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SMART SWITCH TECHNOLOGIES

BC-4000
Bilge Monitor/Controller

Installation Manual

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Introduction

Thank you for purchasing the BC-4000 Bilge Controller. Smart Switch Technologies are very proud to be able to provide this product to you. You have selected a capable system designed to provide years of reliable service under the most demanding conditions.

Smart Switch Technologies are a pioneer in the design and development of distributable intelligence controller systems for the marine industry. The BC-4000 is a versatile, compact, modern, stylish, user-friendly intelligent network system. Our Research and Development Team have developed this system specifically for the marine environment using proven techniques and materials which will ensure a long life at sea.

The BC-4000 provides features found only in expensive computer-based systems on mega-yachts, but does so for a fraction of the cost. It is an economical and capable alternative to manual bilge control and simplistic monitoring systems. The BC-4000 is a system with maximum functionality thereby providing boat owners with easy and accurate management.

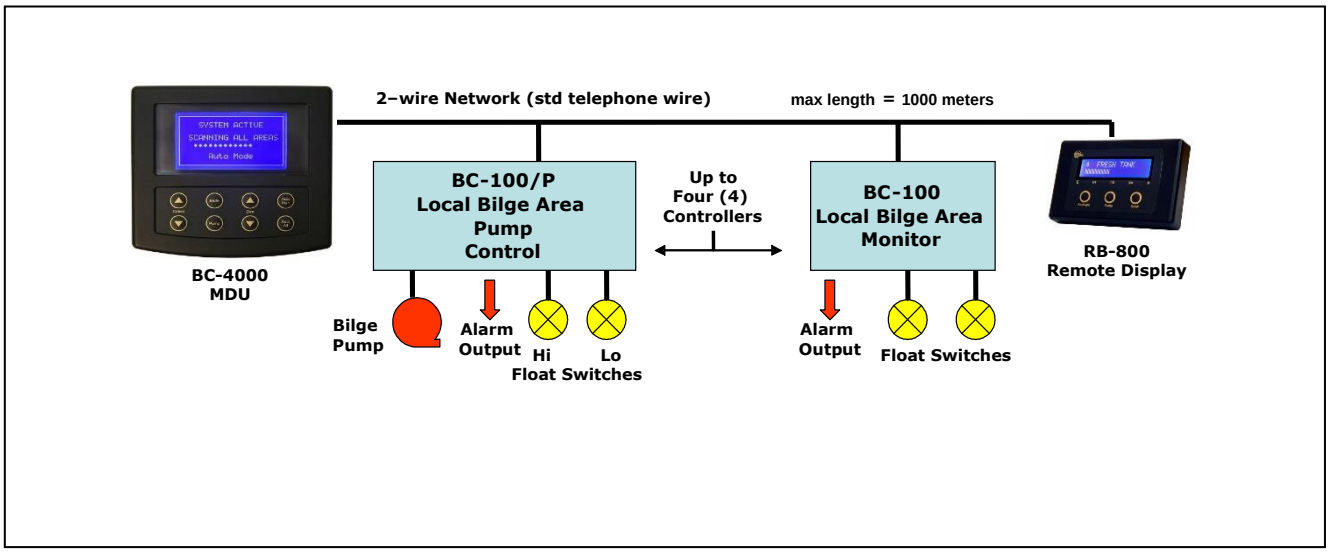
System Overview

The BC-4000 Bilge Controller has been developed to allow monitoring of fluid levels and to provide intelligent intervention for controlling pumps in up to 4 bilge areas. It is a network system consisting of the BC-4000 Master Display Unit and up to 4 Input/Output Units located in bilge compartments. In addition, and as an option, an RB-800 Remote Display Unit may be added to provide bilge status display, at an alternative location on the vessel, for convenient monitoring.

All devices are interconnected by a 2-wire network cable similar to that used for telephone installations. The Master Display Unit (MDU) controls communication with all attached I/O Units and provides monitoring of bilge levels and pumps status as well as pump control - all from a central location. System components may be located anywhere on the network cable and the cable may be up to 1000 meters in length.

These features, unique to the BC-4000, provide boat builders and retrofitters maximum flexibility in locating components onboard the vessel while minimizing wiring costs.

Note: In the event of a network communication failure, I/O units will continue to operate in an automatic mode, providing both pump control and a hardwired alarm for high water level.



BC-4000 Master Display Unit (MDU)

Provides the following functions:

- **Master Control for bilge pumps**
  - **Auto/Manual pump control**
- **Network Communication Controller**
- **Status Display for each bilge area showing**
  - **Pump status (On or Off)**
  - **Number of times the pump has turned on (Can be manually reset or resets automatically at 99)**
  - **Last pump run time**
  - **Low sensor status**
  - **Program mode**
  - **Operate mode**
- **Alarms by bilge area**
  - **High Water**
  - **Low sensor failure**
  - **Pump not running (fuse or open circuit in power wiring or motor)**
  - **Pump has not turned on in programmed time**
  - **Pump still running and has exceeded programmed running time**
  - **Network communication fault**
- **Programmable features**
  - **Delay pump on after water sensor on**
  - **Delay pump off after water sensor off**
  - **Pump-on alarm delay time**
  - **Bilge area names (e.g. "Aft Port", "Engine room", etc)**

BC-100 or BC-100/P Input/Output Unit

The BC-100 controls high and low level sensors and relay one.
The BC-100/P controls the high and low level sensors, relay one and the pump.

