DAVEY

DAVEY®

SumpMaster

Operation Manual

Single or Duplex
Fixed speed pump
Level Control systems



PLEASE READ IMPORTANT CAREFULLY

Please pass these instructions on to the operator of this equipment.

Safety Warning

SAFETY WARNING – This control system contains dangerous voltages and should not be opened or connected by un-authorised personnel.

INTRODUCTION

SumpMaster Pump Controller

The SumpMaster pump control system is a fully integrated pump controller for single or multiple pumps of any type required to operate via level.

Standard “F” model SumpMaster controllers are designed to operate with float switches, but can also be used with probes.

“A” and “A+” models use special inbuilt air pump to provide pneumatic level sensing and control.

The unique electronic - hydraulic control allows each pump to operate at the maximum performance level.

Easy access menu items and in-built pump and system protection allows simple adjustment for any pump application.

SumpMaster also offers a complement of telemetry outputs for simple integration into central monitoring or control applications.

The SumpMaster Pump Control system is part of the Davey Pump Control range.



Version History

This manual covers the software applications for Version No. 29.11.00 or later.
Please contact Davey Water Products to obtain any verification of the currency of this manual for your application.

DEPEND ON DAVEY WATER PRODUCTS

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Reading suggestions for minimal set up.

Operators-
Moving around & editing menu items (1 page)
Pump controller basic functions (1 page)
System operation (1 page)
Settings (3 pages)
Timing (3 pages)

Installers needing a quick check list-
Float Switch Connection (2 pages)
Pump controller basic functions (1 page)
Rotation Check (1 page)
Key Settings (1 page)
Panel layout (1 page)
Wiring diagrams (2 pages)
Installation notes (1 page)

QUICKSTART - Accessing operator controls

Single phase control panel. Motor circuit breaker – Non-adjustable.

To open the clear cover and access the operator controls, use the triangular key provided – turn clockwise to open.



QUICKSTART - Operator controls

Lift cover to access controls.

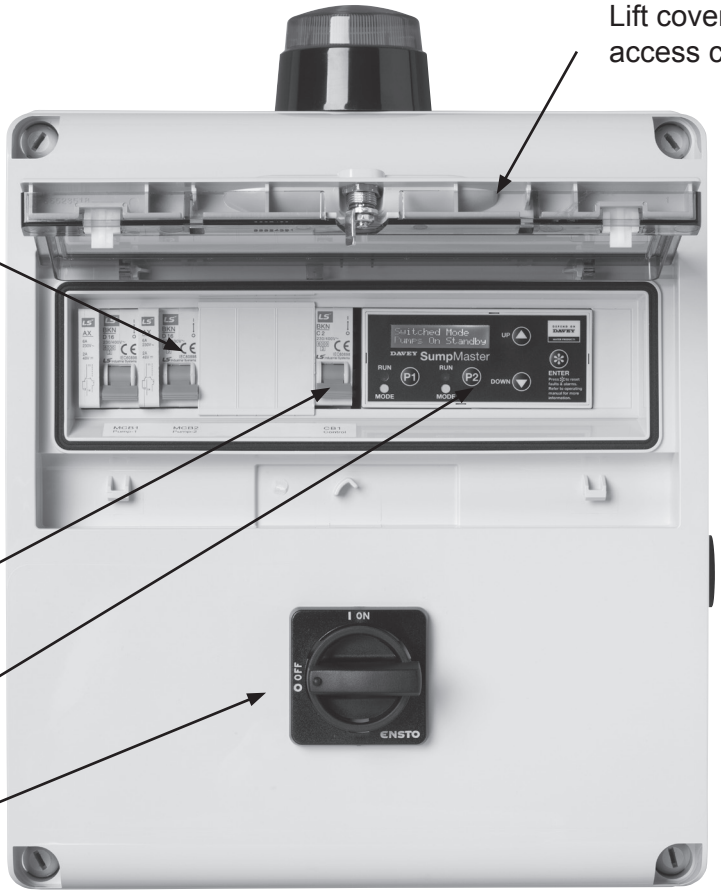
Pump motor circuit breakers. When in the OFF position a small padlock can be inserted through the rocker switch to safely lock out the desired pump.

Pump motor full load current setting dial. (Not shown, only present on 3 phase control panels. Positioned next to the motor circuit breakers)

SumpMaster control power circuit breaker.

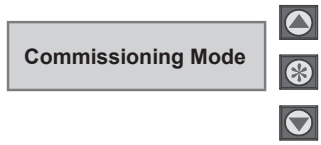
SumpMaster pump controller module.

