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INFORMATION = CONTROL

SMART SWITCH TECHNOLOGIES

TC-8000
Tank Monitor/Controller

Installation Manual

Table of Contents

Introduction

Thank you for purchasing the TC-8000 Holding Tank Controller.

Smart Switch Technologies are very proud to be able to provide this product to you.

The Smart Switch Research and Development Team has spent considerable time and effort in developing, designing and producing this system specifically for the marine environment. We see this as a first in the marine environment and consider Smart Switch to be leading the world in the design and development of distributable intelligence controller systems.

The Holding Tank Controller has been developed with intelligent intervention for monitoring fluid levels and controlling pumps on up to 8 tanks.

The Smart Switch Holding Tank Controller is a versatile, compact, modern, stylish, user-friendly intelligent network system.

The TC-8000 allows builders and retrofitters to offer a system with maximum functionality thereby providing boat owners with easy and accurate management.

Installation

Smart Switch recommends a Qualified Marine or Auto-Electrician installs this product.

System Overview

TC-8000 Master Display Unit (MDU)

Provides the following functions:

- **full control from one central location on your boat**
- **visual indication of tank level (bar graph or lts / gals & percentage)**
- **visual indication of seacock position & pump status**
- **ability to turn holding tank macerator pump on & off manually or automatically**
- **ability to turn holding tank macerator pump on manually & off automatically**
- **all tanks are name programmable e.g. (Aft-Grey) (Port Fuel) (Aft-Fuel)**
- **audible alarm**
- **backlight**

HT-100 or HB-200 or HT-100/P or HB-200/P Input/Output Unit:

Is a controller which provides an input for the fluid level sensor. Each tank on the network requires an IOU. The HT-100 or HB-200 allow for monitoring only while the HT-100/P or HB-200/P provide monitoring and management of pumps connected to them.

The HT-100 or HT-100/P is to be used if using the pressure sensor.
The HB-200 is used with the ultra-sonic sensor for monitoring only.
The HB-200/P is duel purpose and used for the ultra-sonic sensor or the pressure sensor for both monitoring and pump control.

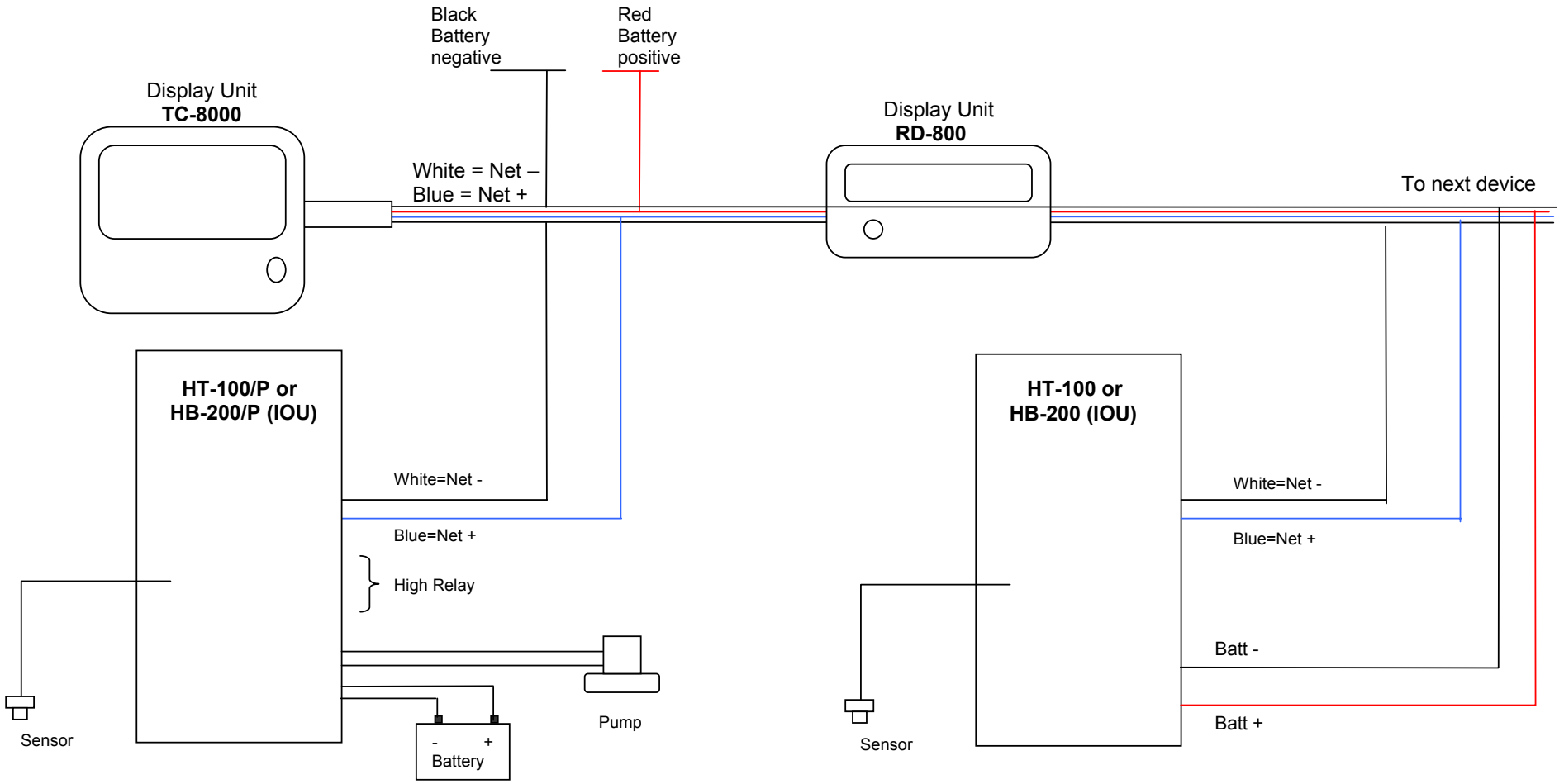
Features include:

- **teach-in level sensor with 5 point interpolation for irregular shaped tanks**
- **controls the pump and provides the input for the level sensor**
- **reversed output for tanks programmed as either fuel, enabling for fuel transfer pumps to turn on when the tank is empty and off when full**
- **tank high level output which can be connected to the Aus/Sea toilet controller and will disable the toilet when the holding tank is full**
- **an internal pump on/off override switch for tank servicing and cleaning**
- **supplied in two different models:**
  HT-100 or HB-200 features level sensor and tank high output
  HT-100/P or HB-200/P features level sensor, tank high output, pump & electric seacock control

RD-800 Remote Display Unit (RDU)

The RD-800 Repeater Display is an optional extra.
Any number of these may be connected throughout the vessel for convenient tank monitoring. Note: The RDU is for monitoring only and will not allow control.