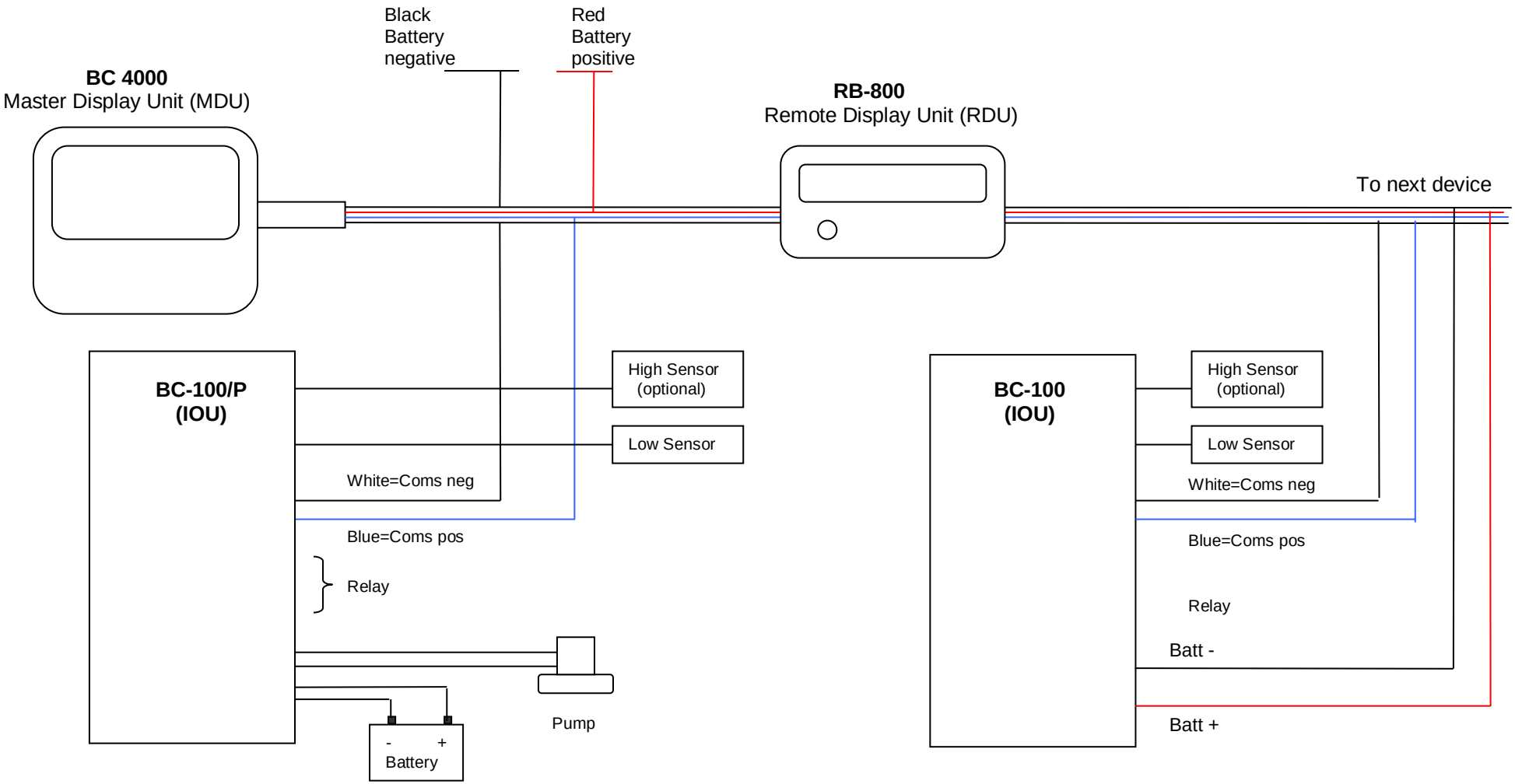
- **BC-100 Operates as automatic bilge controller providing float switch status as well as alarm output. (Can operate as stand alone bilge controller).**

- **BC-100/P Operates as automatic bilge controller providing pump and float switch status as well as alarm output. (Can operate as stand alone bilge controller).**

RB-800 Remote Display Unit (RDU)

The RB-800 Repeater Display is an optional extra.
A Repeater Display may be connected throughout the vessel for convenient monitoring. Note: The RDU is for monitoring only and will not allow control.

