Document ID: MOL/24/0449/00

Annexure number	1 of 1
Annexure Name	Instruction to operate the Automated Cartridge Testing Jig
Reference	NA

Operating Instruction	
1	**Standalone mode**
1.1	**Machine power on procedure**
1.1.1	Plug-in 12-volt 3 ampere (minimum) DC adapter to the testing jig
1.1.2	Connect Pneumatic air supply
1.1.3	Press the power button for 2 second to turn on
1.2	**Machine pre-start checks**
1.2.1	Visually check and conform there is no fault in the machine
1.2.2	Ensure the 5 to 6 bar pressure is getting
1.2.3	Ensure the touch screen in turn on and "PRESS START" is displaying in alpha numeric display
1.2.4	Ensure that no grommets are stuck on vacuuming nozzles
1.3	**Machine Auto cycle procedure**
1.3.1	Load 20 Cartridge in the stacker correct way
1.3.2	Press Start button

1.3.3	Load the stacker when cartridge level reduces
1.4	**Stacker empty condition restart procedure**
1.4.1	Load the Cartridges to stack.
1.4.2	Press the Start button
1.5	**Machine stop procedure**
1.5.1	Press power button once
1.6	**Machine turn off procedure**
1.6.1	Press power button to stop testing cycle
1.6.2	Press power button again after the testing cycle has stopped and "PRESS START" has displayed on screen.
1.6.3	Wait for the alpha numeric display to turn off.
2	**PLC mode operation**
2.1	**Manual power on procedure (PLC can also turn ON ACTJ automatically)**
2.1.1	Plug-in 12-volt 3 ampere (minimum) DC adapter to the testing jig.
2.1.2	Connect Pneumatic air supply
2.1.3	Press the power button for 2 second to turn on
2.1	**Machine pre-start checks**
2.2.1	Visually check and conform there is no fault in the machine
2.2.2	Ensure the 5 to 6 bar pressure is getting
2.2.3	Ensure the touch screen in turn on and "WAITING FOR PLC" is displaying in alpha numeric display.
2.2.4	Ensure that no grommets are stuck on vacuuming nozzles.
2.2	**Manual stop procedure**
2.2.1	Press power button once
2.3	**Manual turn off procedure (PLC can also turn OFF ACTJ automatically)**
2.3.1	Press power button to stop testing cycle

2.3.2	Press power button again after the testing cycle has stopped and "WAITING FOR PLC" has displayed on screen.
2.3.3	Wait for the alpha numeric display to turn off.
3	**ACTJ ERROR LIST**
3.1	**CONTINUOUS ERROR:** • If **5 continuous** valve related errors occurred, Jig will stop testing and show **CNTE**. In this case user can start Valve motor current testing by pressing Menu/Start buttons. • If **10 continuous** Leak-3 errors or 5 continuous Leak-1/Leak-2 errors occurred, Jig will stop testing and show **CNTE**. In this case user can start Vacuum testing by pressing Menu/Start buttons. • If **5 continuous** valve related errors occurred, Jig will stop testing and show **CNTE**. User can press Menu/Start buttons to continue testing. • ***Note***: *For all this continues errors, type of error will be displayed in the second line of display.*
3.2	**POST ERRORS:** Power ON Self-Test (POST) for Valve motors currents and device vacuum channel clogging. • If current consumption of Valve Motors is more than 50mA. jig will show: ❖ **PE01:** No load current during clockwise rotation of Sample side Valve Motor is more than 50mA. ❖ **PE02:** No load current during anti-clockwise rotation of Sample side Valve Motor is more than 50mA. ❖ **PE03:** No load current during clockwise rotation of Elution side Valve Motor is more than 50mA. ❖ **PE04:** No load current during anti-clockwise rotation of Elution side Valve Motor is more than 50mA. • **PE05**: Vacuum is remaining inside channels connected to nozzles due to block in nozzles or vacuuming channels.
3.3	**MECHANISM RELATED ERROR CODES:** • **MC00:** Mechanism plate stuck while going towards Cartridge/Sensor 3 not working. • **MC06:** Mechanism plate stuck while coming back to idle position. • **MC03:** Cartridge plate stuck while coming back to idle position/Sensor 3 not working.

	MC04: Cartridge plate stuck while pushing Cartridge to testing area/Sensor 3 not working. **STACK EMPTY! FILL STACK AND PRESS START**: Number of Cartridges in stack is low. **NO CARTRIDGE, CHECK AND PRESS START**: Cartridge is not sensed after Mechanism plate is gone down for testing Cartridge. **MC01:** Cartridge rejection/pass plate is not going to rejection position/rejection plate sensor is not functional. **MC02:** Cartridge rejection/pass plate is not going to pass position/rejection plate sensor is not functional.
3.4	**QR/SBC ERRORS:** **QR00**: QR reader is not able to read QR. **QR01:** QR reader is disconnected/ not functioning. **QR02:** Unknown response from SBC while reading QR. **QR03:** No response from SBC after issuing QR reads command. **REPEATED TESTING**: Back-to-back testing of the same cartridge (identified from QR on cartridge). **SBC1:** SBC is not booting up. **SBC2:** SBC is not responding to commands from controller board.
4	**LCD TOUCH SCREEN DISPLAY:**
4.1	**Rejections screen:** When jig has turned on, Rejections screen will be displayed on touch screen display by default. User need to press on 'Rejections' tab on top of the display to come back to this screen from any other screens. A table with following information will be displayed on Rejections screen: - Date and time: identification of cartridge test is displayed on this column based on the date and time cartridge tested. - Serial number: Cartridge's serial number read from production QR is displayed on this column. - Reason for rejection: Reason for rejection of Cartridge in testing is displayed on this column. Table will display details of last 49 rejections first in first out manner. User can scroll through details using touch screen.

Date and time	Serial number	Reason for rejection
2024-07-27 10:07:10	QR NA	Unable to read QR
2024-07-27 10:06:26	QR NA	Unable to read QR
2024-07-27 10:05:24	QR NA	Unable to read QR
2024-07-27 10:04:09	QR NA	Unable to read QR
2024-07-27 10:03:56	QR NA	Unable to read QR
2024-07-27 10:03:07	QR NA	Unable to read QR
2024-07-27 10:00:19	QR NA	Unable to read QR
2024-07-27 09:59:13	SCANNER ERROR	QR READER ERROR
2024-07-27 09:59:05	QR NA	Unable to read QR
2024-07-27 09:58:34	QR NA	Unable to read QR
2024-07-17 15:23:36	VBS302330B3845	Sample Nozzle low leak
2024-07-17 15:17:49	BS59242600284	Elution Nozzle high leak
2024-07-17 15:11:59	BS59242600284	Elution Nozzle high leak