Wiring Block Diagram

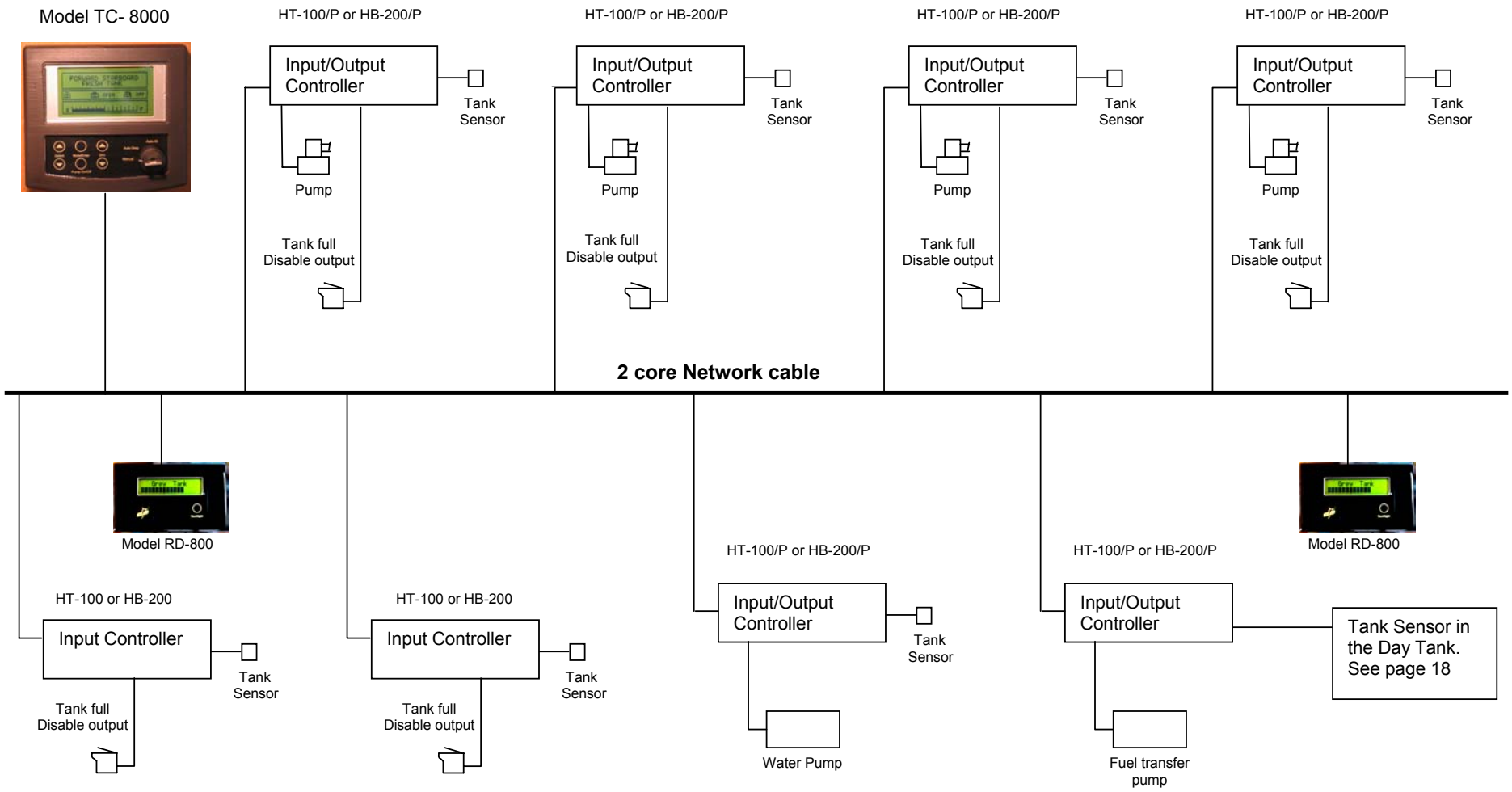


WARNING: As the HT-100/P & HB-200/P supply power for the pump, the supply cables & fuse need be rated as per the pump manufacturer's specifications.

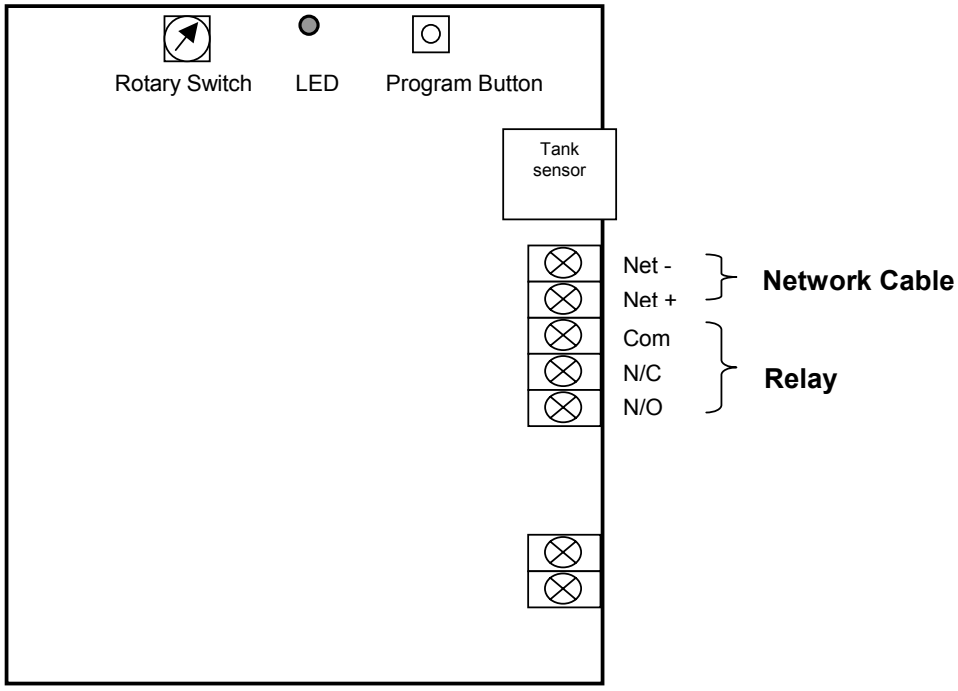
Eight Channel Holding Tank Controller System Layout for Model TC-8000

Any Device can sit Anywhere on this Two Core Bus cable.
Any combination of HT-100/P, HB-200/P and or HT-100, HB-200 (up to eight) can be connected, plus any number of repeater display units - Model RD-800.

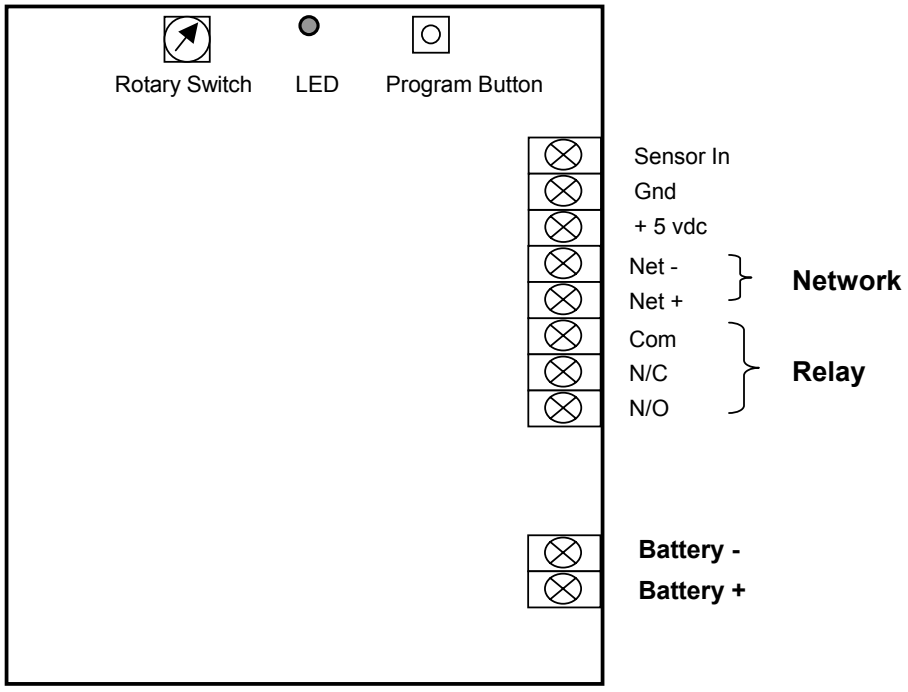
NOTE: The HT-100/P & HB-200/P have the pump and valve option, while the HT-100 & HB-200 do not.



Wiring Diagram for Model HT-100



Wiring Diagram for Model HB-200



Wiring For Ultra-Sonic Sender

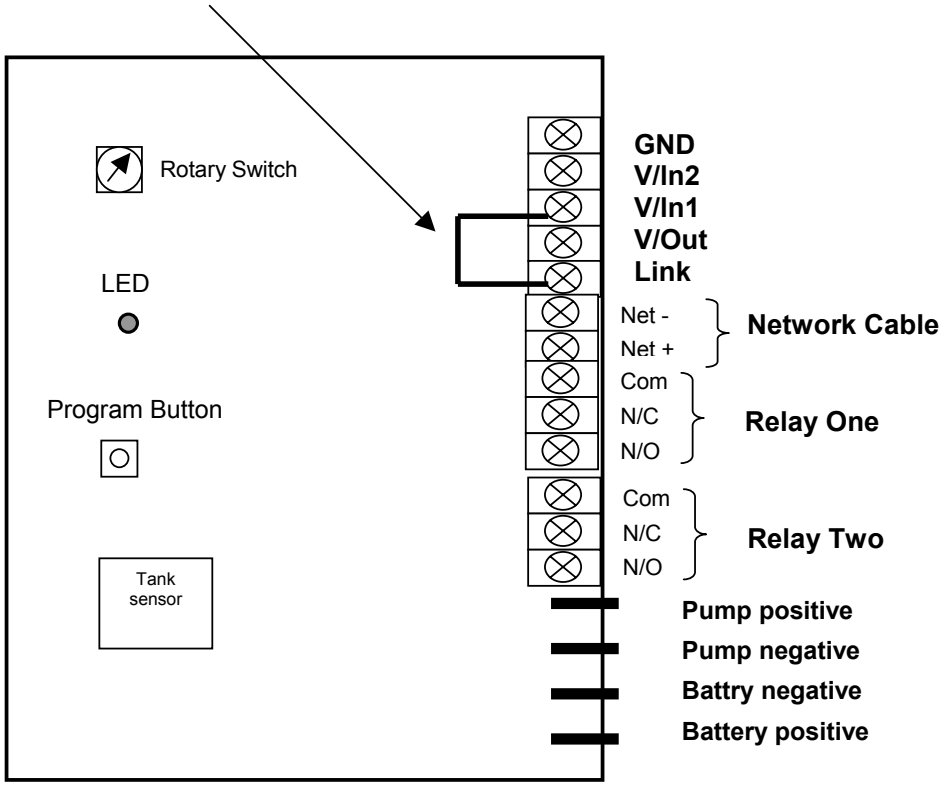
Gnd = Black on Ultra-Sonic Sensor
Sensor In = Green on Ultra-Sonic Sensor
Battery + = Red on Ultra-Sonic Sensor

