

## SMART SWITCH TECHNOLOGIES



### **BC-8000 Bilge Controller**

# **Installation Manual**

# Model BC-8000 Installation Manual

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# BC-8000 Bilge Control System

## Introduction

Thank you for purchasing the BC-8000 Bilge Controller. SS Technologies is 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.

SS Technologies is a pioneer in the design and development of distributable intelligence controller systems for the marine industry. The BC-8000 Bilge Controller is a versatile, compact, modern, stylish, user-friendly intelligent network system. Our Research and Development Team has developed this system specifically for the marine environment using proven techniques and materials which will ensure a long life at sea.

The BC-8000 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-8000 allows builders and retrofitters to offer a system with maximum functionality thereby providing boat owners with excellent visibility into conditions in bilge areas and allowing a variety of control options under both normal and off-normal conditions.

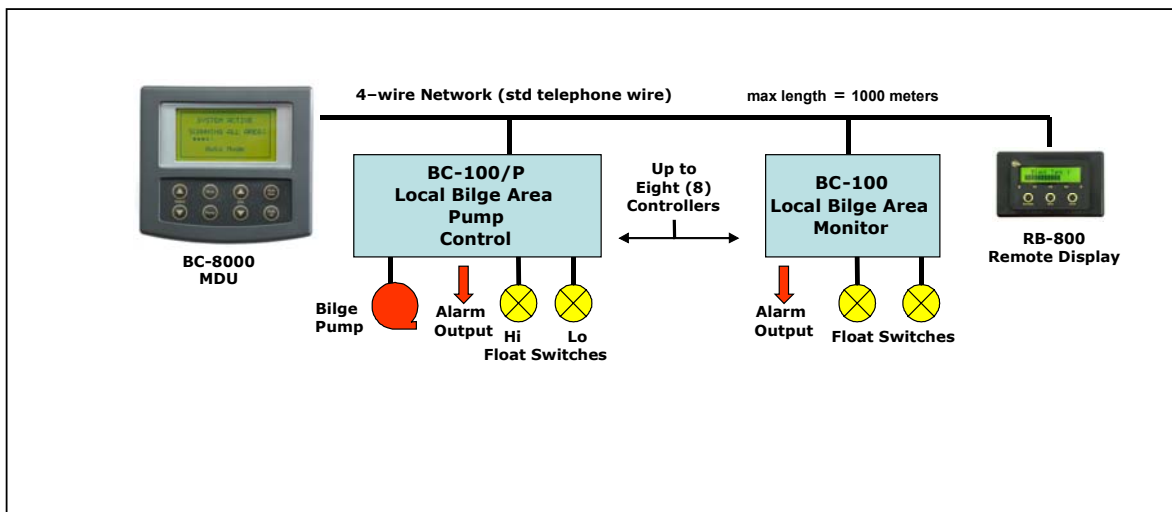
## System Overview

The BC-8000 Bilge Controller has been developed to allow monitoring of fluid levels and to provide intelligent intervention for controlling pumps in up to 8 bilge areas. It is a network system consisting of the BC-8000 Master Display Unit and up to 8 Input/Output Units located in bilge compartments. In addition, and as an option, any number of RB-800 Remote Display Units may be added to provide bilge status displays throughout the vessel.

All devices are interconnected by a 4-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-8000, 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-8000 Master Display Unit:**

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
- Bilge area by name (e.g. "Aft Port", "Engine room" etc.)

