

Programming Manual

Features:

- Communication over Ethernet
- TCP/UDP server
- Configurable IP address
- Human readable commands
 and messages
- Grouped output control
- Contacts self-test mode
- Macro configurator software



Preparing the software tools :

The Ethernet connection is implemented using a WIZnet W7100A module. The related datasheets can be downloaded from the following links:

https://www.WIZnet.io/product-item/w7100a/

https://www.WIZnet.io/product-item/wiz107sr/

The most important software tool is the WIZ107SR/WIZ108SR Configuration Tool Ver 1.4.4.1 which is used for scan, configure TCPIP/UDP settings and can be downloaded from the following link:

https://www.WIZnet.io/wp-content/uploads/WIZnethome /S2E%20Module/WIZ107_108SR/Utility/WIZ107_108_config_tool.zip

You also can check for future updates on the manufacturer webpages for the WIZ107SR module.

Setting up the Ethernet interface:

The WIZ107SR/WIZ108SR Configuration Tool Ver 1.4.4.1 should be used to configure the AMUX's TCPIP/UDP settings. Three main steps are required to follow:

1. Search for the AMUX on the network (for this the AMUX has to be powered and connected to the network). This can be performed with the "Search" button on the GUI. Once search is done, the AMUX's MAC address should appear in the list on the left of the GUI. Note that in rare cases for computers



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connected to more than one network in the same time, this search might not work on all networks but rather the primary one only. In that case we recommend to configure the unit on the primary network and then switch it to the network where it will be used.

WIZ107SR / WIZ108SR Confi	guration Tool Verl.4.4.1 — · · >
Search Setting	Upload Weset Partory Pring Prewall List Network © Serial © Options Device network settings Using the follow IP Address DHCP PPPoE Device IP address:
	Input device search identification code Input code: Remember me Delete Search method ● UDP broadcast TCP unicast Broadcast will find the all devices with the same identification code in the same subnet. CP mixed UDP Search Close
Einde Ordeniser - @ Nano de	DDNS settings Enable Host name: DDNS: Port number: DDNS ID: DDNS password:

2. Configure the TCP/IP settings, assign fixed or DHCP controlled IP address, set the Port number to 5000, then specify the subnet mask and gateway IP and let the operation mode at TCP server. Save settings by pressing the **Setting** button.

WIZ107SR / WIZ108SR Configuration	Tool Ver1.4.4.1 – 🗆 🗙
🥘 Search 🖏 Setting 🕢 U	Jpload 🍓 Reset 😸 Factory 🕺 Ping 🌏 Firewall 🔞 Exit
	🥘 Network 🎯 Serial 🧿 Options
⊕- 00:08:DC:61:76:7F	Device network settings
	Using the follow IP Address O DHCP O PPPoE
	Device IP address: 192.168.1.202 : 5000
	Subnet mask: 255.255.255.0
	Gateway: 192.168.1.1
	DNS server: 0.0.0.0
	PPPoE ID:
	PPPoE password:
	Select operation mode for the device
	○ TCP client
	Remote IP/host name: 192.168.11.200 : 5000
	DDNS settings
	Enable Host name:
	DDNS: V Port number: 3030
	DDNS ID: DDNS password:



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3. Finally configure the serial settings for the W7100A module setting the Baud Rate to 115200, Data Bit length to 8, Parity to NONE, Stop Bit to 1 and Flow Control to NONE. Save settings by pressing the **Setting** button

 Metwork Serial Options
Enable debug message output
COM port settings
Baud Rate(R): 115200 V
Data Bit(D): 8 ~
Parity(P): NONE ~
Stop Bit(S): 1
Flow Control(F): NONE ~
Serial data packing condition settings
Timer(T): 0 (0~65535ms)
Size(Z): 0 (0~255 Bytes)
Character(C): 0D (Hexacode Only)
Serial command mode switch code
Enable Trigger Code: 01 02 03 (Hexacode Only)

From this moment is possible to connect to the AMUX with any TCPIP tool (or UDP depending on the settings). You can use for example the Hercules tool for this purpose (but any other TCP console, like Putty will do):

https://www.hw-group.com/software/hercules-setup-utility

AMUX Protocol

The protocol is human readable, uses ASCII coded characters and each message ends with a Carriage Return (CR) character.

Every valid response starts with ">" character or if intermediary lines are present with "#" character (any number of intermediary lines can be, and the last line always has to start with ">"). If an error occurs or invalid command was entered the protocol returns "!" character.

