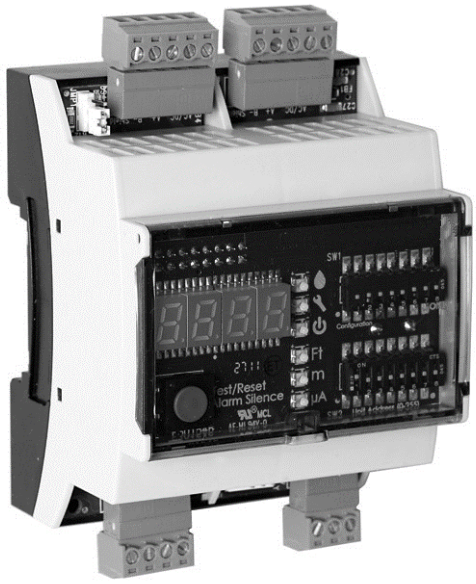
Honeywell Home

# SeaHawk

User Guide



Version 2.5

Firmware Version 3.2

## Content



EN2H-1601GE23 R1020 • Subject to change

# 1. Product Overview

## 1.1. Description

As a most cost effective distance-read leak detection solution, the SeaHawk reports the presence of water and other liquids as detected by sensing cable.

Capable of accommodating up to 3000 m of sensing cable, the SeaHawk has an audible alarm and can communicate via Modbus. As a stand-alone solution, the SeaHawk provides alarm notification and numeric distances on its front panel. Integration into a Modbus network allows the activity and status of one or multiple SeaHawks to be managed from one central location.

## 1.2. Operation

### 1.2.1. Supervised System

The SeaHawk is a supervised system – it continually monitors sensing cable and spot detectors for continuity – and produces alarms for the following conditions:

- Leak detection
- Cable break
- Cable contamination

### 1.2.2. Distance-Read Leak Detection

When the SeaHawk's circuitry measures a current in excess of the user-defined leak threshold, the unit's microprocessor computes the distance to the leak. The SeaHawk then annunciates the leak and communicates via Modbus to a master Modbus enabled BMS controller. The summary relay sends notification to an alarm panel or monitoring system.

### 1.2.3. User Configuration and Communication

The SeaHawk's front panel display – which includes a 4-digit LED panel and six LED indicators – provides information about its status, including the following:

- Leak detected
- Cable fault detected
- Power status
- Configured unit of measure
- Leak detection cable's amperage value
- Distance to leak or contamination
- Length of installed leak detection cable
- Self-test results

The two blocks of DIP switches on the SeaHawk's front panel are used for configuration.

- DIP SW1 configures parameters such as leak and contamination thresholds, latching alarms, and realarm time interval.
- DIP SW2 is used to set the Modbus address for the unit.

The SeaHawk also provides configuration capability and status information to a Modbus-equipped system via its EIA-485 port.

EN2H-1601GE23 R1020 Subject to change

# 2. Technical Specifications

| | | |
|---|---|---|
| Power | | An isolated power supply must be provided for the SeaHawk. A dedicated circuit breaker must also be provided within close proximity to the SeaHawk and clearly be marked as the disconnecting device for the SeaHawk leak detection controller<br>12-24 V AC/DC (±10%), 50-60 Hz - LAS-PSWA |
| Accessories | | Included: leader cable and EOL terminator |
| Output | | |
| | Relay | 1 Form C, 5 A resistive @ 30 VDC, 8 A resistive @ 250 VAC, Minimum load 10 mA @ 5 VDC (Signal) |
| Inputs | | |
| | Leak Detection Cable | Compatible with SeaHawk sensing cable (not included) |
| | Cable Input | Requires 4.57 m leader cable and EOL terminator (included) |
| | Maximum Length | 3000 m |
| | Minimum Length | 11 m |
| | Detection Accuracy | ± 0.6 m +/- 0.5% of the total cable length |
| | Detection Repeat-ability | ± 0.6 m +/- 0.25% of the total cable length |
| | Detection Response Time | 5 to 990 sec (selectable) |
| Communication Ports | | |
| | EIA-485 | 1200, 9600, or 38,400 baud, N2 (selectable); Parity: none, 8 data bits, 1 stop bit |
| Protocols | | |
| | Modbus (RTU) | Slave; RTU mode; Supports function codes 03, 04, 06, and 16 Master; RTU mode for integration with Modbus master BMS/NMS. Addressable from 1 to 254. |
| Alarm Notification | | |
| | Visible Alarm | Red LED for leak alarm<br>Yellow LED for cable contamination or fault<br>4-character LED displays distance or fault status |
| | Audible Alarm | 85 dBA @ 0.6 m; re-sound configurable, 0 to 999 min. |
| Front Panel Interface | | 4-character LED displays leak or contamination distance or fault status |
| | LED Indicators | Six LED indicators:<br>• Yellow: Cable Fault, Break, or Contamination<br>• Green: Power On<br>• Green: Measurements made in feet<br>• Green: Measurements made in meters<br>• Green: Microamps of current on cable |
| | Push Button | Test/Reset/Alarm Silence, cycle through device functions |
| Operating Environment | | |
| | Temperature | 0 °C to 50 °C |
| | Humidity | 5% to 95% RH, non-condensing |
| | Altitude | 4500 m max. |
| | Storage Environment | -20 °C to 70 °C |
| Medium for detection | | Normal water (e.g. not de-ionized, distilled etc.) without oil and corrosive contaminants. |
| Dimensions (WxHxD) | | 71 mm x 109 mm x 61 mm |
| Weight | | 153 g |
| Mounting | | Wall and DIN rail mountable |
| Certifications | | CE; ETL listed: conforms to EN 61010-1; UL 61010-1, certified to CSA C22.2 NO. 61010-1; RoHS compliant |

EN2H-1601GE23 R1020• Subject to change

# 3. Installation and Configuration

## 3.1. Prepare for Installation

To install the SeaHawk, you'll need following supplies:

Included with the SeaHawk

- 4.57 m leader cable
- End-of-line terminator (EOL)

Available and sold separately

- 12-24 VAC/VDC, 50-60 Hz isolated power supply
- SeaHawk Sensing Cable, up to 3000 m
- J-Clips

## 3.2. Physical Connection Overview

The SeaHawk contains two circuit boards:

- The top circuit board houses operational controls and displays. SeaHawk operational information is found in chapter 4., "Operation"
- The lower circuit board houses the connectors for:
  - AC/DC power
  - Relay output
  - Leak detection cable
  - Communications