## **RB-800 Remote Display Unit Option:**

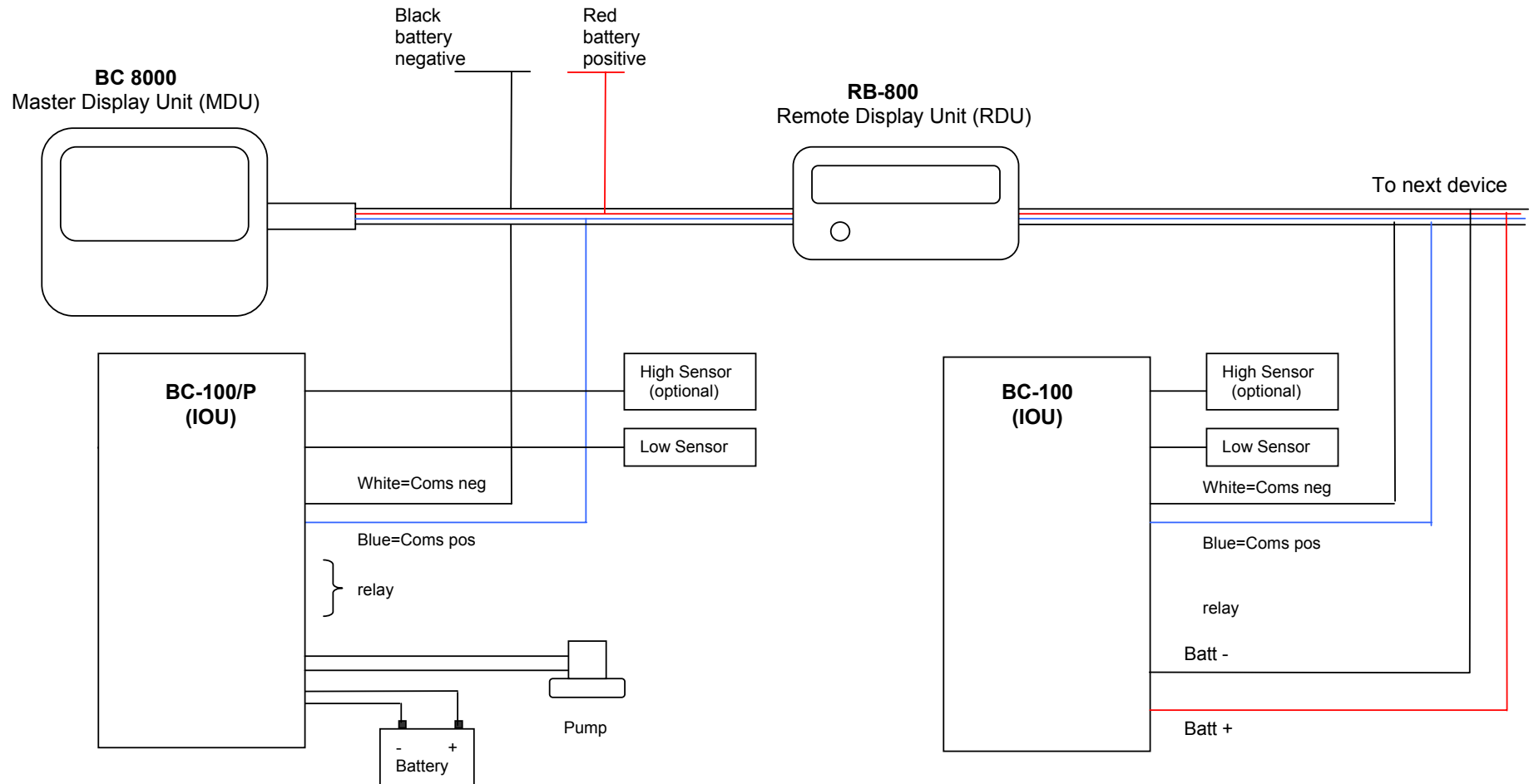
Allows operator selection of area for display and shows fault status for up to eight bilge areas.