Rejections screen

4.2	**Analytics Screen:**
	Local data analytics tab added in GUI.
	User need to press on 'Analytics' tab on top of the screen to display Analytics screen. Following details will be displayed on Analytics screen:
	• pictorial graph*:* Which shows the detail representation of cartridge tested result. As a Number of **Failed** cartridges, Number of **QR Error** and Number of **Passed** cartridges while testing in jig and which shows according to the leak, color **red** shows the high leaks in jig, color **Brown** shows medium leak, color **Green** shows low leak cartridge and color **Blue** shows any other leak in jig this result can be very according to no of runs*.*
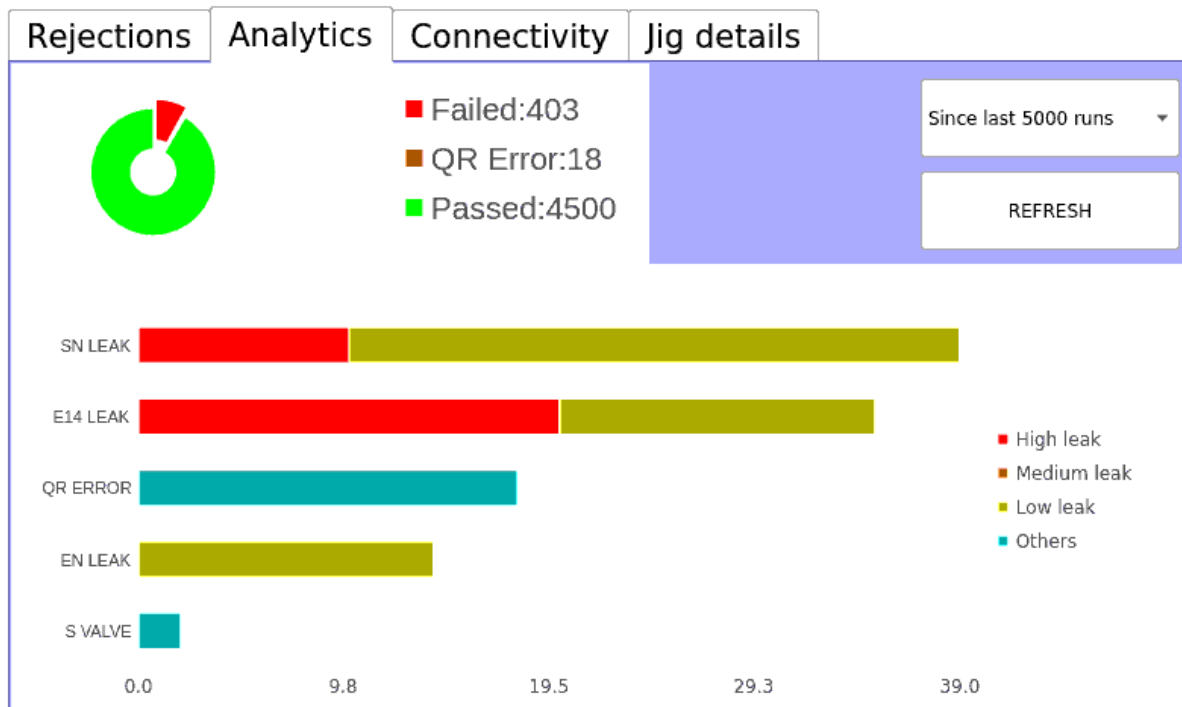
Analytics Screen

| 4.3	**Connectivity Screen:** Periodical ping status and data uploading status will be displayed respectively in Pings and Uploads tabs of connectivity screen. • Network details: Which shows the details of Network connected to jig. • WIFI IP: IP address of jig will be displayed here if jig is connected to WIFI network. • WIFI MAC: Unique Media Access Control address of SBC used in jig. • WIFI Network: Name of WIFI network to which jig is connected. • WIFI Strength: whether internet connection is reliable or not. • Ethernet IP: IP address of jig will be displayed here if jig is connected to LAN network. • Ethernet MAC: Unique Media Access Control address of SBC used in jig. **Uploads:** Which shows the uploading the data to server added for checking server status. Realtime data uploading to server. **Pings:** Which shows the availability of internet by pinging to server. And Ping to test google.com added for checking internet connectivity latency and status. **Debug:** Which shows the messages during troubleshooting the jig by click on **check internet access, Ping to Molbio Server, Check pending data, Advanced network** details in the **Diagnostics.**

GUI option to check following details in local SQLite database is added in GUI:

- Number of files ready to upload.
- Number of incomplete entries in local SQLite database.
- Number of incomplete raw data files.
- Warning massages for issues in server connectivity and data uploading added.
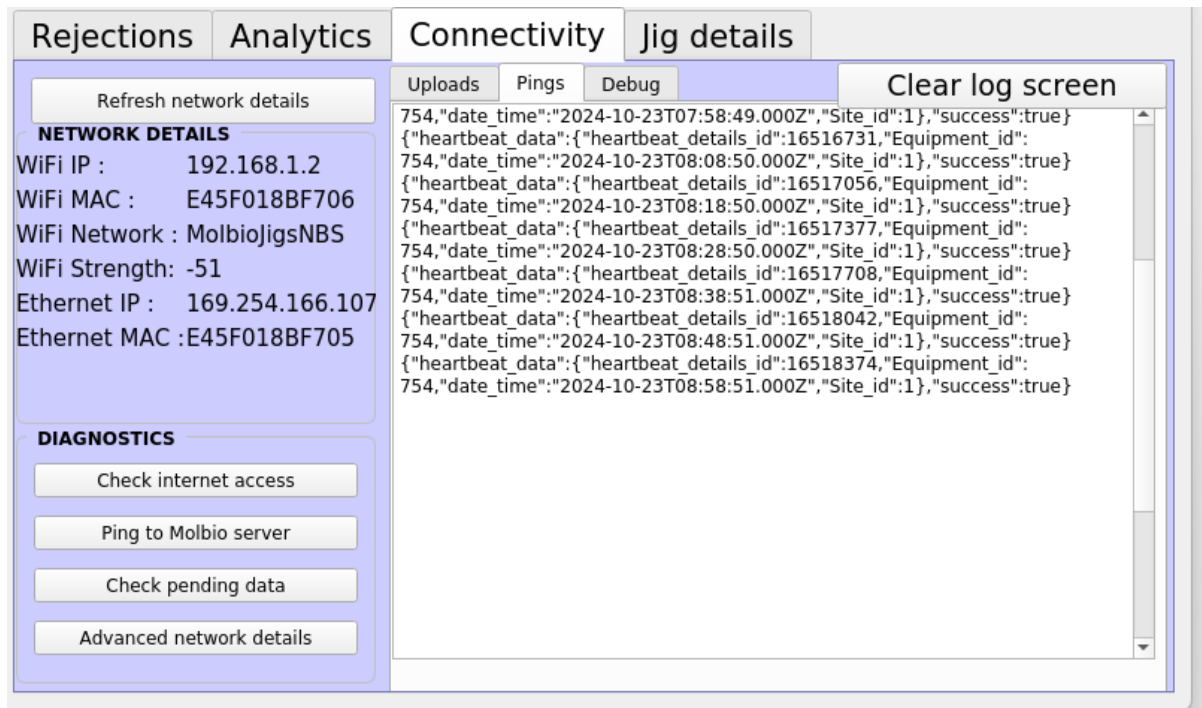
Connectivity Screen

4.4	**Jig details screen:**

User need to press on 'Jig details' tab on top of the screen to display Jig details screen. Following details will be displayed on Jig details screen:

- Jig ID: Unique identifier assigned to individual jigs.
- Date: Current date retrieved from jig's internal calendar.
- Time: Current time retrieved from jig's internal clock. Will get updated on click on refresh button.
- Refresh: By click on Refresh button will get updated values.

Location:

- Site: Location assigned to jig. This is extracted from last two digit of Jig ID.
- Line: shows the line number assigned to jig.
- Station: shows the station assigned to jig.

- Site ID: shows the in which location(place) jig belongs will extracted from the last two digit of jig ID.

Cartridge Batch:

- Shows the current batch number assigned to jig while testing cartridges, which can be changed while assigning new batch number by using **Edit** button.
- After clicking on edit button, which is proacted by Supervisor Password pop window will appears. Enter the Password.
- For rework batch, the batch number will start with prefix RW and enter the batch number.

Configurations: Which shows the status of Profile, site ID validation, line ID validation, station ID validation and QR character count validation. Where' **X** 'shows the disable of Validation and value shows the enabling of the validations.

- Current Profile: shows the select profile.
- QR site validation: were validate with **Site ID**, while testing the cartridge first character of QR Code if does not match will show the error message.
- QR line validation: were validate with **Line**, while testing the cartridge second character of QR Code if does not match will show the error message.
- QR size validation: were validate with **QR size**, while testing the cartridge length of the QR Code character if does not match will show the error message.
- QR size: Which show the No of character must be present in the QR Code for validation. During the cartridge testing.

Preventive Maintenance: Which shows the details of Maintenance of jig.

- Previous date: shows the last service done to jig.
- Previous run ID: shows the run id of jig were last service was done.
- Next run ID: shows the next run id on which service has to be done to jig.
- Period: which shows the interval between **Previous run ID** and **Next run ID**.

Other Details:

- Total tests: Total numbers of tests completed by jig since it has made.

