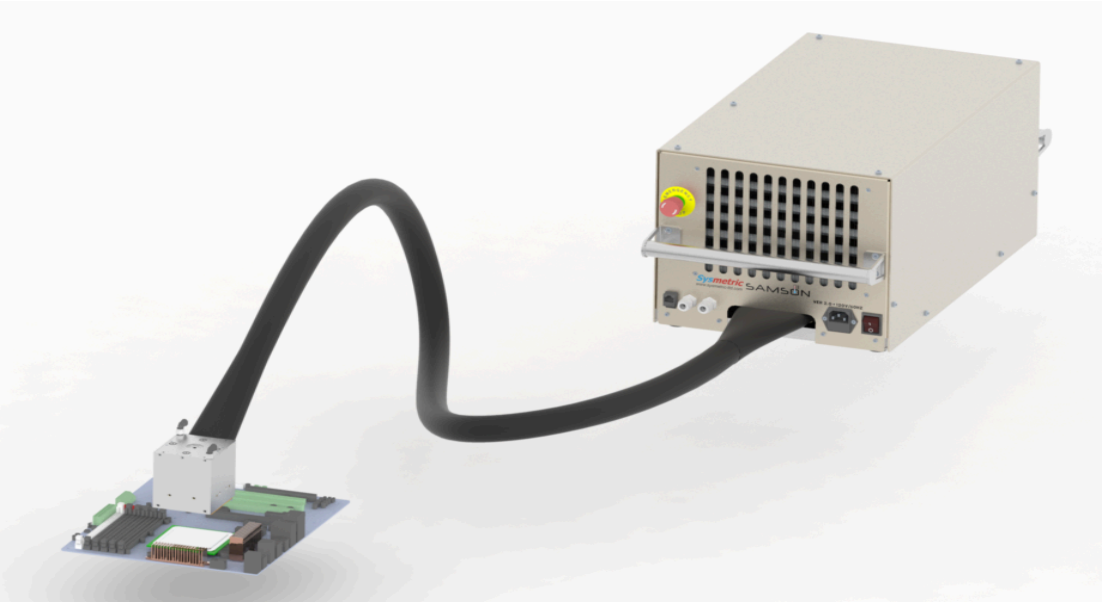
# Samson

## Phase Change Thermal Forcing System

# Operation Manual

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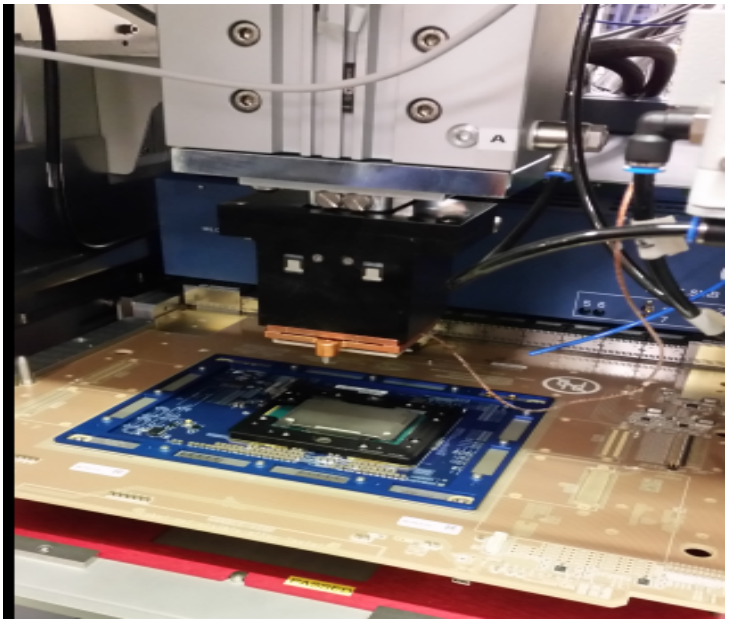
# Contents

# 1. Introduction

The new cooling/heating forcing system is targeted to answer customers' demands to validate Si components in temperature ranges of -40ºC up to +120ºC in a cooling/heating envelope between 100W@-40ºC(Tc) 600W@0ºC(Tc). The Samson thermal tool was designed to fit specific dimensions to fit into Intel Six Shot rack. The tool thermal head is designed to fit Intel pneumatical force actuation and gimbaling with minimum KOV (Keep Out Volume).

Samson tool inside a Six Shot rack



Samson thermal head above DUT inside a rack

### 1.1. Standard Features

- Samson comes in two main configurations:
    1. Samson Air (based on air cooling)
    2. Samson Water (based on a liquid cooling)
- Cooling power envelope of the tool is 100W@-40ºC(Tc) and 600W@0ºC(Tc)
- Temperature range -40ºC to +120ºC.
- Temperature change rate (hot/cold) is approximately 1 ºC/sec (without load).
- Temperature control ±0.2ºC from Set Point.
- The hose length between the thermal head and the control box is 230cm (220cm for the first models).
- Remote interface using I2C communication protocol is specifically designed to support InTEC controller.
- Defrost system activates below 20ºC.

### 1.2. Hazards

- Each thermal tool is specifically designed to be powered by either of the following sources:
    - 230V 50Hz (up to 15A at start up) and max. 5A during operation.
    - 120V 60Hz (up to 16A at start up) and max. 8A during operation.
- All control sub-systems and wiring use 24Volt DC.
- Internal refrigerant system contains pressurized refrigerant R452A.
- All pressurized system parts comply to commercial piping industry standards.

### 1.3. Safety Features

- The operation of this device should be by **authorized personnel only**.
- The Samson tool intended be installed in a rack or a table. For Samson Air there is a need to leave 30cm (minimum) space from air inlets and outlets.
- All system components comply to CE standards. See appendix A. MSDS for SUVA® R452A Refrigerant gas is used for cooling.
- https://www.fsw.uk.com/sites/www.fsw.uk.com/files/r452a_sds_0.pdf
- https://www.honeywell-refrigerants.com/europe/wp-content/uploads/2017/10/Solstice-452A-UK-english-1.pdf
- Maximum internal pressure is 15 Bar. Refrigerant weight is 260gr.

