

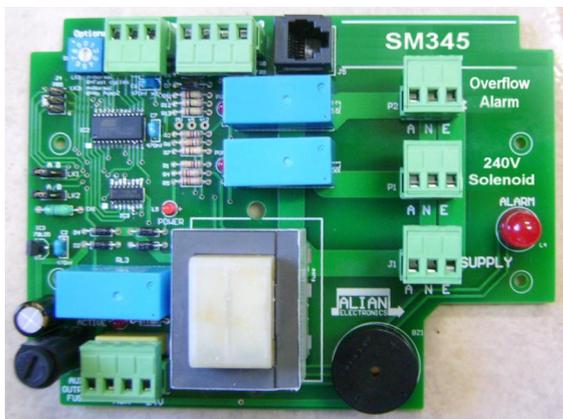
SOLENOID FLOW CONTROLLER INSTALLATION & OPERATION GUIDE

Model SM345v1 Document revision 1 July 2015

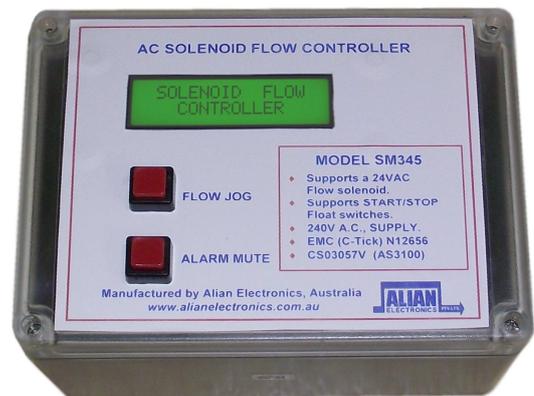
General description

This control module is intended for use with water management systems. Its basic role is to monitor a level probe in a holding tank for a sign that the water has fallen to a specific threshold. When this happens, a Solenoid is activated to allow water to flow into the holding tank. When the storage tank has reached a higher level defined by a second level probe, the controller responds by deactivating the solenoid. A third level sensor may be fitted at a higher level to detect a tank overflow condition, whereupon it would trip a separate Overflow alarm.

The control unit has several presettable options that may be engaged by the installer to suit various field situations. A Liquid Crystal Display (LCD) can provide additional information about the status and operation of the unit.



