

Thermo Scientific  
HyPerforma S.U.B. TK (Resistive)  
**Quick Start Guide**



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Rev. 1.0

## Section 1 Hardware Installation

The Single-Use Bioreactor hardware is shipped directly from the manufacturer and will arrive crated. For unpacking instructions and detailed contents of the crate, please refer to the uncrating instructions that came with the shipment. Be sure to follow the unpacking instructions provided and retain all packaging materials.

### Tools Needed:

- Allen wrench provided in shipping documentation packet
- Adjustable wrench needed for leveling feet (not supplied)



**WARNING:** Any procedures that require the control box to be open should be performed with the main electrical disconnect in the locked out position and all power sources removed from the control box. For operator safety, secure the location of the S.U.B. outer support container by disabling the swivel casters before servicing.

### 1.1 Orientation and Location

- Position reactor and tower in desired location and lock wheels ensuring availability of needed utilities (power, gas, etc.). Right or left hand orientation was determined at time of order. Ensure that tower is located on the same side as the cable and tubing organizer.
- Before running cables, note that the cable and tubing organizer has an adjustment feature to keep the cables lined up with the rear of the control tower. The arm has a slide that can extend and retract manually using the clamping knob.



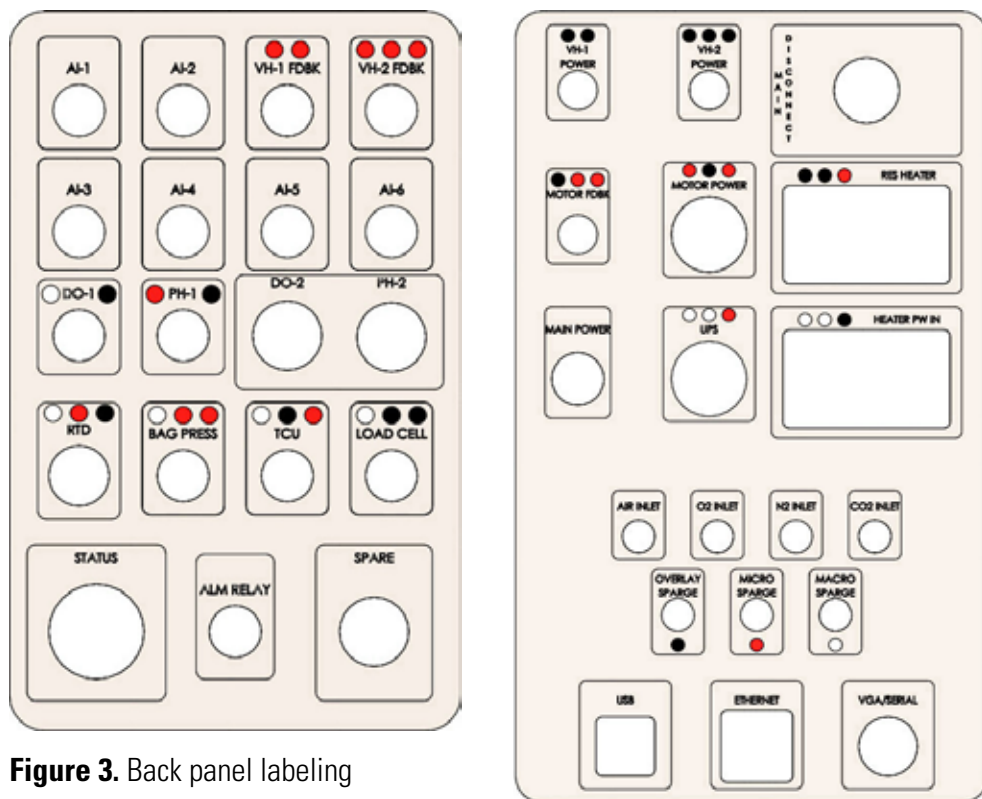
**Figure 1.** Cable and Tubing Organizer