- The tool includes internal safety fuse that trips at150ºC. (OTCB-One Time Circuit Breaker)
- The tool will power off when its thermal head temperature reaches 140ºC.
- For **Samson Water**: In case of leak detection, the main water valve will close, and the tool will power off.
- Intel InTEC controller will turn the Samson thermal tool off at 130ºC.

### *1.4 Safety Symbols*

Below are examples of safety symbols and their meanings. They appear on certain tool parts.

1. Caution – risk of electric shock

2. Ground – connect power supply ground wire here

3. Hot/ Cold – Tool thermal head surface can reach very cold and very hot temperatures. Be aware before touching the thermal head during operation.
   ! Temperatures can reach -40$^0$C and +125$^0$C

### *1.4. Facilities requirements*

- The Samson should be powered through a circuit breaker used as the main overcurrent protection device and main disconnection device. A circuit breaker rated **230V, 15A** or **120V, 20A** at least 10,000 RMS AIC should be located inside the host machine.
- Samson Air tool requires a standard 208-230V or 120V outlet only, depending on a tool specification.
- Samson Water tool requires a standard 208-230V or 120V outlet only, depending on a tool specification. PCW with a flow rate of 0.7±0.2 GPM and a temperature of 13÷19$^0$C.
- Total cooling system efficiency is ~55%.

## 2. General Dimensions

- See Appendix B

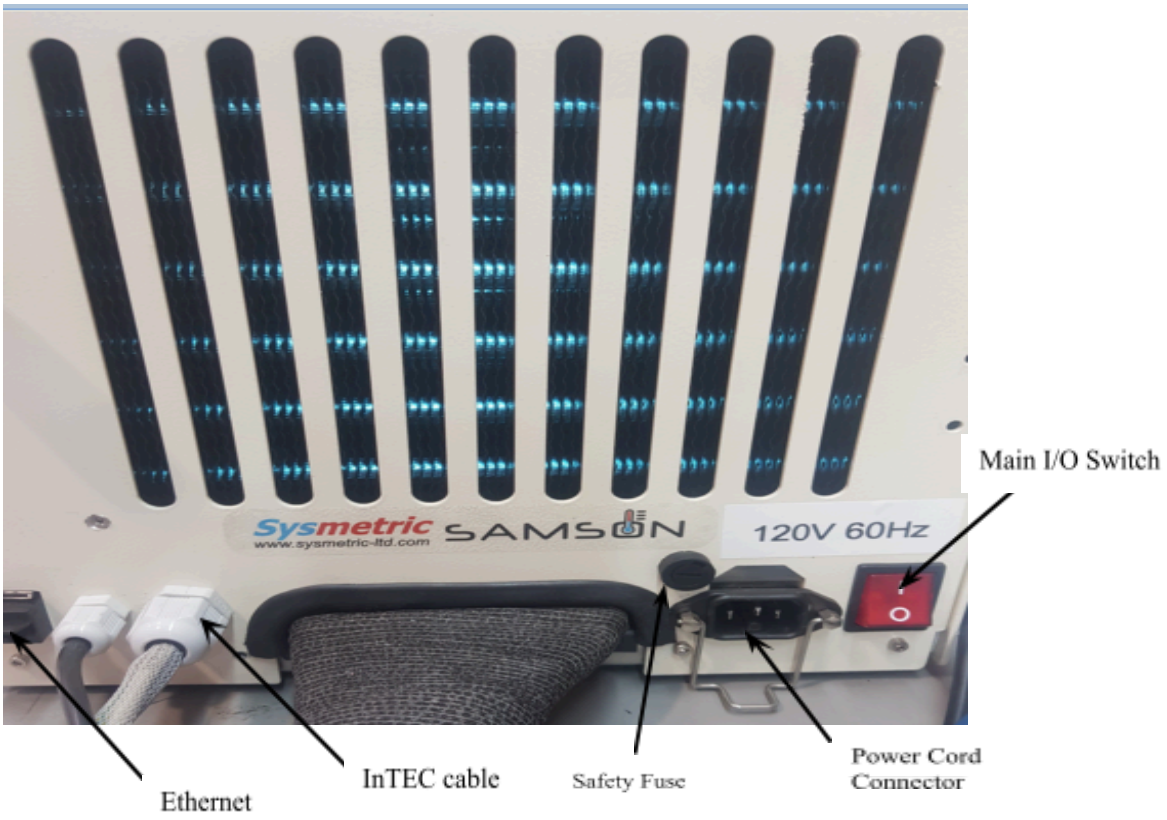
## 3. Before you start

- Verify main red I/O switch of the control box is in "OFF" position.
- Make sure that the tool thermal head doesn't interfere with environment and the tool hose is bent with a minimum radius of 20cm (7.9 IN) to allow free flow.
- Verify that the InTEC cable (a gray cable) is securely connected to the tool control box.
- Verify that the InTEC cable (a gray cable) is connected to InTEC – while InTEC itself is not switched on.
- Verify the TC (Thermocouple) connector is connected to its mating connector on InTEC.
- Mount the tool UI LCD on any ferrous surface (Six Shot rack side wall or a cart side). For Samson Water tool the UI LCD can be left attached to the tool control box.
- **Caution:** Before connecting a power cord to the tool, verify the electricity voltage and frequency match both on a tool spec and a power outlet. The power requirements are written on a tool side identification panel.
  Power outlet options:
  Option 1: 230V- 50Hz, 8A MIN
  Option 2: 120V 60 Hz, 16A MIN
- For Samson Water tool, connect the PCW **supply** and **return** hoses.
  PCW supply is marked with "S". PCW return is marked with "R".

