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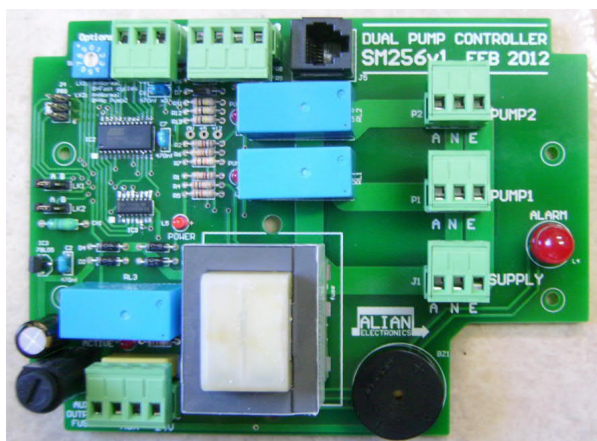
INSTALLATION & OPERATION GUIDELINES Model: SM256v5

General Description

This control module is intended for use with wastewater management systems. Its basic role is to monitor a level probe for a sign that the wastewater in a storage tank has reached a defined level. The controller responds by activating a pump until the wastewater in the tank is reduced or removed. Where two pumps have been fitted, pump operation will alternate with each cycle. Where a second level probe detects a very high level in the tank, both pumps will be activated and a high level alarm will be triggered.

A secondary feature of this system allows for an automatic spray washdown of the interior of the tank after an adjustable 1-6 hours after the last normal pump sequence.

The control unit has several presettable options that may be engaged by the installer to suit a range of field installations. An optional Liquid Crystal Display (LCD) may be fitted to provide additional information about the status and operation of the unit. By using this display, an internal Hour Meter may be viewed which tracks the number of hours and minutes that each pump has operated since the system was first installed.



Controller Hardware

- The module is 155 x 115mm. It should be housed in an enclosure to keep it free of dust, moisture and access by non-technical staff.
- Each 240V output connection will support a pump to 1500 watts, 7.5A. All connections (except for the display socket) are via green unpluggable screw terminal blocks.
- A large LED and Piezo beeper are present on the board to signal overflow alarm conditions.
- A relay controlled 24V, 200ma AC outlet is provided via a 2-way terminal block, to drive an external spray solenoid. This is protected by a 1.5A, M205 style fuse.
- Each of the three power relays have an associated red 'status' led to indicate relay activity. A single red LED labelled 'Power' indicates that mains is connected to the unit.
- A four-way terminal block provides the termination point for up to three moisture conductivity or level probes relative to a common conductor. Probes may be simple conductive metal pins placed within the tank enclosure, or commercial (normally open) float-type level switches. (probe signals are intrinsically safe with less than 5V at less than 1ma of current)



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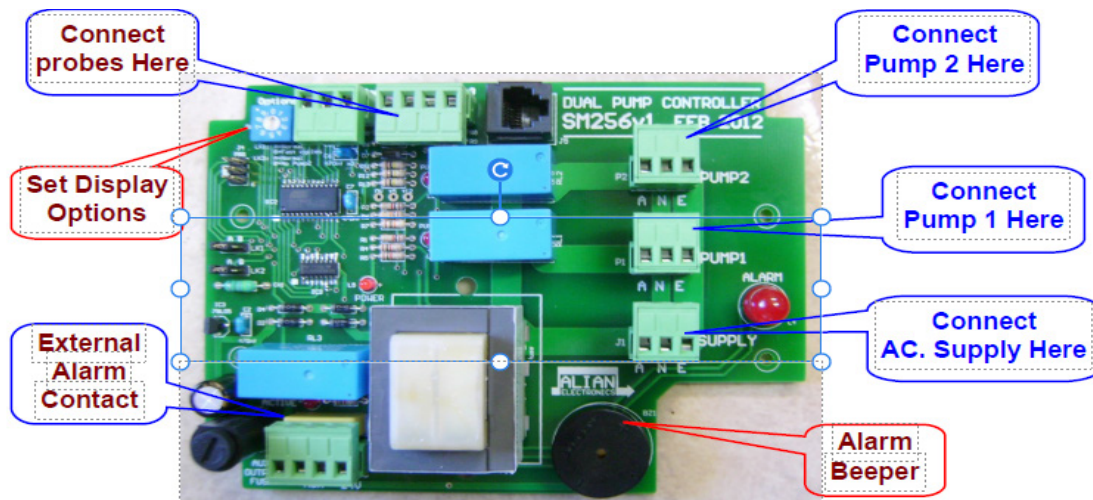
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- A 3-way terminal block provides the termination point for two momentary-action push button switches. One switch (JOG) will force a 30 second drain cycle of a pump. The other switch trips a 6-hour Alarm Mute timer which will block the sound of the audible alarm beeper for 6 hours during high-level and overflow conditions.
- Two option links labelled LK1 and LK2 may be placed into either an A or B position to select installation options. LK1 may be used to 'Fast Forward' several of the internal time delays to allow installers to test a system without having to wait for long time periods.
- LK2 may be used to force the controller into 'Single Pump' mode for situations where only one pump is available for use.
- An RJ12 (telephone) style socket is present for connection to an LCD display via a flat 6-wire cable.
- A small, blue 10-position rotary selector switch is present to select one of several views on the display for the operator to monitor the system status and to adjust washdown spray delay times from 1 to 6 hours.