## **BC-100/P or BC-100 Input/Output Unit:**

The BC-100/P controls the high and low level sensors, relay one and the pump. The BC-100 controls high and low level sensors and relay one. The basic functions and electrical specifications are as follows:

- 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)
- Programmable features
  - Delay pump on after water sensor on
  - Delay pump off after water sensor off
  - Pump-on alarm delay time
  - Bilge area name's
- Electrical Specifications
  - Supply voltage = 12 to 32v (auto sensing)
  - Pump output = 88 amp @ 12v continuous
  - Alarm output = 3 amp inductive
  - Quiescent current = 24 milliamps
  - Use SS Technologies FS2A float switch or other approved manufacturer

# Wiring Block Diagram



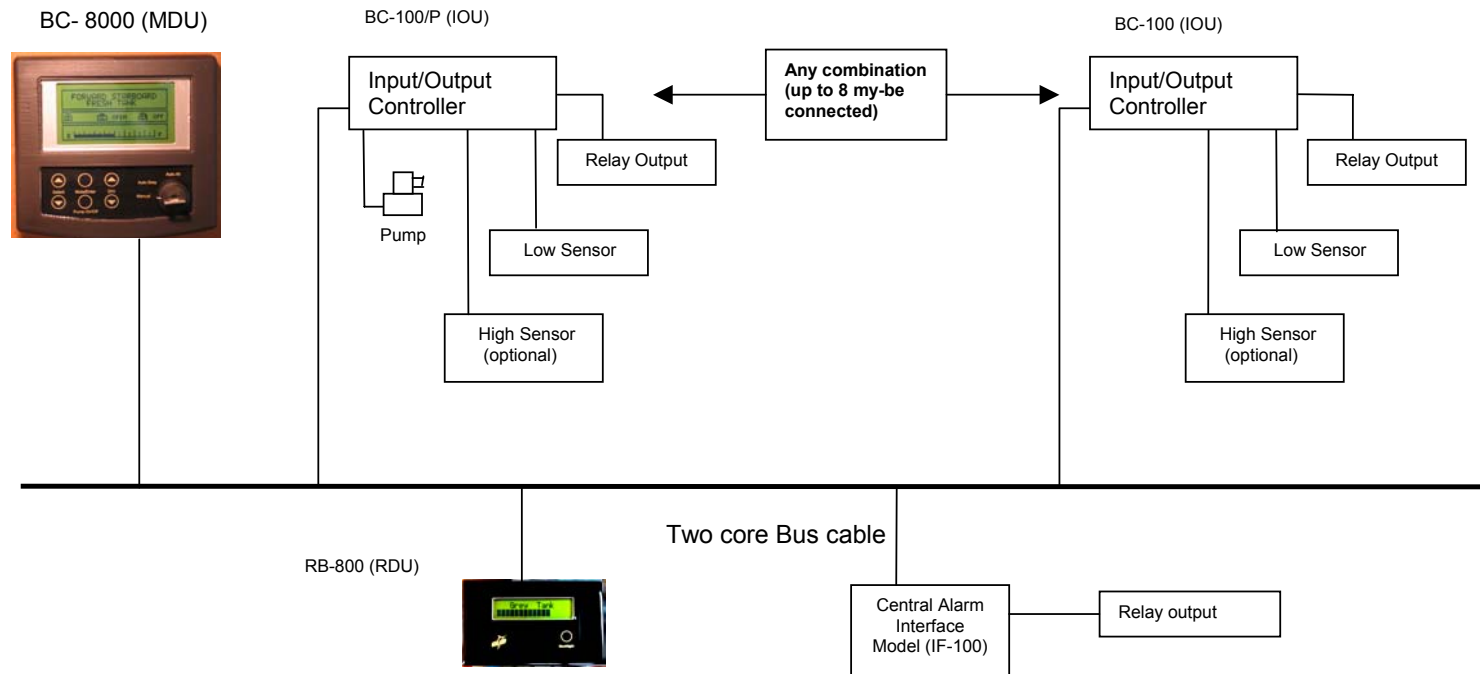
**WARNING:** As the BC-100/P supplies power for the pump the supply and cables need be rated & fused for the pump.

## Eight Channel Bilge Controller System Configuration for Model BC-8000

**Any Device can sit anywhere on this two core Bus cable.**

Any combination of BC-100/P and or BC-100 (up to eight) can be connected plus one model RB-800 repeater display unit.