**Figure 2.** Cable and Tubing Organizer Adjustment Feature

## 1.2 Attaching Cables and Gas Lines

- Connect Motor Power cable into designated Tower connector (●●●)
- Connect Motor Feedback cable into designated Tower connector (●●●)
- Connect Load Cell cable into designated Tower connector (●●●)



**Figure 3.** Back panel labeling

- Use the three (3) color-coded, labeled gas lines and connect each line to the respective colored dot on the Tower.
  - Overlay Sparge – Black (●)
  - Micro Sparge – Red (●)
  - Macro Sparge - White (○)

Connect the corresponding facility gas sources to the designated connectors on the Tower. The connectors are fractional (inches), so if the facility uses metric lines, simply use the adapters provided in the plastic bag inside the Tower (6 mm. to 1/4" adapters).

- Service gas pressure should be a minimum of 30 psi, and a maximum of 35 psi for proper operation. Verify that gas connections are secure and there are no leaks (e.g. Snoop or similar product to detect leaks).
- Connect the RTD (temperature probe) cable (○●●). This cable should be in a box that was shipped with the tower.

Position and attach various hardware items:

- Secure the tool bracket to the tank. This position is not critical, but would be convenient near the motor. Place the ratchet and the custom open end wrench in the tool holder. Attach drive shaft, as shown.
- Attach the adjustable vent filter heater bracket using the clamp lever handles. Position this hardware directly opposite of the motor, as shown.



**Figure 4.** 250 L S.U.B. TK System

- Attach probe clips to probe window (front of the S.U.B.). The probe clips were shipped with the S.U.B. unit.



**NOTE:** Before connecting cables, route them through the tubing and cable organizer first

- If you intend to use the Finesse TruFluor single-use sensors, route the appropriate cables from the Tower into the cable management arm and down to the sensor window area on the S.U.B. These cables will already be attached to the rear of the Control Tower via a liquid tight connection and have the following designation, DO-2 and pH-2 (No color code).
- If you intend to use traditional re-usable sensing probes, route the appropriate cables in the same manner as described above for the single-use sensors. Ensure they are plugged into the back of the control tower (○ DO-1 ●, ● pH-1 ●).
- Locate the bag pressure sensor cable on the Tower (○ ● ●) and route it via the cable management arm and up toward the top arm of the tank.

## Vent Filter Heater

If using a vent heater make the following connections.

- Connect cable to labeled VH-1 POWER (● ●) power source on Tower.
- Connect Yellow Thermocouple to labeled connection on Tower VH-1 FDBK (● ●)
- Route cable through cable management arm and up to vent heater brackets on top of S.U.B. unit.
- If using a second vent heater, use VH-2 connections VH-2 POWER (● ● ●) and VH-2 FDBK (● ● ●) and route parallel with VH-1 cable.

## Resistive Heater Power Connection

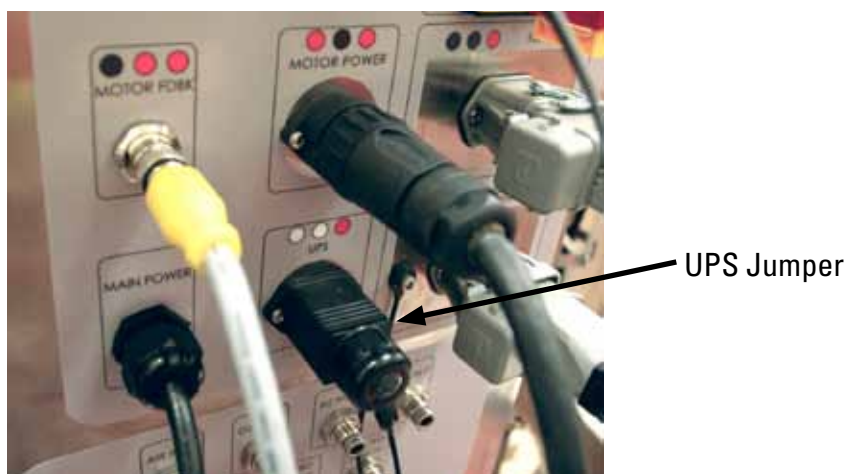
If using a resistive heater make the following connections.