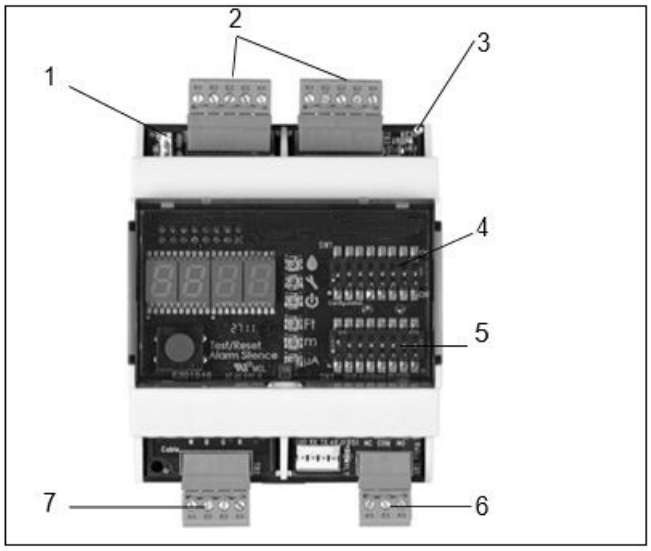



Fig. 1: SeaHawk Physical Inputs

1 Termination Jumper
2 AC/DC Power Connections (2) and EIA-485 Communications Ports (2)
3 EGND1Earth Ground for use with AC Power
4 SW1 Configuration Setting
5 SW2 Modbus Configuration
6 Relay Output
7 Sensing Cable Connection

## 3.3. Mount the SeaHawk

The SeaHawk can be wall fastened or mounted on a DIN rail. The device has two adjustable orange clips on the bottom. Push the clips out to expose two screw holes that allow the device to be fastened on a wall; push the clips in to mount it on a DIN rail.

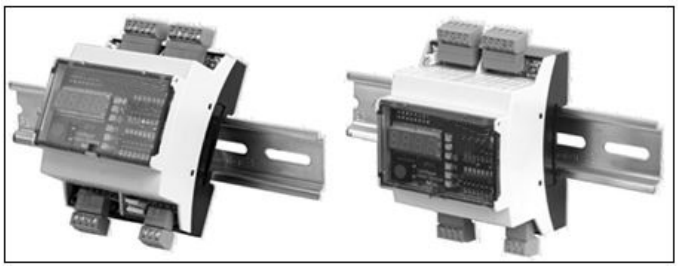


Fig. 2: Mounting the SeaHawk on a DIN rail

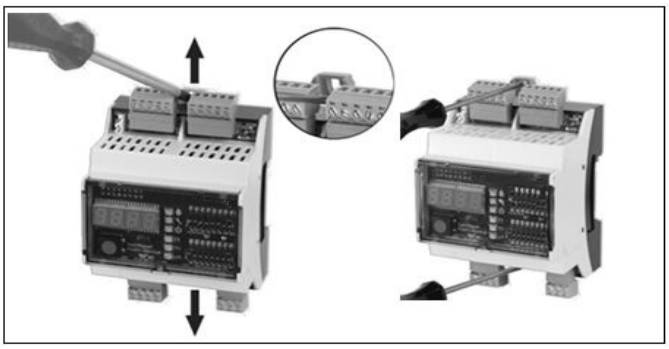


Fig. 3: Mounting the SeaHawk on a wall

## 3.4. Establish Physical Connections

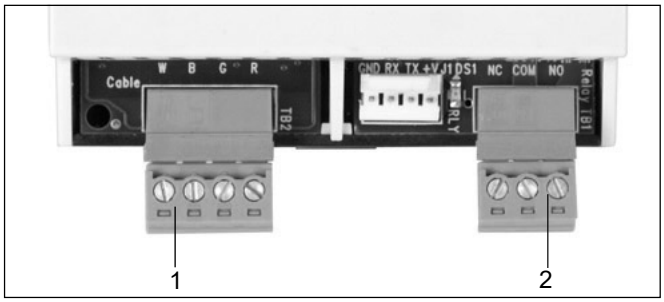



Fig. 4: Sensing Cable Connection (TB2) and Relay Output (TB1)

1 Sensing Cable Connection
2 Relay Output

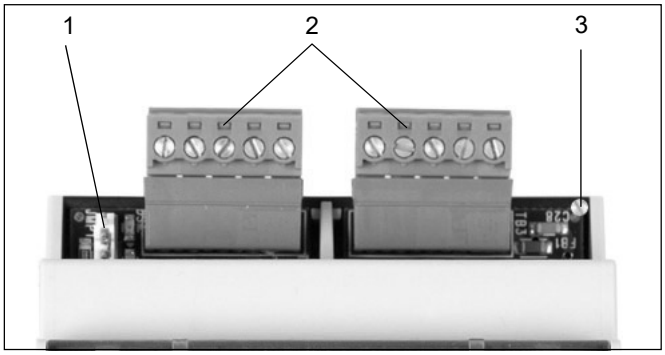



Fig. 5: Power and Communications Connections (TB3 and TB4) and Termination Jumper (JMP)

1 Termination Jumper
2 AC/DC Power Connections (2) and EIA-485 Communications Ports (2)
3 EGND1Earth Ground for use with AC Power

EN2H-1601GE23 R1020• Subject to change

### 3.4.1. TB1: Summary Relay (optional)

Terminal Block 1 is a Form C relay output. This relay enables alarm notification through a local or remote panel, master controller, or BMS whenever a leak, cable fault, or cable contamination is detected.

1. Insert the wires into the appropriate slots on TB1 to connect the relay output to the desired panel or controller.

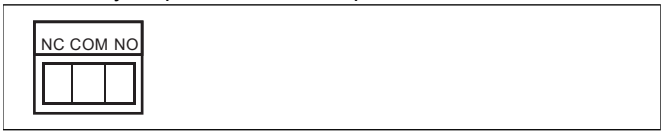



Fig. 6: Relay Output Connection TB1

2. DIP switches are used to adjust settings on the SeaHawk.

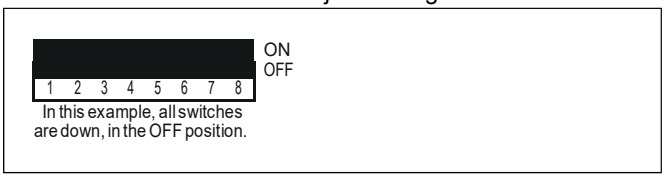



Fig. 7: General DIP Switch Settings

Use DIP switch 5 on the SW1 DIP switch block to configure this relay as latched or unlatched.

- An unlatched alarm resets itself once a detected leak or cable problem has been resolved.
- A latched alarm must be manually reset, even if the detected leak or cable problem is no longer present.

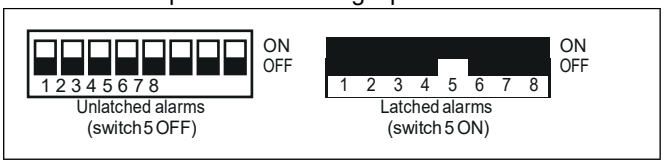



Fig. 8: DIP Switch 5, SW1 - Unlatched or Latched Alarms

### 3.4.2. TB2: Leader Cable

1. A 4.57 m section of non-sensing leader cable is supplied with each SeaHawk. The leader cable connects sensing cable to the SeaHawk, since sensing cable cannot connect directly to the unit. Insert its four stripped wires into the appropriate slots in TB2 – from left to right: white, black, green, and red.

