

N-BW2 Networker Bridge (WIFI) Application Programmers Interface Issue 1.3

1. Document Information	3
1.1 Current Release Document Control & Authorisation	3
1.2 Change History	3
2. N-BW2 Networker Bridge (WIFI) Operation	4
2.1 Overview	4
2.2 Networker System Connection	5
2.2.1 N-C3 & N-C6 Type Networkers	5
2.2.2 Brivis Touch (N-C7) Type Networker	6
2.3 Default Access Point State	7
2.4 Opening a TCP Connection with the N-BW2	8
2.5 Front Panel LEDs	10
3. WIFI Configuration Mode	11
3.1 Retrieving Configuration Settings	12
3.2 Altering Configuration Settings	12
3.3 Saving Configuration Settings	13
3.4 Exiting Configuration Mode	13
4. Networker System Access Mode	14
4.1 Sequence Numbering	15
4.2 System Related – Group 1: {“SYST”:	16
4.3 Heating Related – Group 1: {“HGOM”:	18
4.3.1 Single Set Point Operation	19
4.3.2 Multi-Set Point Operation	21
4.4 Cooling (Add-on) Related – Group 1: {“CGOM”:	23
4.4.1 Single Set Point Operation	24
4.4.2 Multi-Set Point Operation	26
4.5 Cooling (Evaporative) Related – Group 1: {“ECOM”:	28
5. N-BW2 Interface Test Application	30
5.1 WIFI Configuration Screen	31
5.2 Networker System Access Screen	33
5.3 Heating Operating Mode	35
5.3.1 Single Set Point Operation	35
5.3.1.1 No Zones Installed	35
5.3.1.2 Two Zones Installed	38
5.3.1.3 Schedule Setting (Auto-Program)	39
5.3.2 Multi Set Point Operation	41
5.4 Cooling (Add-on) Operating Mode	45
5.5 Cooling (Evaporative) Operating Mode	46
5.6 Switching Operating Mode	48

1. Document Information

1.1 Current Release Document Control & Authorisation

	Name	Signature	Date
Prepared by:	Emilio La Greca	<i>Emilio</i>	04/04/18
Changed by:	Emilio La Greca	<i>Emilio</i>	13/11/19
Checked by:	Emilio La Greca	<i>Emilio</i>	13/11/19
Approved by:	Emilio La Greca	<i>Emilio</i>	13/11/19

1.2 Change History

Issue	Date	Change Details	Change by	Approved by
1.0	04/04/18	First release	<i>Emilio</i>	<i>Emilio</i>
1.1	19/06/18	Added zone temperature measurement descriptor to ZXS tags for STSP operation ("MT": "###")	<i>Emilio</i>	<i>Emilio</i>
1.2	19/03/19	Configuration settings packet delimiter changed from '!' to carriage return (0x0D). Extra version number information added to: { "SYST": { "CFG": Temperature display option added to: { "ECOM": { "CFG": Extra information added to UDP broadcast packet.	<i>Emilio</i>	<i>Emilio</i>
1.3	13/11/19	Added temperature measurement descriptor to GSS tag for ECOM operation ("MT": "###")	<i>Emilio</i>	<i>Emilio</i>

2. N-BW2 Networker Bridge (WIFI) Operation

2.1 Overview

The N-BW2 Networker Bridge (WIFI) (referred to as N-BW2 from here on) provides a means of remotely interfacing to Rinnai Networker based systems allowing control and monitoring of heating/cooling appliances the Networker system manages. The primary interface used for access to the Networker system is a TCP connection over WIFI. Although a USB port is provided this is purely for production testing and setup when the N-BW2 is produced.

The front/rear panels of the N-BW2 appear as illustrated in FIG 2a:

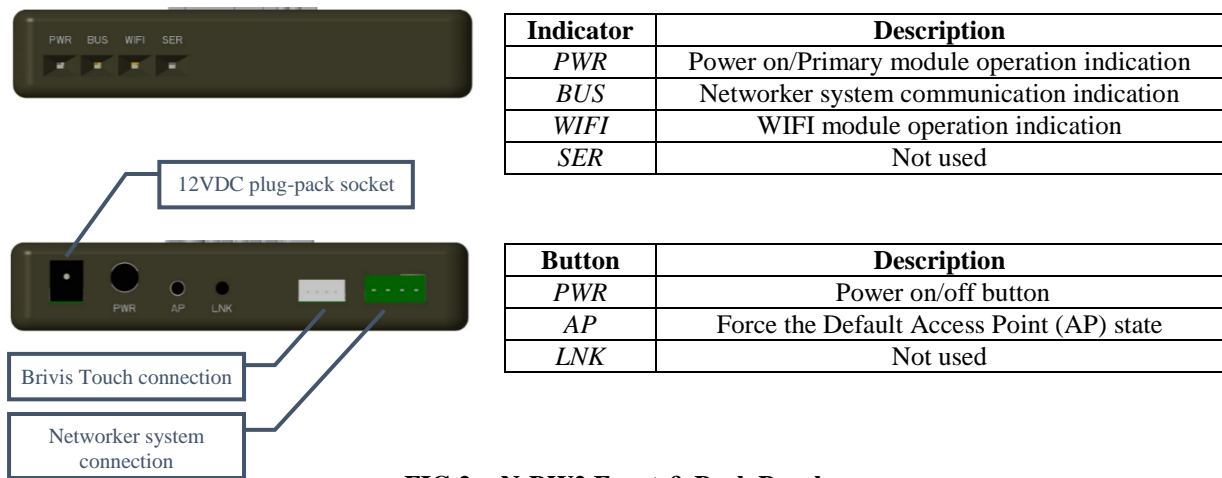


FIG 2a: N-BW2 Front & Back Panels

The N-BW2 can be in one of two distinct operating modes:

- 1) WIFI configuration mode.
- 2) Networker system access mode.

The N-BW2 will operate in one of three distinct WIFI connecting states:

- 1) Default Access Point (AP) state.
All N-BW2's are defaulted to this state when first powered on. When in this state only the WIFI configuration mode is allowed.
- 2) User configured Access Point (AP) state.
In this state the N-BW2 operates as an access point which can be associated with – The SSID and WPA pass-phrase are defined by the user. When operating in this state a network router is not needed to access the Networker system. By default the N-BW2 will operate in the Networker system access mode but can revert to the WIFI configuration mode.
- 3) Station state.
In this state the N-BW2 associates with a router, the SSID and WPA pass-phrase configured to match that of the router. This is the most common state the N-BW2 operates in. By default the N-BW2 will operate in the Networker system access mode but can revert to the WIFI configuration mode.

2.2 Networker System Connection

2.2.1 N-C3 & N-C6 Type Networkers

The N-BW2 must be powered by its own 12VDC plug-pack and connected to the system as illustrated in FIG 2.2.1a.

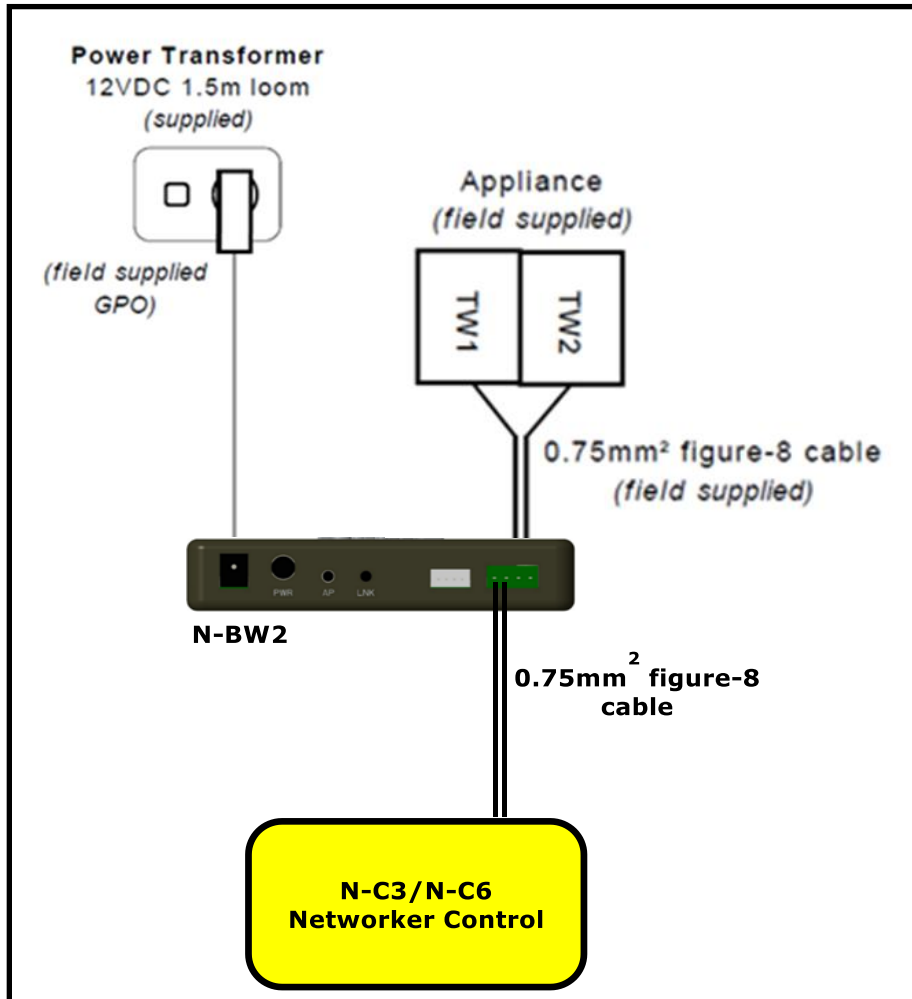
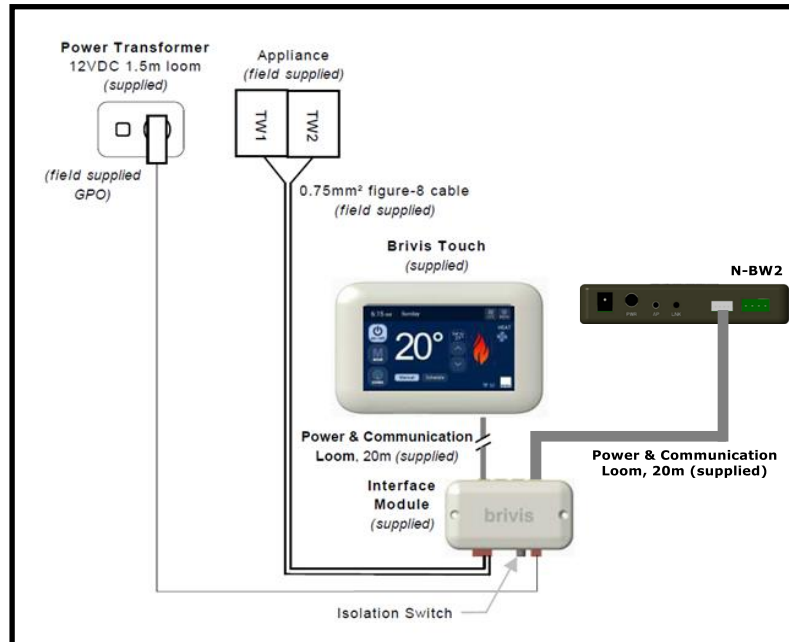


FIG 2.2.1a: N-BW2 Connection to N-C3/N-C6 Networker Controls

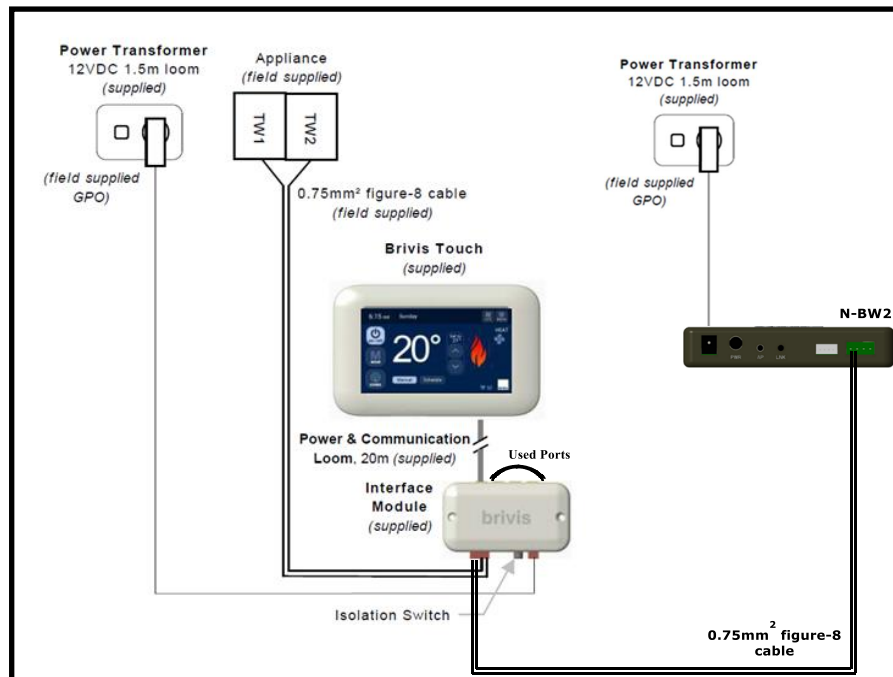
2.2.2 Brivis Touch (N-C7) Type Networker

When a spare port is available on the Brivis Touch Interface Module this port can be used to connect the N-BW2 as it is pin-to-pin compatible with the corresponding connector on the N-BW2. In this case the 12VDC plug-pack is not needed to power the N-BW2 – See FIG 2.2.2a.



**FIG 2.2.2a: N-BW2 Connection to Brivis Touch System –
Using Interface Module Port**

When no spare port is available on the Brivis Touch Interface Module then the N-BW2 must be powered by its own 12VDC plug-pack and connected to the system as illustrated in FIG 2.2.2b.



**FIG 2.2.2b: N-BW2 Connection to Brivis Touch System –
Without Using Interface Module Port**

2.3 Default Access Point State

The product label affixed to the N-BW2 appears as illustrated below:



This label identifies the unique serial number/default password embedded within the N-BW2. The serial number is used to form the default SSID (*RinnaiABC123* in the example above) with the default password used as the WPA pass-phrase (*1234567890* in the example above). When associated with the N-BW2 in this state, the client device can only access the WIFI configuration mode described in Section 3. This default Access Point state is reverted to:

- 1) When the N-BW2 is switched on for the very first time.
- 2) When the N-BW2 has not had user configuration settings saved to its internal memory.
- 3) On power up when the AP button has been held pressed for at least 5 seconds.
- 4) When the N-BW2 has been configured to operate in the Station state but the router it was configured to associate with could not be located after 3 minutes. The N-BW2 will revert to its Default AP state for 2 minutes before reverting back to the user configured Station state.

To ease installation a QR code is provided which when scanned provides the device serial number/default password as follows (using the above label as an example):

ABC123_1234567890

2.4 Opening a TCP Connection with the N-BW2

Before opening a TCP connection with the N-BW2 either the N-BW2 must:

- Be associated with if it is operating in one of its Access Point states, or
- Associate with the router it was configured to associate with when operating in its Station state.

Once this is the case the N-BW2 broadcasts a 256 byte long UDP packet every second using the following broadcast settings:

- Broadcast address : ###.###.###.255
- Broadcast port : 50000

Embedded within this UDP broadcast packet is information listed in the example shown in FIG 2.4a.