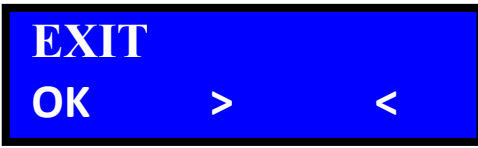|	
	• CPU Temp: Temperature of jig SBC's processor. • SW Version: Version of GUI software installed in jig. • Free Space: Free space in Memory card. User need to press **REFRESH** button to display to see the updated details. *Jig details screen* *Note: LCD touch screen will turn off automatically, if there is no user interaction for 10 minutes. User need to touch on screen to turn it on.*
5	**Service Menu**
5.1	**Accessing Menu**
5.1.1	Service Menu can be accessed from Start Screen.
5.1.2	Press menu button (center button on front panel) to enter Menu.
5.1.3	In Menu, user can navigate through different options using Menu and Start buttons. Power button can be used enter into currently displayed option.

5.1.4	For exiting from Menu, select 'EXIT' option and press power button. **EXIT** **OK > <**	
5.2	**Vacuuming channels testing.**	
5.2.1	Air leakages in vacuuming channels of the jig can be found out using this test. User need to select 'VAC TST' from menu to start vacuum testing.	
5.2.2	Sample side nozzle's vacuuming starts immediately after user enters 'VAC TST', following will be displayed on screen. **Cls S.Nzl** **P= 4.600 V T= 24 s** Block the sample side nozzle tightly with hand so that air won't enter into the nozzle.	
5.2.3	The voltage corresponding to vacuum pressure displayed on left side of alphanumeric display will start to reduce. Once it reaches below 3.500V, vacuuming will stop and jig will monitor vacuum for 5 seconds.	
5.2.4	If vacuum is not dipping below 3.500V within 24 seconds or vacuum is not holding for 5 seconds, the jig will show following message. **S.Nzl Fail** **P= 3.XXX V T=XX s** That is jig have internal leak in sample side nozzle vacuuming channel and need to troubleshoot it.	
5.2.5	If there is no leak sample side nozzle's vacuuming channel, following will be displayed. **S.Nzl Pass** **P= 3.XXX V T=XX s**	
5.2.6	Release the blocking from sample side nozzle, the vacuum pressure voltage should increase above 4.500V, if not increasing it will show following error: **S.Nzl Fail** **CLOG ERROR**	
5.2.7	Press power button to start testing of elution side nozzle's vacuuming channels.	

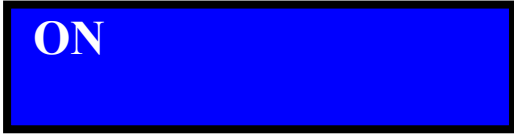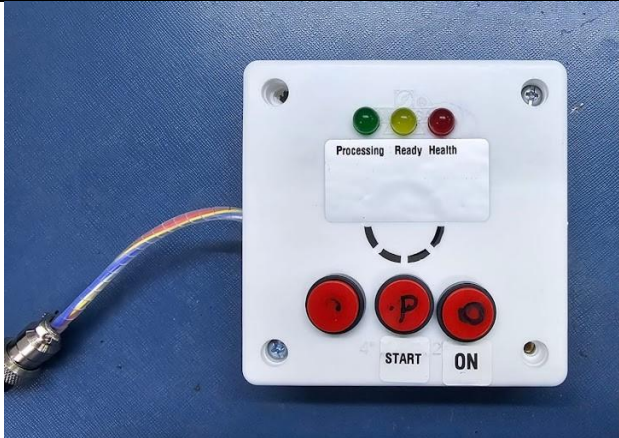| 5.2.8	Block the elution side nozzle tightly with hand so that air won't enter into the nozzle, following is displayed on screen. **Cls E.Nzl** **P= 4.600 V T= 24 s**
5.2.9	The voltage corresponding to vacuum pressure displayed on left side of alphanumeric display will start to reduce. Once it reaches below 3.500V, vacuuming will stop and jig will monitor vacuum for 5 seconds.
5.2.10	If vacuum is not dipping below 3.500V within 24 seconds or vacuum is not holding for 5 seconds, the jig will show following message. **E.Nzl Fail** **P= 3.XXX V T=XX s** That is jig have internal leak in elution side nozzle vacuuming channel and need to troubleshoot it.
5.2.11	If there is no leak elution side nozzle's vacuuming channel, following will be displayed. **E.Nzl Pass** **P= 3.XXX V T=XX s**
5.2.12	Release the blocking from elution side nozzle, the vacuum pressure voltage should increase above 4.500V, if not increasing it will show following error: **E.Nzl Fail** **CLOG ERROR**
5.2.13	Press power button to go back to menu.
5.3	**Mechanism testing.**
5.3.1	This includes testing of cartridge sensing mechanism, rotation and current consumption (tightness) of sample side and elution side valve rotating motors. User need to select 'MECH TST' from menu to start mechanism testing.

5.3.2	After selecting "MECH TST", If cartridge sensing limit switch pin is already in up position/limit switch is permanently closed position/there is electrical short circuit in limit switch circuit. Following error message will be displayed. **CAT.SNS CHK** **SNS ERR**
5.3.3	Press cartridge sensing limit switch pin to up. Jig should display following. **CAT.SNS CHK** **SNS PRSD**
5.3.4	When the cartridge sensing limit switch pin is released, following should be displayed on screen. **CAT.SNS CHK** **SNS RLSD**
5.3.5	If any of the above two steps fails, user needs to troubleshoot cartridge sensing mechanism.
5.3.6	Press power button to start testing of sample side valve rotating motor's anti-clockwise rotation. The sample side valve motor should start ***rotating in anti-clockwise direction*** and following will be displayed. **S.VM ACW** **XXX | mmm -> MMM** In this: - The value at ***XXX*** is real time value of current (in milli ampere) consumption by valve rotating motor that is under test. - The value at ***mmm*** is least observed value of current (in milli ampere) consumed by valve rotating motor in its entire time of rotation during the testing. ***Note: This value should be above 20 milli ampere.*** - The value at ***MMM*** is least observed value of current (in milli ampere) consumed by valve rotating motor in its entire time of rotation during the testing. ***Note: This value should be below 40 milli ampere.***

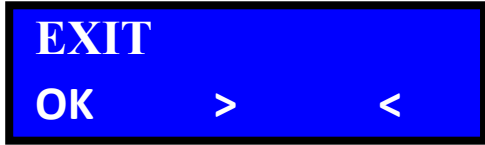|	
5.3.7	Press power button to start testing of sample side valve rotating motor's clockwise rotation. The sample side valve motor should start ***rotating in clockwise direction*** and following will be displayed. **S.VM CW** **XXX | mmm -> MMM** The currently values displayed should be as given in step 8.3.6.
5.3.8	Press power button to start testing of elution side valve rotating motor's anti-clockwise rotation. The elution side valve motor should start ***rotating in anti-clockwise direction*** and following will be displayed. **E.VM ACW** **XXX | mmm -> MMM** The currently values displayed should be as given in step 8.3.6.
5.3.9	Press power button to start testing of elution side valve rotating motor's clockwise rotation. The elution side valve motor should start ***rotating in clockwise direction*** and following will be displayed. **E.VM CW** **XXX | mmm -> MMM** The currently values displayed should be as given in step 8.3.6.
5.3.10	If maximum current values observed in any of the last 4 steps are above 40 milli ampere, the corresponding valve rotating motor is taking more current due to tightness in valve rotating mechanism. If minimum current values observed in any of the last 4 steps are below 10 milli ampere, the corresponding valve rotating motor is not taking current due to either problem in electrical connections/problem with motor itself.
5.3.11	Press power button to go back to menu.
5.4	**Setting rotary valve's half value.**