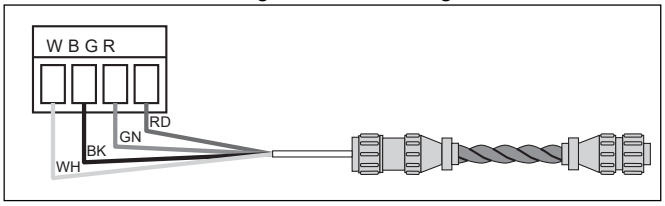



Fig. 9: Cable Connection TB2

If the terminal connector is removed from the end of the cable, make sure the wires are in this same order, W - B - G - R, when the connector is reapplied.

2. Use DIP switch 6 in block SW1 to designate whether the distance on the display is shown in feet or meters:

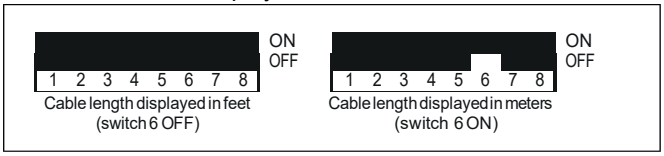



Fig. 10: DIP Switch 6, SW1 - Display Cable Length in Feet or Meters

4. Set the baud rate for the EIA-485 port using DIP switches 1
3. The orange sensing cable has a resistance of 9.2 Ohm/m. Set DIP switch 7 in block SW1 to off. In this example, all switches are down in the OFF position.

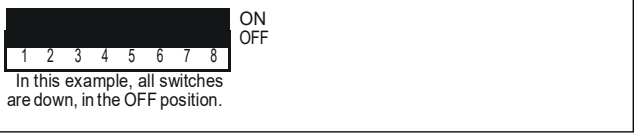



Fig. 11: DIP Switch 7, SW1 - Ohm/m Resistance

### 3.4.3. TB3 and TB4: Input Power and EIA-485 Communications Port

The SeaHawk operates on either 12-24 VAC or 12-24 VDC power. A power supply is not included with the SeaHawk.

An isolated power supply must be provided for the SeaHawk. A dedicated circuit breaker must also be provided within close proximity to the SeaHawk and clearly be marked as the disconnecting device for the SeaHawk leak detection controller.

Do not connect 230 VAC to the unit, or damage will occur to the circuitry.

1. Run a power supply to the location of the SeaHawk, or use a DIN rail mountable power supply and mount it next to the SeaHawk.
2. If you are installing just one SeaHawk, use the two left-most pinouts on either TB3 or TB4 (marked AC/DC) to connect power to the SeaHawk. Insert the positive and negative wires of the power supply into either of the pinouts; the SeaHawk's circuitry will auto-correct.
   - If you are installing more than one SeaHawk, use TB3 and TB4 to create a daisy-chained power connection.
3. If you are installing just one SeaHawk and it will communicate via Modbus to a Modbus controller, use the three right-most pinouts on TB3 or TB4 to connect the SeaHawk to an EIA-485 network.
   - If you are installing more than one SeaHawk, use the appropriate pinouts of TB3 and TB4 to create a daisy-chained Modbus connection.
   - A grounded shield contact is provided for connection to shielded cable. If the shield contact is used, verify the power connector is properly grounded and there is no voltage potential between units on the Modbus network.

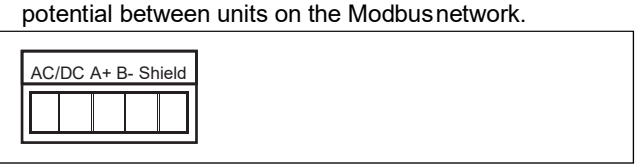



Fig. 12: TB3 and TB4 Power Supply and Communications Connections

- When applying an AC power supply be sure to also wire the ground terminal (EGND1) to an appropriate earth ground.

and 2 on SW1:

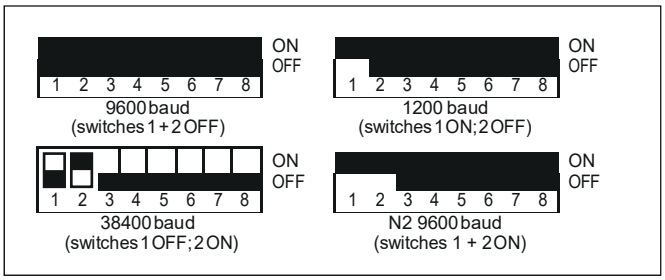



Fig. 13: DIP Switch Settings for Communications Baud Rate

The EIA-485 port is set to 8 data bits, no parity, and 1 stop bit (8, N, 1).

DIP SW2 is used to set the Modbus address.
For further information regarding Modbus configuration, refer to section 5.1., “Modbus Implementation Basics”.

3.4.3.1 Communication via Modbus

1. Now tell the device that it is communicating via Modbus. Use switch 3 on DIP SW1 to do this. Leave switch 3 in the OFF position to communicate via Modbus.


Fig. 14: DIP Switch Settings for Modbus Communications

2. If you are communicating via Modbus, you only need to set the Modbus address via SW2. The Modbus address should be a number between 1 and 254. Adjust the individual switches until their sum equals the Modbus address. The following illustration shows the values of the DIP switches on the SW2 block as well as two examples of how the DIP switches would be set for specific unit addresses.

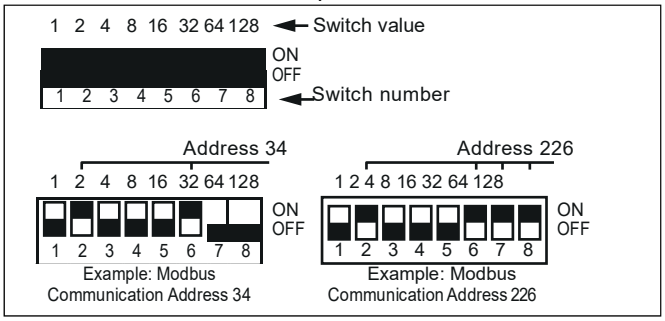



Fig. 15: SW2 DIP Switch Settings for Communications Address

### 3.4.4. JMP - Termination Jumper

The termination jumper, labeled JMP, is located next to TB4. It is used to designate the end of the line unit in a daisy chain. The SeaHawk ships with the jumper in the non-terminated position - over the two pins closest to the device enclosure. If your SeaHawk is the only device in the application, or if it’s not the last unit in the daisy chain, leave the jumper where it is. If your unit is the last device in a daisy chain, move the jumper so it is over the two pins nearest the end of the board.

## 3.5. Select Alarm Options

### 3.5.1. Enable and Disable the Audible Alarm

1. The audible alarm is disabled by default. To modify this setting, adjust switch 8 on DIP SW1:

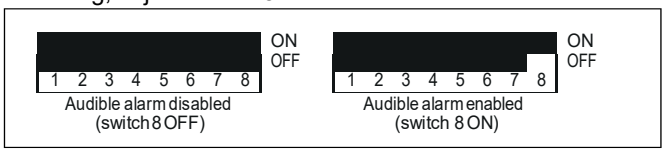



Fig. 16: DIP Switch 8, SW 1 - Audible Alarm Settings

### 3.5.2. Set the Re-Alarm Interval

The SeaHawk can be set to re-alarm – after a leak or cable fault has been detected, the alarm will be re-sent at a 4-hour interval until the alarm condition has been resolved. This re-alarm triggers both the audible alarm and the Modbus readouts.