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AMUX has board address and column address selector and the same address has to be used for messages (like **@rcVER** is **@OOVER** for the image below):



For connection, please use the configured IP address and Port number. After connecting to the AMUX over TCP/IP and sending the basic **@OOVER** command followed by a Carriage Return character (**@OOVER**<CR>) a valid response should be get from the AMUX containing the firmware version:

we recure serve unity by nw-group.com			^
UDP Setup Serial TCP Client TCP Server UDP Test Mode About			
Received/Sent data			
Connecting to 192.168.1.240 Connected to 192.168.1.240 @OOVER#CR#OOMUX8x32 v6.3 CUST [2]#CR>@OOVER#CR	TEP Module IP 192.168.1.240 Ping TEA authorization TEA key 1: [01020304 2: [05060708 Authorization cc	Port 5000 5000 00 00 00 00 00 00 00	onnect
	PortStore test	e ved <u>t</u> est data DP	
Send			
@00VER <cr> Image: Hex @00TESTRELAYS<cr> Image: Hex</cr></cr>	Send Send	ww.HW-group	o u p o.com
	1 1		



Command	Description		
@rcVER <cr> r - board row address</cr>	Get firmware and AMUX version		
Example:	Send @00VER <cr> Receive #00MUX8x32 v6.3 CUST [2] >@00VER</cr>		
Note:	CUST=Macros enabled GEN=Macros disabled [n] 1=5x64, 2=8x32 v5+, 3=8x32 v1.0		
@rcSWITCHsrrrccc <cr> r - board row address c - board column address s - state (0 off / 1 on) rrr - row (001-008) in single mode (001-080) when scaled (MUX8x32) ccc - column (001-032) in single mode (001-320) when scaled (MUX8x32) rrr - row (001-005) in single mode (001-050) when scaled (MUX5x64) ccc - column (001-064) in single mode (001-640) when scaled (MUX5x64)</cr>	Change relay state (cache only)		
Example:	Send Receive	@00SWITCH1001001 <cr> >@00SWITCH1001001</cr>	
Note:	One or more SWITCH commands always have to be followed by UPDATE to have the real relays switched!		
@rcUPDATE <cr> r - board row address c - board column address</cr>	Apply relay state (set previously with SWITCH)		
Example:	Send@00UPDATE <cr>Receive>@00UPDATE</cr>		



Command	Description	
@rclSWITCHsrrrccc <cr> r - board row address c - board column address s - state (0 off / 1 on) rrr - row (001-008) in single mode (001-080) when scaled (MUX8x32) ccc - column (001-032) in single mode (001-320) when scaled (MUX8x32) rrr - row (001-005) in single mode (001-050) when scaled (MUX5x64) ccc - column (001-064) in single mode (001-640) when scaled (MUX5x64)</cr>	Change relay state (instant switch on the real relays)	
Example:	Send	@00ISWITCH1001001 <cr></cr>
Note:	ISWITCH does not needs UPDATE, it switches the real relays instantly.	
<pre>@rcRESET<cr> r - board row address c - board column address</cr></pre>	Clear all relay state to open	
Example:	Send Receive	@OORESET <cr> >@OORESET</cr>
@rcALLs <cr> r - board row address c - board column address s - state (0/1)</cr>	Set all relay states to on/off	
Example:	Send	@00ALL0 <cr></cr>
Important:	Setting all columns with all rows is dangerous if anything is connected to rows and columns!	
<pre>@rcDIAGsrrrcccR<cr> r - board row address c - board column address s - state (0 off / 1 on)</cr></pre>	Switch diagnose and range relays	



Command	Description		
rrr - row (001-008) in single mode (001-080) when scaled (MUX8x32) ccc - column (001-032) in single mode (001-320) when scaled (MUX8x32) rrr - row (001-005) in single mode (001-050) when scaled (MUX5x64) ccc - column (001-064) in single mode (001-640) when scaled (MUX5x64) R - range (3=100mA)			
Example:	Send	@00DIAG10010013 <cr></cr>	
Liumpie.	Receive	>@00DIAG1001001	
Important:	Do not run diagnose with electronic equipment connected to rows or columns!		
@rcMEASURE <cr></cr>			
r - board row address c - board column address	Measure voltage on diagnose		
	Send	@00MEASURE <cr></cr>	
Example:	Receive	#00mV115 >@00MEASURE	
@rcTESTRELAYS <cr></cr>	Diagnoso all rolavs		
r - board row address c - board column address	(close->measure->open->measure)		
	Send	@OOTESTRELAYS <cr></cr>	
Example:	Receive	#00FAIL-Row3-Col18 >@00TESTRELAYS	
Important:	Do not run diagnose with electronic equipment connected to rows or columns!		
@rctestrelayv <cr></cr>	Digano	se all relays with voltage	
r - board row address c - board column address	(close->measure->open->measure)		
Example:	Send Receive	@00TESTRELAYS <cr> #00DIAGCODE12999Row3-</cr>	