Wiring For Pressure Sender SEN-B300

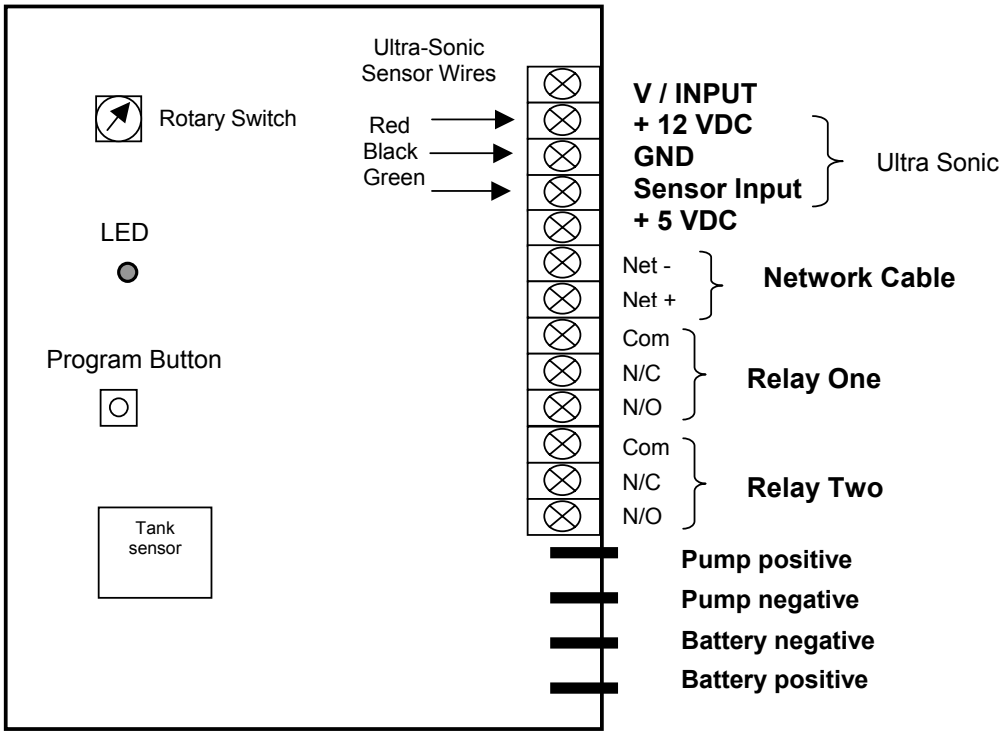
Gnd = Black on Pressure Sensor
Sensor In = Green on Pressure Sensor
+ 5 vdc = Red on Pressure Sensor

Wiring Diagram for Model HT-100/P

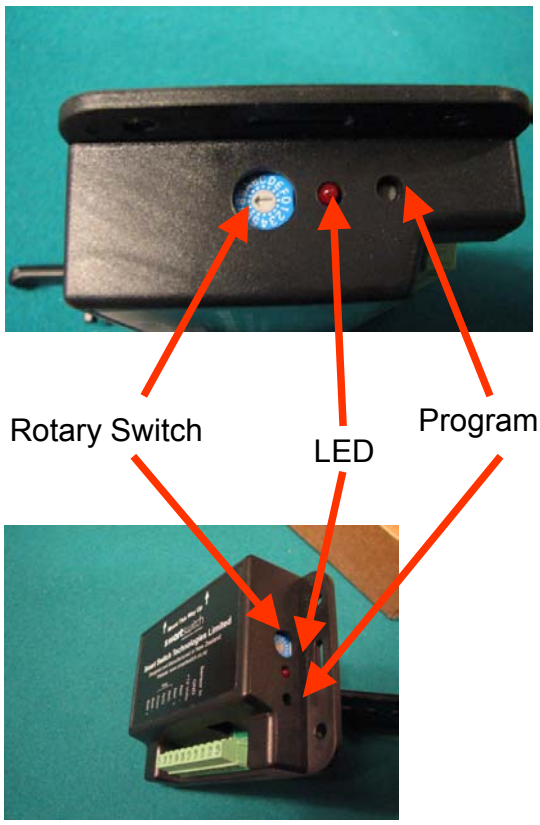
If no Seacock Interlock Switch is used then place a jumper between Link and V/In1 (see page 14)



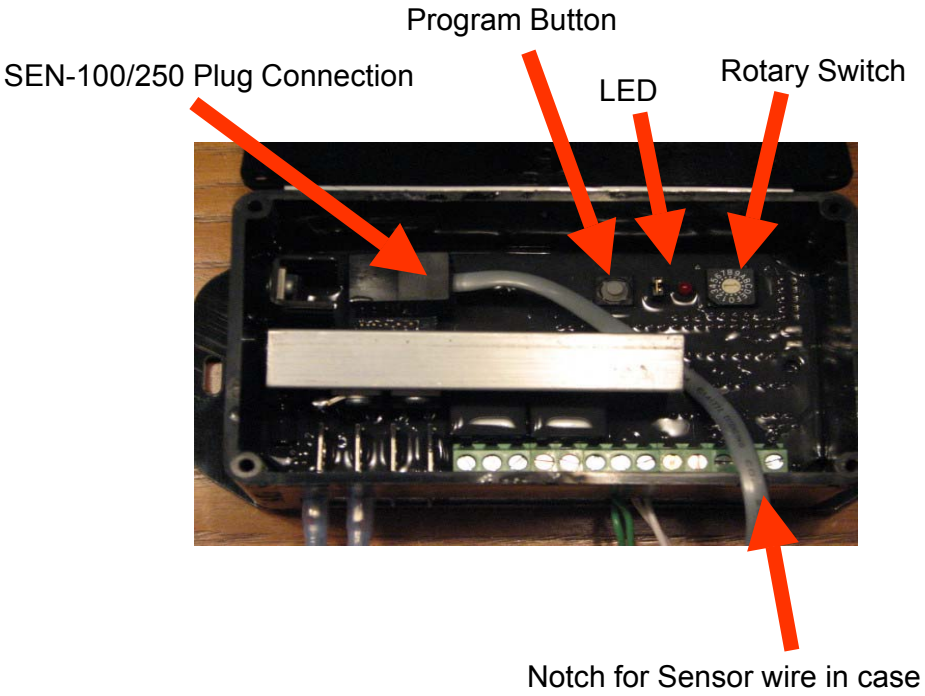
Wiring Diagram for Model HB-200/P



HB-200 Input/Output Unit



HT-100/P or HB-200/P Input/Output Unit



Installation Steps

Step 1:

Install and connect the Master Display Unit.

Step 2:

Install, connect and calibrate the tank sensors.

Step 3:

Install and connect the I/O units (HT-100, HB-200 or HT-100/P, HB-200/P).

Step 4:

Set-up Rotary Switches.

Step 5:

Seacock Interlock Switch or Jumper.

Step 6:

Set-up Pump Sensing.

Step 7:

Program the Master Display Unit.

Step 8:

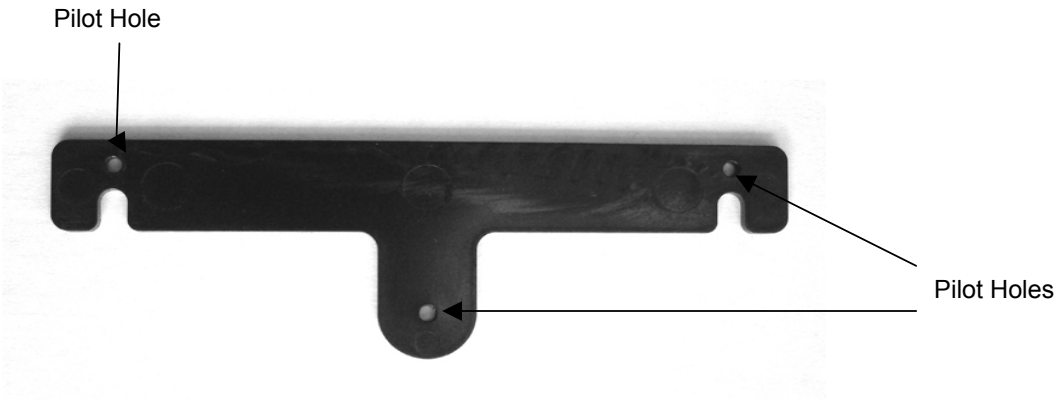
Test system.

Mounting the TC-8000 Master Display Unit

Position the mounting template tool provided and mark all three pilot holes. Drill a 3mm hole on the two outside holes and fit the mounting screws provided. Place the template tool back over the screws and tighten the screws until the template tool can just slip on and off the screws (ensure the tool in not too loose).

Drill the bottom hole to 12 mm (cable hole).

Place the Display Unit keyholes over the two screws and gently pull down. If the screws have been tightened to the correct depth the Display will clip down and self tighten.