1. The re-alarm option is disabled by default. Activate the re-alarm setting with DIP switch 4 of SW1:

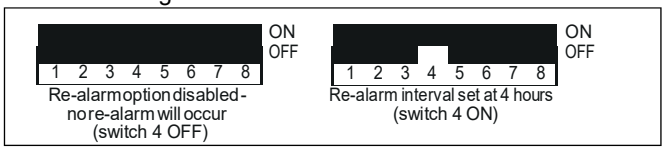



Fig. 17: DIP Switch 4, SW1 - Re-Alarm Interval

## 3.6. Connect the SeaHawk Leak Detection Cable

To avoid faulty leak detection readings, connect a minimum length of 11 m of sensing cable to the SeaHawk.

The SeaHawk is shipped with a 4.57 m leader cable. This leader cable was connected to the SeaHawk in section 3.4.2., “TB2: Leader Cable”. The following directions help you connect sensing cable to the SeaHawk.

### 3.6.1. Connect Lengths of Sensing Cable

1. Unscrew the end-of-line (EOL) terminator from the end of the leader cable.
2. Attach the first length of sensing cable to the leader cable.
   - Insert the male pins into the female connector, and twist the collar on the female side of the connector to secure.

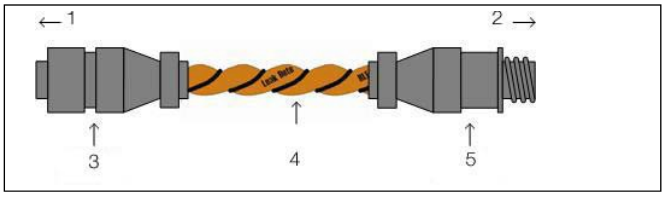



Fig. 18: SeaHawk Sensing Cable

1 Toward Cable End
2 Toward Control Head
3 Female Connector
4 Cable
5 Male Connector

6. Route the sensing cable according to your cable layout diagram. Attach additional lengths of sensing cable as necessary.
7. Secure the EOL terminator to the unoccupied end of the last length of sensing cable.

If the EOL terminator is not present at the end of the cable run, a cable fault will register.

8. If you are using a reference map, compare it with the actual cable installation. Revise any discrepancies created through the physical installation of the cable.

EN2H-1601GE23 R1020• Subject to change

### 3.6.2. Secure Sensing Cable to the Floor

Secure the sensing cable to the floor with either J-Clips, or one of the other approved methods shown in Fig. 19:, “Secure the Cable”. Available and designed specifically for use with sensing cable, J-Clips are the manufacturer's recommended installation method.

- To avoid contaminating the cable, clean the entire floor as much as possible. Use isopropyl alcohol to clean the spots on the floor where J-Clips will be placed.
- Place one J-Clip every 1.5 to 1.8 m along the length of the sensing cable and one at each turn of the cable. Use more J-Clips if a tighter configuration is required.
- If the cable is installed over an obstruction, clip the cable on both sides, as close to the obstruction as possible.
- The J-Clip’s adhesive backing does not work well on porous concrete floors. It is recommended to use a drop of silicone or another nonconductive adhesive to help secure the J-Clip to the floor.

⚠ Do not install the cable directly in front of an air conditioner. Allow a minimum of 1.2 to 1.8 m between the unit and the cable. If the cable is too close to the air conditioning unit’s air stream, the moisture from the humidifier may cause false leak readings. If the cable must be installed in front of an air conditioning unit, place the J-Clips 1 m apart.

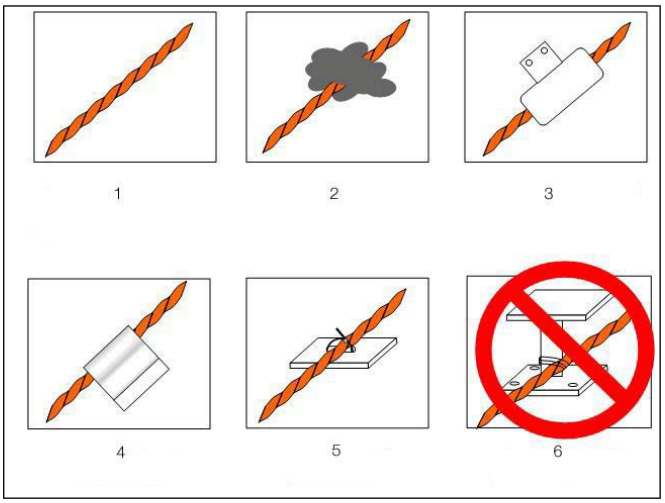



Fig. 19: Secure the Cable

1 Laid freely on the floor. Recommended in spaces with no access.
2 Secure to floor with non-conductive mastic
3 Installed in protective covering
4 Secure to floor with J-Clip
5 Secure to floor with zip tie
6 Do not secure to metallic pedestals

## 3.7. Apply Power to the SeaHawk

⚠ An isolated power supply must be provided for the SeaHawk.

In addition, a dedicated circuit breaker must be provided within close proximity to the SeaHawk and be clearly marked as the disconnecting device for the SeaHawk leak detection controller.

Do not connect 230 VAC to the unit, or damage will occur to the circuitry.

1. An isolated power supply was run and power was connected to the SeaHawk in section 3.4.3., “TB3 and TB4: Input Power and EIA-485 Communications Port”.
2. Ensure all connections are correct and all screw terminals are secure.

⚠ For AC power connection, wire EGND1 to Earth ground.

3. Apply power to the SeaHawk.
   - The device will begin to boot.
4. Wait approximately one minute for the SeaHawk to start up.
   - Under normal operating conditions, the power LED glows green and the LED display reads `SH10`. No alarm should be present.
5. If an alarm is present, consult chapter 7., “Troubleshooting” for troubleshooting information.
6. Press the Test/Reset button once to verify the amperage reading. For new leak detection cable, the amperage will be either 0 or 1 µA. If the current is higher than 0 or 1 µA, contamination may have been introduced during installation. Clean the floor, and then uses isopropyl alcohol to clean the cable. If the sensing cable is not new, the reading may be higher. It is recommended to clean the cable if the amperage reading is 15 µA or higher.
7. Press the Test/Reset button twice to verify the length of installed sensing cable. If the length displayed is different from the actual length installed, consult chapter 7., “Troubleshooting” for troubleshooting information.

## 3.8. Test the System

If the SeaHawk is already connected to a BMS, notify monitoring personnel before you begin testing the system.