N-BW2 IP Address

```

192.168.1.1 : 63806 Length = 431 bytes
MD5 = F08D1D2D06AA59655467AD8D14FC2F7E
----- 19/03/2019 12:05:36.615
0000 52 69 6E 6E 61 69 5F 4E 42 57 32 5F 4D 6F 64 75 Rinnai_NEW2_Modu
0010 6C 65 00 00 00 00 00 00 00 00 00 00 00 00 00 00 le.....
0020 6C C7 AA E5 08 00 00 00 00 00 00 00 00 00 00 00 1.....
0030 48 53 50 45 30 50 59 32 36 43 00 00 00 00 00 00 HSPEOPV26C.....
0040 C7 BB 1D 1D 10 72 AF B1 20 59 8D B7 37 A8 D3 65 .....r...V...e
0050 1A CF 85 71 AB 14 A8 98 4F C7 C4 35 A5 FE 84 64 .....q...O...5...d
0060 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0070 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0080 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0090 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00A0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00B0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00C0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00D0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00E0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00F0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 05 .....
0100 53 79 73 74 65 6D 30 34 00 00 00 00 00 00 00 00 System04.....
0110 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
0120 08 03 CD 47 AE 45 54 5F 42 42 5F 4C 32 5F 34 31 .....GNET_BB_L2_41
0130 35 35 39 41 00 00 00 00 00 00 00 00 00 00 00 00 559A.....
0140 00 00 00 11 03 B2 42 52 56 2D 57 61 72 65 68 6F ....._BRV-Wareho
0150 75 73 65 00 00 00 00 00 00 00 00 00 00 00 00 00 use.....
0160 00 00 00 00 00 00 0D 03 C4 52 41 2D 49 6E 74 65 .....RA-Inte
0170 72 6E 61 6C 00 00 00 00 00 00 00 00 00 00 00 00 rnal.....
0180 00 00 00 00 00 00 00 00 0B 03 C4 42 52 56 2D ....._BRV-
0190 49 6E 74 65 72 6E 61 6C 00 00 00 00 00 00 00 00 Internal.....
01A0 00 00 00 00 00 00 00 00 00 00 00 00 00 0C 03 C4 .....

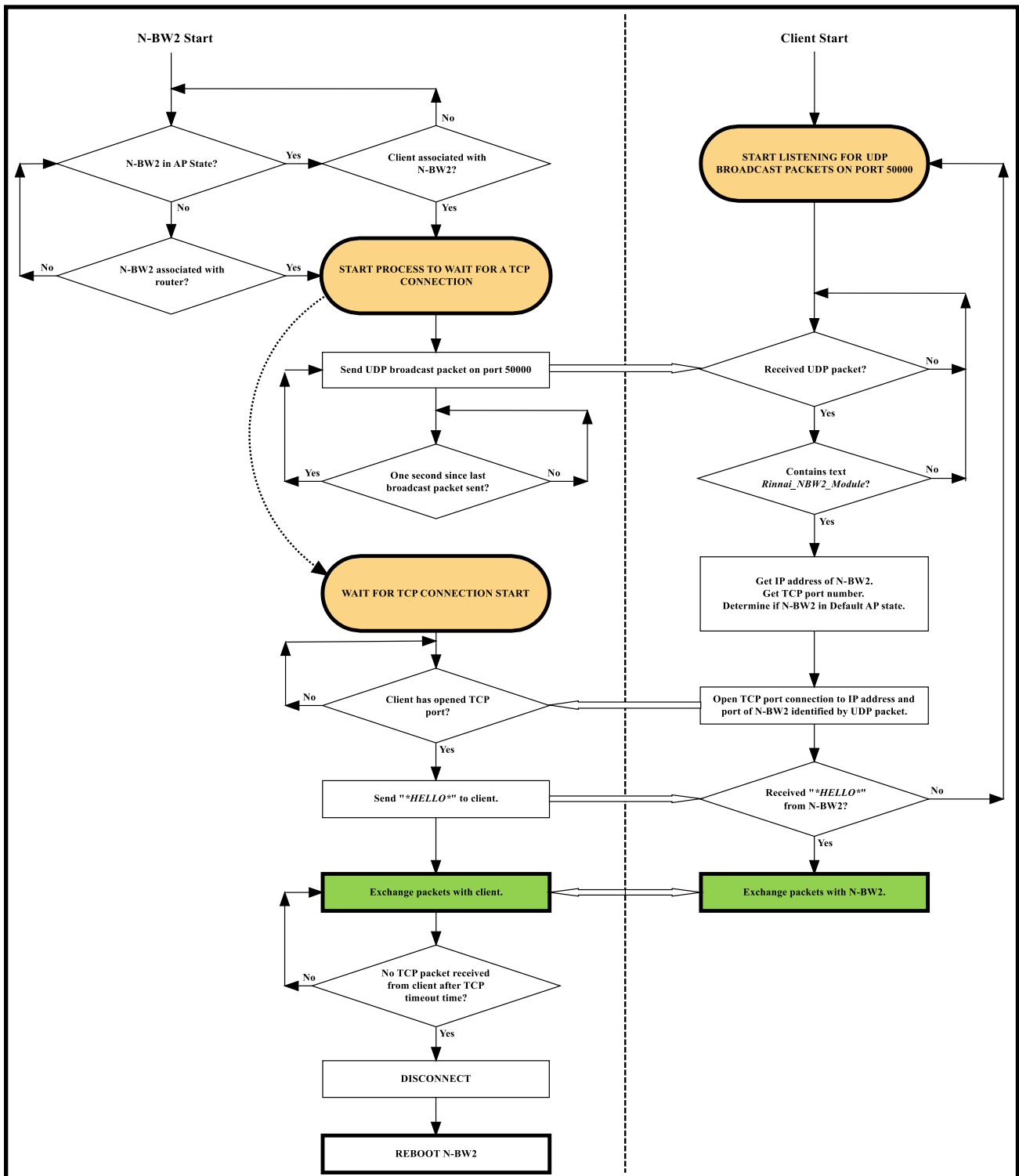
```

Index	Description
0000h - 001Fh	N-BW2 identification tag.
0020h - 0021h	TCP port, high byte first. In this case 6Ch C7h equates to port 27847.
0022h	Default AP operating state indication.
AAh	Operating in Default AP state.
55h	Not operating in Default AP state.
0023h	Overall firmware version of module.
0024h	Wi-Fi Module firmware version.
0025h	WLAN access mode.
0	AP Mode – Default.
1	AP Mode – User Configured.
2	Station Mode – Uer Configured.
00FFh	Number of scanned SSIDs (Default AP mode only).
FOR SCANNED SSIDs n = 0 to 9	
0100h + n x 23h	SSID name.
0100h + n x 20h	SSID name length.
0100h + n x 21h	Security type
OPEN – 0	WEP – 1
WPA – 2	WPA2 – 3
0100h + n x 22h	Received Signal Strength Indication (RSSI)

FIG 2.4a: N-BW2 UDP Broadcast Packet

From this UDP packet the IP address of the N-BW2 (source address) can be determined and together with the information listed above all the information needed to open a TCP connection with the N-BW2 is available. Once a valid TCP connection with the N-BW2 is opened the N-BW2 responds with “*HELLO*?”. Provided the client issues commands to the N-BW2 the TCP connection will remain open. If no response from the client that initiates the connection is received within the TCP timeout time ($T_{TCP\text{OUT}}$), the N-BW2 will terminate the connection and perform a reboot.

The entire process for connecting to the N-BW2 is illustrated in FLC 2.4a. The TCP packet size to allow for is 2080 bytes minimum.



FLC 2.4a: Connecting to the N-BW2

2.5 Front Panel LEDs

The front panel LEDs can be lit green/orange, the meaning of the indications given below in TABLE 2.5a.

Indicator	Description		
PWR	Power on/Primary module operation indication		
	Color	Indication	
	Orange	<i>Flash Fast</i>	Primary module is saving operational/configuration settings to memory.
		<i>Continuous</i>	
	Green	<i>Solid</i>	Primary module is clearing the configuration settings to their default values.
		<i>Flash Fast</i>	Primary module is loading configuration settings from memory.
<i>Continuous</i>			
<i>Solid</i>	Primary module is idle (indicates power on).		
BUS	Networker system communication indication		
	Flashes green once when a Networker System communication packet has been received.		
WIFI	WIFI module operation indication		
	Color	Indication	
	Orange	<i>Flash Fast</i>	WIFI module is saving configuration settings to memory.
			WIFI module is configuring itself for Default AP state operation due to AP pushbutton being pressed.
		<i>Flash Slow</i>	WIFI module is in the Default AP state with no client associated with it.
			<i>Continuous</i>
		<i>Flash Once</i>	WIFI module is in the Default AP state and a packet transfer has occurred.
		<i>Flash N Times Repeatedly</i>	WIFI module has experienced a fault, the number of flashes indicates the fault code.
	<i>Solid</i>	WIFI module is waiting for switch over to the Default AP state after being in the Station state with no connection to the named router occurring for 3 minutes.	
	Green	<i>Flash Fast</i>	WIFI module is loading configuration settings from memory.
		<i>Flash Slow</i>	WIFI module is in the user configured AP state with no client associated with it OR in the user configured Station state and not associated with the named router.
		<i>Continuous</i>	
		<i>Flash Once</i>	WIFI module is in the AP or Station state and a packet transfer has occurred.
	<i>Solid</i>	WIFI module is waiting for switch over to the Station state after being in the Default AP state with no connection by a client for 2 minutes.	

TABLE 2.5a: N-BW2 Front Panel LEDs

3. WIFI Configuration Mode

This mode is used to set various WIFI Configuration settings. The general format of the WIFI Configuration Mode command is as follows:

C	\$	<	DVPW	>	DEFAULT PASSWORD	<	TAG DESCRIPTOR	>	TAG VALUE	CR
----------	-----------	-------------	-------------	-------------	-----------------------------	-------------	---------------------------	-------------	----------------------	-----------

Identifier	Description
C	Indicates WIFI Configuration Command.
\$	The type of access operation.
	R Report setting (Default)
	G Retrieve setting
	S Alter Setting
<	Start of tag descriptor.
DVPW	Default password tag descriptor.
>	End of tag descriptor.
DEFAULT PASSWORD	N-BW2 default password used to gain access to settings.
<	Start of tag descriptor.
TAG DESCRIPTOR	Identifies the setting to access.
>	End of tag descriptor.
TAG VALUE	The associated tag value where applicable.
CR (Carriage Return) = 0x0D	End of command.

**TABLE 3a: WIFI Configuration Mode
Command Format**

The tag descriptors that are supported are listed in TABLE 3b.

TAG Descriptor	Access	Description	Default
<SSID>	G/S/R	Allows the user configured SSID to be set or retrieved.	""
<NPWD>	S	The user configured SSID WPA pass-phrase to be set (Must be at least 8 characters long).	""
<JOIN>	G/S/R	The network join type (<i>7 = AP, 1 = Station</i>).	7
<TNRX>	G/S	The TCP timeout time (<i>T_{TCP}OUT</i>). Range = 1 to 60 minutes.	5 minutes
<SAVE>	S	Initiate save settings upon which the N-BW2 reboots with the new configuration settings applied	N/A
<BOOT>	S	Reboot N-BW2 without saving any configurations settings applied.	N/A

**TABLE 3b: WIFI Configuration Command Tag
Descriptors Supported**

When the Default AP state is being used this mode of operation is defaulted to always once a TCP connection to the client is made. In any other state this mode will be entered when a configuration type command is issued by the client. Once in the WIFI Configuration Mode the N-BW2 defaults to reporting the two most basic settings, as illustrated below:

CR<SSID><JOIN>CR

No data associated with the tags occurs when access has not been granted to the configuration settings. Once access is granted the actual data associated with the tags will be provided.

CR<SSID>MyNetwork<JOIN>7CR

When a 'G' or 'S' command is issued this reporting response is interrupted with the corresponding response as acknowledgement that the command has been received and processed.

3.1 Retrieving Configuration Settings

The 'G' command is used to retrieve the required setting. The default password must accompany any GET command to gain access to the setting as is illustrated in the following example:

On issuing **CG<SSID>CR**
Response packet produced **CG<DVPW>CR**

In this example the N-BW2 responded in this way because the default password issued with the GET command was invalid.

On issuing **CG<DVPW>1234567890<SSID>CR**
Response packet produced **CG<DVPW><SSID>MyNetworkCR**

In this example the N-BW2 responded with the user configured SSID because the default password issued with the GET command was valid.

3.2 Altering Configuration Settings

The 'S' command is used to alter the required setting. The default password must accompany any SET command to alter the setting as is illustrated in the following example:

On issuing **CS<SSID>MyNewNetworkCR**
Response packet produced **CS<DVPW>CR**

In this example the N-BW2 responded in this way because the default password issued with the SET command was invalid.

On issuing **CS<DVPW>1234567890<SSID>MyNewNetworkCR**
Response packet produced **CS<DVPW><SSID>MyNewNetworkCR**

In this example the N-BW2 responded with the new user configured SSID because the default password issued with the SET command was valid.



The SSID associated WPA pass-phrase must be at least 8 characters long. When setting this password the validity of the password is checked by the N-BW2 and if invalid the N-BW2 will respond accordingly as illustrated in the following examples:

On issuing `CS<DVPW>1234567890<NPWD>InvalidPasswordCR`
 Response packet produced `CG<DVPW><NPWD>????????CR`

In this example the N-BW2 responded in this way because the SSID WPA pass-phrase to set is invalid.

On issuing `CS<DVPW>1234567890<NPWD>CorrectPasswordCR`
 Response packet produced `CG<DVPW><NPWD>*****CR`

In this example the N-BW2 responded in this way because the SSID WPA pass-phrase to set is valid.

3.3 Saving Configuration Settings

The N-BW2 settings that are altered are not committed to its onboard memory. This must be explicitly done with the **<SAVE>** tag accompanied by the default password as illustrated below:

On issuing `CS<DVPW>1234567890<SAVE>CR`
 Response packet produced `CG<DVPW><SAVE>CR`

Upon saving the configuration settings to its onboard memory the N-BW2 undergoes a reboot, therefore when altering the settings the **<SAVE>** command should be issued only after all the configuration required settings have been altered.

3.4 Exiting Configuration Mode

The only way to exit the WIFI Configuration Mode without saving any altered settings is by rebooting the N-BW2 either by powering off then back on or issuing the **<BOOT>** command accompanied with the default password.

Issuing of the **<BOOT>** command is as illustrated below:

On issuing `CS<DVPW>1234567890<BOOT>CR`
 Response packet produced `CG<DVPW><BOOT>CR`

After a short delay the N-BW2 reboots.

4. Networker System Access Mode

This mode is used to access the Networker System. The Networker System Access Mode command uses JavaScript Object Notation (JSON), the general format being as follows:

```
N ### { "GROUP 1 TAG": { "GROUP 2 TAG": {"CD1":"VAL", "CD2":"VAL", "CD#":"VAL" } } }
```

Identifier	Description
N	Indicates Networker System Access Command.
###	Sequence Number.
{	Start of Group 1 Text.
"GROUP 1 TAG":	Group 1 Tag Descriptor.
{	Start of Group 2 Text.
"GROUP 2 TAG":	Group 2 Tag Descriptor.
{	Start of Group 2 Commands.
"CD1":"VAL",	Group 2 associated command and corresponding value.
"CD2":"VAL",	Group 2 associated command and corresponding value.
"CD#":"VAL"	Group 2 associated command and corresponding last value.
}	End of Group 2 Commands.
}	End of Group 2 Text.
}	End of Group 1 Text.

TABLE 4a: Networker System Access Mode Command Format

Commands are grouped based on functionality. The Group 1 descriptor is at the top of the hierarchy with the following supported:

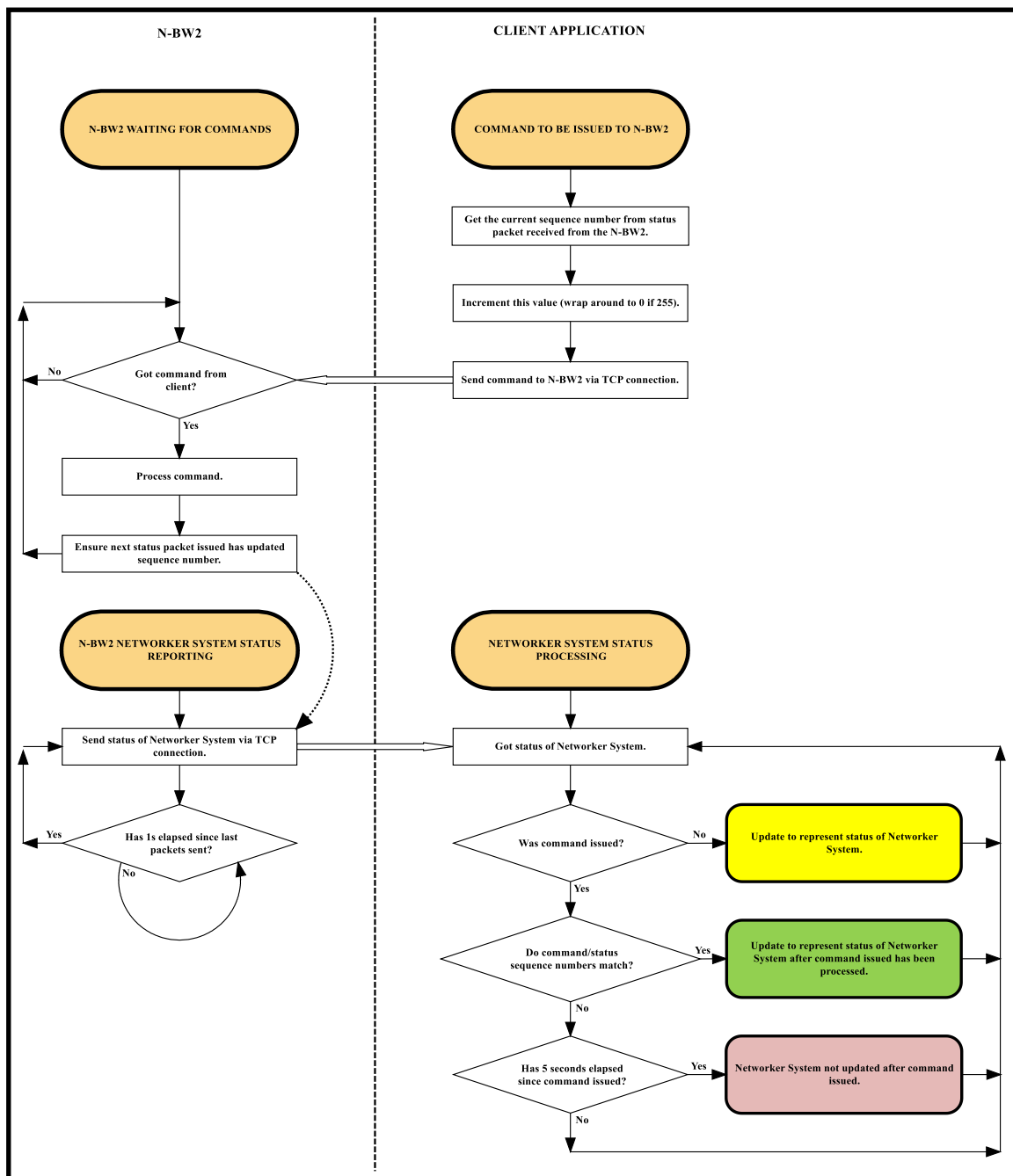
- 1) {"SYST":
System related commands.
- 2) {"HGOM":
Heating Operating Mode related commands.
- 3) {"CGOM":
Cooling (Add-on) Operating Mode related commands.
- 4) {"ECOM":
Evaporative Cooling Operating Mode related commands.

Each group 1 tag descriptor has a defined set of group 2 related tag descriptors these described in the corresponding Group 1 descriptor sections.

4.1 Sequence Numbering

The N-BW2 continually transmits the state of the Networker system at one second intervals. When a command is issued by the client application there is no acknowledgement by the N-BW2 that it has received this command by virtue of this continual status reporting. To overcome this a sequence number is used to indicate when a command has been received by the N-BW2.

Before the client application issues a command it should get the current value of the sequence number, increment it (if 255, wrap around to 0) then use this incremented value in the command packet. The N-BW2, on receiving this command packet will use this sequence number in the next status packet it issues, the client application using this to determine when the command packet has been received by the N-BW2. The flow chart in FLC 4.1a illustrates this.