The SM345 control module

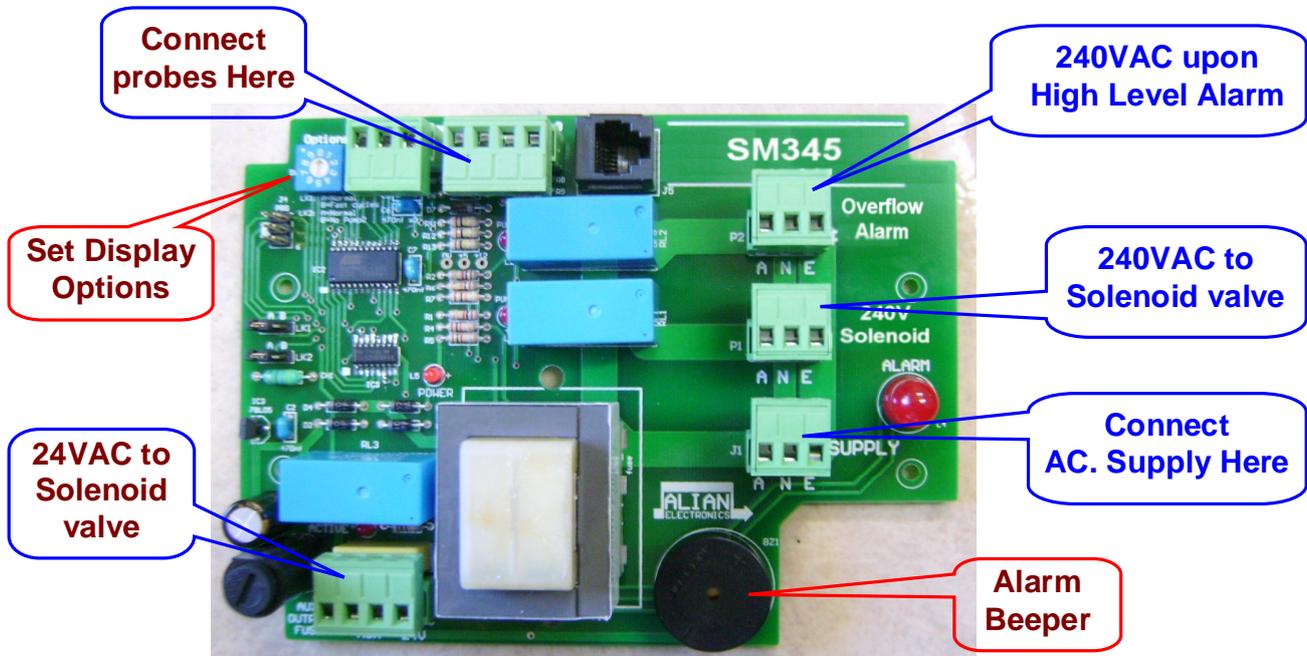


The SM345 in its IP66 enclosure

Controller hardware

- The controller has a switched 24VAC output via a fuse for activating 24V inlet valves. This is protected by a 1.5A, M205 style fuse.
- The controller has a 230VAC output that operates at the same time as the 24V output, for driving higher voltage solenoid valves.
- A second 240V output will become active during Overflow Alarm conditions.
- Each of the three output 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 terminal block provides for up to three level probes relative to a common terminal. 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 under 1ma of current flow)
- An internal Hourmeter & Fill Cycle counter give service staff feedback on tank operation.
- The Front Panel features two push-button switches. The JOG button will force a 30 second solenoid fill cycle. The ALARM MUTE button trips a 6-hour Alarm Mute timer which will mute the audible alarm beeper for 6 hours during overflow Alarm events.
- A blue 10-position rotary selector switch is present to select one of several views on the display for diagnostic functions.

- The unit is housed in a gasketed IP66 enclosure 155 x 115 x 80mm. Where the unit is to be located outdoors, it should be housed in a secondary enclosure to reduce the effects of sunlight, weathering and to limit system access by non-technical staff. (The alarm Mute feature may be extended to a weatherproof button on the outer enclosure.)
- All connections (display socket excepted) are via green unplugable screw terminal blocks.
- An LED indicator and Alarm Beeper are present to signal overflow alarm conditions.



DETAILS OF SYSTEM OPERATION

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, A fixed 2.5 second 'settling' time applies to the operation and release of any probe detection event to prevent sporadic operation of solenoids or level alarms.

The **PR1** input would normally be connected to a float switch set at the lowest desired water level. As it is usually submerged, this contact is normally CLOSED. When the tank level falls and exposes this switch, it goes OPEN and it will trigger the start of a solenoid cycle. Both the 24VAC and 230VAC outputs (Relays 1 and 3) are activated at this time.

The **PR2** (Medium) probe is normally situated about the 80% capacity level of the tank. When the this probe is submerged and CLOSES a contact, it will signal the end of a fill cycle and deactivate the solenoid valve relays 1 and 3.

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 water and closes a contact, the controller will pulse the

electronic beeper and flash the **ALARM LED** indicator at one-second intervals and also activate the second 240V output relay (Relay 2) so that it may be used to activate a more prominent alarm circuit.

Pressing the **Alarm Mute** button at this time will trip a 6-hour countdown timer. During this interval 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.

The **Overflow Alarm** will automatically cancel when the **HIGH** probe returns to a 'dry' state.

Solenoid Jog Button

Briefly pressing this button at any time will force the fill solenoid for a fixed 30 seconds.

THE LCD 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 is mildly backlit so that it may be read under low light level conditions

When the controller unit is powered up, the display will give an introductory message, which includes details of the software release within the **SM345** controller. After this initial wakeup sequence, the information that appears on the display is determined by the position of the **OPTION** switch on the controller board. This small, blue rotary switch may be set by rotating the centre slot with a small flat-blade screwdriver into one of ten positions.



Display options selector

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.



- ◆ Where the JOG button has been pressed a countdown timer shows seconds remaining.
- ◆ Where an Overflow Alarm has been detected the FIL solenoid is forced into a Standby condition and an OVERFLOW ALARM message will appear on the screen.



Display Option Level 2 (Diagnostic position)

This level is useful to the installer as it shows which input sensors and output relays are active.



S240 reflects the status of the 240VAC switched solenoid output and **S24** reflects the status of the 24VAC switched solenoid output.

ALM shows the status of the Overflow Alarm relay, which provides a switched 240V output during alarm conditions.

The LMH flags show the state of the Low, Medium and High probe inputs, where a Closed state is indicated by a 'Y' character on the screen.

Normal controller operation will still take place on this screen level.

Display Option Level 3

This level shows the status of the Alarm Mute timer. Normally showing '00:00:00' when tripped, it will show hours, minutes and seconds remaining before the audible alarm beeper will be enabled.



Display Option Level 4

This is another useful level for the installer. Instead of showing the On/Off status for the three level probes, it shows the raw analog value that the probe is actually measuring. (This may be used to locate 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 typically returns a value of about **070**.

Any reading in the range of **44** to **200** is considered to be a valid detection of water.

Display Option Level 5

This level shows the total **HMS (hours, minutes and seconds)** that the fill solenoid has been in operation. It is capable of counting up to 27,000 hours



The **QTY** value is a count of every complete fill cycle.

Both values are retained by the system indefinitely, even under AC power fail conditions.

By taking note of these values between site visits, maintenance staff can gauge how effectively the system is operating and approximate the volume of water that is flowing into a holding tank.

(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 & 7

These levels are unused.