1. To verify the SeaHawk’s accuracy, test three points within the length of sensing cable - one at the beginning, one in the middle of the length, and another near the end of the length of cable.
2. There are a variety of ways to simulate a leak.
   - Pour a small puddle of water on the cable while it rests on the floor.
   - Dunk the cable in a cup of water.
   - Wet a paper towel or rag and wrap it loosely around the cable. This is popular if the cable is used in pipe applications. Be careful to wrap the wet cloth loosely around the cable. Do not put pressure on the cable.

⚠ To avoid inaccurate readings, do not grip the cable with your hand.

3. Verify that the SeaHawk reports the leaks within approximately 0.6 m of their actual physical location.
4. Remove all simulated leak sources and return the system to its normal operating state.

EN2H-1601GE23 R1020 Subject to change

# 4. Operation

## 4.1. Front Panel Controls and Display

The front panel of the SeaHawk contains a 4-character LED and series of colored LEDs that are used together to convey device status and information regarding detected leaks and cable faults. A blue button is used to cycle the 4-character LED, silence the audible alarm, and reset the alarm.

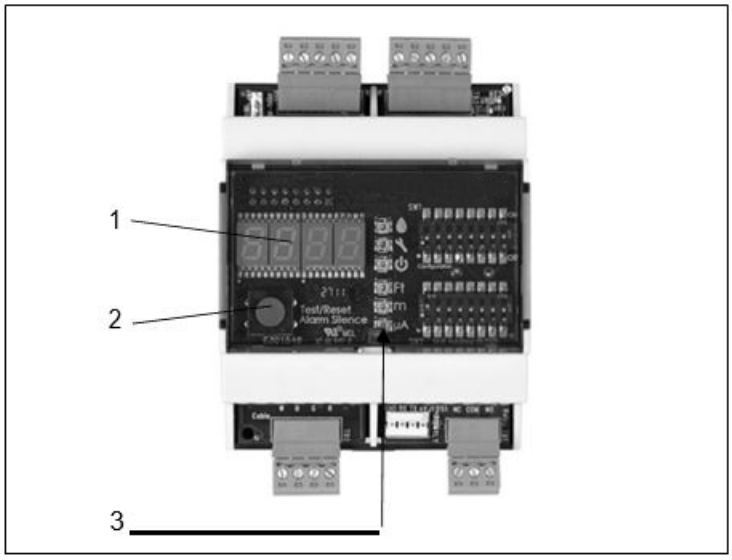



Fig. 20: Front Panel Controls and Display

1 Four-Character, LED Display
2 Test / Reset Alarm Silence Button
3 LED Indicators

| Front Panel Indicator | Symbol | Description |
|---|---|---|
| 4-character LED | SH10 | System is running in its normal operating state. |
| | 675 (e.g.) | A leak, fault, or contamination has been detected. The numerical distance to the leak displays on the LED. A green LED lights next to the appropriate distance measurement, and either the LED next to the water drop glows red to indicate a leak, or the LED next to the wrench glows yellow to indicate cable contamination. If the distance is measured in meters, a tenths place decimal value will appear in measurements from 0.0 to 999.9. All meter values over 1000 will display as whole meter measurements. |
| | cbr | A cable break or fault has been detected. A yellow LED flashes next to the wrench symbol. |
| LED | | Red LED: Leak is detected - distance is displayed on 4-character LED |
| | | Yellow LED: Cable fault - 4-character LED displays cbr |
| | | Yellow LED: Cable contamination - 4-character LED displays the distance to the contamination |
| | | Green LED: Power on |
| | Ft | Green LED: Measurements are made in feet |
| | m | Green LED: Measurements are made in meters |
| | µA | Green LED: Microamps of current on cable - amperage is displayed on 4-character LED |
| Test/Reset Alarm Silence Button | Blue Push Button | In normal operating conditions, the button functions include:<br>• Press once: Displays cable current in Ohm/foot and the green LED lights next to the microamp symbol<br>• Press twice: Displays the length of installed cable components and the green LED lights next to the appropriate Ft or m symbol<br>• Press three times: Return to the default display (SH10)<br>• Press and hold: Self-test is initiated and the character display reads cal 8060, which indicates the value of the test resistor. |
| | | If an alarm sounds, briefly press the button to turn off the audible alarm. The Status LED remains red, and the 4-character LED continues to show the alarm condition. |
| | | In an alarm condition, whether the audible alarm is sounding or not, press and hold this button for 3 seconds to clear the alarm. |

Table 1: Front Panel Controls and Displays

EN2H-1601GE23 R1020 • Subject to change

## 4.2. Manage Alarms

General Guidelines

1. If the audible alarm sounds, briefly press the Test/Reset button to silence it.
2. Look at the display, or read the appropriate Modbus register, to determine the type of alarm and the distance to the leak, contamination, or cable break.
3. If you have a leak detection reference map, cross-reference the distance with the map.
4. Fix the problem (fix the leak, then dry the area and the section of cable involved in the leak; replace broken cable; clean contaminated cable).

Contamination Alarm Guidelines

If the cable is in a contamination alarm state, check the following:

- Verify that the cable is at least 1.2 m away from any air conditioning unit.
- If there is dirt, grit, or grime on the cable, clean the cable with isopropyl alcohol and a clean rag.
- If the cable is in a high traffic area, move it or install a cable protector over it.

# 5. Modbus Communication

## 5.1. Modbus Implementation Basics

The SeaHawk uses its EIA-485 port to communicate via Modbus. The SeaHawk is configured to act as a slave device on a common network and is a slave only device – it will never initiate a communications sequence.

### 5.1.1. Modes of Transmission

The SeaHawk supports the Modbus RTU mode of transmission, with 8 data bits, no parity and one stop bit. Each Modbus packet consists of four fields:

- Slave Address Field
- Function Field
- Data Field
- Error Check Field (Checksum)

#### 5.1.1.1 Slave Address Field

The slave address field is one byte in length and identifies the slave device involved in the transaction. The valid Modbus slave address range is between 1 and 254. The Modbus address was set in Section 3.4.3., “TB3 and TB4: Input Power and EIA-485 Communications Port”. Refer to Fig. 15:. SW2 DIP Switch Settings for Communications Address for more specific information.

#### 5.1.1.2 Function Field

The function field is one byte in length and tells the SeaHawk which function to perform. Functions 03 (Read 4xxxx output registers) and 04 (Read 3xxxx input registers) are supported by the SeaHawk.

#### 5.1.1.3 Data Field

The length of the data field varies depending on the function. The data fields for the SeaHawk are 16-bit registers, transmitted high order byte first (big-endian).

#### 5.1.1.4 Error Check (Checksum) Field

The checksum field lets the receiving device determine if the packet has transmission errors. The SeaHawk RTU mode uses a 16-bit cyclic redundancy check (CRC-16).