Wiring Block Diagram

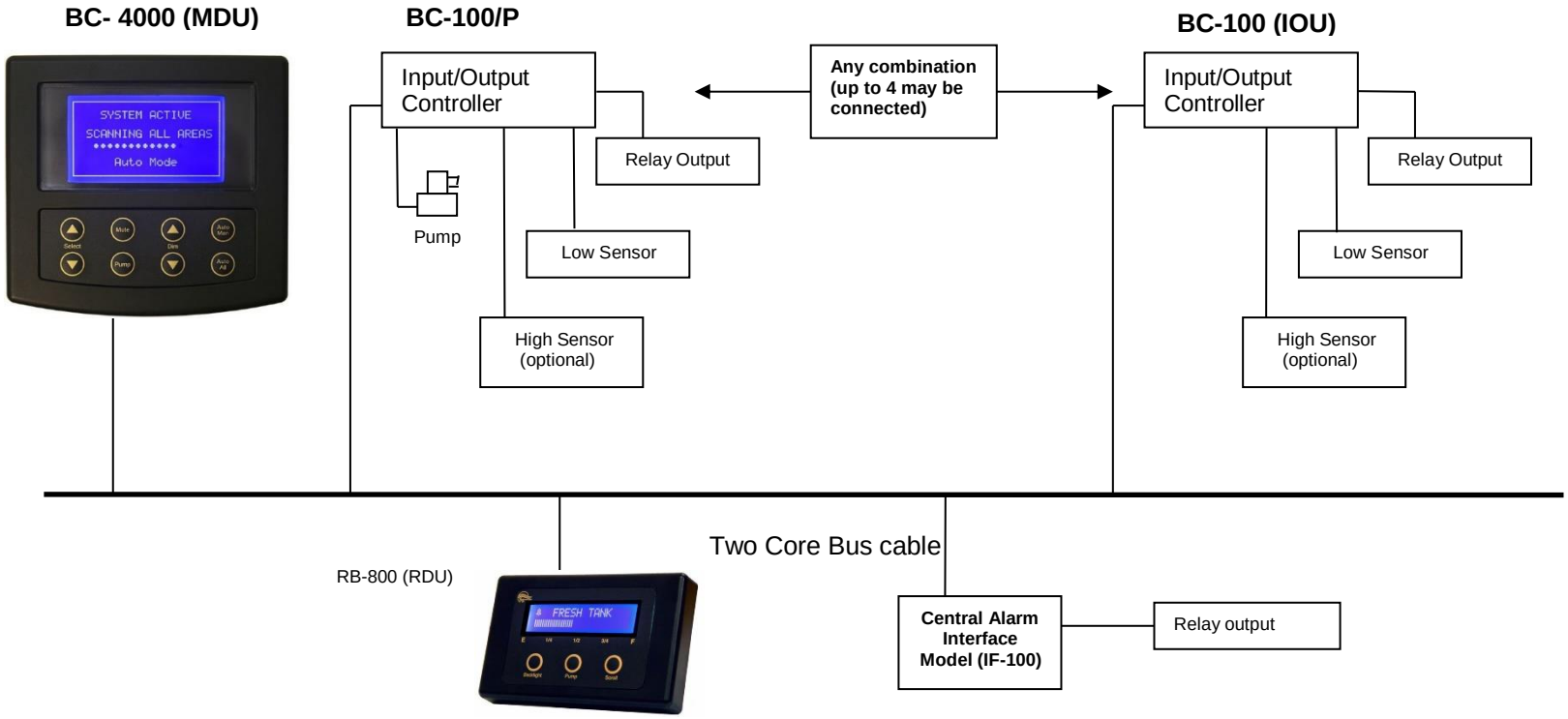


WARNING: As the BC-100/P supplies power for the pump, the supply cables & fuse need to be rated as per the pump manufacturer's specifications.

Four Channel Bilge Controller System Layout for Model BC-4000

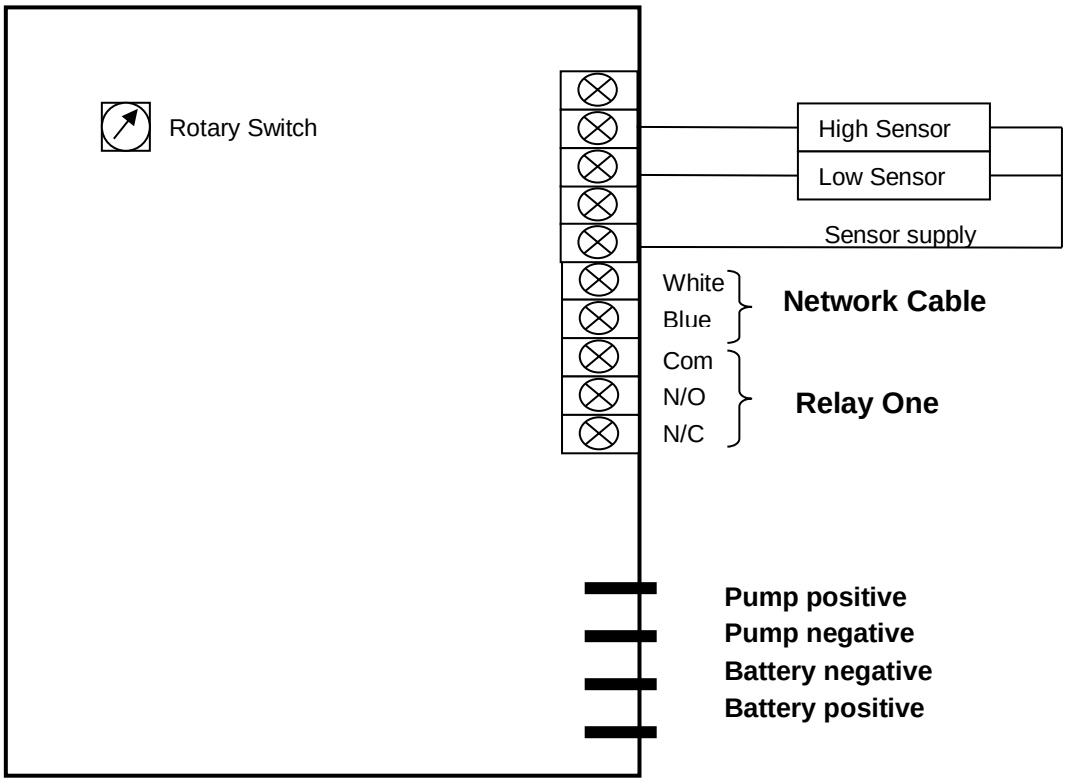
Any Device can sit anywhere on this Two Core Bus cable.
Any combination of BC-100/P and or BC-100 (up to Four) can be connected, plus one repeater display unit – Model RB-800