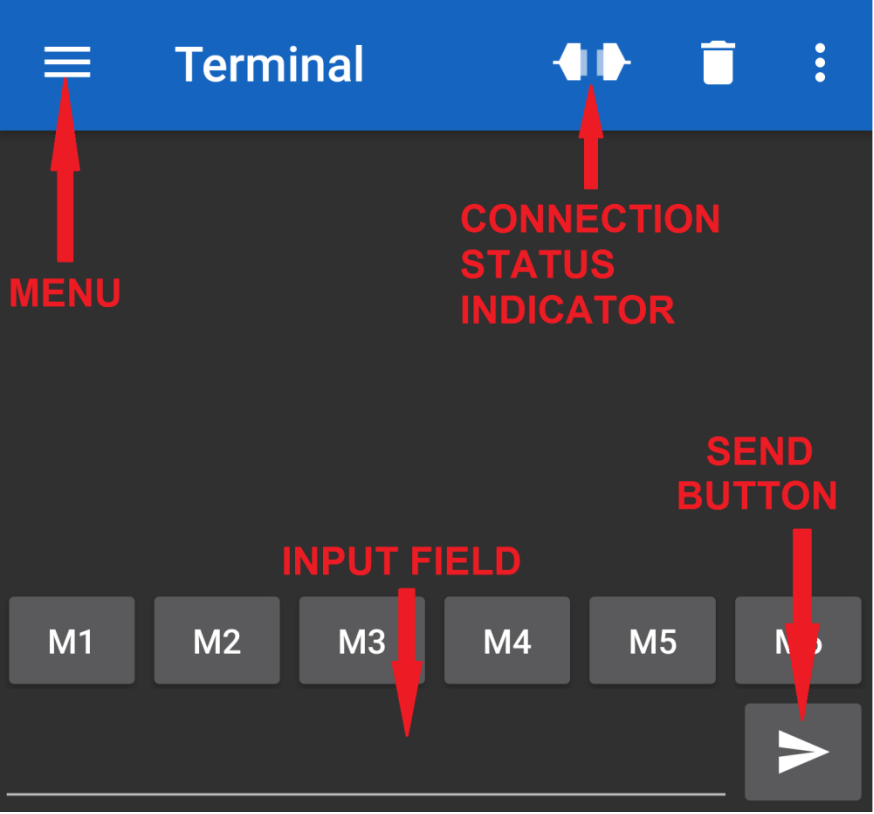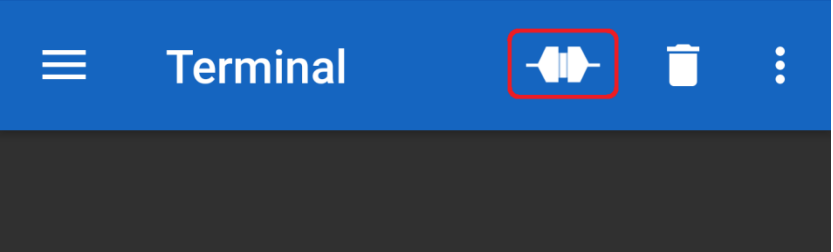|	
5.4.1	In cartridge's leak testing stage, sample side rotary valve of cartridge needs to be positioned in the middle of its full-scale rotation to block airflow. In some jigs rotary valve will not stop in this required center position. In these jigs, stopping position of rotary valve can be adjusted by changing rotary valve's half value in this menu. The default value of rotary valve's half value is 20. If value is increased, rotary valve will stop nearer elution chamber. If value is decreased, rotary valve will stop farther from elution chamber.
5.4.2	For changing rotary valve's half value, user needs to select "RTRY VLV HALF" from menu. Following will be displayed. **SET VLV HF VAL** **VALUE= 20**
5.4.3	User can change it to required value by using Menu and Start buttons.
5.4.4	Only value is changed to required, user can press power button. Jig will prompt to save the new value as given below. **SAVE?** **VALUE= XX** Press Menu and Power button together to save the value and exit to menu. User can press power to exit to menu without saving value.
5.5	**Enabling/disabling QR.**
5.5.1	User can enable/disable QR by selecting "QR" option from menu. If QR menu is selected user will be prompted to enter secret pin code for proceeding.
5.5.2	The initial value of the password will be "0000". Currently selected digit of pin will be highlighted with underscore as in below figure **PIN?** **<u>0</u> 0 0 0** Press menu button to increment and start button to decrement selected digits, respectively. Press power button to select next digit. Pressing when 4th digit is selected will verify the entered pin. If pin is correct user will be proceeded to option for enabling/disabling QR. If pin is incorrect, following will be displayed.

<table>
<tr><td></td><td colspan="2" align="center">FAIL</td></tr>
<tr><td></td><td colspan="2">If pin verification failed, jig will reset prompt for entering pin.
Note: User can exit from password prompt by pressing menu and start button together.</td></tr>
<tr><td>5.5.3</td><td colspan="2">Once entered pin has verified successfully, option for enabling or disabling QR will be displayed.</td></tr>
<tr><td>5.5.4</td><td colspan="2">If QR is currently off, following will be displayed, prompting user to turn on QR.

ON QR?

If use press menu and start button together, QR functionality will be turned on and following will be displayed.

ON

After 2 seconds, jig will return back to menu.</td></tr>
<tr><td>5.5.5</td><td colspan="2">If QR is currently on, following will be displayed, prompting user to turn off QR.

OFF QR?

If use press menu and start button together, QR functionality will be turned off and following will be displayed.

OFF

After 2 seconds, jig will return back to menu.</td></tr>
<tr><td>5.6</td><td colspan="2">Enabling/disabling Data.</td></tr>
<tr><td>5.6.1</td><td colspan="2">User can enable/disable data recording by selecting "DATA" option from menu. If DATA menu is selected user will be prompted to enter secret pin code for proceeding.</td></tr>
<tr><td>5.6.2</td><td colspan="2">The initial value of the password will be "0000". Currently selected digit of pin will be highlighted with underscore as in below figure

PIN?
<u>0</u> 0 0 0

Press menu button to increment and start button to decrement selected digits, respectively. Press power button to select next digit.</td></tr>
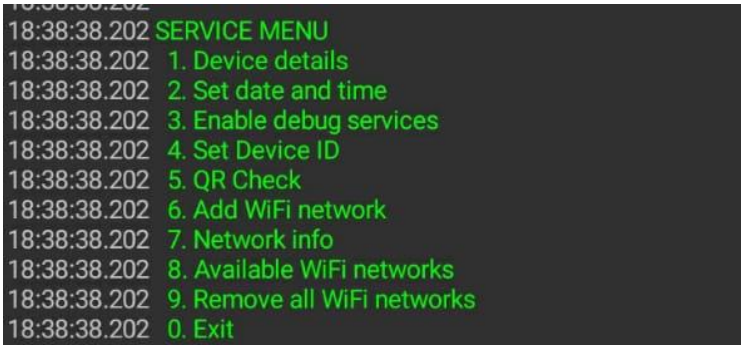</table>

	Pressing when 4th digit is selected will verify the entered pin. If pin is correct user will be proceeded to option for enabling/disabling data recording. If pin is incorrect, following will be displayed. **FAIL** If pin verification failed, jig will reset prompt for entering pin. *Note: User can exit from password prompt by pressing menu and start button together.*
5.6.3	Once entered pin has verified successfully, option for enabling or disabling QR will be displayed.
5.6.4	If data recording is currently off, following will be displayed, prompting user to turn on data recording. **ON DATA?** If use press menu and start button together, data recording functionality will be turned on and following will be displayed. **ON** After 2 seconds, jig will return back to menu.
5.6.5	If data recording is currently on, following will be displayed, prompting user to turn off data recording. **OFF DATA?** If use press menu and start button together, data recording functionality will be turned off and following will be displayed. **OFF** After 2 seconds, jig will return back to menu.
5.7	**Pairing with Bluetooth device.**
5.7.1	User need to activate pairing mode in jig, for pairing with Smartphone to access Bluetooth CLI based serve menu. Select "BT PAIR" option from menu to activate Bluetooth pairing mode.

Pressing when 4th digit is selected will verify the entered pin.

5.7.2	When this menu is selected jig will be in Bluetooth pairing mode for 60 seconds and following will be displayed. **PAIR** *Note: If SBC in jig is not initialized when user enters this option, jig will wait for SBC to initialize for 2 minutes. If SBC is not initialized within 2 minutes, jig will display "SBC Er-1" and user needs to troubleshoot SBC.*
5.7.3	If any pairing request has been received from any other Bluetooth device and got paired successfully, following will be displayed for 2 seconds and jig will return to menu. **OK**
5.7.4	If pairing request is not received within 60 seconds, following will be displayed for 2 seconds and jig will return to menu. **T-OUT** Note: User can also exit back from this option to menu without waiting for 60 seconds by pressing menu and start button together.
5.8	**PLC Output signals testing details Service Menu.**
5.8.1	Connect to the PLC testing jig with a 12-v power to ACTJ using GX9 connector.