#### 5.1.1.5 Exception Responses

If a Modbus master sends an invalid command to the SeaHawk or attempts to read an invalid register, an exception response is generated. The response packet will have the high order bit of the function code set to one. The data field of the exception response contains the exception error code.

| Code | Name | Description |
|---|---|---|
| 01 | Illegal Function | The function code is not supported |
| 02 | Illegal Data Address | Attempt to access an invalid address |
| 03 | Illegal Data Value | Attempt to set a variable to an invalid value |

Table 2:Exception Codes

## 5.2. Packet Communications for the SeaHawk

### 5.2.1. Function 03: Read Output Registers

To read the SeaHawk parameter values, the master must send a Read Output Registers request packet.

The Read Output Registers request packet specifies a start register and the number of registers to read. The start register is numbered from zero (40001 = zero, 40002 = one, etc.).

| Read Registers Request Packet | Read Registers Response Packet |
|---|---|
| Slave Address (1 byte) | Slave Address (1 byte) |
| 03 (Function code) (1 byte) | 03 (Function code) (1 byte) |
| Start Register (2 bytes) | Byte count (1 byte) |
| # of registers to read (2 bytes) | First register (2 bytes) |
| CRC Checksum (2 bytes) | Second register (2 bytes) |
| | … |
| | Cry Checksum (2 bytes) |

Table 3:Read Output Register Packet Structure

| Register | Name | Description | Units | Range |
|---|---|---|---|---|
| 40001 | Leak Threshold | Trip point for leak alarm | 25-175 µAmp<br>Default: 120 µAmp | 0-65535 |
| 40002 | Contamination Threshold | Trip point for contamination alarm | 25-175 µAmp<br>Default: 50 µAmp | 0-65535 |
| 40003 | Re-alarm Interval (read-only) | Amount of time that passes before unit resends alarm notification<br>Note: Set with DIP SW1; this register is read-only. | 0 (Disabled) or 4 hours<br>Default: 0 (Disabled) | 0-65535 |
| 40004 | Latched Alarms (read-only) | Latched alarm requires SeaHawk to be reset once alarm is cleared.<br>Note: Set with DIP SW1; this register is read-only. | 1 = Enabled<br>0 = Disabled<br>Default: Disabled | 0-65535 |
| 40005 | Silence Audible Alarm | Indicates whether or not the audible alarm sounds when the SeaHawk goes into alarm state | 1 = Enabled<br>0 = Disabled<br>Default: 0 (Disabled) | 0-65535 |
| 40006 | Reset Alarm | Resets the SeaHawk after an alarm state. Alternatively, press and hold the front panel's Test/Reset button for 3 seconds. | 1 = Enabled (reset alarm)<br>0 = Disabled (do not reset alarm)<br>Default: 0 (Disabled) | 0-65535 |
| 40007 | Sample Size | Number of samples taken to calculate the leak detection. | 4 = Minimum<br>25 = Maximum<br>0 = Set to default value<br>Default: 12 | 0-65535 |
| 40008 | Resistance per Foot | Milliohm of resistance of installed leak detection cable. This value is set here and can also be read through register 30008. | 2000 – 3500 Milliohm/foot<br>or<br>4240 Milliohm/foot | 0-65535 |
| 40009 | AC Rejection Frequency | Used by ADC to reject AC powerline frequencies. Needed only if the SeaHawk is running on 24 VAC power. | 0 = 60 Hz<br>1 = 50 Hz<br>Default: 1 (50 Hz) | 0-65535 |
| 40010 | Spare | Not used | | 0-65535 |
| 40011 | Spare | Not used | | 0-65535 |
| 40012 | Spare | Not used | | 0-65535 |
| 40013 | Spare | Not used | | 0-65535 |
| 40014 | Spare | Not used | | 0-65535 |
| 40015 | Spare | Not used | | 0-65535 |
| 40016 | Leak Alarm Delay | Amount of time that passes between leak detection and alarm notification. | 5 – 990 seconds<br>Default: 10 seconds | 0-65535 |
| 40017 | Contamination Alarm Delay | Amount of time that passes between cable contamination detection and alarm notification. | 5 – 990 seconds<br>Default: 120 second | 0-65535 |

Table 4:Output Registers

EN2H-1601GE23 R1020 • Subject to change

### 5.2.2. Function 04: Read Input Registers

To read the SeaHawk input values, the master must send a Read Input Registers request packet.

The Read Input Registers request packet specifies a start register and the number of registers to read. The start register is numbered from zero
(30001 = zero, 30002 = one, etc).

| Read Registers Request Packet | Read Registers Response Packet |
|---|---|
| Slave Address (1 byte) | Slave Address (1 byte) |
| 04 (Function code) (1 byte) | 04 (Function code) (1 byte) |
| Start Register (2 bytes) | Byte count (1 byte) |
| # of registers to read (2 bytes) | First register (2 bytes) |
| CRC Checksum (2 bytes) | Second register (2 bytes) |
| | … |
| | Cry Checksum (2 bytes) |

Table 5:Read Input Registers Packet Structure

| Register | Name | Description | Units | Range |
|---|---|---|---|---|
| 30001 | Status | Bit level status | None | 0-65535 |
| 30002 | Leak Distance | Location of leak | Feet/Decimeter | 0-65535 |
| 30003 | Units | Unit of measure | 1=Feet; 0=Meter | 0-65535 |
| 30004 | Leak Current | Leakage current on cable | μA | 0-65535 |
| 30005 | Cable Length | Installed cable length | Ft/Decimeter | 0-65535 |
| 30006 | Leg1 Res | Resistance of cable<br>A read only value, this value is calculated directly from the installed leak detection cable | Ohm | 0-65535 |
| 30007 | Leg2 Res | Resistance of cable<br>A read only value, this value is calculated directly from the installed leak detection cable | Ohm | 0-65535 |
| 30008 | Res/Ft | Resistance of cable per foot<br>A value is set through register 40008 | Milliohm | 0-65535 |
| 30009 | Version | Firmware version; if the register reads 301, then the firmware version is 3.0.1. | x.x.x | 0-65535 |
| 38001 | Leak Distance | Leak distance in meters - float point - displays with a tenths place decimal value. This register must be viewed and displayed as float inverse. | Meter | 0.0-9999.9 |
| 38003 | Cable Length | Cable length in meters - float point - displays with tenths place decimal value. This register must be viewed and displayed as float inverse. | Meter | 0.0-9999.9 |

Table 6:Input Registers

| Bit | Description |
|---|---|
| 00 | 1 = Leak detected |
| 01 | 1 = Cable break detected |
| 02 | 1 = Contamination detected |
| 03 | 1 = Summary alarm |
| 04-15 | Spare |

Table 7:Response Sample

## 5.3. RTU Framing

The example below shows a typical Query/Response from a SeaHawk module.

| Slave Address | Function Code | Count Bytes of Data | Register Data Msb | Lsb | Register Data Msb | Lsb | Register Data Msb | Lsb | CRC 16 “Lsb” | CRC 126 “Msb” |
|---|---|---|---|---|---|---|---|---|---|---|
| 02 | 04 | 06 | 00 | 00 | 00 | 00 | 00 | 01 | B5 | A3 |

Table 8:Response Sample

Slave address 02 responds to Function Code 04 with six bytes of hexadecimal data and ends with CRC16 checksum.