- Connect cable labeled RES HEATER (● ● ●) to the power source on the Tower
- Connect cable labeled HEATER POWER IN (○ ○ ●) into designated tower connector.

## 1.3 Power Connections

Before connecting power, verify, again, all gas lines were checked and not leaking.

- Connect main power cord (no color code) to correct utility source.
- It is strongly recommended that a UPS (Uninterrupted Power Supply) (○ ○ ●) be used. The purpose of this connection is to maintain power to the controls during a power outage.
- If UPS power is not available or not used, then the UPS Jumper connector must be put in place of the UPS cable.



**Figure 5.** UPS Jumper

## 1.4 Securing Position of Control Tower and S.U.B.

Ensure the S.U.B. unit is in its intended position.

- Lock the vessel in place by lowering the leveling feet. Ensure that unit is level before operation.
- Using the Allen wrench provided with S.U.B. unit shipping documents, remove the load cell shipping plates and secure them in the bracket at the rear of the control tower. There are two ¼-20 socket head cap screws that need to be removed from each load cell protection plate. Move the tower to desired position and lock in place and level using the leveling feet.

## 1.5 HMI (Monitor)

The monitor can be tilted up and down and rotate left to right.

## 1.6 Power Up the System

- Start by turning on the MAIN DISCONNECT switch located at the back of the control tower.
- Ensure the Emergency Stop (located at the front of the tower) is not activated (should be in the out position). If it is engaged, then twist to disengage. Note that the E-stop light will remain red, even though it is disengaged, until the next step has been completed.
- Turn power on by pressing the green Start/Re-set button located at the front of the tower behind the operator screen. E-stop light will then turn off.
- Note that a green operation light, located at the back of the tower, will also turn on.

## 1.7 System Will Begin Booting Up

- Refer to User's Guide for detailed instructions on calibration steps (load cells, sensors, etc).
- A virtual keyboard icon is located at the bottom of the window display for notes, values, etc.



## Section 2 BPC Installation

1. Carefully unpack the S.U.B. BioProcess Container (BPC) from its two protective poly bags.
2. Uncoil and remove protective packaging from the sparger, drain, and auxiliary lines on the bottom of the BPC. Don't remove the protective packaging on top of the BPC at this time.
3. Carefully lower the bottom end of the BPC into the S.U.B. with any tubing sets on the top side laying over the side until the bearing assembly is level with the drive shaft motor.
4. Remove the protective black cap from the bearing assembly and slide into the retention mechanism on the agitation motor and lock it into place.



**Figure 6.** Bearing port inserted into motor mount slot and clamp

5. Guide bottom tubing lineset through their proper channels:
  - Insert frit and open pipe sparger lines through the sparge plate (round, white plastic with slots) first, before locating it in the base of unit.
  - Insert drain line through bottom front face directly below agitation motor. Hang the drain line coil on the arm provided. Also route the sample line through the snap in slots on the drain coil arm.
  - Attach BPC positioning tabs (bottom of chamber) onto the alignment pins located at the base of the S.U.B. tank. Note that the 50 L BPC does not require this step and is not recommended, but has tab holders available, if desired.



**Figure 7.** BPC tab holders used for proper BPC positioning

- Insert sensors, KleenPaks, and auxiliary linesets through the “probe belt opening on the tank”.
6. Uncover vent filters, wrap heating blankets (if used) around the filters, attach/adjust vent bracket, and mount vent filters in bracket.