FLC 4.1a: Networker System Access Sequence Numbering

4.2 System Related – Group 1: {“SYST”:

This group identifies system wide information and is always sent by the N-BW2 as part of the status information reported. In TABLE 4.2a below the “R” in the COMMAND column indicates read-only operation while a “W” indicates read/write functionality.

GROUP2	COMMAND	Values	Description				
{“CFG”: {	---	---	General Configuration				
	“MTSP”: “\$”	R	Y/N	Multi set point control enabled	Y = Yes	N = No	
	“DF”: “\$”	R	Y/N	Dual fuel control allowed	Y = Yes	N = No	
	“TU”: “\$”	R	C/F	Temperature display units	C = Celsius F = Fahrenheit		
	“CF”: “\$”	R	1/2	Clock display format (12 hour/24 hour)	1 = 12 hour	2 = 24 hour	
	“ZA”: “\$”	R	Alphanumeric	Zone A description (16 characters maximum)			
	“ZB”: “\$”	R	Alphanumeric	Zone B description (16 characters maximum)			
	“ZC”: “\$”	R	Alphanumeric	Zone C description (16 characters maximum)			
	“ZD”: “\$”	R	Alphanumeric	Zone D description (16 characters maximum)			
	“VR”: “####”	R	0000 - 9999	N-BW2 firmware version			
	“CV”: “###”	R	000 - 999	N-BW2 WiFi module firmware version			
	“CC”: “###”	R	000 - 255	Certificate checksum value			
	“NC”: “\$”	R	Y/N	N-C7 based system	Y = Yes	N = No	
{“AVM”: {	---	---					
	“HG”: “\$”	R	Y/N	Gas heating	Y = Yes	N = No	
	“EC”: “\$”	R	Y/N	Cooling (Evaporative)	Y = Yes	N = No	
	“CG”: “\$”	R	Y/N	Cooling (Add-on)	Y = Yes	N = No	
	“RA”: “\$”	R	Y/N	Reverse-cycle air-conditioning	Y = Yes	N = No	
	“RH”: “\$”	R	Y/N	Reverse-cycle heating	Y = Yes	N = No	
{“OSS”: {	---	---	Overall System Operation				
	“DY”: “\$\$\$”	R	MON-SUN	Networker day of the week			
	“TM”: “hh:mm”	R	00-23:00-59	Networker time			
	“RG”: “\$”	R	Y/N	N-BW2 Module is registered with the master networker	Y = Yes	N = No	
	“ST”: “\$”	R	N,C,P,U,Y	Operating state	N = Normal Operation	C = Clock Setting	P = Parameter Setting
				U = User Settings	Y = Pin number entry		
				Operating mode			
	“MD”: “\$”	W	H,E,C,R,N	H = Heating	E = Cooling (Evap)	C = Cooling (Add-on)	
				R = Reverse Cycle	N = None		

Continued...

GROUP2	COMMAND	Values	Description
{ "FLT": {	---	---	Fault Information
	"AV": "\$" R	Y/N	Fault has been detected Y = Yes N = No
	"GP": "\$" R	H,E,C,R,N	Appliance type exhibiting fault
			H = Heating E = Cooling (Evap) C = Cooling (Add-on)
			R = Reverse Cycle N = Controlling Device
	"UT": "##" R	01-15	Identification of unit exhibiting fault
	"TP": "\$" R	M,B,L	Fault Severity M = Minor B = Busy L = Lockout
"CD": "##" R	##	Fault Code	

TABLE 4.2a: Networker System {"SYST": Group

4.3 Heating Related – Group 1: {“HGOM”:

This group identifies heating related information and is sent by the N-BW2 as part of the status information reported when heating is the current operating mode of the Networker System.

Under the heating operating mode, there exists two very distinct modes of operation:

1) Single Set Point Operation (Standard)

In this mode of operation one set point temperature defines the operation of the system even if the system is zoned.

2) Multi Set Point Operation (Zone Plus)

In this mode of operation the heating system is zoned and each zone that exists in the system can have its own operating characteristics. For example one zone can be under manual control while another is under schedule control both with different set point temperatures defined.

The {“SYST”: {“CFG”: {“MTSP”: “\$” } } } tag indicates the current operating mode the system is in. The commands required for these two distinct modes differ slightly so they are described in separate sections

For example the following command alters the set point temperature of Zone B to 23°C when operating under heating mode in a multi set point system:

```
{“HGOM”: {“ZBO”: {“SP”: “23” } } }
```

For a single set point system the equivalent command would be:

```
{“HGOM”: {“GSO”: {“SP”: “23” } } }
```

Note that when the schedule setup is being accessed the mode switch {“SYST”: {“OSS”: {“M”: “\$” } } } will not be executed until the schedule setup is exited.

4.3.1 Single Set Point Operation

In TABLE 4.3.1a below the “R” in the COMMAND column indicates read-only operation while a “W” indicates read/write functionality.

GROUP2	COMMAND	Values	Description		
{ "CFG": {	---	---	Configuration.		
	"ZUIS": "\$" R	Y/N	Common Zone installed Y = Yes N = No		
	"ZAIS": "\$" R	Y/N	Zone A installed Y = Yes N = No		
	"ZBIS": "\$" R	Y/N	Zone B installed Y = Yes N = No		
	"ZCIS": "\$" R	Y/N	Zone C installed Y = Yes N = No		
	"ZDIS": "\$" R	Y/N	Zone D installed Y = Yes N = No		
	"CF": "\$" R	Y/N	Circulation fan available Y = Yes N = No		
	"PS": "\$" R	Y/N	Pre-Sleep time period enabled Y = Yes N = No		
{ "OOP": {	---	---	Overall Operation		
	"ST": "\$" W	F,N,Z	Operating State F = Off N = On Z = Fan Only		
	"CF": "\$" W	Y/N	Circulation fan on Y = Yes N = No		
	"FL": "###" W	01 - 16	Fan only operation speed level (01 - 16)		
{ "GSO": {	---	---	General System Operation		
	"OP": "\$" W	A/M	- Schedule or Manual A = Schedule M = Manual		
	"SP": "###"	00 - 30	Set point temperature (< 8 = OFF)		
	"AO": "\$" W	N,A,O	Schedule override N = None A = Advance O = Operation		
{ "GSS": {	---	---	General System Status		
	"HC": "\$" R	Y/N	Calling for heat Y = Yes N = No		
	"FS": "\$" R	Y/N	Fan active Y = Yes N = No		
	"GV": "\$" R	Y/N	Gas valve active Y = Yes N = No		
	"PH": "\$" R	Y/N	Pre-heat active Y = Yes N = No		
	"AT": "\$" R	W,L,R,P,S	Schedule operating mode time period		
			W	L	R
	"AZ": "\$" R	W,L,R,P,S	Schedule time period advanced to		
W			L	R	P
{ "ZUO": {	---	---	Common Zone Operation		
	"UE": "\$" R	(Y/N)	User enabled Y = Yes N = No		
{ "ZAO": {	---	---	Zone A Operation		
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No		
{ "ZBO": {	---	---	Zone B Operation		
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No		
{ "ZCO": {	---	---	Zone C Operation		
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No		
{ "ZDO": {	---	---	Zone D Operation		
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No		

Continued...

GROUP2	COMMAND	Values	Description				
{"ZUS": {	---	---	Common Zone Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for heat) Y = Yes N = No				
{"ZAS": {	---	---	Zone A Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for heat) Y = Yes N = No				
{"ZBS": {	---	---	Zone B Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for heat) Y = Yes N = No				
{"ZCS": {	---	---	Zone C Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for heat) Y = Yes N = No				
{"ZDS": {	---	---	Zone D Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for heat) Y = Yes N = No				
{"APS": {	---	---	System Schedule Setup				
	"AV": "\$" W	Y/N	Active Y = Yes N = No				
	"DY": "\$\$\$" W	MON-SUN	Day of the week to program (Individual day grouping) (MON. TUE, WED, THU, FRI, SAT, SUN)				
	"WD": "\$" W	Y/N	Program weekdays (Weekday day grouping)				
			Y = Yes	N = No			
	"TP": "\$" W	W,L,R,P,S	Time period being programmed				
			W	L	R	P	S
			Wake	Leave	Return	Pre-Sleep	Sleep
	"TM": "hh:mm" W	00-23:00-59	Time period start time in 24 hour format				
	"SP": "##" W	00 – 30	Time period set point temperature (< 8 = OFF)				
	"ZA": "\$" W	N/F	Zone A programmed state	F = OFF	N = ON		
	"ZB": "\$" W	N/F	Zone B programmed state	F = OFF	N = ON		
"ZC": "\$" W	N/F	Zone C programmed state	F = OFF	N = ON			
"ZD": "\$" W	N/F	Zone D programmed state	F = OFF	N = ON			

**TABLE 4.3.1a: Networker System {"HGOM": Group
Single Set Point Operation**

4.3.2 Multi-Set Point Operation

In TABLE 4.3.2a below the “R” in the COMMAND column indicates read-only operation while a “W” indicates read/write functionality.

GROUP2	COMMAND	Values	Description				
{"CFG": {	---	---	Configuration				
	"ZUIS": "\$" R	Y/N	Common Zone installed Y = Yes N = No				
	"ZAIS": "\$" R	Y/N	Zone A installed Y = Yes N = No				
	"ZBIS": "\$" R	Y/N	Zone B installed Y = Yes N = No				
	"ZCIS": "\$" R	Y/N	Zone C installed Y = Yes N = No				
	"ZDIS": "\$" R	Y/N	Zone D installed Y = Yes N = No				
	"CF": "\$" R	Y/N	Circulation fan available Y = Yes N = No				
	"PS": "\$" R	Y/N	Pre-Sleep time period enabled Y = Yes N = No				
	"DG": "\$" R	D,W,A	Schedule day grouping D = Individual W = Weekdays A = All Days				
{"OOP": {	---	---	Overall Operation				
	"ST": "\$" W	F,N,Z	Operating State F = Off N = On Z = Fan Only				
	"CF": "\$" W	Y/N	Circulation fan on Y = Yes N = No				
	"FL": "###" W	01 - 16	Fan only operation speed level (01 – 16)				
{"ZXO": {	---	---	Zone X Operation (X = A, B, C, D)				
	"UE": "\$" W	Y/N	User enabled (Fan Only) Y = Yes N = No				
	"OP": "\$" W	A/M	Schedule or Manual A = Schedule M = Manual				
	"SP": "###"	00 – 30	Set point temperature (< 8 = OFF)				
	"AO": "\$" W	N,A,O	Schedule override N = None A = Advance O = Operation				
{"ZXS": {	---	---	Zone X Status (X = A, B, C, D)				
	"AE": "\$" R	Y/N	Auto enabled (Calling for heat) Y = Yes N = No				
	"ID": "\$" R	Y/N	Information defined ready for use Y = Yes N = No				
	"FS": "\$" R	Y/N	Fan active Y = Yes N = No				
	"GV": "\$" R	Y/N	Gas valve active Y = Yes N = No				
	"PH": "\$" R	Y/N	Pre-heat active Y = Yes N = No				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AT": "\$" R	W,L,R,P,S	Schedule operating mode time period				
			W	L	R	P	S
	"AZ": "\$" R	W,L,R,P,S	Schedule time period advanced to				
W			L	R	P	S	

Continued...

GROUP2	COMMAND	Values	Description								
{ "APZ": {	---	---	Zone Schedule Setup								
	"ZV": "\$"	W	A,B,C,D,N	Zone being programmed							
				<table border="1"> <thead> <tr> <th>A</th> <th>B</th> <th>C</th> <th>D</th> <th>N</th> </tr> </thead> <tbody> <tr> <td>Zone A</td> <td>Zone B</td> <td>Zone C</td> <td>Zone D</td> <td>None</td> </tr> </tbody> </table>	A	B	C	D	N	Zone A	Zone B
	A	B	C	D	N						
	Zone A	Zone B	Zone C	Zone D	None						
	"ID": "\$"	R	Y/N	Information defined ready for use Y = Yes N = No							
	"DY": "\$\$\$"	W	MON-SUN	Day of the week to program (Individual day grouping) (MON. TUE, WED, THU, FRI, SAT, SUN)							
	"WD": "\$"	W	Y/N	Program weekdays (Weekday day grouping)							
				<table border="1"> <thead> <tr> <th>Y = Yes</th> <th>N = No</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Y = Yes	N = No					
	Y = Yes	N = No									
"TP": "\$"	W	W,L,R,P,S	Time period being programmed								
			<table border="1"> <thead> <tr> <th>W</th> <th>L</th> <th>R</th> <th>P</th> <th>S</th> </tr> </thead> <tbody> <tr> <td>Wake</td> <td>Leave</td> <td>Return</td> <td>Pre-Sleep</td> <td>Sleep</td> </tr> </tbody> </table>	W	L	R	P	S	Wake	Leave	Return
W	L	R	P	S							
Wake	Leave	Return	Pre-Sleep	Sleep							
"TM": "hh:mm"	W	00-23:00-59	Time period start time in 24 hour format								
"SP": "###"	W	00 – 30	Time period set point temperature (< 8 = OFF)								

**TABLE 4.3.2a: Networker System {"HGOM": Group
Multi-Set Point Operation**

4.4 Cooling (Add-on) Related – Group 1: {“CGOM”:

This group identifies add-on cooling related information and is sent by the N-BW2 as part of the status information reported when cooling is the current operating mode of the Networker System.

Under the cooling operating mode, there exists two very distinct modes of operation:

- 1) Single Set Point Operation (Standard)
In this mode of operation one set point temperature defines the operation of the system even if the system is zoned.
- 2) Multi Set Point Operation (Zone Plus)
In this mode of operation the gas heating system is zoned and each zone that exists in the system can have its own operating characteristics. For example one zone can be under manual control while another is under schedule control both with different set point temperatures defined.

The {“SYST”: {“CFG”: {“MTSP”: “\$” } } } tag indicates the current operating mode the system is in. The commands required for these two distinct modes differ slightly so they are described in separate sections

For example the following command alters the set point temperature of Zone A to 18°C when operating under cooling (add-on) mode in a multi set point system:

```
{“CGOM”: {“ZAO”: {“SP”: “18” } } }
```

For a single set point system the equivalent command would be:

```
{“CGOM”: {“GSO”: {“SP”: “18” } } }
```

Note that when the schedule setup is being accessed the mode switch {“SYST”: {“OSS”: {“M”: “\$” } } } will not be executed until the schedule setup is exited.

4.4.1 Single Set Point Operation

In TABLE 4.4.1a below the “R” in the COMMAND column indicates read-only operation while a “W” indicates read/write functionality.

GROUP2	COMMAND	Values	Description			
{ "CFG": {	---	---	Configuration.			
	"ZUIS": "\$" R	Y/N	Common Zone installed Y = Yes N = No			
	"ZAIS": "\$" R	Y/N	Zone A installed Y = Yes N = No			
	"ZBIS": "\$" R	Y/N	Zone B installed Y = Yes N = No			
	"ZCIS": "\$" R	Y/N	Zone C installed Y = Yes N = No			
	"ZDIS": "\$" R	Y/N	Zone D installed Y = Yes N = No			
	"CF": "\$" R	Y/N	Circulation fan available Y = Yes N = No			
	"PS": "\$" R	Y/N	Pre-Sleep time period enabled Y = Yes N = No			
{ "OOP": {	---	---	Overall Operation			
	"ST": "\$" W	F,N,Z	Operating State F = Off N = On Z = Fan Only			
	"CF": "\$" W	Y/N	Circulation fan on Y = Yes N = No			
	"FL": "###" W	01 - 16	Fan only operation speed level (01 – 16)			
{ "GSO": {	---	---	General System Operation			
	"OP": "\$" W	A/M	Schedule or Manual A = Schedule M = Manual			
	"SP": "###"	00 – 30	Set point temperature (< 8 = OFF)			
	"AO": "\$" W	N,A,O	Schedule override N = None A = Advance O = Operation			
{ "GSS": {	---	---	General System Status			
	"CC": "\$" R	Y/N	Calling for cool Y = Yes N = No			
	"FS": "\$" R	Y/N	Fan active Y = Yes N = No			
	"CP": "\$" R	Y/N	Compressor active Y = Yes N = No			
	"AT": "\$" R	W,L,R,P,S	Schedule operating mode time period			
			W	L	R	P
	"AZ": "\$" R	W,L,R,P,S	Schedule time period advanced to			
W			L	R	P	S
{ "ZUO": {	---	---	Common Zone Operation			
	"UE": "\$" R	(Y/N)	User enabled Y = Yes N = No			
{ "ZAO": {	---	---	Zone A Operation			
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No			
{ "ZBO": {	---	---	Zone B Operation			
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No			
{ "ZCO": {	---	---	Zone C Operation			
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No			
{ "ZDO": {	---	---	Zone D Operation			
	"UE": "\$" W	(Y/N)	User enabled Y = Yes N = No			

Continued...

GROUP2	COMMAND	Values	Description				
{ "ZUS": {	---	---	Common Zone Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for cool) Y = Yes N = No				
{ "ZAS": {	---	---	Zone A Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for cool) Y = Yes N = No				
{ "ZBS": {	---	---	Zone B Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for cool) Y = Yes N = No				
{ "ZCS": {	---	---	Zone C Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for cool) Y = Yes N = No				
{ "ZDS": {	---	---	Zone D Status				
	"MT": "###" R	000 – 999	Measured temperature (x10). (999 indicates undefined)				
	"AE": "\$" R	(Y/N)	Auto enabled (Calling for cool) Y = Yes N = No				
{ "APS": {	---	---	System Schedule Setup				
	"AV": "\$" W	Y/N	Active Y = Yes N = No				
	"DY": "\$\$\$" W	MON-SUN	Day of the week to program (Individual day grouping) (MON. TUE, WED, THU, FRI, SAT, SUN)				
	"WD": "\$" W	Y/N	Program weekdays (Weekday day grouping)				
			Y = Yes	N = No			
	"TP": "\$" W	W,L,R,P,S	Time period being programmed				
			W	L	R	P	S
			Wake	Leave	Return	Pre-Sleep	Sleep
	"TM": "hh:mm" W	00-23:00-59	Time period start time in 24 hour format				
	"SP": "##" W	00 – 30	Time period set point temperature (< 8 = OFF)				
	"ZA": "\$" W	N/F	Zone A programmed state	F = OFF	N = ON		
	"ZB": "\$" W	N/F	Zone B programmed state	F = OFF	N = ON		
"ZC": "\$" W	N/F	Zone C programmed state	F = OFF	N = ON			
"ZD": "\$" W	N/F	Zone D programmed state	F = OFF	N = ON			

**TABLE 4.4.1a: Networker System {"CGOM": Group
Single Set Point Operation**

4.4.2 Multi-Set Point Operation

In TABLE 4.4.2a below the “R” in the COMMAND column indicates read-only operation while a “W” indicates read/write functionality.