Register Values:

40001 = 0000 (hex)
40002 = 0000 (hex)
40003 = 0001 (hex)

## 5.4. Calibrate Cable Length via Modbus

The length of sensing cable connected to the SeaHawk can be calibrated through a Modbus-enabled system. This helps fine-tune a distance-read leak detection system. If no alarms are present, follow these steps to calibrate and test the system:

1. Set the SW1 DIP switches for the correct cable resistance per meter, as follows:


Fig. 21: DIP Switch Settings for Ohm/Meter

2. Press the Test/Reset button on the controller once to verify the cable's amperage reading. Calibration cannot be performed if the current is above 15 μA.

The following cleaning instructions apply to Honeywell Home orange sensing cable! If you have questions regarding the care and maintenance of your sensing cable, please consult the cable's data sheet or contact the manufacturer.

- If the cable is new and the current is higher than 1 μA, clean the cable. Isopropyl alcohol removes any contamination that might have been introduced to the cable during installation.
- If the cable is older and the amperage reading is above 15 μA, clean the cable. A mild dish detergent solution removes most dirt. Isopropyl alcohol is also an effective cable cleaner.

3. Read the Leg 1 and Leg 2 resistance values in Modbus registers 30006 and 30007. Ensure that the reading are similar - within 2% of each other. This helps rule out any major cable problems before calibration begins. Record the resistance reading from Leg 2, Modbus register 30007.
4. Add up all the lengths of sensing cable and any other equipment in the system that simulates a length of cable. Record this value. Keep in mind:
   - Each weighted cable connector (WCCS) simulates 15.24 m of cable.
   - Each spot detector (SD-Z) simulates 15.24 m of cable. Since the controller calculates internally with feet and if you have added your installation in meters multiply your result with 3.2808 to obtain the length in feet.
5. Sensing cable has a resistance of 2.8 Ohm/foot. A system's actual resistance will rarely be exactly 2.8 Ohm/foot, but it will be close - each individual cable or system will vary a very small bit from that 2.8 Ohm/foot value. If you know the exact resistance of your cable, you can fine-tune your system for a more precise distance reading. The formula for calculating this value - and more specific directions for using the formula - are as follows:

$$\text{Resistance per foot in Milliohm/foot (Modbus register 40008)} = \frac{\text{Leg 2 Resistance (Modbus register 30007)}}{\text{Total feet of cable installed on the system}} \times 1000$$

6. Divide the Loop 2 resistance by the total length of cable. This value is the resistance of the cable installed on your system in Ohm/foot. This Ohm/foot value is for your reference only (the Ohm/foot value will have a decimal point in it, and you cannot write a number with a decimal point to register 40008). Record this value.
   Multiply the value in Ohm/foot by 1000. This will give you the value in Milliohm/foot. This Milliohm/foot value is your end result, and the number you will write to Modbus register 40008. Record this value.
7. Access your Modbus-enabled system. Write the Milliohm/foot resistance value to the SeaHawk's Modbus register 40008, omitting any digits after the decimal point.

Example:

$$\underset{\text{Resistance per foot in Milliohm/foot (Modbus register 40008)}}{2788} = \frac{\overset{\text{Leg 2 Resistance (Modbus register 30007)}}{2091}}{\underset{\text{Total feet of cable installed on the system}}{750}} \times 1000$$

- The Leg 2 resistance on the system is 2091 Ohm.
- The system has 167.64 m of sensing cable.
- 4 SD-Zs simulate 15.24 m of cable each, for a total of 60.96m sensing cable (4*15.24 = 60.96).
  System-wide, there are 228.60 m of actual and simulated cable 167.64 + 60.96 = 228.60.
- Convert this length into feet by multiplying with 3.2808. (228.60 x 3.2808 = 749,991)
- Devide 2091 Ohm by 749.991 feet of cable. The result is a resistance of 2.788 Ohm/foot.
- Multiply 2.788 Ohm/foot by 1000 to get Milliohm/foot.
- Access Modbus register 40008 and record the new Milliohm/foot value, 2788.

# 6. Preventive Maintenance

Follow these steps monthly to test the SeaHawk and ensure that the device is functioning properly. If your SeaHawk is hooked into a BMS, notify monitoring personnel before you begin to test the system.

1. Place water on the cable - either dip the cable into a cup filled with water, wrap the cable with a wet cloth, or pour a puddle of water onto the cable.
2. Verify the "leak detected" alarm on the control panel.
3. Compare the distance reading on the SeaHawk to a reference map (if available) to ensure the SeaHawk displays the correct leak location. See section 5.4., "Calibrate Cable Length via Modbus" for more information about calibrating the leak detection cable.
4. Dry the cable and verify the SeaHawk returns to normal.
5. Remove the End-of-Line terminator (EOL).
6. Confirm the "cable break" (`cbr`) alarm on the SeaHawk.
7. Reinstall the EOL.
8. Verify the SeaHawk returns to normal.
9. Monitor the cable current monthly to ensure the cable is not being contaminated. The SeaHawk will alarm if the contamination is excessive.
10. Monitor the cable current. If the cable current is greater than 15 μA, troubleshoot the cables to determine which cable is contaminated. The contaminated cable should be removed, cleaned, and retested.

EN2H-1601GE23 R1020 • Subject to change

# 7. Troubleshooting

Contamination and/or physical damage to the cable is not covered under warranty.