Mains power isolator switch.

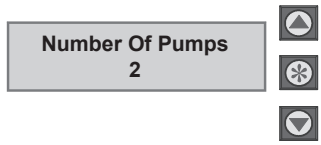


QUICKSTART - Commissioning Mode

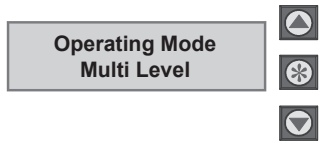
To make it quicker and easier to initially set up the SumpMaster a “Commissioning Mode” has been included which will guide you through the each of the available options as you select different modes and settings. In most cases this will have already been completed prior to the system being dispatched. Commissioning mode can be re-done but any setting previously entered will be changed back to default values.



1. To enter the Commissioning Mode, press and hold down the UP and DOWN keys and then turn on the power to the controller.
   When Commissioning Mode is displayed release the both keys.



2. The display should now show “Number of Pumps” flashing on the top line.
   Use the UP and DOWN keys to adjust the setting, the options are 1 or 2 pumps.
   Press the ENTER “ * ” key when finished.



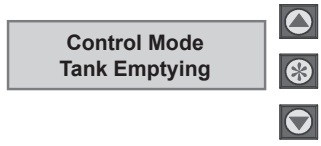
3. The display should now show “Operating Mode” flashing on the top line.
   Use the UP and DOWN keys to adjust the setting.
   “Level” mode options are - Single Level, Multi Level, Air Pump 1 Level, Air Pump Multi-Lvl.

FOR FLOAT CONTROLLED SYSTEMS

Single Level – This mode requires the system to be fitted with a level transducer or float/level switches which starts at one level and stops at another for all pumps.

Multi Level – This mode requires the system to be fitted with a level transducer or float/level switches which will allow individual start and stop levels for all pumps.

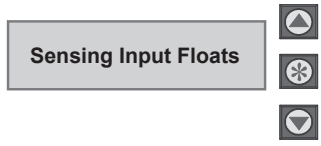
Press the ENTER “ * ” key when finished.



4. The display should now show “Control Mode” flashing on the top line.
   Use the UP and DOWN keys to adjust the setting, the options are Tank Emptying and Tank Filling.

If taking water from a tank or pit and pumping it elsewhere then select Tank Emptying.
If transferring water into a tank or pit then select Tank Filling.

Press the ENTER “ * ” key when finished.

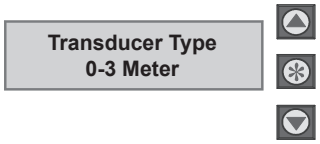


5. The display should now show “Sensing Input” flashing on the top line.
   Use the UP and DOWN keys to adjust the setting, the options are Analogue, Reverse Analogue and Floats.

FOR FLOAT CONTROLLED SYSTEMS - Con't

Floats – This mode requires the system to be fitted a number of floats placed at different levels. The system can be operated from only one float but that will not allow operation of any alarm or backup modes.
Analogue – This mode requires the system to be fitted with a level transducer where the output of the transducer increases as the water level rises.
Reverse Analogue – This mode requires the system to be fitted with a level transducer where the output of the transducer decreases as the water level rises.

Press the ENTER " * " key when finished. If "Sensing Input" is set to "Floats" go to the END.



6. If operating mode was set to one of the "Level" modes and the sensing Input was set "Analogue" the display should now show "Transducer Type" flashing on the top line.
   Use the UP and DOWN keys to adjust the setting, the options are Custom, 0-3 Meter, 0-5 Meter and 0-10 Meter.

Custom – This mode requires calibration of the sensor to be completed manually. See sections on Transducer Zero and Adjust Level.
0-3 Meter – This pre-calibrates the controller to operate on a sensor with a full scale output of 3 meters. Further scaling or adjustment can then be carried out if required. See sections on Transducer Zero and Adjust Level.
0-5 Meter – This pre-calibrates the controller to operate on a sensor with a full scale output of 5 meters. Further scaling or adjustment can then be carried out if required. See sections on Transducer Zero and Adjust Level.
0-10 Meter – This pre-calibrates the controller to operate on a sensor with a full scale output of 10 meters. Further scaling or adjustment can then be carried out if required. See sections on Transducer Zero and Adjust Level.

Press the ENTER " * " key when finished

END

Commissioning Complete – These are the basic setting completed, there are other settings that may need to be adjusted, read items as indicated at the bottom of the Contents page.

