

SINCE 1889



INSTRUCTION MANUAL FOR Wi-Fi NETWORK BRIDGE

MODELS **WBV4A / WBV4B / WBV4C**

- Third Edition -
Rev 1.3a

Thank you for purchasing the “VS4 Wi-Fi Network Bridge”. This device enables remote communication with a PC or mobile device and allows remote equipment operation, temperature monitoring and recording (Data Logger function).

This device works exclusively with Yamato VS4 and VS6 (on VS4 mode) controller available on mechanical convection equipment models DVS/DKN/ADP/DP/FO/IC

FCC STATEMENT

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Please notice that if the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains FCC ID: 2AHMR-ESP07S" any similar wording that expresses the same meaning may be used.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

TABLE OF CONTENTS

- 1 INTRODUCTION..... 4
- 2 INSTALLING THE Wi-Fi BRIDGE ON A DKN-xxx oven..... 5
- 1. VS-4 Wi-Fi Bridge modules: 5
 - 2.1.1 Power Supply and RS485 to TTL converter module installation..... 5
 - 2.1.2 Control and RF module installation 6
- 3 Connecting the bridge to a Wi-Fi network 7
- 2. Choosing a Wi-Fi access point. 7
- 3. Connecting to a Wi-Fi Access Point for the first time..... 7
- 4 Accessing the Wi-Fi Bridge..... 8
 - 4.1 Testing Wi-Fi connectivity..... 8
 - 4.2 Wi-Fi Bridge’s Home page (Main Menu)..... 10
 - 4.2.1 Differences between WBV4 models A, B and C..... 10
 - 4.3 Commands available on the Command Line interface 10
 - 4.3.1 Getting Oven status: command ‘12’ 10
 - 4.3.2 The “Nickname” command..... 11
 - 4.3.3 Restart: Command ‘00’ 11
 - 4.3.4 Wi-Fi Reset command: ‘13’ 11
 - 4.3.5 Bridge information command: ‘14’ 11
 - 4.3.6 Bridge Locate commands: ‘ID on’, ‘ID off’ 11
 - 4.3.7 Read VS-4 Register command: ‘RABC’ (models A and B)..... 11
 - 4.3.8 Write VS-4 register: command ‘WABCnnnnn’ (models A and B) 11
 - 4.3.9 Saving an Oven program into a file on the Wi-Fi Bridge command ‘PnS’ 12
 - 4.3.10 Loading a program file into Oven: Command ‘PnL’ 12
 - 4.3.11 Starting Fixed Temperature operation remotely. Command ‘SFT ttt’ (models A and B) 12
 - 4.3.12 Starting a Program remotely. Command ‘RUN np’ (models A and B) 12
- 5 LoGGING oven temperature (Data Logger function)..... 13
 - 5.1 “Log [nn]” command..... 13
 - 5.2 Viewing/Retrieving the log files: 14
- 6 The File Editor: 15
 - 6.1 Standard file names and descriptions: 15
 - 6.2 Working with files 16
 - 6.3 Uploading a file from a PC. 17
- 7 Updating the Firmware..... 19
- 8 Remote Operations..... 20
 - 8.1 Remote Operations landing page 20
 - 8.2 Starting a Fixed temperature Operation. 21
 - 8.3 Working with Programs 21
 - 8.3.1 Viewing a program’s temperature profile 22
- 9 Remote operations Web interface using Node Red backend. 23

TABLE OF FIGURES

| | |
|---|----|
| Figure 1: DKN wiring diagram | 5 |
| Figure 2: Control module placement..... | 6 |
| Figure 3: Wi-Fi selected | 7 |
| Figure 4: Wi-Fi Selection | 7 |
| Figure 5: New-DKN AP | 7 |
| Figure 6 - Authentication screen | 8 |
| Figure 7 - Wi-Fi Bridge Main Menu: model A | 9 |
| Figure 8 - Wi-Fi Bridge Main Menu models B and C..... | 9 |
| Figure 9 -Log status query Figure 10 – Setting log function..... | 13 |
| Figure 11 - Log files | 14 |
| Figure 12: JavaScript editor page..... | 15 |
| Figure 13: working with files..... | 16 |
| Figure 14: Choose file button | 17 |
| Figure 15: OS file browser..... | 17 |
| Figure 16: the Upload button | 18 |
| Figure 17: verifying the upload..... | 18 |
| Figure 19 - Firmware update page..... | 19 |
| Figure 20 - Firmware file selection | 19 |
| Figure 21 - Firmware uploading..... | 19 |
| Figure 22 - Remote Operations page..... | 20 |
| Figure 23 - Fixed temperature operation | 21 |
| figure 24: Program Temperature profile plot..... | 22 |
| Figure 25: Program data file | 22 |
| Figure 26: node-red home screen | 23 |
| Figure 27: Node-red code | 23 |
| Figure 28: PROGRAM mode dashboard..... | 24 |
| Figure 29: fixed temp dashboard..... | 24 |
| Figure 30: Status dashboard | 24 |

1 INTRODUCTION

Summary

- This device (software and hardware) adds a Wi-Fi interface to any Yamato products that use a VS-4, VS-6 operating in VS-4 mode, or CR5A Planar controller board. Examples include all DKN series ovens and FO series muffle ovens. It enables operators and managers to remotely interact with an oven located anywhere on a provisioned local network (or the internet).
- Oven remote operations/monitoring/logging can be done securely by using a PC or Smart phone connected to same network as the Bridge, either with a web browser accessing the built in pages on the WBV bridge or by customizing your own web pages and accessing the bridge using its provided API.
- All functionality present on current VS-4 RS485 communication interface (OP-19) is also available through the Wi-Fi bridge but in a more user-friendly way: The low level RS-485 serial communication protocol is encapsulated into Web Socket packets over TCP/IP, which is supported by all Internet web browsers and other IoT platforms like IBM's Node-Red. No need to calculate checksums, delay times, etc. The bridge does all that.
- In addition, extra information can be stored in the Wi-Fi bridge and retrieved remotely using any web browser remotely. Ex: Temperature logs for any past date.
- The software API (Application Programming Interface) adds convenient functions like Program Upload/download from a PC, in-browser Program editing /save back. Real Time Status monitoring, data logging, etc. Because it is built on top of HTTP/Web socket server standards, adding even more functions to the final application is easy (for an HTML / JavaScript programmer, that is).
- The Wi-Fi Bridge and API should also work on CR5A equipped ovens “as-is” and they can be ported to VS-5 and other Yamato controllers running Modbus with minimum effort, saving customer application development and deployment time as the remote control and monitoring User Interface would be the same for all ovens.
- Thousands of Wi-Fi bridges (and ovens) can co-exist on the same network. Each one gets its own ‘network’ name automatically assigned by the Wi-Fi bridge device based on its Network MAC address, which is unique by definitions. Ex: A Wi-Fi bridge with MAC address A6:55:F3:1A:**2B:3C** will assign itself the name "WBV-**2B3C**". Traditionally, all devices with an Ethernet interface (Wi-Fi or wired) should have a label on the unit indicating its MAC address. The WBV4 Wi-Fi bridge is no different. A locator function makes it easy to locate one particular Oven in a sea of ovens: an user can issue a “ID ON” command to a Wi-Fi bridge and it starts blinking its bright Yellow LED, making it easier to spot.

2 INSTALLING THE WI-FI BRIDGE ON A DKN-XXX OVEN

1. VS-4 Wi-Fi Bridge modules:

The Wi-Fi Bridge is implemented as two interconnected modules: One module is installed inside the oven, next to the Planar board, and another module is installed outside the oven, next to the Option Terminal Block located on the right side of the oven. To install the module inside the oven, first make sure AC power cable is disconnected from main Power and Main circuit breaker is set to Off.

2.1.1 Power Supply and RS485 to TTL converter module installation

The Power supply/RS485 module has two harnesses and one USB type A female connector: The AC power harness is terminated two female receptacles (blue or Pink color). Those receptacle should be inserted on vacant positions of Terminal Blocks TM1, labeled "1" and "2", The two wire communication harness should be connected to VS-4 CN3, pins 3 and 4. If you received a unit with a shielded cable on a 4 pin header block, plug this connector on VS4 connector CN3 so that the coaxial cable "sits" above CN-3 pins 3 and 4, not pins 1 and 2. If your device has a two wire connector, the Black wire should be aligned to pin 4 of CN3, while the lighter color wire (white or yellow) should be on pin 3. The supplied USB "A" to Micro USB 6' cable should be connected to the power Supply module on the "A" side. The Micro USB end of the cable should be routed to the outside of the oven enclosure and connected to the Control and RF module. Remove the extra metal cover plate located next to the Option Terminal block and use that opening to string the cable out. See figure 1.