**Figure 8.** Filter being placed in bracket

7. Route the overlay sparge set (located at the top of the BPC marked “Overlay Sparge”) through the cable and tubing organizer arm to the top of the main beam of the cable and tubing organizer and connect to the fitting marked OVERLAY SPARGE. This will be the lineset that will be used to pre-fill the BPC with air, so ensure that the clamp on this lineset is released.
8. Route the Micro Sparge Line (labeled), located at the bottom of the BPC, up through the main beam of the cable and tubing organizer using the black snap in features. Connect to the correct gas fitting labeled MICRO SPARGE. Unclamp this lineset when ready to sparge through frit.
9. Route Macro Sparge line (labeled), located at the bottom of the BPC, running parallel to the Micro Sparge Line, using the same snap in features. Connect to the correct gas fitting labeled MACRO SPARGE. Ensure the clamp is released on this line, as well before operation.



**NOTE:** To reduce the risk of filter membrane wetting, position each sparge filter above the low point of the sparge line.



**Figure 9.** BPC linesets

10. Connect the pressure sensor cable onto the sensor located at the top of the BPC.



**Figure 10.** Pressure sensor

11. Ensure the cable has been routed through the cable and tubing organizer and connect to the fitting located at the rear of the control cabinet labeled BAG PRESS (○●●).



- 12. IMPORTANT** Disengage any clamps on the lineset for the exhaust filter(s). If the clamps are left engaged, the BPC could burst when filling it with air or liquid.

13. Position and close a bar clamp (Part No. SV20664.01) on the bottom drain line as close as possible to the BPC port (Figure 11). Also place bar clamps on probe ports intended for conventional probes (Figure 12).



**Figure 11**



**Figure 3.12**

14. Insert RTD or selected temperature sensor into thermo-well (Figure 13, Figure 14).
- Place small amount of glycerol (0.5 mL) in well to aid in heat transfer.
  - Sensor should be inserted until base of probe meets the mouth of the thermo-well.
  - Secure by twisting the luer lock collar. The thermo-well will stretch slightly when RTD is seated.



**Figure 13**



**Figure 14**

## Section 3 Software Start Up

With the software booted up, click on the “HOME” button on the upper left side of the screen. In the top right hand corner of the screen, click on the icon “Guest.”

Then click on the User pull down menu and select “Administrator.”

Enter the correct Password, which is “admin.”

To type information without plugging a USB keyboard into the control tower, click on the miniature keyboard icon located at the bottom middle of the screen. This will bring up a touch screen keyboard. When finished using the touch screen keyboard just click on the upper right hand corner to close it. Note, you must bring up the keyboard FIRST before opening a drop down menu. Also note that the keyboard can be moved and repositioned.



**Figure 15** Initial TruBio View With Log On Breakout

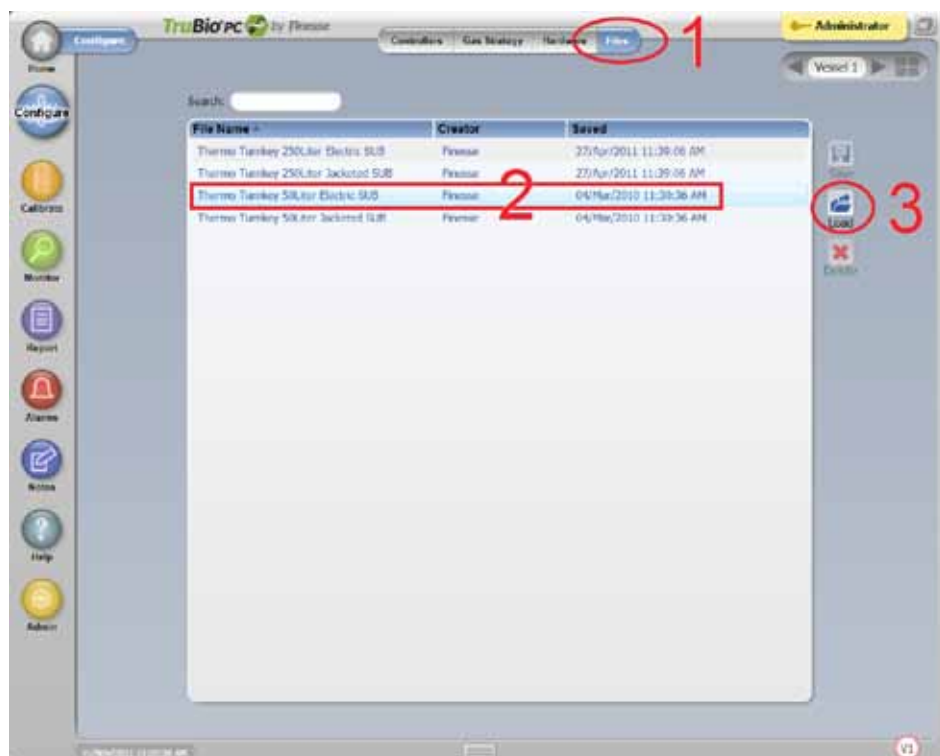
Now the heading should read “Administrator.”