Samson Water tool **Supply** and **Return** hoses connection

# 4. Tool Operation

## Basic operation



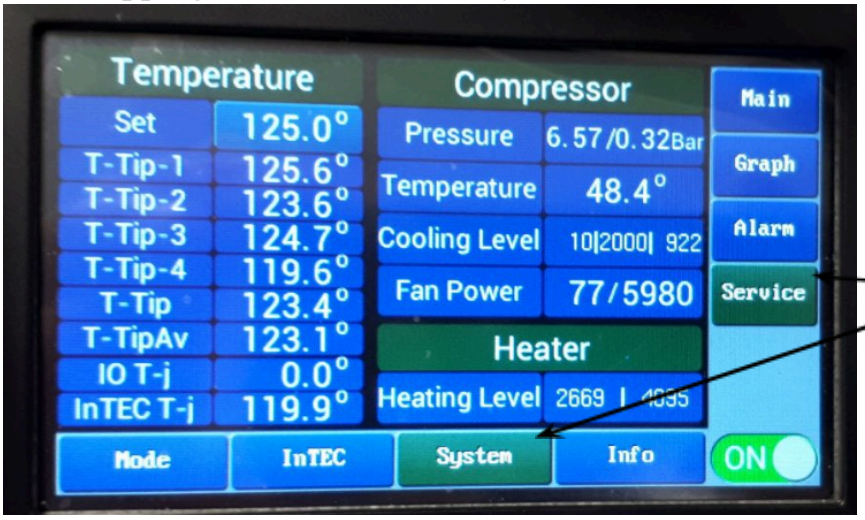

- Switch the tool on by moving the main I/O switch to the "I" position.
- Tap "**Main**" in the upper right corner of the UI LCD.


- Make sure temperature Set Point is set to 25**ºC**, if not tap the temperature value next to the **Set** and change to 25**ºC.** Tap the **Enter Key** (left arrow) to enter the new temperature.


- Turn on the tool by tapping the 

button on the UI LCD, after a few seconds (up to 30 seconds) the tool status will change to green indicating that it is ON. 

- Wait at least 5 minutes until pressure and the four tip temperatures stabilize (25**ºC)**.
- In order to view system parameters, enter the service screen by tapping **Service** and then **System**:




**Service** and **System** buttons

**Mode screen**

In the **Mode** screen a user is able to change the defrost heating level at rate 0%, 25%, 50%, 75% and 100%. The default should be set to 75%.
There are other parameters in this screen, but their values should be changed **only by a qualified maintenance personnel**.
*Caution*: only **a qualified maintenance personnel** should modify these parameters as system operation and performance can be affected with an improper use.


## 5. InTEC connection

- Verify the InTEC cable is connected both to the Samson and to the InTEC.
- Turn the InTEC power switch on.
- After several seconds a message “Intec Control” will blink on the Samson UI LCD indicating that InTEC controls the Samson tool now.
  *Note:* None of the Samson tool parameters can be changed while InTEC controls the Samson tool. In order to change the Samson tool parameters, the tool should be changed to a **LOCAL** mode.


# 6. PID Parameters, Advanced Options

The PID values can be modified from **Service** □ **Control** screen
The PID values are to be used **only by qualified maintenance personnel**.


*Caution*: only **a qualified maintenance personnel** should modify these parameters as system operation and performance can be affected with an improper use.

# 7. Graph view

In order to see the Temperature Graph tap **Graph** on the main screen.
There are 2 parameters to view the graph:

1. PV – Process Value

2. SV – Set Value

*PV- SV* button displays the delta between process value and setting value.
*PV* button displays the actual temperature.


# 8. Alarms

- **Alarm** screen logs alarm events during operation. All alarms are transmitted to the InTEC controller (if connected).
  example alarms messages: I2C communication error, High temp, Low compressor pressure, Tip temp difference.
  A critical alarm will shut down the machine: a thermal head temperature reaches 140ºC, a cooling fan is not functioning properly, water leak detected, a compressor temperature reaches above70ºC in Samson Air, a condenser temperature reaches above 70 ºC (Samson Water)

# 9. Firmware

The Samson tool comes with the latest available firmware straight from the factory. However, firmware updates are being released from time to time.
To update the tool firmware, connect an ethernet cable to the RG-45 connector which is located on a front panel of the Samson control box.
For firmware update procedure see Appendix C

# 10. Thermal Kit (Pedestal) Mounting

The thermal pedestal should be assembled following Intel provided procedures.

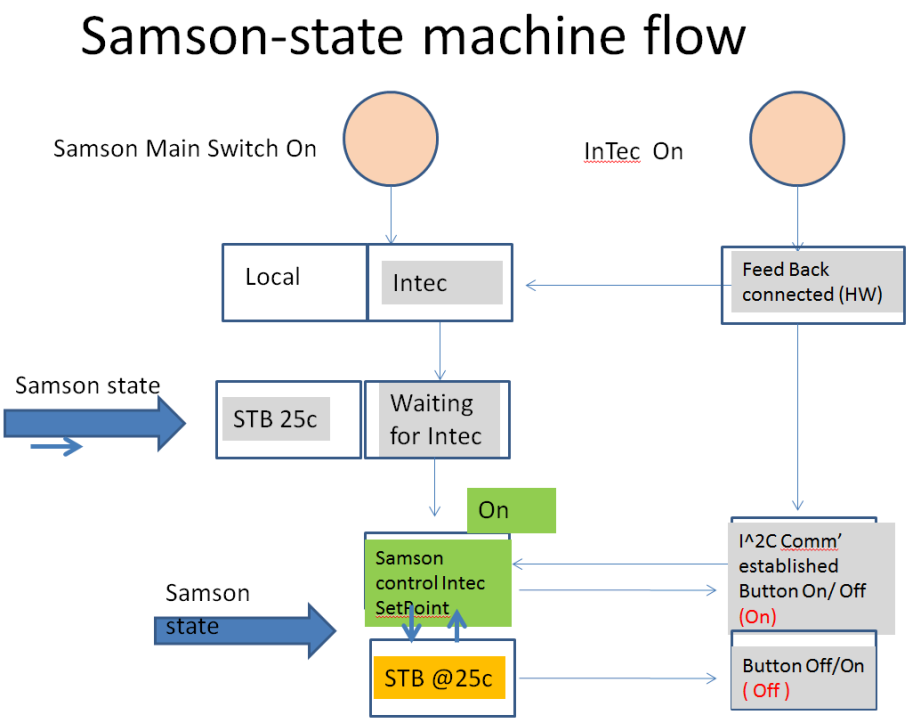
# 11. Anti – condensation Purge Box Assembly