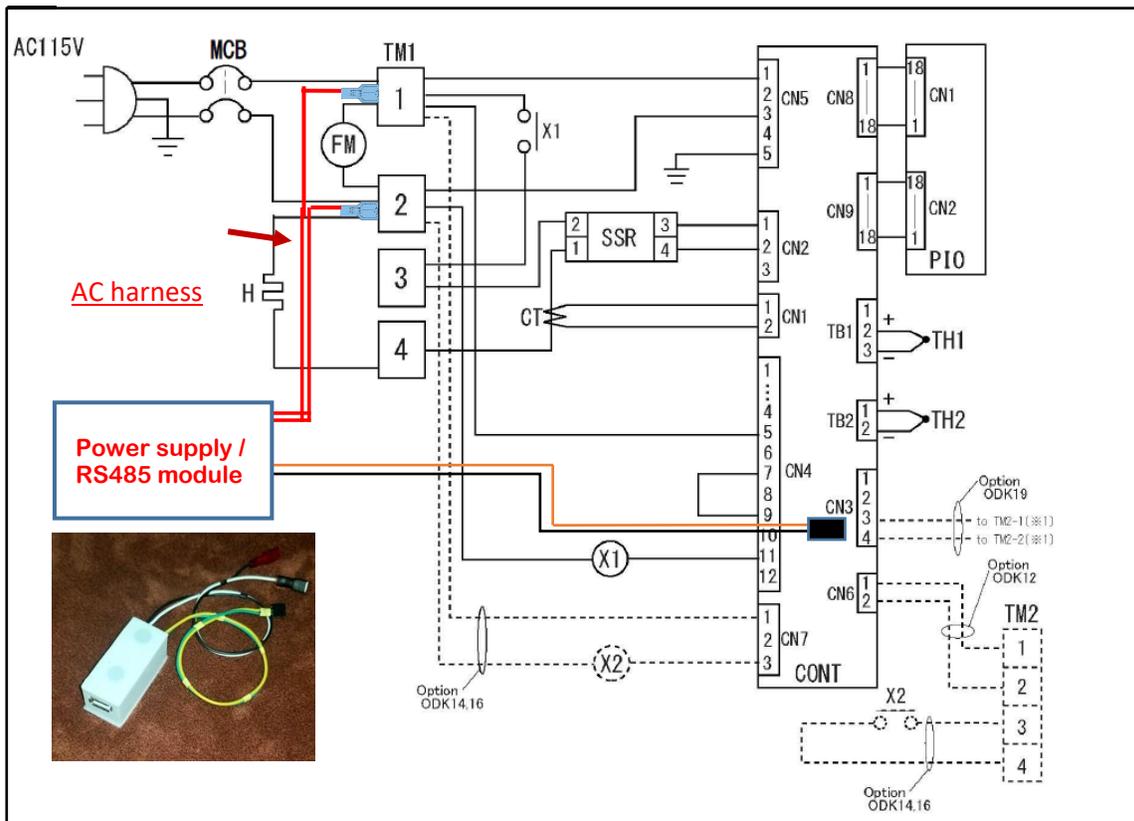


Figure 1: DKN wiring diagram

2.1.2 Control and RF module installation

The control and RF module contains a microcontroller and a 2.4 GHz b/g/n Wi-Fi radio. It needs to be placed outside of the oven enclosure to increase Wi-Fi communications range (antennas don't work well inside shielded metal boxes.) Connect this module to the cable coming from the Power supply module and attach it to the side or top of the oven.

This module has a magnetic base that should be used to keep the module attached to the oven's metal chassis. Best performance can be achieved by placing the Wi-Fi module on top, or on the right side face near the top and close to the oven door, with the antenna pointed up. Avoid spots that get unusually hot (ex: don't place the unit near the exhaust ports).

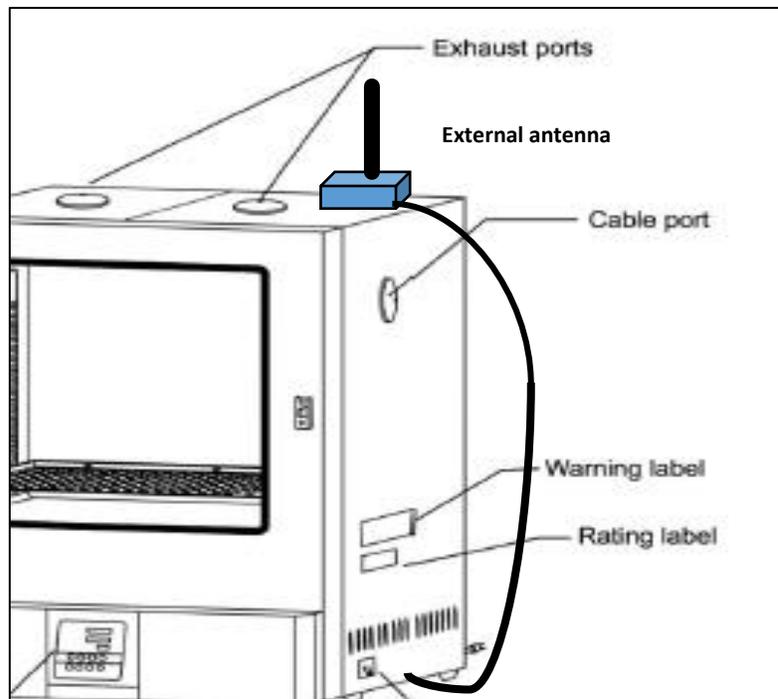


Figure 2: Control module placement

3 CONNECTING THE BRIDGE TO A WI-FI NETWORK

2. Choosing a Wi-Fi access point.

Although the Wi-Fi Bridge has a powerful radio, it conforms to international standards for EMI emissions, which limit the maximum radio power that can be used. That being said, the maximum recommended distance between the Wi-Fi Bridge and the Wi-Fi access point it will connect to is 50 meters on an unobstructed area. Walls and other large metal barriers will reduce the Wi-Fi range. Ideally, the Wi-Fi Bridge should be placed on top of the oven.

IMPORTANT: In order to use the Temperature Logging function and to evaluate its License status, the Wi-Fi Bridge must have access to a Network Time Server (ntp) on the internet. If the device is not allowed to connect to “ntp://us.pool.ntp.org” or “ntp://ntp1.aliyun.com” (Chinese builds) another time server on the local network must be provided by the DHCP server.

3. Connecting to a Wi-Fi Access Point for the first time.

To configure the Wi-Fi Bridge to connect to an Access point, the following procedure should be used:

If there is no Access Point name pre-programmed on the Wi-Fi Bridge, or if it cannot connect to a previously configured Access Point, the bridge enters Wi-Fi Setup mode: It starts its own Access point and activates its bright Red LED light. The installer should use a PC or cell phone and connect it to the Wi-Fi bridge’s Access Point, with SSID “WBV-nnnn”. The value of ‘nnnn’ can be found on a sticker placed on the Wi-Fi Bridge itself. After connecting to the Bridge’s Access Point, open a web-browser and navigate to <http://192.168.4.1>. A configuration web page will be displayed. Click “Configure Wi-Fi” to see a list of detected Wi-Fi networks. Select the correct one for your installation and enter the Wi-Fi password. Click “Save”. The Bridge turns its Access point OFF, reboots and try to connect to the new Access point. If connection fails, the bridge resets and re-enable its Internal AP. If connection is successful, the Bridge will light itself Yellow and then Green.

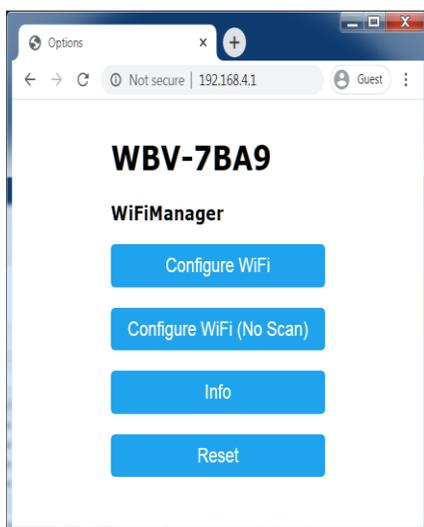


FIGURE 5: NEW-DKN AP

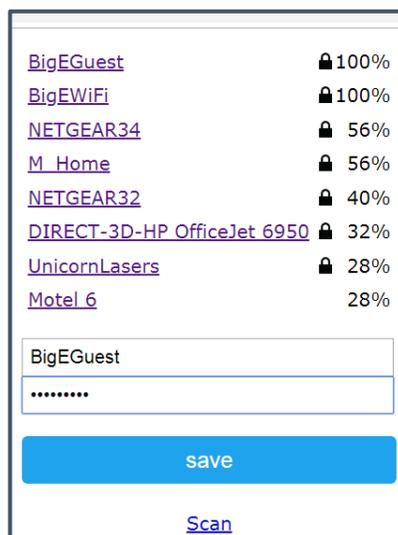


FIGURE 4: WI-FI SELECTION

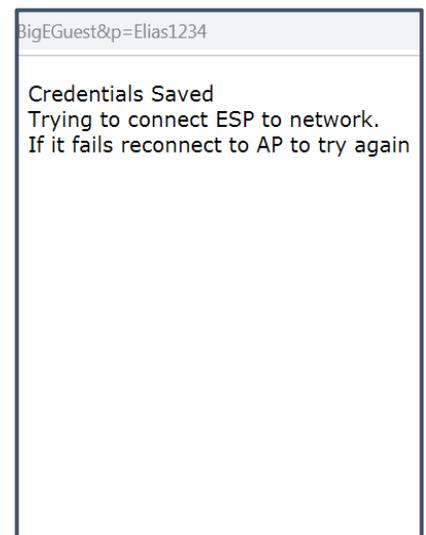


FIGURE 3: WI-FI SELECTED

4 ACCESSING THE WI-FI BRIDGE

4.1 Testing Wi-Fi connectivity

On a computer or smart-phone connected to the same local network as the Wi-Fi Bridge, navigate to [Http://WBV-nnnn/](http://WBV-nnnn/) or <http://WBV-nnnn.local/> .NOTE: Some Wi-Fi access points and Routers do not allow clients to broadcast its mDNS or NetBIOS names. If you can't find your Wi-Fi bridge after it is showing a Green color LED, ask your IT person to find out the IP address of the WBV device and use it to access the bridge (ex: <http://123.123.123.123/> and also ask for the WBV-nnnn be added to the local DNS server. Once the Bridge gets an IP address it will always try to use that same IP, even after Power off.

Before the Main Menu screen is displayed, an authentication pop-up appears. It asks for Username and Password information. For now, the Use name is fixed at **"WBVuser"** and password is **"Yamato"**. After entering these credentials, the Main Menu screen should be displayed. There, you can easily go to the local File Editor tool, see temperature log charts, update the firmware or navigate to the Remote Operations page. Just click one of the available buttons. Use the command line field to enter pre-defined commands to the Bridge and see results in the window immediately below it. They are case insensitive (typing "help" is same as typing "HELP", "T" = "t", etc. The "help" command will display the available commands for the firmware version you have on that device.