Sensor Installation

If the Smartswitch pressure sensor is being fitted see pages 10, 11 and 12.
PLEASE NOTE: If a charcoal filter is fitted to the Black tank see Special Pump (page 19)

If the Ultra-Sonic sensor is being fitted see page 12.

Sensor Installation

! WARNING !

PLEASE NOTE: If a charcoal filter is fitted to the Black tank see Special Pump (page 19)

PLEASE NOTE: For sensor Model SEN-100 The Maximum Tank Height is 1 Meter

PLEASE NOTE: For sensor Model SEN-250 The Maximum Tank Height is 2.5 Meter

The maximum surge and safe pressure is 28psi.

For more information see "Calibration Tips & Tricks" on our web site www.smartswitch.co.nz

Mounting Adaptors Available:

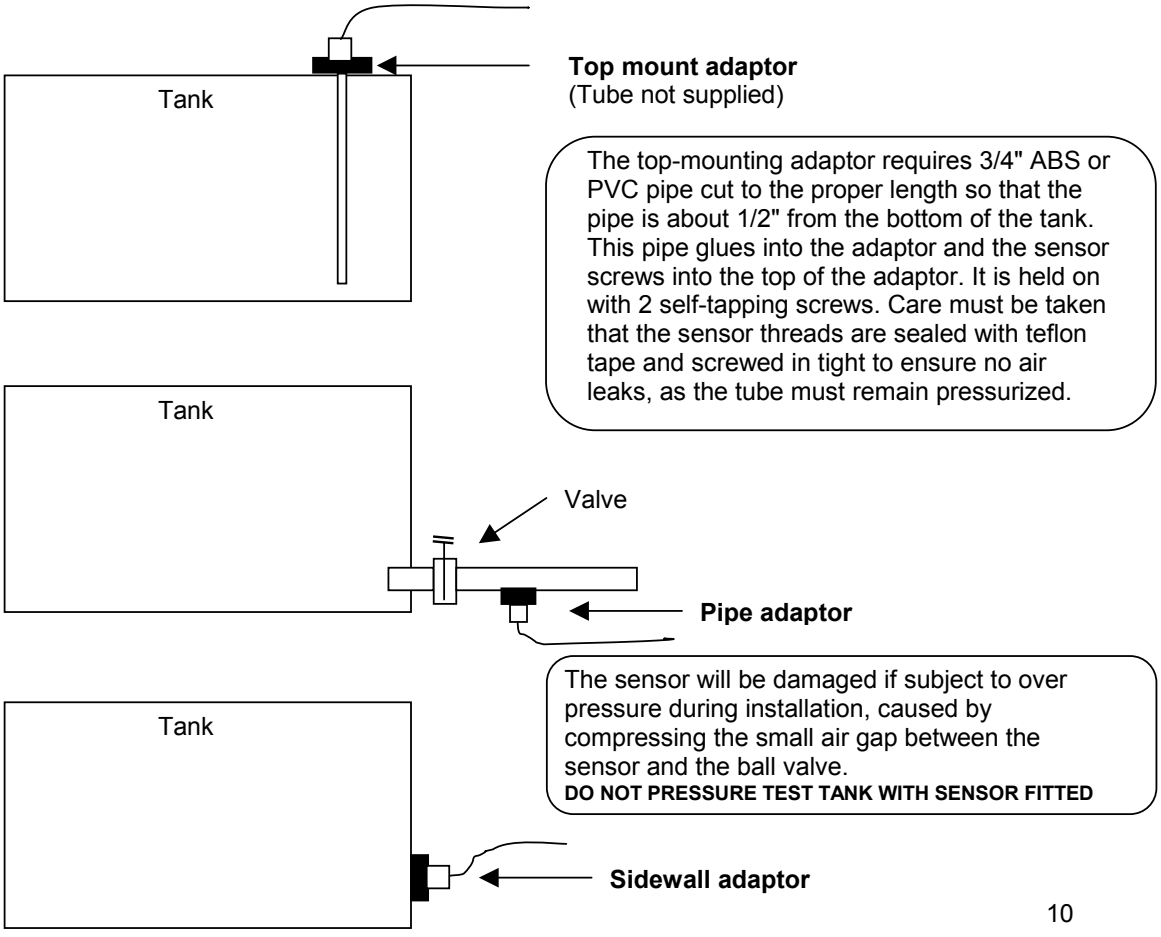
A range of mounting adaptors are available which include flat sidewall, top mount, 1.5" pipe, 2" pipe, 3" pipe and drain valve. **Ask your dealer for details.**

Interface Adaptors:

Should a 4 to 20 milliamp loop sensor supplied by another manufacturer be used, then the adaptor (part number SM-420) will need to be installed.
Should a 0 to 180 or 33 to 230 ohm sensor supplied by another manufacturer be used, then the adaptor (part number SM-180) will need to be installed.

Sensor Installation:

The sensor should be mounted as low in the sidewall as possible using a ¾" spin-in **or** the flat sensor adaptor. If the sensor adaptor is used it will require drilling a 5/8" hole in the sidewall. Apply silicon glue liberally to the bottom of the adaptor. Using #10 x ½" stainless steel self-tapping screws attach the adaptor to the sidewall. Once the adaptor is attached make sure that the hole in the adaptor is clear of any excess glue. Allow drying as per the instructions for the glue. Wrap the threads of the sensor using Teflon plumbers tape and install the sensor. Tighten by hand. It is not recommended to install the sensor in the bottom of the tank. Although the sensor will operate correctly it will provide an area for debris to collect which would be difficult to flush out.



Sensor Programming Instructions

Two different methods of tank programming are available if using the pressure sensor:

2 Point Calibration: sets tank low and tank high points which can only be used if the tank is a regular size and shape.

5 Point Calibration: sets tank low, tank quarter, tank half, tank three quarters and tank full points, offering more accuracy if the tank is an irregular size and shape.

2 Point Calibration:

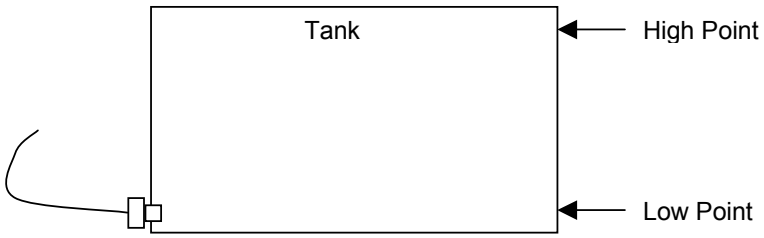
Turn Rotary Switch on the I/O Box to position 0

When calibration mode is entered (holding down the program button for 3 seconds) the LED will *flash very fast,* while the I/O Box is calculating the Empty point. Once this has finished you will see Three slow flashes and the LED will stay on indicating it has programmed the Empty point. It is now ready to set the Full point.

When the button is pressed again, to set the Full point, the LED will *flash very fast,* while the I/O Box is calculating the Full point. Once this has finished you will see Three slow flashes indicating it has programmed the Full point. The LED will then turn off.

NOTE: While the fast flashing continues it is indicating the tank contents have not settled enough for the unit to take a good reading (wait for the contents to settle).

NOTE: If you see 12 slow flashes this indicates the unit could not see any difference between the Empty point setting and the Full point setting. The Empty and Full points need to be different.
Turn Rotary Switch to correct position (see Setting Rotary Switch page 13)



Note: The Bottom Only, Top Only and Setting The Calibration From One IOU To Another, only applies to HT-100 or HT-100P units with manufacture dates after March 2007.

After calibrating the bottom and top settings of a tank you may wish to go back and change either of these settings individually:

The Bottom Only setting can be changed by turning the Rotary Switch to position A

Fill the tank to the required TANK LOW LEVEL, minimum suggested is liquid just covering the sensor. Wait approx. 30 seconds for the fluid to settle. Press and hold down the Program Button (on the IOU) until the LED comes on (approx. 3 seconds), this will set the tank low point. Press and release the program button, the LED will give 3 quick flashes. The tank low point has now been saved and the unit will automatically leave program mode. The device is now ready for use.
Turn Rotary Switch to correct position (see Setting Rotary Switch page 13)

The Top Only setting can be changed by turning the Rotary Switch to position B

Fill the tank to the required TANK FULL LEVEL and wait approx. 30 seconds for the fluid to settle. Press and hold down the Program Button (on the IOU) until the LED comes on (approx. 3 seconds), this will set the tank high point. Press and release the Program Button, the LED will give 3 quick flashes. The tank high point has now been saved and the unit will automatically leave program mode. The device is now ready for use.
Turn Rotary Switch to correct position (see Setting Rotary Switch page 13)

5 Point Calibration:

Turn Rotary Switch (IOU) to position F

When calibration mode is entered (holding down the program button for 3 seconds) the LED will *flash very fast,* while the I/O Box is calculating the Empty point. Once this has finished you will see Six slow flashes and the LED will stay on indicating it has programmed the Empty point. It is now ready to set the 1/4 point.