NOTE: The BC-100/P has the pump option while the BC-100 does not.

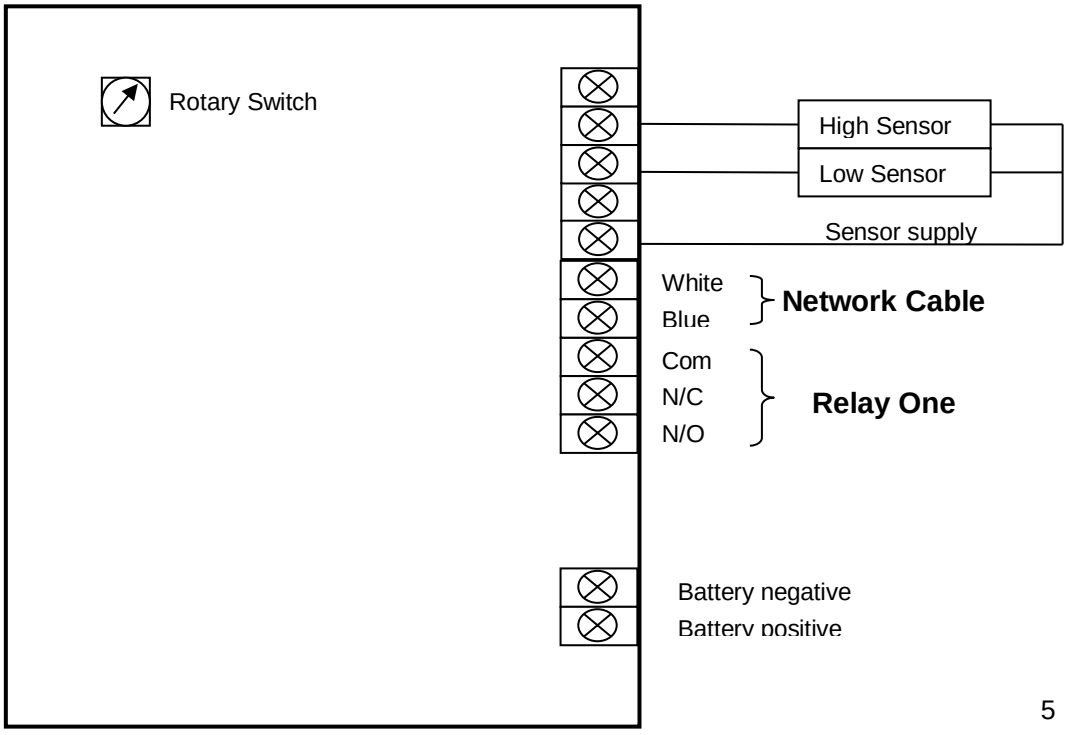


Note: The Central Alarm Interface is an optional extra and provides the ability to spy on the network for any data e.g. any High Sensor On, any Pump On, which may be required as an input for another device. The IF-100 has one Relay output.

Wiring Diagram for Model BC-100/P



Wiring Diagram for Model BC-100



Installation Steps

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

Step 1:

Install and connect the Master Display Unit.

Step 2:

Install and connect the Bilge I/O units (BC-100/P or BC-100).

Step 3:

Set-up Rotary Switches.

Step 4:

Set-up Pump Sensing.

Step 5:

Program the Master Display Unit.

Step 6:

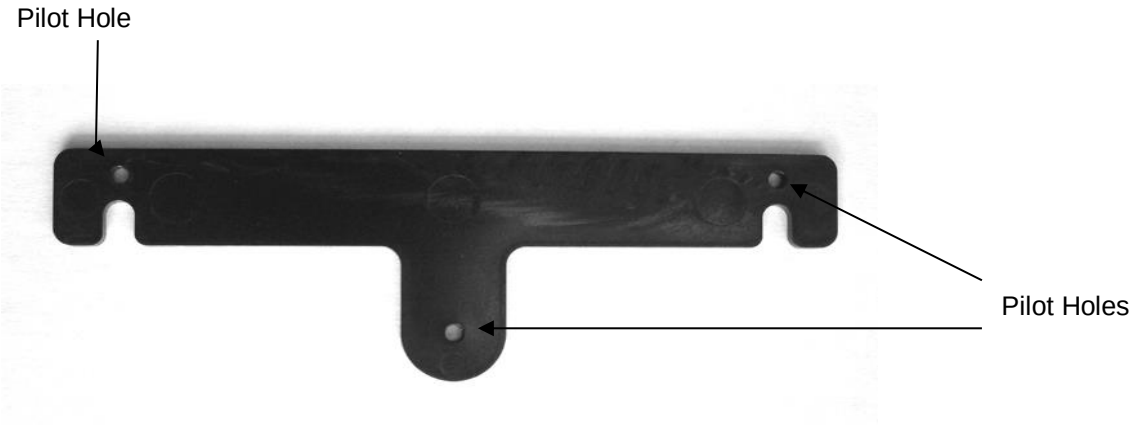
Test system.