**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.

# Installation Steps

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

## Step 1:

Install and connect the Master Display Head Unit (BC-8000) [page 6](#).

## Step 2:

Install and connect the Bilge Input/Output Units (BC-100/P or BC-100) [page 7](#).

## Step 3:

Setup Rotary Switches [page 8](#).

## Step 4:

Setup Pump Sensing [page 9](#).

## Step 5:

Program the Display Unit (BC-8000) [page 10](#).

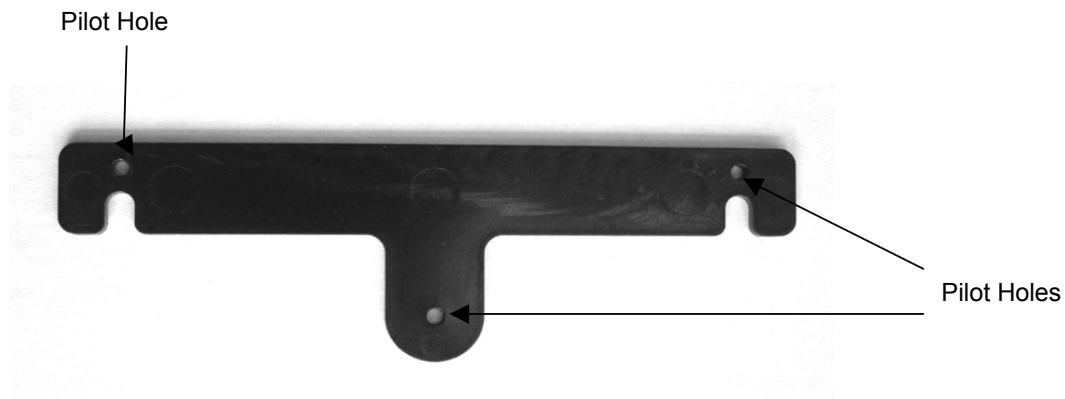


## Mounting the BC-8000 Display Unit

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 tool (ensure the tool is not too loose).

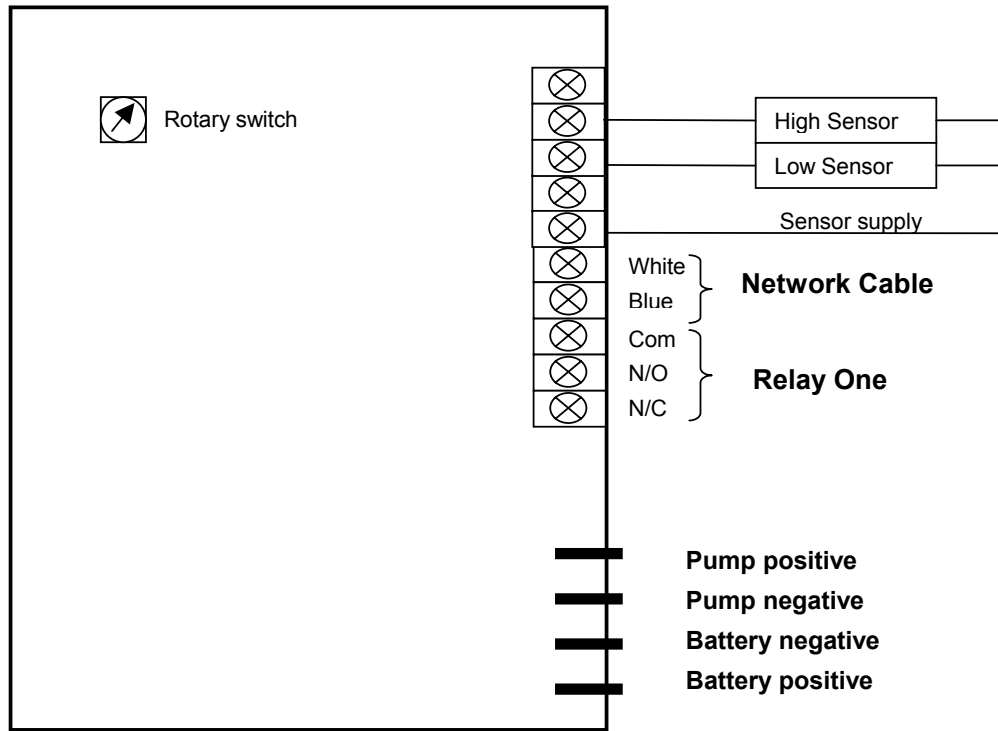
Drill the bottom hole to 12 mm (cable hole).