The next step is to load the correct configuration file for the SUB unit. Click on the “Configure” button on the left side of the screen.



**NOTE:** you can also click on the yellow “Load Configuration File” button when first turning on the system.

Click the tab on the top that reads “File.”



**Figure 16** Configure Files View

Select the appropriate S.U.B. TK system to be used by clicking to highlight it.

- Thermo Turnkey 250L Electric SUB
- Thermo Turnkey 250L Jacketed SUB
- Thermo Turnkey 50L Electric SUB
- Thermo Turnkey 50L Jacketed SUB

Load the new configuration by clicking the “Load” button on the right.

Select “Yes” when the pop up window appears.

The screen automatically jumps to the “Home” display window.

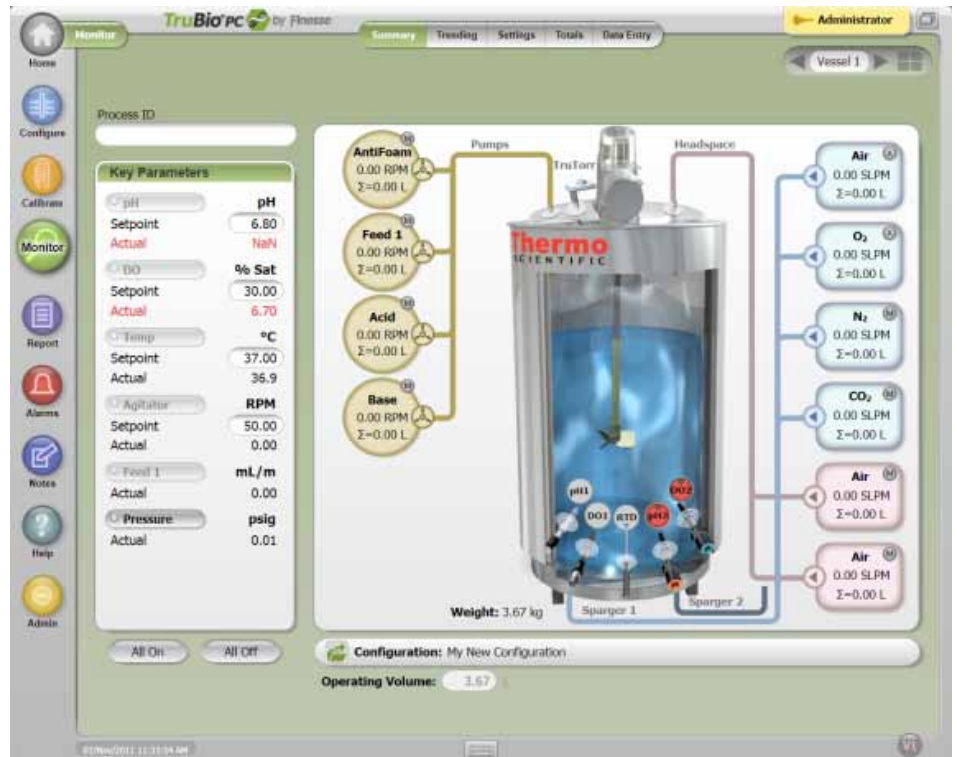


Figure 17 "Home" Monitor View

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