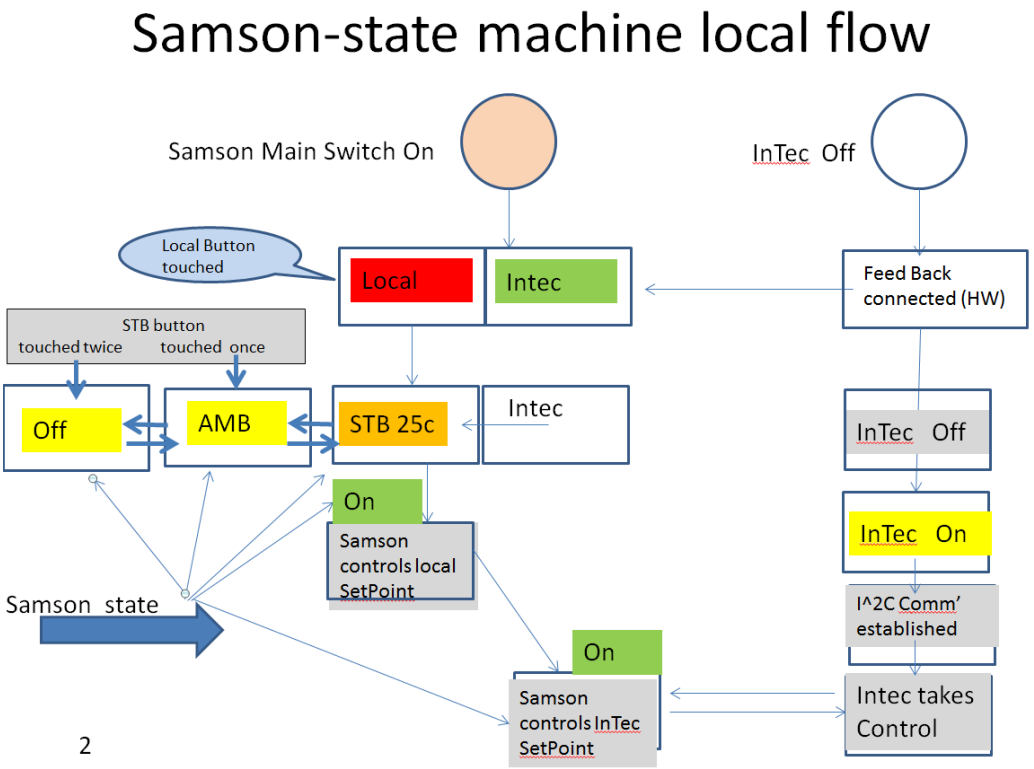
The anti – condensation purge box assembly varies depending on the tool application. The instructions are provided by Intel.

# 12. Maintenance:

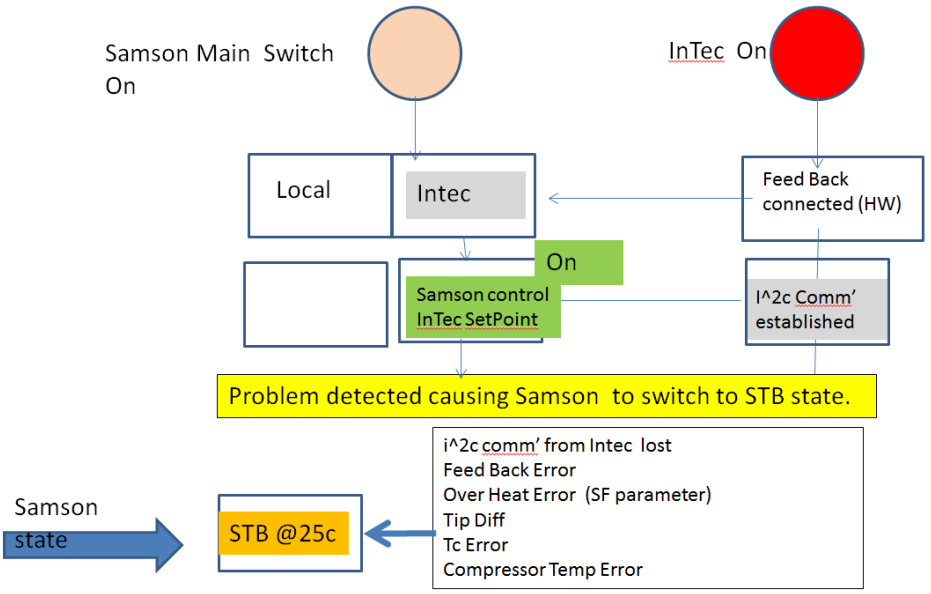
A Samson tool should be sent to *Sysmetric* for inspection and maintenance every 2 years. The inspection includes checkups for leak detection, valves operation and a compressor operation. For more information please contact Samson tool Intel product manager.