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.

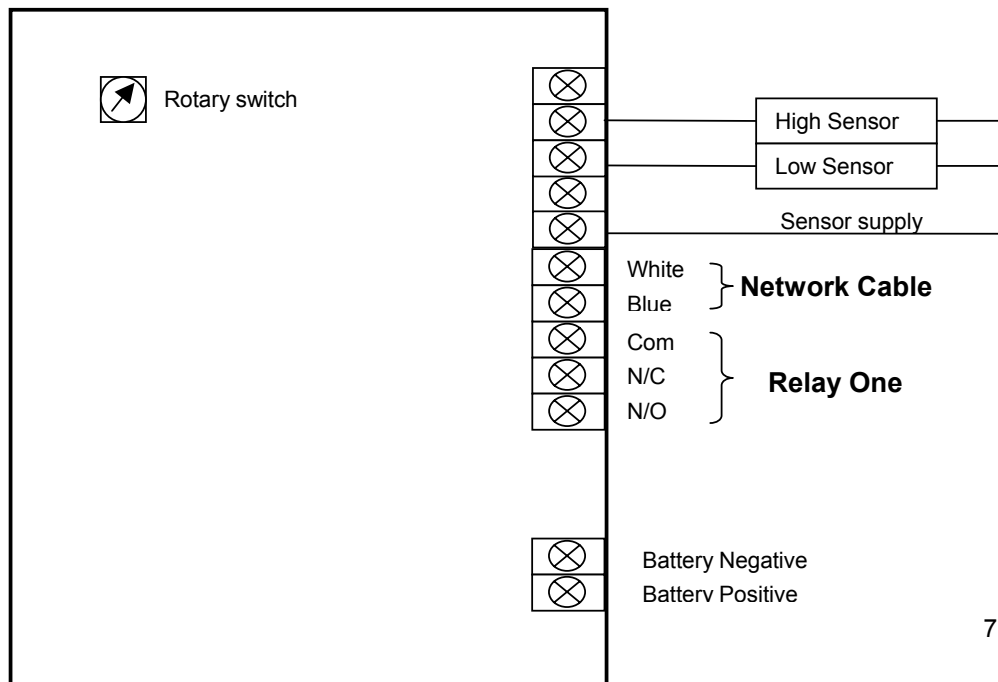


. See page 3 (Wiring Block Diagram) for wiring details.

# Wiring Diagram for Model BC-100/P



# Wiring Diagram for Model BC-100



## Setting Rotary Switch (Network Address)

To enable the MDU to remotely monitor and control each bilge area, each I/O unit must have a unique network address. This is accomplished by setting the rotary switch inside the I/O unit to a switch position (from 2 to 9).

**Important: Each Input/Output Unit BC-100/P or BC-100 on the network must have the Rotary Switch set to a unique number. Two I/O units may NOT share the same Rotary Switch number.**