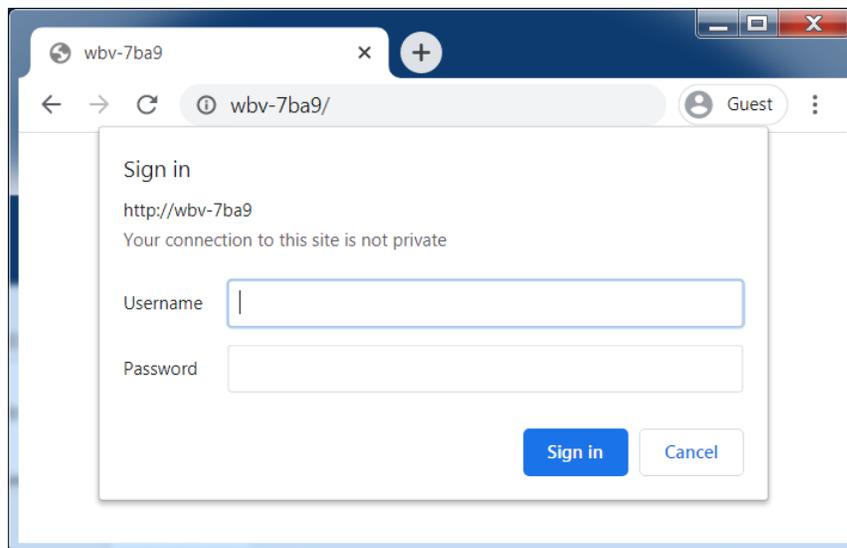


FIGURE 6 - AUTHENTICATION SCREEN

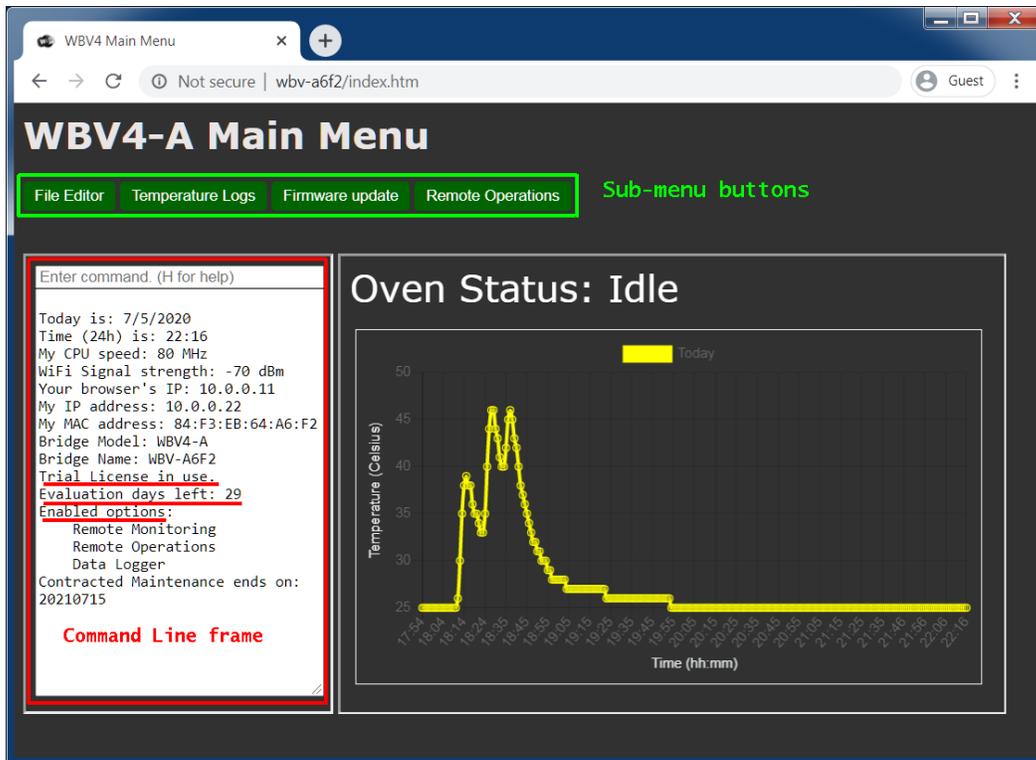


FIGURE 7 - WI-FI BRIDGE MAIN MENU: MODEL A

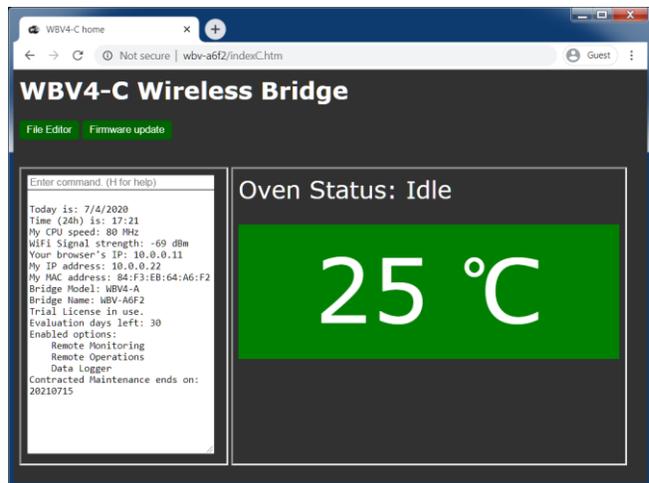
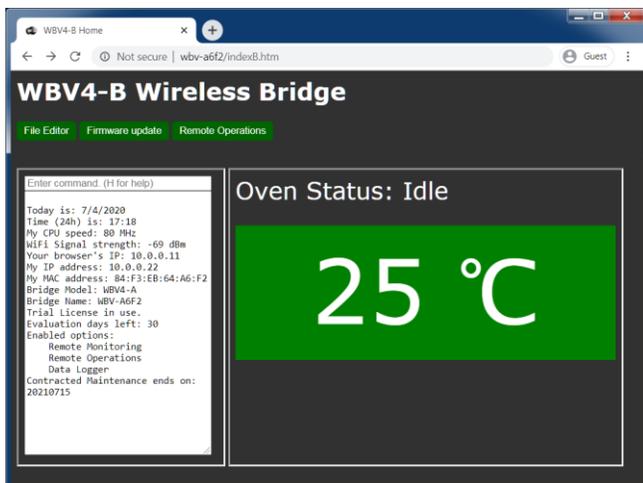


FIGURE 8 - WI-FI BRIDGE MAIN MENU MODELS B AND C

4.2 Wi-Fi Bridge's Home page (Main Menu)

The Home Page of a WBV web interface consists of three areas: Sub-menu buttons, a Command Line frame and a Oven Status frame. A WBV model A displays a chart with the last 240 temperature samples from that day's Temperature Log, if logging is enabled. WBV models B and C home page always display the current temperature and oven status on a large window next to the Command Line frame. Typing the letter 'T' or 't' on the command line and pressing Enter will also returns the current temperature on the response box. (NOTE commands are not case sensitive). The Bridge queries the Oven, gets a reply, formats it and sends it to the web browser (in Celsius). If, after a few seconds, the Oven does not reply to the bridge, a communication error has occurred. The Wi-Fi Bridge will start blinking the color Magenta until the communication with oven is restored.

4.2.1 Differences between WBV4 models A, B and C.

This user manual includes information for features available in model A. However, models B and C support only a subset of those features. Model C units do not support functions related to Data Logging or Remote operations. Model B units do not support functions related to Data Logging.

When any WBV4 unit is turned on for the first time, it assumes the identity of a WBV4 model A for 30 days. After that, the unit will assume the identity of Model C unless the user activates it with a License For model A or B. The customer should have received a License file corresponding to the purchased model by e-mail. If that has not happened or customer wishes to upgrade the unit to a model B or A, contact Yamato-USA. To activate the License file on a WBV4 unit use the File Editor utility (from Home page), click 'Chose File' and Upload the license file. Once user clicks Browser's 'back' button, a message will be displayed on the Command Line frame indicating the acceptance or failure of the License file. If accepted, the unit will reset and it should assume the identity matching that of the license.

4.3 Commands available on the Command Line interface

Most commands listed below have two versions: the one listed and another one followed by a J. Ex: 12 and 12J. The J version returns the information requested as a JASON string. It is useful for creating you own custom scripts.

4.3.1 Getting Oven status: command '12'.

The Bridge's home page display's the oven status on top of the temperature (all models). Remote Operators can also type command '12' on the Command line frame and the status will be displayed on the response box. Alternatively, Model A and B bridges also display status information on the 'Remote Operations' page. If oven is idle, no further status is displayed. If oven is running a Program or Fixed temperature, more details are shown.

```
keypad:.... Locked
Run/Idle:..... Idle
Op. mode:.... Fixed temp
Output Monitor: 10000
Target Temp:..40
```

4.3.2 The “Nickname” command

The “Nickname” command allows the user to assign a more familiar name to an Oven, which is displayed on several screens. Once set, the oven’s network name (mDNS and NetBios) changes to the set name. After that, the Wi-Fi Bridge is accessed at <http://nickname.local/> (Apple Mac and IO/S) and <http://nickname/> (Windows PC). Command Usage:

“NN” : displays current Friendly name;

“NN new_name” : sets Friendly name to new_name and reboots bridge

“NN .” : deletes the Nickname, if any, and resets the bridge name to its original name.

After the command is executed, the Bridge will re-start.

4.3.3 Restart: Command ‘00’.

This command will cause a bride to re-start. It may take up to 20 seconds for the bridge to connect to the programmed Wi-Fi Access Point and another 30 seconds for it to get the current GMT time from an NTP Time Server. Operations will not resume unless the bridge can acquire the GMT time from the network. To access the home page again, press your browser’s refresh button.

4.3.4 Wi-Fi Reset command: ‘13’

The ‘13’ command will erase the Bridge’s current Wi-Fi settings and cause a re-start. Upon re-booting, the Bridge will start its internal Acess point and the user will need to re-configure the local Wi-Fi AP name and password, just like on the initial installation procedure.

4.3.5 Bridge information command: ‘14’

Enter 14 at the command line to see information on your Wi-Fi Bridge. This may be useful on a technical support call. The same information is shown on the Bridge’s home page when it is loaded or refreshed (response panel).

4.3.6 Bridge Locate commands: ‘ID on’, ‘ID off’

The ‘ID on’ command will cause the bridge to glow itself Amber color (blinking) until the command ‘ID off’ is issued. Used when remote operator needs to locate one particular oven amongst many.