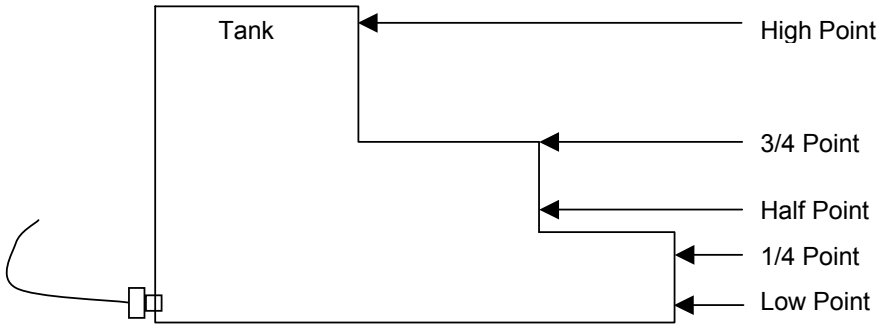
When the button is pressed again, to set the 1/4 point, the LED will *flash very fast,* while the I/O Box is calculating the 1/4 point. Once this has finished you will see Two slow flashes indicating it has programmed the 1/4 point. The LED will stay on indicating it has programmed the 1/4 point. It is now ready to set the 1/2 point.

When the button is pressed again, to set the 1/2 point, the LED will *flash very fast,* while the I/O Box is calculating the 1/2 point. Once this has finished you will see Three slow flashes indicating it has programmed the 1/2 point. The LED will stay on indicating it has programmed the 1/2 point. It is now ready to set the 3/4 point.

When the button is pressed again, to set the 3/4 point, the LED will *flash very fast,* while the I/O Box is calculating the 3/4 point. Once this has finished you will see Four slow flashes indicating it has programmed the 3/4 point. The LED will stay on indicating it has programmed the 3/4 point. It is now ready to set the Full point.

When the button is pressed again, to set the Full point, the LED will *flash very fast,* while the I/O Box is calculating the Full point. Once this has finished you will see Five flashes indicating it has programmed the Full point. The LED will then turn off.

NOTE: While the fast flashing continues it is indicating the tank contents have not settled enough for the unit to take a good reading (wait for the contents to settle).
Turn Rotary Switch to correct position (see Setting Rotary Switch page 13)



Setting The Calibration From One Input/Output Unit To Another:

Once the IO/Box has been calibrated you can transmit the calibration settings from that unit to as many more as required (tanks would need to be the same shape, size and content).

The I/O Box can transmit to, or receive from, any I/O Box and vice versa.
Note: This must be done independently from the complete system setup (only the 2 IOU's connected).
Step 1: Connect the power and network cable to both units.
Step 2: Turn the Rotary Switch to position C for the master transmitter (the unit that is calibrated).
Step 3: Turn the Rotary Switch to position D for the slave receiver (the unit that needs calibrating).

You will see both LED'S flashing, please wait (approx 20 seconds) for the LED'S to stop flashing, the slave receiver now has the same calibration setting as the master transmitter.

For more information see "Calibration Tips & Tricks" on our web site www.smartswitch.co.nz

Ultra-Sonic sensor :

If using the Ultra-Sonic sensor turn the Rotary Switch to position 1
Press and hold down the Program Button for 3 seconds, the LED will flash 4 times and turn off.
Turn Rotary Switch to correct position (See Setting Rotary Switch page 13

Setting Rotary Switch (Network Address)

Each Input/Output Unit (HT-100, HB-200 or HT-100/P, HB-200/P) **on the network must have the Rotary Switch set to a unique number (from 2 to 9). NO two devices may share the same Rotary Switch number.**

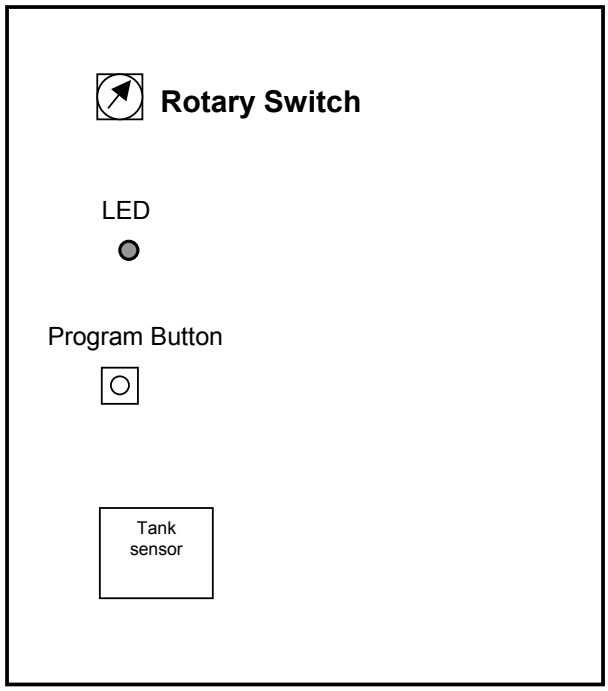
The Rotary Switch is situated inside the Box of the HT-100/P and HB/200P Input/Output Unit and on the outside of the case on the HT-100 and HB-200 (see diagrams below and page 7 for position).

For ease of reference fill in Table 1 below prior to programming as this will enable quick reference when programming the Display Unit. See example below.

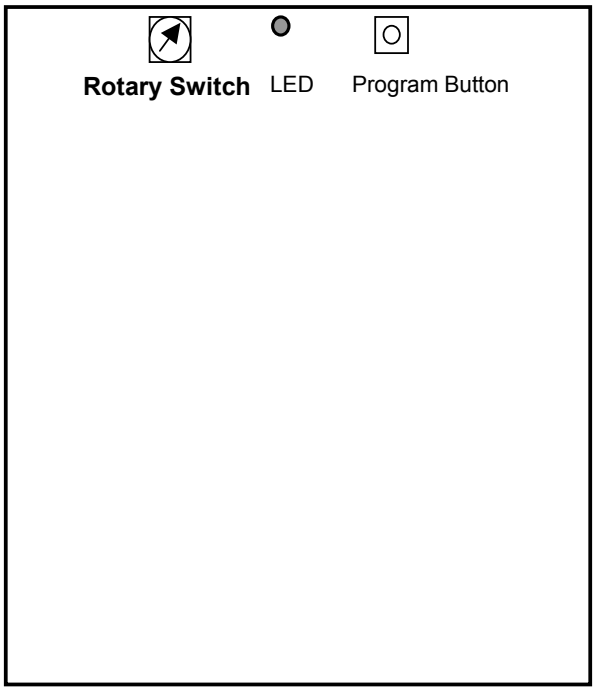
Table 1

	Switch #	Tank Position	Tank Type	Tank Vol
Example	*2*	*AFTPORT*	*GREY*	*400L*

HT-100/P & HB-200/P (Inside Case)



HT-100 & HB-200 (Side of Case)

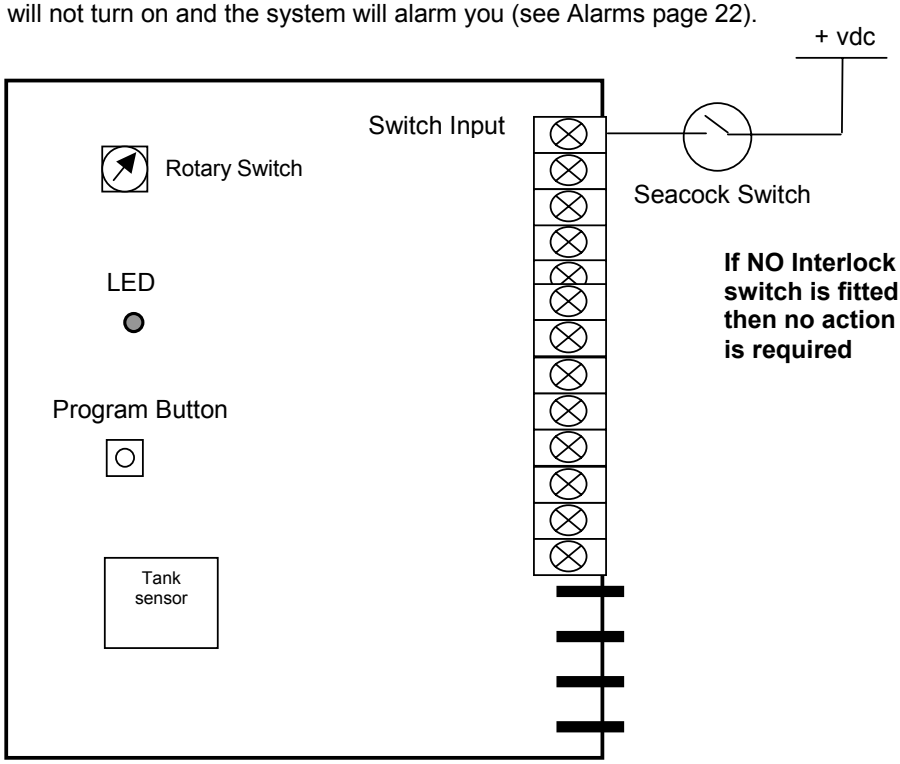


Seacock Interlock Switch Installation

Important: The HT-100/P and the HB-200/P provide for an interlock with a seacock valve to prevent the pump from starting in the event the seacock valve is closed. In the event there is no interlock contact on the seacock, the following procedure MUST be followed to allow the pump to operate in either manual or automatic mode.