Display Option Level 8

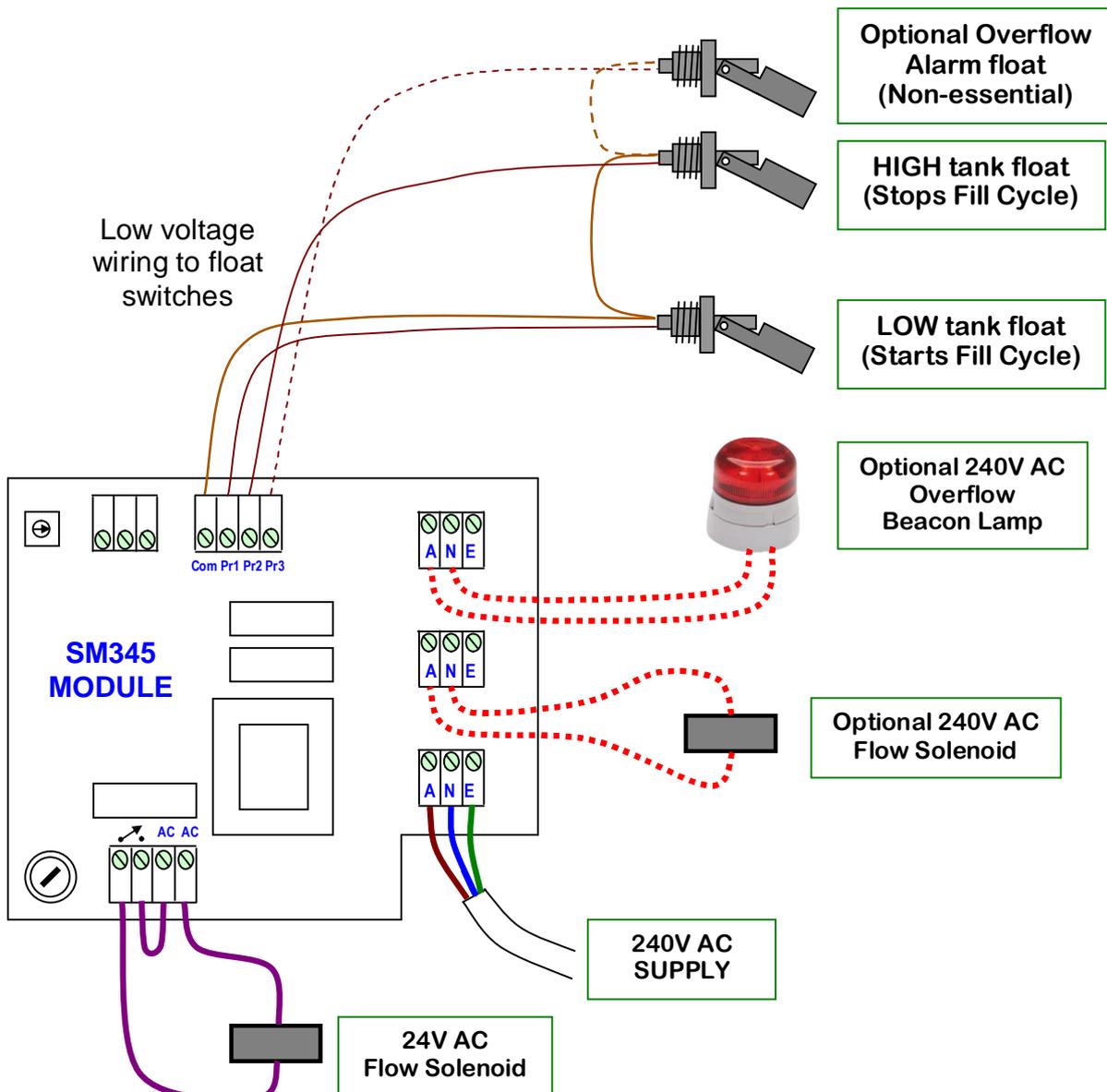
While the switch is in Position 8 a quick functional test of the controller can be implemented by the installer. In this level, briefly closing any level probes will cause repeated alarm beeping .

Briefly operating the **Alarm Mute** button in this level will trigger a single test cycle which will operate the **240V Solenoid Output** for 1 second, then the **24V Solenoid output** for 1 second, then the **240V Overflow Alarm output** for 1 second, then the **Overflow Alarm led** for 1 second and lastly the electronic **Beeper** for 1 second.



Electrical Connections of the SM345

This diagram shows a typical wiring arrangement where the Flow Solenoid may be either a 24V or 240V AC powered device.



Appendix 1 – Resetting the SM345 Hour Meter

This is a special sequence that will allow service personnel to erase the Hour meter and Fill Cycle counter 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 tank filling events may be preserved.

To manually erase these counters, observe these steps:

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 **Solenoid** hour meter to zero press the **Solenoid Jog** button.
To reset the **Cycle Counter** to zero, press the **Alarm Mute** button.

Step 4 Return 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 Restore the **Display Option** switch back '**1**' for normal operator viewing.