## Appendix A


Samson-state machine flow
Samson Main Switch On
InTec On
Local
Intec
Feed Back connected (HW)
Samson state
STB 25c
Waiting for Intec
On
Samson control Intec SetPoint
I^2C Comm' established Button On/ Off (On)
Samson state
STB @25c
Button Off/On ( Off )

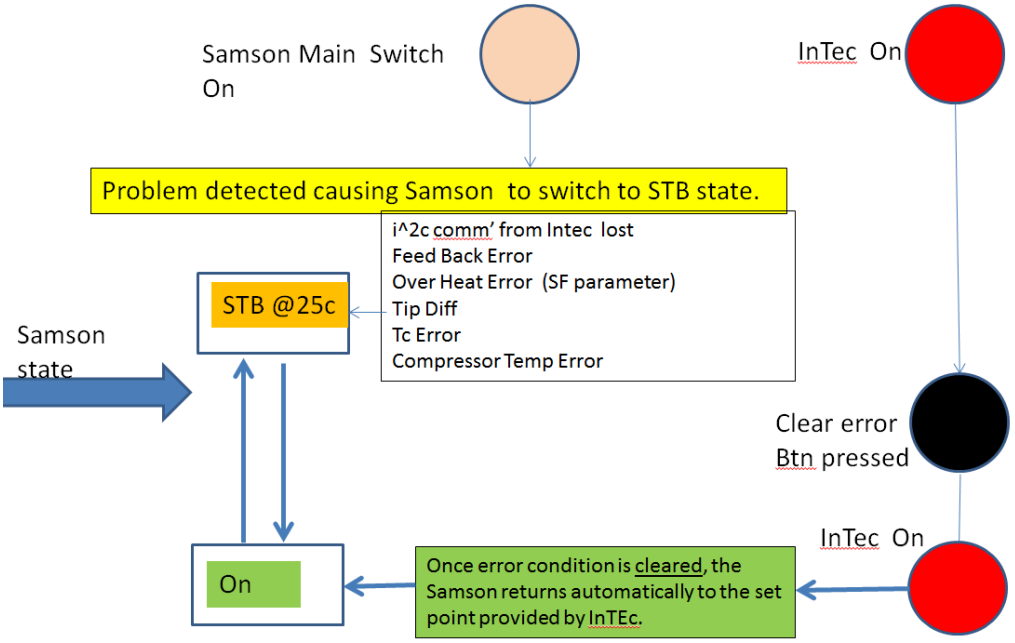

Samson-state machine local flow
Samson Main Switch On
InTec Off
Local Button touched
Local
Intec
Feed Back connected (HW)
STB button touched twice
touched once
Off
AMB
STB 25c
Intec
InTec Off
On
Samson controls local SetPoint
InTec On
Samson state
I^2C Comm' established
On
Samson controls InTec SetPoint
Intec takes Control
2

# Samson-state machine alarm flow




3

# Samson-state machine alarm flow cont'

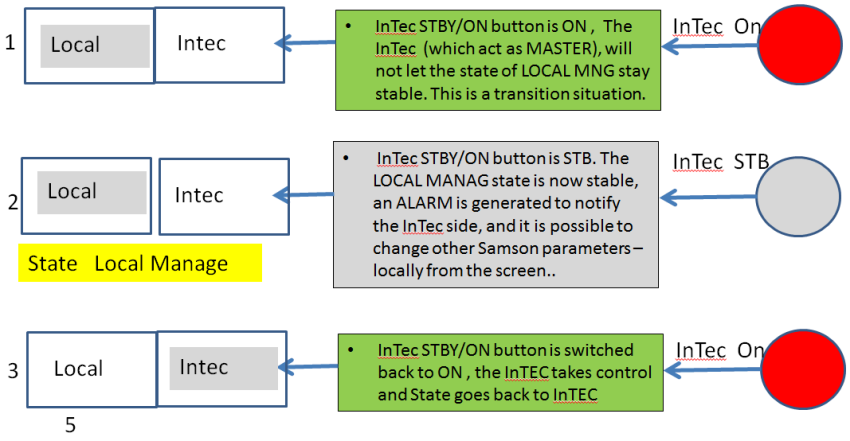



4

Cont'

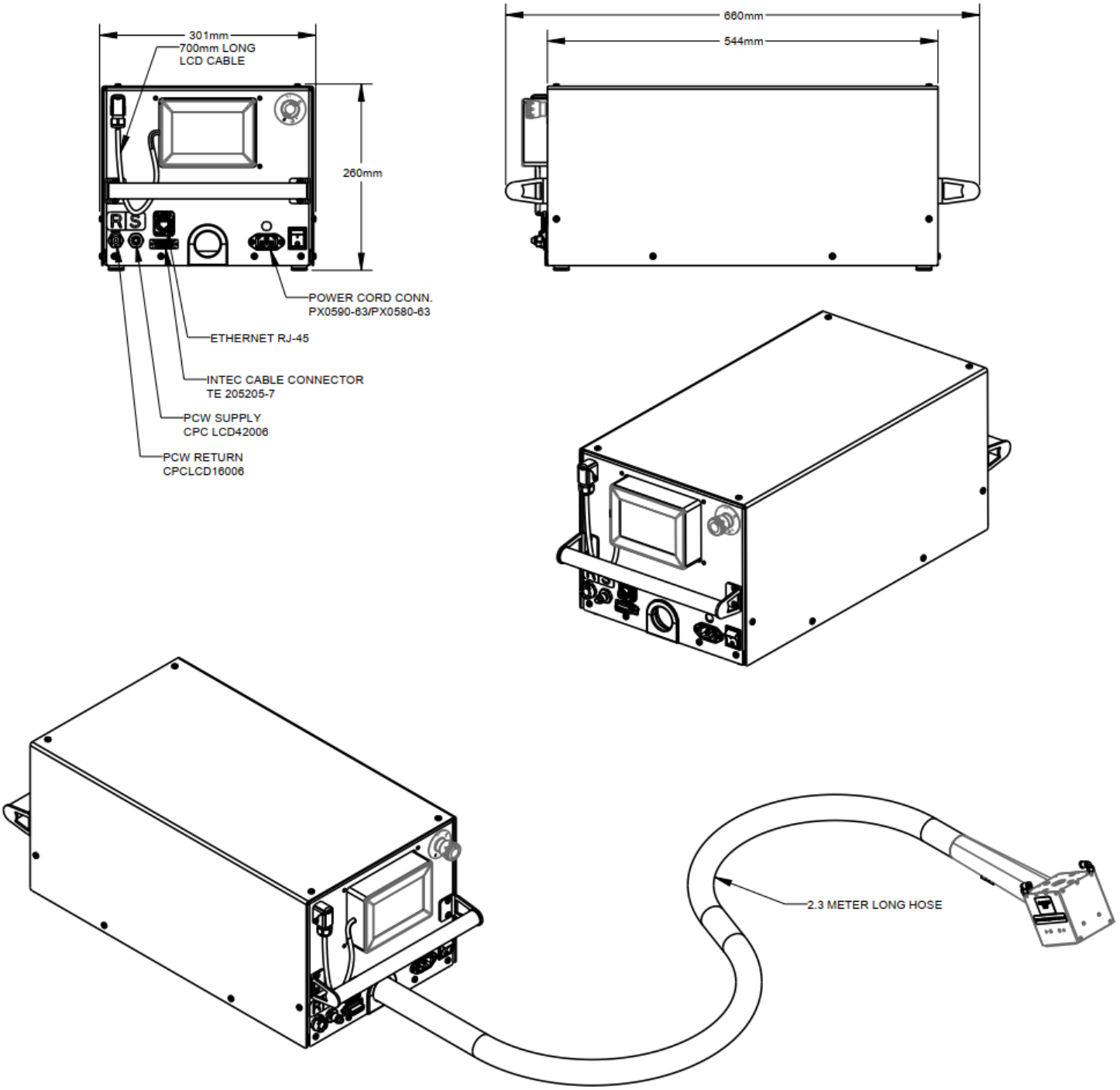
# Samson-state machine alarm flow cont'