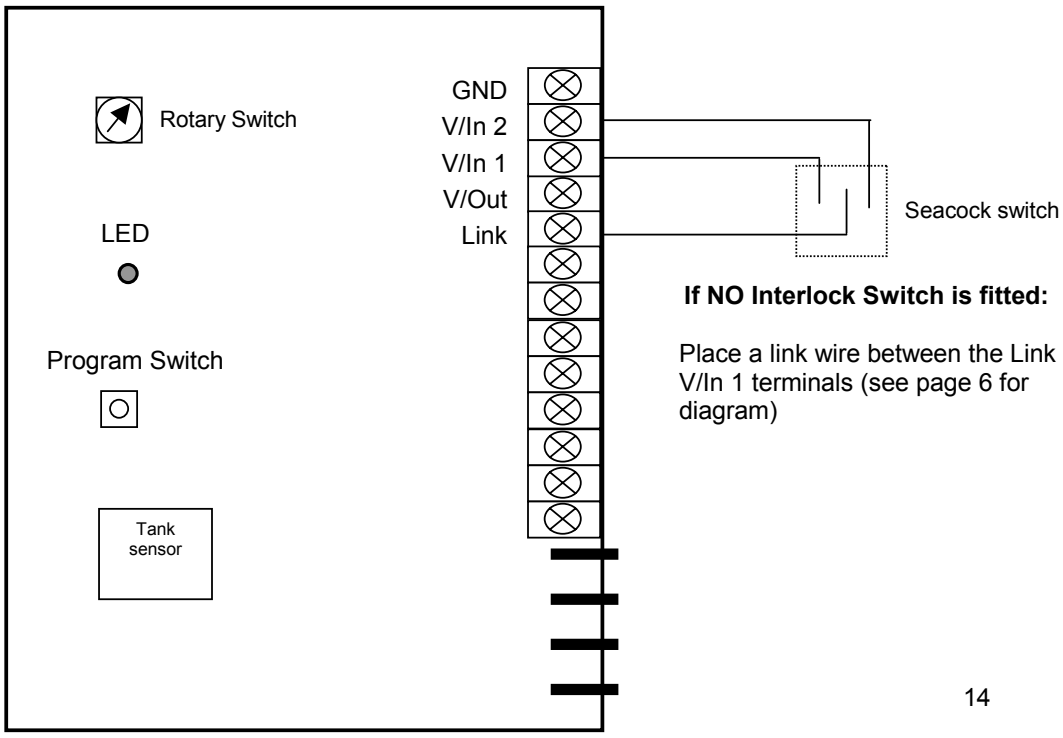
If an Interlock Switch is fitted then wire as follows. When the Seacock Valve is closed and the pump is activated, the pump will not turn on and the system will alarm you (see Alarms page 22).

HB-200/P



HT-100/P

Note: For the HT-100/P ONLY, in the event there is no interlock contact on the seacock, the following procedure MUST be followed to allow the pump to operate in either manual or automatic mode: Place a link wire between the Link & V/In 1 terminals (see page 6 for diagram)



Pump Current Sensing

The HT-100/P & HB-200/P are equipped with special current sensing circuitry to detect if after a pump is turned on, it is in fact running.

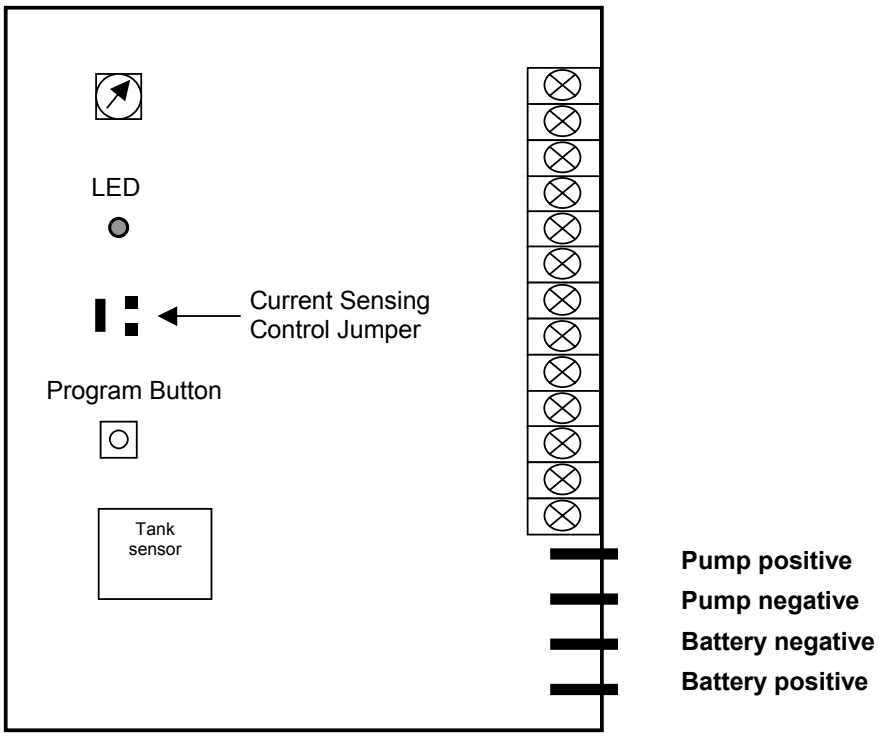
If a pump is turned on, either Manually or Automatically, and the pump fails to start due to short or open circuit, the pump icon for that tank will flash and the alarm will sound indicating a fault. Pressing the Mute key will mute the alarm.

If the attached load/pump is below the current sensing range, or the output is connected to a relay, then this feature will need to be disabled.

This option can be enabled or disabled by the position of the Current Sensing Control Jumper.

To **Enable** this feature Remove the Jumpers.

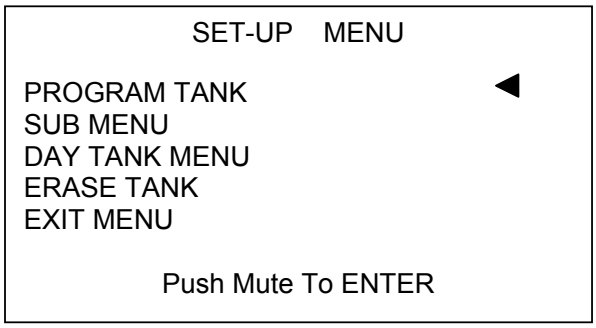
To **Disable** this feature Insert the Jumpers.



Programming Instructions

Step 1: Placing the unit in Program Mode

Press and hold down the Mute & Select Up keys together for 3 seconds. This will bring you to the Set-Up Menu and place the unit in program mode.



Scroll to PROGRAM TANK and press the Mute key.

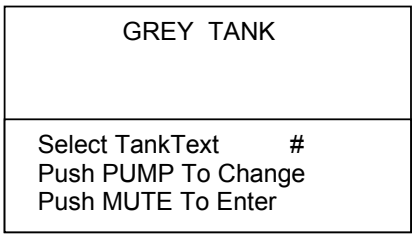
Note: After a tank has been programmed any of the settings may be changed by scrolling to the option requiring changing and pressing the Mute key.

Step 2: Programming a Tank

Once in program mode each tank can be individually programmed and the screen will display: “Select Switch # ”. Use the Select Up or Down key to change the Switch number which corresponds to the I/O unit you wish to program (refer to Table 1 on page 13) for Switch number.
Once the Switch number has been selected press the Mute key.

Step 3: Selecting Tank Name

The display will now show:



NOTE: There is a list of pre-programmed names for you to choose from, if you want to change a name see step 3a below. Once a name has been used **DO NOT** use the same name again when programming another tank choose another name from the list to either use or change.

Use the Select Up or Down key to scroll through the pre-programmed tank names. Press the Mute key once the required name has been found. Otherwise if you would like to change the name, press the Pump key and see next step 3a.

Step 3a: Changing Tank Name Text

The tank name text may be changed. After selecting the Tank (name), as above, use the Dim Up or Down key to move the cursor to each individual letter and the Select Up or Down key to scroll through the alphabet. Press the Mute key to enter, once you have finished.

Step 4: Selecting Tank Type

The display will now show:

Grey=1	Black=2
Fuel=4	Water=3
Select TankType	#
Use Select Keys	
Push MUTE To Enter	

Use the Select Up or Down key to scroll through the tank various types (note this is not the tank name, it is the tank type). Press the Mute key once the appropriate tank type has been found.