5.8.2	Service Menu can be accessed from Start Screen.
	Press menu button (center button on front panel) to enter Menu.
	When this menu is selected jig will show the PLC OUT TESTING, will shows this menu,
	 PLC OUT TESTING **OK < >**
	This testing will go in the loop until get exit from this menu.
	 JIG_PROCESSING
	While LED GREEN indication which shows the **JIG_PROCESSING**, and off indication shows **JIG_IDEL**.
	 JIG_READY
	While LED YELLOW indication which shows the **JIG_READY**, and off indication shows **JIG_NOT_READY**
	 JIG_HEALTH_NOTOK
	While LED RED indication which shows the **JIG_HEALTH_NOTOK**, and off indication shows **JIG_HEALTH_OK**
	For exiting from Menu, select 'EXIT' option and press power button.
	 EXIT **OK > <**
5.8.3	**PLC input signal testing Service Menu.**
	When this menu is selected jig will show PLC IN TESTING, will shows this menu,
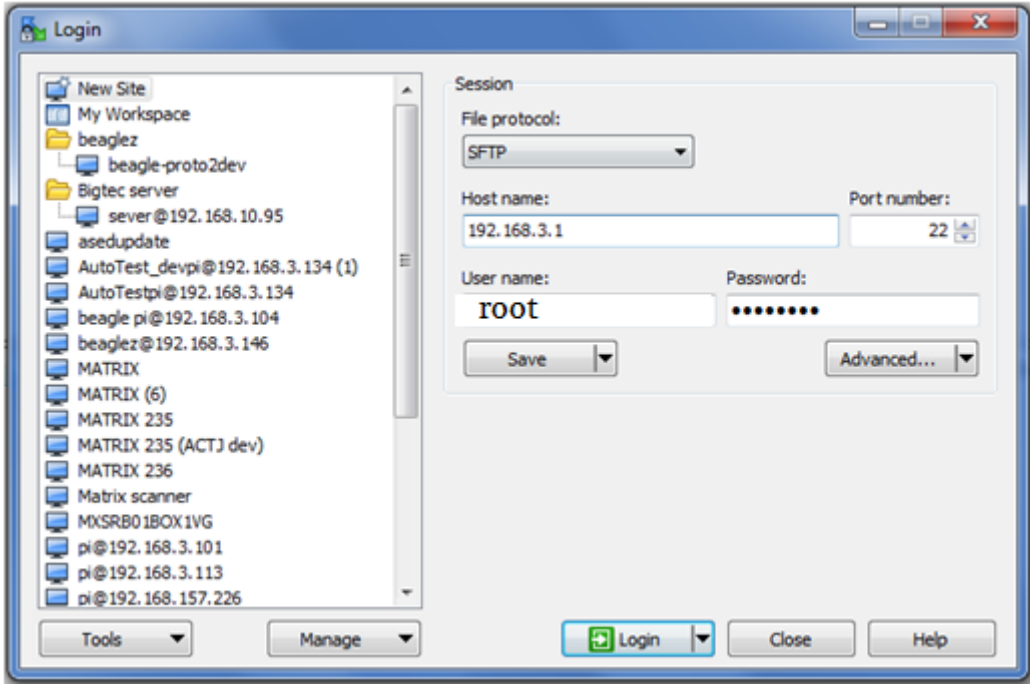
<table>
<tr><td></td><td colspan="2">
<div style="background:blue;color:white">

PLC IN TESTING

OK   <   >

</div>

When ON/ OFF switch is pressed, **ACTJ_OFF** should be displayed on screen**.**

When START is pressed, **ACTJ_START_PRO** should be displayed on screen.

For exiting from Menu, select 'EXIT' option and press power button.

<div style="background:blue;color:white">

EXIT

OK   >   <

</div>
</td></tr>
<tr><td>5.9</td><td colspan="2">**SBC Configuration**</td></tr>
<tr><td>5.9.1</td><td colspan="2">**Establishing connection with jig's SBC and accessing Bluetooth CLI service menu.**</td></tr>
<tr><td>5.9.1.1</td><td colspan="2">Enable the pairing mode in jig as explained in 'Pairing with Bluetooth device' section of this document</td></tr>
<tr><td>5.9.1.2</td><td colspan="2">On any device with Android OS, turn on Bluetooth and pair with the jig.</td></tr>
</table>
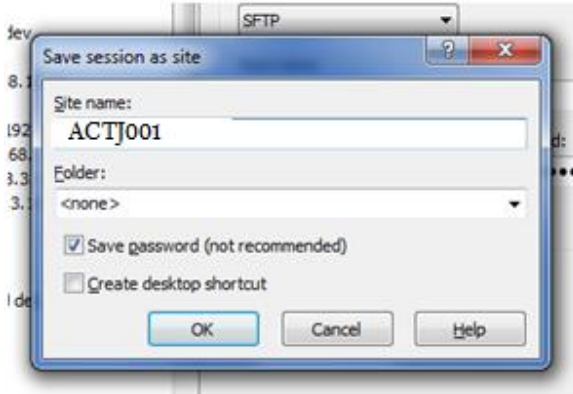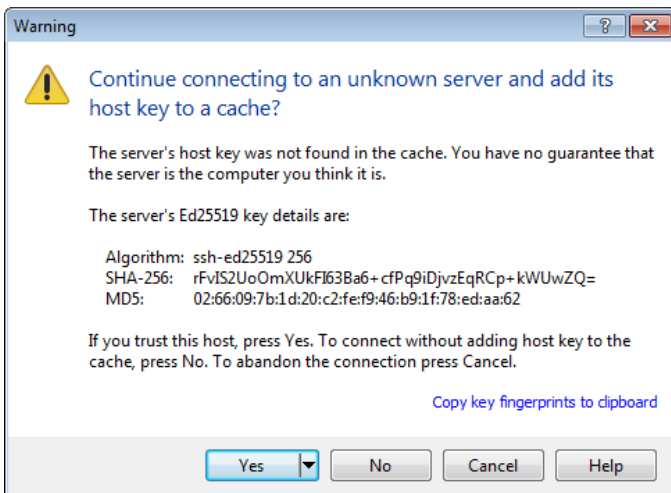
5.9.1.3	Install Serial Bluetooth Terminal application from Google Play and open it, an overview of main screen of Serial Bluetooth application was given below.
5.9.1.4	**Goto Menu > Settings > Terminal > Send; select 'NUL' in Newline option. This must be done after installing application.**
5.9.1.5	Goto Devices option in Menu; under 'BLUETOOTH CLASSIC' tab, select Name of Trueprep Auto device to be connected. If the connection to Trueprep Auto was established successfully, the Connection Status Indicator will change, as highlighted in following image.

5.9.1.6	In Serial Bluetooth Terminal, enter 'S' and press sent, to enter SBC service menu. In service menu all options available will be displayed as given below: 18:38:38.202 SERVICE MENU 18:38:38.202 1. Device details 18:38:38.202 2. Set date and time 18:38:38.202 3. Enable debug services 18:38:38.202 4. Set Device ID 18:38:38.202 5. QR Check 18:38:38.202 6. Add WiFi network 18:38:38.202 7. Network info 18:38:38.202 8. Available WiFi networks 18:38:38.202 9. Remove all WiFi networks 18:38:38.202 0. Exit User can select required option by entering number corresponding to option in input field and pressing Send icon. Note: Previously entered characters will retain in input field after sending then. User needs to clear this before entering new characters.
5.9.2	**Getting jig details.**
5.9.2.1	Select 'Device details' by entering '1' and pressing sent.
5.9.2.2	Device details will be displayed in following format: <Device ID> <SBC SW Version> <MAC ID> <IP (Only if connected to WIFI)> <Total runs> <Device Date> <Device Time> **After displaying Device details jig will go back to service menu.**
5.9.3	**Setting date and time.**
5.9.3.1	Select 'Set date and time' by entering '2' and pressing sent. Following will be displayed on terminal: *Enter date and time in DD/MM/YY-hh/mm/ss format*
5.9.3.2	Enter the date and time in format given above, time should be entered in 24 Hour Clock format and press sent.