GROUP2	COMMAND	Values	Description				
{ "CFG": {	---	---	Configuration				
	"ZUIS": "\$" R	Y/N	Common Zone installed Y = Yes N = No				
	"ZAIS": "\$" R	Y/N	Zone A installed Y = Yes N = No				
	"ZBIS": "\$" R	Y/N	Zone B installed Y = Yes N = No				
	"ZCIS": "\$" R	Y/N	Zone C installed Y = Yes N = No				
	"ZDIS": "\$" R	Y/N	Zone D installed Y = Yes N = No				
	"CF": "\$" R	Y/N	Circulation fan available Y = Yes N = No				
	"PS": "\$" R	Y/N	Pre-Sleep time period enabled Y = Yes N = No				
{ "OOP": {	---	---	Overall Operation				
	"ST": "\$" W	F,N,Z	Operating State F = Off N = On Z = Fan Only				
	"CF": "\$" W	Y/N	Circulation fan on Y = Yes N = No				
	"FL": "###" W	01 - 16	Fan only operation speed level (01 - 16)				
{ "ZXO": {	---	---	Zone X Operation (X = A, B, C, D)				
	"UE": "\$" W	Y/N	User enabled (Fan Only) Y = Yes N = No				
	"OP": "\$" W	A/M	Schedule or Manual A = Schedule M = Manual				
	"SP": "###"	00 - 30	Set point temperature (< 8 = OFF)				
	"AO": "\$" W	N,A,O	Schedule override N = None A = Advance O = Operation				
{ "ZXS": {	---	---	Zone X Status (X = A, B, C, D)				
	"AE": "\$" R	Y/N	Auto enabled (Calling for cool) Y = Yes N = No				
	"ID": "\$" R	Y/N	Information defined ready for use Y = Yes N = No				
	"FS": "\$" R	Y/N	Fan active Y = Yes N = No				
	"CP": "\$" R	Y/N	Compressor active Y = Yes N = No				
	"MT": "###" R	000 - 999	Measured temperature (x10). (999 indicates undefined)				
	"AT": "\$" R	W,L,R,P,S	Schedule operating mode time period				
			W	L	R	P	S
	"AZ": "\$" R	W,L,R,P,S	Schedule time period advanced to				
W			L	R	P	S	

Continued...

GROUP2	COMMAND	Values	Description	
{ "APZ": {	---	---	Zone Schedule Setup	
	"ZV": "\$"	W	A,B,C,D,N	Zone being programmed
				A B C D N
				Zone A Zone B Zone C Zone D None
	"ID": "\$"	R	Y/N	Information defined ready for use Y = Yes N = No
	"DY": "\$\$\$"	W	MON-SUN	Day of the week to program (Individual day grouping) (MON. TUE, WED, THU, FRI, SAT, SUN)
	"WD": "\$"	W	Y/N	Program weekdays (Weekday day grouping)
				Y = Yes N = No
	"TP": "\$"	W	W,L,R,P,S	Time period being programmed
				W L R P S
Wake Leave Return Pre-Sleep Sleep				
"TM": "hh:mm"	W	00-23:00-59	Time period start time in 24 hour format	
"SP": "##"	W	00 – 30	Time period set point temperature (< 8 = OFF)	

**TABLE 4.4.2a: Networker System {"CGOM": Group
Multi-Set Point Operation**

4.5 Cooling (Evaporative) Related – Group 1: {“ECOM”}:

This group identifies evaporative cooling related information and is sent by the N-BW2 as part of the status information reported when evaporative cooling is the current operating mode of the Networker System. In TABLE 4.5a below the “R” in the COMMAND column indicates read-only operation while a “W” indicates read/write functionality.

GROUP2	COMMAND	Values	Description			
{“CFG”: {	---	---	Configuration.			
	“ZUIS”: “\$”	R	Y/N	Common Zone installed	Y = Yes	N = No
	“ZAIS”: “\$”	R	Y/N	Zone A installed	Y = Yes	N = No
	“ZBIS”: “\$”	R	Y/N	Zone B installed	Y = Yes	N = No
	“ZCIS”: “\$”	R	Y/N	Zone C installed	Y = Yes	N = No
	“ZDIS”: “\$”	R	Y/N	Zone D installed	Y = Yes	N = No
	“TP”: “\$”	R	Y/N	Display temperature	Y = Yes	N = No
{“GSO”: {	---	---	General System Operation			
	“SW”: “\$”	W	F/N	Switched state	F = Off	N = On
	“OP”: “\$”	W	M/A	Operating state	M = Manual	A = Auto
	“FS”: “\$”	W	F/N	Fan state (Manual operation)	F = Off	N = On
	“PS”: “\$”	W	F/N	Pump state (Manual operation)	F = Off	N = On
	“FL”: “##”	W	01 - 16	Fan speed level (01 – 16) (Manual Operation)		
	“SP”: “##”	W	19 - 34	Comfort level (Set Point) (19 – 34) (Auto Operation)		
	“ZUUE”: “\$”	W	Y/N	Zone U user enabled	Y = Yes	N = No
	“ZAUUE”: “\$”	W	Y/N	Zone A user enabled	Y = Yes	N = No
	“ZBUUE”: “\$”	W	Y/N	Zone B user enabled	Y = Yes	N = No
	“ZCUUE”: “\$”	W	Y/N	Zone C user enabled	Y = Yes	N = No
	“ZDUUE”: “\$”	W	Y/N	Zone D user enabled	Y = Yes	N = No
{“GSS”: {	---	---	General System Status			
	“PW”: “\$”	R	Y/N	Prewet action is active	Y = Yes	N = No
	“BY”: “\$”	R	Y/N	Cooler is busy	Y = Yes	N = No
	“PO”: “\$”	R	Y/N	Pump is being operated	Y = Yes	N = No
	“FO”: “\$”	R	Y/N	Fan is being operated	Y = Yes	N = No
	“SN”: “\$”	R	Y/N	Service notification	Y = Yes	N = No
	“MT”: “###”	R	000 – 999	Measured temperature (x10). (999 indicates undefined)		
	“ZUAE”: “\$”	W	Y/N	Zone U auto enabled	Y = Yes	N = No
	“ZAAE”: “\$”	W	Y/N	Zone A auto enabled	Y = Yes	N = No
	“ZBAE”: “\$”	W	Y/N	Zone B auto enabled	Y = Yes	N = No
	“ZCAE”: “\$”	W	Y/N	Zone C auto enabled	Y = Yes	N = No
	“ZDAE”: “\$”	W	Y/N	Zone D auto enabled	Y = Yes	N = No

Continued...

GROUP2	COMMAND	Values	Description			
{ "PSU": {	---	---	Programmed switch on/off operation			
	"AV": "\$"	W	Y/N	Programming active	Y = Yes	N = No
	"SW": "\$"	W	F/N	Program to switch off/on	F = Off	N = On
	"SNT": "hh:mm"	W	00-23:00-59	Time to switch on		
	"SNE": "\$"	W	Y/N	Switch on enabled	Y = Yes	N = No
	"OP": "\$"	W	M/A	Switched on operating state	M = Manual	A = Auto
	"PS": "\$"	W	F/N	Switched on pump state	F = Off	N = On
	"FL": "##"	W	01 - 16	Switched on fan speed level (01 – 16) (Manual Operation)		
	"SP": "##"	W	19 - 34	Switched on comfort level (Set Point) (19 – 34) (Auto Operation)		
	"SFT": "hh:mm"	W	00-23:00-59	Time to switch off		
	"SFE": "\$"	W	Y/N	Switch off enabled	Y = Yes	N = No
	"ZUUE": "\$"	W	Y/N	Zone U user enabled at switch on	Y = Yes	N = No
	"ZAUE": "\$"	W	Y/N	Zone A user enabled at switch on	Y = Yes	N = No
	"ZBUE": "\$"	W	Y/N	Zone B user enabled at switch on	Y = Yes	N = No
	"ZCUE": "\$"	W	Y/N	Zone C user enabled at switch on	Y = Yes	N = No
"ZDUE": "\$"	W	Y/N	Zone D user enabled at switch on	Y = Yes	N = No	

TABLE 4.5a: Networker System {"ECOM": Group

5. N-BW2 Interface Test Application

All the commands listed in Sections 3 & 4 can be exercised/viewed using the N-BW2 Interface Test Application. This is a Windows based application that connects via WIFI to an N-BW2 to allow access to both the WIFI Configuration and Networker System Access modes.

On starting the application connection to the N-BW2 must be established by selecting the *CONNECT via WIFI* label as illustrated in FIG 5a.



FIG 5a: N-BW2 Interface Test Application – Connecting to N-BW2

Once a connection is established the application will show the current Networker System status, unless the N-BW2 is operating in its Default AP state. In this latter case the WIFI configuration screen will be automatically displayed as the N-BW2 is by default in the WIFI Configuration mode when it is operating in the Default AP state.

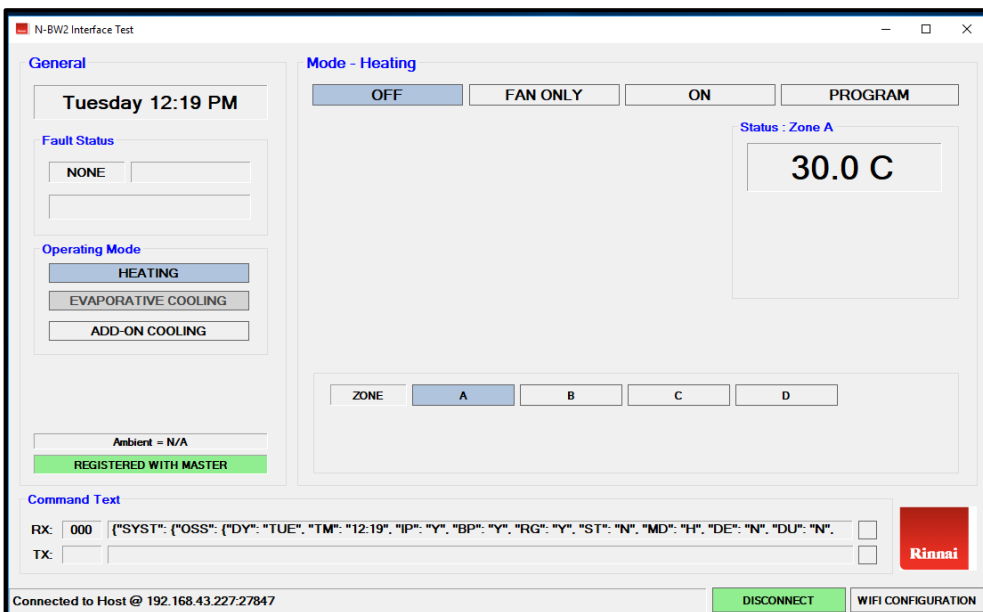


FIG 5b: N-BW2 Interface Test Application – Networker System Access

5.1 WIFI Configuration Screen

The WIFI Configuration mode of the N-BW2 can be forced by selecting the *WIFI CONFIGURATION* label, the appearance of this screen illustrated in FIG 5.1a.

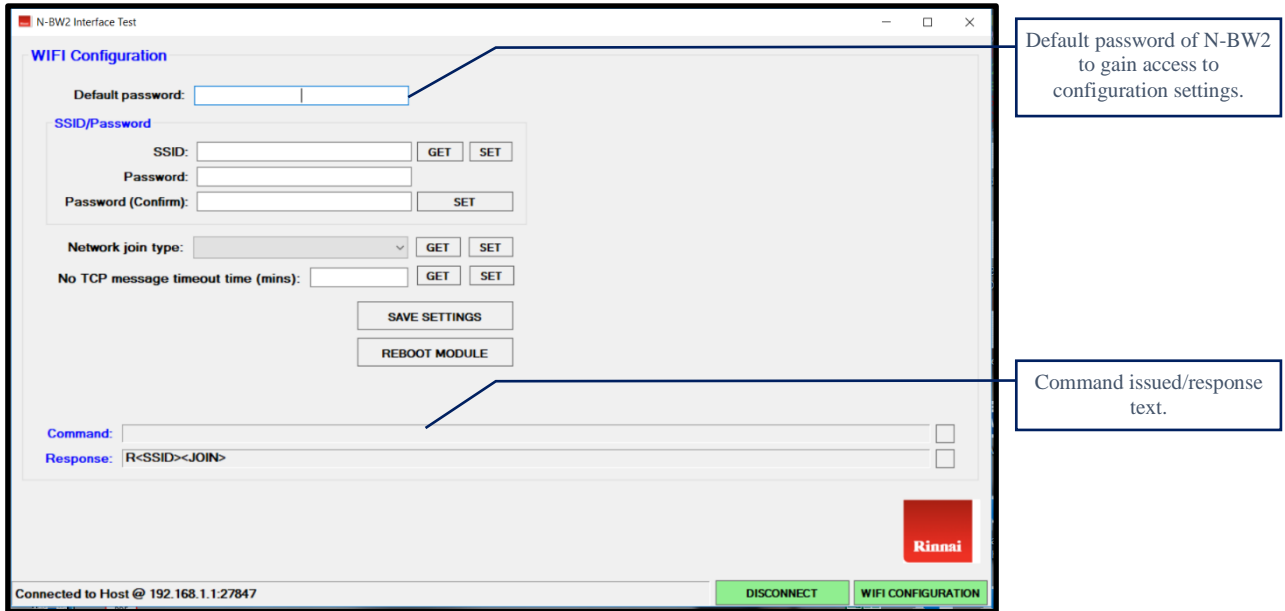


FIG 5.1a: N-BW2 Interface Test Application – WIFI Configuration Screen

Using the *GET* labels the various configuration settings can be retrieved provided the corresponding N-BW2 default password has been entered correctly as illustrated in FIG 5.1b. The corresponding *GET* label flashed green indicates successful retrieval of the setting. The WPA pass-phrase (password) cannot be retrieved, only set.

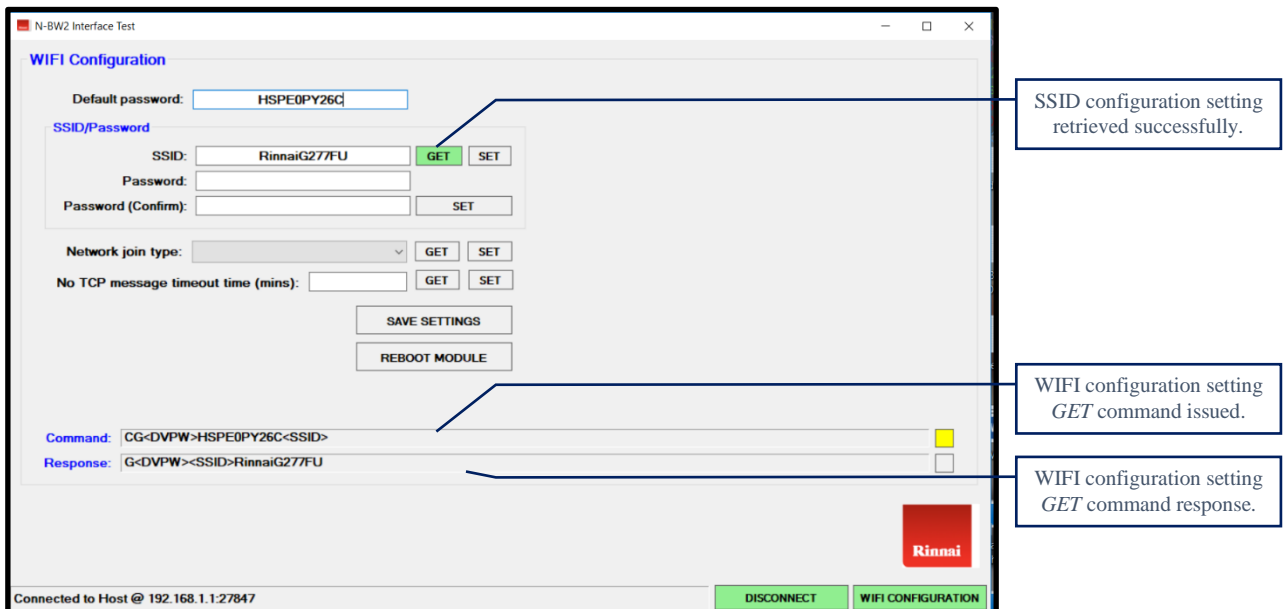
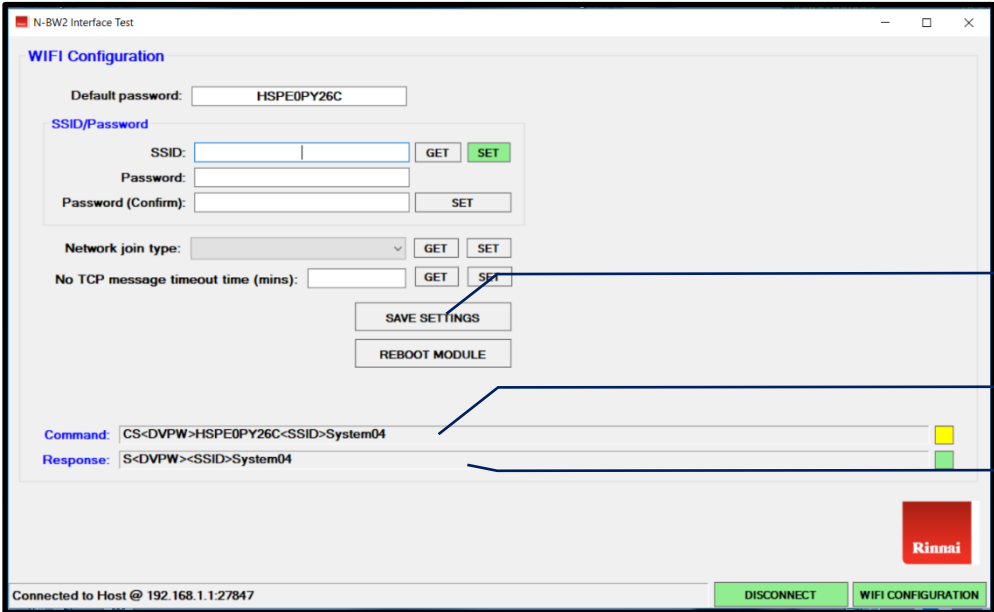


FIG 5.1b: N-BW2 Interface Test Application – GET Settings

Using the *SET* labels the various configuration settings can be written provided the corresponding N-BW2 default password has been entered correctly as illustrated in FIG 5.1c. The corresponding *SET* label flashed green indicates successful writing of the setting.