| Problem | Action |
|---|---|
| Control panel will not power up | 1. Check with a DVOM (multi-meter) for AC or DC input power on the lower left hand terminal block on the SeaHawk.<br>• If no voltage is present at the terminal block, check the power supply and circuit breaker that power the SeaHawk. |
| Cable Break Alarm | 1. Verify the leader cable from the sensing cable run is plugged into TB2, the terminal block marked “Cable.”<br>2. Verify the End-of-Line terminator (EOL) is installed on the end of the orange sensing cable run.<br>3. A section of sensing cable may be damaged or faulty.<br>• To isolate a section of damaged sensing cable, remove the EOL terminator from the end of the cable run and install it onto the end of the leader cable coming from the control panel. If the condition clears, there is a damaged/faulty section of sensing cable.<br>• Start moving the EOL terminator to the end of each section of sensing cable to isolate the faulty section.<br>• If you do not find a faulty section of cable and the cable break alarm does not clear, go to step 4.<br>4. If the sensing cable is all functional, the leader cable may be damaged or faulty.<br>• To test the leader cable, power down (shut off) the control panel.<br>• Remove the terminal block marked “Cable” from the unit.<br>• Remove the four leader cable wires going into the four position terminal block.<br>• Install a jumper wire between pins 1 and 2 and another jumper wire between pins 3 and 4.<br>• Reinstall the terminal block back into TB2 and reapply power.<br>• If the cable break condition clears, there is a problem with the leader cable. |
| Control panel does not calculate the proper length of cable | 1. Verify the leader cable wires are wired into TB2, the terminal block marked “Cable,” in the correct order - from left to right, white - black - green - red.<br>2. Calibrate the cable. To do this, adjust the resistance per length (Configuration menu via the Web Interface). The control panel is pre-calibrated from the factory. The overall length should be within 5% of actual installed length. |
| Control panel does not calculate the proper leak distance | 1. Check to see if multiple leaks are present on the cable. The first leak should be read and latched by the system; however, if the system is updated, or if two or more simultaneous leaks occur within 30 seconds of the initial leak, the system may display an average distance (sum of the distances to all the leaks ÷ the total number of leaks). If no water is present, continue to step 2.<br>2. A section of the sensing cable may be faulty. To determine if this is the case:<br>• Power down the control panel and remove the End-of-Line terminator (EOL) from the end of the sensing cable.<br>• Find the junction between the first and second sections of sensing cable. Separate the two sections and install the EOL terminator at the end of the first section of sensing cable.<br>• Turn power back on at the control panel. Allow the control panel to run for five to ten minutes. Apply a damp cloth, rag or paper towel to the end of the first section of orange sensing cable. If the leak is calculated correctly, remove the EOL terminator; reconnect the sensing cable and move down to the next section of cable.<br>• Repeat this process until a faulty reading is obtained. If the reading is off at the first section of cable, the SeaHawk may be miscalculating distance. |
| Persistent Cable Contamination Alarm | 1. Unless an obvious contamination can be found, to clear a contamination alarm the cable must be removed from its installation and cleaned. Usually the cable can be cleaned by pulling it through a clean damp rag. You can also wipe the cable with isopropyl alcohol.<br>2. If the cable is contaminated by oil, glycol or chemicals, the cable can be washed. Remove the cable from its installation, and submerge in a solution of one capful mild dish washing detergent to 8 liters lukewarm water (< 40 °C). Agitate the cable in the solution, rinse with clear lukewarm water and wipe dry with a clean towel.<br>3. Connect the cable to the SeaHawk and test it to make sure the contaminates have been removed before reinstalling the cable on the floor. |

Table 9:Troubleshooting

EN2H-1601GE23 R1020 • Subject to change

# 8. Configuration Reference

This chapter provides a complete listing of all possible configuration and address settings that can be made using the DIP switches in blocks SW1 and SW2.

The configuration of a stand-alone SeaHawk can be performed using the DIP switches on the front panel. If the SeaHawk will be connected to a Modbus equipped monitoring system, some of the configuration can be performed using the registers.
Chapter 2., “Technical Specifications” describes how to install and configure the SeaHawk and refers to specific DIP switch settings where appropriate. Information about Modbus communications can be found in chapter 5., “Modbus Communication”.

## 8.1. DIP Switches

The SeaHawk contains two blocks of DIP switches.

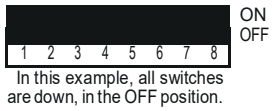



Fig. 22: General Dip Switch Settings

## 8.2. DIP SW1 Settings

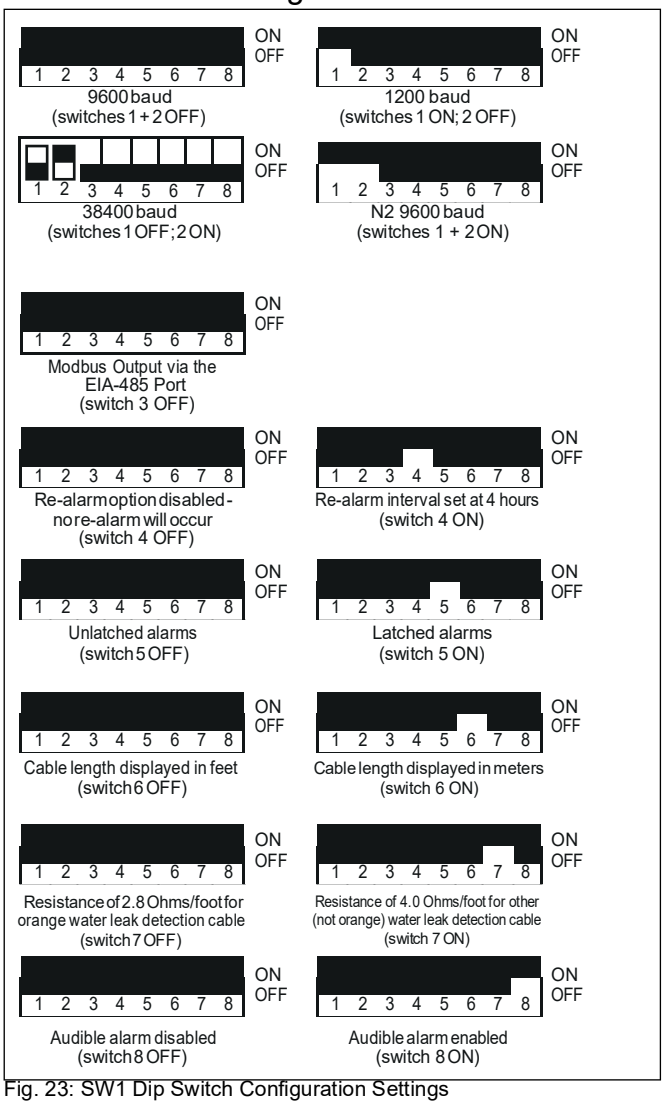



Fig. 23: SW1 Dip Switch Configuration Settings

## 8.3. DIP SW2 Settings

DIP switch 2 is used to set the address of the Modbus device. First, use switches 1 and 2 on SW1 to set the communication baud rate. Then, use switch 3 on DIP SW1 to designate Modbus communications. Use the switches on DIP SW2 as follows for the communications you plan to employ.

### 8.3.1. Configure the SeaHawk for Modbus Communications

The Modbus address should be a number between 1 and 254. Adjust the individual switches until their sum equals the Modbus address. Figure 23 shows the values of the DIP switches on the SW2 block as well as two examples of how the DIP switches would be set for specific unit addresses.

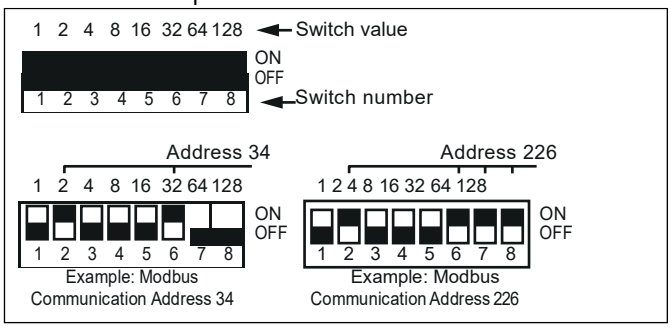



Fig. 24: SW2 DIP Switch Settings for Modbus Unit Address



EN2H-1601GE23 R1020• Subject to change

## Tables



## Figures



resideo
www.resideo.com

Ademco 1 GmbH
Hardhofweg 40
74821 Mosbach
Phone: +49 1801 466 388
info.de@resideo.com
homecomfort.resideo.com



Honeywell Home