Mounting the BC-4000 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.



For wiring details see page 3 (Wiring Block Diagram).

Setting Rotary Switch (Network Address)

Each Input/Output Unit (BC-100/P or BC-100) **on the network must have the Rotary Switch set to a unique number (from 2 to 5). NO two devices may share the same Rotary Switch number.**

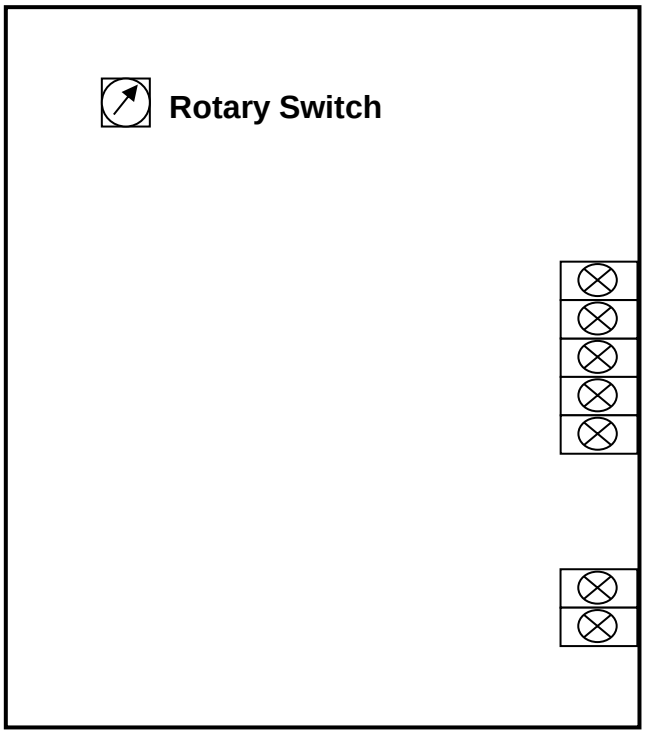
This Rotary Switch is situated inside the Box of the Input/Output Unit (see below for position).

For ease of reference please use the chart provided as this will enable quick reference when programming the Display Unit.

Switch Position	Bilge Position *Choose one "Bilge Position" designation from list on right or create your own and record in this chart opposite each "Switch Position" for future reference during MDU programming.*
2	
3	
4	
5	
	Notes:

Bilge Positions

- **AFT**
- **STERN**
- **FORWARD**
- **AFTPORT**
- **AFTMIDSHIP**
- **AFTSTARBOARD**
- **MIDSHIPPORT**
- **MIDSHIPCENTRE**
- **MIDSHIPSTARBOARD**
- **FORWARDPORT**
- **FORWARDCENTRE**
- **FORWARDSTARBOARD**
- **ENGINEROOM**
- **ENGINEPORT**
- **ENGINESTARBOARD**



Pump Current Sensing

The BC-100/P I/O Unit is equipped with special current sensing circuitry to detect if after a pump is turned on, it is in fact running.

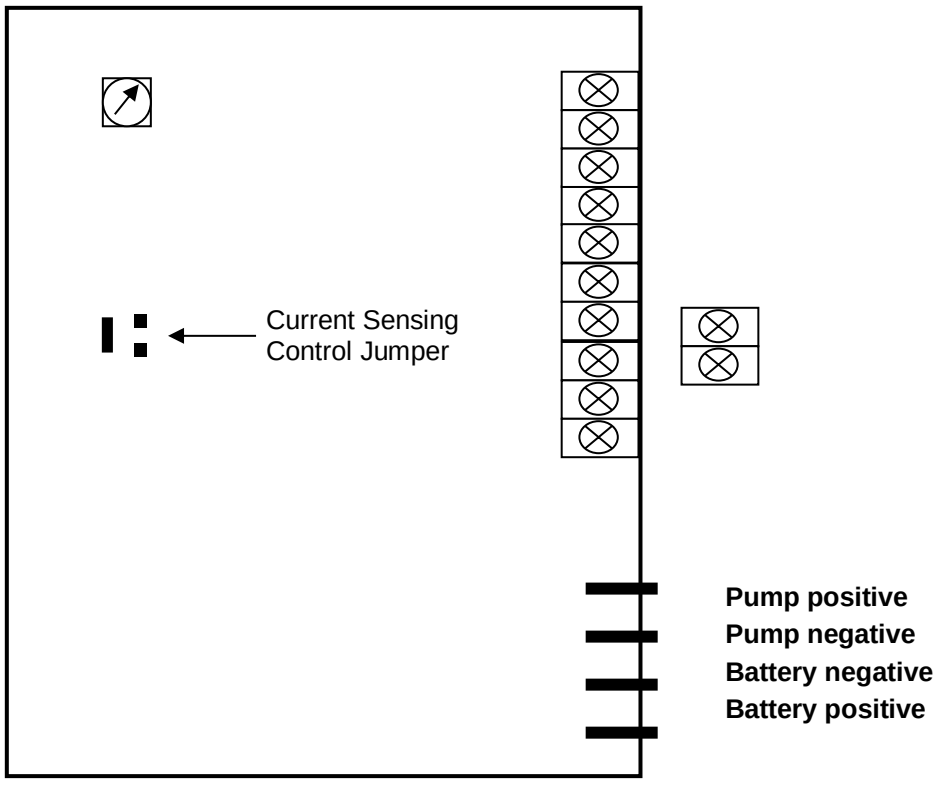
If the pump is turned on, either manually or automatically, and the pump fails to start due to short or open circuit, the alarm screen for that bilge area will display: "**Pump : Fault**" and the alarm will sound, indicating a fault. Pressing the Mute key will mute the alarm.