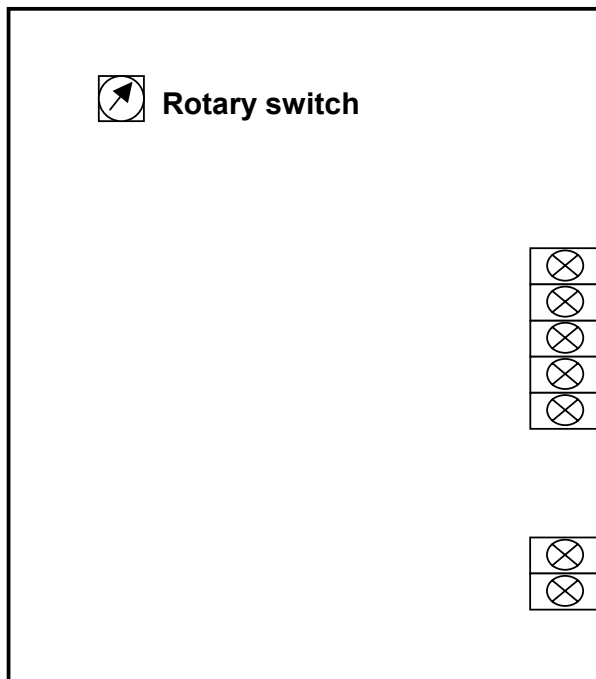
This Rotary Switch is situated inside the Box of the Input/Output Unit (see below for position).

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

Switch Position	Bilge Position
	<i>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</i>
2	
3	
4	
5	
6	
7	
8	
9	

### 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.

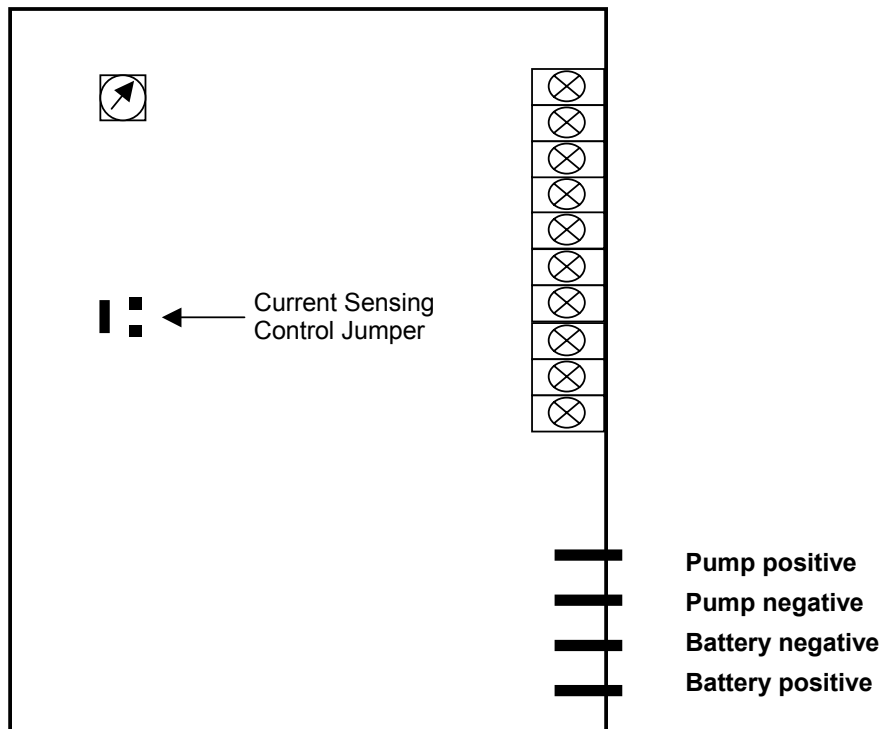
If the pump is turned on either manually or automatically and the pump fails to start due to short or open circuit, the alarm screen for that **bilge** area will display “**Pump : Fault**” the alarm will sound indicating a fault. Pushing the mute button will mute the alarm.

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 ( eg. 110vac volt )**

To **Enable** this feature Remove the Jumpers

To **Disable** this feature Insert the Jumpers




# Programming Instructions for Master Display Unit

## Step 1: Placing the unit in Program Mode



Press and hold down the Mute & Select Up keys together for three seconds. This will place the unit in program mode.