Step 5: Setting the Alarm Point

The display will now show:

Set Alarm On Point
Use Select Keys
Push MUTE To Enter
E ############ F

Use the Select Up or Down key to scroll through the tank levels 0 to 16 bars. (0 = Empty 16 = Full). Once you have selected the required level, of the alarm trigger point, press the Mute key.

Step 6: Audible Alarm

The screen will now display: “DO YOU WANT AN AUDIBLE ALARM”.
Press the Select Up key to select “Yes” or the Select Down key to select “No”.

If Yes is selected the audible alarm will sound based on the Alarm Point as set above.
If No is selected there will be no audible alarm associated with that tank, only a visual bell.

Step 7: Tank Volume (see Note 1 page 24)

The screen will now display: “DO YOU WANT TO SET TANK VOLUME”.

This allows for displaying the tank volume in either Liters or Gallons. If this feature is required press the Select Up key to select “Yes”. Next select “Ltrs” for Liters or “Gal” for Gallons.

The screen will now display: “Set Vol 00000”. Use the Select Up and Down key to change the value of each digit and the Mute key to enter and move to the next digit. . When the last digit is reached and the Mute key is pressed, the system will save all associated data programmed for that particular tank and return to the Set-Up Menu.

Otherwise press the Select Down key to select “No”. The system will save all associated data programmed for that particular tank and return to the Set-Up Menu.

You have now completed the programming of a particular tank. This must be repeated for all additional tanks.

Erasing Tanks:

A tanks data may be completely erased. From the Set-Up Menu scroll to ERASE TANK and press the Mute key.

The display will now show:

GREY TANK
Select Switch # Push MUTE To Enter Push PUMP To EXIT

Use the Select Up or Down key to scroll through the Switch numbers to the tank that requires erasing. Once the tank is displayed press the Mute key. Or to exit this screen and return to the Set-Up Menu press the Pump key.

The display will now show:

GREY TANK
Are You Sure ▲ Yes No ▼

Use the Select Up key for YES or the Select Down key for NO. If Yes is selected the Tank Position and Type will be erased for that Switch position and the unit will return back to the Set-Up Menu. If No is selected the unit will return back to the Set-Up Menu.

Day Tank Menu:

This menu allows you to set where the fuel is coming from and where it is going to. This allows for automatic cut off if the supply tank is empty.

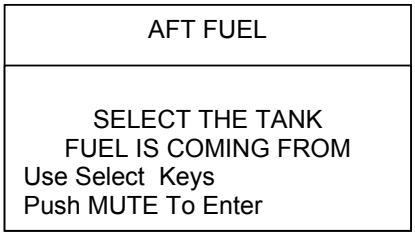
The display will now show:

PORT ENGINE FUEL
SELECT THE TANK FUEL IS GOING TO Use Select Keys Push MUTE To Enter

Use the Select Up or Down key to scroll through to the tank fuel is TRANSFERING TO. Once the tank is displayed press the Mute key.

NOTE: The transfer pump needs to be connected to the Tank Controller (HT-100/P or HB-200/P) that is monitoring the Day Tank .

The display will now show:

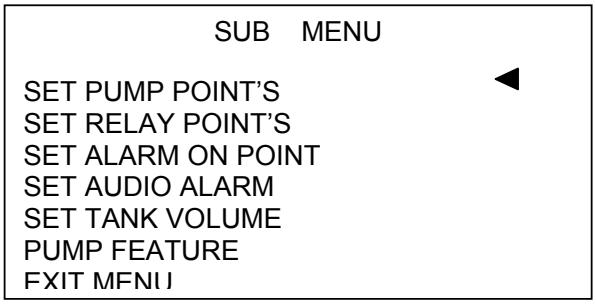


Use the Select Up or Down key to scroll through to the tank fuel is TRANSFERING FROM. Once the tank is displayed press the Mute key. You will now be returned to the main Set-Up Menu.

Exit Menu:

Once all tanks have been programmed you will need to take the system out of Set-Up mode and into monitoring mode. From the Set-Up Menu scroll down to EXIT MENU and press the Mute key.
This will save all associated data that has been set and take the system out of program mode and into monitoring mode. The TC-8000 is now ready for use!

Sub Menu:

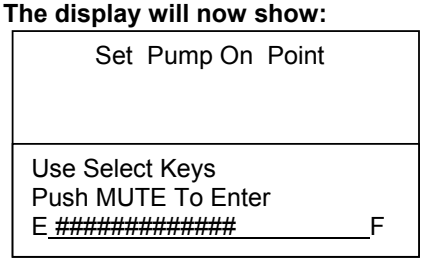


Any of items listed in the Sub Menu may be changed at any time without having to re-program the entire tank.
Use the Select Up and Down to scroll to the feature requiring changing and press the Mute Key.
Follow the on screen instructions

Setting Pump On and Off Point's

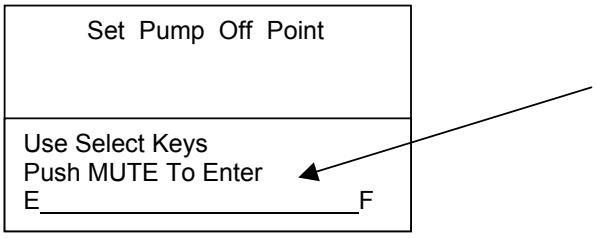
This feature allows you to set where you want the pump to turn On

The display will now show:



Use the Select Up or Down key to move the Pump On point to the desired level. Press the Mute key to set this as the Pump On point.

The display will now show:



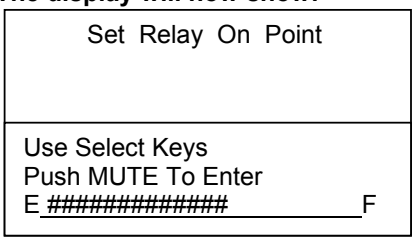
Note: the arrow is the on point marker which shows where the pump on point was set.

Use the Select Up or Down key to move the Pump Off point to the desired level. Press the Mute key to set this as the Pump Off point and return you to the main menu.

Setting Relay 1 On & Off Points

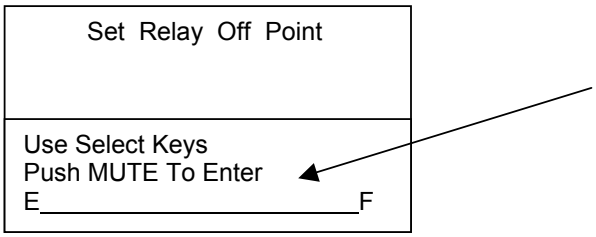
This is a feature particularly useful for Black Tanks e.g. set the On point for 15 and Off point for 13. If Relay 1 was connected to a toilet disable input, then the relay would turn on when the tank reached 15 bars disabling the toilet. Once the tank had been discharged to 13 bars the toilet would be enabled again.

The display will now show:



Use the Select Up or Down key to move the Relay On point to the desired level. Press the Mute key to set this as the Relay On point.

The display will now show:



Note: the arrow is the on point marker which shows where the relay on point was set.

Use the Select Up or Down key to move the Relay Off point to the desired level. Press the Mute key to set this as the Relay Off point and return you to the main menu.

Special Pump:

If you are using a pressure sensor under the following conditions you will need to use this feature:

1. **Black tank has a charcoal filter fitted****
2. **Pressure sensor is located in the discharge pipe or any location where turbulence is likely during the pumping operation**

   ****Explanation: When the pump is turned on liquid is removed from the tank quicker than air can replace it, due to the constrictive nature of the air filter.**

The Special Pump feature will allow the pump to run for a pre-set time without looking at the tank level (which will be wrong due to the above reason). The pump will then turn Off for one minute allowing the tank to equalize its pressure. The system will then look at the tank level and turn the pump back On for a time period. This time will be based on the tank level e.g. if the tank level is low the time period will be short. This will continue until the tank is empty.

From the Sub Menu scroll down to Pump Feature and press the Pump Key.

The display will now show:

DO YOU WANT TO SET SPECIAL PUMP
Use Select Keys ▲ Yes No ▼

Press the Scroll Up key to select “Yes” or the Scroll Down key to select “No”
If “No” is selected the feature will be turned Off and the system will return you to the Menu.

If Yes is selected:

The display will now show:

SET PUMP TIME
Use Select Keys ▲ Default Set ▼

This is the time period the pump will run (if full) before looking at the tank level.
Either Default or Set maybe selected.
If Default is selected the time period will be set to 3 minutes and the system will return you to the Menu.

If Set is selected:

The display will now show:

SET PUMP TIME
Use Select Keys Push Mute To Enter Set Minutes = 1

Use the Select Up Key to scroll through the times 1 to 5 minutes. Press the Mute Key to enter. The system will now return you to the Menu

Operating Instructions

Keyboard:

The Select Up and Down allows for scrolling between tanks.
The Mute key mutes the alarm.
The Pump key turns the pump on and off (see details below).
Dim Up and Down adjusts the display contrast.