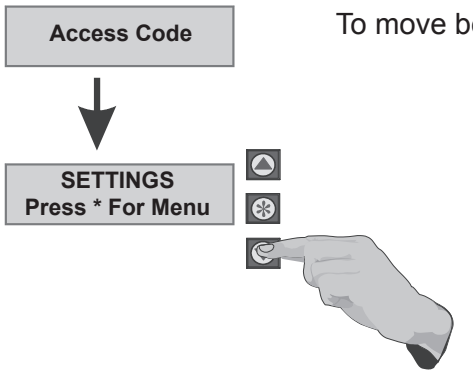
If a mistake is made during the commissioning sequence the power can be turned off and the sequence restarted.

NOTE

For the majority of installations using float switch control you can now skip to page 38 for the physical installation details including wiring and float switch setting.

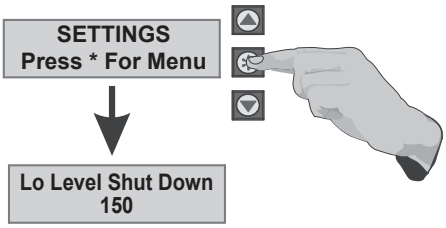
If, on the other hand, you are an experienced tradesperson who has experience with and need to set the controller for other than normal float switch operation, or if you need to access the operation or fault histories, please read on from here.

QUICKSTART - Moving Around & Editing Menu Items



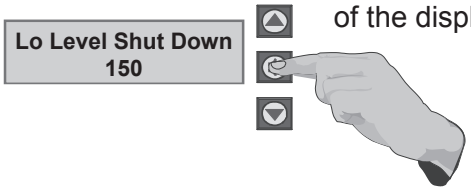
To move between the Main Menu screens press the UP or DOWN key.

To access a sub menu press the ENTER " * " key. Access to the sub menus is controlled by an Access Code which can be entered prior to accessing the sub menu or if it has not been entered it will pop up allowing it to be entered prior to accessing any of the sub menu. If the Access Code is not entered correctly the system will disable entry into the Sub menus and the use of any pump select or enable keys.

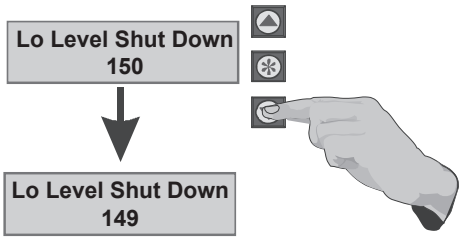


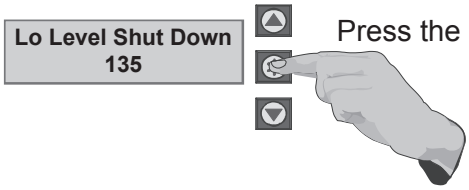
To scroll through the sub menu select the UP or DOWN keys

When the menu to be edited is displayed is press the ENTER Key once, the top line of the display will then flash, this is to indicate that the data can now be edited.



Now press the UP or DOWN key until the desired value is reached.

