-SDS102 as UDP Server, local port: 23.
B. Open “ALLNET SDS-Serials Test” Software twice. Set work mode as UDP, remote IP and port same with ALL-SDS102.
C. Click “Send” then the COM receive data.
D. Click “Send” at serial side, only the software communicate latest can receive the data.



UDP Server Test Screenshot



UDP Server Test Screenshot

3.1.5. TCP and UDP Comparison

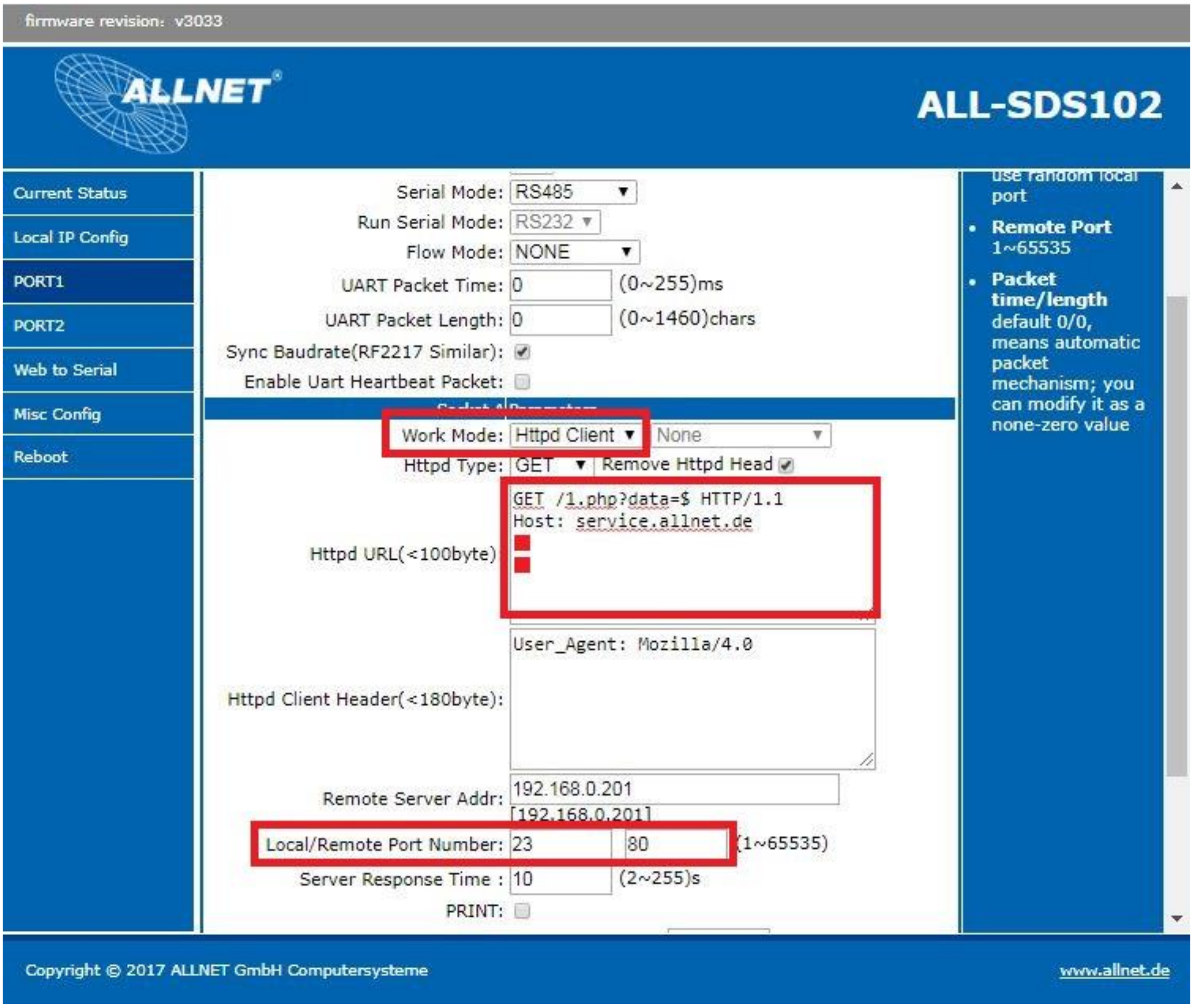
	TCP	**UDP**
Advantages	Stable, no loss Reliable connection mechanism Resend after data sending fails	No Connection mechanism, simple, flexible Suit for small packet and high frequency Accurate data sending interval
Disadvantages	Long packet starting Jam for small packet and high frequency Inaccurate interval resulted from check and resend mechanism	More less under bad network environment

3.1.6. HTTPD Client

It is used to transmit data from ALL-SDS102 to HTTP server or gain data from HTTP server.
ALL-SDS102 can handle complex HTTP protocol so user just do programming for serial, and not need to worry about HTTP.
When ALL-SDS102 sends data to HTTP server via serial port, it only needs to send the header of requested data; All the returned data will be transmitted by ALL-SDS102, user need to analyze the packets.
Test Example:

1) Entry http://192.168.0.7 (ALL-SDS102's IP) to open its web page

1. Set ALL-SDS102 as HTTPD Client.
2. Set HTTPD packet Header.

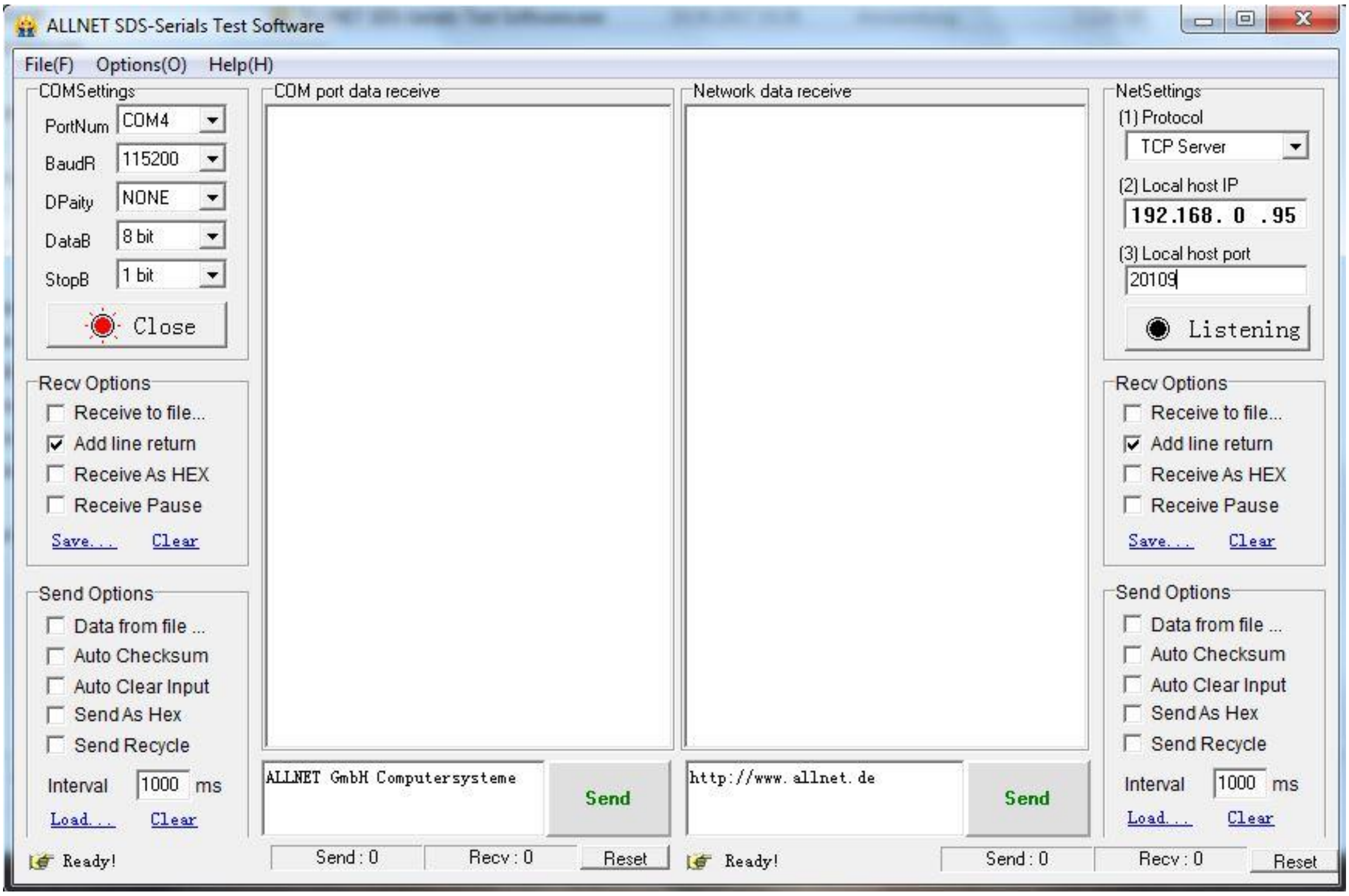


HTTPD Client Web page Configuration Screenshot

Note:

- HTTPD Client only support GET to request HTTPD Server. POST will be available in the following.
- GET/ is fixed packet header.
- 1.php?data= is the visited/submitted the page
- $ stands for data sent by serial (Serial port does not need to send “$”)
- HTTP/1.1 is requested protocol.
- Host is means requested IP address/ domain.
- Enter twice

2) Save the parameters and restart ALL-SDS102.
3) Open serial port to send data, then the data can be submitted onto our web page server.



HTTPD Client Test Screenshot

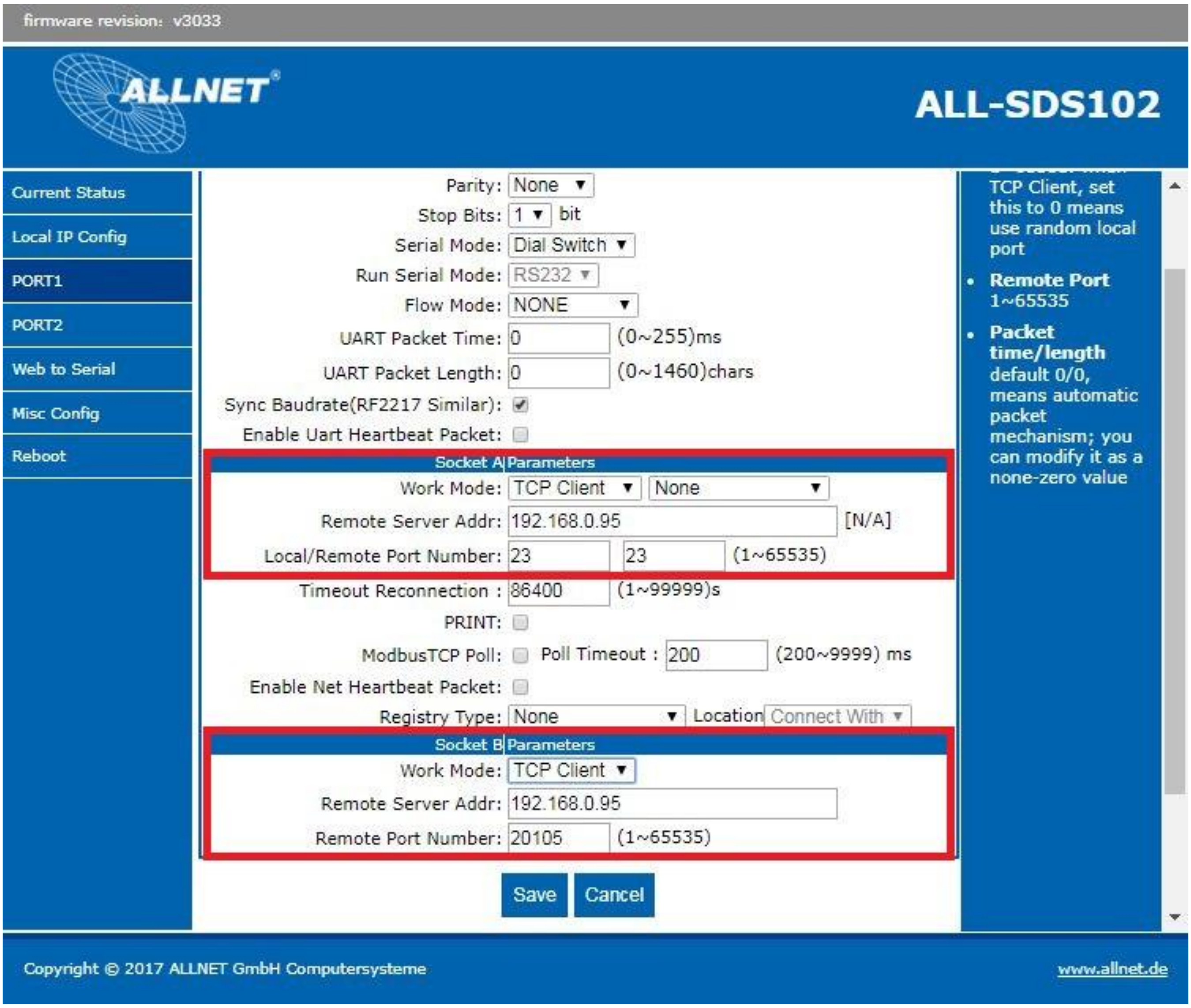
3.2. Socket B Communication

ALL-SDS102 support double socket communication mode, socket A and socket B. One serial port corresponding to two socket communication mode can be realized through setting the parameter of socket B.
But socket B is only used for transparent transmission and only worked as TCP client or UDP client.

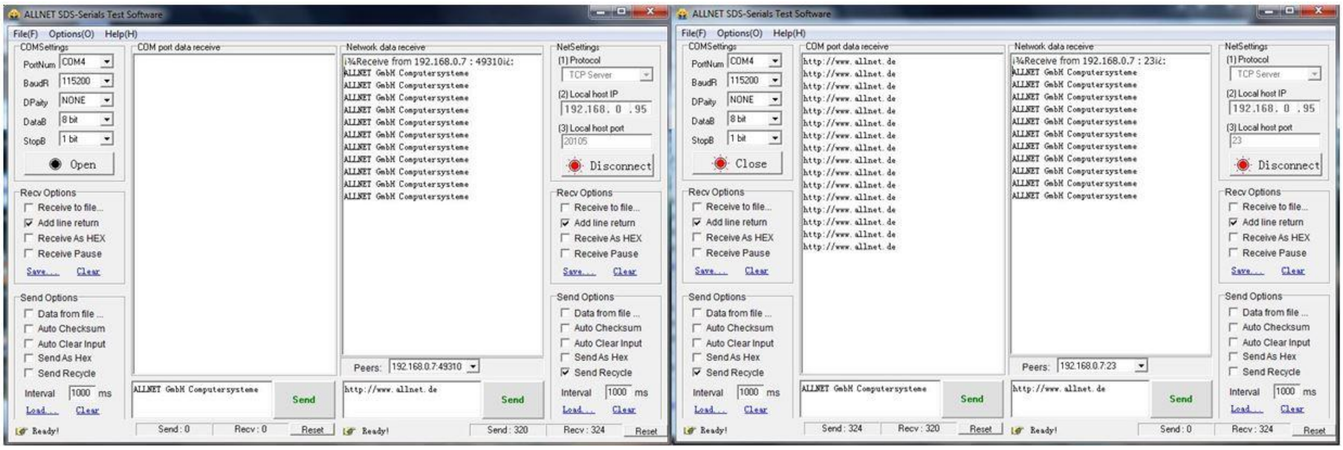
Set ALL-SDS102 as double socket communication mode, the data of serial port will be transparently transmitted to socket A and socket B at one time. When data comes from socket A and socket B simultaneously, ALL-SDS102 will transmit the data of socket A to serial port firstly, and then transmit the data of socket B once the data of socket A finished.

Communication example:

1. Set the parameter of socket A and socket B by web page



2. Set up socket A and socket B by "ALLNET SDS-Serials Test Software.exe", and open serial port which connects to server.
3. Click "Send" on the software, data will be transmitted from socket A and socket B to serial port.



3.3. ALLNET-VCOM Application

It solve the transmission problem of traditional device PC software working as COM. ALLNET-VCOM (Virtual com software) support receiving data from set COM and send serial data out as network.

How to connect ALL-SDS102 with Virtual COM:

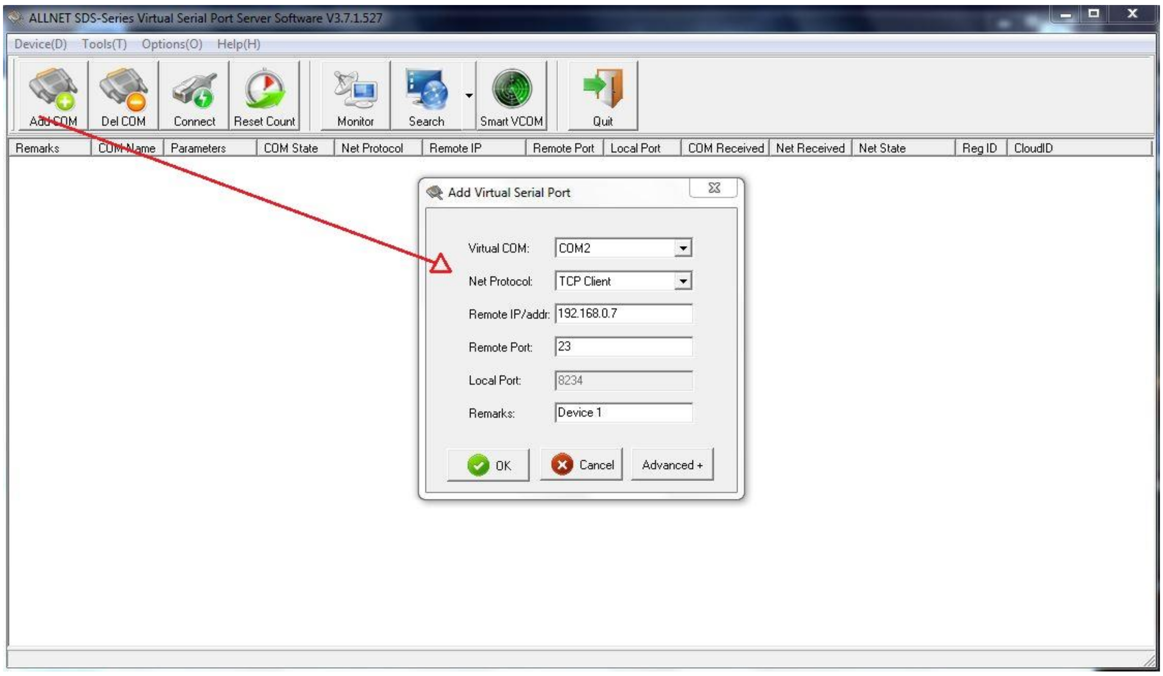
1. Set ALL-SDS102 as TCP server
2. Open ALLNET-VCOM software, click “Add COM’ and select COM2 (Avoid existed COM).