Command	Description		
	Col18 RX:>@00TESTRELAYV		
Note:	DIAGCODE format: DIAGCODE format: DIAGCODExvvvvRowR-ColC x = 1 - connected relay voltage too high (closed relay resistance too high) x = 2 - disconnected relay voltage too low (open relay resistance too low) x = 3 - both tests failed vvv - measured voltage (mV) row - row col - column		
Important:	Do not run diagnose with electronic equipment connected to rows or columns!		
@rcFINDSHORTS <cr></cr>	Detect short circuits between columns		
r - board row address c - board column address	(Diagnosis will use Row 8 for MUX8x32, Row 5 for MUX5x64)		
	Send	@00FINDSHORTS <cr></cr>	
Example:	Receive	#00SC:CoI04-CoI11 >@00FINDSHORTS	
Important:	Do not run diagnose with electronic equipment connected to rows or columns!		
@rcPING <cr></cr>			
r - board row address c - board column address	Ping		
Example:	Send	@00PING <cr></cr>	
Lample.	Receive	>@00PING	



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Custom command set (MACRO)

<pre>@rcCMDEXECN[name]<cr></cr></pre>	Execute a macro with a given name	
r - board row address c - board column address [name] - name of the macro to be run		
Example:	Send	@00CMDEXECNMacro <cr></cr>
example.	Receive	>@00CMDEXECNMacro
<pre>@rcCMDEXECI[index]<cr></cr></pre>		
<pre>@rcCMDEXECI[index]<cr> r - board row address c - board column address [index] - index of the macro to be run</cr></pre>	Execute	e a macro with a given index
@rcCMDEXECI[index] <cr> r - board row address c - board column address [index] - index of the macro to be run</cr>	Execute Send	e a macro with a given index @00CMDEXECI11 <cr></cr>

Custom command set (MACRO tree) can be edited with software provided by 3EL:

https://www.3el.ro/fordownload/WindowsMux.zip

Download the zip, unpack it anywhere and start MUX3El.exe from there.

The software will start with a login. Be sure nothing is connected to the AMUX (does not permits multiple connections):

Connect	×
Connection:	TCP/IP (Wiznet)
Host:	192.168.1.240
Port:	5000
Address(row,col):	00 Enabled
ОК	Cancel



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After a successful connection the screen should look like this for 8x32 AMUX:

MIX Connected to 192.168.1.240:5000	_	×
Columns 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	TX:RESET	^
Row 1 O <th>RX:>RESET TX:VER RX:=00MUX8x32 v6.3 CUST [2] RX:>VER ->Address: 00 ->Rows:8 Cols=32 </th> <th></th>	RX:>RESET TX:VER RX:=00MUX8x32 v6.3 CUST [2] RX:>VER ->Address: 00 ->Rows:8 Cols=32 	
Selected Command list: VER Manual command:		~
Addr: 00 Row: Col: State: Timeout (~s): 15 	Diag switches	
Col: -1 V With Address C CPC Timeout (as): 2 Mean count: 100 Benchmark	Diag shorts	
	Custom commands	
Row: 2		

And like this for 5x64 AMUX:

Mix Could not connect to COM1	– 🗆 🗙
Columns	
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 3	0 31 32
Row 1 00000000000000000000000000000000000	
Row 5 00000000000000000000000000000000000	
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 1	2 63 64
Row 1 00000000000000000000000000000000000	
Row 2 00000000000000000000000000000000000	
Row 3 00000000000000000000000000000000000	
Row 5 00000000000000000000000000000000000	
Command list: VER Manual command:	
Addr: 00 Row: Col: State: Timeout (~s): 15 Ser	d Diag switches
	Diag shorts
Col: 1 With Address CRC Timeout (~s): 2 Mesg count: 100 Bench	Custom commands
Send	Help

The rows and columns are detected automatically from the response to the VER command.

You can run diagnosis from this user interface ("Diag switches", "Diag shorts"). It is important to not run any kind of diagnosis with electrical equipment connected to the rows and columns!