5.9.3.3	The terminal will go back to service menu automatically, enter '1' and press sent to get device details and verify that time was registered.
5.9.4	**Setting Device ID.**
5.9.4.1	Select 'Set Device ID' by entering '4' and pressing sent. 'Enter the Cartridge Test Jig ID' will be displayed on terminal. Enter the ID to be assigned for Jig and press sent. **Note: Label with Jig ID is pasted on jig's control box. When entering Jig ID needs to be entered without hyphens ('-') in this Bluetooth menu. Also 2-character site ID needs to be added at the end of jig ID.**
5.9.4.2	The jig will display newly entered device ID and will go back to service menu. Enter '1' and press sent to get device details and verify that Device ID was registered.
5.9.5	**Checking QR Reading functionality.**
5.9.5.1	Place cartridge with production QR code in testing area (below mechanism plate).
5.9.5.2	Select 'QR Check' by entering '4' and pressing sent.
5.9.5.3	The jig will scan QR on cartridge placed in testing area and displays the data in scanned QR on Bluetooth terminal. The terminal will go back to service menu automatically.
5.9.6	**Adding new WIFI network.**
5.9.6.1	Select 'Add WIFI network' by entering '6' and pressing sent.
5.9.6.2	When asked for SSID, enter WIFI name and press sent.
5.9.6.3	When asked for password, enter the password of WIFI network and press sent.
5.9.6.4	Jig will ask for confirmation, ensure WIFI name and password entered correct, enter 'y' and press sent to confirm. **Note: User can exit without saving currently entered WIFI details by entering any character other than 'y' here.**
5.9.6.5	**Wait for about 10 seconds, after 10 seconds jig will WIFI network and information and go back to service menu.**
5.9.6.7	Then turn off and turn on jig. And check IP in device details to very that it is connected to internet. If jig is not connected to WIFI, IP won't be displayed.
5.9.7	**Getting currently connected network's details.**
5.9.7.1	Select 'Network info' by entering '7' and pressing sent.

5.9.7.2	Various details about network to which jig has currently connected, will be displayed in Bluetooth terminal.
5.9.8	**Scanning for WIFI networks in range.**
5.9.8.1	Select 'Available WIFI networks' by entering '8' and pressing sent.
5.9.8.2	Jig will scan WIFI networks in proximity and display their names/SSIDs.
5.9.9	**Remove all WIFI networks.**
5.9.9.1	Select 'Remove all WIFI networks' by entering '9' and pressing sent. Caution: This option will remove WIFI network passwords from jig. User need to enter WIFI password manually in order to connect to WIFI network again.
5.9.9.2	If this option is selected jig will prompt user to confirm about removal of saved network details by displaying following in Bluetooth terminal. *'This will remove all saved networks. Confirm? <y=Yes/other=discard>'* **If user enters 'y', jig will remove all saved network details (names/SSIDs and passwords) from memory.**
5.10	**New Updates Procedure in ACTJ Jig**
5.10.1	Copy ACTJ_INSTALL file to "/ACTJ" directory. (In root directory)
5.10.2	Goto ACTJ folder in terminal by entering command: cd /ACTJ/ACTJ_INSTALL
5.10.3	Give execution permission to "actjinstall.sh" file by entering command: chmod +x actjinstall.sh
5.10.4	Start install process by entering command: ./actjinstall.sh
5.10.5	Once installation completes, SBC will restart.
6	**Procedure for setting Static IP**
	Basic process is to access ACTJ jig's Raspberry Pi using SSH protocol (user: root, port:22 and password: provided by bigtec) and add following lines at end of ***/etc/dhcpd.config*** file interface eth0 static Ip address=xxx.xxx.xxx.xxx static routers=xxx.xxx.xxx.xxx static domain_name_servers=x.x.x.x
6.1	**Procedure on Windows system using WinSCP and Advanced IP Scanner tools**

6.1.1	Ensure following software are installed in PC: • WinSCP (Available here: https://winscp.net/eng/download.php) Advanced IP Scanner (Available here: https://www.advanced-ip-scanner.com)
6.1.2	Turn ON the jigs from which data needs to be taken, wait for 20 to 30 seconds Raspberry Pi of jig to get ready.
6.1.3	Connect ACTJ jig's Ethernet port to Computer.
6.1.4	Find out the IP address of ACTJ jigs connected using Advanced IP Scanner, by opening it and scanning for connected devices by pressing ▶ Scan button. The Advances IP Scanner will list connected jig names and their IP addresses. Copy or note down IP address of required jig.
6.1.5	Open WinSCP, following Login window will be displayed. If not displayed, select New Session from Session menu on Menu Bar of WinSCP.
6.1.6	In Login window, user needs to enter following details: • In Host name field, enter IP address of the jig to be connected (obtained using Advanced IP Scanner). • In User name field, enter 'root'. • In Password field, enter password shared by bigtec team. • For other options, you should use the default values in the image • Port number field: 22 • File protocol field: SFTP

	Click on save button to save entered session details.
6.1.7	Following 'Save session as site' window will open. In Site name, enter jig ID of ACTJ jig of which with IP address belongs
6.1.8	Leave Folder option as, <none> Ensure 'Save password (not recommended)' is ticked. If user wants to create a direct desktop shortcut to this jig, tick 'Create desktop shortcut'. Click on 'OK'.
6.1.9	The new jig session will be created and button (with jig ID entered in previous step) to access jig session will be displayed on left pane of Login screen.
6.1.10	Double click on newly created previously created jig session name on left pane, WinSCP will start connecting jig. If following message is displayed click on 'Yes'.
6.1.11	Once connected to ACTJ jig, the folders on jig will display on right-hand side of WinSCP.
6.1.12	Go to / etc folder in root directory and double click on dhcpd.config file to open it in Text Editor
6.1.13	Add following lines to end of dhcpd.config file interface eth0 static Ip address=xxx.xxx.xxx.xxx

|	

	static routers=xxx.xxx.<mark>xxx</mark>.xxx
	static domain_name_servers=x.x.x.x
	
	Please change static Ip address, static routers, static domain_name_servers as required.
	
	Example:
	
	    interface eth0
	    static Ip address=192.168.<mark>175</mark>.xxx
	    static routers=192.168.<mark>175</mark>.1
	    static domain_name_servers=8.8.8.8 4.2.2.2