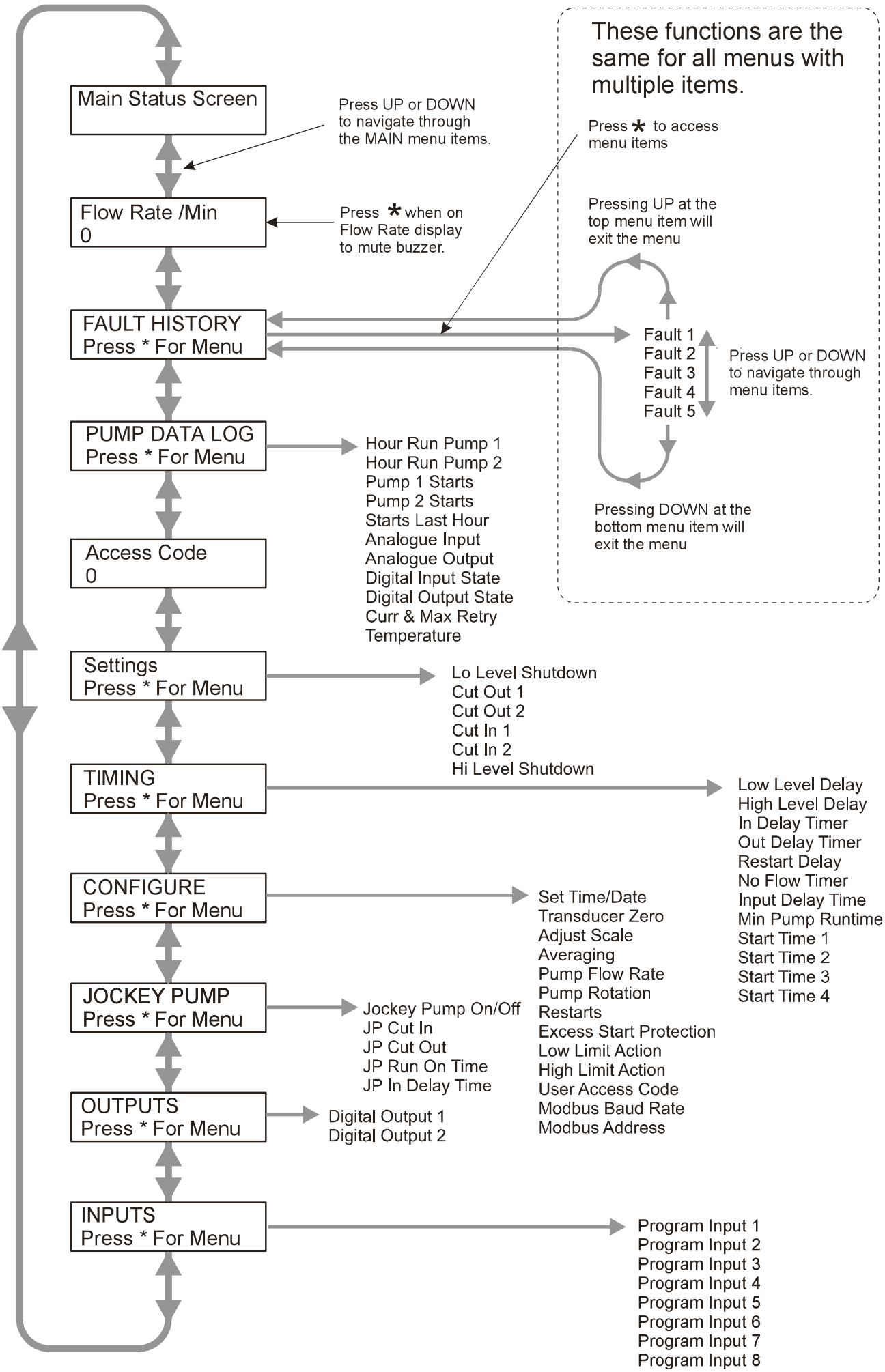




Press the ENTER Key again to save the value selected.

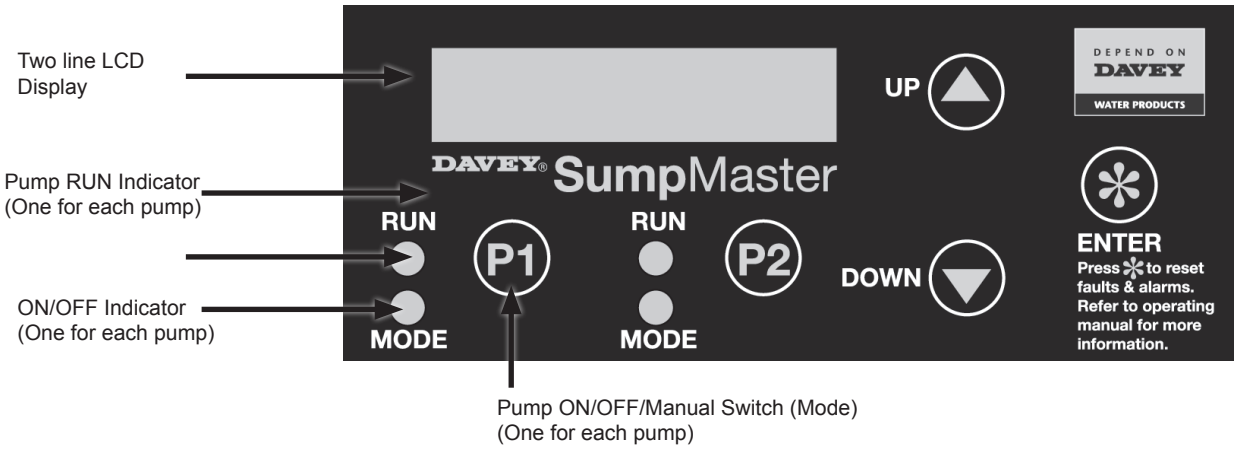
To move out of a submenu press the up or down key to scroll to the top or bottom of the submenu and the display will return to the main menu area.