Details of system operation

Option Link LK1

In the '**A**' position, standard 6-hour time delays are used for the Spray-washdown cycle and the Alarm Mute timer. In the '**B**' position, both of these delays are reduced to only 15 seconds.

Option Link LK2

In the '**A**' position, Pump 1 and Pump 2 operation will alternate with every use. In the '**B**' position Pump 2 operation is blocked out and only the Pump 1 outlet socket will be active.

Level Probe Connections

These probes are intrinsically safe with less than 5V of DC being present at the terminals. Maximum current that can flow through these probes is less than 1 milliamp.

The probe connections are labelled **COM PR1 PR2 PR3**. The **COM** connection should be used as a common connection to all level switches, or in the case of conductivity probe use, it should be wired to an electrode at the very base of the tank. A fixed 2.5 second 'settling' time applies to the operation and release of any probe detection event to prevent sporadic pump operation by splashed water.



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PR1 Tank Dry or Low Level Alarm

The **PR1** input is often not used. It is present for specific installations where pumps can be forcibly shut-down if a tank has been pumped dry below the height of a **LOW** probe or float switch. If it is not used, input **PR1** should be permanently linked to Com to prevent the controller from triggering a **LOW LEVEL ALARM**.

When this input goes Open Circuit, or the conductivity probe is exposed to the air a Low Level Alarm is triggered. Any active pumps will be forced **OFF**. The Alarm contact will **Close**. The LED Alarm lamp will double flash each second. The Alarm Beeper will double beep each second. (pressing the **MUTE** button will suppress the beeper sounds for 6 hours)

When the **PR1** probe is submerged, or the **PR1** float switch Closes, the alarm conditions will automatically reset and normal operation will follow.

The **PR2** (Medium) probe is normally situated about the 80% capacity level of the tank. When the probe is reached a pump will be activated. When the probe has gone 'dry', the pump will continue to operate for **an additional 25 seconds**. This should be sufficient time to drain the tank. Every time this probe detects moisture it will reset an internal clock counter to 6 hours, at which time a Spray Cycle will be automatically engaged.

The **PR3** (High) probe would normally be situated just below the rim of the tank, about 95% of the tank capacity. If this probe detects liquid, it will force both pumps ON simultaneously in order to reduce tank levels quickly. During this time a **FLOOD ALARM** will be signalled. The alarm will automatically cancel as soon as the HIGH probe returns to a 'dry' state.

Spray Washdown Cycle

This is a special cleaning cycle to prevent the build-up of sediments and waste within the holding tank. It is activated 1 to 6 hours (adjustable) after the last time a pump was triggered by rising water levels. It consists of three steps. First a pump is operated for 30 seconds to drain any residual water within the holding tank. Then the Spray solenoid is activated for 30 seconds to release strong jets of water to free-up any solids and particulate matter. This is followed by another 30 second drain cycle to remove the rinse water. After the Spray Cycle has concluded, the system returns to a passive standby state.

Note that during the 90 second Spray Cycle, the Low Medium and High level probes (PR1,PR2,PR3) are ignored by the system.

Motor Jog Button

Briefly pressing this button at any time will force a pump to operate for 30 seconds. Pressing this button will not trigger the countdown of a Spray Cycle sequence.

Flood Alarm

The Flood Alarm is active whenever the HIGH probe detects moisture. Mostly the second pump coming in will quickly bring the level under control, but it serves to indicate to the operator that there is a danger of an overflow or flood condition occurring. Both the large Flood Alarm LED and the Piezo Beeper will operate at one-second intervals during this time. Pressing the Alarm Mute button will trip a 6-hour countdown timer. During this time the Beeper will be deactivated. The intention of this is to allow for some 'quiet' where a system is near a residential area and a flood event takes place at night.



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THE YELLOW OLED DISPLAY

The display shows a lot of information about the pump controller status, including hours/minutes remaining on time delays, probe activity and which pump is presently active.