## Step 2: Selecting the Bilge area to program


Once the unit is in program mode the display will show " Select Switch  " use the Select Up or Down keys to change the switch number which corresponds to the bilge I/O unit being programmed (refer to table on page 3) for switch number.

Once the switch number has been selected push the "Mute" key to accept.

## Step 3: Program or Erase


The display will now show " Prog  " "Erase  " use the Select Up key to program or the Select Down key to erase. If Select Up is pushed go to step 4 if Select Down is pushed see **Erase** below.


## Step 4: Selecting Bilge Area Name

The display will now show " Select Position  " use the Select Up or Down key to scroll through the pre-programmed named bilge positions (e.g. AFTPORT). Once you have found the one required push the Mute key to accept.


## Step 5: Selecting Delay On, Delay Off and Alarm Times

The top area of the display will now show "Delay On Time ". The mid-section will display


"Select Delay Time  " Use the Select Up or Down key to scroll through the delay timers. Once you have found the one required push the Mute key to accept. If "USE DEFAULTS " is selected see **Defaults** below.

If "Delay On Time " or " Delay Off Time " is selected the mid-section will now display " Seconds = 00  ". Use the Select Up or Down key to scroll through the times (these increase in 5 second increments). When selection is made push the " Mute " key to accept.

This process needs to be done for both " Delay On Time " and " Delay Off Time ". Unless " USE DEFAULTS " is selected.

Once the "Delay On Time " and " Delay Off Time " has been set the display will now show " Delay Alarm Time ". Push " Mute " to accept. The mid-section will now display " Seconds = 00  ". Use the Select Up or Down key to scroll through the times (these increase in 5 second increments). When selection is made push the " Mute " key to accept.

The minutes will now need to be entered.

" Minutes = 00  ". Use the Select Up or Down key to scroll through the times (these increase in 1 minute increments). When selection is made push the " Mute " key to accept.

## Programming Instructions Continued

### Step 6: Next or End

The display will now show " Next ▲ " " End ▼ " use the Select Up key to program the next I/O unit or push the Select Down key to exit from program mode.

### Defaults:

When this option is selected the sensor delay on and off times will be set to 5 seconds and the pump on alarm time will be set to 1 minute. Go to step 6

### Erase:

The display will now show " ARE U SURE Y N " use the Select Up key for NO or the Select Down key for YES. If NO is selected the unit will return back to Step 2 if YES is selected the Tank Position and Type will be erased for that switch position and the unit will return back to Step 5.

# 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 place in manual mode.

**Auto All** – The **first push** will place any bilge areas currently programmed as “**manual**” in to “**automatic**” mode (the display will show **Auto Mode**). A **second push** will place the programmed manual areas back into manual mode (the display will now show (**Semi-Auto Mode**) all bilge areas will now revert to their original programmed modes. That is, those programmed Auto will be in automatic and those programmed Manual will be in manual mode as described below).

## Manual Mode:

When any area is placed into **Manual Mode** the **pump will NOT turn on when either a low or high float switch turns on, however the system will automatically alarm you indicating there is water in that area.** The Pump may be turned on manually see section Manual Pump On/Off (page 14).

## Auto Mode:

When in **Auto Mode**, if the **low float switch turns on** the Delay On Time and Pump Run Alarm Time’s are started. Once the Delay On Time is reached, the **pump will turn on**. When the **low float switch turns off** the Delay Off Time is started and once reached, the **pump will turn off**. If the pump is still running and the Pump Run Alarm Time is reached the alarm will sound and the bilge area (including stats) will be displayed.

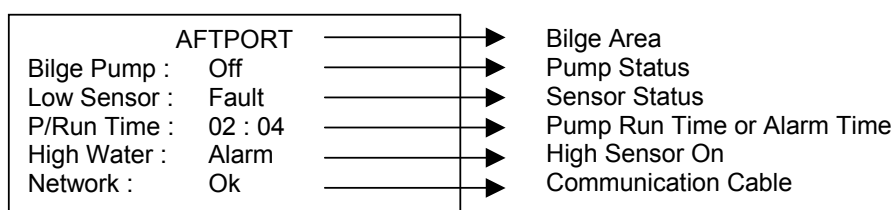
**If the low float switch is faulty and the high float switch turns on** the Delay On Time is ignored and the **pump will turn on immediately**. The alarm will sound and the bilge area (including stats) will be displayed.