The screenshot shows the 'WIFI Configuration' window of the 'N-BW2 Interface Test' application. It includes fields for 'Default password' (HSPE0PY26C), 'SSID/Password' (SSID, Password, Password (Confirm)), 'Network join type', and 'No TCP message timeout time (mins)'. Each field has a 'GET' and 'SET' button. A 'SAVE SETTINGS' button is also present. Below the configuration fields, a 'Command' field shows 'CS<DVPW>HSPE0PY26C<SSID>System04' and a 'Response' field shows 'S<DVPW><SSID>System04'. A 'Rinnai' logo is in the bottom right corner. The status bar at the bottom shows 'Connected to Host @ 192.168.1.1:27847', 'DISCONNECT', and 'WIFI CONFIGURATION'.

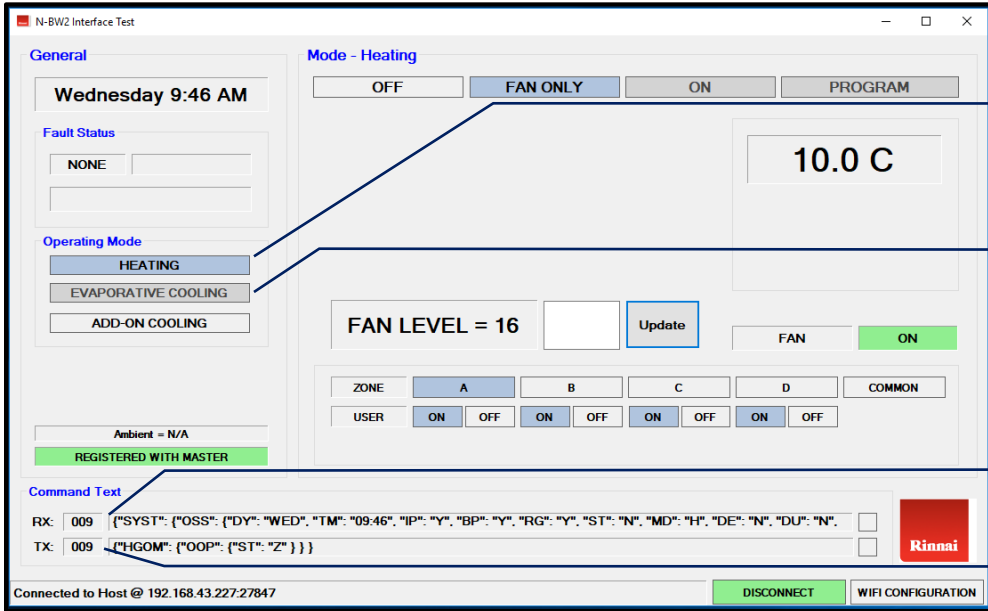
Annotations on the right side of the screenshot:

- Altered settings not committed to memory until the *SAVE SETTINGS* label is selected
- WIFI configuration setting *SET* command issued.
- WIFI configuration setting *SET* command response.

FIG 5.1c: N-BW2 Interface Test Application – SET Settings

5.2 Networker System Access Screen

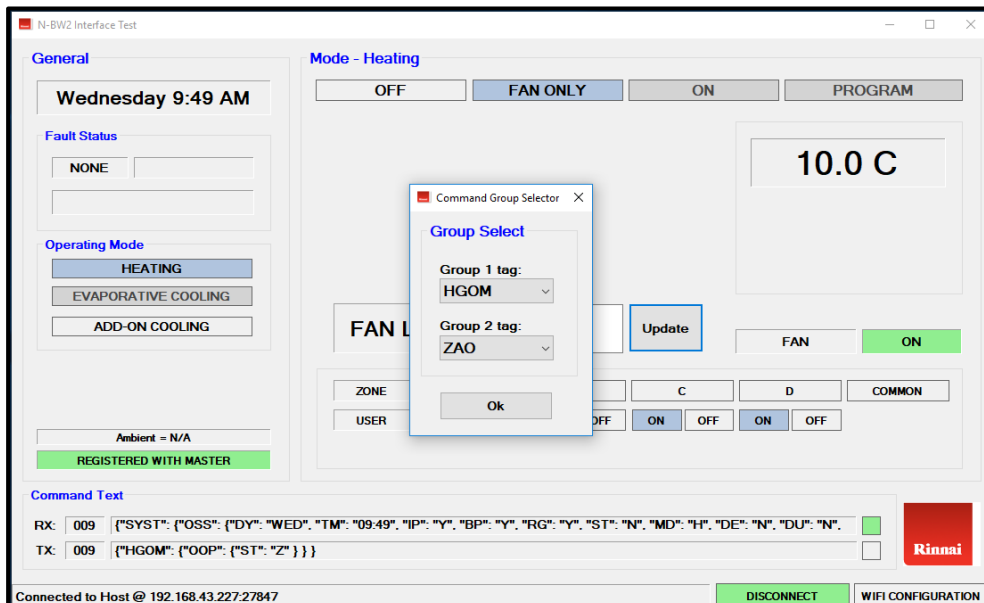
Once a connection is established the application will show the current Networker System status, an example of which is illustrated below in FIG 5.2a.



The screenshot shows the N-BW2 Interface Test application window. The interface includes a 'General' section with the date and time 'Wednesday 9:46 AM', a 'Fault Status' section with 'NONE', and an 'Operating Mode' section with 'HEATING' selected. The 'Mode - Heating' section shows 'OFF', 'FAN ONLY' (highlighted in blue), 'ON', and 'PROGRAM' buttons. A large display shows '10.0 C'. Below this, 'FAN LEVEL = 16' is shown with an 'Update' button and 'FAN ON' status. A 'ZONE' section has buttons for A, B, C, D, and COMMON. A 'USER' section has 'ON' and 'OFF' buttons for each zone. The 'Command Text' section shows RX and TX data. A 'Rinnai' logo is in the bottom right. Callouts explain: 'A label highlighted blue indicates the currently selected function, in this case heating mode fan only operation', 'A greyed label indicates this function is not available, in this example the evaporative cooling operating mode is not available.', 'Receive data sequence number.', and 'Transmit command sequence number.'

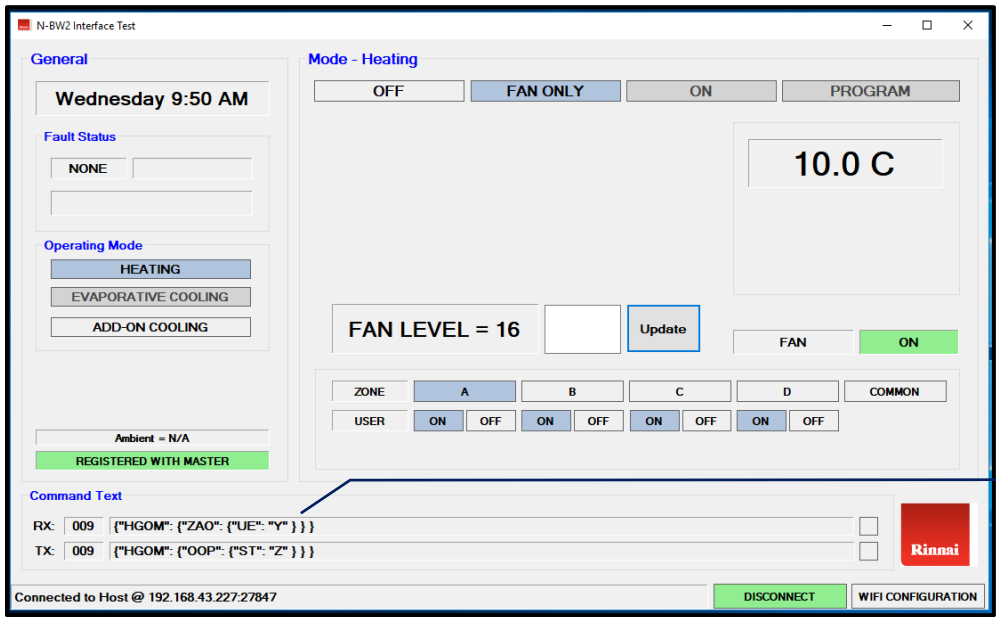
FIG 5.2a: N-BW2 Interface Test Application – Networker System Access

The Networker System status can be a lengthy packet, too long to fit in the receive label provided. The required information to display can be defined by clicking on the receive data label and selecting the GROUP 1 & 2 tags accordingly as illustrated in FIG 5.2b.



The screenshot shows the N-BW2 Interface Test application window with a 'Command Group Selector' dialog box open. The dialog box has a 'Group Select' section with 'Group 1 tag: HGOM' and 'Group 2 tag: ZAO' selected. The background interface is similar to FIG 5.2a, but the time is 'Wednesday 9:49 AM'. The 'Command Text' section shows RX and TX data. The 'Rinnai' logo is in the bottom right.

FIG 5.2b: N-BW2 Interface Test Application – Group Tag Selection



Now only {"HGOM": {"ZAO": {"UE": "Y" }}}

FIG 5.2c: N-BW2 Interface Test Application – Group Tag Selection

5.3 Heating Operating Mode

5.3.1 Single Set Point Operation

5.3.1.1 No Zones Installed

With no zones installed the heating operating mode screen appears as illustrated in FIG 5.3.1.1a below.

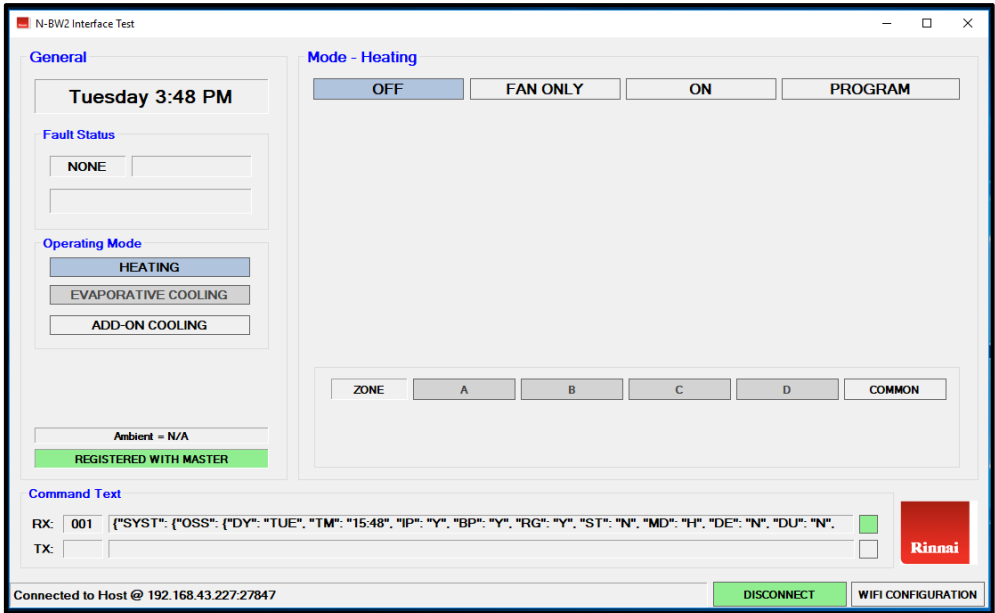
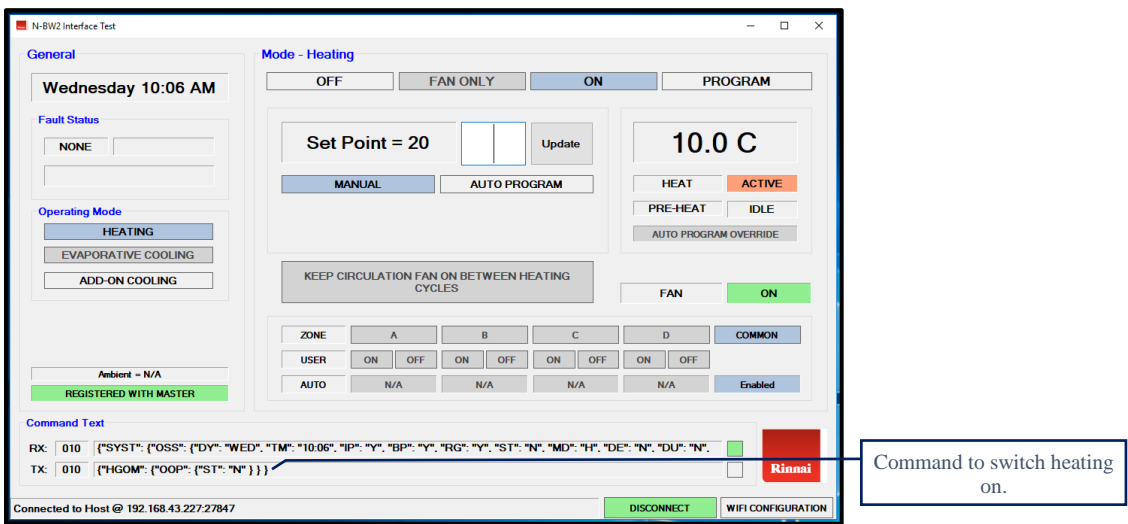
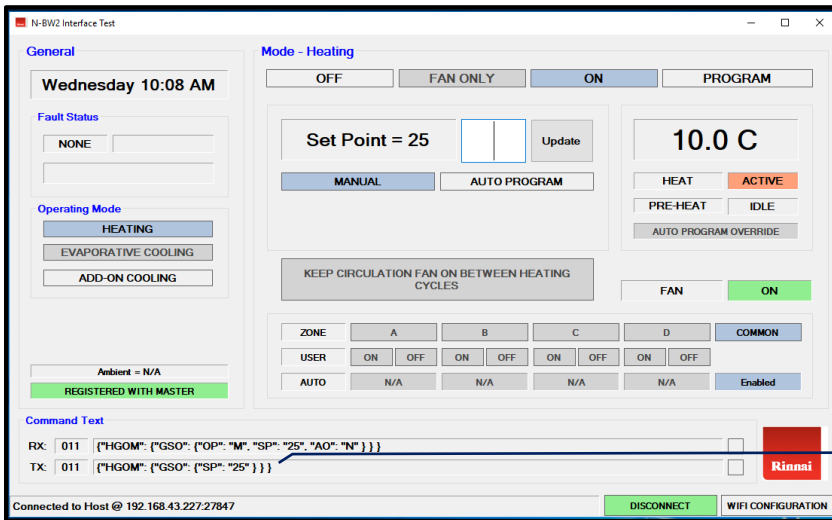


FIG 5.3.1.1a: Heating Operating Mode (Switched off) – Single Set Point Operation (No Zones)

When the heating operating mode is switched on the screen appears as illustrated in FIG 5.3.1.1b with various command functions illustrated.



Continued...



General
Wednesday 10:08 AM

Fault Status
NONE

Operating Mode
HEATING
EVAPORATIVE COOLING
ADD-ON COOLING

Ambient - N/A
REGISTERED WITH MASTER

Mode - Heating
OFF | FAN ONLY | ON | PROGRAM

Set Point = 25 [Update]

MANUAL | AUTO PROGRAM

HEAT ACTIVE | PRE-HEAT IDLE | AUTO PROGRAM OVERRIDE

FAN ON

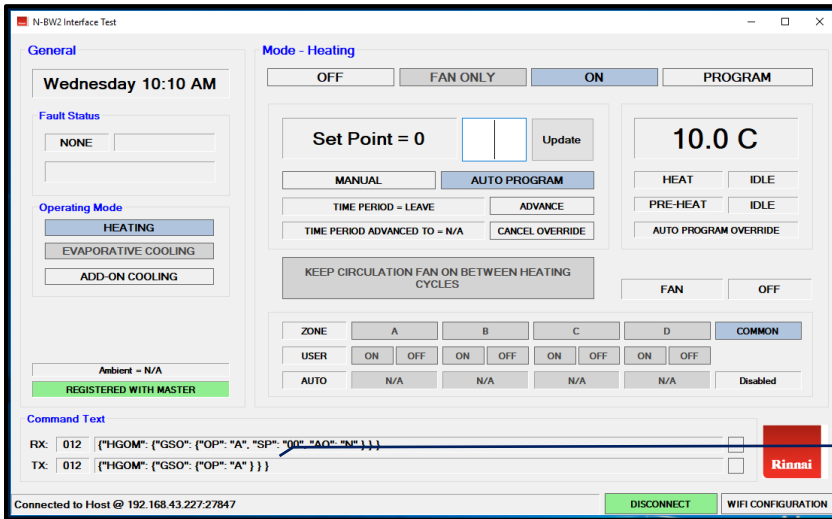
KEEP CIRCULATION FAN ON BETWEEN HEATING CYCLES

ZONE: A B C D COMMON
USER: ON OFF ON OFF ON OFF ON OFF
AUTO: N/A N/A N/A N/A Enabled

Command Text
RX: 011 [{"HGOM": [{"GSO": [{"OP": "M", "SP": "25", "AO": "N"}]}]}]
TX: 011 [{"HGOM": [{"GSO": [{"SP": "25"}]}]}]

Connected to Host @ 192.168.43.227:27847

Command to change set point temperature to 25°C.



