Battery Powered Separator Alarms

IS 065 Series
Installation, Operation & Maintenance

Separators And Alarms Should Be Serviced And Maintained In Accordance With BS EN 858-2

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Declaration of Conformity

This product meets all the essential safety requirements of the relevant European Directives.

The full text of the Declaration of Conformity can be found at:

http://www.aquasentry.co.uk/products/separators-and-alarms/battery-powered-separator-monitors/

IMPORTANT

Note: In all cases good, standard electrical practice should be followed, and the installation must conform to the appropriate local code of practice – e.g. BS EN 60079-25 in the UK. The installation must be such that the intrinsic safety is not compromised by: - exposure to risk of mechanical damage, unauthorised modification or interference, exposure to moisture, dust and foreign bodies, excessive heat, invasion of intrinsically safe circuit by other electrical equipment or circuitry. (See Note in installation section)

Please contact Aquasentry for any advice on 01924 284900.

General Description

The unit is designed to monitor up to two oil/water separator tanks for build-up of oil, silt or excessive liquid and flash a xenon beacon. The GSM-enabled version of the unit will also notify a designated user by text message. The startup screen shows the firmware type as PCP-7480.

General Operation

The control unit automatically checks the condition of the probes and battery every 15 minutes. Any probe condition changes, or a low battery condition are notified via a text message sent to the number programmed into the unit. A probe check can also be initiated manually at any time by pressing the button on the front of the unit.

Probes to be monitored can be enabled or disabled by internal DIP switches.

In order to save battery power, the LCD is only powered up during a probe check that was initiated by pressing the button on the front of the unit. The automatic 15-minute interval checks will not power up the LCD.

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Applicable Firmware

Firmware ID	Description	Version
PCP-7480	Text-only	All versions

Installation

This product has been designed and certified as being intrinsically safe. It is of paramount importance, that the unit should not be modified in any way and the installation be carried out by an approved installer, in accordance with the Environment Agency guidelines (PPG3). Any deviation from this could invalidate the certification warranty and render the unit unsafe for its intended use.

Control Unit

Refer to Table 3 on page 8 for required cable specifications.

The control unit must be positioned in a non-hazardous area. For all wiring details, refer to Table 4 on page 8 and Table 5 on page 8.

Connection to Control Unit

The Probe cable(s) should be fed through the appropriate glands, as shown in Figure 1. This also applies to the beacon and opto output cables, if used.

All cables must be secured to the PCB with cable ties as shown.

IMPORTANT NOTE: Under NO circumstances must the control unit casing be drilled to allow cable entry in any area(s) other than those already provided, as this would infringe the certification and therefore safety of the product.

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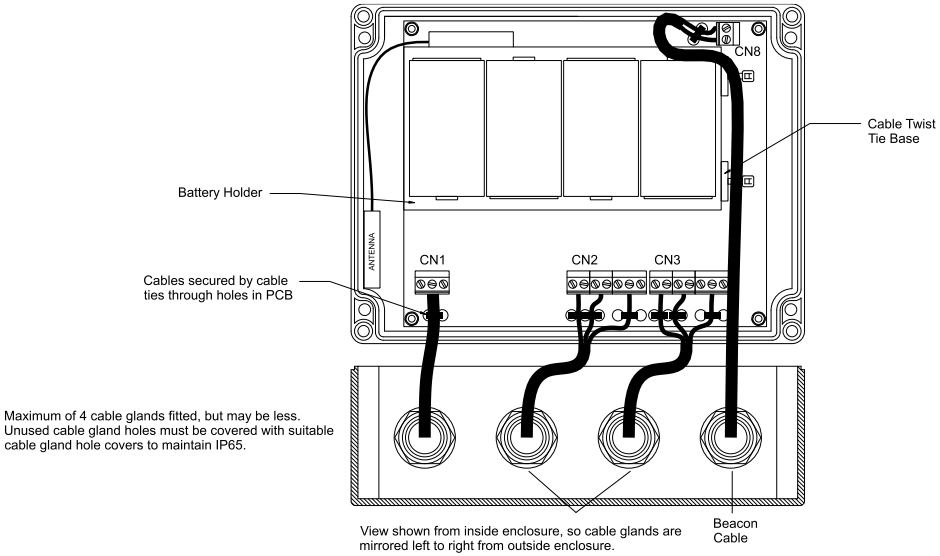

Figure 1 - Connection to control unit

Using a Junction Box

An intrinsically safe junction box should be used where incoming cable sizes must be reduced to gain entry through the cable glands in the base of the control unit.