Net Protocol: TCP Client

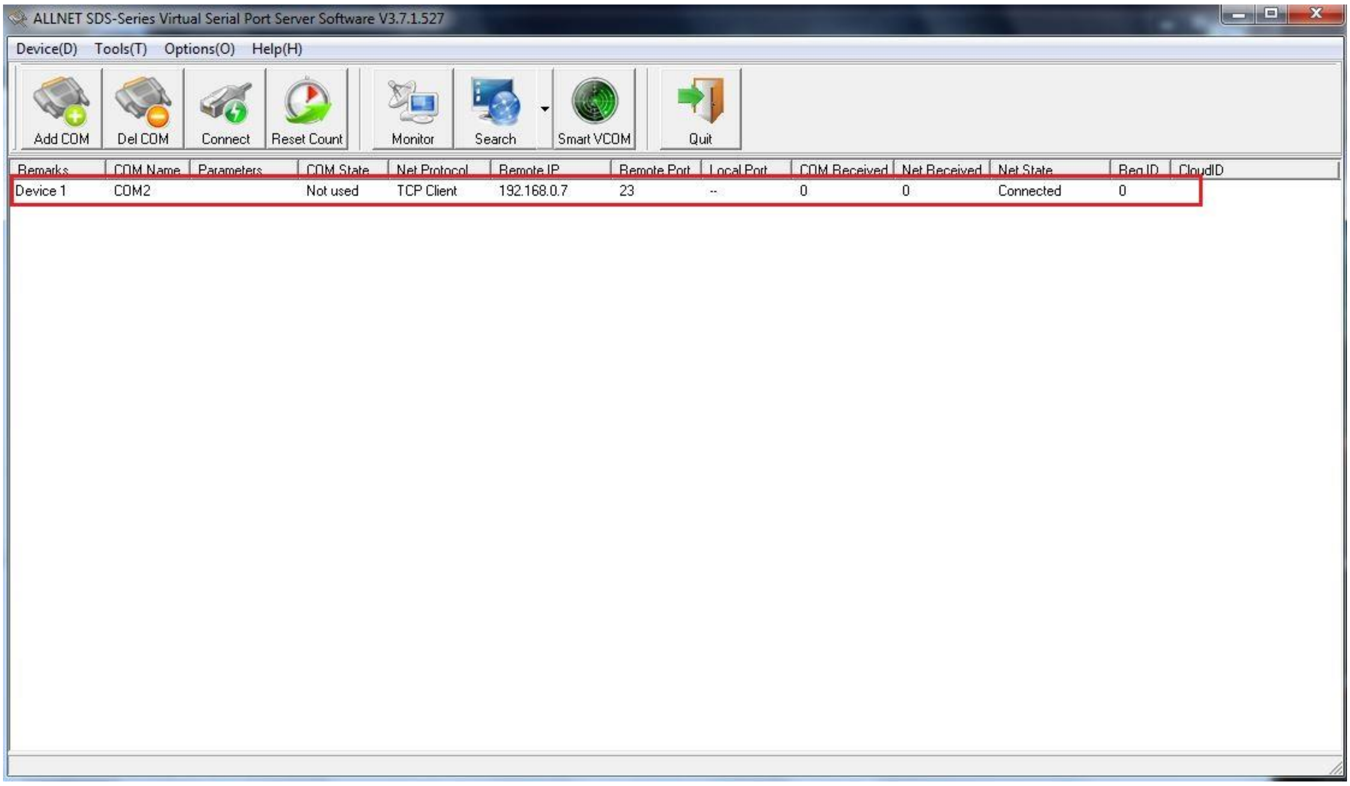
Remote IP and port is the same one with ALL-SDS102

Remarks: Can write the name of device

3. Click “OK’ to check whether connection is built. “Connected” sow ready for data transmission.



ALLNET-VCOM Add a COM



ALLNET-VCOM Build Connection

3.4. Modbus Gateway

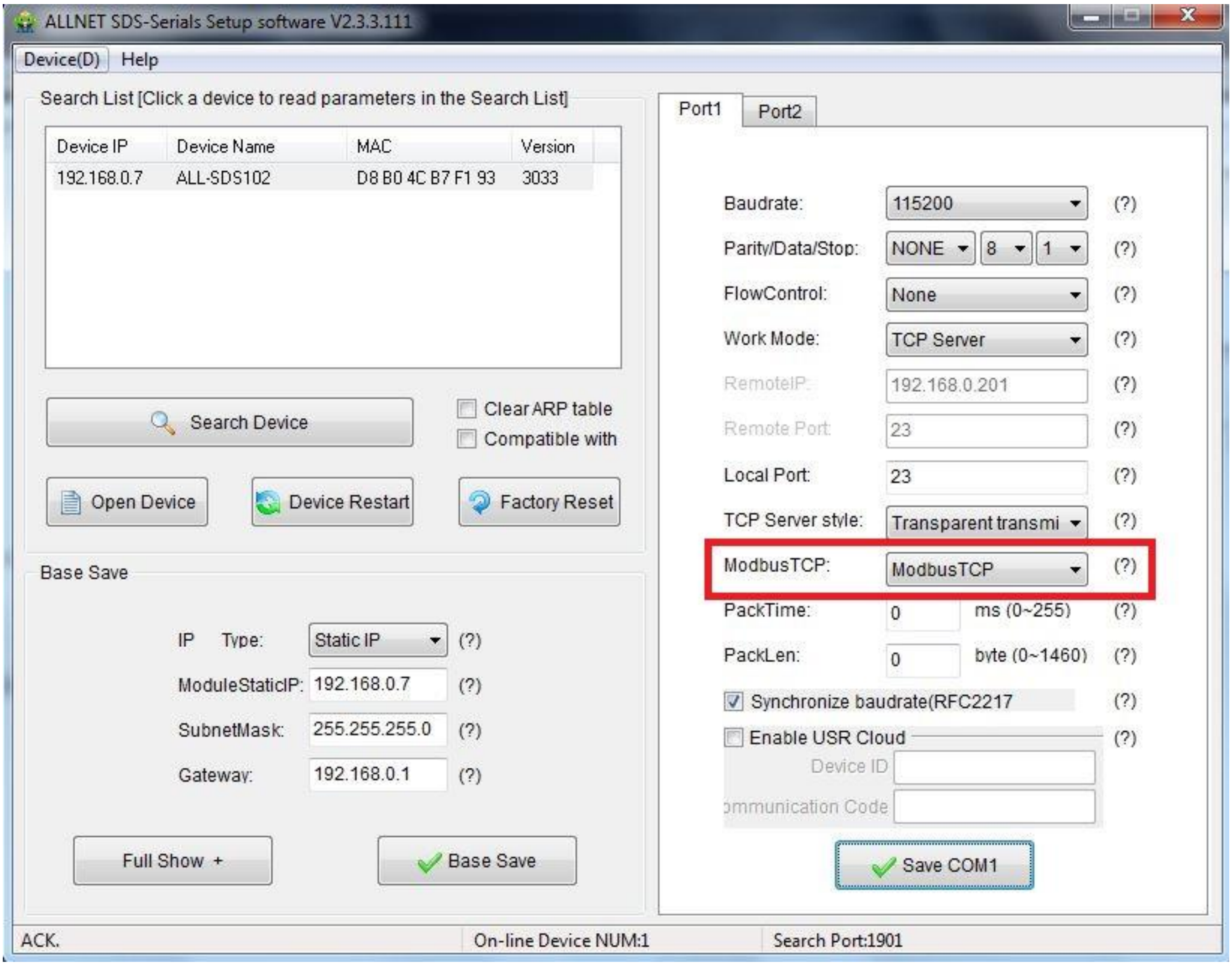
3.4.1. Transmit modbus protocol in transparent mode

ALL-SDS102 supports the transmission of modbus protocol in transparent mode

3.4.2. Modbus RTU to Modbus TCP

ALL-SDS102 support Modbus RTU to Modbus TCP, setting method as below:

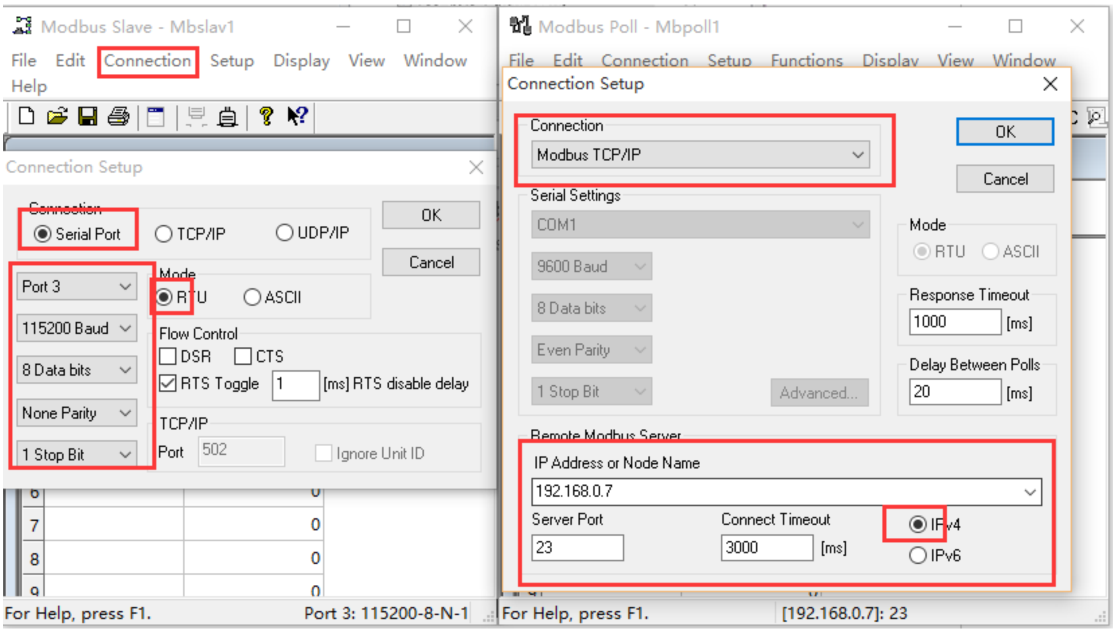
1. Open ALLNET SDS-Serials Setup Software, set ALL-SDS102 as TCP server or TCP client.
2. Select “ModbusTCP” on the red color
3. Click to save the parameter



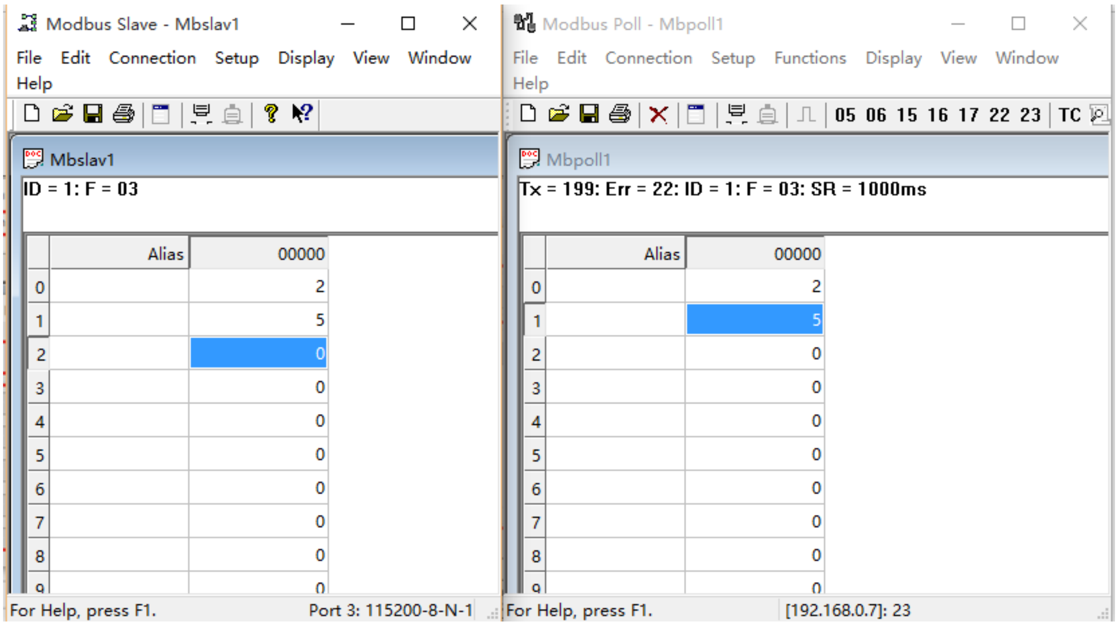
Modbus TCP Configuration

4. Check and verify Modbus RTU to Modbus TCP through modbus Poll and Modbus Slave

5. Setting modbus software is as below:



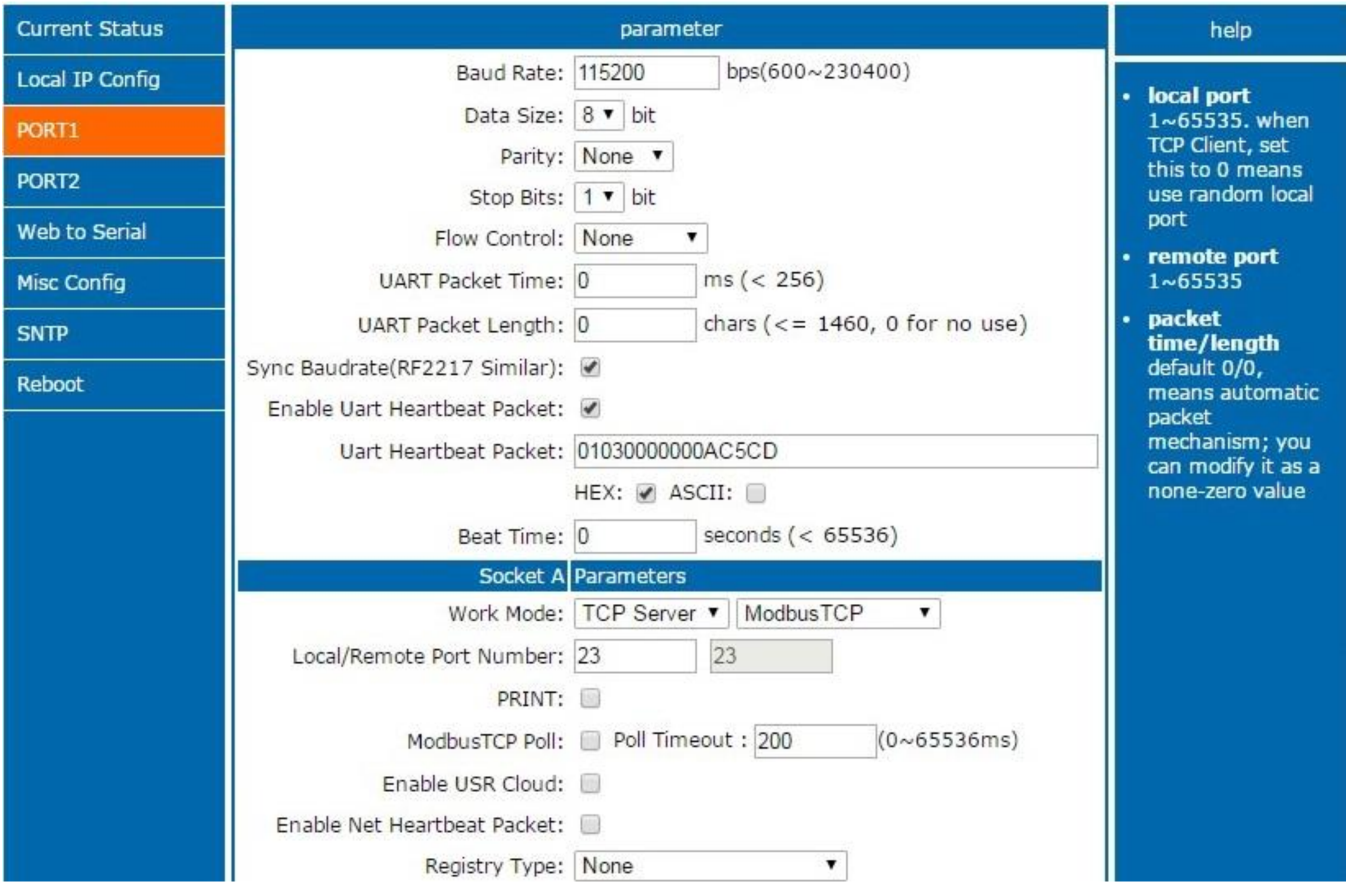
6. Click OK once configuration finished, update the data of modbus slave and modbus data will also be updated.



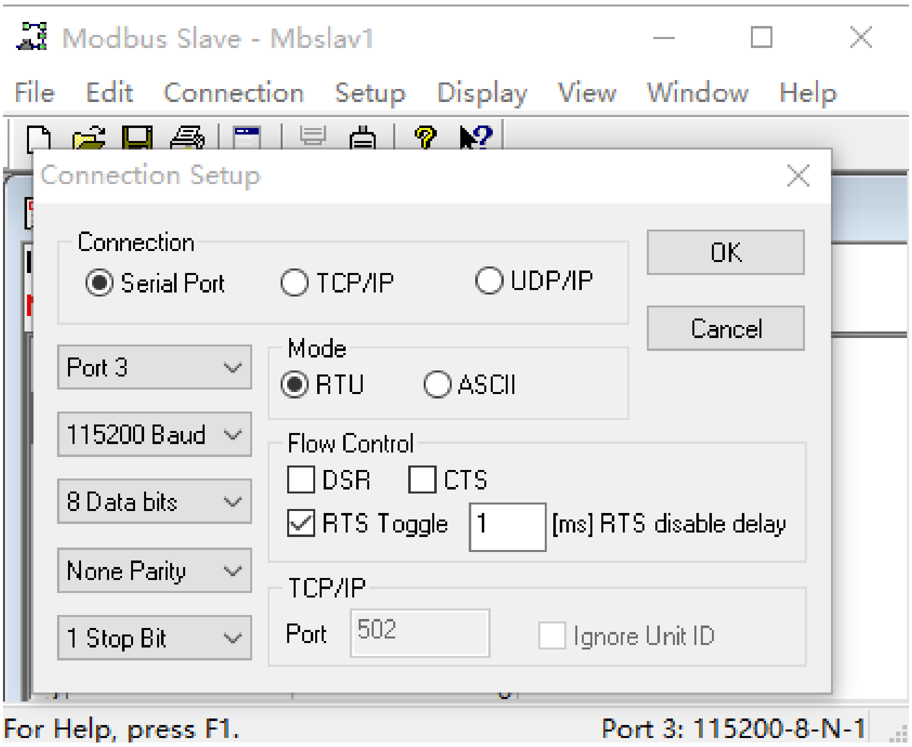
3.4.3. Modbus Active Query Function

Modbus active query function can be realized through the serial heartbeat packet function of ALL-SDS102.

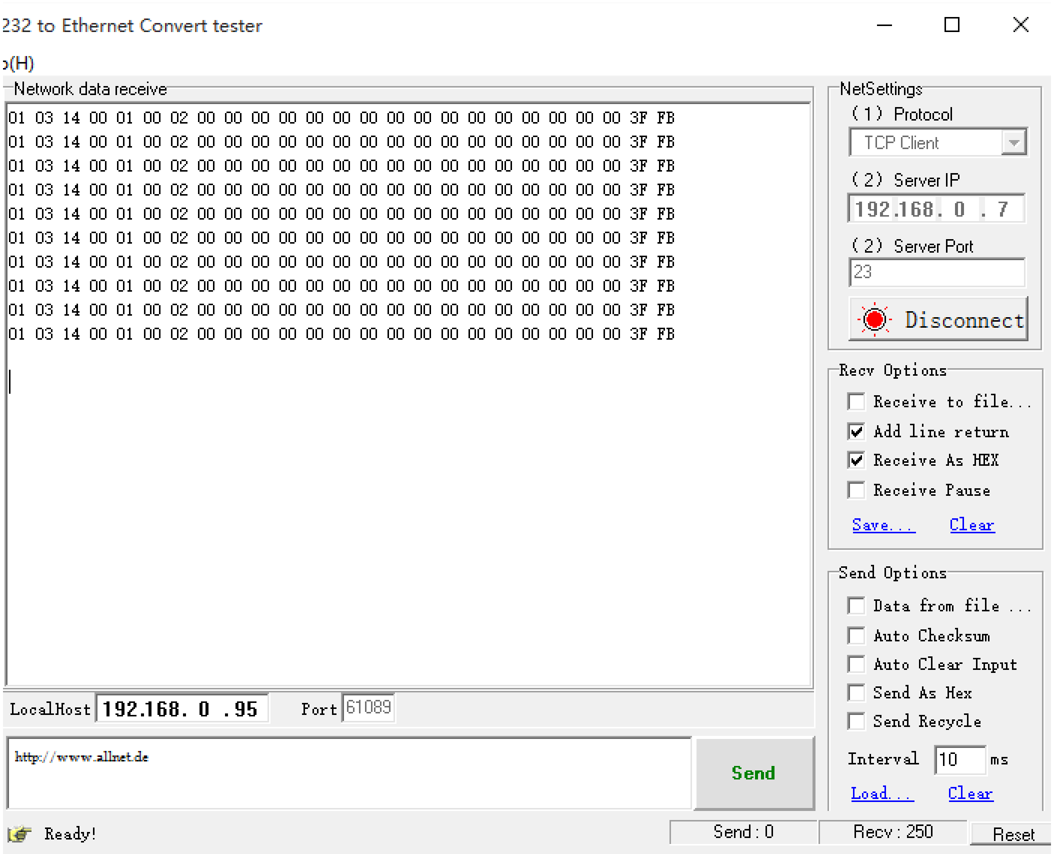
1. Open serial heartbeat packet function via web page, query command is heartbeat packet data, example:



2. Set modbus slave software, refer to the following:



3. Return result for query command is as drawing:

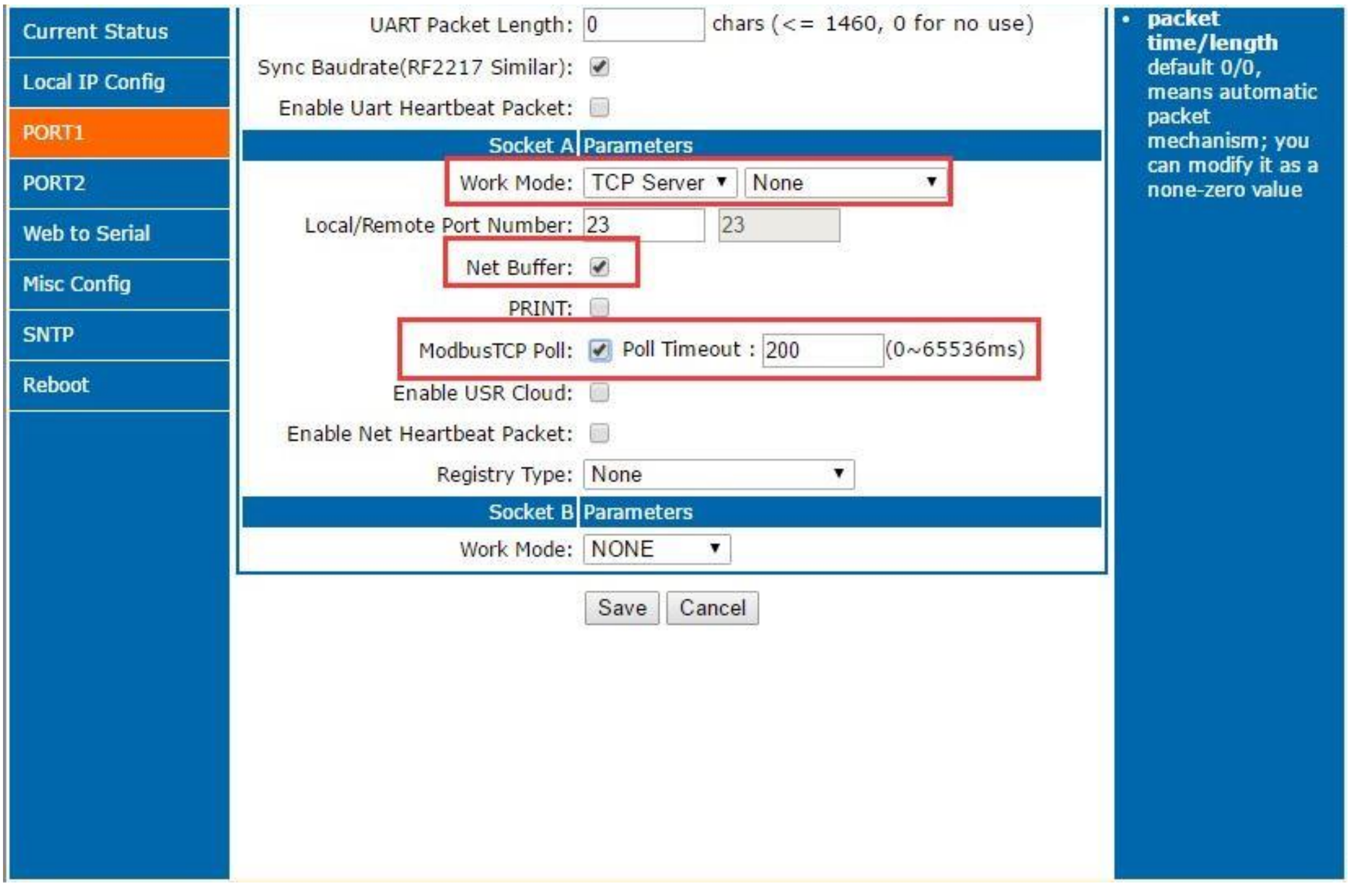


3.4.4. Modbus Polling Function

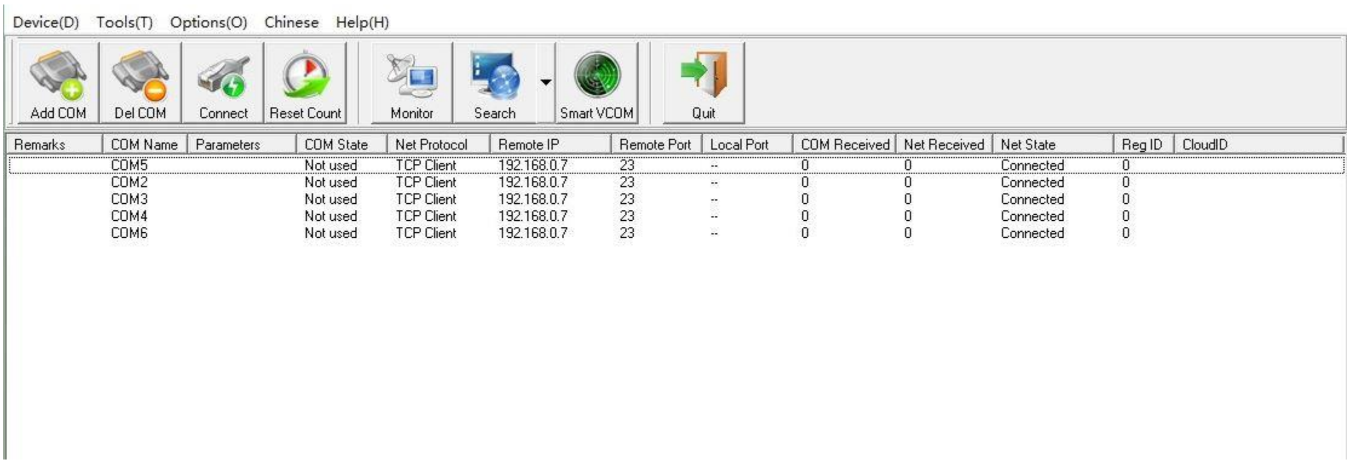
ALL-SDS102 support modbus polling function under TCP server mode. Set ALL-SDS102 as Modbus Poll, support multiple host polling to check parameter.

1. Multiple host polling is realized through virtual com.

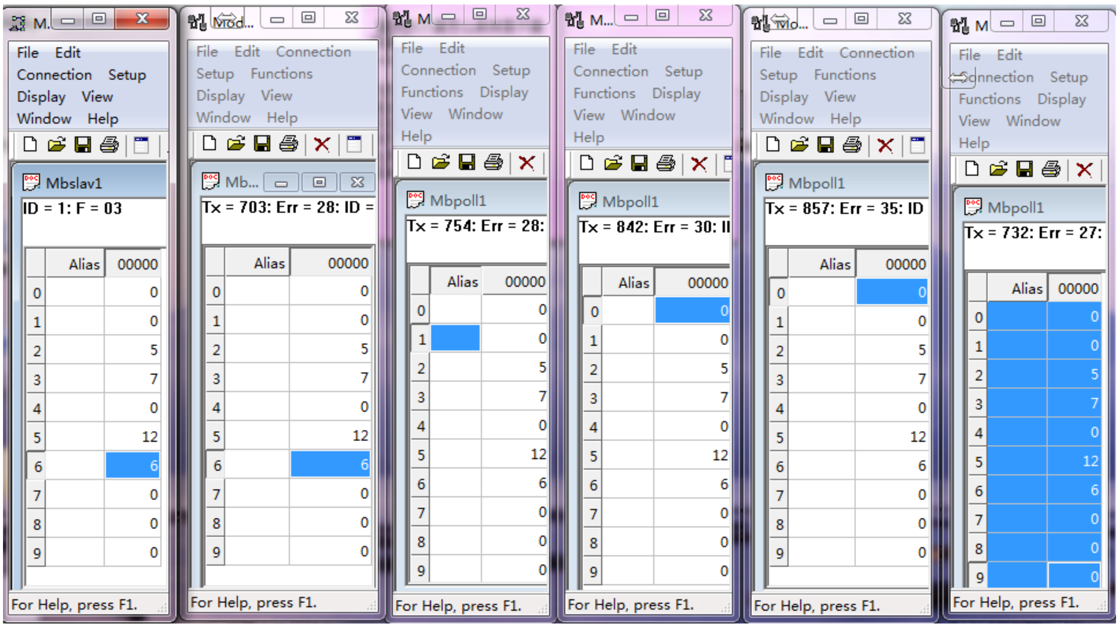
A. Set parameter of ALL-SDS102 via web page, make sure to select ModbusTCP Poll and set overtime



B. Open virtual com software to setup serval ports and connects to ALL-SDS102

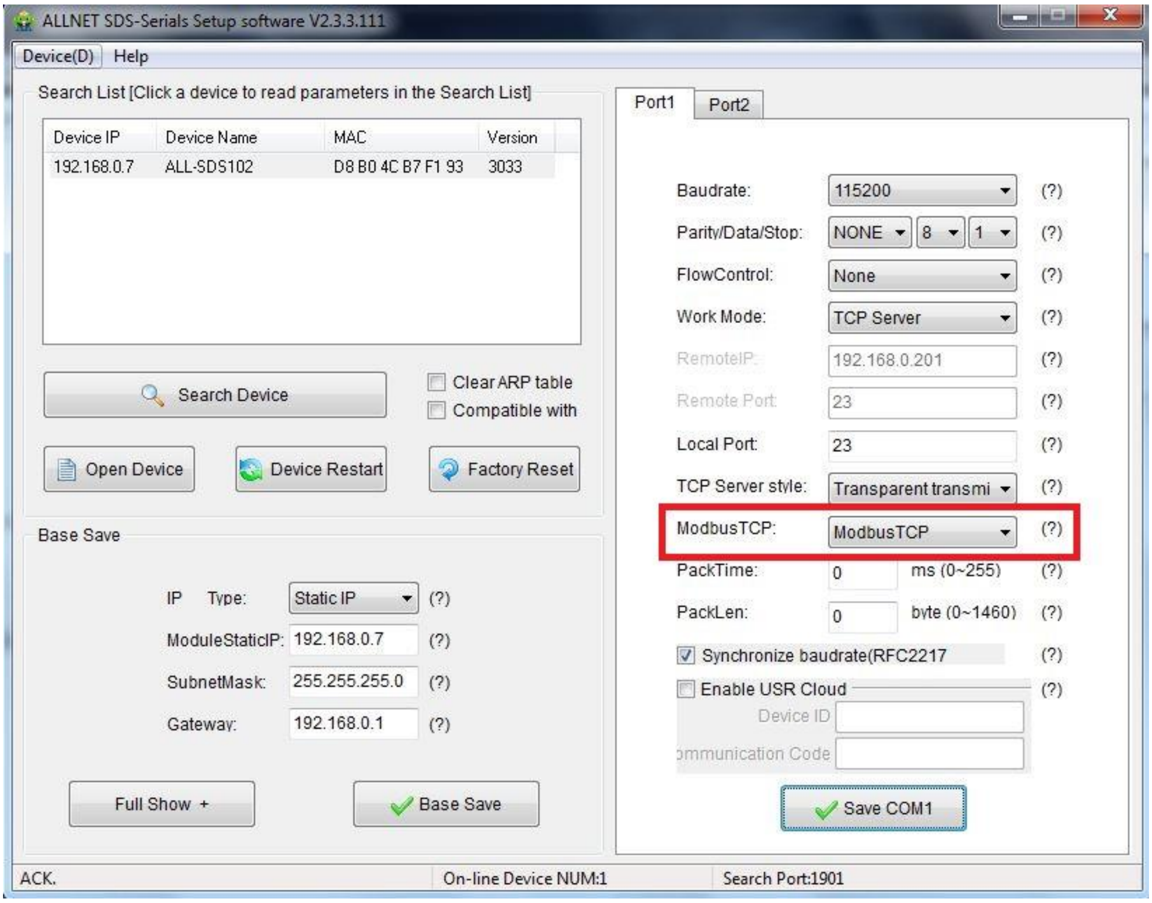


C. Open modbus slave software, choose the serial port which connected with ALL-SDS102. Run modbus Poll software and make port-forwarding with this serial port.
D. The value of modbus poll will also be changed when you revise the value of modbus slave.



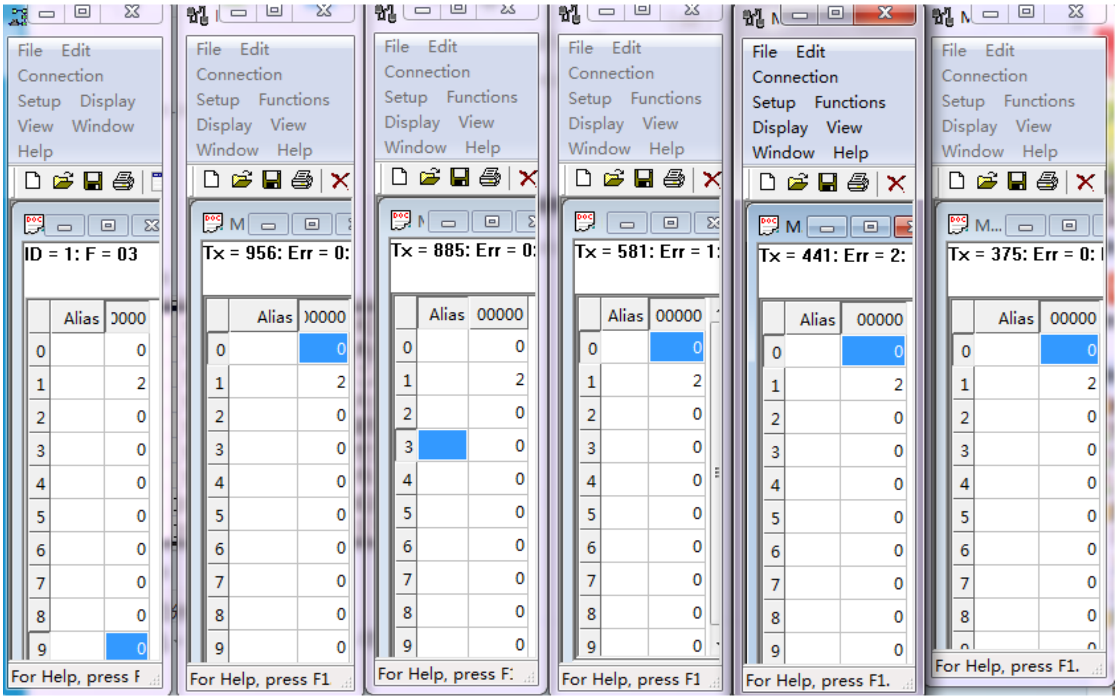
2. Conduct Modbus Polling through Modbus TCP to Modbus RTU

A. Set ALL-SDS102 via software, select Modbus TCP



B. Open modbus slave software, choose the serial port which connected with ALL-SDS102. Run modbus polling softare to select network mode and connect with ALL-SDS102.

C. The value of modbus poll will also be changed when you revise the value of modbus slave.



3. Modbus Polling supports 8 host query for the most, more in the near future. Need set polling time properly when using modbus polling function. If polling interval is too shot and baud rate is too low for the process of polling command which might lead to conflict between command circle and polling time.

3.5. Value-added Functions

3.5.1. DHCP

DHCP is obtaining IP address automatically. ALL-SDS102 IP obtaining have 2 types: DHCP and static IP. It is static IP192.168.0.7 by default.

DHCP is effective after change to DHCP and restart. When ALL-SDS102 connects to router or device assigning IP, it require IP address from host within network, which takes about 5-15 seconds. Then you can search ALL-SDS102's IP address. It is convenient for setting different IP address in different environment.

Note:

Don't set DHCP when ALL-SDS102 connected to PC directly because generally PC don't have the ability of assigning IP. Otherwise, ALL-SDS102 cannot transmit data normally, but wait for IP.

3.5.2. DNS

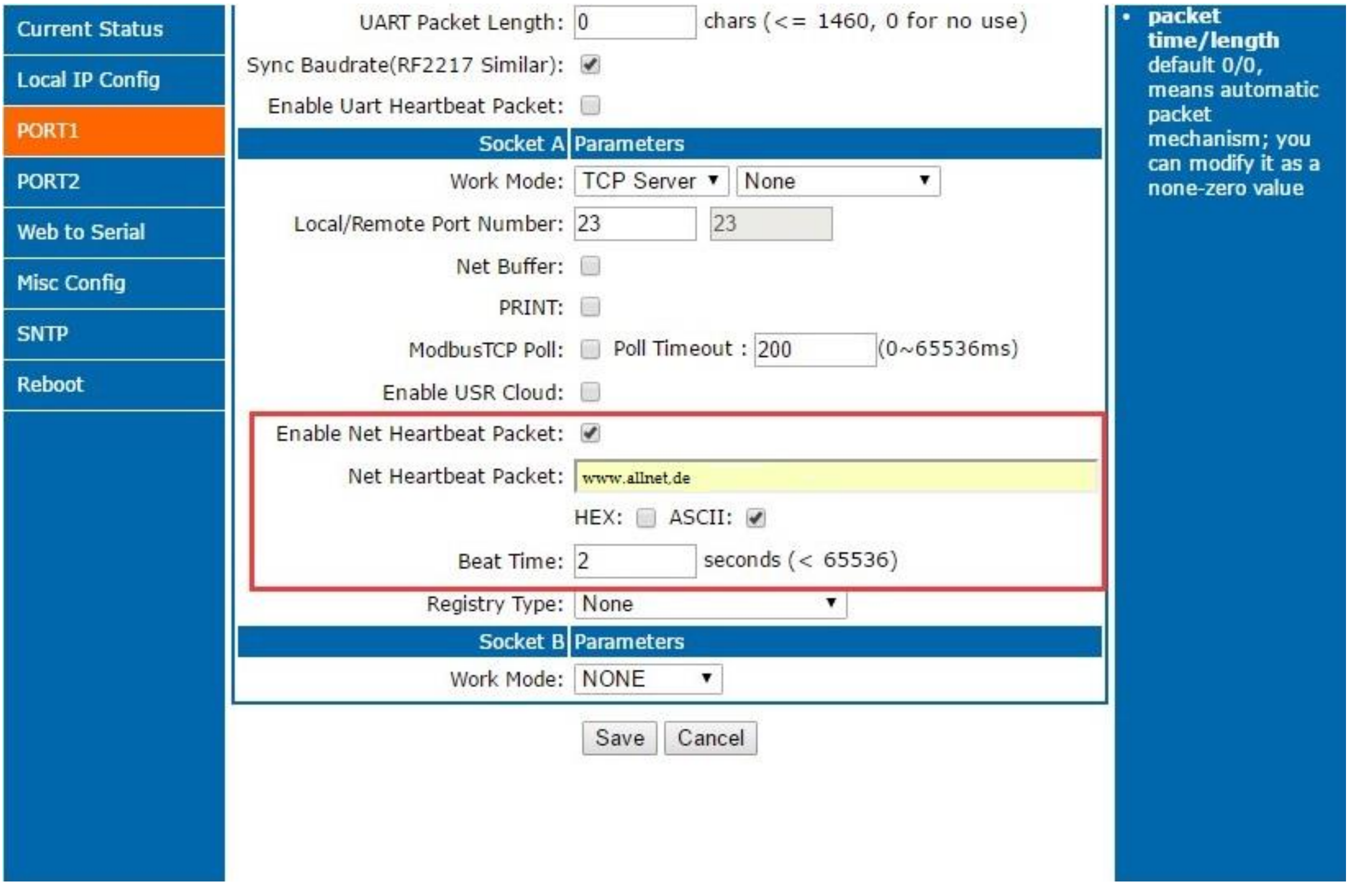
ALL-SDS102 access the domain name or dynamic domain name when work under Client mode. The length of domain name must be less than 30 bytes .ALL-SDS102 will analysis the domain name constantly if cannot connect to destination server.

When server's IP address is dynamics, DNS make ALL-SDS102 parameter no changes if according IP doesn't change no matter how server IP address changes.

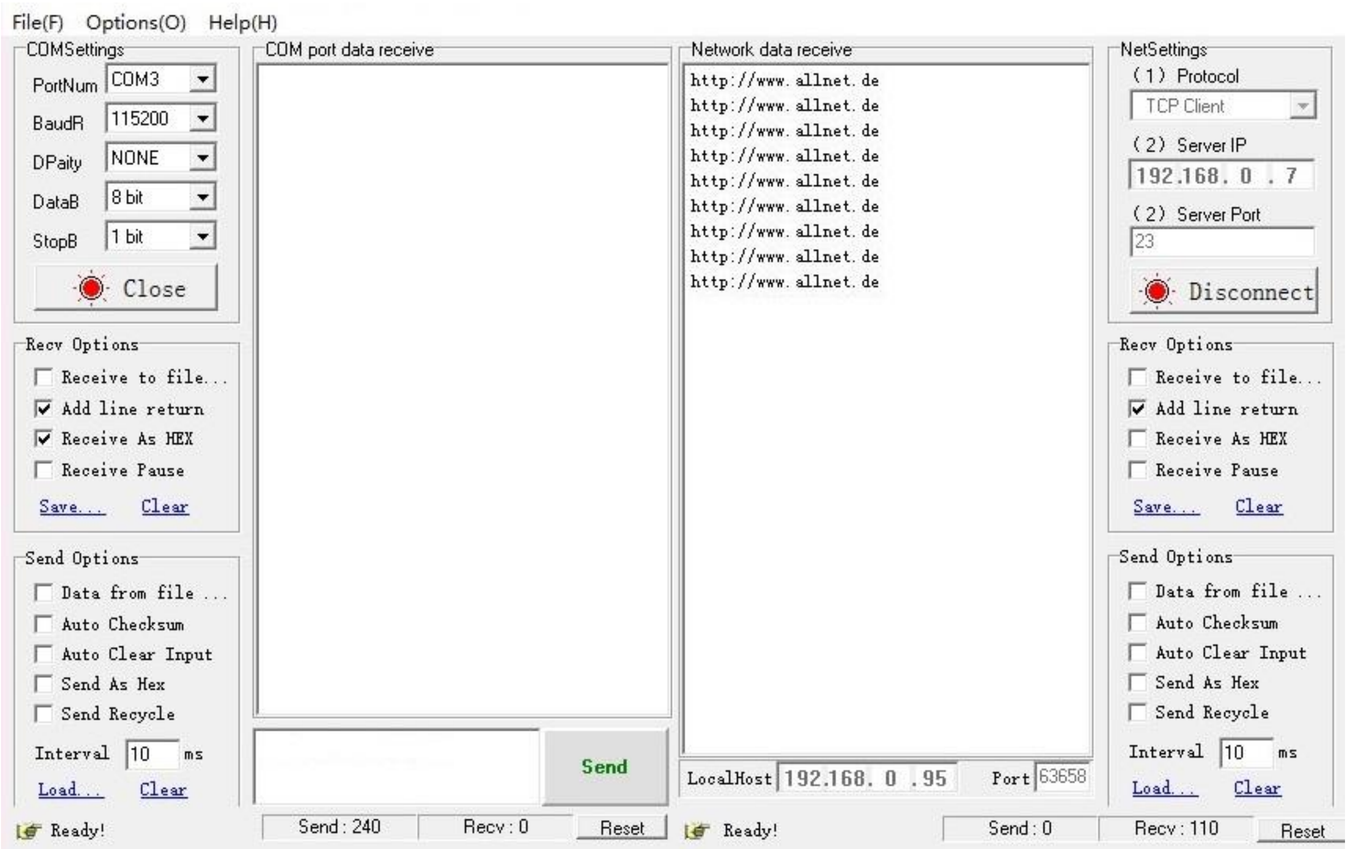
3.5.3. Self-Defined Heartbeat Function

ALL-SDS102 supports heartbeat function. Heartbeat is divided into network heartbeat and serial port heartbeat.