4.3.7 Read VS-4 Register command: ‘RABC’ (models A and B)

Type ‘R’ followed by the 3 letter VS-4 register name to read the value programmed in that register. Register name must be typed in CAPS. EX: to read register PV1, type ‘RPV1’ on the command box. Bridge returns the register name followed by the value in it.

4.3.8 Write VS-4 register: command ‘WABCnnnnn’ (models A and B)

Enter ‘W’ followed by the 3 letter register name and a 5 digit numeric value on the command box. . Register name must be typed in CAPS Ex: writing the Operation start/stop register RUN with value 00000. Oven replies OK or Error.

4.3.9 Saving an Oven program into a file on the Wi-Fi Bridge command 'PnS'

Enter 'P' followed by Program number (1, 2 or 3) and letter 'S'. A file named 'Program'n'.txt' will be created or updated on the Wi-Fi Bridge. It is a simple text file that can be edited by the built-in File Editor or downloaded to a computer on same network. Likewise, there are commands to Upload a program file to the bridge and then load them back into the oven for use.

4.3.10 Loading a program file into Oven: Command 'PnL'

Enter 'P' followed by the program number you wish to load into oven and the letter 'L'. If exists, the program file will be loaded into the oven.

4.3.11 Starting Fixed Temperature operation remotely. Command 'SFT ttt' (models A and B)

On the command line, enter "SFT nnn" where nnn is the three digit target Temperature. The oven will change state from Stop to Run and the heating element will be turned on. The oven will heat up until the Target temperature is reached. It will then keep the chamber at that set temperature until the "Stop" command is issued. This function is also available on the Remote Operations page (graphical interface).

4.3.12 Starting a Program remotely. Command 'RUN np' (models A and B)

If this option is enabled, you can start one of the three programs stored into the Wi-Fi Bridge by entering the command "RUN np", where 'n' is the program number and 'p' is desired pattern within that program. Program execution will stop once the last step has finished or the Stop command is issued. . This function is also available on the Remote Operations page (graphical interface)

Because this involves loading the oven with a complete program, it may take up to 30 seconds for the Bridge to acknowledge the command.

5 LOGGING OVEN TEMPERATURE (DATA LOGGER FUNCTION)

WBV-4A Wi-Fi Bridge model supports data logging functionality. It can be set to periodically save a record containing a precise date/time (derived from GMT time) and the corresponding oven temperature. By default, this data is appended to daily log files, which are created at 00:00 AM and closed at 11:59 PM. These daily log files are kept in the Bridge's Flash memory until the Operator downloads/deletes them using the File Editor utility. The file name correspond to the file creation date. EX: file 20200325.txt contains all data points collected on March 25th, 2020.

To setup the data logger configuration, use the 'Log' command, on the Command line window as follows.

5.1 "Log [nn]" command

The 'Log' command can be issued without parameters, in which case it returns the Log operation state and the current log interval. When used with the 'nn' parameter, it sets the number of minutes between data point captures. If 'nn' is set to '00', logging will not occur (disabled).

NOTE: Whenever the user changes the Log interval or enables/disables Logging, the Wi-Fi Bridge will re-start.

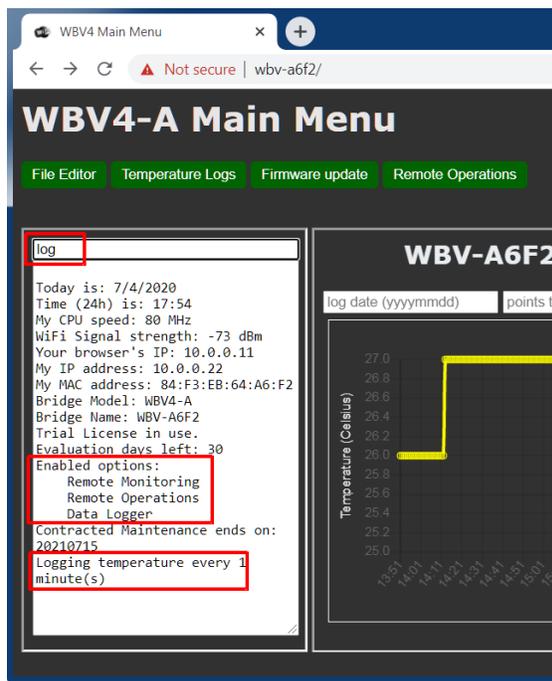


FIGURE 9 -LOG STATUS QUERY

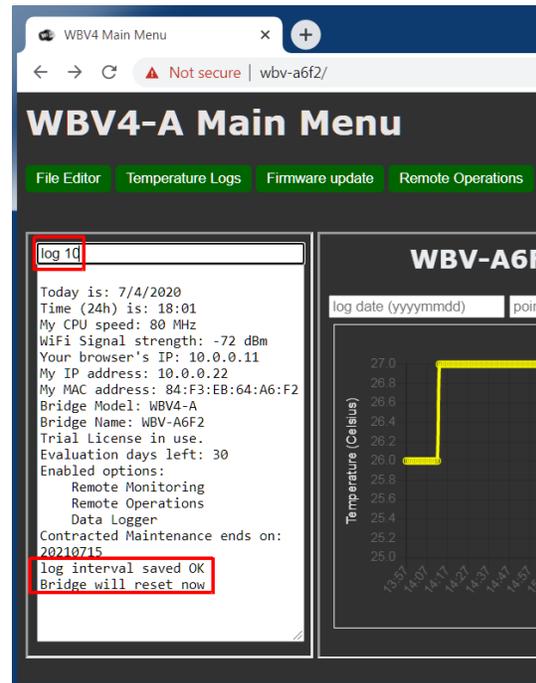


FIGURE 10 – SETTING LOG FUNCTION

On the left figure above, the 'Log' command is issued without parameters and the Bridge returns the current setting. The factory default for Model A is Logging Enable with Sample interval = 1 minute.

The figure on the right shows user setting Log sample interval to 10 minutes. After Enter is pressed, the new value is saved and the Bridge resets itself. The user needs to manually refresh the page. If Log Sample Interval is set to '00', No logging will occur (Log Disabled).

5.2 Viewing/Retrieving the log files:

The log files are not deleted by default. They will remain in the Bridge’s Flash memory until the operator deletes them using the built-in file editor. When the Flash memory fills up, data logging will stop until older files are downloaded/deleted. The daily log file size is dependent of data sample interval and the number of minutes the oven is running. Each data sample saved is 16 bytes long.

Ex 1: Logging temperature every minute, 24h/day will consume 23Kilo bytes per day. At this rate, the Bridge can save 60 days of data in its Flash memory. (Worst case scenario). Operator needs to download/delete older files at least every 60 days.

Ex 2: The sample rate is set to 4 minutes and the oven only operates 8 hours per day (by default, capture only occurs if the oven is ON and temperature inside the chamber is >= 25 Celsius). In this case, the bridge can keep about 2 years of data in its Flash memory before it fills up.

By default, the Home page of WBV4 model A displays Today’s temperature chart as taken from the log file corresponding to Today’s date. The chart is dynamically updated every minute to include a new data point even if Log function is disabled. On that web frame, the user can chose another date to display its Temperature chart (if logging was enabled for that date and the file was not deleted...) or chose how many point to display (from the file tail). A larger chart view can be reached by clicking Temperature Logs button. To view/download or delete Log files, use the File Editor tool (see next chapter and refer to figure below).

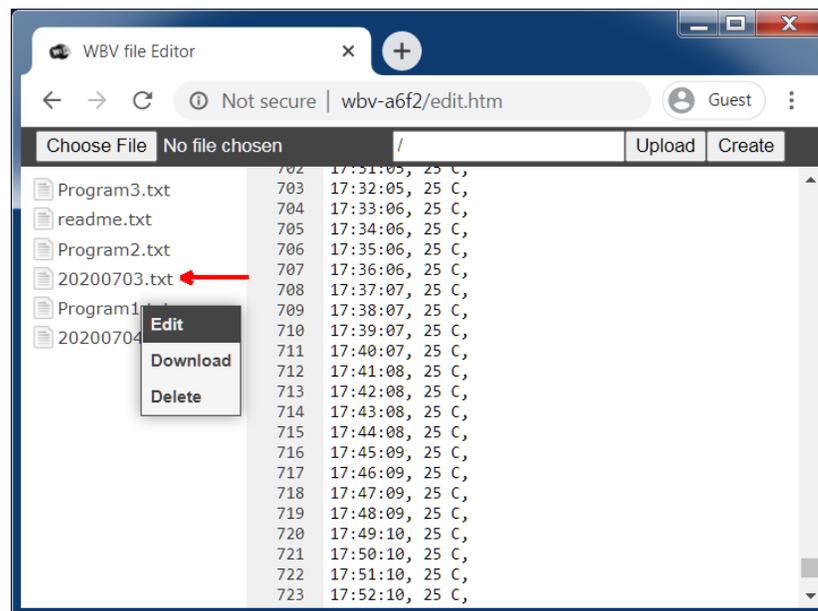


FIGURE 11 - LOG FILES

6 THE FILE EDITOR:

One important function of the Wi-Fi Bridge is its powerful file Editor. It can be accessed by clicking the “File Editor” button present on some of the Bridge’s web pages. The file editor utility is an open source javascript editor that can run on any modern browser. However, due to its size, it is not located in the Wi-Fi Bridge itself. Instead, the browser fetches it from a public repository on the internet when it is invoked. Therefore, **to use this function, the client PC or device that is accessing the Wi-Fi Bridge has to have internet access.** Only text files are available for viewing/editing or downloading. Selecting a files from the file list on the leftside of the window causes the editor to load the file on the screen. In this example, “Program2.txt” was selected. This file is generated with command “P2S” issued on Bridge’s main web page.