Maintenance and Repair

Due to the harsh environments which the probes can be subjected to, it is advised that they are inspected and cleaned with a damp cloth at regular intervals. Except for the batteries and SIM, the control unit does not contain user serviceable parts. For all repairs, contact Aquasentry on 01924 284900.

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Technical Information

Electrical

Enclosure	200mm(W) 150mm(H) 76mm(D) IP65 polycarbonate	
Supply Voltage		6V DC battery (4 x 1.5V alkaline 'D' cells)
Current Consumption	Sleep mode	Typically 106µA
	LCD active	Typically 323µA
	Checking probes	Average 4mA
	GSM transmit	200mA max.
Typical Battery Life	> 2 years	
Low Battery Threshold	4.5V	
Fusing	FS1	100mA resettable fuse
	FS2	F 100mA H 250V 1500A breaking capacity
	FS3,4	Littelfuse 0242.050UAT1 50mA 250V 4000A breaking capacity
	FS5	Littelfuse 0242.100UAT1 100mA 250V 4000A breaking capacity
	FS6	T 3.15A H 250V 1500A breaking capacity
Max probe cable length		200m (less if values in Table 3 would be exceeded)
Opto-Isolated Output (CN1)		U_m = 253Vrms. This output is designed to switch DC signals of up to 12V, 100mA
Beacon Output (CN8)		11.2V DC, 100mA maximum

Table 1 - Electrical Specifications

Beacon Output

Current units have the beacon output enabled by default. It operates for 2 minutes every half hour when an alarm occurs, by default. Careful thought should be given to the amount of time the beacon is on during an alarm as it uses considerable power which will inevitably reduce battery life considerably.

Notes on the beacon output:

1. Um = 0, i.e. no other source of power must ever be connected directly or indirectly to this output.
2. Cable used must have ≥ 1mm insulation and be ≤ 2m length.
3. Must only be connected to a beacon which is powered entirely from this unit, i.e. this output must not be used as a control signal to a beacon that has its own power supply.
4. The beacon must be isolated from earth.

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I/O Parameters

U_o	7.88V
I_o	53mA
P_o	104mW
C_i	0
L_i	0

Table 2 - Hazardous area terminals (CN2, 3)

NOTE: The parameters in Table 2 apply separately to CN2 and CN3, which are separate I.S. circuits.

The capacitance and either the inductance or inductance to resistance ratio (L/R) of the load connected to hazardous area terminals CN2, 3 must not exceed the following values:

Group	Capacitance (µF)	Inductance (mH)	OR	L/R Ratio (µH/Ω)
IIC	8.8	12.8		98
IIB	115	51.4		392
IIA	1,000	102		784

Table 3 – CN2, 3 load parameters

Probe Cables

The total capacitance and inductance of the cable used between the control unit and the probe must not exceed that shown in Table 3.

Mechanical

Protection and/or screening of the cable should also be considered. The maximum length of cable between probe and control unit must not exceed 200 metres or less if the values in Table 3 would be exceeded.

Probe Terminals

Probe Type	A	B	C	D	E	F	G
High Oil	RED	BLUE					
High Liquid			RED	BLUE			
Silt					BROWN	GREEN/ YELLOW	BLUE

Table 4 - Probe cable connection details (CN2, 3)

Beacon Terminals

CN8 Terminal	Connect To
+	Beacon positive terminal
-	Beacon negative terminal

Table 5 – Beacon cable connection details (CN8)

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Opto-Isolated Output Terminals

The opto-isolated output is intended to be used to simulate a switch press to an arbitrary piece of external equipment. The output replaces the mechanical switch on the equipment's switch input. It is typically operated for around 20 seconds when a high oil alarm occurs on zone 1. This may be used to operate a piece of external equipment that closes a drain valve to prevent pollution, for example. The output can be used either to connect to a switch input on an external piece of equipment, or to operate an external relay if an external power supply is used. See Figure 2 for connection details for both modes of operation.