A. Set Network heartbeat through web page



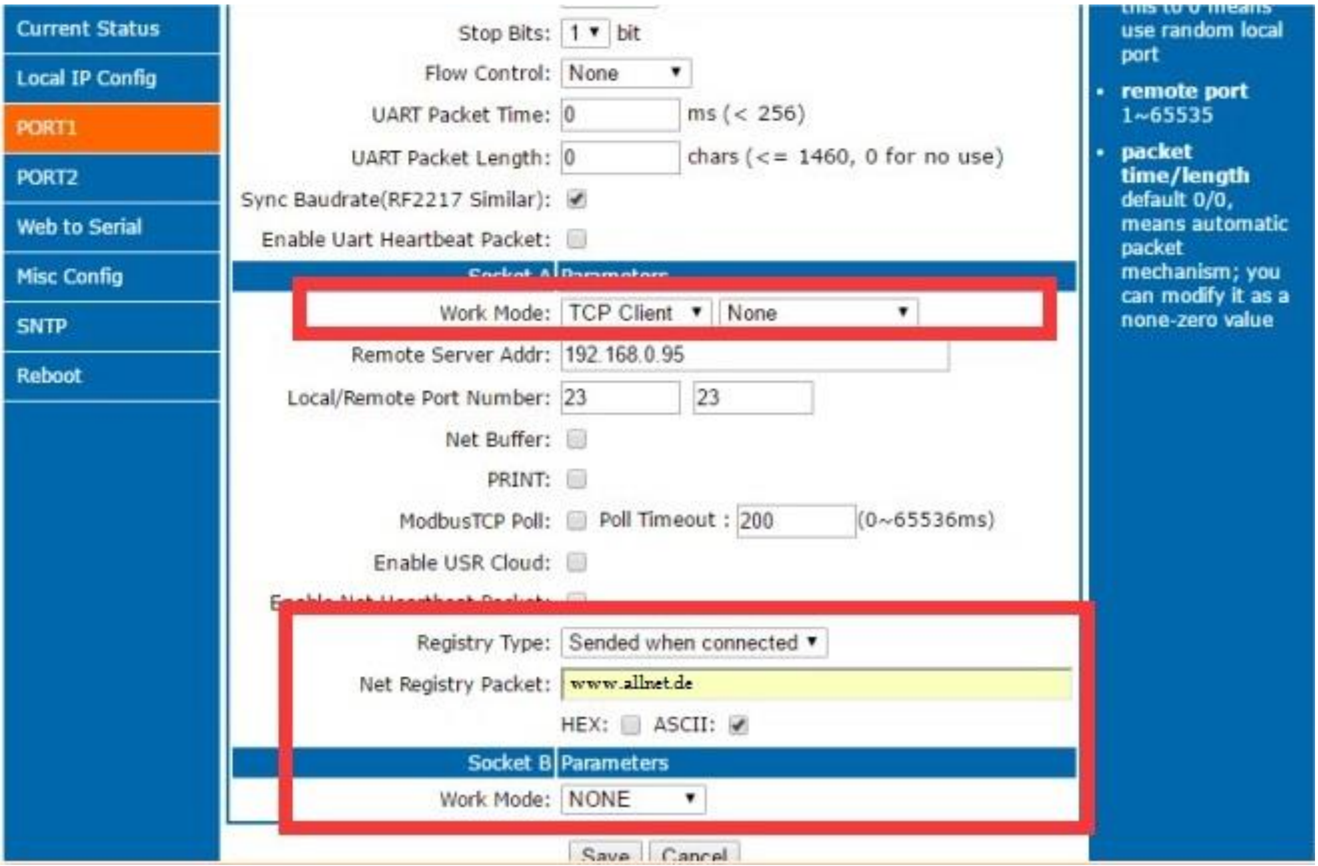
Drawing 26 - Self-Defined Heartbeat Function



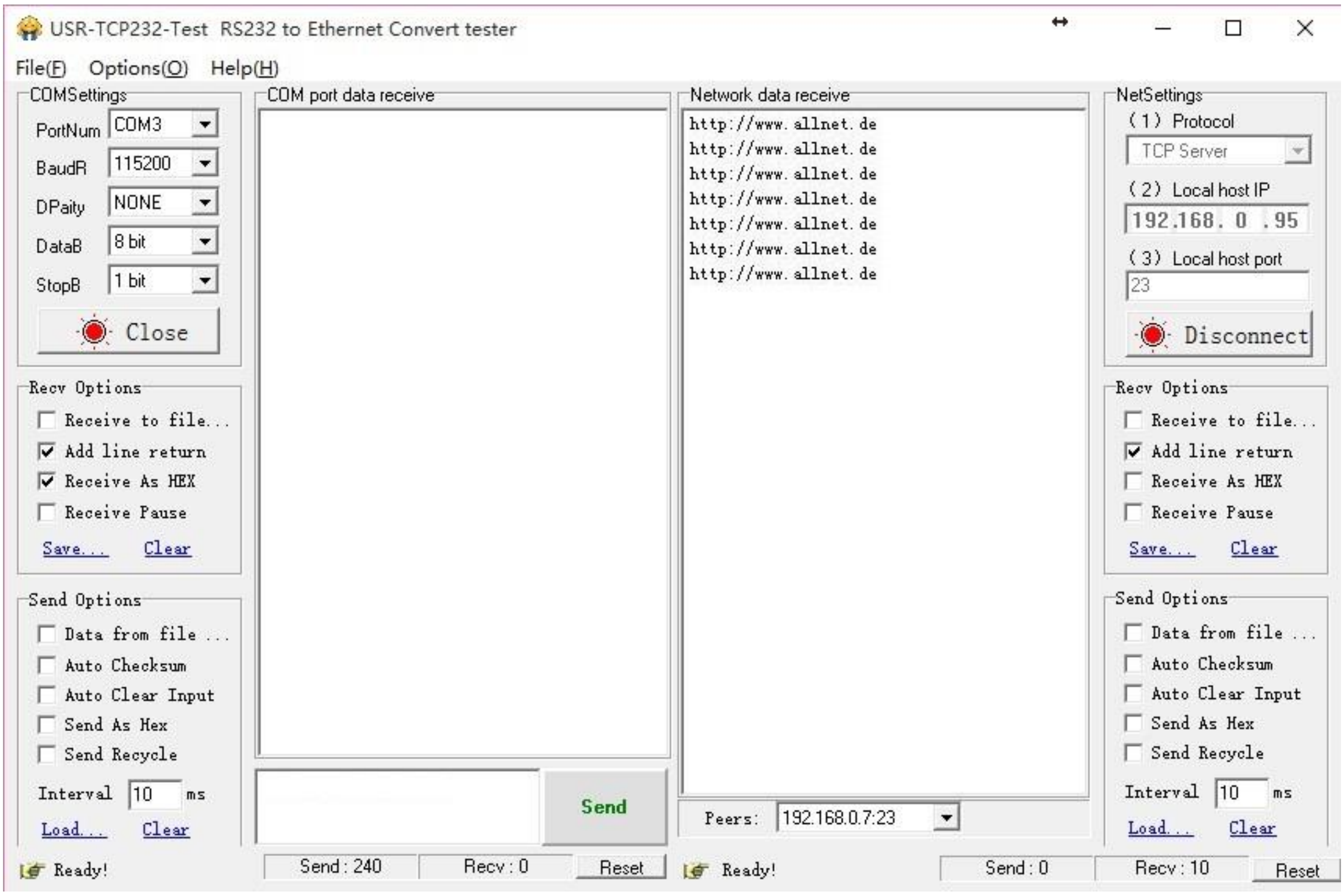
3.5.4. Self-Defined Registration Package Function

ALL-SDS102 supports self-defined registration package function and also supports to send self-defined registration package after connection establishment, meanwhile, it supports to send registration package when sending data. One example as blow:

A. Configure the relevant parameters via web page



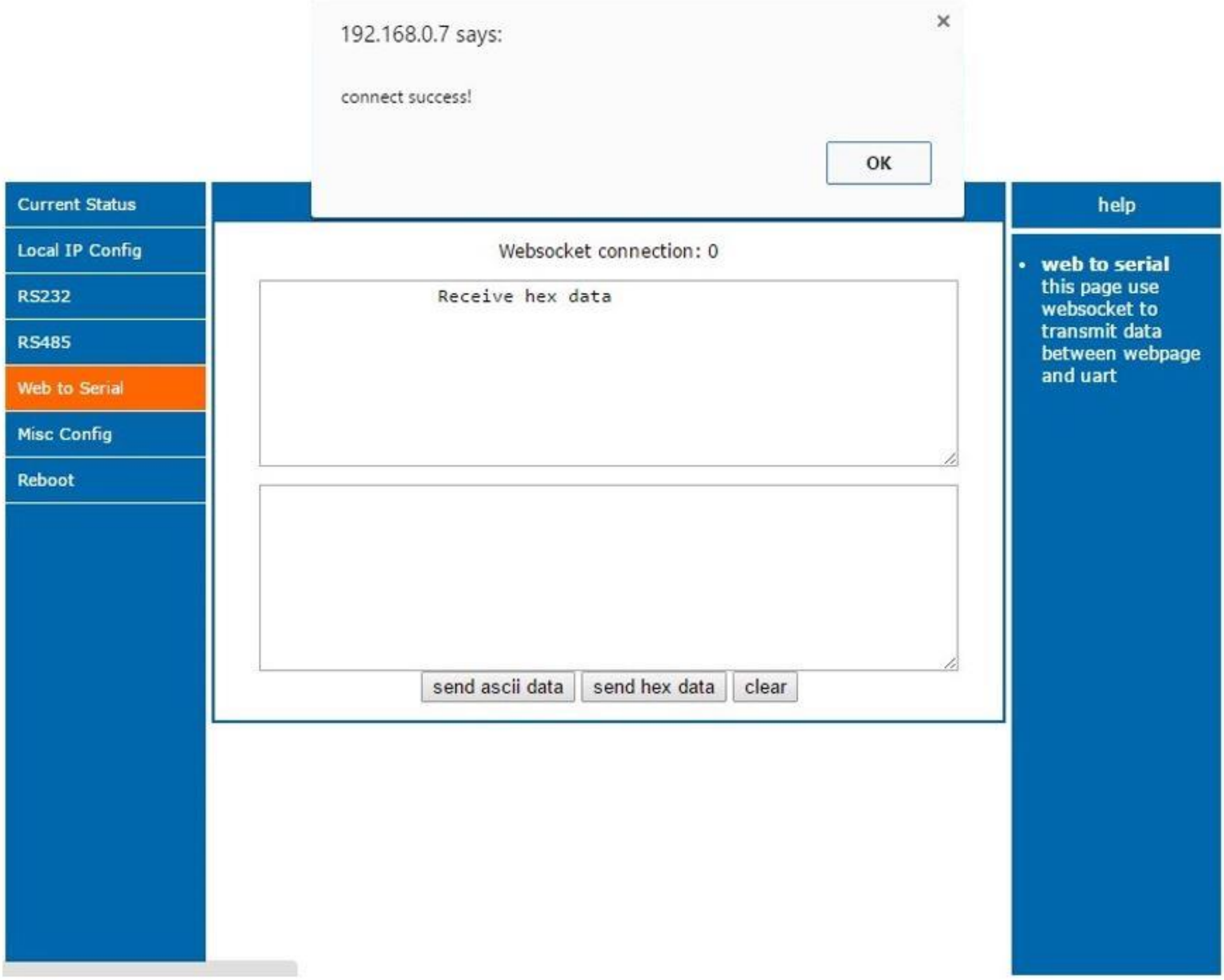
B. Testing result:



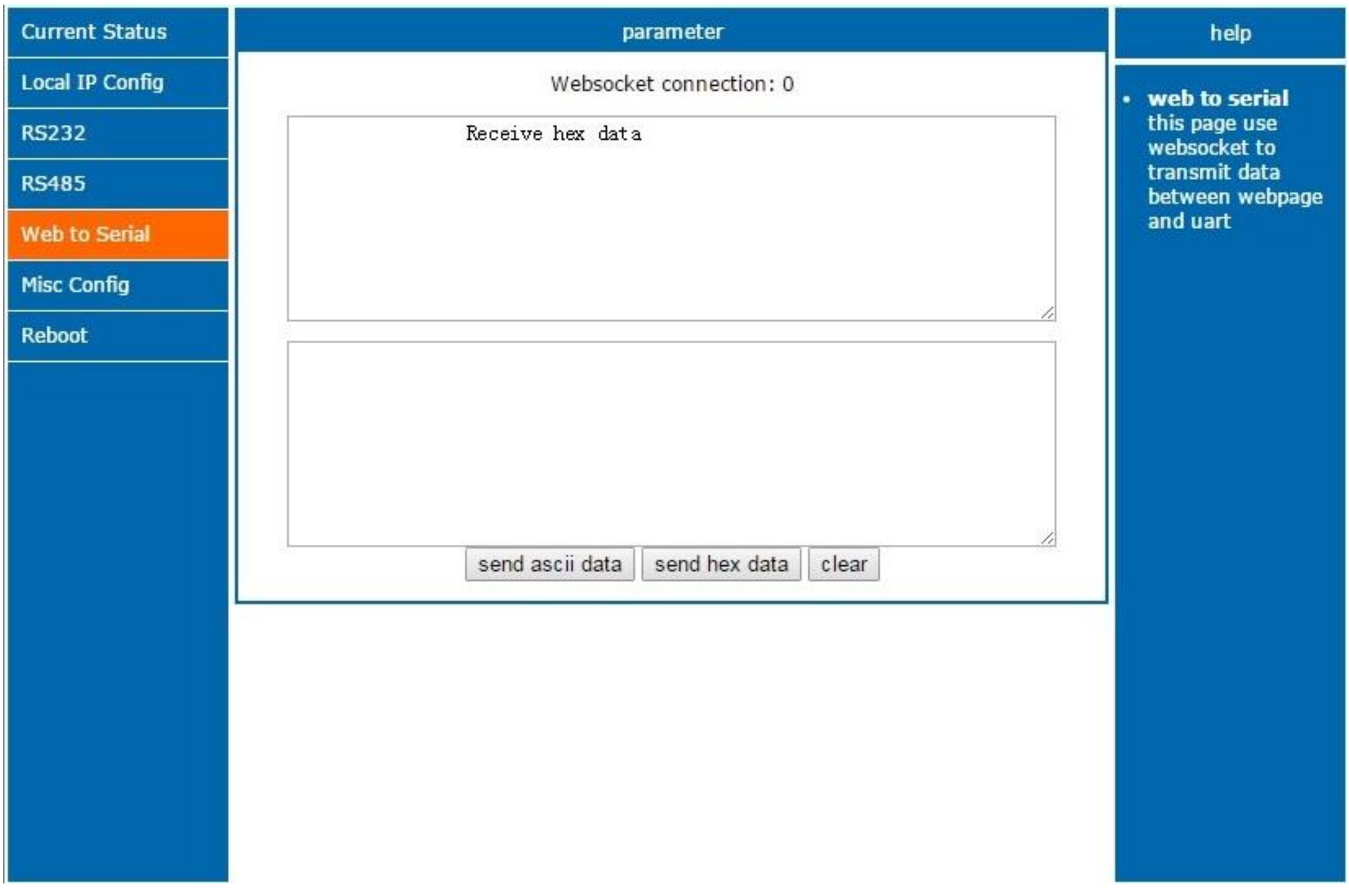
3.5.5. Web to serial

Web to serial function can make interaction between webpage and serial.

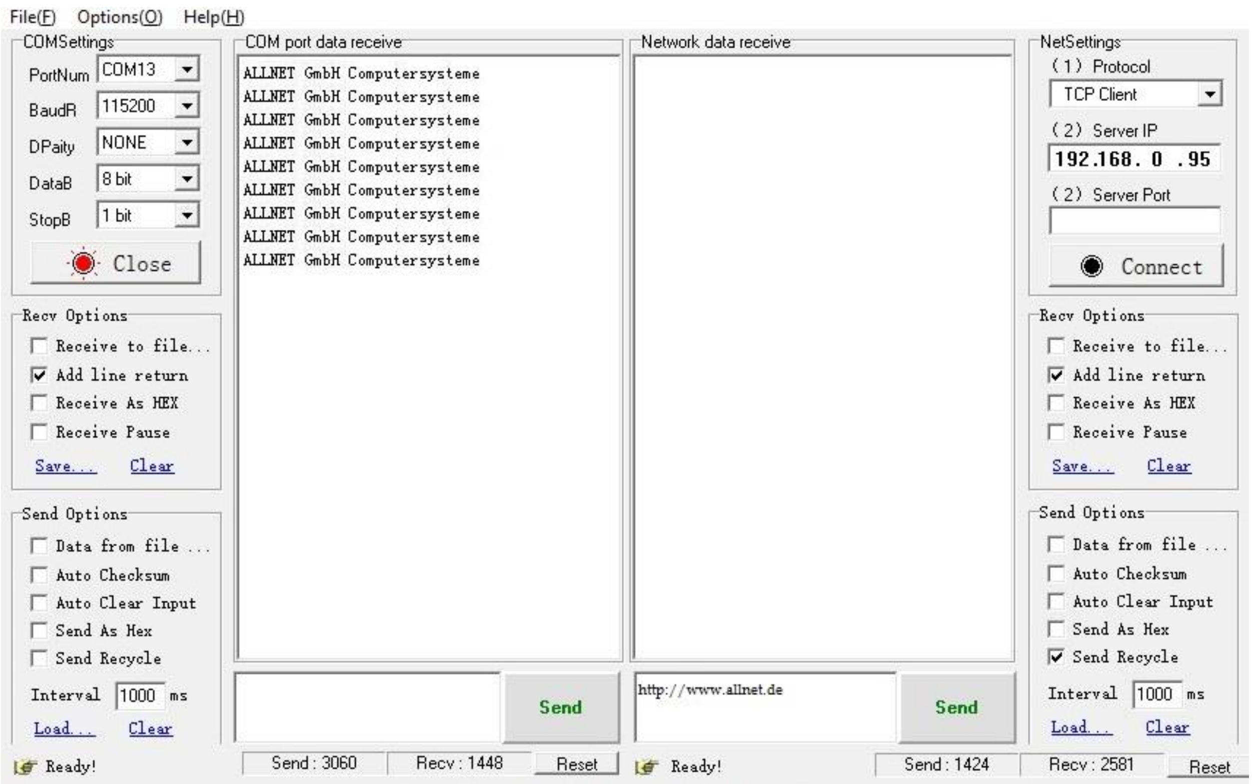
1. Set port 6432 as default.
2. Open webpage and click “web to serial”. It pops up “connect success” then can send/receive data. Open ALLNET SDS-Serials Test Software, configure serial parameter and click “Open”.
3. Click “send ASCII data”, COM can receive data. Click “Send” in TEST Software, webpage can receive data.



Web to Serial Webpage



Web to Serial COM Send/Receive Data



Web to serial test

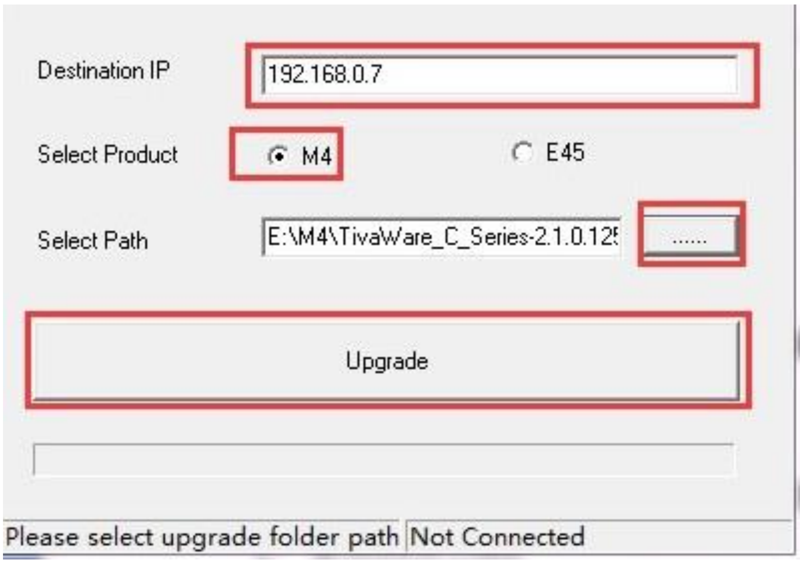
Web to serial needs user’s webpage programming ability. Design webpage, request own device’s data and process data then reveal the results on webpage. According to chapter4.1.17 Customized Webpage, can download revised webpage into ALL-SDS102.

1. Build a connection and connect to ALL-SDS102
```
function connectx(){
try{
socket=new WebSocket('ws://'+window.location.host+':6432');
socket.binaryType = "arraybuffer";
}catch(e){
alert('error');
return;
}
socket.onopen = sOpen;
socket.onerror=sError;
socket.onmessage=sMessage;
socket.onclose=sClose
}
```
2. Receive Data Function
```
function sMessage(msg)
```
3. Send data function
```
function send()
```

3.5.6. Customized Webpage

User can make revision as LOGO/NAME on the basis of ALL-SDS102’s webpage to realize the personalized applications.

1. Download Upgrade
2. Revise webpage code
3. Open “UpgradeHtml.exe”, set USR_ALL-SDS102’ IP, Select product M4 and upload revised webpage file.
4. Then upgrade.