General
Wednesday 10:10 AM

Fault Status
NONE

Operating Mode
HEATING
EVAPORATIVE COOLING
ADD-ON COOLING

Ambient - N/A
REGISTERED WITH MASTER

Mode - Heating
OFF | FAN ONLY | ON | PROGRAM

Set Point = 0 [Update]

MANUAL | AUTO PROGRAM

HEAT IDLE | PRE-HEAT IDLE | AUTO PROGRAM OVERRIDE

FAN OFF

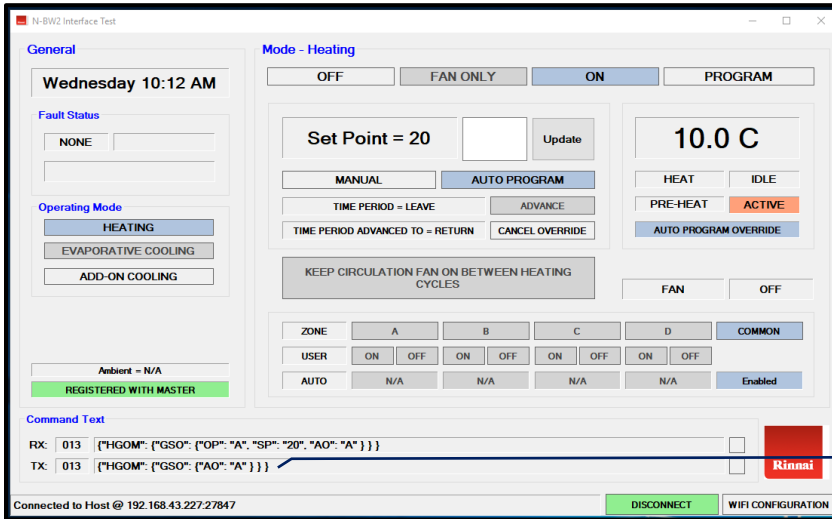
KEEP CIRCULATION FAN ON BETWEEN HEATING CYCLES

ZONE: A B C D COMMON
USER: ON OFF ON OFF ON OFF ON OFF
AUTO: N/A N/A N/A N/A Disabled

Command Text
RX: 012 [{"HGOM": [{"GSO": [{"OP": "A", "SP": "00", "AO": "N"}]}]}]
TX: 012 [{"HGOM": [{"GSO": [{"OP": "A"}]}]}]

Connected to Host @ 192.168.43.227:27847

Command to change to schedule operation.



General
Wednesday 10:12 AM

Fault Status
NONE

Operating Mode
HEATING
EVAPORATIVE COOLING
ADD-ON COOLING

Ambient - N/A
REGISTERED WITH MASTER

Mode - Heating
OFF | FAN ONLY | ON | PROGRAM

Set Point = 20 [Update]

MANUAL | AUTO PROGRAM

HEAT ACTIVE | PRE-HEAT IDLE | AUTO PROGRAM OVERRIDE

FAN OFF

KEEP CIRCULATION FAN ON BETWEEN HEATING CYCLES

ZONE: A B C D COMMON
USER: ON OFF ON OFF ON OFF ON OFF
AUTO: N/A N/A N/A N/A Enabled

Command Text
RX: 013 [{"HGOM": [{"GSO": [{"OP": "A", "SP": "20", "AO": "A"}]}]}]
TX: 013 [{"HGOM": [{"GSO": [{"AO": "A"}]}]}]

Connected to Host @ 192.168.43.227:27847

Command to advance the schedule time period.

Continued...

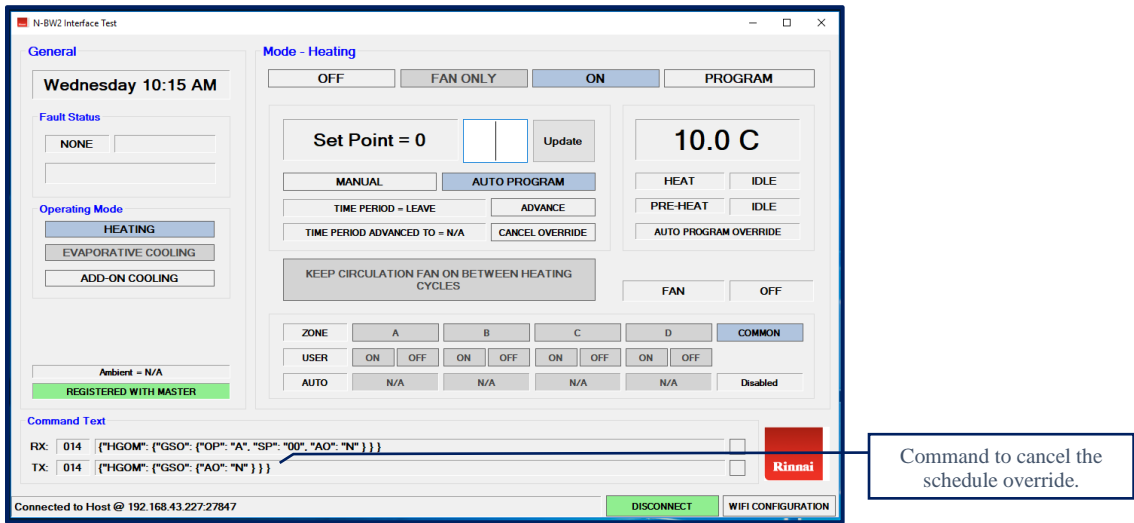


FIG 5.3.1.1b: Heating Operating Mode (Switched on) – Single Set Point Operation (No Zones)

5.3.1.2 Two Zones Installed

With two zones installed the heating operating mode screen appears as illustrated in FIG 5.3.1.2a below with Zone B selected resulting in the temperature measured in this zone being displayed.

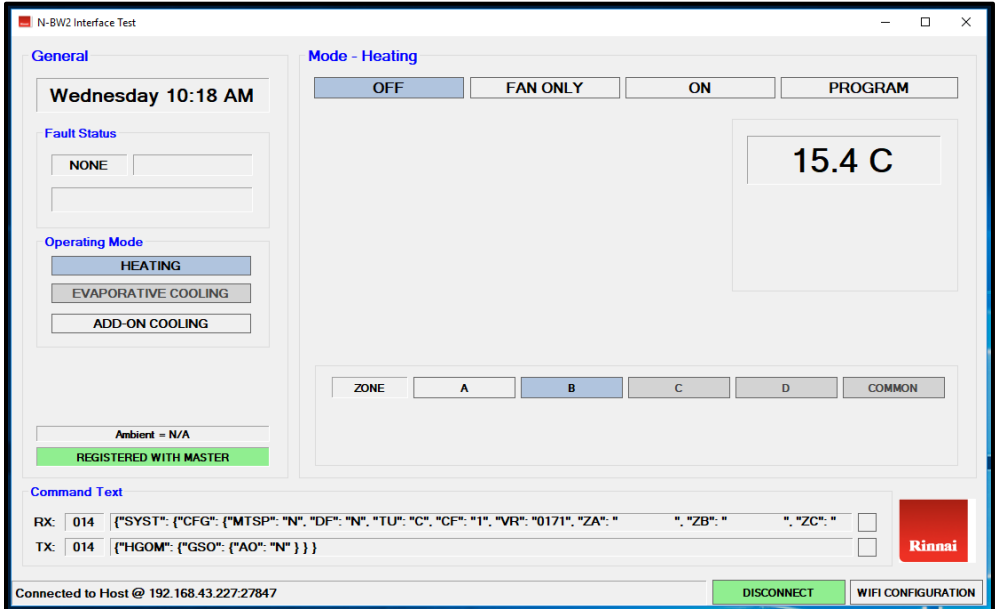


FIG 5.3.1.2a: Heating Operating Mode (Switched off) – Single Set Point Operation (2 Zones Installed)

When the heating operating mode is switched on the screen appears as illustrated in FIG 5.3.1.2b.

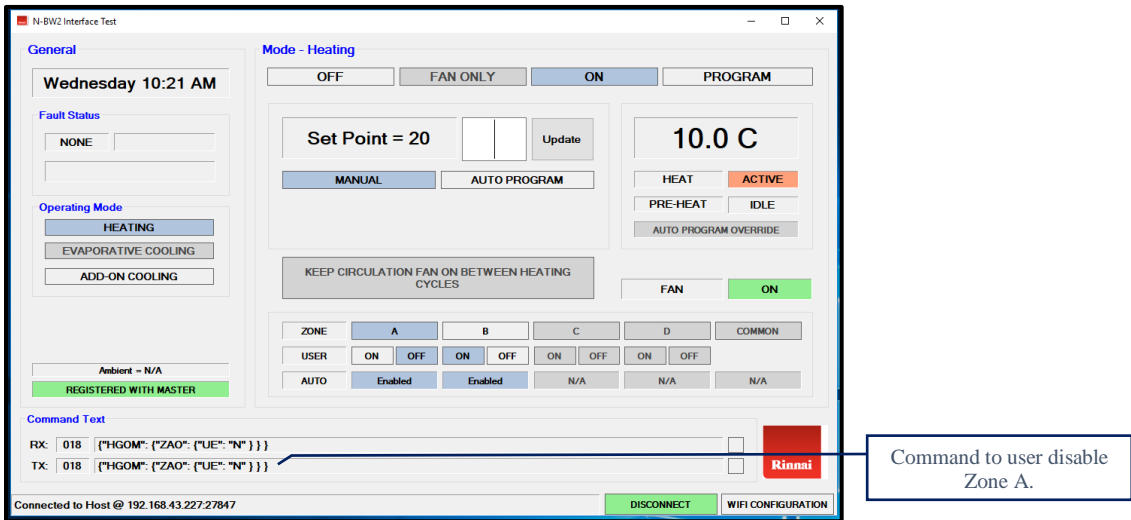


FIG 5.3.1.2b: Heating Operating Mode (Switched on) – Single Set Point Operation (2 Zones Installed)

5.3.1.3 Schedule Setting (Auto-Program)

Selecting the *PROGRAM* label places the system into the heating schedule setting mode as illustrated in FIG 5.3.1.3a below.

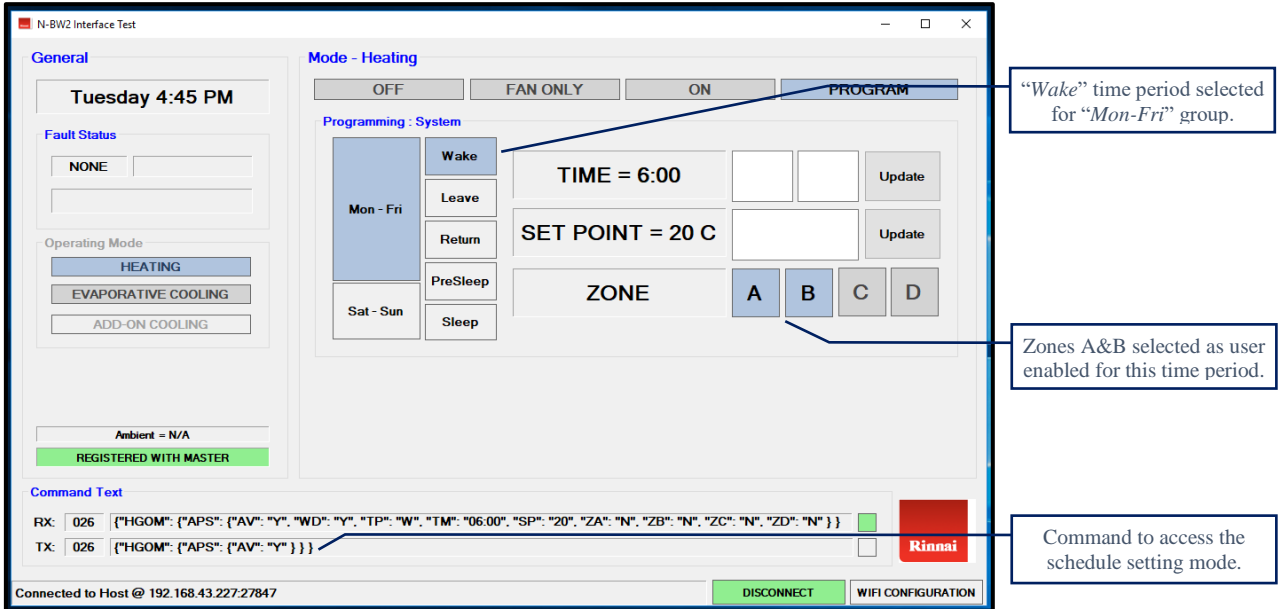
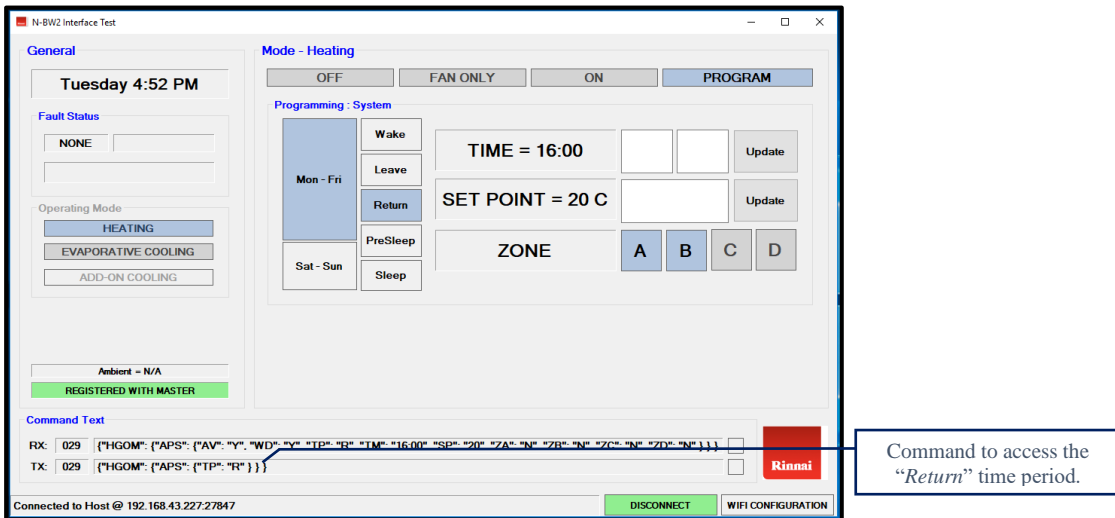
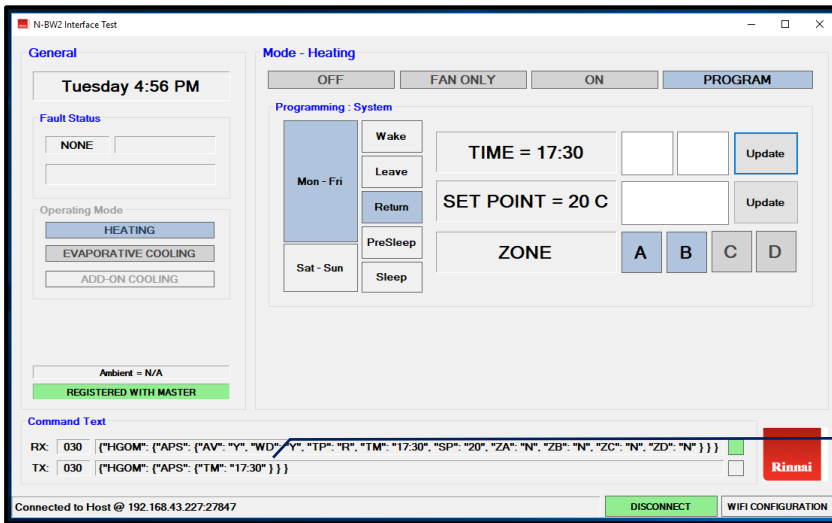


FIG 5.3.1.3a: Heating Operating Mode (Schedule Setting Access) – Single Set Point Operation (2 Zones Installed)

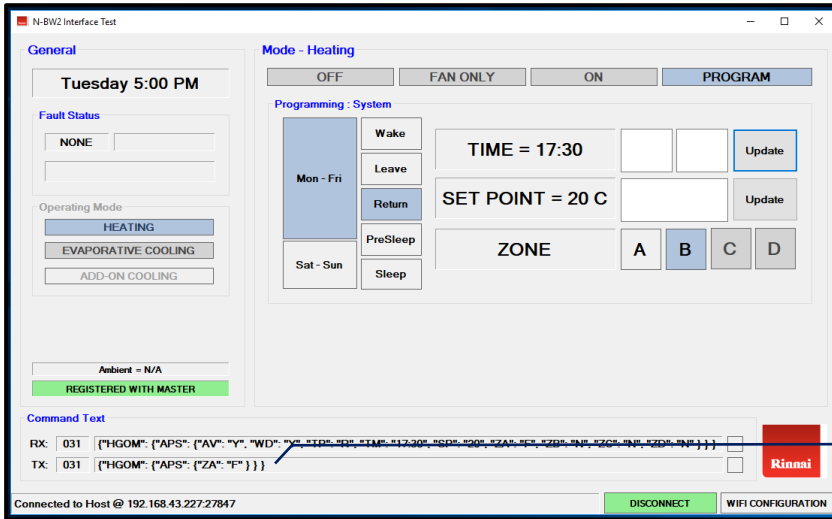
When the heating schedule setting mode is being accessed the screen appears as illustrated in FIG 5.3.1.3b with various command functions illustrated.