Additional Resistor

For PCB revisions earlier than V2.00, it has been found that under some circumstances when the opto output is used to drive a relay that there is excessive leakage current when the output is off. This is alleviated by fitting an external 4.7KΩ resistor between CN1 terminals B and C, as shown in Figure 2. This resistor should always be fitted. Do not solder the resistor to the board as this would invalidate the ATEX certification. Always connect it to the screw terminals.

The resistor has been fitted to the PCB as standard from PCB V2.00 onwards.

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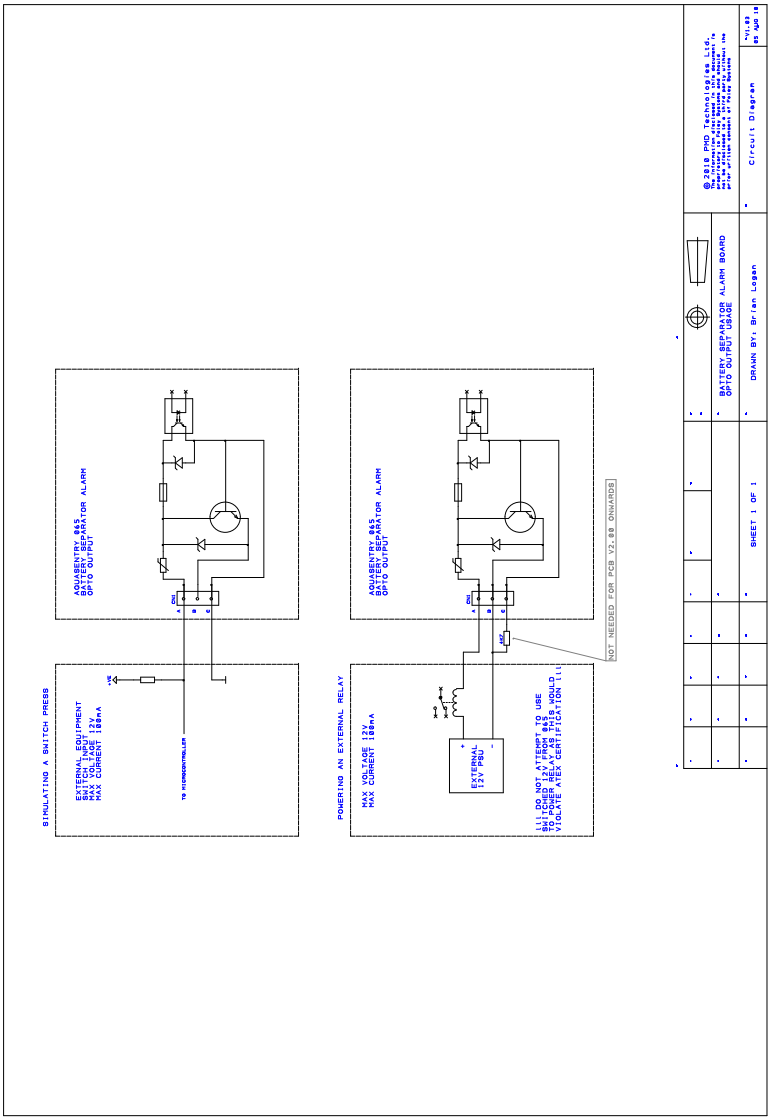

Figure 2 - Wiring of opto output to trigger external equipment

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SIM Installation

"Pop-out" SIMs have started to be supplied in recent years, Figure 3. Due to reliability issues experienced with pop-out SIMs, PCBs prior to V2.00 should only be fitted with a 2FF SIM which doesn't have pop-outs for other form-factors, Figure 4. This is due to the poor quality of some pop-out SIMs which results in them flexing and making poor electrical contact. PCB V2.00 and later has a 4FF SIM holder.