MENUS


These functions are the same for all menus with multiple items.
Main Status Screen
Press UP or DOWN to navigate through the MAIN menu items.
Press * to access menu items
Flow Rate /Min
0
Press * when on Flow Rate display to mute buzzer.
Pressing UP at the top menu item will exit the menu
FAULT HISTORY
Press * For Menu
Fault 1
Fault 2
Fault 3
Fault 4
Fault 5
Press UP or DOWN to navigate through menu items.
PUMP DATA LOG
Press * For Menu
Hour Run Pump 1
Hour Run Pump 2
Pump 1 Starts
Pump 2 Starts
Starts Last Hour
Analogue Input
Analogue Output
Digital Input State
Digital Output State
Curr & Max Retry
Temperature
Pressing DOWN at the bottom menu item will exit the menu
Access Code
0
Settings
Press * For Menu
Lo Level Shutdown
Cut Out 1
Cut Out 2
Cut In 1
Cut In 2
Hi Level Shutdown
TIMING
Press * For Menu
Low Level Delay
High Level Delay
In Delay Timer
Out Delay Timer
Restart Delay
No Flow Timer
Input Delay Time
Min Pump Runtime
Start Time 1
Start Time 2
Start Time 3
Start Time 4
CONFIGURE
Press * For Menu
Set Time/Date
Transducer Zero
Adjust Scale
Averaging
Pump Flow Rate
Pump Rotation
Restarts
Excess Start Protection
Low Limit Action
High Limit Action
User Access Code
Modbus Baud Rate
Modbus Address
JOCKEY PUMP
Press * For Menu
Jockey Pump On/Off
JP Cut In
JP Cut Out
JP Run On Time
JP In Delay Time
OUTPUTS
Press * For Menu
Digital Output 1
Digital Output 2
INPUTS
Press * For Menu
Program Input 1
Program Input 2
Program Input 3
Program Input 4
Program Input 5
Program Input 6
Program Input 7
Program Input 8

QUICKSTART - Pump Controller basic functions

The interface for SumpMaster Control Panel allows access for the operator to edit values throughout the menus.



To edit values and settings within menus
Press the ENTER (*) key when the desired menu is displayed. The top line will flash if the menu can be edited (some menus may be locked and unavailable). Use the UP and DOWN buttons to change the selection, then press ENTER (*) again to confirm the change.

Each pump is controlled by an individual "P" button. By default a valid Access Code is required to enable, or manually run a pump. Pumps can however be stopped and disabled without an Access Code. (Default is 21).

To enable a pump for operation
Press the "P" button and the associated mode indicator will light up. The selected pump is now available for operation in Automatic mode.

To disable a pump in Automatic Mode
Press the "P" button until the Pump ON/OFF indicator light turns off.

To operate a pump on Manual
Press and hold the "P" switch for 3 seconds to start a pump in "Manual".

The Pump MODE light will be flashing and the RUN indicator will be on. To turn a manual pump off, press and release the "P" switch.
The RUN light turns off when the pump is disabled. To return it to Automatic press the "P" button again until the Mode indicator turns on.

MANUAL MODE PROTECTION
Pump protection settings apply to all pumps including those in manual mode.
The individual pump protection features can be adjusted or disabled but the SumpMaster controller will maintain pump protection when required and will not allow pumps to run in manual mode.

Optional alarm/fault light and buzzer
If an alarm strobe light and buzzer are fitted an output will be set to Any Fault.
To reset the fault and turn off the alarm and buzzer the Enter key must be pressed.

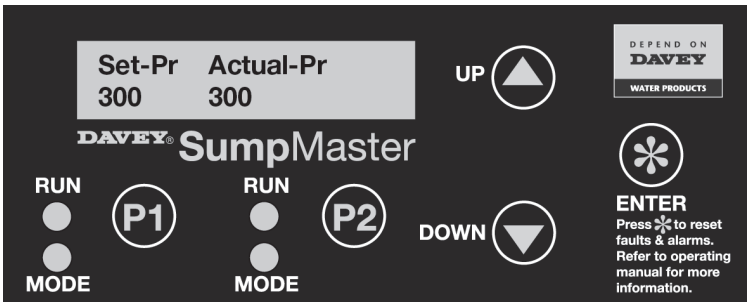
NB: By default all pumps will be off when system is powered up for the first time.