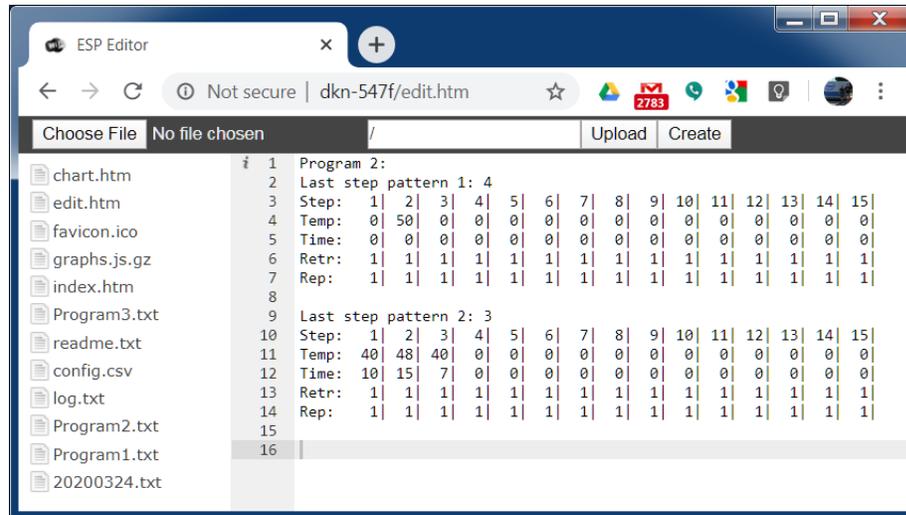


FIGURE 12: JAVASCRIPT EDITOR PAGE

6.1 Standard file names and descriptions:

The Wi-Fi bridge has a simple built in File System that stores files necessary for the bridge configuration, its Web interface and other programs for communicating with an oven. For security reasons, only .txt files are displayed.

readme.txt: almost same as the Help command, but may contain revision information and other tips

YYYYMMDD.txt: Log files are saved with this file name convention: YYY is the Year, MM is the month, DD is the day). If logging is enabled, the current file is closed at midnight and a new file is created to continue logging operations.

Programn.txt: Program files contain program patterns. Generated by ‘PnS’ commands or upload from PC using this file editor page. These files are stored on the Wi-Fi bridge and not on VS-4 controller. If the file has been modified, the operator must load that file into VS-4 controller before it can be used. Use API command “PnL” to upload Program file ‘n’ into VS-4. Or use command “RUN np”, which does that automatically.

6.2 Working with files

Left clicking a file name with the mouse will load the file into the editor right side of the screen and it can be edited by simply typing over the file data and saving it by pressing 'Ctrl' + 'S'.

Right clicking on a file name will display a pull down menu with a choice of Edit, Download or Delete the file. The download file option will cause the browser to download the file into the PC or phone that started that operation. On this example, Program3 file is being edited. **NOTE:** Deleting a file cannot be undone.

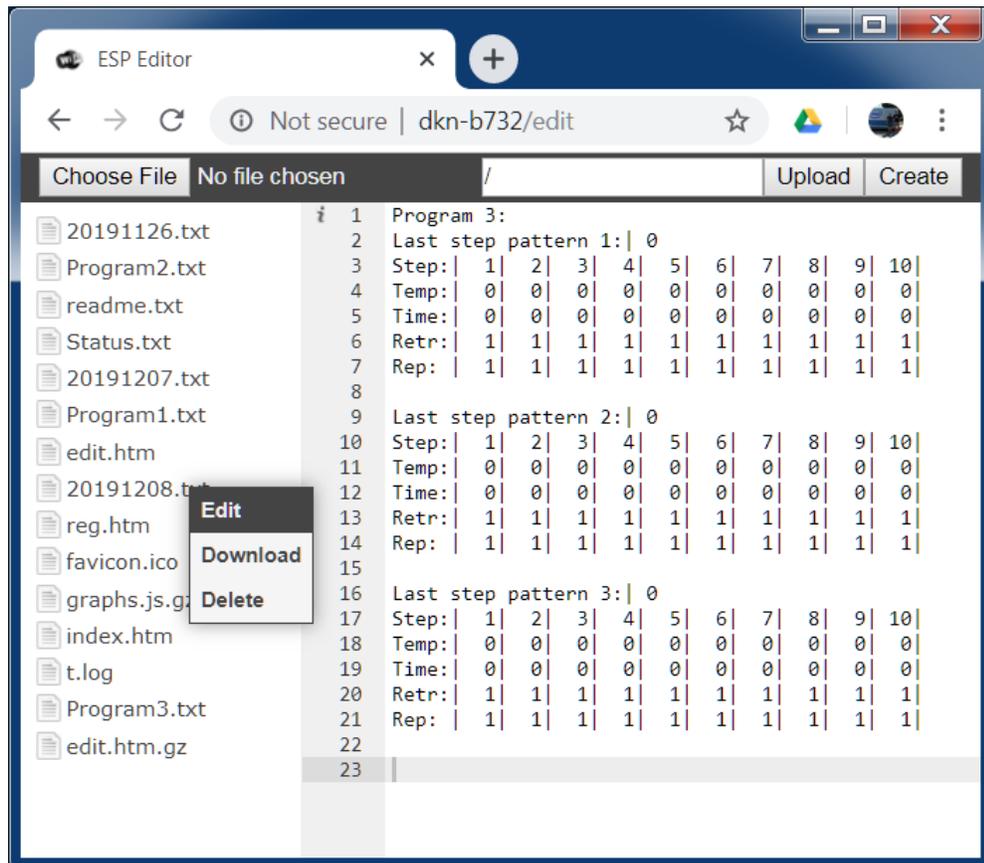


FIGURE 13: WORKING WITH FILES

NOTE: Another way to download files from the Bridge to a computer without using the editor utility is to point your browser directly to the file you want. Ex: to download file Program2.txt, just navigate to page [Http://wbv-nnnn.local/Program2.txt](http://wbv-nnnn.local/Program2.txt) . The file will be displayed on the browser window and you can save it to the computer by using mouse Right click and selecting "Save as..." option.

6.3 Uploading a file from a PC.

Users can design a program or program pattern in MS Excel or other application and then upload it to the Wi-Fi bridge. To Upload a file, click on the Choose File button on the upper left corner of the page.

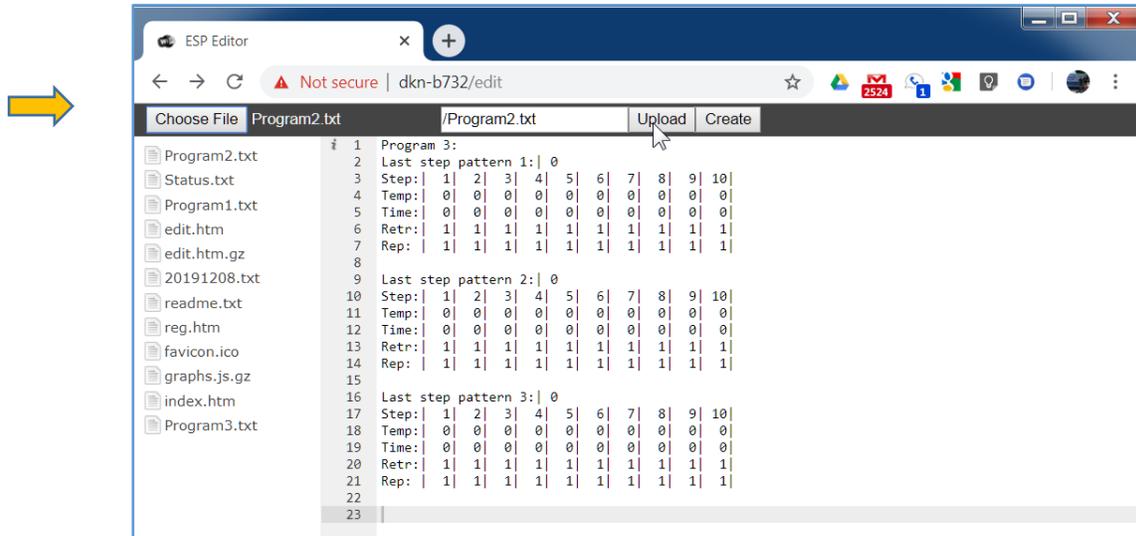


FIGURE 14: CHOOSE FILE BUTTON

An Operating system Pop up dialog will open and the user can navigate the PC file system and find the correct file. Select the file to upload and click "Open":

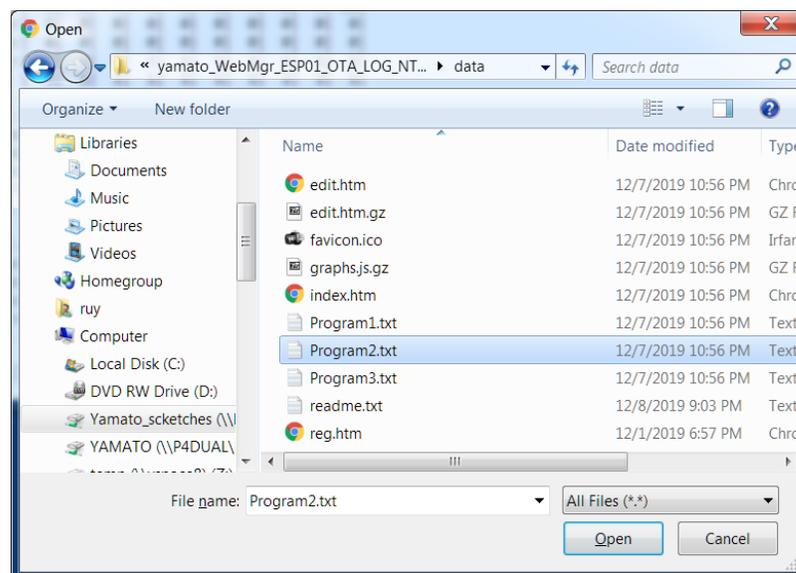


FIGURE 15: OS FILE BROWSER

After selecting the file, the web browser will go back to the editor page (note that the selected file name shows up on the text box next to the “Upload” button. Click the “Upload” button to execute the operation.