## 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.

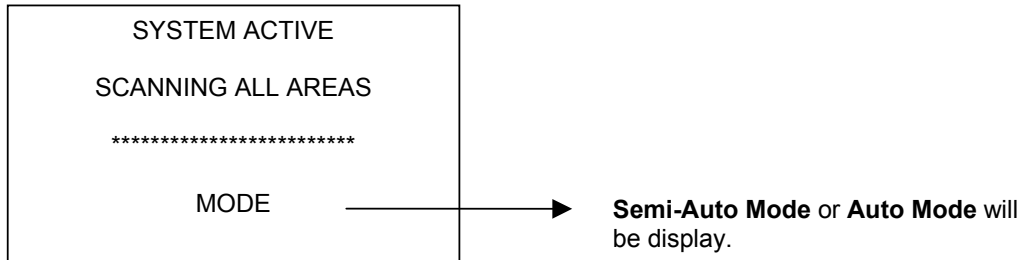
The alarm display screen will show the following:



## Alarm Mute:

Pushing the mute button will mute the alarm. However the fault alarm display screen will remain until the fault has been corrected. Should another fault occur, the alarm will start again. Pushing the Mute button will mute the alarm but the fault alarm display screen will remain until the fault has been corrected. Should faults continue occurring, the above process will be repeated. Pushing the Select Down button will allow you to toggle between fault screens.

## Normal Operation Screen



## Bilge Area Status Screen

Pushing 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 pushed within 30 seconds or the Select Up key is pushed this screen will go back to the Normal Operation Screen as above.

AFTPORT	—	→	Bilge Area
Bilge Pump :	Off 12	—	→ Pump Status & Number of times the pump has turned on
Low Sensor :	Off	—	→ Sensor Status
P/Run Time :	00 : 58	—	→ Pump Run Time or Alarm Time
ProgramMode :	Manual	—	→ Programmed Mode (Auto or Manual)
OperateMode :	Auto	—	→ Current Operating Mode (Auto or Semi)

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

If a bilge area was programmed for manual and the system was in Semi-Auto mode this would display Manual but if the system where in full Auto mode it would display Auto.

## Manual/Auto Mode Selection (Programme Mode)

**To place a bilge area into Manual Mode:** Step 1. Push the Select Down key and keep pushing until the bilge area required is reached. Step 2. When the bilge area required is reached push the **Auto/Manual** key, placing 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.

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

*This feature has been designed as a quick and easy override function. Any bilge area deemed as illegal to discharge would be programmed as Manual Mode but easily converted to Full Auto Mode on leaving port and back to Manual Mode upon entering port.*



## Manual Pump On/Off

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

Pushing the Select Up key will exit from the Bilge Status Screen, it will also turn the pump **Off**.

## 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 this 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 area's have been set for manual mode but the system is running in auto mode (by pushing the "Auto All" key).

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 pushing the "Auto All" key any and all manual areas would be converted to Auto mode. When arriving back to port simply push the "Auto All" key again and this will place any and all areas set as manual, back to manual mode.

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

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

## Making Changes while a Fault screen is displayed

If there is a fault screen displayed pushing 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 pushing the Auto All key. Pushing the Select Up key again will take you back to the fault screen.

If you require going into the bilge status screen then push the Select Up key will take you into the Normal Operation Screen (without the scanning dots) pushing the Select Down key will allow you to scroll to the area of interest. Push the Select Up key to exit back to the fault screen or if no other key is pushed within 30 seconds it will exit automatically.

## Electrical Specifications BC-8000

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