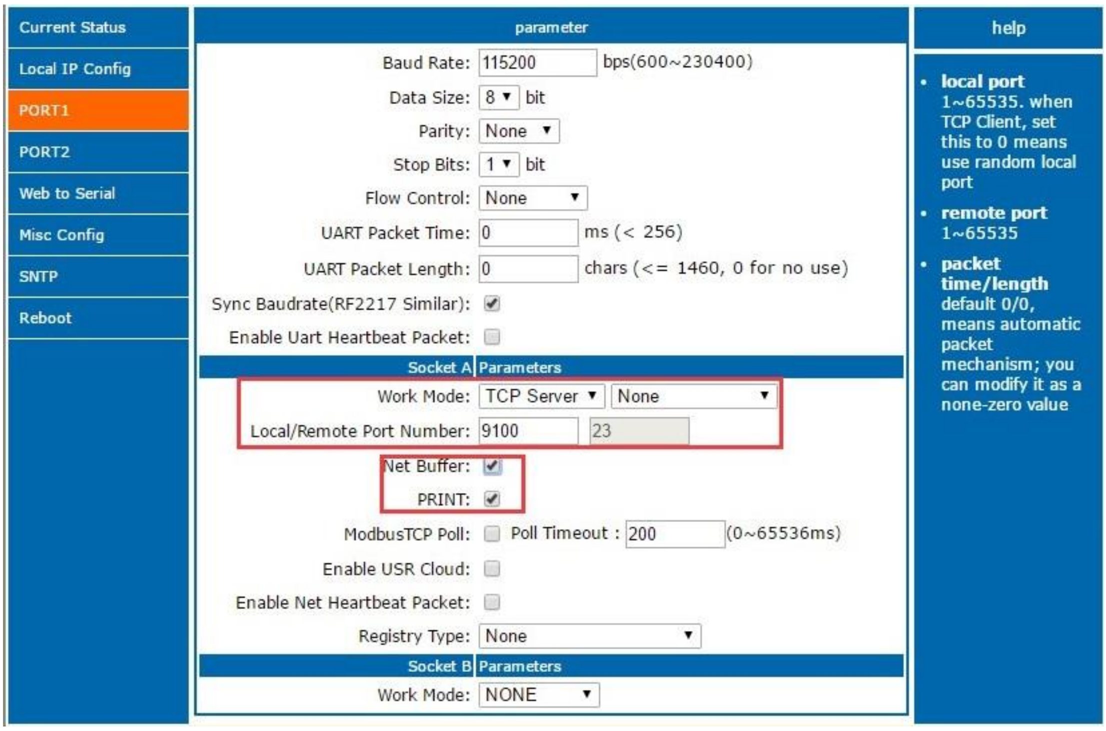
Customized Webpage Upgrade

3.5.7. Network Printing Function

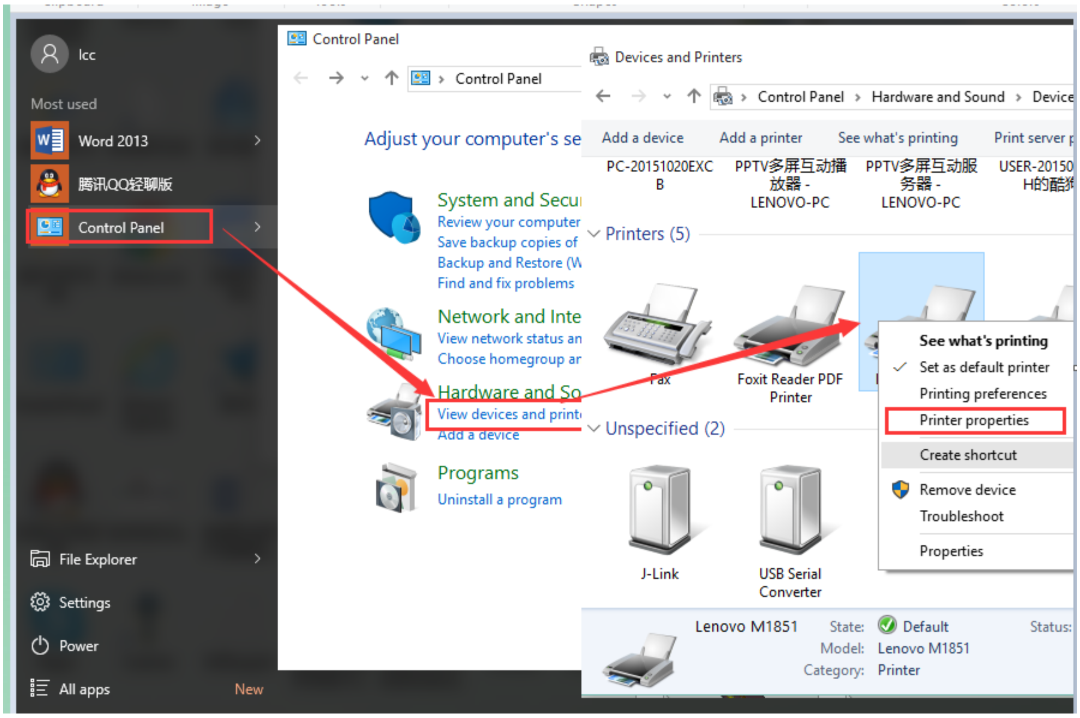
Network printing function is similar to printer server, it can be realized by the previous serial printer through the existed printing driver.

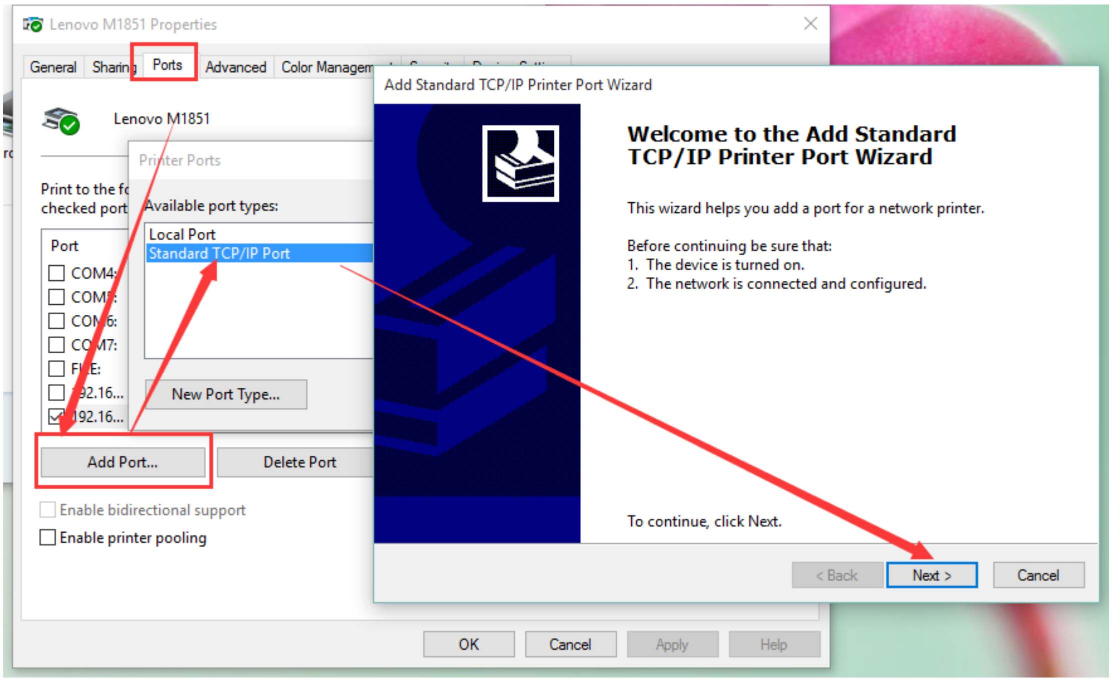
Testing Method:

A. Configure the parameter, set work mode as “TCP Server”, local port number “9100”, and have to choose “Net Buffer” and “PRINT”. Others do not need to be chosen.



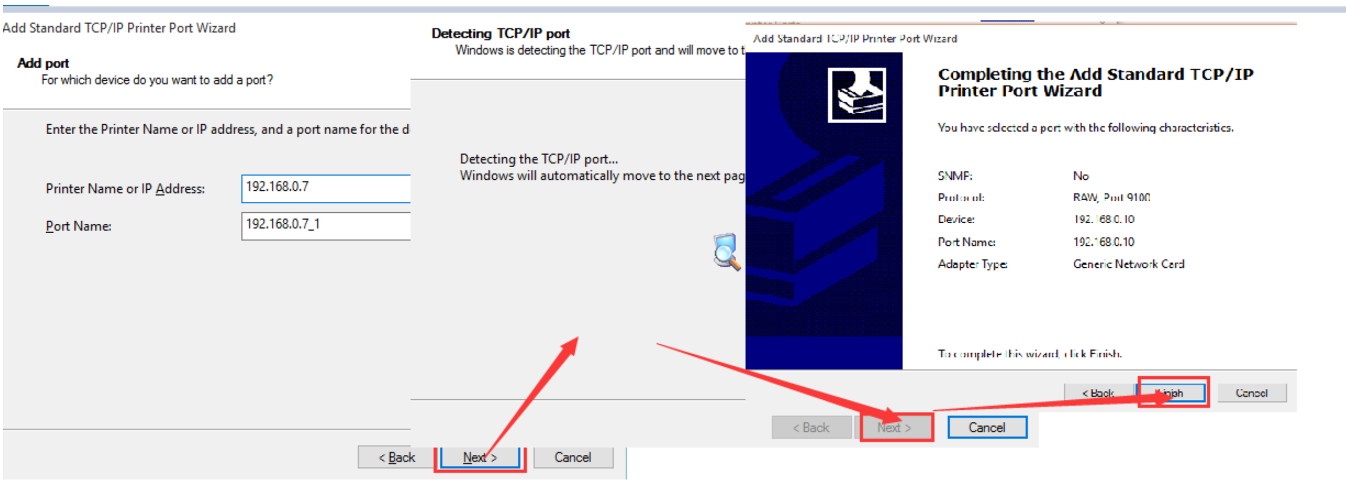
B. Set Printer Driver





Click next and input the ALL-SDS102'IP address, then keep clicking next till finished

C. Serial port connects to the printer, open a word file to print



3.5.8. Serial Port Packaging Mechanism

ALL-SDS102 can configure serial port packaging time and serial port packaging length. ALL-SDS102 will make packaging for the data of serial port according to the packaging length and packaging time in the transparent transmission mode.

Example for judgment of packaging time and packaging length:

A. Set packaging time as 10ms, packaging length as 512 bytes

When serial port received data, ALL-SDS102 will package and send it to network if the interval time of receiving data is over than 10ms or data length is more than 512。

B. If the value of packaging time or packaging length is 0, the packaging rule is effective for non-zero one.
C. Set packaging time and length as 0. ALL-SDS102 will conduct default packaging time when packaging time is set as 0ms. Namely, when serial port receiving data, ALL-SDS102 will package and send the data to network if interval time more than packaging time of sending 4 bytes. For example, baud rate 115200, packaging time for 4 bytes is T=0.4ms, when the calculated value is smaller than 0.1ms, packaging time can be calculated as 0.1ms.

$$T= 1/\text{baud rate}*10*4$$

3.5.9. Flow Calculation

When ALL-SDS102 receives data from network and then send to serial port, as the limit of serial port speed, user have to control the flow, if not the problem of data overflow on serial port side will occur. So data flow is required to calculated when sending data from network to serial port.

Example:

Network sends data in m bytes every n seconds. Method of checking if there is overflow: (Supposed network condition is good and network data transmission time is negligible)

A. If there is no overflow, m bytes data must be transmitted within n seconds, then the transmitting time of M bytes data:

$$T = \frac{1}{\text{Baud Rate}} * 10 * \mathrm{m}$$

If n >2T, then data will not overflow, ALL-SDS102 can work normally. Just need keep n>T under baud rate 9600.

3.5.10. Synchronous baud rate (RFC2217)

For encryption during data transmission, devices change data bytes, baud rate, parity and so on. ALL-SDS102 supports revise serial parameter accordingly.

Synchronous baud rate is named RFC2217. USR Similar RFC2217 make adjustments on the basis of RFC2217 protocol to improve accuracy of transmission.

Protocol length is 8 bytes. And values taken for example is in HEX:

Name	Packet Header	Baud Rate	Bytes parameter	Parity
Bytes	3	3	1	1
Explanation	reduce misjudgment	High is in front, smallest is 600(00 02 58)	data bytes, baud rate, parity	Remove 4 bits of header and ignore the high bit
(115200, N,8,1)	55 AA 55	01 C2 00	03	46
(9600, N,8,1)	55 AA 55	00 25 80	03	28

Serial parameter bit:

Bit #	Explanation	Value	Description
1:0	Data bit selection	00	5 bits
		01	6 bits
		10	7 bits
		11	8bits
2	Stop Bit	00	1 bit
		01	2bits
3	Parity Enable	00	Disable Parity
		01	Enable Parity
5:4	Parity Type	00	ODD

		01	EVEN
		10	Mark
		11	Clear
8:6	NC	000	0

Using methods:

1. ALLNET SDS-Serials Setup software, click "Synchronous baud rate (RFC2217)".
2. When serial parameter changes is needed, it send RFC 2217 packet. ALL-SDS102 receive the command from network and revise serial parameter accordingly.

3.5.11. KeepAlive

When ALL-SDS102's network is abnormal, it can judge the status in time and disconnect. And connect to server once network recovers.

3.5.12. Device ID

The function have 2 types: send ID once connection and send ID once sending data. It is used to condition that need register packet or need packet header/tail for normal transmission.

3.5.13. Webpage Port

ALL-SDS102 has built-in webpage server and the port is 80. Also the port can be revised and visit the web via revised port.

3.5.14. Revise MAC

User can check software's MAC address. ALL-SDS102 MAC is Globally Unique. Also it support customized MAC.

3.5.15. Firmware Upgrade

Firmware upgrade is fulfilled via network. For details, please refer to Chapter 5.1 configure parameter with configuration software.

3.5.16. Hardware Flow Control RTS/CTS & XON/XoFF

RTS/CTS: ALL-SDS102 supports serial RTS/CTS Hardware flow control function. It is disabled by default. Don’t enable it if device doesn't support Hardware flow control. This function is only run under RS232 port.
XoN/XoFF: ALL-SDS102 support software flow control function. It is disabled by default. It can be selected under RS232 port or RS422 port.

3.5.17. Reload

Cut off power firstly.
Press “reload” and supply power. Then keep pressing reload for 5 seconds.

Reload

4. Setting Protocol

ALL-SDS102 includes two protocol: network setting protocol and serial port setting protocol.

4.1. Network Setting Protocol

4.1.1. Set Parameter Process

1. Build SOCKET:
   Build UDP SOCKET, destination IP: 55.255.255.255, destination port: 1901. Low is in front.
2. Setting command process:
   A.The network send searching command
   B.ALL-SDS102 returns IP address and MAC
   C.The network read ALL-SDS102’s parameter
   D.Organize setting command according to MAC, known user name/password and parameter to be configured.
   E.Send setting command
   F.ALL-SDS102 returns “correct setting”
   G.Host PC send “save setting” command
   H.ALL-SDS102 returns “correct”

I.Restart command
J.USE-ALL-SDS102 returns “correct setting”

4.1.2. Setting Command Content

Command Look-up List:

Function	Header	Length	command	MAC (6 bytes)	User name /password (12bytes)	Parameter	Parity (sum)
search	FF	01	01	-	-	-	02
reset	FF	xx	02	[MAC]	[username] [password]	-	xx
read settings	FF	xx	03	[MAC]	[username] [password]	-	xx
Save settings	FF	xx	04	[MAC]	[username] [password]	-	xx
Basic settings	FF	xx	05	[MAC]	[username] [password]	Basic parameter	xx
Com 0 settings	FF	xx	06	[MAC]	[username] [password]	COM parameter	xx
Com 1 settings	FF	xx	07	[MAC]	[username] [password]	COM parameter	xx
Com 2 settings	FF	xx	08	[MAC]	[username] [password]	COM parameter	xx
USR Cloud			0x10	[MAC]	[username] [password]		

Notice: Check bit is sum check, starts from length byte (including length) to adding before checking (not including checking), result is check value, only low byte is remained.

1. Command examples
   A. Search command example
   Search command is set to:
   FF 01 01 02
   Sum check: 02 = 01 + 01
   B. Reset command example
   FF 13 02 d8 b0 4c 00 04 c9 61 64 6d 69 6e 00 61 64 6d 69 6e 00 c8
   Sum check:
   C8 = 13 + 02 + ... + 6E + 00
   User name and password both are 5 bytes+00 bits 0 for the lack.
   C. Read settings command example
   Send (16 bytes): FF 13 03 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 F9

D. Save reading settings command example

Send (16 bytes)：FF 13 04 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 FA

2. Some commands detailed annotation

A. Basic setting parameter command

Basic Parameter:

Name	Byte	Example	Explanation
ucSequenceNum	1	xx	Write the read values
ucCRC	1	xx	Write the read values
ucVersion	1	xx	Write the read values
ucFlags	1	80	IP address type: 0 in 8th bit: DHCP;1 in 8th bit: Static IP
usLocationURLPort	2	20 19	Write the read values
usHTTPServerPort	2	50 00	HTTP server port
ucUserFlag	1		Write the read values
ulStaticIP	4	38 00 A8 C0	Static IP
ulGatewayIP	4	01 00 A8 C0	Gateway
ulSubnetMask	4	00 FF FF FF	Subnet Mask
ucModName	16	55 53 52 2D 54 43 50 32 33 32 2D 45 00 00 00 00	ALL-SDS102 name
username	6	61 64 6D 69 6E 00	username
password	6	61 64 6D 69 6E 00	password
ucNetSendTime	1		Write the read values
uiId	2	01 00	Device ID
ucIdType	1	0	Device ID type (0~3) 0:no use 1:send id when connect 2:send id when send data 3:both
ucUserMAC	6	FF FF FF FF FF FF	MAC
ucReserved	8		Unused

Example:

FF 56 05 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 61 66 03 80 20 19 50 00 02 07 00 A8 C0 01 00 A8 C0 00 FF FF FF 55 53 52 2D 54 43 50 32 33 32 2D 45 34 35 00 00 61 64 6D 69 6E 00 61 64 6D 69 6E 00 02 01 00 00 AC CF 23 66 66 67 00 48 54 54 50 2F 31 2E 1C

B. Port settings parameter command

Port parameter:

Name	bytes	example	Explanation
ulBaudRate	4	00 C2 01 00	Baud Rate
ucDataSize	1	08	COM data bits (0X05/0x06/0x07/0x08)
ucParity	1	01	COM parity 1: no, 2: odd, 3: even, 4: mark, 5: space
ucStopBits	1	01	COM stop bit (0x01/0x02)
ucFlowControl	1	01	COM flow control (0x01; no, 0x03:HW)
ulTelnetTimeout	4	00 00 00 00	Network reconnection time
usTelnetLocalPort	2	17 00	Local Port
usTelnetRemotePort	2	17 00	Remote Port
uiTelnetURL	30	31 39 32 2E 31 36 38 2E 30 2E 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00	IP address send in ASCII. Example: 192.168.0.1
ulTelnetIPAddr	4	00 00 00 00	Not adopted
ucFlags	1	02	Enable MODBUSTCP：0x010(bit2) Enable 2217: 0x08(bit3) Enable USR cloud: 0x010(bit4)
ucWorkMode	1	03	Working mode: 0: UDP, 1: TCP Client, 2: UDP Server, 3: TCP Server, 4: HTTPD Client
uiPackLen	4	C8 00 00 00	COM pack length
ucPackTime	1	0A	COM pack time
ucTimeCount	1	91	Write the read values
TCP server type	1	1	Write the read values
ucReserved	4	Casual value	saved

Example:

FF 52 06 AC CF 23 66 66 67 61 64 6D 69 6E 00 61 64 6D 69 6E 00 00 C2 01 00 08 01 01 01 00 00 00 00 17 00 17 00 31 39 32 2E 31 36 38 2E 30 2E 32 30 31 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 08 03 C8 00 00 00 0A 95 11 00 00 00 00 42

4.1.3. Commands' Return Content

1. Return results of search command

Return command:

Bytes	Name	Example	Explanation
0	TAG_STATUS	FF	
1	Packet_length	24	
2	CMD_DISCOVER_TARGET	01	
3	Board_type	00	
4	Board_ID	00	
5~8	Client_IP_address	C0 A8 00 07	Device IP(High in front)
9~14	MAC_address	AC CF 23 20 FE 3D	Device MAC(High in front)
15~18	Firemware_version	D0 07 12 34	D0 07: device version# (low in front) 12 34: encrypted version
19~34	Application_title	55 53 52 2D 54 43 50 32 33 32 2D 35 30 30 00 00	Device name
35	checksum	F0	checksum

Example:
Return results of search command(36 bytes)
FF 24 01 00 4B C0 A8 00 4D D8 B0 4C 00 04 C9 DD 07 01 00 55 53 52 2D 54 43 50 32 33 32 2D 34 30 31 00 00 EF
The method of the check is as follow:
0xEF = 00 - FF - 24 - 01 - 00 - 4B - ... - 31 - 00 - 00

2. Return results of reset command
   Response(4 bytes): FF 01 02 4B, if user name and password are right, 4B = 'K'
   FF 01 02 45, if user name and password are wrong, 45 = 'E'
3. Return results of read command
   Description：
   Return all parameter of ALL-SDS102 network. 193 bytes in total, no parity, no protocol, return parameter directly.
   Returned content: 193 (basic parameter+serial parameter+serial parameter)