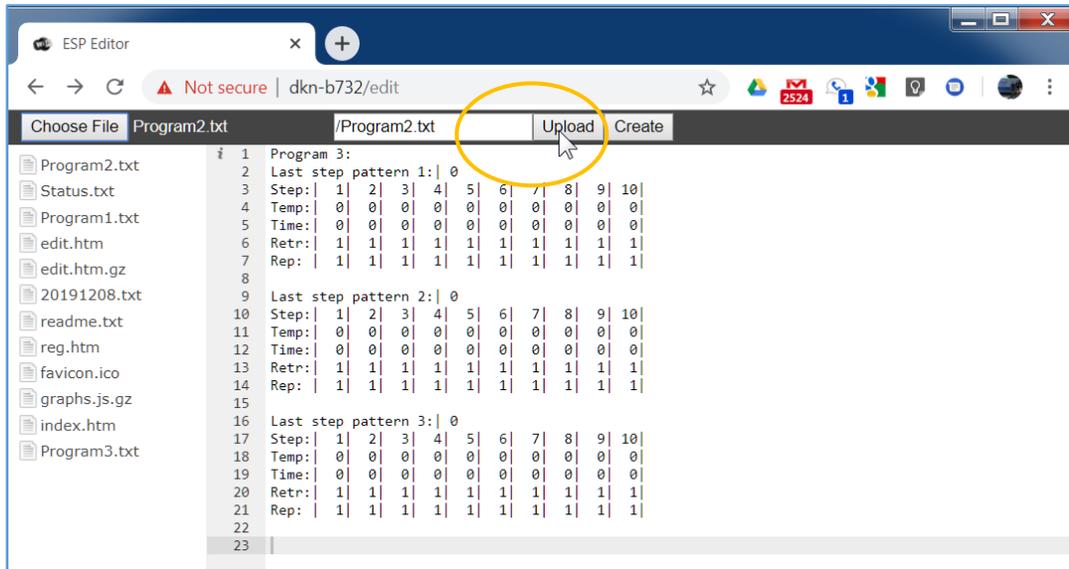


FIGURE 16: THE UPLOAD BUTTON

Select the just upload file on the left side on the editor window to load it on the editor and verify that the correct file was uploaded.

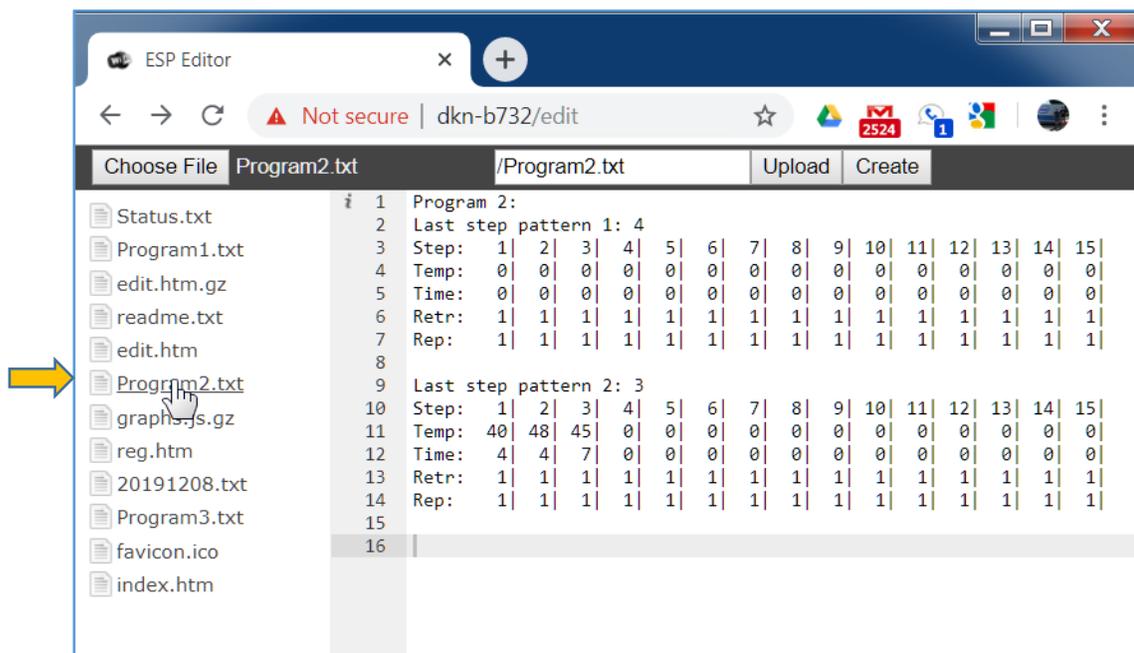


FIGURE 17: VERIFYING THE UPLOAD

7 UPDATING THE FIRMWARE

Should it become necessary to update the Firmware of the Wi-Fi Bridge, a binary file (.bin) will be made available to the customer. It can be programmed into the Bridge by the Firmware Update function, accessed by clicking the button of same name at the Wi-Fi Bridge main menu page. The procedure should happen as follows:

- Make sure you can access the new binary file. It should be between 350KB and 500KB in size.
- Open a Web browser session on the Bridge you want to update.
- Click Firmware update button on Wi-Fi Bridge main menu.
- Select the new (.bin) file by clicking Chose File button (An OS pop-up window help you with that.)
- Back to the Update firmware web form, the Update button.
- You can track the file upload progress on the bottom of the browser window
- Once the firmware file has been uploaded, the Bridge will validate its content (MD5 hash) and proceed to self-update. This phase should take approximately 30 seconds and the Web Browser will disconnect from the Bridge if the update is successful.
- Reconnect your Web Browser session to the Bridge's main page as you would for a new session.

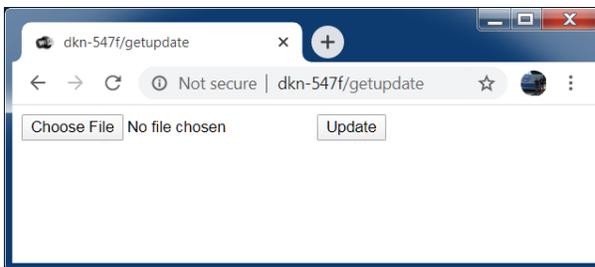


FIGURE 18 - FIRMWARE UPDATE PAGE

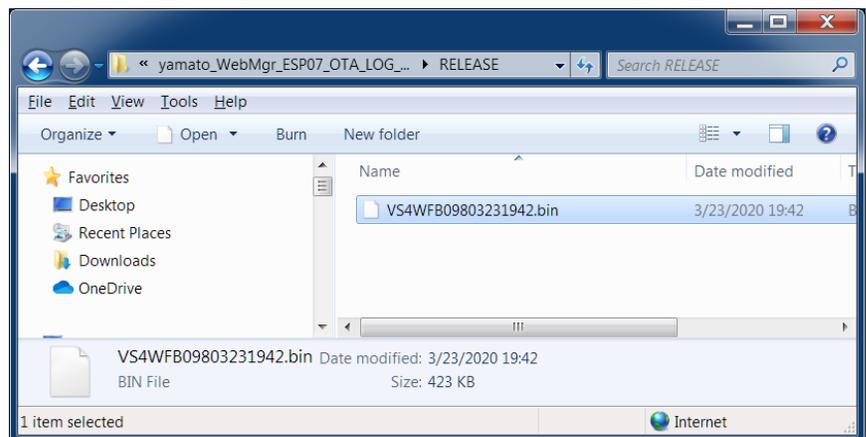


FIGURE 19 - FIRMWARE FILE SELECTION

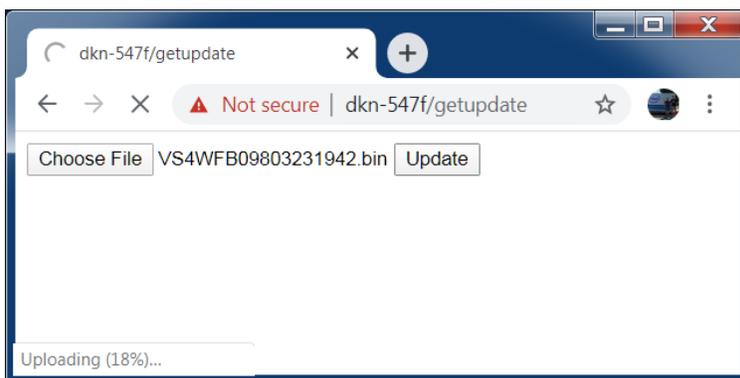


FIGURE 20 - FIRMWARE UPLOADING

8 REMOTE OPERATIONS

8.1 Remote Operations landing page

WBV4 models A and B allow a remote operator to execute and monitor oven operations.