Figure 3 - Pop-out SIM

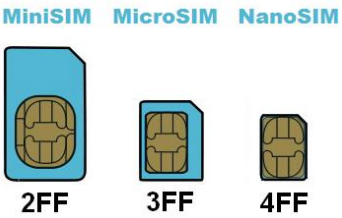

Figure 4 - SIM form-factors

For end users that have taken a service contract, the unit is normally supplied fitted with a 2FF non-pop-out text-only SIM (4FF for PCB V2.00 and later), which may be from one of several providers. Credit on the SIM is maintained by Aquasentry so long as payment for the service contract is maintained by the end user.

For customers who do not wish to take a service contract, any other SIM may be fitted by the end user. It will be then be the responsibility of the end user to maintain credit on the SIM. Failure to maintain credit on the SIM will result in the unit not being able to send a text message when an alarm occurs. Aquasentry will not be held responsible for failure to report alarms under such circumstances.

Battery Installation

The unit is supplied with batteries installed and an insulating tab in place to prevent the batteries powering the unit to avoid contact with the monitoring service until installation time.

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NOTE: The battery insulating tab **MUST** be removed prior to use for the unit to become operational. Ensure friction between the cover plate and the batteries does not prevent the batteries properly contacting the battery holder contacts.

Batteries will normally be replaced by Aquasentry once a year for end users with a service contract. Any replacement batteries fitted by the end user themselves must be alkaline in order to preserve the long battery life. Observe correct polarity when fitting and secure the plate with cable ties to ensure the batteries are not displaced by vibration.

Test Mode

Test mode can be used during installation to show the instantaneous state of all the probes as well as the battery state. For the GSM-enabled version of the unit, it is also used to set the phone number to be notified by text message when an alarm occurs. Once the batteries have been inserted and the LCD is powered up, one of the following methods can be used to enter test mode. Older firmware versions only support some of these methods, so experimentation may be necessary.

- If the unit's lid is secured in place so no access to the internal board is possible without removing the lid, press and hold the button on the front of the unit for about 5 seconds until the LCD shows "TEST MODE", then release the button.
- With the lid removed and the board inside accessible, press and hold the button on the front of the unit whilst pressing and releasing the reset switch on the board inside the unit. Continue to hold the button on the front of the unit until the display shows "Test Mode". This may take up to 10 seconds or so to display.
- With the lid removed and the board inside accessible, press and release the TEST button on the board.

To exit test mode, simply press the reset switch on the board inside the unit without pressing the front of unit button.

If no action is taken, normal operation will resume when the button has not been pressed for 10 minutes (5 minutes on older firmware versions) to prevent the unit being left in test mode and causing excessive battery drain.

Detailed Operation

Test Mode

A test mode can be entered which allows the instantaneous state of the probes to be seen along with the battery voltage. See the *Test Mode* section for details on entering test mode.

- Link block LK1 inside the unit must have a jumper link installed across positions 2 and 3 for the probe inputs to work correctly.
- To save power, the display will go blank after 3 minutes. On later firmware versions the unit will reset after 10 minutes to ensure it is not accidentally left in test mode.
- Probes that have been disabled by the DIP switches on the board are shown with a '-' symbol.
- When enabled, probes show an 'F' or 'C' for fail (alarm) or clear, respectively.
- Setting the "HIGH OIL 1" DIP switch to the ON position will also power up the beacon output terminal block at CN8 for testing purposes.
- Setting the "HIGH LIQUID 1" DIP switch to the ON position will also switch on the opto output at terminal block CN1 for testing purposes.

- Batteries are considered low and in need of replacement below about 4.500V.
- Battery voltage is typically 6.400V for new batteries.

A typical screen layout in test mode is shown in Figure 5.