If the pump output is connected to a Relay, instead of the pump, the current drawn will be below the current sensing range, therefore this feature will need to be disabled. A Relay would be used if the pump was a different voltage (e.g. 110vac).

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

To **Enable** this feature Remove the Jumpers

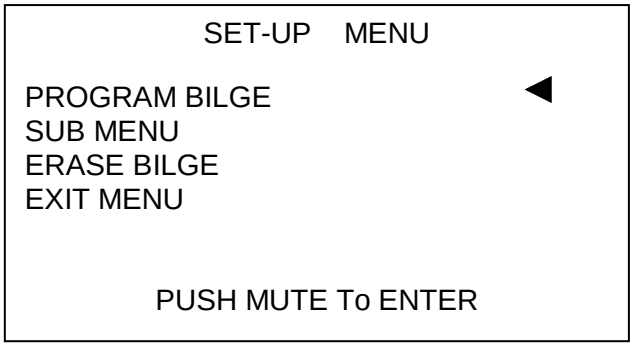
To **Disable** this feature Insert the Jumpers



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.



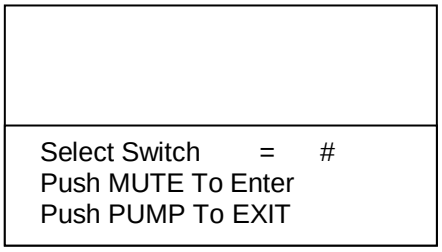
Press the Mute key.

Note: After a bilge area has been programmed any of the settings may be changed by scrolling to the Sub Menu and pressing the Mute key.

Step 2: Selecting the Bilge Area to Program

Once in program mode each bilge area can be individually programmed.

The display will now show:

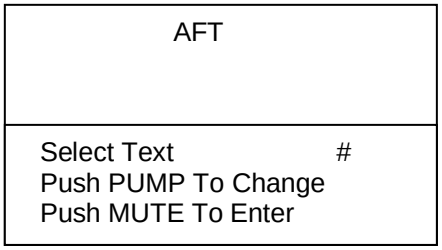


Use the Select Up or Down key to change the Switch number which corresponds to the I/O unit you wish to program (refer to table on page 8) for Switch number.

Once the Switch number has been selected press the Mute key.

Step 3: Selecting Bilge Area Name

The display will now show:



Use the Select Up or Down key to scroll through the pre-programmed bilge names until you find the one that best describes the bilge position (e.g. AFTPORT). 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 Bilge Area Name Text

The bilge area name text may be changed. After selecting the Bilge (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 Sensor On Time

The Sensor On Time is the amount of time the sensor needs to be ON before the pump is turned On.

The display will now show:

SENSOR ON TIME
Seconds = Push MUTE To Enter

Press the Mute key to set these parameters or press the Select Up or Down key to use defaults (see Default Times – page 13).

The display will now show:

SENSOR ON TIME
Seconds = 00 Push MUTE To Enter

Use the Select Up Key to increase time or the Select Down key to decrease the time (these increase in 5 second increments). Press the Mute key to accept.

Step 5: Selecting Sensor Off Time

The Sensor Off Time is the amount of time the sensor needs to be OFF before the pump is turned Off.

The display will now show:

SENSOR OFF TIME
Seconds = Push MUTE To Enter

Press the Mute key to set these parameters or press the Select Up or Down key to use defaults (see Default Times – page 13).

The display will now show:

SENSOR OFF TIME
Seconds = 00 Push MUTE To Enter

Use the Select Up Key to increase time or the Select Down key to decrease the time (these increase in 5 second increments). Press the Mute key to accept.

Step 6: Selecting Pump Run Alarm

The Pump Run Alarm is the amount of time the pump will run before the Pump Run Alarm is activated.

The display will now show:

PUMP RUN ALARM
Seconds = Minutes = Push MUTE To Enter

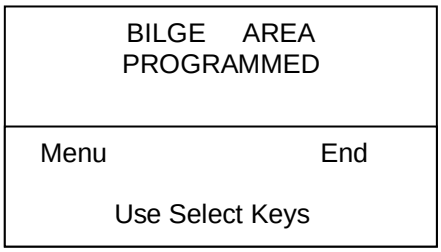
Press the Mute key to set these parameters or press the Select Up or Down key to use defaults (see Default Times – page 13).