1. If the InTec STBY/ON button is ON , The InTec (which act as MASTER), will not let the state of LOCAL MNG stay stable, so it is just a transition situation.
2. If the InTec STBY/ON button is STBY, The LOCAL MANAG state is now stable, an ALARM is generated to notify the InTec side about the mode, and it is possible to change other parameters –except the set point- locally from the screen.
3. Once the InTec STBY/ON button is switched back to ON , the InTEC takes control and State goes back to InTEC .

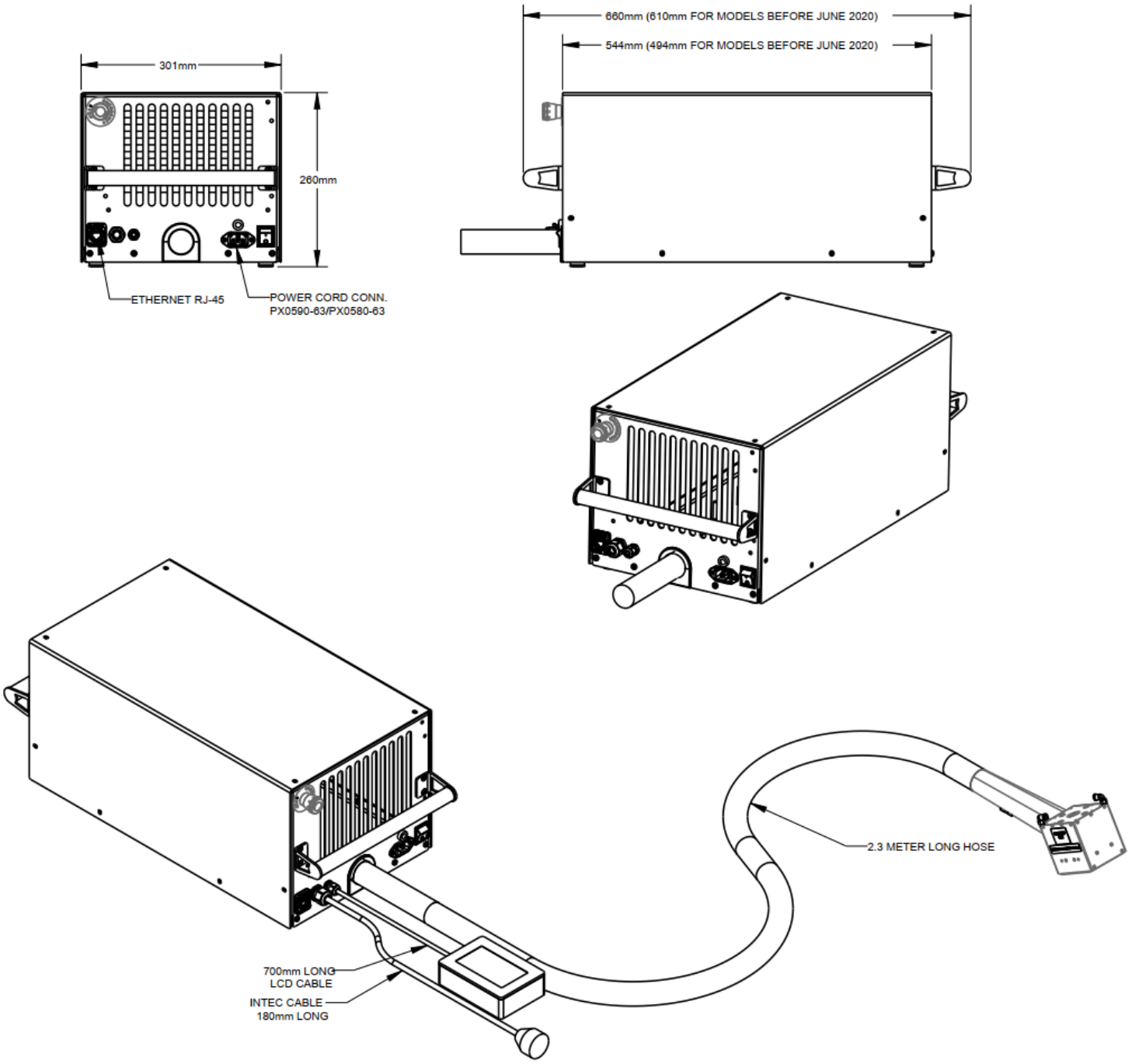


# Appendix B – General Dimensions

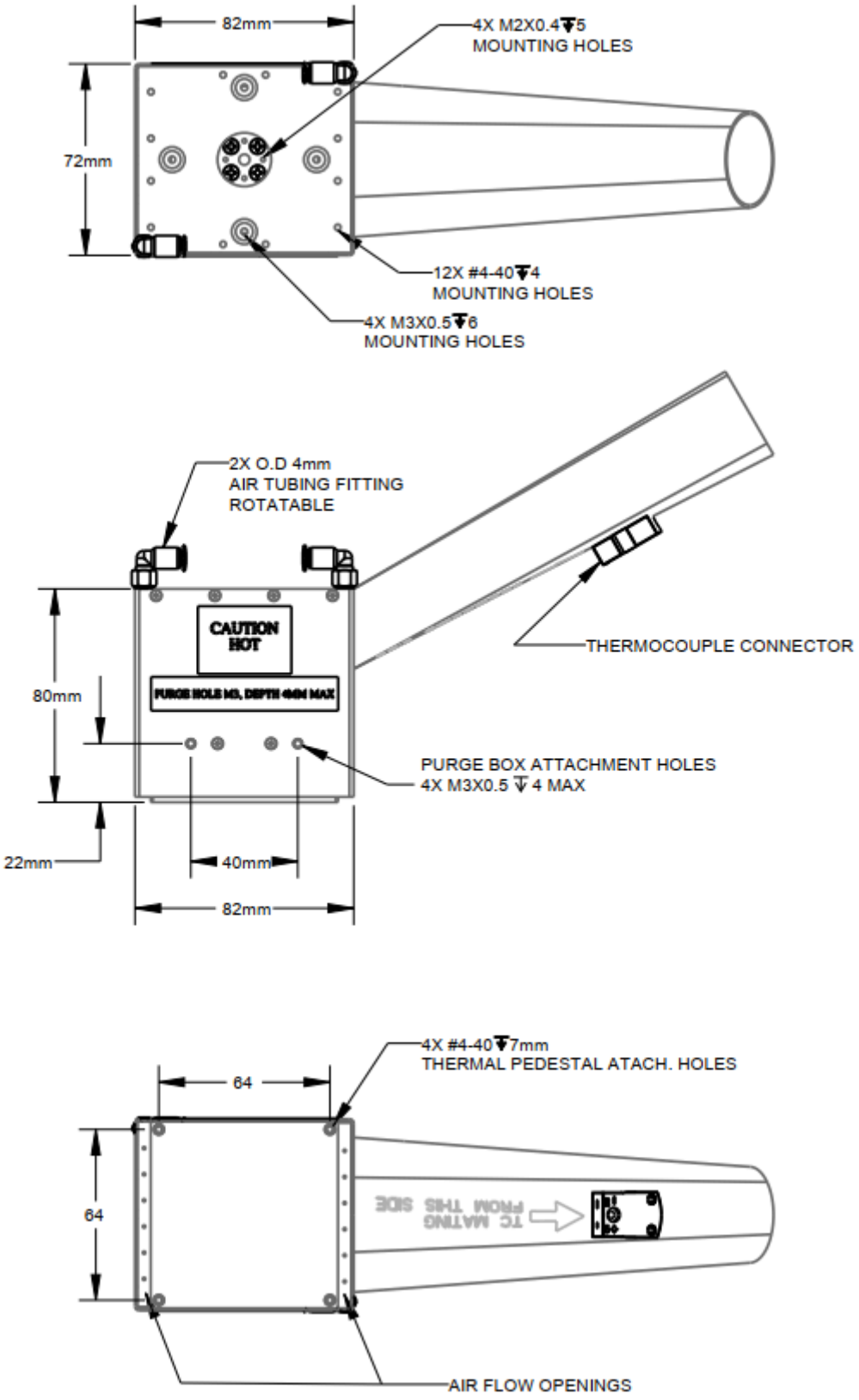
Samson Water control box.



Samson Air control box.

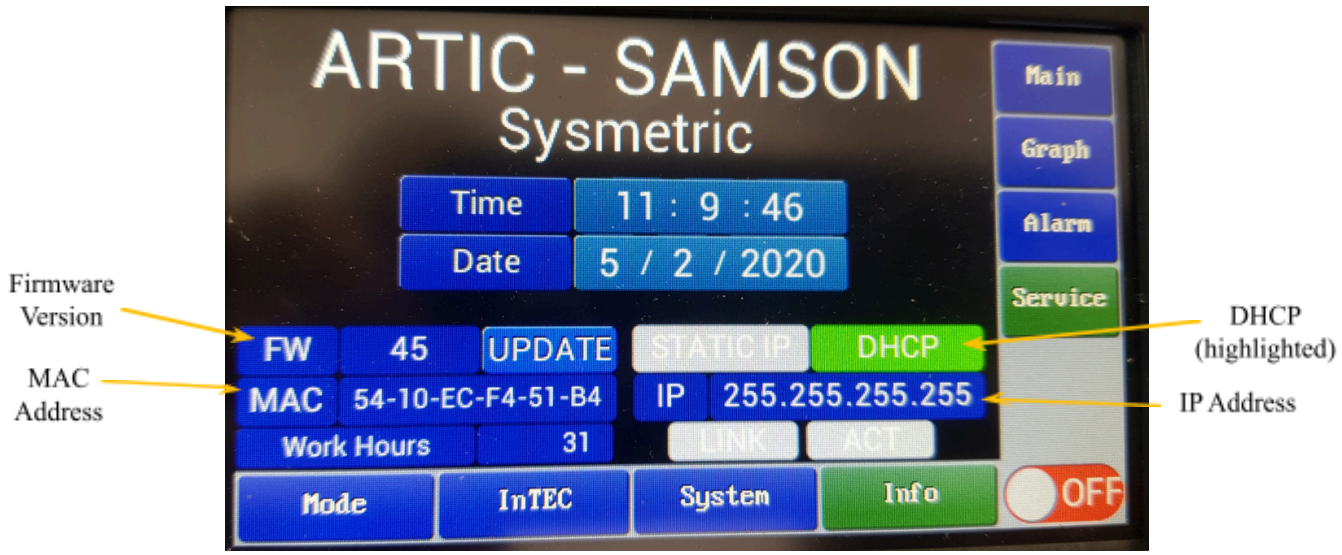


A thermal head. This thermal head comes with both Samson Air and Samson Water tools.