4. Return results of save settings command
   If settings are correct, it returns:
   FF 01 04 4B
5. Return results of basic settings command
   FF 01 05 4B
6. Others return results
   Sum check fault returns 'E' + right parity
   Correct execution: FF 01 CMD 'K'
   User name/password fault returns: FF 01 CMD 'P'
   Others faults return: FF 01 CMD 'E'

4.2. Serial Setting Protocol

4.2.1. AT Command

AT Command List:

Table 1 AT Command List

Command	Instruction
(blank)	Blank Command
E	Open/close echo function
Z	Re-start device
VER	Query version number
ENTM	Enter to transparent transmission mode
MAC	Query/set MAC
UART	Set/query serial port parameter
SOCKMN	Set SOCK parameter
DHCPEN	Open/close automatic obtaining IP address
WANN	Open/close WAN port parameter
WEBU	Query/set web page user's name and password
WEBPORT	Query/set web page port number
SEARCH	Query/set searching key words
CLEAR	Factory reset
UART	Set/query serial port 0 parameter
UART1	Set/query serial port 1 parameter
SOCK	Set/query port 0 network SOCKETA parameter

SOCK1	Set/query port 1 network SOCKETA parameter
SOCKB	Set/query port 0 network SOCKETB parameter
SOCKB1	Set/query port 1 network SOCKETB parameter
MAC	Query MAC parameter
WRMAC	Set MAC parameter
DNS	Set/query domain name analyzing address
WANN	Set/query module IP address, gateway, subnet mask parameter

4.2.2. Enter AT Command Mode

A.Send +++ to ALL-SDS102 through serial port
B.ALL-SDS102 return ‘a’
C.Need reply “a” within 3s once received previous ‘a’
D.Return+ok to enter AT command mode

4.2.3. AT Command details

1. AT+E
   - Function: Set/query echo setting
   - Format:
     - Query

       AT+E <CR>

       <CR><LF>+OK=<on/off><CR><LF>
     - Set

       AT+E=<on/off><CR>

       <CR><LF>+OK<CR><LF>
   - Parameter:

① on: Open echo function, and input AT command (Echo on)
② off: Close echo function. (Echo off)

2. AT+ENTM
   - Function: Enter transparent transmission mode (Exit command mode)
   - Format:
     - Set

       AT+ENTM<CR>

       <CR><LF>+OK<CR><LF>
   - Parameter: N/M

     Change work mode from command mode to transparent transmission mode after run this command correctly

3. AT+Z
   - Function: Re-start ALL-SDS102
   - Format:
     - Set

       AT+Z<CR>

       <CR><LF>+OK<CR><LF>

       Parameter: N/M

       <Notice>: ALL-SDS102 will re-start after run this command correctly.
     - Date xxxx.xx.xx (For example 2014.01.02 stands for January 2nd, 2014).
4. AT+VER
   - Function: Set/query firmware version

- Format:
  - Query

    AT+VER<CR>

    <CR><LF>+OK=<ver><CR><LF>
- Parameter:
  - ver: Set/Query the firmware version of ALL-SDS102
    - Gerenal version: AA.BB.CC: AA stands for big version, BB stands for small version number, CC stands for hardware version C.C
    - Custom version: AA.BB.CC.DD-ID; DD stands for customer's version, ID stands for customer's ID number

5. AT+MAC
   - Function: Query MAC
   - Format:
     - Query

       AT+MAC<CR>

       <CR><LF>+OK=<mac><CR><LF>
   - Parameter:
     - mac: MAC Address of ALL-SDS102 (Example 01020304050A);

6. AT+WRMAC
   - Function: Set MAC
   - Format:
     - Set

       AT+WRMAC=<mac><CR>

       <CR><LF>+OK<CR><LF>
   - Parameter:
     - mac: MAC Address of ALL-SDS102 (Example 01020304050A);

7. AT+WEBU
   - Function: Set/query user's name and password of web page
   - Format:
     - Query

       AT+WEBU<CR>

       <CR><LF>+OK=<username,password><CR><LF>
     - Set

       AT+WEBU<CR>

       <CR><LF>+OK =<username,password><CR><LF>
   - Parameter:
     - username: user's name, supports max 5 bytes. Does not support blank
     - password: password, supports max 5 bytes

8. AT+WEBPORT
   - Function: Set/query web server port of ALL-SDS102
   - Format:

- Query

  AT+WEBPORT<CR>

  <CR><LF>+OK=<port><CR><LF>
- Set

  AT+WEBPORT<CR>

  <CR><LF>+OK =<port><CR><LF>

➢ Parameter:
- port: web server's port of ALL-SDS102, default 80;

9. AT+SEARCH

➢ Function: Set/query search port and key words of ALL-SDS102 inside LAN

➢ Format:
- Query

  AT+SEARCH<CR>

  <CR><LF>+OK=<port,keywords><CR><LF>
- Set

  AT+ SEARCH <CR>

  <CR><LF>+OK =< port,keywords><CR><LF>

➢ Parameter:
- port: serching port of ALL-SDS102, default 48899
- keywords: searching key words of ALL-SDS102, Default: www.usr.cn (Max 20 bytes).

9. AT+CLEAR

➢ Function: Restore factory setting

➢ Format:
- Set

  AT+CLEAR<CR>

  <CR><LF>+OK<CR><LF>

Parameter: N/M

10. AT+UART

➢ Function: Set/query the parameter of UART0

➢ Format:
- Query:

  AT+UART<CR>

  <CR><LF>+OK=<baudrate,data_bits,stop_bit,parity,flowctrl，uartnum><CR><LF>
- Set

  AT+UART=<baudrate,data_bits,stop_bit,parity,flowctrl，uartnum ><CR><LF>

  <CR><LF>+OK<CR><LF>

➢ Parameter:
- baudrate: baud rate
  - 9600,19200,38400,57600,115200,230400,380400,460800
- data_bits: data bits 5,6,7,8
- stop_bits: stop bits 1,1.5,2 (which module supports)
- parity: check bit

- NONE (no check bit)
- EVEN (even check)
- ODD (odd check)
- MASK (1 check)
- SPACE (0 check)

◆ flowctrl: hardware flow control (CTS RTS)

- NFC: no hardware flow control
- FC: hardware flow control
- 485: supports 485, after opening, RS_EN pin and RTS pin are the same

◆ uartnum：0

11. AT+UART1

➢ Function: Set/query UART0 interface parameter

12. AT+SOCKMN

(M: socket number, A~H. N: corresponding serial port number, 1~8. Omit MN numbers for single serial port and single socket)

➢ Function: Set/query network protocol parameter format:

◆ Query

AT+SOCKMN<CR>

<CR><LF>+OK=<protocol,IP,port ><CR><LF>

◆ Set

AT+SOCKMN=< protocol,IP,port ><CR>

<CR><LF>+OK<CR><LF>

➢ Parameter:

◆ Protocol: protocol type

- TCPS: TCP server
- TCPC: TCP client
- UDPS: UDP server
- UDPC: UDP client
- TCPA: TCP auto
- WEBUART: websocket, tranmission from webpage to serial port

◆ IP: Server’s IP address when ALL-SDS102 works as “CLIENT’

◆ Port: Protocol port, decimal number, smaller than 65535

13. AT+DHCPEN

➢ Function: Open/close DHCP Server;

➢ Format:

◆ Query

AT+DHCPEN<CR>

<CR><LF>+OK=<Type><CR><LF>

◆ Set

AT+DHCPGW=<Type><CR>

<CR><LF>+OK<CR><LF>

➢ Parameter

- Type:
  - On: open DHCP server function
  - Off: close DHCP server function (ALL-SDS102 works as wireless switch at this time)

14. AT+WANN
    - Function: Set/query obtained WAN port IP (DHCP/STATIC);
    - Format:
      - Query

        AT+WANN<CR>

        <CR><LF>+OK=<mode,address,mask,gateway><CR><LF>
      - Set

        AT+WANN=<mode,address,mask,gateway><CR>

        <CR><LF>+OK<CR><LF>
    - Parameter:
      - mode: network IP mode.
        - static: static IP
        - DHCP: dynamic IP (address, mask, gateway parameter is omitted)
      - address: IP address.
      - mask: subnet mask.
      - gateway: gateway address.

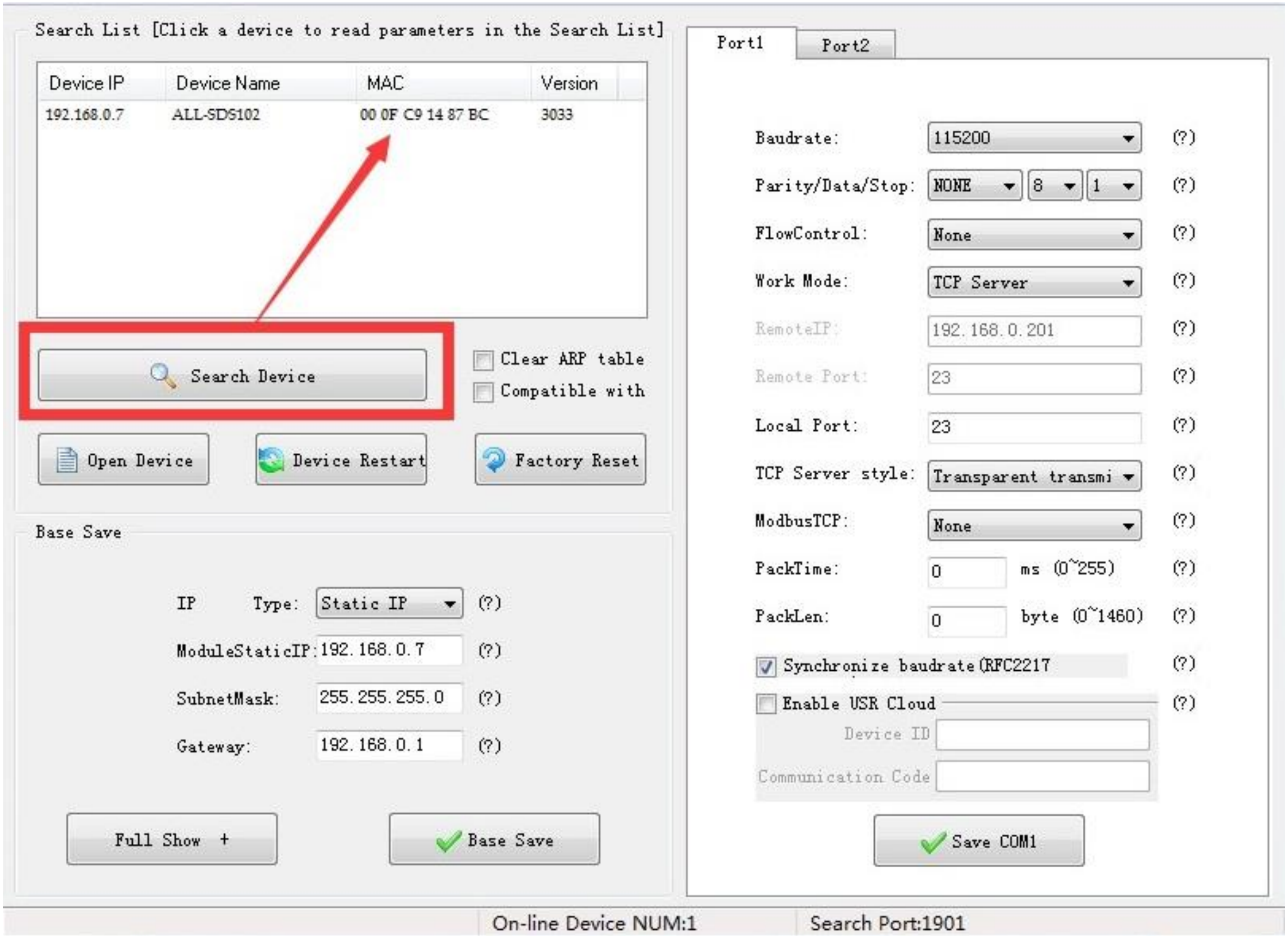
5. Parameter Configuration

It is setup software configuration, webpage configuration and serial configuration.
How to configure:
Revise user name/password→set IP access method→serial parameter→ALL-SDS102 work mode→work mode related parameter

5.1. Software Configuration

To make sure setup software normal running, please check the below firstly:
1. ALL-SDS102 and setup software PC are within same LAN.
2. Disable the anti-virus software and firewall on PC.
3. Disable network card nothing to do with this testing.

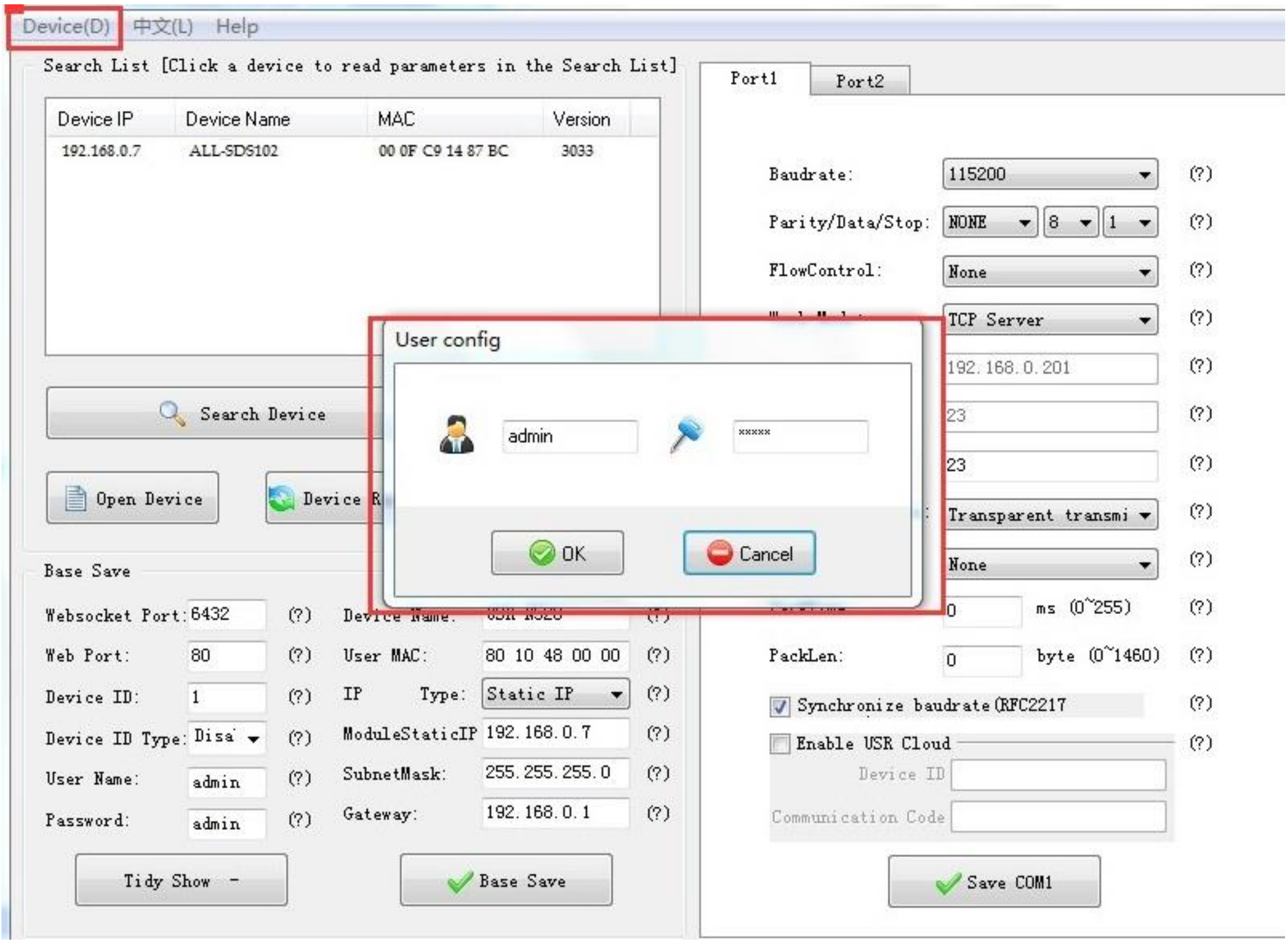
Download ALLNET SDS-Serials Setup Software here:
http://www.allnet.de/de/allnet-brand/support/downloads-search/
Search device and all ALL-SDS102 device within LAN can be found. It includes IP, name, MAC and version.



Software Configuration—Search

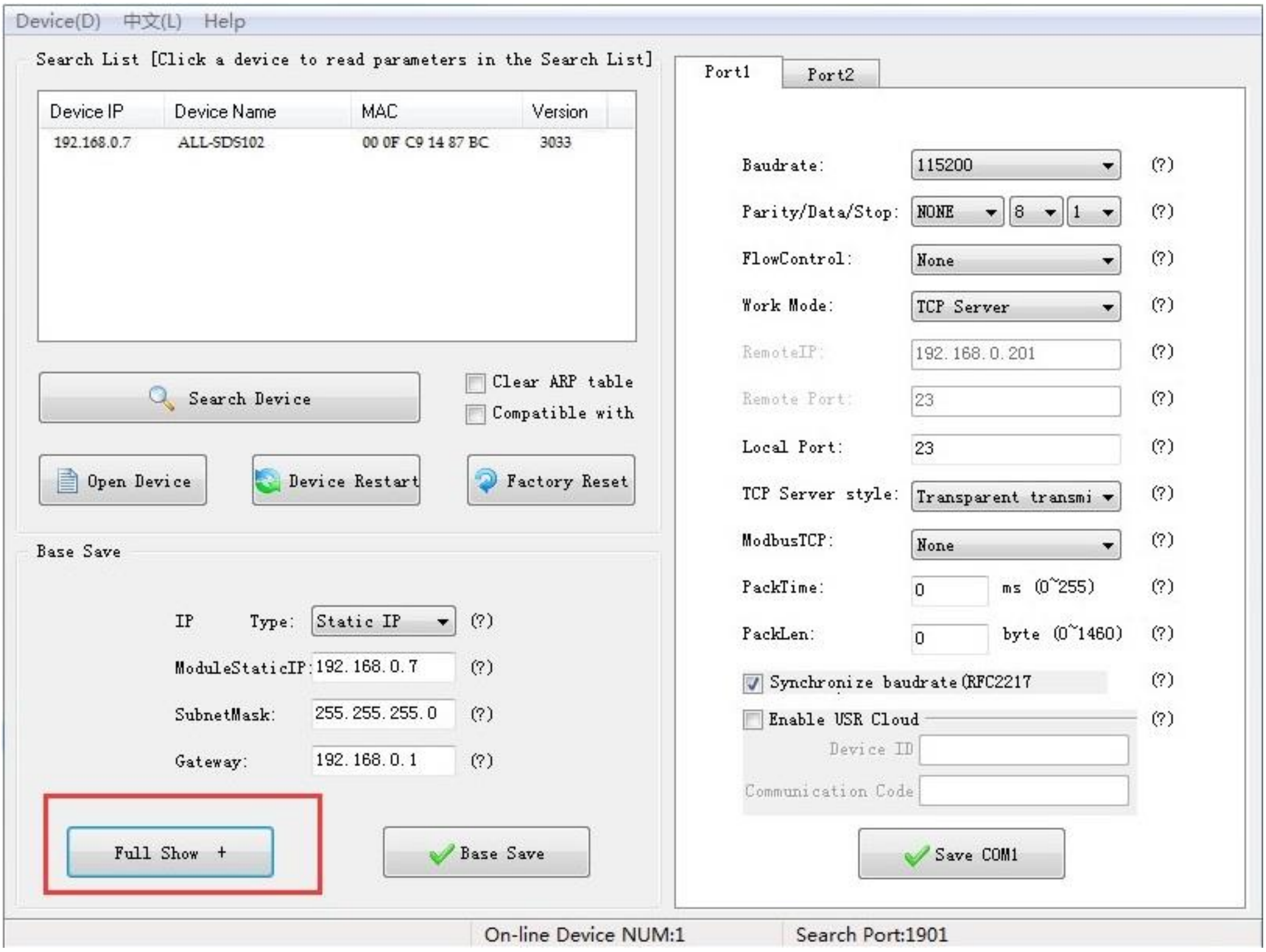
1. Click 'Device' on the top of the program and then check user name/password via 'User config'. If it is correct, it reveals ALL-SDS102 information. If not, it pops up retype window, click "Confirm".

   User name and password is admin by default.