The Grey and Black tanks have three Modes of operation

Key Switch = Manual Mode:

When any tank programmed as either Grey or Black reaches the programmed high-level point and the alarm is **ON,** the alarm will activate and show a flashing bell beside the tank icon. (All other tanks will show the bell on solid). Press the Mute key to mute the alarm. If the alarm is **OFF** it will only show a flashing bell beside the tank icon. The alarm will turn **ON** when the tank reaches the programmed high-level point and **OFF** when the tank has been emptied by two bars. **Relay 1** will turn will turn **ON** when the tank reaches the programmed Relay **ON** point and **OFF** when the programmed Relay **OFF** point is reached. This output could be used (for example) to disable the toilet controller.

To operate the pump manually, scroll to the tank requiring pumping. If the tank is a Grey Tank, turn the Key Switch to Auto Grey. If the tank is a Black Tank, turn the Key Switch to Auto All. Press the Pump key. The pump will turn **ON**, and will turn **OFF** automatically when the tank reaches empty, or it can be turned off at any time by pressing the Pump key again or switching the Key back to Manual.

Key Switch = Auto Grey Mode:

In Auto Grey Mode any tank programmed as a **Grey** tank, once full, will automatically do the following if connected to:

HT-100/P or HB-200/P: The pump and Relay 2 will turn **ON,** and turn **OFF** automatically when the tank is empty.

HT-100 or HB-200 : Relay 1 will turn will turn **ON** when the tank reaches the programmed Relay **ON** point and **OFF** when the programmed Relay **OFF** point is reached.

Key Switch = Auto All Mode:

In Auto All Mode any tank programmed as either **Black or Grey,** once full, will automatically do the following if connected to:

HT-100/P or HB-200/P: The pump and Relay 2 will turn **ON,** and turn **OFF** automatically when the tank is empty. If the tank is **empty** the pump will stay activated while the Pump key is pressed and held.

HT-100 or HB-200: Relay 1 will turn **ON** when the tank reaches the programmed Relay **ON** point and **OFF** when the programmed Relay **OFF** point is reached.

Fresh Tanks:

The alarm will turn **ON** if the tank reaches the programmed low-level value and **OFF** when the tank has been filled by three bars.

Pump Output (HT-100/P & HB-200/P only)

The Pump Output will automatically turn **ON** if the tank is equal to or greater than the programmed pump ON value. The Pump Output will turn **OFF** when the tank is equal to or less than the programmed pump OFF value. The Pump Output can be started and stopped at any time by pressing the Pump key.

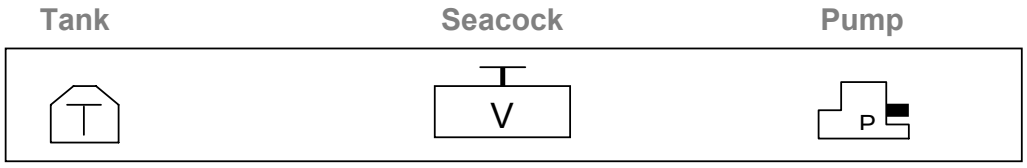
Default values :
Pump Output Off = Tank level = 0
Pump Output On = Tank level = 1

Fuel & Day Fuel tanks have one Mode of operation (automatic)

HT-100 & HB-200: The alarm will turn **ON** when the tank reaches the programmed low-level value and will turn **OFF** when the tank has been filled by three bars.
Relay 1 will turn **ON** when the tank reaches the programmed Relay **ON** point and **OFF** when the programmed Relay **OFF** point is reached.

HT-100/P & HB-200/P: Pump output and Relay 2 will automatically turn **ON** when the tank reaches the programmed low-level value. The pump output and Relay 2 will turn **OFF** when the tank is full, or can be stopped and started at any time with the Pump key. The alarm will turn **ON** if the tank reaches two bars less than the programmed low-level value and **OFF** when the tank has been filled by three bars. Relay 1 will turn **ON** when the tank reaches the programmed Relay **ON** point and **OFF** when the programmed Relay **OFF** point is reached.

Alarms



If any one of these features is in alarm, the alarm bell will **be flashing**. If another tank is being displayed, other than the one in alarm, the bell will be **ON solid** (not flashing).

Tank= either full or empty (depending on type of tank)
Seacock = Seacock closed (see page 14)
Pump = Pump failure (see page 15)
Pressing the Mute button will mute the alarm.

Turning Tank Alarm Off

Press and hold the Mute key for 4 seconds (the buzzer will bleep every second). Repeat to turn alarm back on. If the alarm is **ON** the small bell at the bottom right corner will be displayed, if **OFF** the bell will disappear.

Tank Alarm Functions

If the alarm is **ON** and (Grey or Black reached the programmed high level) **or** (Fresh or Fuel has reached the programmed low level) then the alarm will sound. Press the Mute key to mute the alarm. The bell icon will stay flashing until if Grey or Black, the tank level is three bars less than fill, or if Fresh or Fuel, the tank level is three bars higher than the programmed low level.

If the alarm is **OFF** and (Grey or Black reached the programmed high level) **or** (Fresh or Fuel has reached the programmed low level) only the bell icon will flash.
The bell icon will stay flashing until (Grey or Black) the tank level is three bars less than the programmed high level **or** (Fresh or Fuel) the tank level is three bars higher than the programmed low level.

Changing Display Modes

The system has two Display Modes:

Mode 1: Displays tank name, percentage and Lts or Gals as well as a bar graph at the bottom of the screen. (Default Mode)

Mode 2: Displays all tanks on one screen. Press and hold the Mute key, now press the Select Down key. Repeating this will change back to Mode 1. (The number at the bottom of each bar graph corresponds to the tank number displayed in the multi display screen just above the “E” symbol.)

Note 1: The Lts/Gal & Percentage will ONLY work with HT-100/P & HT-100 with a manufacture date from 1st July 2007.

Display Mode 1

Display Mode 2

Errors

Should a programmed tank either lose communication, or power, the tank level indicator will display “----------COMMS FAULT----------“. The tank level indicator will resume normal operation once the problem has been rectified.

TC-8000 Wiring Connections

Red = Battery +
Black = Battery –
Blue = Net +
White = Net -

This Calibration method applies to I/O Units manufactured before 01/06/2009

2 Point Calibration:

Turn Rotary Switch on the I/O Box to position 0

Fill the tank to the required TANK LOW LEVEL, minimum suggested is liquid just covering the sensor. Wait for approx. 30 seconds for the fluid to settle. Press and hold down the Program Button (on the IOU) until the LED comes on (approx. 3 seconds) this has set the tank low point.

Fill the tank to the required TANK FULL LEVEL. Wait approx. 30 seconds for the fluid to settle. Press and release the Program Button, the LED will give 3 quick flashes. The tank high point has now been set and the unit will automatically leave program mode. The device is now ready for use.
Turn Rotary Switch to correct position (see Setting Rotary Switch page 15)

5 Point Calibration:

Turn Rotary Switch on the I/O Box to position F

Fill the tank to the required TANK LOW LEVEL, minimum suggested is liquid just covering the sensor. Wait for approx. 30 seconds for the fluid to settle. Press and hold down the Program Button (approx. 3 seconds), the LED will give 4 quick flashes and stay on. The tank low point has now been set.

Fill the tank to the required QUARTER LEVEL and wait approx. 30 seconds for the fluid to settle. Press and release the Program Button, the LED will give 1 quick flash. The tank 1/4 point has now been set.

Fill the tank to the required HALF LEVEL and wait approx. 30 seconds for the fluid to settle. Press and release the Program Button, the LED will give 2 quick flashes. The tank 1/2 point has now been set.

Fill the tank to the required THREE QUARTERS LEVEL and wait approx. 30 seconds for the fluid to settle. Press and release the Program Button, the LED will give 3 quick flashes. The tank 3/4 point has now been set.

Fill the tank to the required FULL LEVEL and wait approx. 30 seconds for the fluid to settle. Press and release the Program Button, the LED will give 4 quick flashes and turn off. The tank full point has now been set. The unit will automatically leave program mode. The device is now ready for use.

Turn Rotary Switch to correct position (see Setting Rotary Switch page 15)

Electrical Specifications TC-8000

Supply Voltage	12 to 32 Volts DC (Auto-sensing)
Quiescent Current	0.02 Amps
Data Retention	50 years (without power)

Electrical Specifications RD-800

Supply Voltage	12 to 32 Volts DC (Auto-sensing)
Quiescent Current	0.03 Amps
Data Retention	50 years (without power)

Electrical Specifications HT-100 & HB-200

Supply Voltage	12 to 32 Volts DC (Auto-sensing)
Quiescent Current	0.024 Amps
Relay 1	3 amps Inductive
Data Retention	50 years (without power)

Electrical Specifications HT-100/P & HB-200/P

Supply Voltage	12 to 32 Volts DC (Auto-sensing)
Quiescent Current	0.024 Amps
Pump Output Load	88 amps @ 12 Volts
Relay 1& 2	3 amps Inductive
Data Retention	50 years (without power)

Network Cable

The cable connecting the Display Units to the Input/Output Units is referred to as the network cable and may run up to 1000 meters in total length.

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