6.1.14	Click Save button on top of text and restart the jig to set static Ip settings to the one given in previous step.
	Troubleshooting and miscellaneous procedures
7	**Firmware loading procedure**
7.1	***Setting up* PICkit 3 for Programmer-To-Go operation**
7.1.1	***Connect PICkit 3 to computer using USB Type A to Mini USB adapter cable.***
7.1.1.1	***Open MPLAB IDE. Go to File>Import and load the firmware hex file to be programmed.***
7.1.1.2	In 'Configure' menu select 'Select Device', enter name of microcontroller (PIC18F4550) to be programmed in 'Device:'. Click on 'OK' button.
7.1.1.3	In 'Programmer' menu select 'Select Programmer', then click on 'Pickit 3' option. **Note:** Pickit3 is already in Programmer to Go mode, MPLAB IDE will prompt user to whether to keep old Firmware or not. Click 'No' in this dialog box, as we have to load new Firmware.
7.1.1.4	In 'Programmer' menu select 'Settings' and click on 'Programmer to go Tab' (Figure 9.1.1).
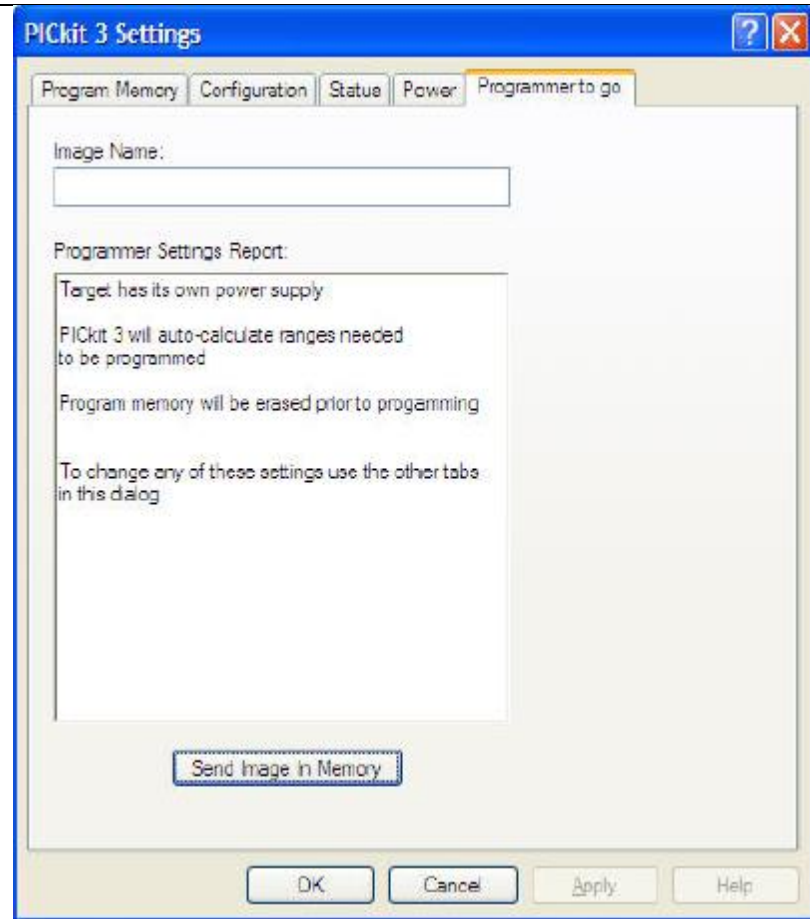
Figure 9.1.1

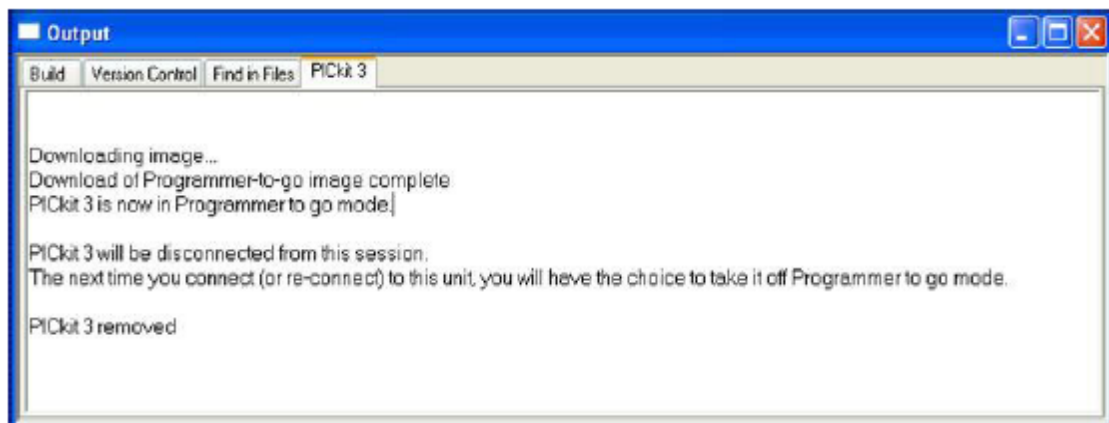| 7.1.1.5	In the "Image Name" field, type in the name wanted to be used for your firmware.
7.1.1.6	Click Send Image In Memory to execute a hex file transfer to the PICkit 3 unit.
7.1.1.7	*After you click Send Image In Memory, the Output window displays a message (Figure 9.1.2) when the download is complete.* *Figure 9.1.2* *Once the firmware hex file is transferred to the PICkit 3, it can be used to load firmware to microcontroller.*

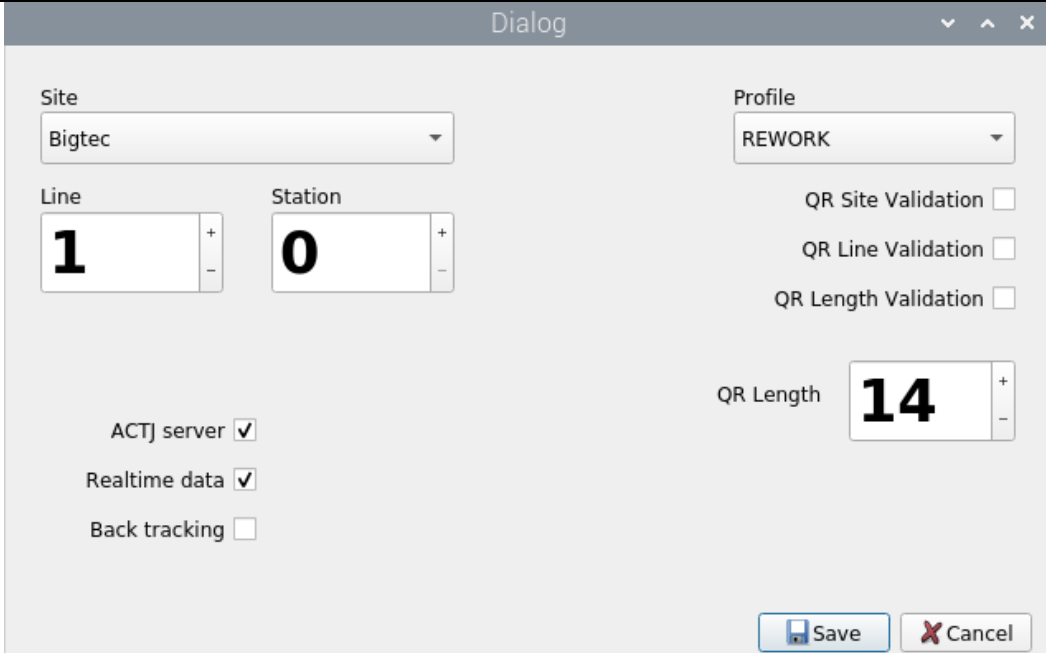|	
7.1.1.8	Disconnect the PICkit 3 from the PC USB port. When any USB power source is applied, the PICkit 3 unit will power-up in Programmer-To-Go mode, indicated by the blinking *"Active" LED*
7.1.1.9	*After firmware has transferred, PICKit 3 should be tagged showing the version of firmware in PICKit 3.*
7.1.1.10	*Loading Firmware from PICkit 3 (in Programmer-To-Go mode) to Jig*
7.1.2	Connect a USB power source to PICkit 3 configured as Programmer-To-Go
7.1.2.1	Ensure the PICkit 3 "Power" LED is lit. The "Active" LED blinks once to indicate **the unit is in Programmer-To-Go mode and ready to program.**
7.1.2.2	Note down rotary valve's half value of Jig (refer section 8.4). If this value is not 20, it needs to be entered back after programming.
7.1.2.3	Turn off the jig.
7.1.2.4	Disconnect the cable going from Controller Board to Raspberry Pi .
7.1.2.5	Connect the PICkit 3-unit ICSP connector to the jig and power on the jig.
7.1.2.6	*Press the PICkit 3 push button to begin programming.*
7.1.2.7	During the programming operation the PICkit 3 "Status" LED will turn orange and remain lit continuously while the operation takes place. A green "Status" LED indicates that firmware is loaded. Red indicates that firmware loading has failed.
7.1.2.8	*If programming was successful enter the* rotary valve's half value of Jig (refer section 8.4)
7.1.2.9	Turn off the jig by long pressing power button.
7.1.2.10	Reconnect the cable going from Controller Board to Raspberry Pi SBC **Note: Ensure cable's polarity correct. Raspberry Pi SBC will damage if polarity is reversed.**
7.1.2.11	Turn on the jig and ensure than firmware version displayed at start-up is correct.
7.1.2.12	Details of indications given by Status LED and Active LED on PICKit 3 has given in below table (Table 10): **Note: In some PicKit3s Status LED will be in orange color instead of green.**