<u>To edit menu data</u>
Press the ENTER key to edit data in the required menu, the top line will flash if the current menu is an editable screen. Use the UP and DOWN buttons to change the selection, then press ENTER again to confirm the change.

QUICKSTART - Rotation Check

The following procedures are the minimum required to start and operate the SumpMaster. If you are concerned regarding the commissioning of the unit please read the complete manual or call your closest Davey Water Products dealer.

The following test confirms the operational directions of all pumps in both Manual and Automatic Modes



This is a most important procedure and should be completed prior to any other commissioning procedure. Only Qualified Personnel should be allowed to complete this procedure as there is High Voltage wiring within the panel.

1. Switch OFF all motor circuit breakers. ☐
2. Turn ON power to SumpMaster controller. ☐
3. Make sure all Pump Mode indicators are OFF, If not press “P1” and/or “P2” keys to turn pump off all pumps (All pumps should now be off) ☐
4. Adjust Overloads to to suit motor ratings. Switch ON all circuit breakers. ☐
5. Press “P1” to turn on Pump 1. The Running indicator should light up. ☐

   (If the message “Key Pad Locked” appears, The Access Code menu will then appear, increment the Access Code using the UP key until it is 21 and then press Enter. Now Press “P1” again)

   Check Rotation against the pump manufacturers direction arrow.
   After checking turn Pump1 to OFF by pressing “P1” again.
6. Press “P2” to turn on Pump 2 (If fitted). The Running indicator should light up ☐

   Check Rotation against the pump manufacturers direction arrow.
   After checking turn Pump1 to OFF by pressing “P2” again.
7. If any of the other pumps have the wrong direction of rotation change two of the wires on the wiring connected to the motor in question. This should only be done by qualified personnel. ☐

- Re-check direction

8. Rotation check complete. ☐

********IMPORTANT********

Failure to follow this procedure will VOID WARRANTY And possibly cause failure of the pump.

Cancelling audible beeper.
If during commissioning you wish to cancel the BEEP heard on key strokes go to the “Flow-Rate” display and press *

QUICKSTART - Key Settings

1. Press the Up Key until the Message **Access Code** is displayed.
2. Press the “Enter Key” once, the display should start to flash, now press the UP Key until the number 21 appears in the lower part of the screen, now press the Enter Key” again, the display should stop flashing. The correct Access code is now set. (The same sequence of key presses is used to adjust all settings on the SumpMaster)
3. If the system is displaying Level then press the “DOWN Key” until **CONFIGURE** screen is displayed.
4. Press the “Enter Key” to access the **CONFIGURE** Sub Menu.
5. The first menu is the **OPERATING MODE** and should now be displayed. If it was in Level mode, the LEVEL will be displayed on the bottom line. There are two options for Level, Single and Multi.
6. Press the “Enter Key” to change the **OPERATING MODE**, the top line should now be flashing. Press the up or down key until the desired operating mode is displayed (Multi or Single Level), then press the “Enter Key” again.
7. Press the “DOWN Key” until the **CONTROL MODE** screen is displayed. Change to suit the application, **Tank Filling** if pumping into a tank and **Tank Emptying** if pumping out of a tank.
8. Press the “DOWN Key” until the **SENSING INPUT** screen is displayed. If floats or switches are used change this setting to “Switched”, If a level transducer is being used it should be set to “Analogue”
9. If the SENSING INPUT is set to **Analogue** jump to the next step. If floats are being used then the input that each float is connected to has to be assigned to the appropriate function – Pump Start/Stop. Read the section on INPUTS to establish how this is done.
10. Then press the “UP Key” until the **CONFIGURE** is exited . Keep pressing the “UP Key” until the **SETTINGS** menu appears.
11. Press the “Enter Key” to access the **SETTINGS** Sub Menu.
12. Press the “DOWN Key” Until the **Cut In Level** screen is reached.
13. Adjust the **Cut In Level** by pressing the “Enter Key” once, the display should then start to flash, now press the “UP or DOWN Key” to alter the **Cut In Level**.
14. Press the “Up or DOWN Key” Until the **Cut Out Level** screen is reached.
15. Adjust the **Cut Out Level** by pressing the “Enter Key” once, the display should then start to flash, now press the “UP or DOWN Key” to alter the **Cut Out Level**.
16. After the adjustments have been made, press the “DOWN Key” until the sub menu is exited and the “SETTINGS” main screen appears.

CALIBRATING LEVEL TRANSDUCER

For a full explanation go to the section marked - CALIBRATION OF ANALOGUE SENSORS.