The display will now show:

PUMP RUN ALARM
Seconds = 00 Minutes = Push MUTE To Enter

Use the Select Up Key to increase time or the Select Down key to decrease the time (these increase in 5 second increments for the second's field and 1 minute increments in the minute field). Press the Mute key to accept seconds. The minutes field will then become active, enter minutes and press the Mute key to accept. You have now completed the programming of a particular bilge area. This must be repeated for all additional bilge areas.

The display will now show:



If you have more bilge areas to program, or wish to make changes, then press the Select Up key (Menu). This will return you to the Set-Up Menu.
If this is the last or only bilge area that requires programming then press the Select Down key (End). This will save all associated data that has been set and take the system out of program mode and into monitoring mode. The BC-4000 is now ready for use!

Defaults Times:

When this option is selected the Sensor On and Off times will be set to 5 seconds and the Pump Run Alarm time will be set to 1 minute.

Erase Bilge:

A bilges data may be completely erased. From the Set-Up Menu scroll to Erase Bilge and press the Mute key.
Use the Select Up and Down keys to scroll to the bilge area you want to erase and press the Mute key.

The display will now show:

Use the Select Up key for No or the Select Down key for Yes. If Yes is selected the bilge data will be erased for that Switch position and the system will return back to the Set-Up Menu. If No is selected the system will return back to the Set-Up Menu.

Sub Menu:

If Sub Menu is selected you will be able to change either the Sensor On Time, Sensor Off Time or the Pump Run Alarm without having to re-program the entire bilge.
Use the Select Up and Down to scroll to the feature requiring changing and press the Mute Key. Follow the on screen instructions. To exit from the Sub Menu scroll down to Exit Sub Menu and press the Mute key. This will return you to the Set-Up Menu.

Exit Menu:

Once all bilge areas 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 BC-4000 is now ready for use!

Operating Instructions

Keyboard:

Select Down - allows for scrolling between bilge areas.
Select Up - allows for screen changing when a fault is displayed.
Mute – has two functions: 1) Mutes the alarm. 2) Turns backlight on and off.
Pump - turns the pump on and off when in Manual Mode.
Dim Up and Down - adjusts the display contrast.
Auto/Manual – this is used to place any bilge area in to Manual Mode, after scrolling to the bilge area required to be placed in Manual Mode.
Auto All – this is used to alternate from Auto Mode to Semi-Auto Mode. (Note: This will be applicable if one or more bilge areas have been set to Manual in the status screen as noted above. If it is in Auto Mode then all alarms and pumps will work automatically. If it is in Semi-Auto Mode then only those bilge areas set to Automatic Mode will do this. Those set to Manual Mode will alarm you and show status only. However the pump for this area can be turned on and off from here by pressing 'Pump'.)

Definition of Auto, Manual and Semi-Auto Modes:

Manual Mode

When any bilge area is placed in Manual Mode, the bilge pump can only be turned on and off manually. However should the high or low water sensor come on, the MDU will sound the alarm and the display will show the bilge area affected.

Auto Mode

When any bilge area is placed in Auto Mode, the bilge pump will be turned on and off automatically. Should any fault occur the MDU will sound the alarm and the display will show the bilge area with the problem.

Semi-Auto Mode

Semi-Auto Mode means one or more bilge areas have been set for Manual Mode but the rest are still running in Auto Mode.

This feature has been designed as a quick and easy override function, for example in port where bilge discharge is illegal the area would be set for Manual Mode but on leaving port, by pressing the "Auto All" key, any and all Manual areas would be converted to Auto mode. When arriving back to port simply press the "Auto All" key again and this will place any and all areas set as Manual, back to Manual Mode.

Manual/Auto Mode Selection (Program Mode)

This is the mode the system is programmed as, Auto or Manual.

To place a bilge area into Manual Mode: Press the Select Down key and keep pressing until the bilge area required is reached. When the bilge area required is reached, press the Auto/Manual key. This will place the bilge area into Manual Mode. Note: repeat to place back into Auto Mode.

Manual/Auto Mode Selection (Operate Mode)

This is the mode the system is operating in Auto or Semi-Auto mode.

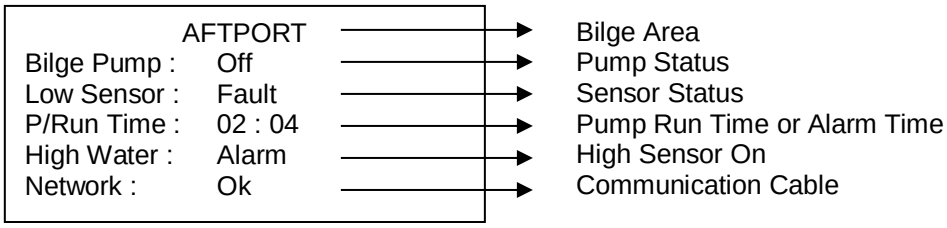
Pressing the Auto All key will place all bilge areas programmed as Manual into Full Auto Mode (the display will show Auto-Mode). A second press will place the programmed Manual bilge areas back into Manual Mode (the display will now show Semi-Auto Mode).