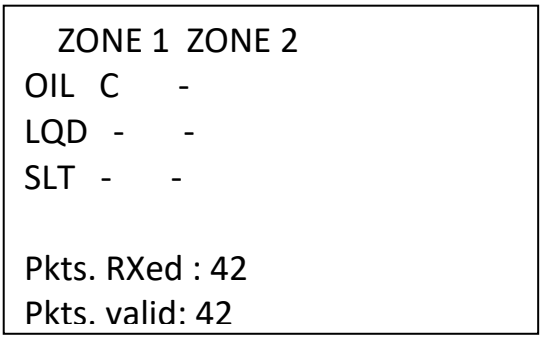

Figure 5 - Typical test mode screen layout

Text Message Destination Phone Number

The second screen in test mode displays the phone number to which text messages will be sent when an alarm occurs. It can be shown by entering test mode, as described above, and pressing then releasing the button on the front of the unit whilst the initial test mode screen is showing. A new unit with no number set will show the screen in Figure 6.

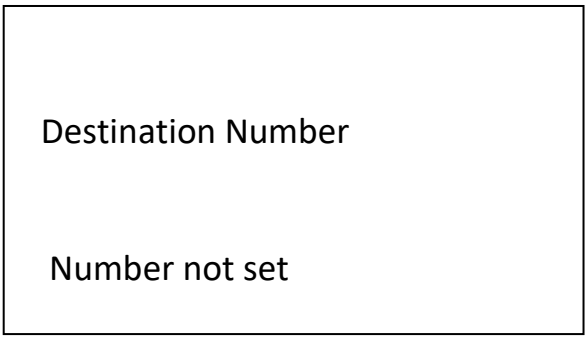

Figure 6 - Screen shown when destination phone number not set

To set the phone number, ensure the test mode is showing the screen above and allow 30 seconds before sending a text message to the unit's SIM phone number containing the phone number in international format. So, for example, 01234 123456 becomes:

```
+441234123456
```

Once the text message is received, the screen will change to display the new phone number and it will be stored in the unit and used from now on to send text messages to when an alarm occurs.

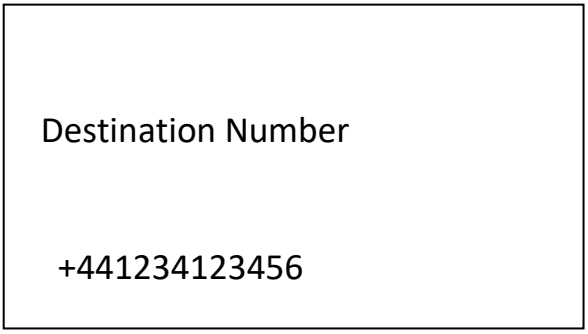

Figure 7 - Screen shown when destination phone number is set

To revert the unit back to the number not being set, send the unit a text message containing:

```
+0
```

Normal Operation

After the batteries have been installed and the startup display has been shown, the unit will check the probes 6 times, 8 seconds apart. This is to prevent false alarms.

NOTE: The silt probe must be in the alarm state for 64 consecutive 15-minute probe check intervals before it registers an alarm is raised. This is to prevent false triggering due to silt cloud stirred up during a heavy downpour.

Once the checks are complete, any probes that enter alarm state or low battery condition will cause the unit to send a text message to the programmed phone number to report the condition. The unit switches off the LCD and enters a low power state for 15 minutes until the next probe check is due.

In order to save battery power, the LCD is only powered up during a probe check that was initiated by pressing the button on the front of the unit. The automatic 15-minute interval checks will not power up the LCD.

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Accessories

Probe Cable

Whilst many different cables can be suitable for use with the probes, some customers feel more comfortable with some guidance. A typical example of a suitable cable is shown in Table 6. It can be ordered from Aquasentry or from Farnell (https://www.farnell.com/) as order code 1503980.

Manufacturer	Lapp Kabel
Manufacturer Part No.	0012640
Inductance	0.65mH/km
Capacitance	Core-core: approx. 135nF/km
	Core-screen: approx. 185nF/km

Table 6 - Typical probe cable

Beacon

Choosing a 12V xenon beacon that consumes a suitably low current for battery operation results in a limited range. A suitable beacon is detailed in Table 7. It can be ordered from Aquasentry or RS Components (https://www.rs-online.com/) as order code 309-5944.

Manufacturer	Klaxon
Manufacturer Part No.	45-713121
Voltage	12V
Current	60mA (average)
Colour	Amber
IP Rating	IP65

Table 7 - Typical beacon

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