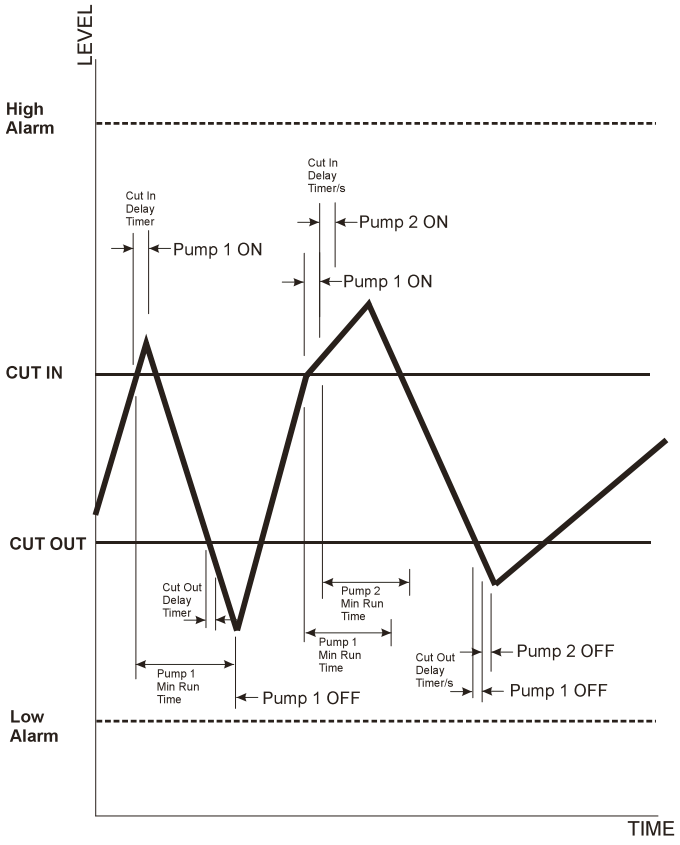
1. Press the “DOWN Key” until you reach the Main Menu Marked **“CONFIGURE”**
2. Enter the submenu by pressing the “Enter Key”
3. Press the “DOWN Key” until the “Zero Level” screen is displayed. (At this point the level transducer need to be removed from the tank)
4. Adjust the value in the bottom screen until the reading is “0” – Use the same key sequence as previously to adjust zero. (If “Value too Low” appears, increase the Zero offset value slowly until a zero value is obtained by pressing the key).
5. Press the “DOWN key” until you **reach “ADJUST LEVEL”.** (At this point the level transducer needs to be inserted into the tank to a known depth).
6. Adjust the value in the “Adjust Level” screen until the transducer depth is the same as the screen level.
7. The System is now Calibrated. Press the DOWN key until the main system level screen (Status Screen) returns.

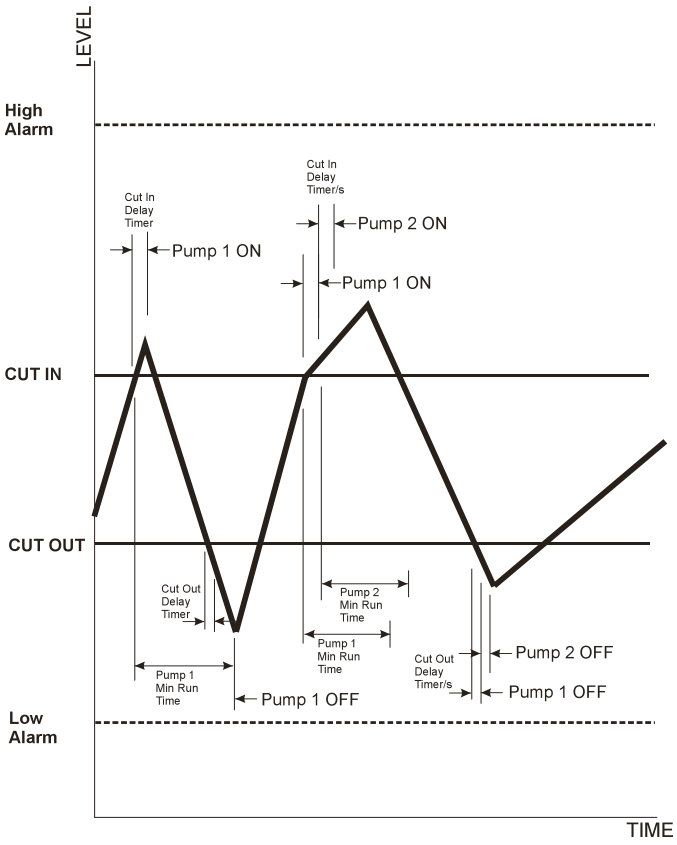
SYSTEM OPERATION

The operating constraints for the system are detailed below.