Alarms:

The system will give an audible alarm and display screen for the following reasons:

1. High float switch on.
2. Faulty pump.
3. Faulty network connection.
4. Pump running alarm time has been reached.

The alarm display screen will show the following:

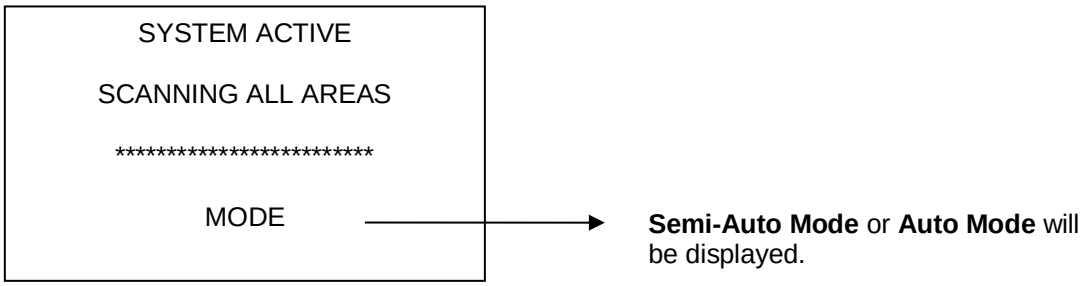


If the low float switch is faulty and the high float switch turns on, the Delay On Time is ignored and the pump will turn on immediately. The alarm will sound and the bilge area (including stats) will be displayed.

Alarm Mute:

Pressing the Mute key will mute the alarm. However the fault alarm display screen will remain until the fault has been corrected. Should faults continue to occur, the above process will be repeated. Pressing the Select Down key will allow you to toggle between fault screens.

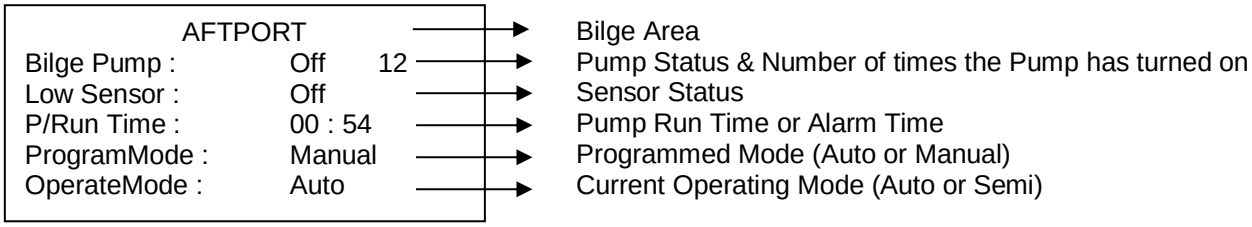
Normal Operation Screen



Bilge Area Status Screen

Pressing the Select Down key will allow you to toggle through each bilge area to see the status of that area. The bilge area that turned on last will be displayed first.

Note: If no other key is pressed within 30 seconds, or the Select Up key is pressed, this screen will go back to the Normal Operation Screen as above.



The Program Mode is the mode that has been set in memory.

The Operate Mode is the current mode selected e.g. Auto or Semi-Auto (as above) and is the mode the bilge area will be working in.

Manual Pump On/Off

To manually turn a pump on or off, press the Select Down key. This will then bring up the Bilge Status Screen (as above). Keep pressing the Select Down key until the bilge area required is found. Once found, if in Auto Mode, press the Auto Manual key, which will place that bilge area into Manual Mode.

Once Manual Mode has been selected the pump can be turned On or Off manually with the Pump key.

Pressing the Select Up key will exit from the Bilge Status Screen, it will also turn the pump off.

Resetting Pump On Number (Number of times the pump has turned on)

Press the Select Down key and keep pressing until the bilge area required is reached. Once the area has been reached pressing the Auto All key will reset the pump on counter back to 0. Press the Select Up key to exit or if no other key is pressed within 30 seconds it will exit automatically.

Making Changes while a Fault screen is displayed

If there is a fault screen displayed pressing the Select Up key will take you into the Normal Operation Screen (without the scanning dots), if required the system can be placed into Auto or Semi-Auto Mode by pressing the Auto All key. Pressing the Select Up key again will take you back to the fault screen, or if no other key is pressed within 30 seconds, it will take you back to the fault screen.

If you require going into the bilge status screen, to look at any or all bilge areas, then pressing the Select Up key will take you into the Normal Operation Screen (without the scanning dots). Pressing the Select Down key will allow you to scroll to the area of interest. Press the Select Up key to exit back to the fault screen or if no other key is pressed within 30 seconds it will exit automatically.

Electrical Specifications BC-4000

Supply Voltage	12 to 32 Volts DC (Auto-Sensing)
Quiescent Current	0.038 Amps
Data Retention	50 years (without power)

Electrical Specifications RB-800

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

Electrical Specifications BC-100/P

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

Electrical Specifications BC-100

Supply Voltage	12 to 32 Volts DC (Auto-Sensing)
Quiescent Current	0.024 Amps
High Relay Load	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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