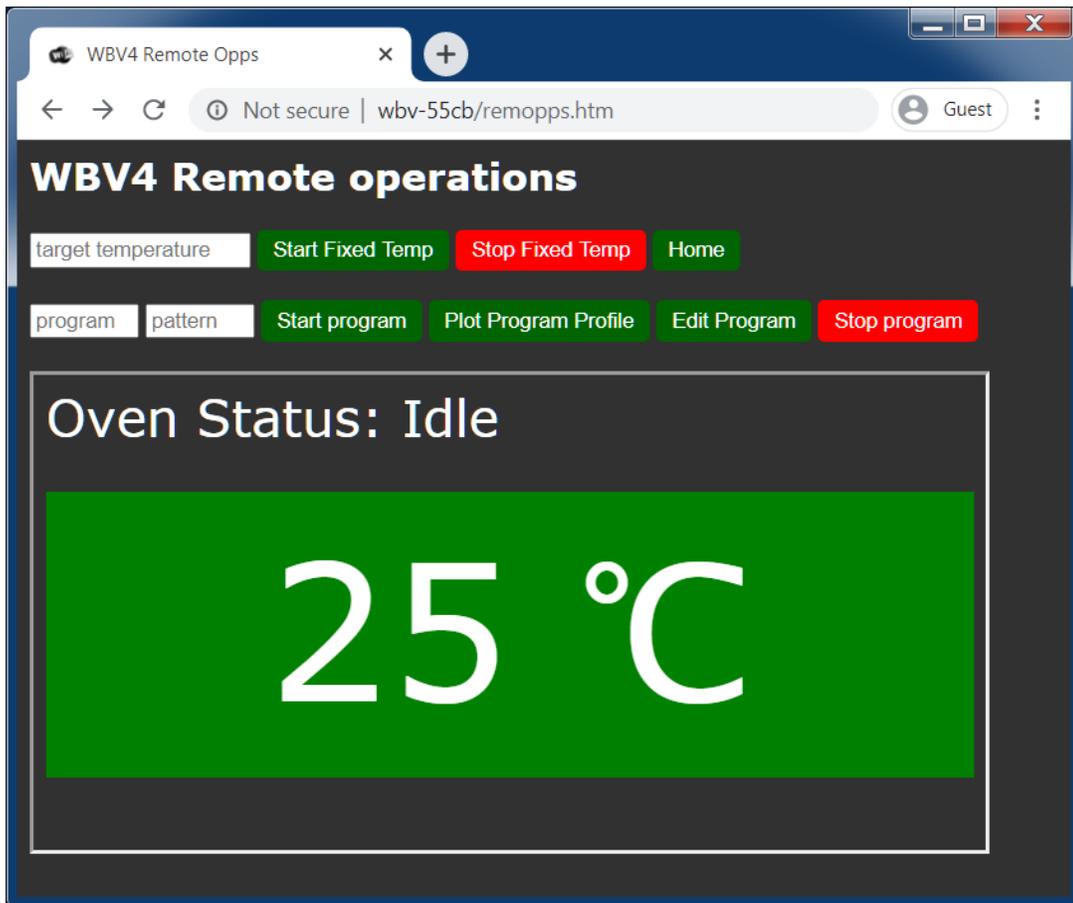


FIGURE 21 - REMOTE OPERATIONS PAGE

When user clicks the Remote Operations button from WBV4 model A or B home page, the Remote Operations page is displayed. Currently, two modes of operation can be initiated/monitored: Fixed Temperature mode and Program mode. A dynamically updated status frame is always displayed on the lower part of the browser window. It updates itself every 10 seconds. Once the operations are started, the oven is in full control and the web browser window can be closed without interfering with the on-going operation. The remote operator can come back to this page to get latest status at any time.

8.2 Starting a Fixed temperature Operation.

To start a Fixed Temperature Operation, the remote operator just needs to enter a 3 digit target temperature in the appropriate box and click the 'Start Fixed Temp' button. The Oven status web frame will indicate the real-time oven status, updated every 10 seconds.

To stop this operation, just click any of red Stop buttons..

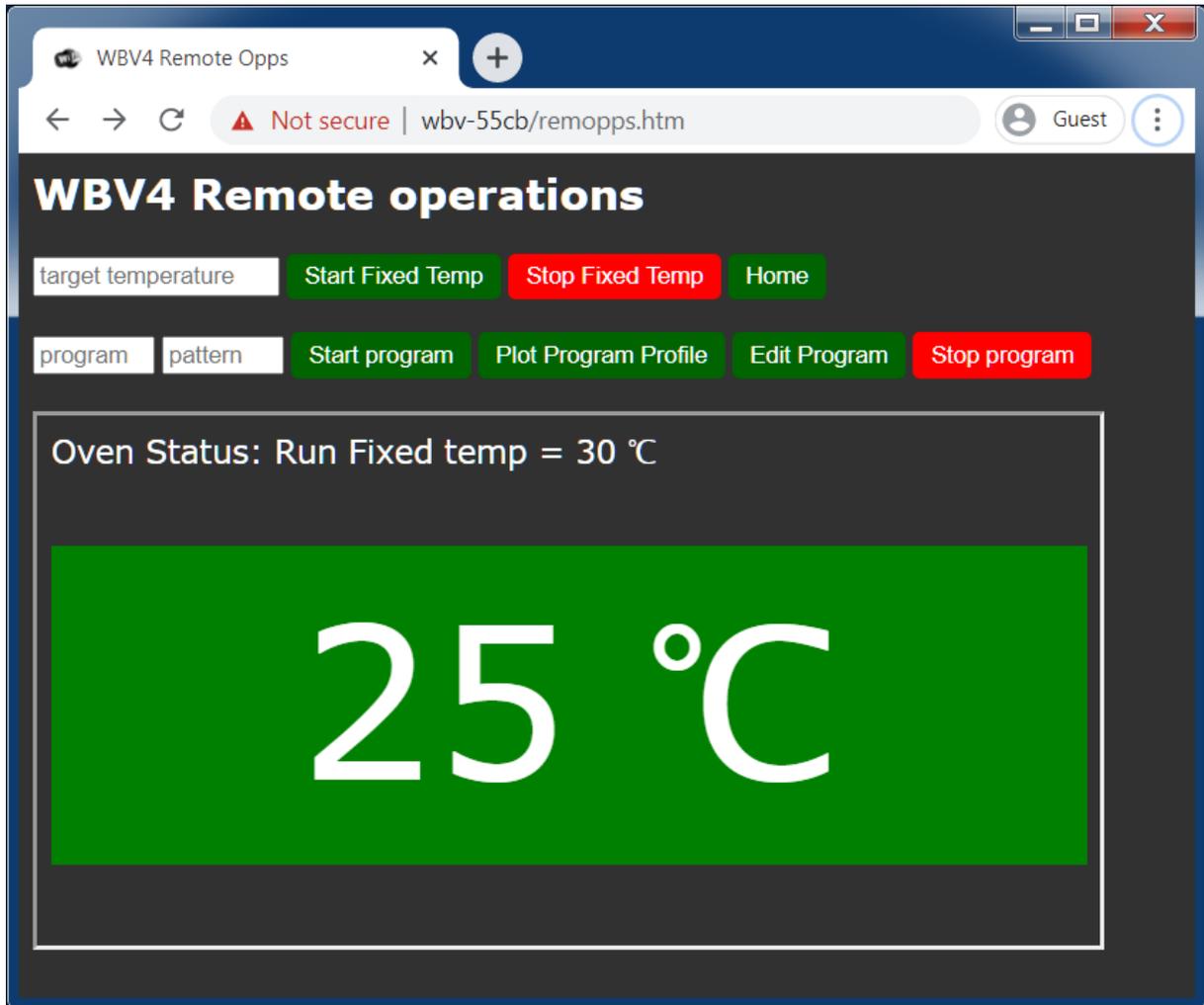


FIGURE 22 - FIXED TEMPERATURE OPERATION

8.3 Working with Programs

The Wi-Fi Bridge is able to load and save back all three operating programs stored in the connected oven. Use the Command Line window to load existing programs from an Oven into the Wi-Fi bridge (PnL, where n is the program number). Likewise, the command 'PnS' will save a program residing on the Wi-Fi bridge into the connected oven. The 'Save back to oven' operation is done automatically when the remote operator clicks the 'Start Program' button on the Remote Operations page. To start a Program, just enter the program number and the Pattern number on the appropriate text boxes and click 'Start Program'.

8.3.1 Viewing a program's temperature profile

From the Remote Operation page, the user can view a graphic representation of a stored Program's Temperature profile, including the inner pattern loops and linear approximations for Rise/Fall times between different steps. Just enter the Program and Pattern Numbers and click the Plot button. For simplification purposes, the rise time is assumed to be three degrees/min.. Fall time is assumed at two degree/min.

The chart below is 'real life' approximation the Program shown on the bottom of this page. Note the repeat loop after Step 3, which executes twice. The total time to run the program is considerably longer once Rise/Fall times are factored in. (Program1.txt shows total time of 150 minutes but the simulation of same program indicates total time of 286 minutes, or almost 2x).