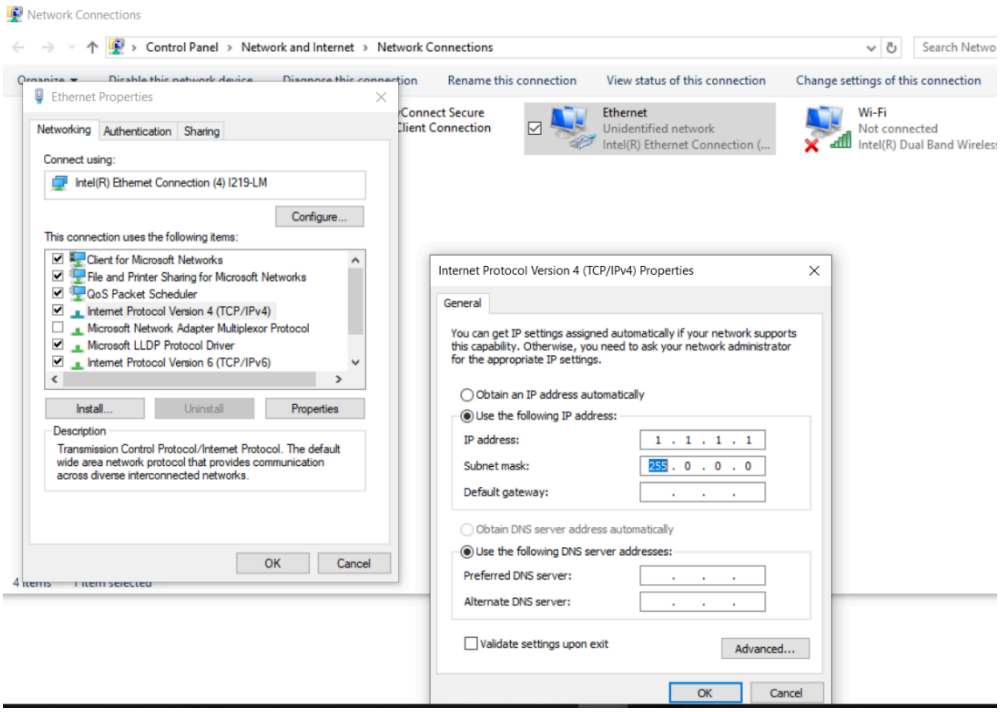
## *Appendix C – Firmware Update*

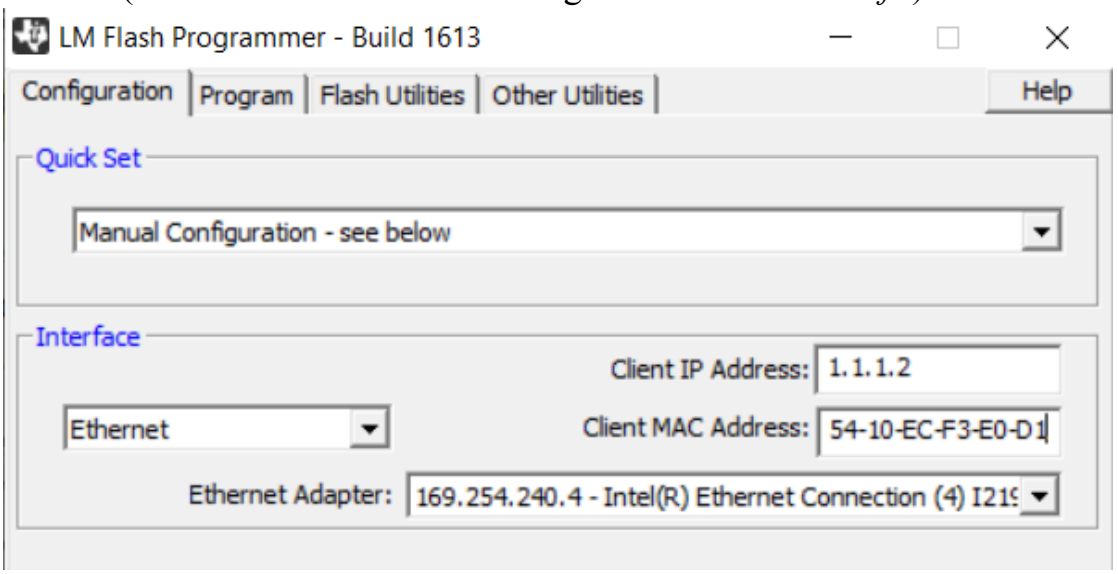
- Tap **Service** □ **Info** in lower right screen, the following screen appears:




1. Make sure the tool is in 

mode.
2. Download "LMFlash Programmer" software to a local PC from the following link (downloading firmware to Samson can be carried out on a PC with DHCP/DIRECT link configuration).
   LM Programmer Link:
   http://www.ti.com/tool/LMFLASHPROGRAMMER
   Must use build **1613**
3. Make sure that the needed firmware *.bin file is available on you PC.
4. Disconnect Wi-Fi on your PC and change Internet Protocol Version 4 (TCP/IPv4) to use a specific IP (see the below picture).




3. Connect LAN cable between the PC and the Samson tool.
4. Open the LM FLASH.exe
5. Configure Quick Set to Manual configuration and then set Client IP address to 1.1.1.2 and Client MAC address to tactual Samson MAC address (to see the MAC address navigate to *Service --> Info*)
6. 


8. From the Program menu browse to the needed directory to select the FW file
9. From the Samson main screen change InTec to **Local** then touch **turn off** on the tool UI LCD to put a tool in a turned off mode.

10. In UI LCD Navigate to **Service** --> **Info** to change the IP to **Static IP** and update IP to **1.1.1.2**
11. Go to LM Flash and press "program". It should take several seconds to have the new firmware "burned".
12. On Samson UI LCD there will "Firmware Update" message.
13. The tool will restart. Go to **Service** --> **Info** and check the firmware version to display the installed version.