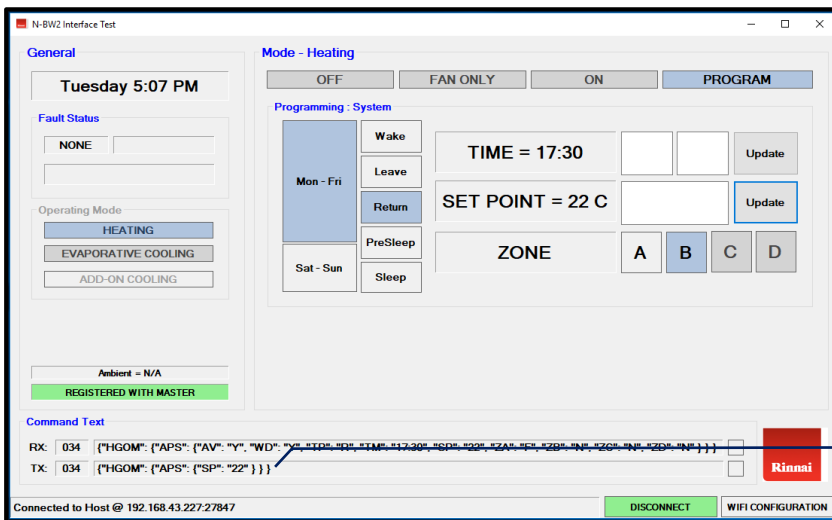
Continued...



Command to set the "Return" time period time to 17:30.



Command to switch off Zone A for the "Return" time period.



Command to set the "Return" set point temperature to 22°C.

FIG 5.3.1.3b: Heating Operating Mode (Schedule Setting Functions) – Single Set Point Operation (2 Zones Installed)

5.3.2 Multi Set Point Operation

With multi set point operation zones must be installed, the maximum allowed being four. The screen appears as illustrated in FIG 5.3.2a when the heating operating mode is switched off.

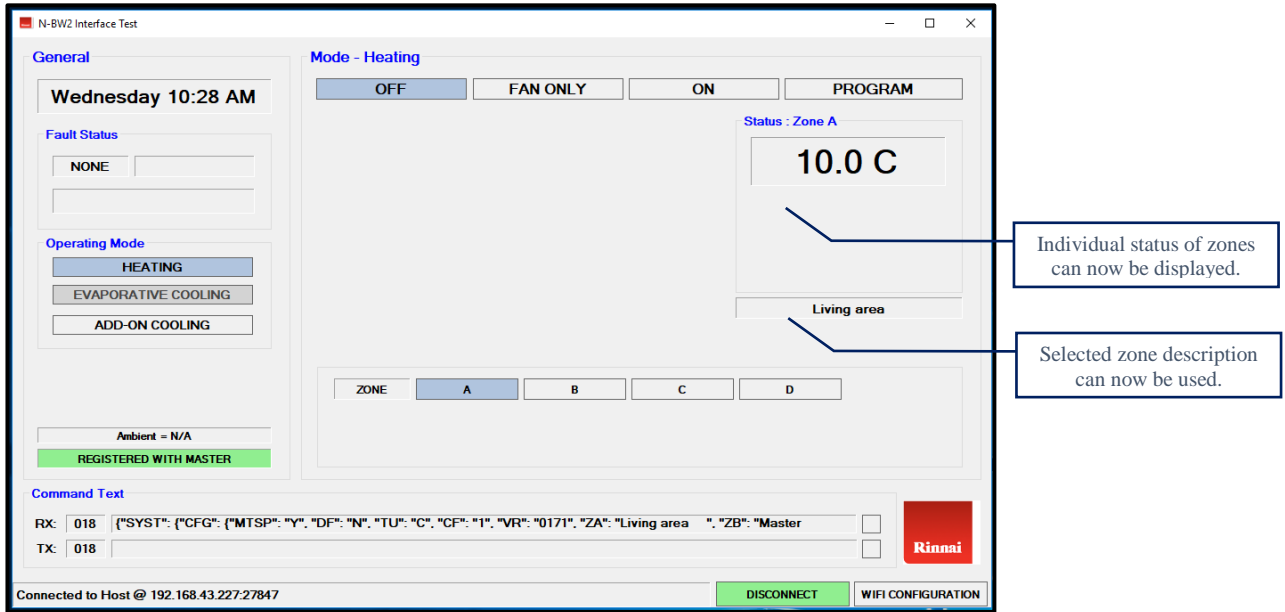
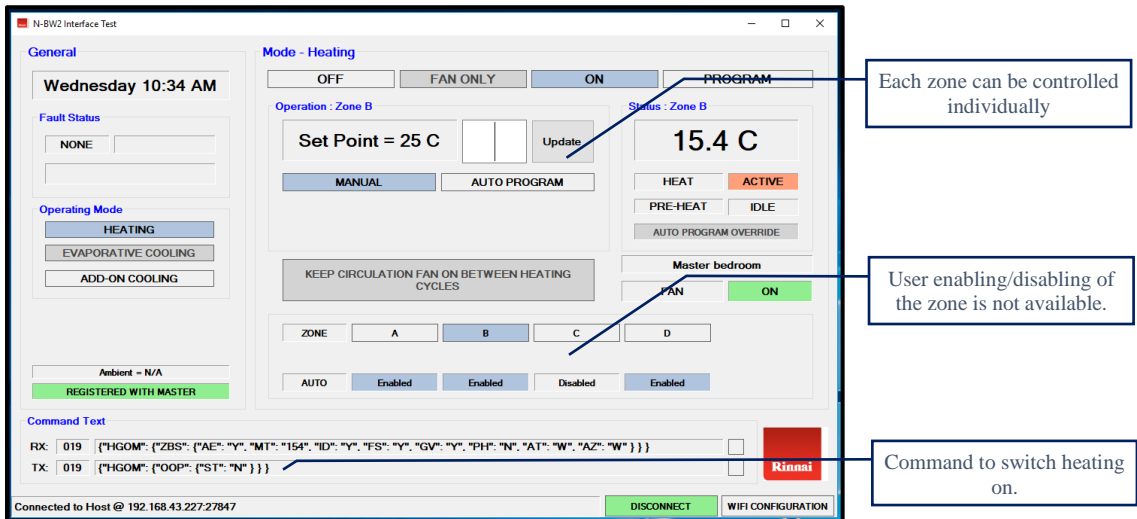
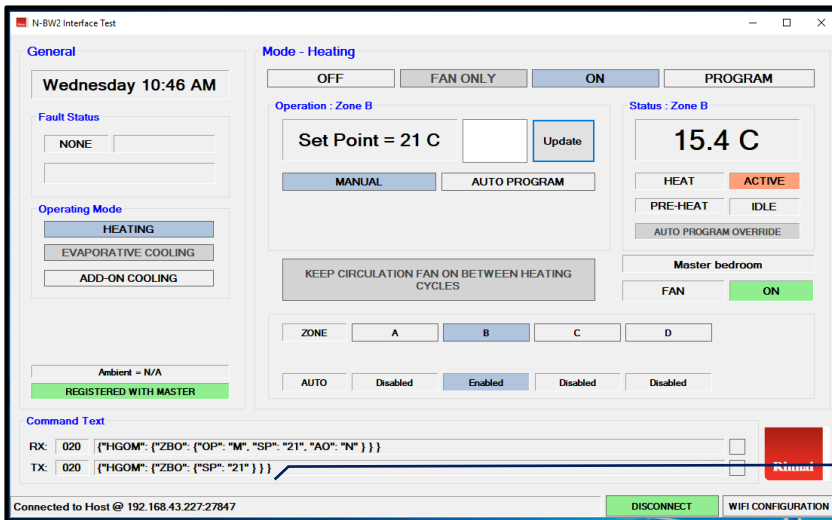


FIG 5.3.2a: Heating Operating Mode (Switched off) – Multi Set Point Operation (4 Zones Installed)

When the heating operating mode is switched on the screen appears as illustrated in FIG 5.3.2b with various command functions illustrated.



Continued...



General
Wednesday 10:46 AM

Fault Status
NONE

Operating Mode
HEATING
EVAPORATIVE COOLING
ADD-ON COOLING

Ambient = N/A
REGISTERED WITH MASTER

Mode - Heating
OFF | FAN ONLY | ON | PROGRAM

Operation : Zone B
Set Point = 21 C [Update]
MANUAL | AUTO PROGRAM

Status : Zone B
15.4 C
HEAT | ACTIVE
PRE-HEAT | IDLE
AUTO PROGRAM OVERRIDE

Master bedroom
FAN | ON

KEEP CIRCULATION FAN ON BETWEEN HEATING CYCLES

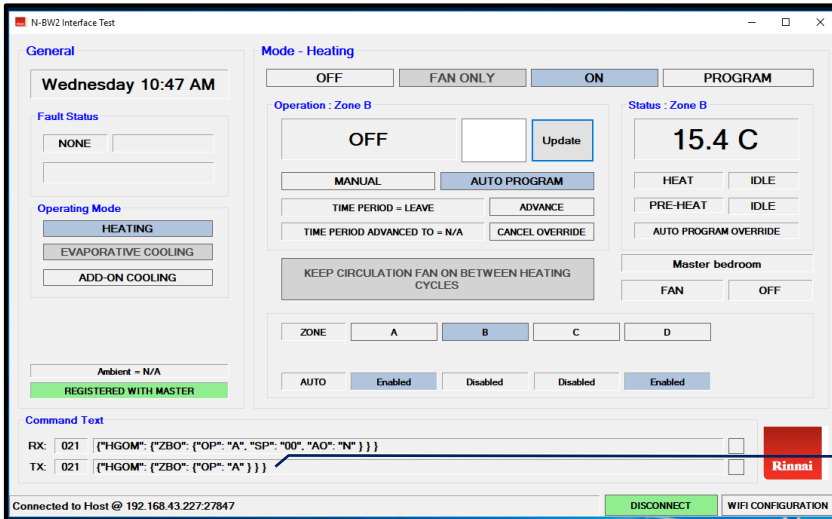
ZONE | A | B | C | D

AUTO | Disabled | Enabled | Disabled | Disabled

Command Text
RX: 020 [{"HGOM": {"ZBO": {"OP": "M", "SP": "21", "AO": "N"} }}]
TX: 020 [{"HGOM": {"ZBO": {"SP": "21"} }}]

Connected to Host @ 192.168.43.227:27847

Command to change Zone B set point temperature to 25°C.



General
Wednesday 10:47 AM

Fault Status
NONE

Operating Mode
HEATING
EVAPORATIVE COOLING
ADD-ON COOLING

Ambient = N/A
REGISTERED WITH MASTER

Mode - Heating
OFF | FAN ONLY | ON | PROGRAM

Operation : Zone B
OFF [Update]
MANUAL | AUTO PROGRAM

Time Period = LEAVE | ADVANCE
Time Period Advanced to = N/A | CANCEL OVERRIDE

Status : Zone B
15.4 C
HEAT | IDLE
PRE-HEAT | IDLE
AUTO PROGRAM OVERRIDE

Master bedroom
FAN | OFF

KEEP CIRCULATION FAN ON BETWEEN HEATING CYCLES

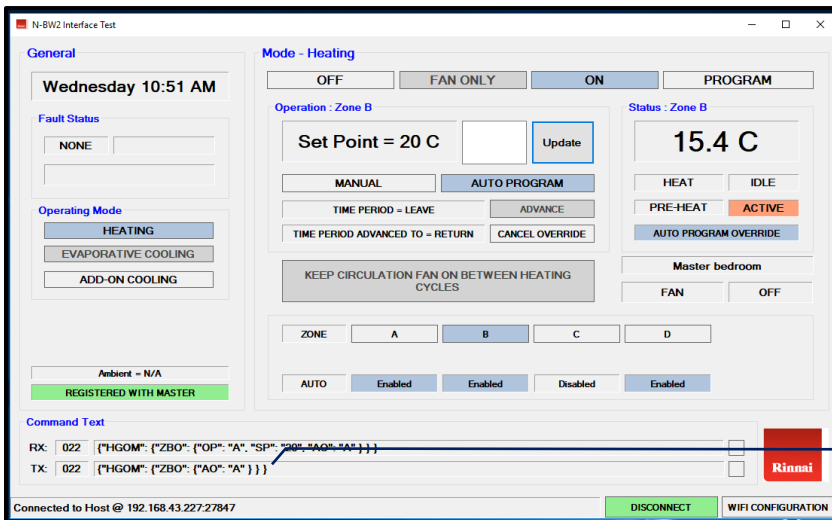
ZONE | A | B | C | D

AUTO | Enabled | Disabled | Disabled | Enabled

Command Text
RX: 021 [{"HGOM": {"ZBO": {"OP": "A", "SP": "00", "AO": "N"} }}]
TX: 021 [{"HGOM": {"ZBO": {"OP": "A"} }}]

Connected to Host @ 192.168.43.227:27847

Command to change Zone B to schedule operation.



General
Wednesday 10:51 AM

Fault Status
NONE

Operating Mode
HEATING
EVAPORATIVE COOLING
ADD-ON COOLING

Ambient = N/A
REGISTERED WITH MASTER

Mode - Heating
OFF | FAN ONLY | ON | PROGRAM

Operation : Zone B
Set Point = 20 C [Update]
MANUAL | AUTO PROGRAM

Time Period = LEAVE | ADVANCE
Time Period Advanced to = RETURN | CANCEL OVERRIDE

Status : Zone B
15.4 C
HEAT | IDLE
PRE-HEAT | ACTIVE
AUTO PROGRAM OVERRIDE

Master bedroom
FAN | OFF

KEEP CIRCULATION FAN ON BETWEEN HEATING CYCLES

ZONE | A | B | C | D

AUTO | Enabled | Enabled | Disabled | Enabled

Command Text
RX: 022 [{"HGOM": {"ZBO": {"OP": "A", "SP": "00", "AO": "A"} }}]
TX: 022 [{"HGOM": {"ZBO": {"AO": "A"} }}]

Connected to Host @ 192.168.43.227:27847

Command to advance the Zone B schedule time period.

Continued...

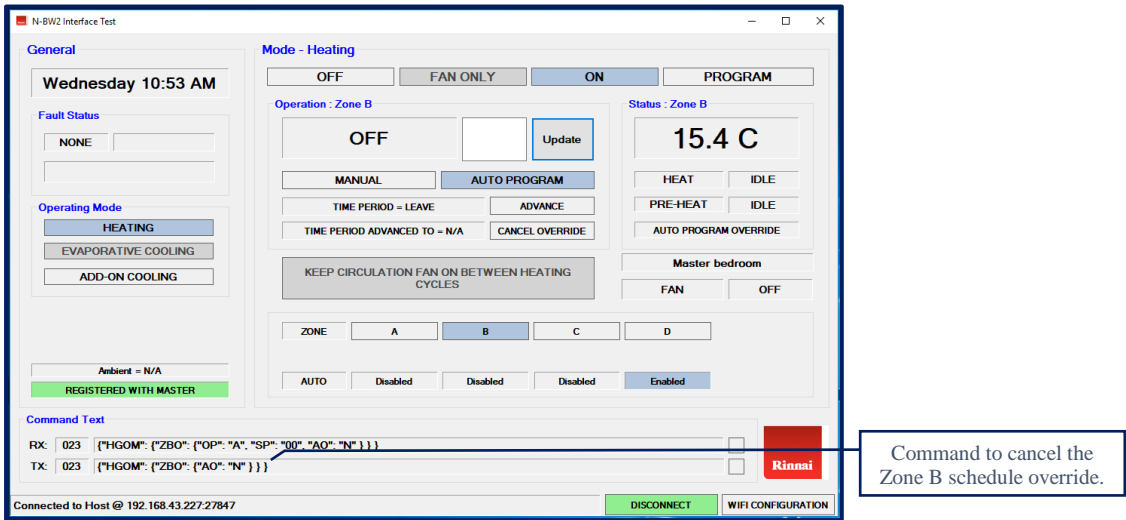


FIG 5.3.2b: Heating Operating Mode (Switched on) – Multi Set Point Operation (4 Zones)

The screen appears as illustrated in FIG 5.3.2c when the heating operating mode is switched to fan only operation.