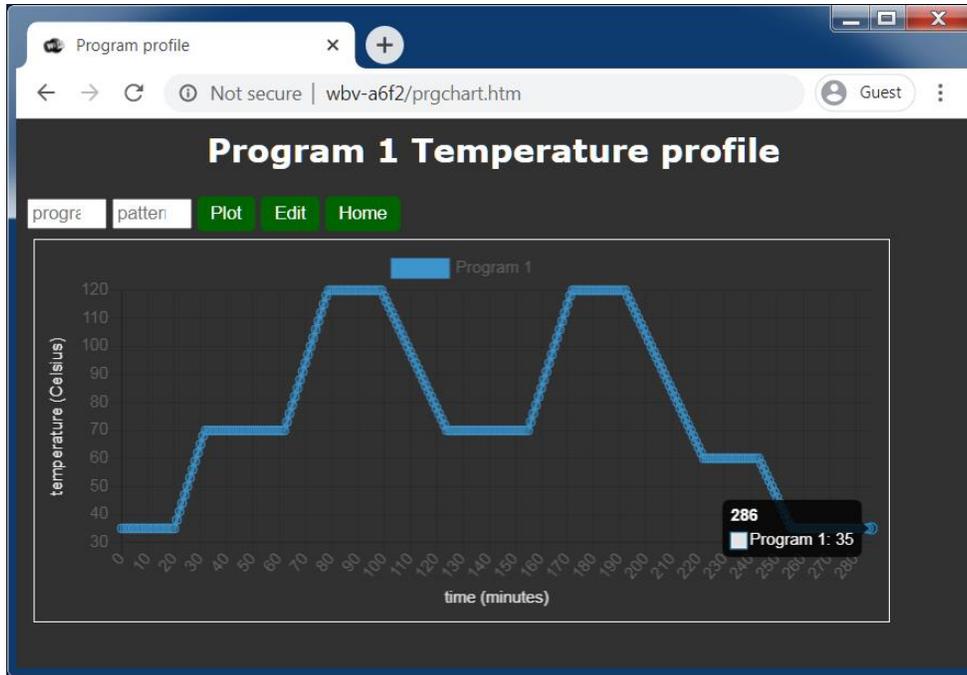


FIGURE 23: PROGRAM TEMPERATURE PROFILE PLOT

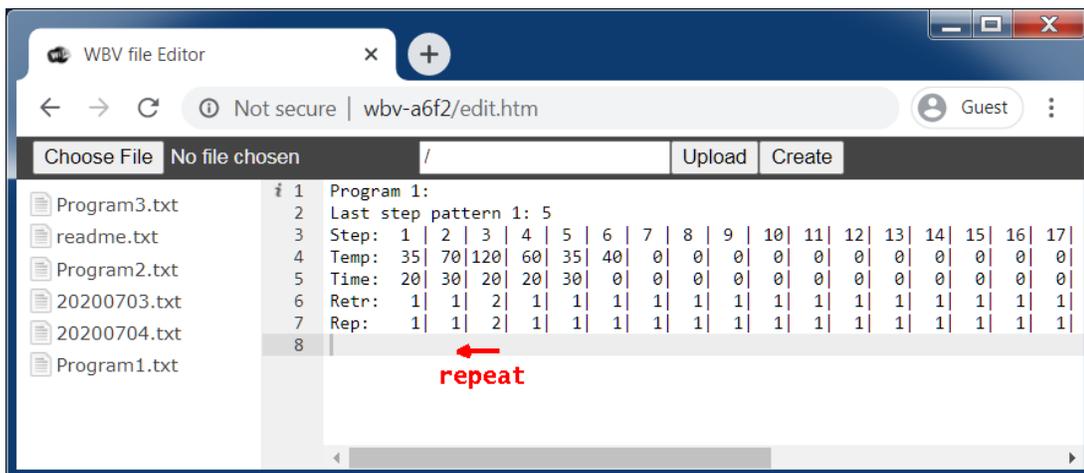


FIGURE 24: PROGRAM DATA FILE

9 REMOTE OPERATIONS WEB INTERFACE USING NODE RED BACKEND.

[Node-RED](#) is a flow-based development tool for visual programming, developed originally by IBM for wiring together hardware devices, APIs and online services as part of the Internet of Things initiative. Node-RED provides a web browser-based flow editor, which can be used to interlink Node-JS/JavaScript functions and create a full application in hours. The VS-4 Wi-Fi Bridge provides the APIs needed to interface with Node-Red out of the box (Websockets and webserver).

Node-red backend runs on a computer on same network as the Wi-Fi bridge. This computer serves custom designed web pages called Dashboards, to clients devices like other PCs or cell phones, on same network.

To design these Dashboards or Flows, Node red's browser-based front end provides an extensive library of graphical elements representing logical functions of various complexities, and the programmer just have to interconnect them to implement the desired behavior.

On the example below, a simple Oven management interface allows operators to start an oven remotely either in fix temperature mode or Program mode. For fixed temperature, a slider control is provided to set the temperature along with a start button. If Program mode is selected, the operator can chose which program and Pattern to use before clicking Start button. After the over is in the RUN mode, a Status dashboard is displayed.

Vortex consulting can create custom Node-Red Dashboards and applications through consulting services. Contact Yamato USA for more information.

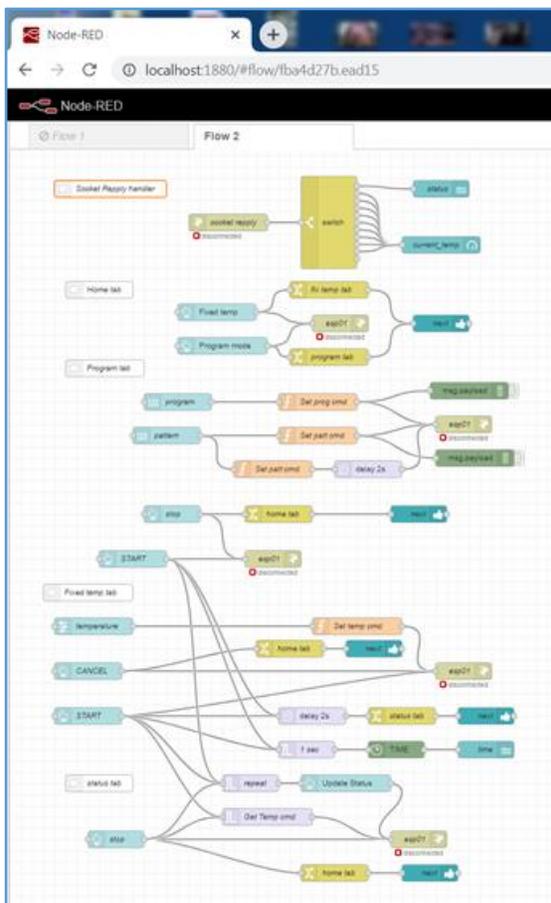


FIGURE 26: NODE-RED CODE

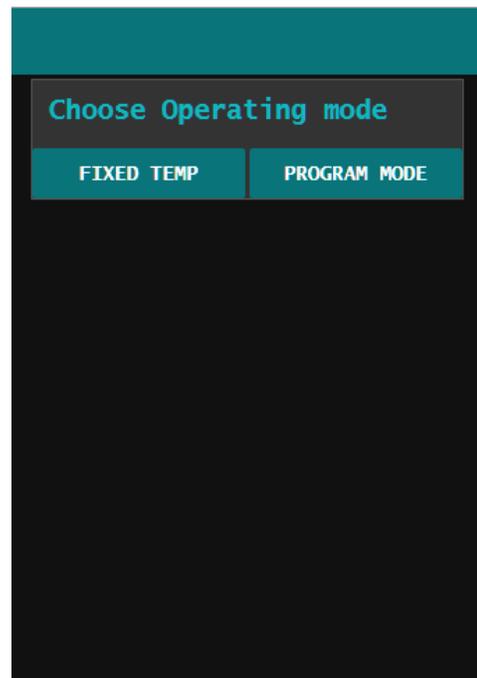


FIGURE 25: NODE-RED HOME SCREEN

Dashboard for Fixed Temperature operation:

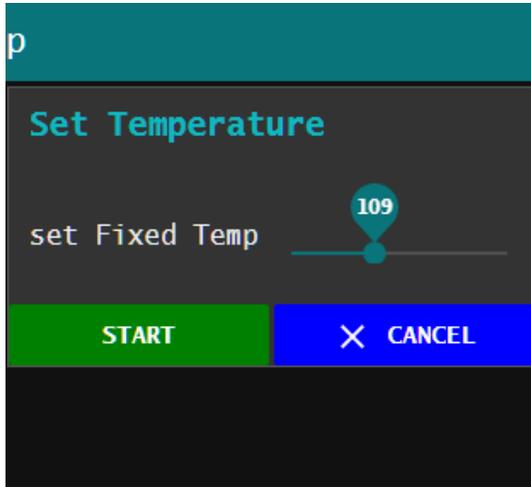


FIGURE 28: FIXED TEMP DASHBOARD

Dashboard for Program mode operation:

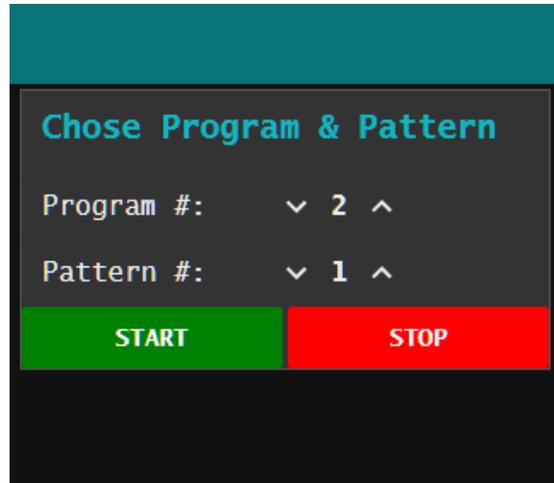


FIGURE 27: PROGRAM MODE DASHBOARD

: Status dashboard after Start Prog mode

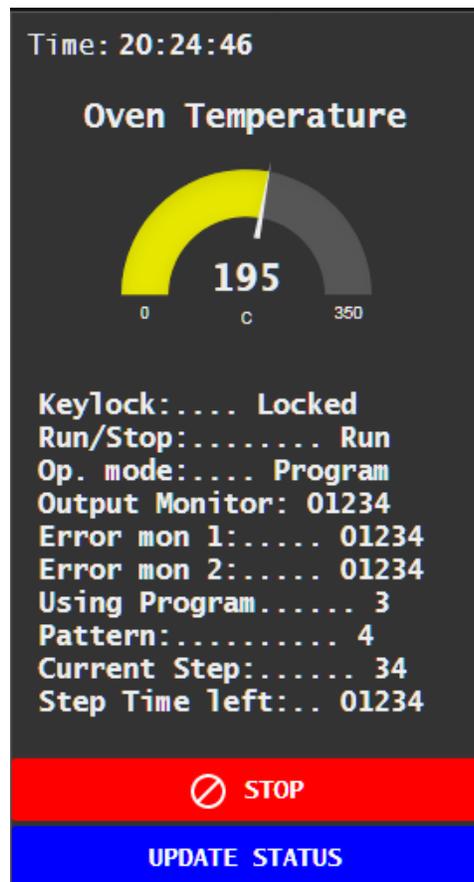


FIGURE 29: STATUS DASHBOARD

Responsibility:

Please follow the instructions provided in this document when operating the equipment. Yamato Scientific will be not liable for accidents or damages to any equipment that is not used in accordance with this instructions or is found to be in non-compliance to industry safety standards.

Also, In no event and under no legal theory, whether in tort (including negligence), contract, or otherwise, unless required by applicable law (such as deliberate and grossly negligent acts) or agreed to in writing, shall YAMATO-USA be liable to You for damages, including any direct, indirect, special, incidental, or consequential damages of any character arising as a result of the use of this device and software or out of the use or inability to use the Software (including but not limited to damages for loss of goodwill, work stoppage, computer failure or malfunction, or any and all other commercial damages or losses), even if such Contributor has been advised of the possibility of such damages.

Note

- ◆ Contents of this document is subject to change without further notice.
- ◆ If you find that your manual is missing pages, contact your nearest Yamato Service Office for replacement. Or download an updated copy from Yamato's web site at:

<https://yamato-usa.com/download-center/>

Instruction Manual for
Wi-Fi Network Bridge
VIB4A / WIB4B / WIB4C
Third Edition March 9th, 2021

Yamato Scientific America Inc.
925 Walsh Avenue
Santa Clara, CA USA
<http://www.yamato-usa.com>