THE DISPLAY SCREEN SAVE FEATURE

To ensure a long life for the high-brightness yellow OLED display, a Screen Save feature has been incorporated from Version 5 software onwards.

After one hour of button inactivity the screen will revert to a slow moving dot on an otherwise blank background. Pressing either PUMP JOG or ALARM MUTE will reset the screen save timer and restore the view of current pump activity. After the display has been reactivated, normal JOG and ALARM button functionality will return to those buttons.

When the controller unit is powered up, the display will give an introductory message, which includes details of the software release within the SM256 controller. After this initial wakeup sequence, the information that appears on the display is determined by the position of the OPTION switch on the pump controller board. This small, blue rotary switch may be set by rotating a small flat-blade screwdriver into one of ten positions. Changing positions of this switch does not affect the operation of the pump controller.

Display Option Level 0

This shows a brief message about the manufacturer of the controller hardware.

Display Option Level 1

This is the home position which would be used on most occasions.

It shows which (if any) of the two pumps are active as per the image below.

Once a pump cycle is complete and the Spray countdown timer has been activated, the display will show how many hours and minutes until the Spray Cycle commences. During the 3 steps of the 90 second Spray Cycle, the display will show whether the controller is presently spraying or draining.

Display Option Level 2 (Normal position)

This level is useful to the installer as it shows which pumps are active, the spray solenoid, plus the on/off status of the three level probes.

The status of the 25 second pumping countdown counter is also shown on this page.

Display Option Level 3

This level shows the status of the Alarm Mute countdown timer.

Normally at '00:00:00', it will show hours, minutes and seconds remaining before the audible alarm beeper will be enabled.



PUMP 1: off
PUMP 2: off

P1 P2 SP LMH CNT
-- -- -- Y-- 000

ALARM MUTE TIMER
(05:59:47)



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Display Option Level 4

This is another useful level for the installer. Instead of showing a simple On/Off status for the three level probes, it shows the raw analog value that the probe is actually measuring in the water. (Useful to see if there is an intermittent or unwanted water leak path between probes)

The letters **LMH** signify **Low**, **Mid** and **High** measurements. (These correspond with inputs PR1, PR2, PR3.) The value of 255 indicates the probe is dry. The value of 044 indicates a direct short or 'closed' level switch. Clean water usually returns a value of about 070.

Any reading below 200 is considered to be a valid detection of water.

Display Option Level 5

This level shows how many hours, minutes and seconds each of the two pumps has operated since the system was first installed. It is capable of counting up to 27,000 hours for each pump. The values are stored in long-term memory and will be retained indefinitely in the absence of power on the controller.

(each counter may be individually reset back to 'zero' by the application of a special command sequence by an authorised service technician.)



Display Option Level 6

This level will allow the operator to view or change the delay time before a Spray-Rinse cycle is activated. While on this display level, pressing the Alarm Mute button will allow the delay time to step between 1 and 6 hours, or to **<DISABLED>** to force the system to disable the washdown/spray feature entirely. The controller will remember the selected delay number in its special non-volatile memory, even after mains power has been removed.



Note that when the SPRAY DELAY is set to <DISABLED> the AUX relay automatically becomes an auxiliary Alarm Relay contact that will operate as long as the ALARM led is flashing.

Display Option Level 8

While the switch is in Position 8 a quick functional test of the controller can be implemented by the installer. In this level, briefly closing any of the level probes will cause repeated beeps on the display.

Also, briefly operating the **Alarm Mute** button in this level will trigger a single test cycle which will operate **Pump 1** for 1 second, **Pump 2** for 1 second, **Spray Solenoid** for 1 second, **Flood Alarm led** for 1 second and **Piezo Beeper** for 1 second.



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Appendix 1 – Resetting the SM256 Hour Meter

This is a special sequence that will allow service personnel to erase the present hour meter values back to 00000:00:00. Normally it is not desirable for the customer to have access to this feature so that a true reading of pump longevity can be measured.

It is intended to be used whenever a new pump is installed on a system.

Step 1 Set the LK1 option link into Position 'B'

Step 2 Set the Display Option switch to Position 9

Step 3 To reset the Pump 1 hour meter to zero press the Motor Jog button.

or

Step 3 To reset the Pump 2 hour meter to zero press the Alarm Mute button.

Step 4 Set the Display Option switch to '5' to confirm the hour meter has been reset
Step 5 Set the LK1 option link into Position 'A'

Step 6 Set the Display Option switch back to a normal viewing position

As the corresponding meter is cleared to zero and saved to permanent memory, a brief double-beep confirmation will be heard from the LCD display ote that when the SPRAY DELAY is set to <DISABLED> the AUX relay automatically becomes an auxiliary Alarm Relay contact that will operate as long as the ALARM led is flashing.



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