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The result should look like this when there are any errors:

Mix Connected to 192.168.0.220:5000	— 🗆	×
Columns		
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	TX:@21ISWITCH1015069 RX:>@21ISWITCH1015069	^
	-	
Selected	1	
Command list: VER Manual command:		~
Addr: 21 Row: Col: State: Timeout (~s): 15	, Diag switches	
Send	Diag shorts	
Col: With Address Timeout (~s): 2	Custom commands	
Row: - Send	Help	
	nep	

A turned-ON switch is marked with a black dot in green square, a defective switch is marked with a white dot in red square, a short circuit detected in between two columns turns in a red dot in green square (the switch itself is healthy but an external short circuit happened).

Editing the custom command set (MACRO list) can be done with pressing the "Custom commands" button which should show a new dialog what will read out the macro list from the AMUX if available:

Custom commands		×
Customer name: 100_CMD		Set count: 99 / 100
	^	Write count: 22
ISWITCH1001001 - Instant switch row: 1[1] col: 1[1] to ON		Version: 1
ISWITCH0003003 - Instant switch row:3[3] col:3[3] to OFF		Databytes: 3044 / 3067
ISWITCH0004004 - Instant switch row:4[4] col:4[4] to OFF		
ISWITCH0006006 - Instant switch row:6[6] col:6[6] to OFF		Add new set of commands
ISWITCH1007007 - Instant switch row:7[7] col:7[7] to ON		Add new command
ISWITCH0008032 - Instant switch row:8[8] col:32[32] to OFI SWITCH1001001 - Switch row:1[1] col:1[1] to ON		Delete selected element
SWITCH1002002 - Switch row:2[2] col:2[2] to ON		Edit selected element
DELAY0100 - Delay: 100 msec		Execute selected set (by name)
WPDATE - Update switches SWITCH0001001 - Switch row:1[1] col:1[1] to OFF		Execute selected set (by index)
UPDATE - Update switches		HINT: Use DragDrop on the tree
ET_12 SET_12 SET_12		
ISWITCH1001001 - Instant switch row: 1[1] co: 1[1] to CN		Download from multiplexer
ISWITCH1003003 - Instant switch row:3[3] col:3[3] to ON		Upload to multiplexer
ISWITCH1004004 - Instant switch row:4[4] col:4[4] to ON ISWITCH1005005 - Instant switch row:5[5] col:5[5] to ON		Force reloading in multiplexer
ISWITCH1006006 - Instant switch row:6[6] col:6[6] to ON		
ISWITCH1007007 - Instant switch row:7[7] col:7[7] to ON	v	Save to file
		Load from file



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"Customer name" holds the name of the whole macro list.

"Set count" is the number of the macros in the configuration (maximum of 100).

"Write count" is the counter for macro zone flash write. The flash in the AMUX controller is guaranteed to support 20000 writes so don't go over that.

"Version" is the format version of the macro list.

"Databytes" shows the currently used bytes by macro list and in this case the maximum is 3067 bytes.

The tree on the left is the visual representation of the current MACRO list.

"Add new set of commands" is for adding a new MACRO:

Add new set of commands	×
Name: SET_6	
Cancel	ОК

"Add new command" is adding a new command for the currently selected macro. Possible commands are:

- Switch (more switches can be executed at once with Update):

	Command		\times
	Command list: Swite	h 🔽	
	Row: 1	Col: 1 State: OFF	
	Cancel	ОК	
- Instant switch	(relay switch e	executed instantly):	
	Command		\times
	Command list: Insta	nt switch 👤	
	Row: 1	Col: 1 State: OFF	
	Cancel	ОК	

- Delay (millisecond). Note that the AMUX will execute this delay during the execution of the MACRO (which will block the

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communication too until it is executed). Thus it is not recommended to use big delays, it is intended for shorter delays (maximum is 2000msec).

Command		×
Command list: Delay		-
Delay: 0	(msec)	
Cancel		ОК

- Update (to update relay state after a set of switches):

Command		×
Command list:	Update switches	•
Cancel		ОК

"Edit selected element" is for editing any element selected in the macro tree.

"Execute selected set (by name)" and "Execute selected set (by index)" will execute the selected MACRO. These two buttons are only active when a macro is selected and it is not when a command is selected.

NOTE: if you are editing a macro tree, executing a macro is possible only after it is uploaded in the AMUX!

"Drag and Drop" is working in the macro tree so users can move a command between macros.

"Download from multiplexer" will download the macro tree from the connected AMUX.

"Upload to multiplexer" will upload the current macro tree to the connected AMUX.

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"Force reloading in multiplexer" will reload the macro list from the one saved in the connected AMUX.

"Save to file" will save the current macro tree to a csv file.

"Load from file" will load the macro tree from a csv file. NOTE: to activate the loaded macro tree in the connected AMUX after "Load from file", "Upload to multiplexer" is needed.