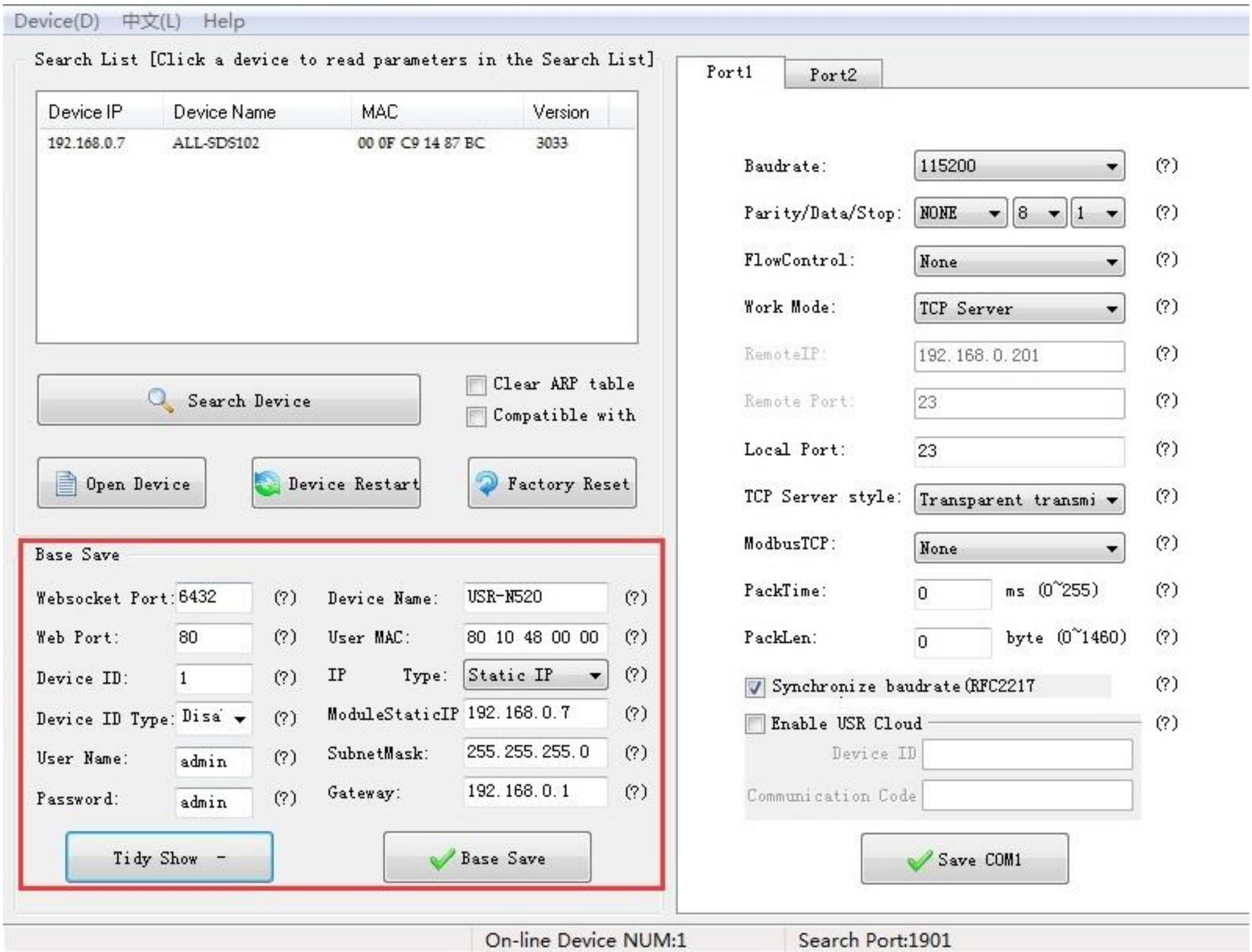


Software Configuration-Password

2. Basic parameter configuration
   Click "Full Show" and all basic parameter is revealed.
   Set the parameter as needs and click "Base Save" then can set successfully.



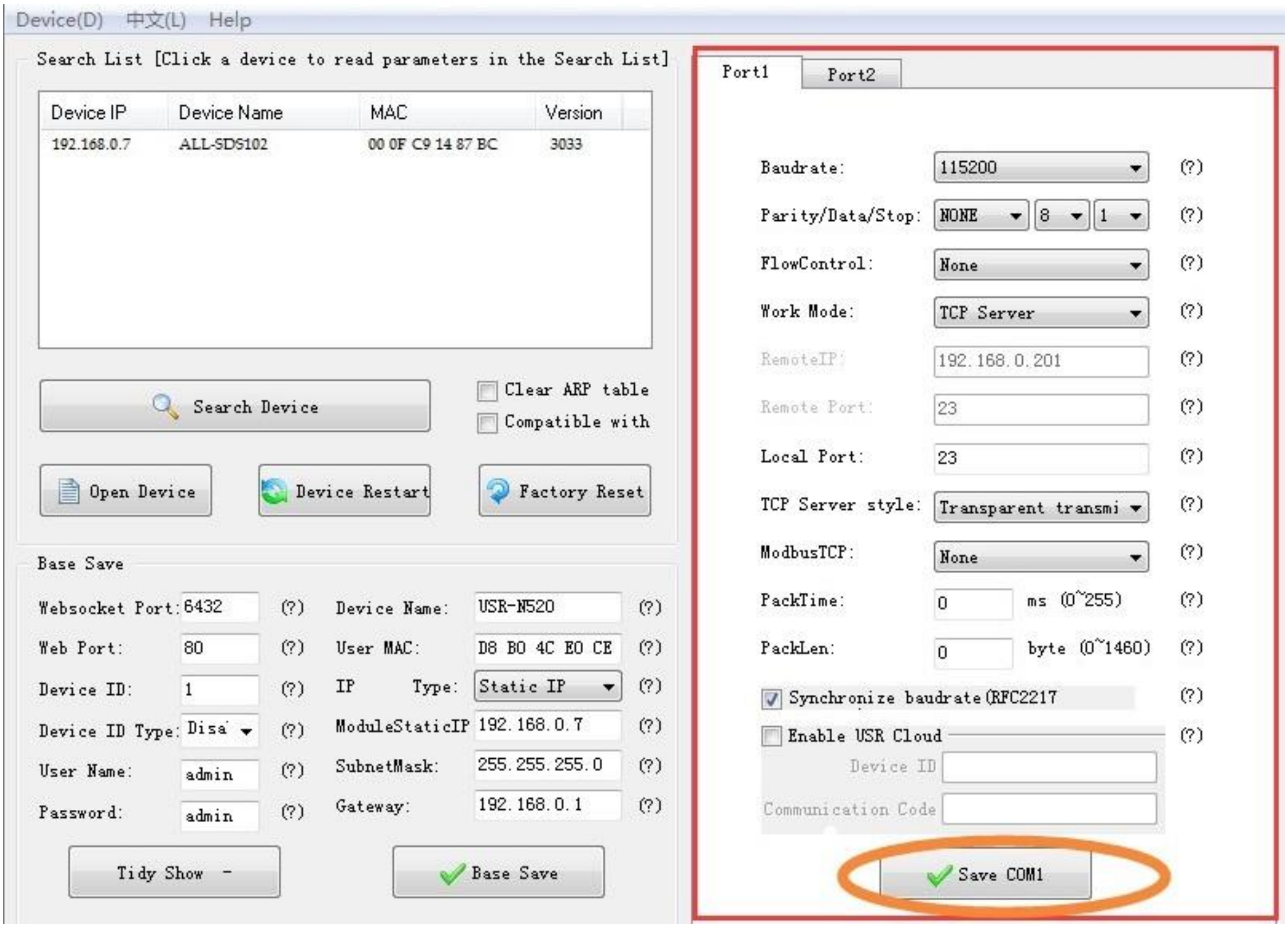
Software Configuration --Full Show



Software Configuration-Base Save

- Websocket port: refer to Chapter 4.1.8.3 Webpage to serial
- Webpage port: it is 80 by default when visit webpage.
- Device ID: refer to Chapter 4.1.8.6 Device ID
- Device ID type: sending ID type
- User name: Authentication Code for revising parameter to avoid other users within same LAN revising it.
- Password: same as user name.
- Device Name: ALL-SDS102's name can be revised.
- MAC address: ALL-SDS102 ' MAC
- IP address type: Static and DHCP
- ALL-SDS102 static IP: same segment with router.
- Subnet Mask: 255.255.255.0 by default.
- Gateway: it is router IP generally, can transmit cross network segment and DNS if set correctly.

3. Port configuration (Port1 / Port2 configuration)
Click the COM to set, revise parameter then click “Save COM1”.



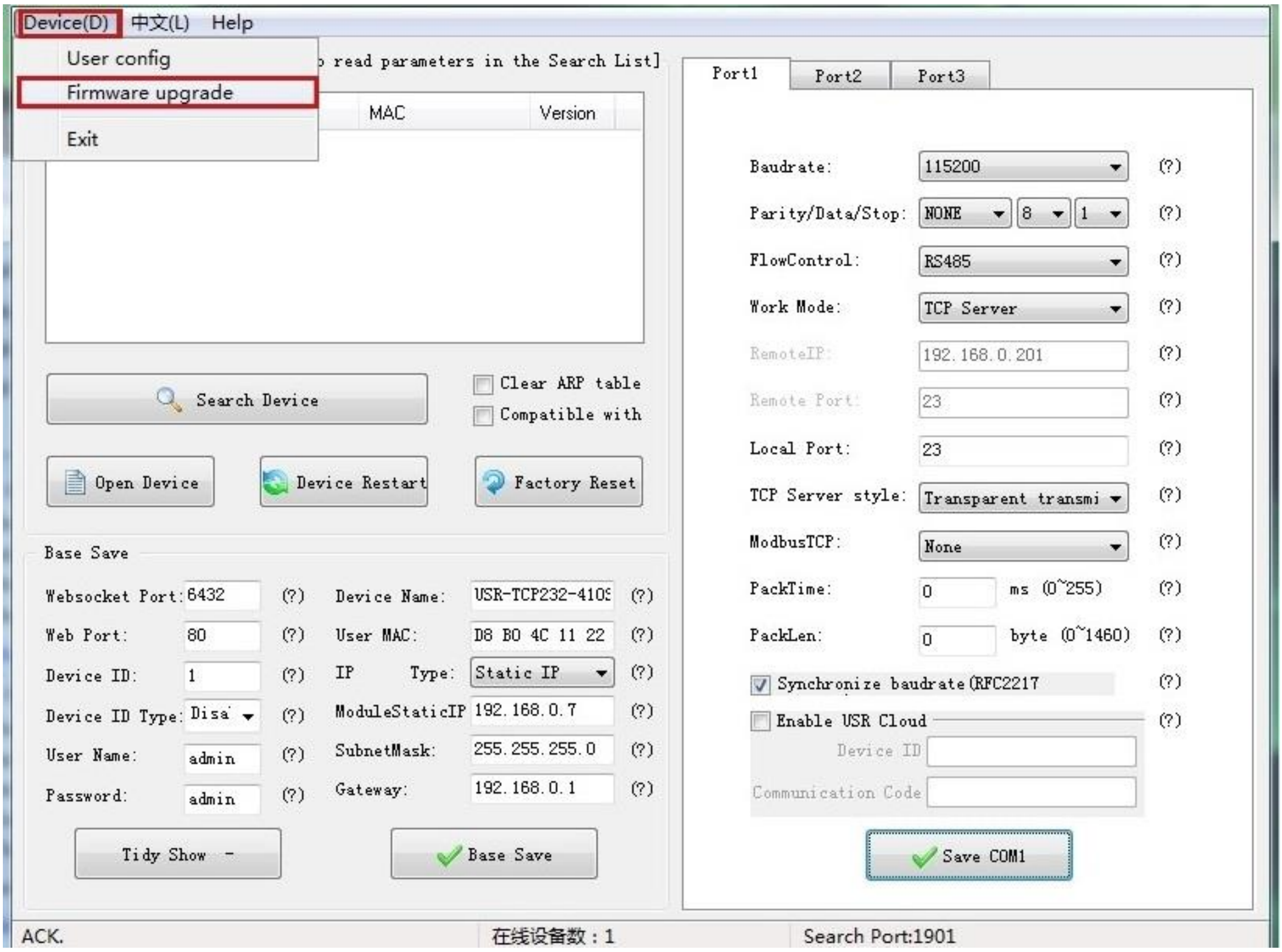
Software Configuration-COM 1 Configuration

- Serial Baud rate: it can be standard or customized.
- Parity/Data/Stop: serial parameter.
- Serial Flow control: None/Hardware/XON XOFF, None for no flow control, Hardware for hardware flow control, XON/XOFF for software hardware flow.
- Work Mode: TCP Server /TCP Client/HTTPD Client/UDP Client/UDP Server
- Destination IP/Port: IP connected when ALL-SDS102 works as client (TCP Client/HTTPD Client/UDP Client)
- Local Port: port ALL-SDS102 to connect. Advice to set it to “0” when ALL-SDS102 works under TCP Client for connection with Random port.
- TCP Server Type: No.
- Modbus TCP: set this when Modbus TCP to Modbus RTU is needed.
- Serial pack time: relate to serial unpacking mechanism.
- Serial pack length: relate to serial unpacking mechanism.
- Similar RFC2217: Please refer to Chapter 3.5.10 Similar RFC2217

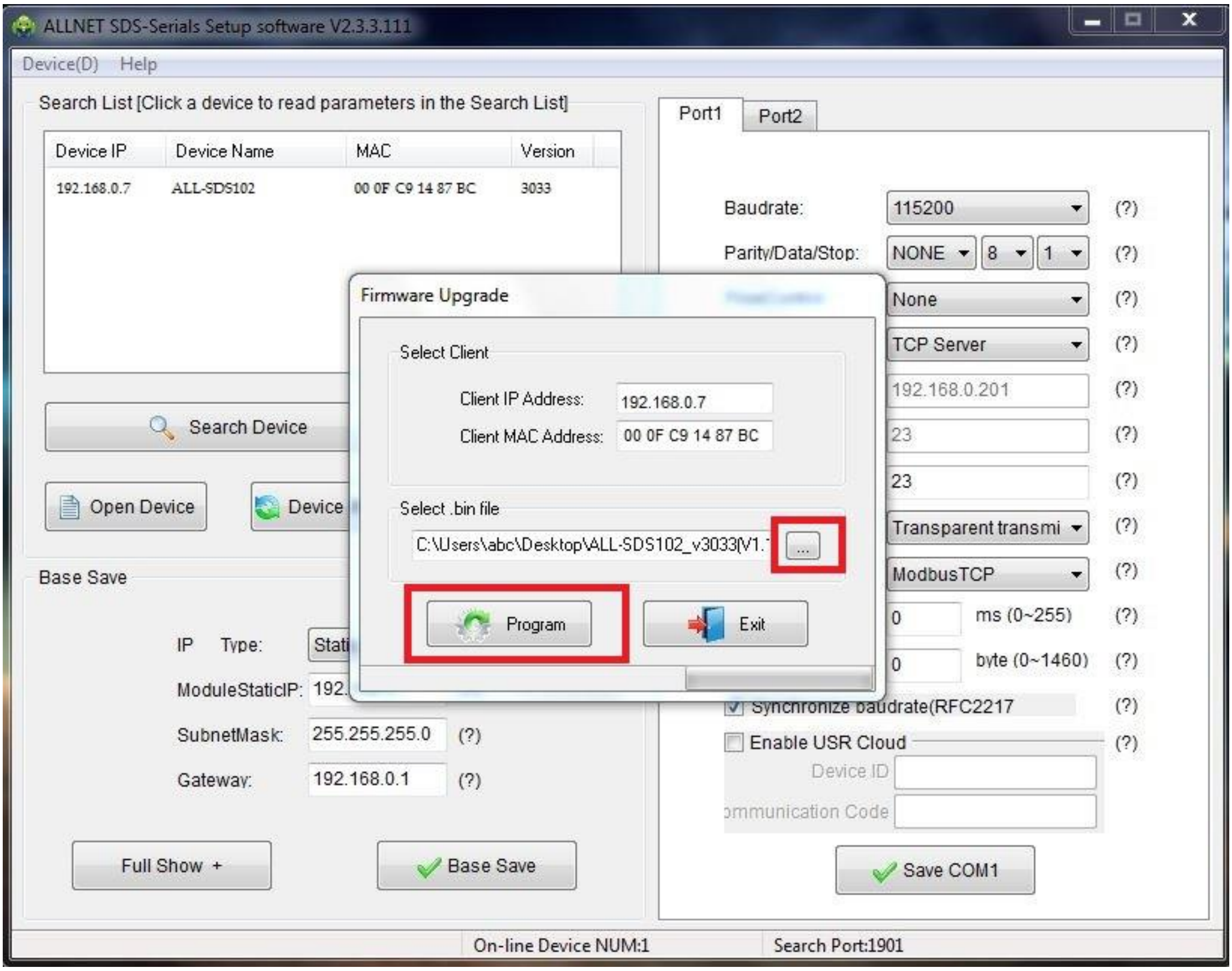
4. Firmware Upgrade

If ALL-SDS102 need to upgrade with new firmware, please contact USR sales.

During firmware upgrade, ALL-SDS102 connects to PC directly. PC Upgrade via Wi-Fi is prohibited.

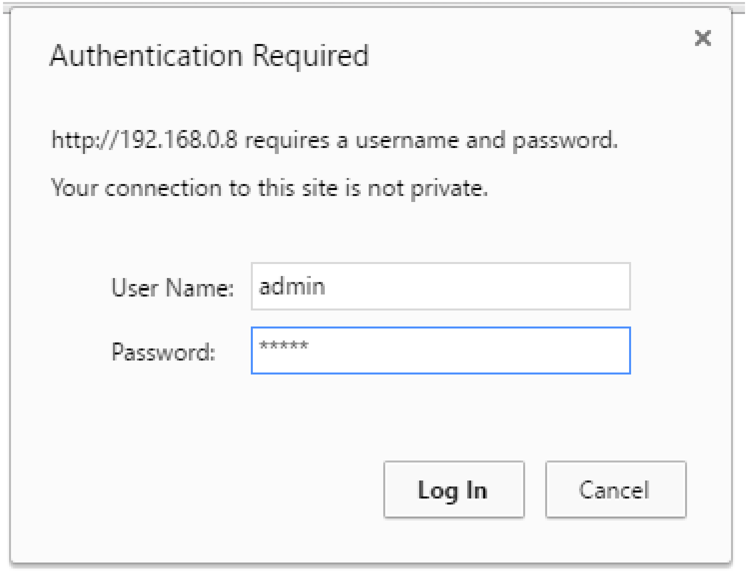


Firmware Upgrade

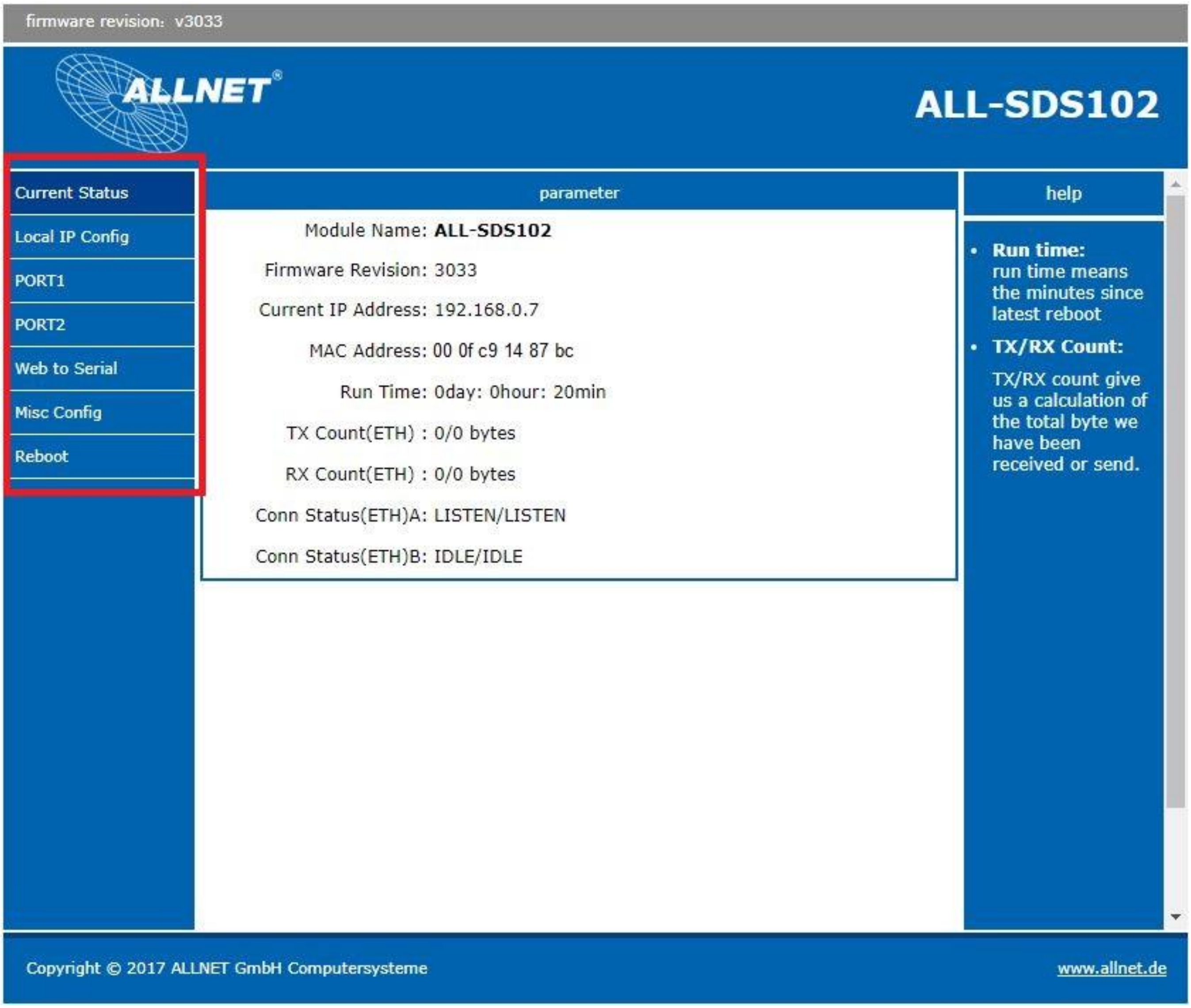


5.2. Webpage Configuration

Open browser and type in ALL-SDS102 IP (192.168.0.7 by default)
Then user name: admin and password: admin.