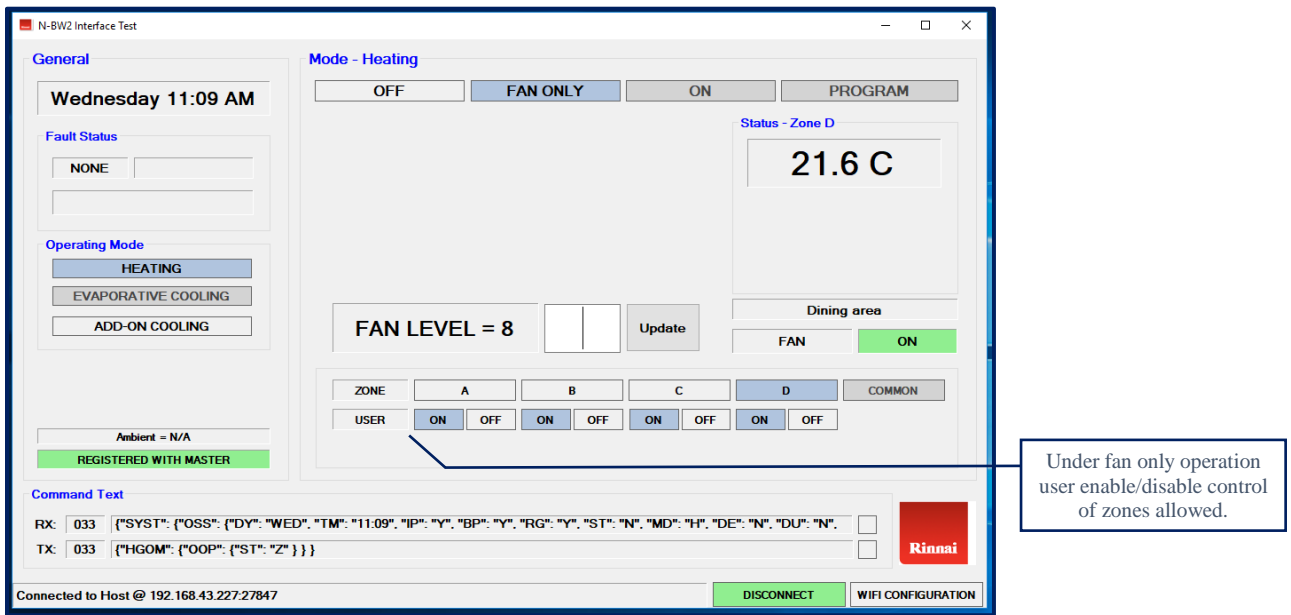
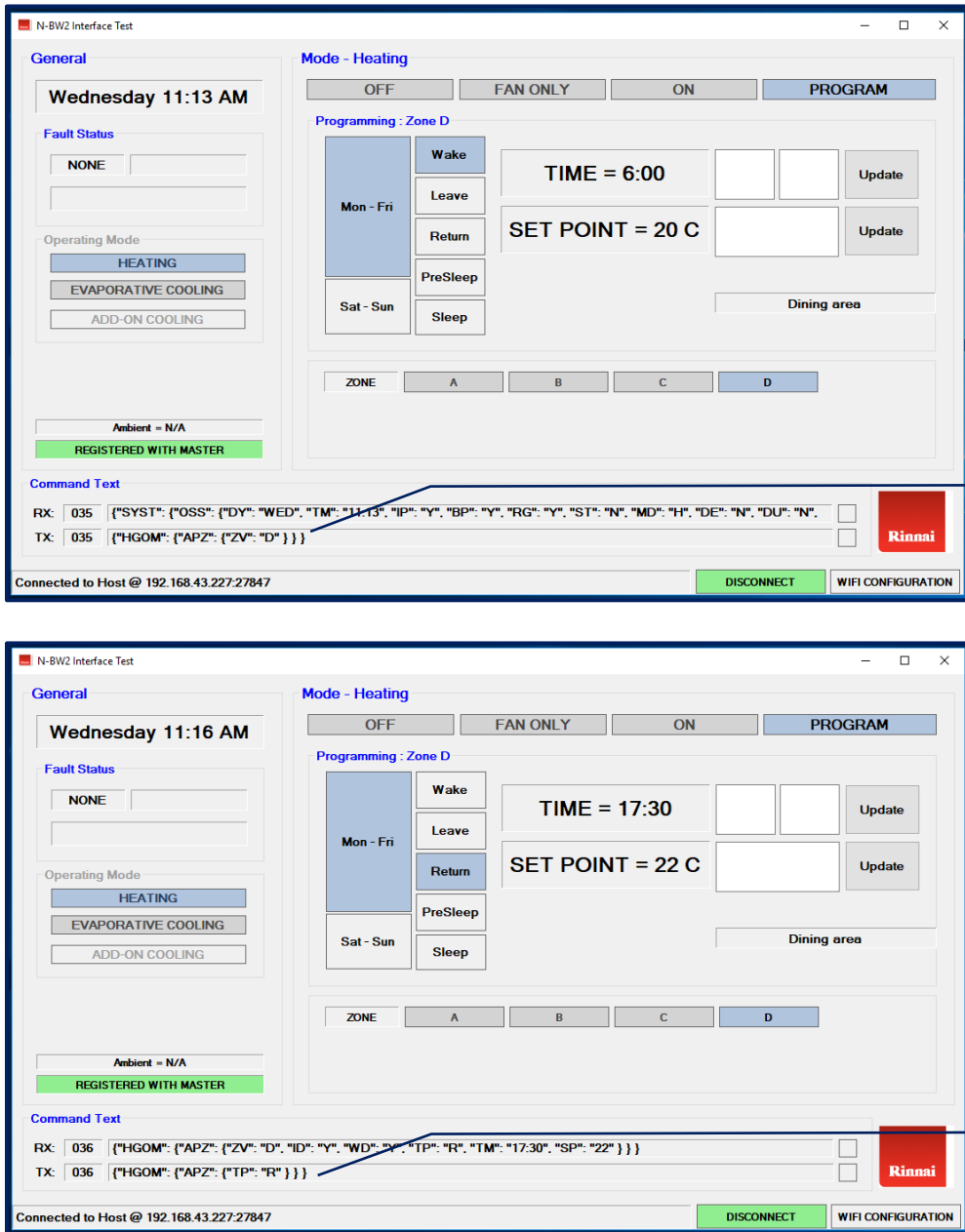


FIG 5.3.2c: Heating Operating Mode (Switched to Fan Only) – Multi Set Point Operation (4 Zones)

Selecting the *PROGRAM* label places the currently selected zone into the schedule setting mode as illustrated in FIG 5.3.2d below.



The figure consists of two screenshots of the N-BW2 Interface Test software. Both screenshots show the 'Mode - Heating' section with 'PROGRAM' selected. The left sidebar contains 'General' information including the current time (Wednesday 11:13 AM and 11:16 AM), fault status (NONE), and operating mode (HEATING). The main area shows 'Programming : Zone D' with a calendar grid and various schedule settings.

Top Screenshot (11:13 AM): The 'PROGRAM' button is selected. The 'Return' time period is set to 6:00 with a set point of 20 C. A callout box points to the 'PROGRAM' button with the text: "Command to access schedule settings of Zone D."

Bottom Screenshot (11:16 AM): The 'Return' time period is now set to 17:30 with a set point of 22 C. A callout box points to the 'Return' button with the text: "Command to access the 'Return' time period schedule settings of Zone D."

Command Text:

Top Screenshot:
 RX: 035 [{"SYST": {"OSS": {"DY": "WED", "TM": "11:13", "IP": "Y", "BP": "Y", "RG": "Y", "ST": "N", "MD": "H", "DE": "N", "DU": "N"}, "HGOM": {"APZ": {"ZV": "D"}}}}]
 TX: 035 [{"HGOM": {"APZ": {"ZV": "D"}}}]

Bottom Screenshot:
 RX: 036 [{"HGOM": {"APZ": {"ZV": "D", "ID": "Y", "WD": "W", "TP": "R", "TM": "17:30", "SP": "22"}}}}]
 TX: 036 [{"HGOM": {"APZ": {"TP": "R"}}}]

FIG 5.3.2d: Heating Operating Mode (Schedule Setting) – Multi Set Point Operation (4 Zones)

5.4 Cooling (Add-on) Operating Mode

This operating mode is identical to the Heating operating mode except that the { “CGOM”: tag precedes the commands.

5.5 Cooling (Evaporative) Operating Mode

The evaporative cooling operating mode screen appears as illustrated in FIG 5.5a below when the evaporative cooling is switched off.

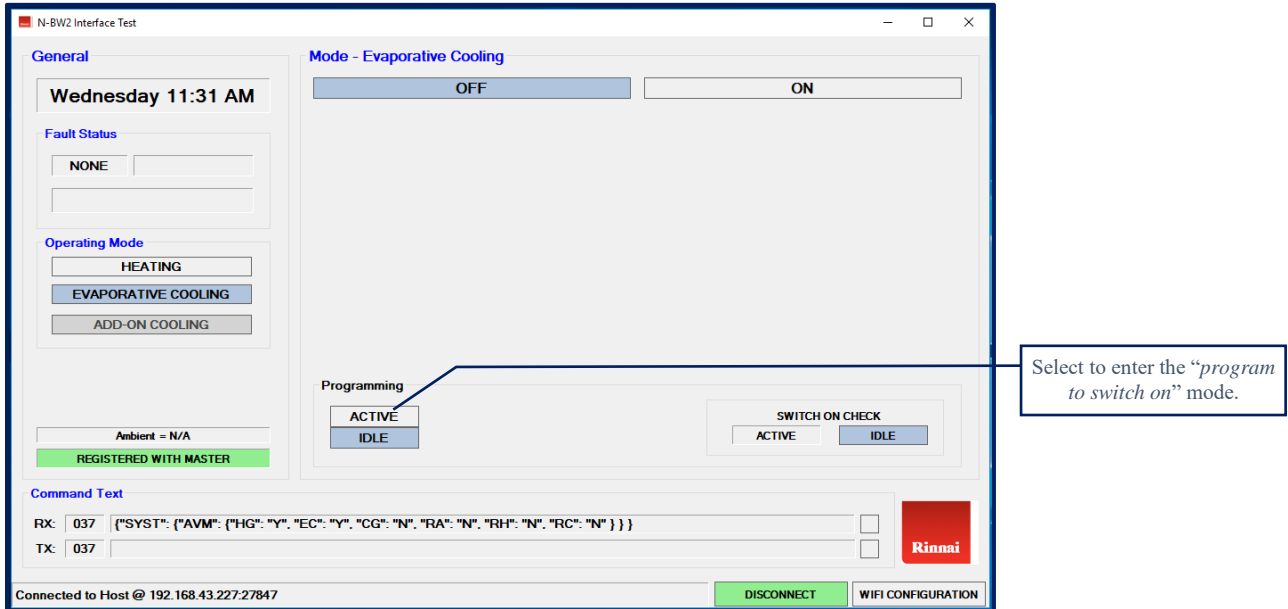


FIG 5.5a: Evaporative Cooling Operating Mode (Switched off)

The evaporative cooling operating mode screen appears as illustrated in FIG 5.5b below when the evaporative cooling is switched on under manual control with the pump switched off.

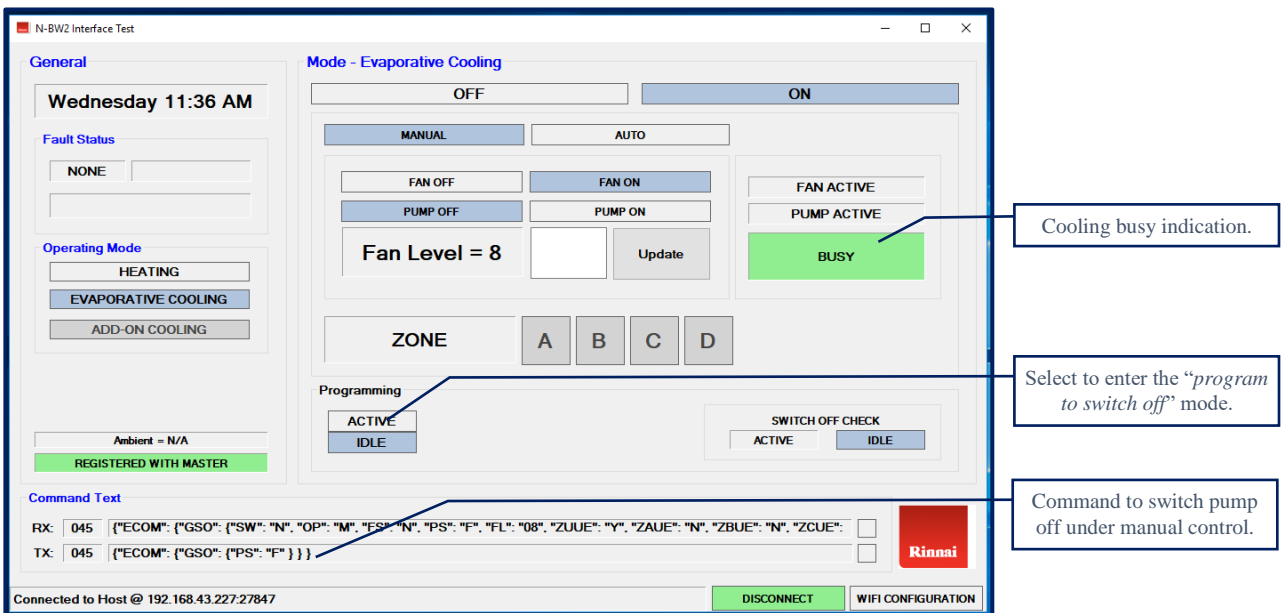


FIG 5.5b: Evaporative Cooling Operating Mode (Switched on – Manual Control)

The evaporative cooling operating mode screen appears as illustrated in FIG 5.5c below when the evaporative cooling is switched on under auto control.

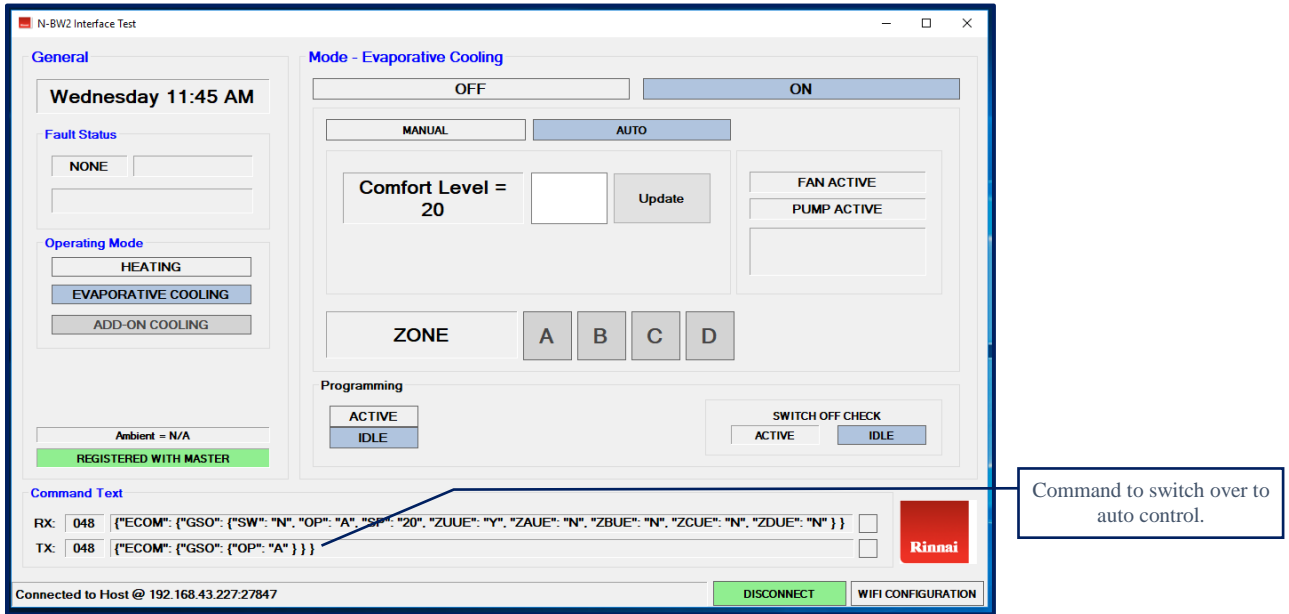
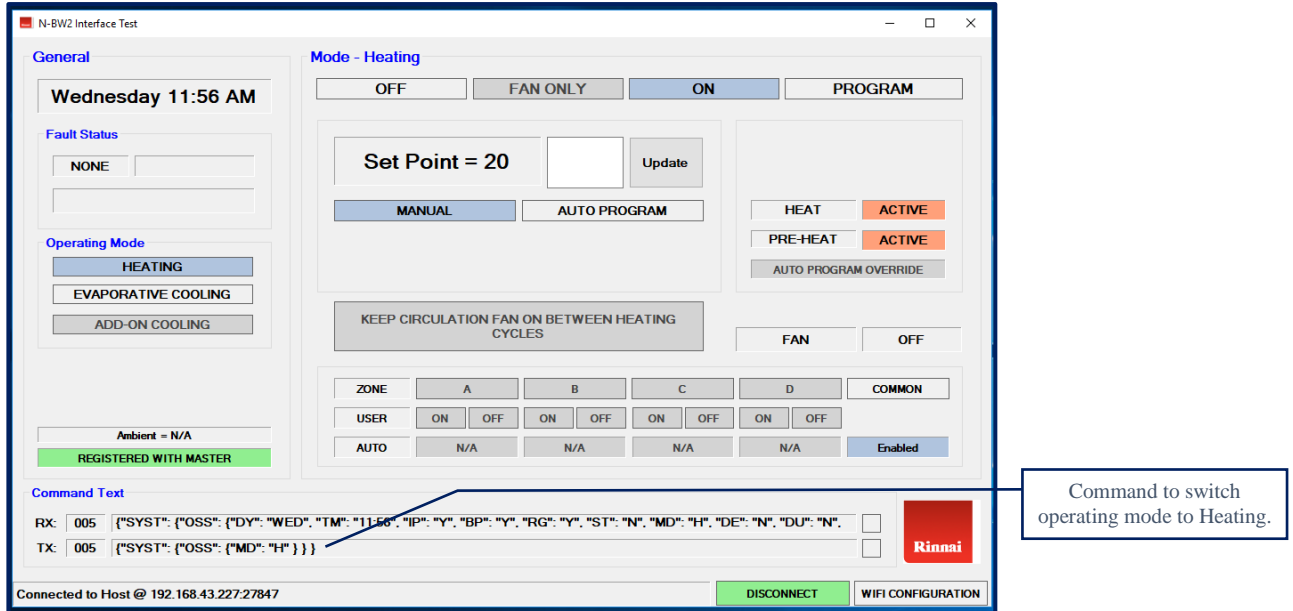


FIG 5.5c: Evaporative Cooling Operating Mode (Switched on – Auto Control)

5.6 Switching Operating Mode

The example below shows switching from the evaporative cooling operating mode to the heating operating mode, in this case while the system was “switched on”.



The screenshot displays the 'N-BW2 Interface Test' window. The 'General' section shows the date and time as 'Wednesday 11:56 AM'. The 'Fault Status' is 'NONE'. The 'Operating Mode' is set to 'HEATING'. The 'Mode - Heating' section shows the system is 'ON' with a 'Set Point = 20'. The 'HEAT' and 'PRE-HEAT' status indicators are 'ACTIVE'. The 'Command Text' field contains the following commands:

```

RX: 005 [{"SYS": {"OSS": {"DY": "WED", "TM": "11:56", "IP": "Y", "BP": "Y", "RG": "Y", "ST": "N", "MD": "H", "DE": "N", "DU": "N"},
TX: 005 [{"SYS": {"OSS": {"MD": "H"} } } ]
  
```

A callout box points to the Command Text field with the text: "Command to switch operating mode to Heating."

FIG 5.6a: Switching Operating Mode