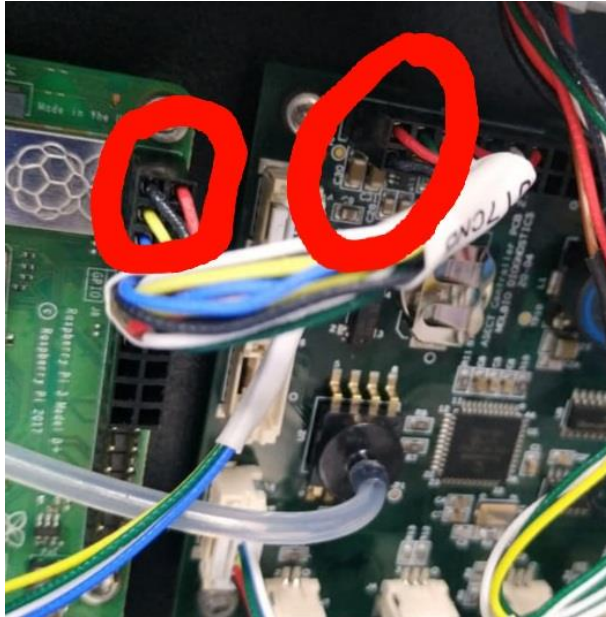| LED Status		Interpretation	
Active LED	**Status LED**	**Code**	**Description**
Single Blink (Blue)	Green	Success/Ready	No errors were encountered during the programming operation. PICkit 3 Programmer-To-Go is ready to program again.
Off	Red – Continuous Rapid Blinking: ●●●●●●●●……	VDD/VPP Error	PICkit 3 was unable to set the VDD or VPP voltage to the expected value. If PICkit 3 is not providing VDD, then the error must be a VPP error. See (**Section 2.4 "Communication Connections"** and **Section 3.4.4 "Powering the Target"**) for VDD and VPP information.
Off	Red – 2 blinks in succession: ●● ●● ●● ●●…….	Device ID Error	PICkit 3 received an unexpected Device ID from the target. Ensure the target part matches that selected when the PICkit 3 Programmer-To-Go was set up. May indicate a bad ICSP connection preventing the PICkit 3 from communicating with the target. Not applicable to Baseline devices.
Off	Red – 3 blinks in succession: ●●● ●●● ●●●……	Verify Error	The target did not Verify successfully after programming. Ensure the target VDD meets the minimum required. With Baseline devices, this error may indicate ICSP communication problems.
Off	Red – 4 blinks in succession: ●●●● ●●●●……	Internal Error	An unexpected internal Programmer-To-Go error occurred. If it happens a second time, try downloading to the PICkit 3 again.

Table 10

7.2	**Changes in the Settings**	
	Click on Settings in Jig Details tab will show this Dialog box. • Site, can be selected from drop down menu respectively. • Line, Sation can be increased or decreased from + or - button respectively. • Profile, can be changed from the drop-down menu for rework or fresh, respectively. • QR site Validation, QR Line Validation, QR Length Validation can be enabled by checking it respective checkbox. • QR Length can be increased or decreased from +or – button respectively. • ACTJ Server, Realtime data can be checked while running in PLC mode. • Click on save button to save the settings.	

8.2	QR functionality issue troubleshooting procedure

8.2.1	Manually read QR by pressing the button.
	
	        - **Fail**: If light is coming, check QR reader position and retry. If the position is correct and still fails, scan Setup QRs and retry.
	
	        If light is not coming, check Raspberry pi is on/device name is displaying in Bluetooth search from phone. If Pi is not on check SD card is inserted/Raspberry pi connection is proper.
	
	    - **Pass:** Go to next step**.**

8.2.2	Read QR from Bluetooth menu.
	
	        - **Fails**: Replace QR reader's USB Cable. Turn off and turn on the device and retry. Still fails, scan factory reset QR and Setup QRs, turn off and turn on the device and retry
	
	        - **Pass**: Go to next step.

8.2.3	Unpair phone from Jig, go to jig's service menu and go to BT PAIR option, search for jig in phone's Bluetooth and pair. Look for '**PAIRED**' or '**OK**' is has come on Jig's display once Jig name selected for pairing from phone. - **Fails**: There is communication issue between raspberry pi and controller board. Either Raspberry Pi's pins got damaged due to wrong connector polarity (Change raspberry pi) or controller board to raspberry pi cable is damaged (Change SBC cable)/not connected properly.

Note: It is noticed that if polarity of controller board to raspberry pi cable is wrong, the raspberry pi pins will get shorted and get permanently damaged, always ensure this connector is connected in proper direction/polarity as in attached photo. It should be in the order, that those wires marked in red should be always in correct 1 to 1 position as in the below picture.

8.3	**Resetting and configuring QR scanner.**
8.3.1	QR scanner in jig needs to be reset and configured in the case of QR scanner functionality issue or replaced with new QR scanner
8.3.2	QR codes given below needs to be scanned in given order to reset and configure QR code scanner to work with jig. If QR scanner is not triggering automatically, press button on QR code scanner to scan below QR.
8.3.2.1	Reset
8.3.2.2	Close tail

8.3.2.3	Forbid read all bar code
8.3.2.4	Allow reading QR
8.3.2.5	USB Virtual serial port
8.3.2.6	Command triggered mode
8.3.2.7	Command triggered mode

ABBREVIATIONS

- S.N: Sample Nozzle
- E.N: Elution Nozzle
- S.VM: Sample side Valve Motor
- E.VM: Elution side Valve Motor
- CW: Clock Wise
- ACW: Anti Clock Wise
- FT: Force Test
- MCHPLTD: Mechanism Plate Down
- MCHPLTD: Mechanism Plate Up
- CAT PLT BW: Cartridge Plate Backward

- CAT PLT FW: Cartridge Plate Forward

- IP: Internet protocol

- SBC: Single Board Computer

- ID: Identifier

CARTEIDGE ERRORS(FAIL)		
SI no	**Error**	**Error Code**
1	S.N LEAK 1	SNL1
2	S.N LEAK 2	SNL2
3	S.N LEAK 3	SNL3
4	E.N LEAK 1	ENL1
5	E.N LEAK 2	ENL2
6	E.N LEAK 3	ENL3
7	E.N LEAK 4	ENL4
8	E.N LEAK 5	ENL5
9	E.N LEAK 6	ENL6
10	S.N CLOGED	SNC0
11	E.N CLOGED	ENC0
12	E.N1 CLOGED	ENC1
13	S.VM CW FAIL	SVCW
14	S.VM ACW FAIL	SVAW
15	E.VM CW FAIL	EVCW
16	E.VM ACW FAIL	EVAW
17	S.VM FT ACW FAIL	SVTA
18	E.VM FT CW FAIL	EVTC
19	CONT. ERROR	CNTE
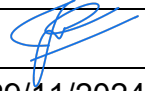
MECHANISM ERRORS (MXER)		
SI no	**Error**	**Error Code**
1	MCH PLT D STUCK	MC00
2	REJECT PLT STUCK	MC01
3	PASS PLT STUCK	MC02
4	CAT PLT BK STUCK	MC03
5	CAT PLT FW STUCK	MC04
6	CAT PLT BK STUCK	MC05
7	MCH PLT U STUCK	MC06
8	NO CARTRIDGE	MC07

QR ERRORS (NOQR)		
SI no	**Error**	**Error Code**
1	NO QR (QR NOT READABLE)	QR00
2	QR READER ERROR	QR01
3	QR FB ERROR	QR02

4	QR T.OUT	QR03

SBC ERRORS		
SI no	**Error**	**Error Code**
1	SBC Er-2	SBC2
2	SBC Er-1	SBC1

-End -

Activity			
*****	**Prepared by**	**Verified by**	**Approved By**
Sign	*dilipbn*		
Date	29/11/2024	29/11/2024	29/11/2024
Designation	Engineer R&D	Deputy Manager-R&D	Deputy GM