Webpage Log In



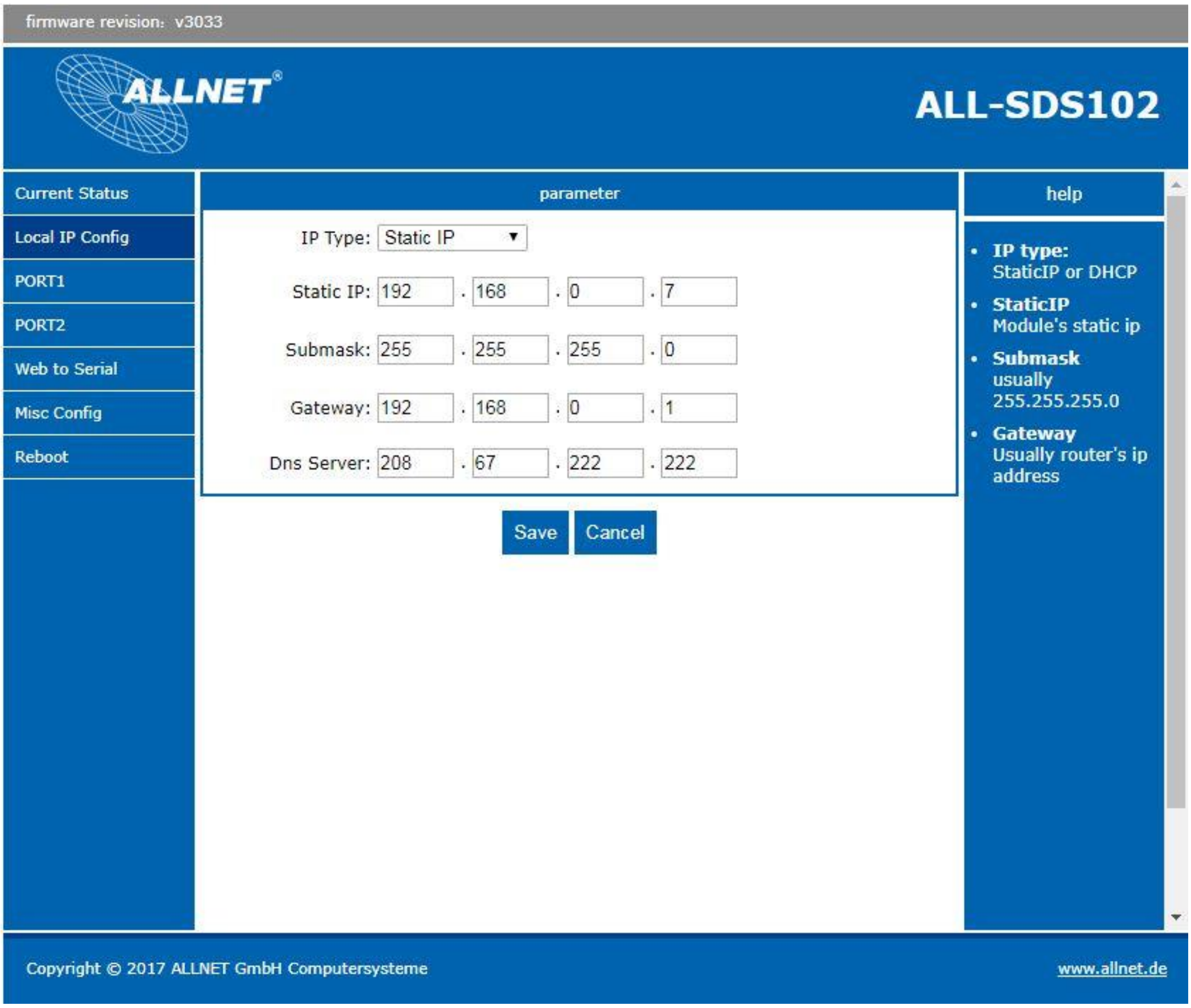
1. Current Status - reveals basic information:

■ ALL-SDS102 name
■ Firmware version
■ Current IP address
■ MAC address
■ Total running time: from be powered
■ Count of data sending: how many data sent from powered
■ Count of data receiving: how many data received from powered
■ ALL-SDS102 connection status: check whether connection is built.

2. Local IP Config

Save configuration after revise. Then restart.

■ Local IP Configuration
■ IP address gaining methods
■ Local IP
■ Subnet Mask
■ Gateway

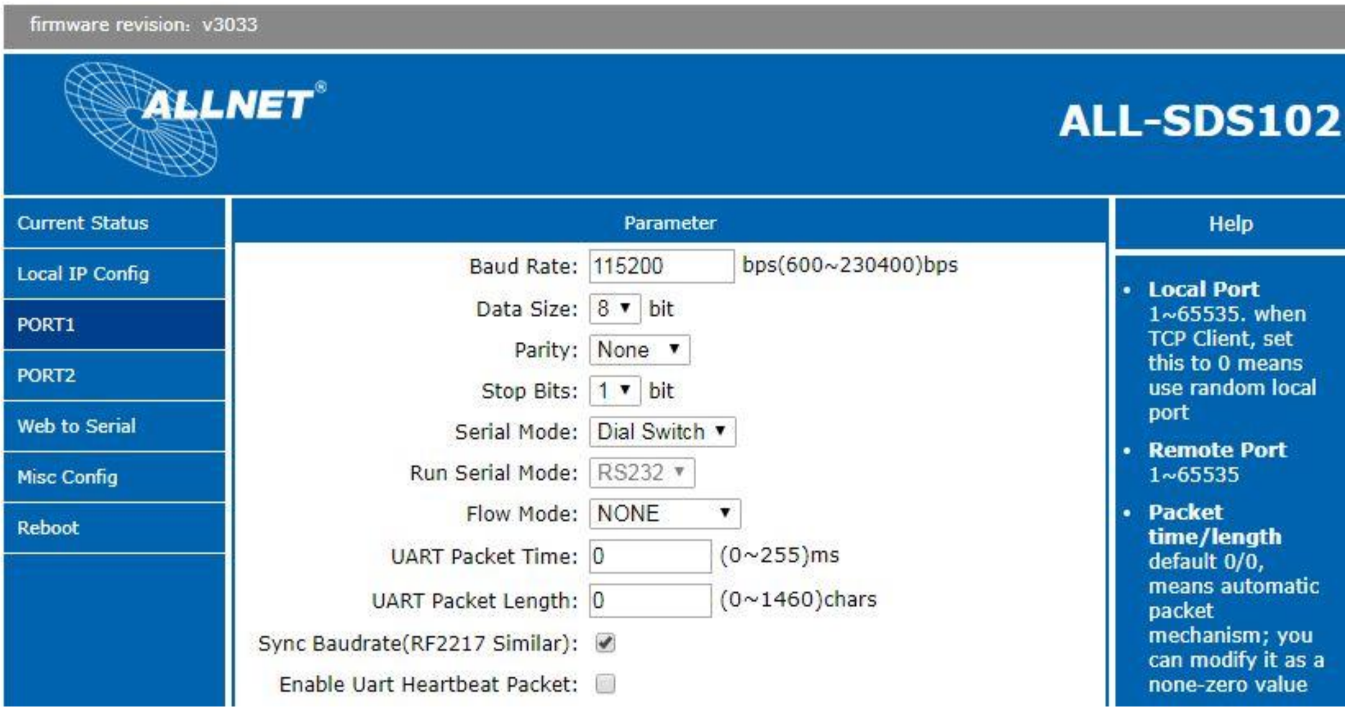


Webpage Configuration-Local IP Configuration

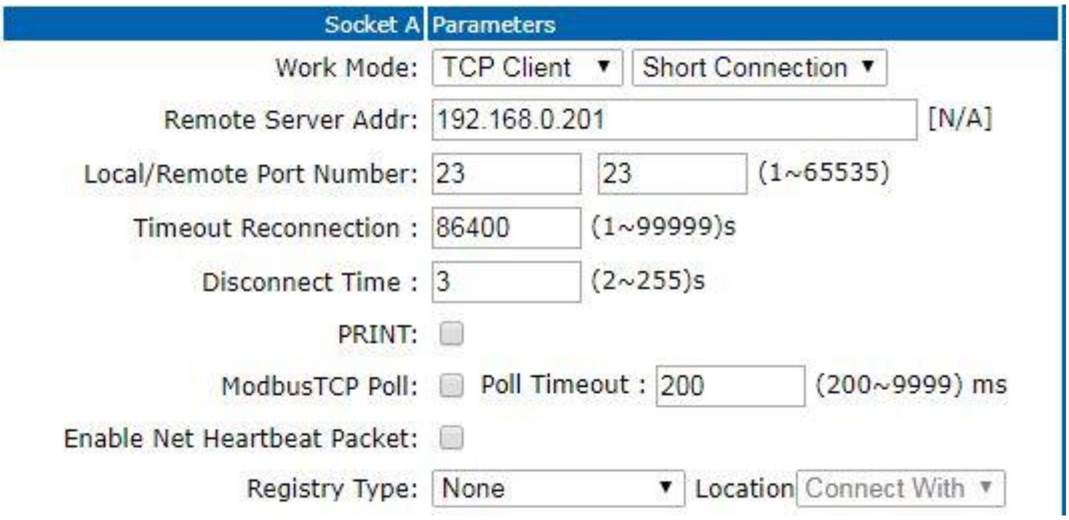
3. PORT1

A. Basic Parameter, as below

- Baud Rate
- Data Bit
- Parity Bit
- Stop Bit
- Flow hardware and RS485
- Local Port
- Remote Port
- Work Mode
- Remote server address
- Serial pack time
- Serial pack length
- Similar RCF2217

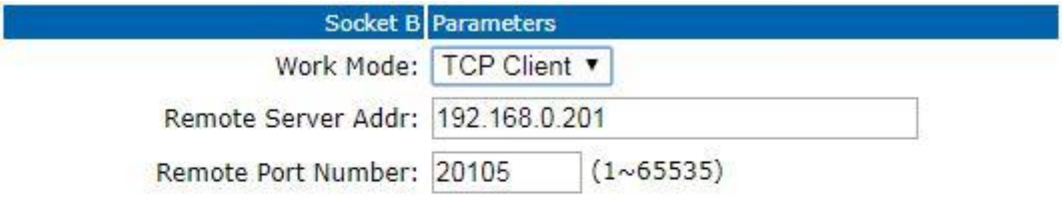


B. Socket A Parameters Configuration



- Work Mode
- Remote Server Address
- Local/Remote Port number
- Timeout reconnection
- Disconnect time
- Print: Function for network printing
- ModbusTCP Poll: Function for Modbus Polling
- Enable Net Heartbeat Packet: user-defined heartbeat packet
- Registry type: User-defined registration packet

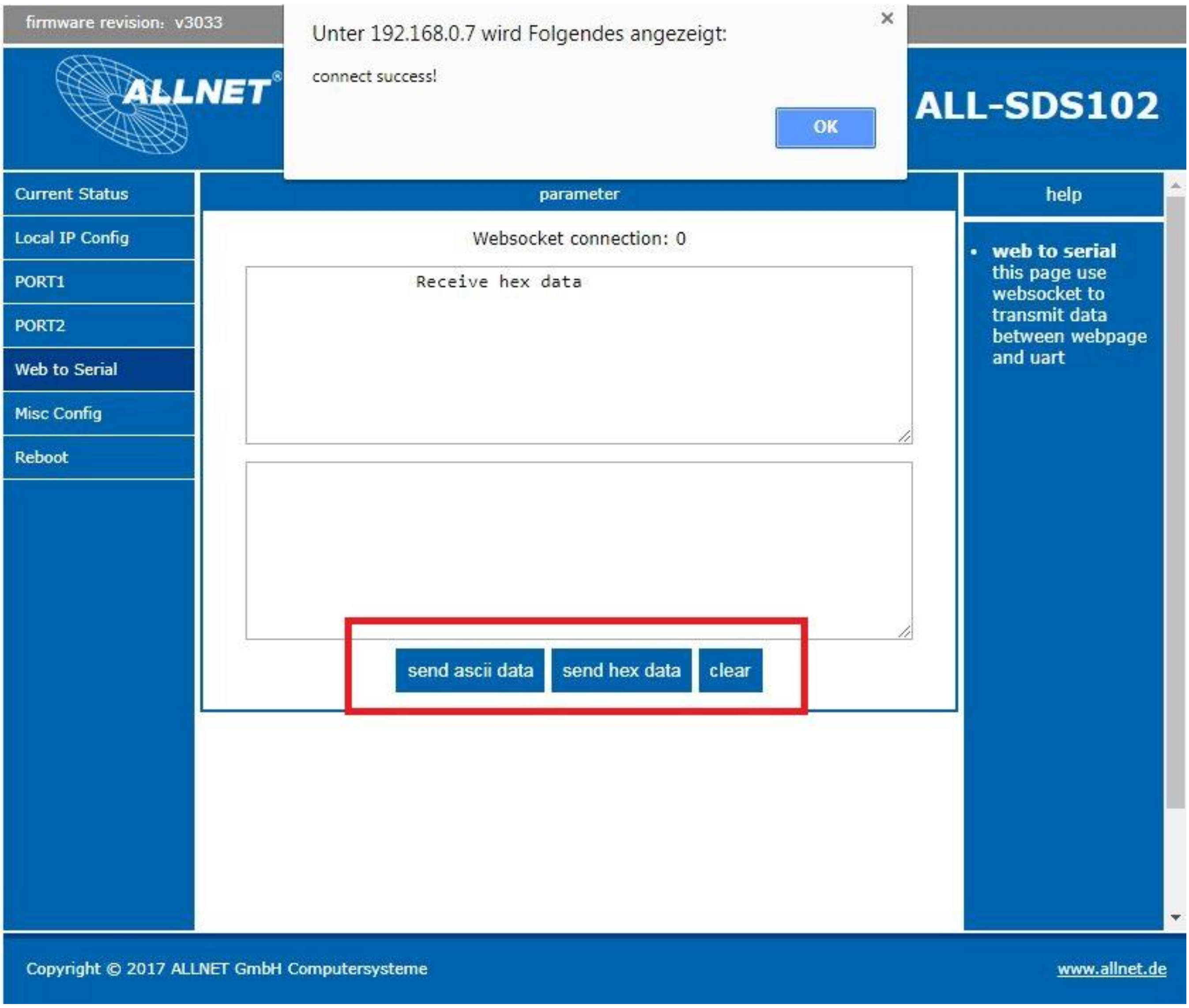
C. Socket B Parameters Configuration



- Work Mode: TCP Client/UDP Client
- Remote Server Address
- Local/Remote Port number

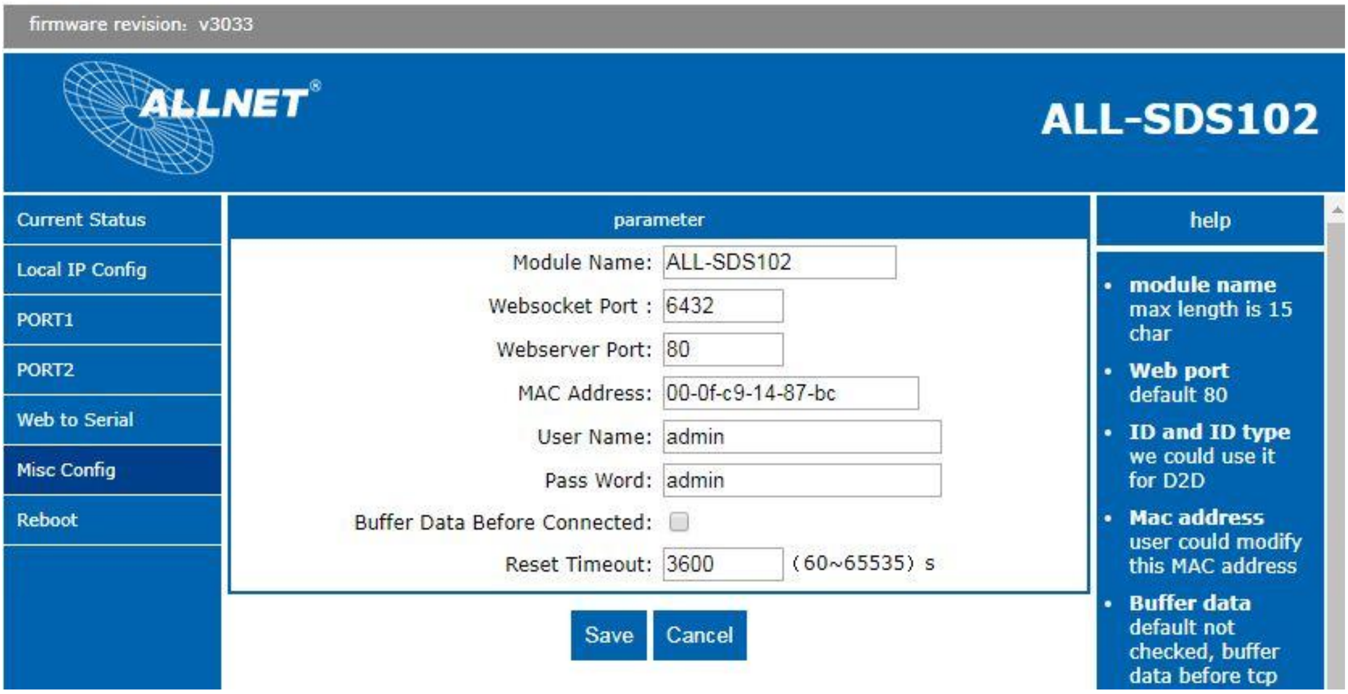
4. Web to serial

Click “web to serial” and “connect success” pops up. Confirm then send data.

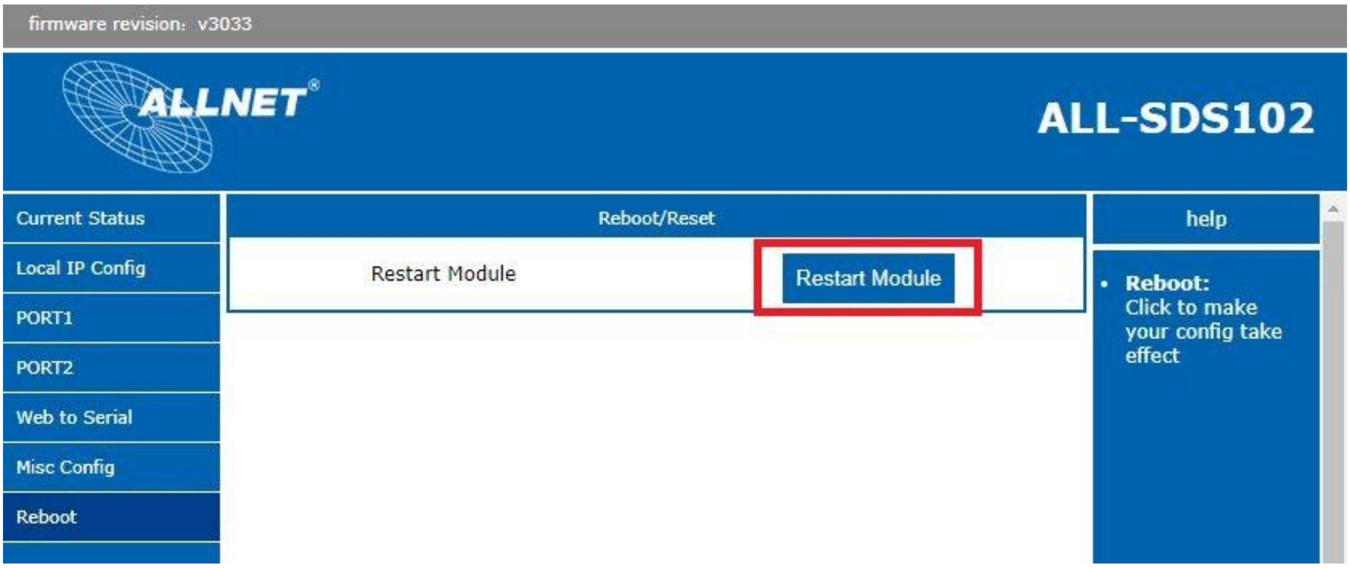


Web to Serial

5. Misc Config (Advanced configuration)
   - Module Name: ALL-SDS102 (User can modify it)
   - Websocket Port
   - Webserver Port
   - User Name/ Password: For webpage, user can modify it
   - MAC Address (can be revised)
   - Buffer data before connected: whether serial and network data are cached if disconnection.
   - Reset timeout: how long ALL-SDS102 reset when no data from COM or Network. Set to “0” then no rest.



6. Reboot
   Save all data then click restart to take effect.



Webpage configuration- Restart

5.3 Serial Configuration

Serial configuration use AT command, please refer to Chapter 4.2 Serial setting Protocol.

Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions.

- Do not open the device. Opening or removing the device cover can expose you to dangerous high voltage points or other risks.

  Only qualified service personnel can service the device. Please contact your vendor for further information.

- Do not use your device during a thunderstorm. There may be a risk of electric shock brought about by lightning.

- Do not expose your device to dust or corrosive liquids.

- Do not use this product near water sources.

- Make sure to connect the cables to the correct ports.

- Do not obstruct the ventilation slots on the device.

ALLNET GmbH Computersysteme declares that the device **ALL-SDS102** is in compliance with the essential requirements and other relevant provisions of Directive 2004/108/EC or 2014/30/EU. The Declaration of conformity can be found under this link: **www.allnet.de/downloads.html**

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