Tank Empty Mode – Single Level

When the system level rises to the system cut In point the controller will start a cut in delay timer and if the level is still above the cut in point when the cut in timer expires then a pump is started. If the level then drops below the cut in point no further pumps are started. When the level falls below the cut out level the cut out timer is started, if the cut out timer expires and the level is still lower than the cut out point then the pump will be turned off, unless the pump minimum run time has not been achieved and then it will remain on until the minimum run timer expires. Should the level rise above the cut in point and a pump is started but this pump is unable to reduce the level below the cut in level before cut in timer elapses again, then a second pump will start (if fitted and available). After the level falls below the cut out point the first pumps cut out timer will start and when it expires it will turn off the pump if the minimum pump run time has been achieved, the same will then occur for the second pump.





Tank Empty Mode – Multi Level

When the system level rises to system cut In 1 point the controller will start a cut in delay timer and if the level is still above cut in 1 point when the cut in timer expires then a pump is started. If the level does not reach cut in 2 point no further pumps are started. When the level falls below cut out 1 level the cut out timer is started, if the cut out timer expires and the level is still lower than cut out 1 point then the pump will be turned off, unless the pump minimum run time has not been achieved and then it will remain on until the minimum run timer expires. Should the level rise above cut in 1 point and a pump is started but this pump is unable to meet demand causing the level to rise above cut in 2 level, then cut in 2 timer is started and when cut in 2 timer elapses a second pump will start (If fitted and available). After the level falls below cut out 1 point the first pumps cut out timer will start, when it expires it will turn off the pump if the minimum pump run time has been achieved, the same will then occur for the second pump.

Tank Filling – The same sequences occur for tank filling

MENUS

The SumpMaster controller has numerous adjustment menus to allow the system to be tuned to suit each application. These are listed below and explained throughout this manual. A detailed explanation of each menu function starts on page 18.

Menus throughout this manual show the complete range of options available. If a menu is not needed because the option is disabled then these screens will not appear. For example if only 1 pump is implemented, then screens with options for pump 2 will be hidden.

Main Menu		Units	Range	
System Level		number	0 - 9999	Current reading
Flow Rate /Min		number	0 - 9999	Calculated flow

NOTE- To MUTE the buzzer press the * screen when Flow Rate is displayed

Main Menu	Sub Menu	Units	Fault Messages	Initial record
FAULTS	Fault 1	display	None Logged Lo Level Shutdown,	None Logged
	Fault 2	display	Hi Level Shutdown, No Flow Shutdown,	None Logged
	Fault 3	display	# Pump 1 - 2 Shutdown # Pump 1 - 2 No Flow	None Logged
	Fault 4	display	Power Off Power Glitch	None Logged
	Fault 5	display	Auto Reboot	None Logged

Only displayed if "Number of pumps" is set to 2

Main Menu	Sub Menu	Units	Range	Initial value
PUMP DATA LOG	Hours Run 1	hours	0 - 65535	0
Note 1	Hours Run 2	hours	0 - 65535	0
	Pump Starts 1	number	0 - 65535	0
Note 1	Pump Starts 2	number	0 - 65535	0
	Pump Starts Last Hr	number	0 - 65535	0
Note 2	Analogue Input 1	%	0.00 - 100.00	Current reading
Note 2	Analogue Output 1	%	0.00 - 100.00	Current reading
	Digital Input State	number	1 to 8 X for Active	Current reading
	Digital Output State	number	1 to 2 X for Active	Current reading
	Curr & Max Retry	number	0 to 21	Current reading
	Temperature	number	0 to 100C	Current reading

Note 1 - Only visible if "Number of pumps" is set to 2

Note 2 - "Analogue Input"& "Output" is only visible if the "Sensing Input" in CONFIGURE menu is set to "Analogue"

Main Menu	Units	Range	Initial setting
Access Code	number	0 - 250	21

Main Menu	Sub Menu	Units	Range	Initial setting
SETTINGS				
Note 1	LoLevel Shutdown	seconds	0 - 9999	150
Note 2	LoLevel Alarm	seconds	0 - 9999	150
Note 3	Low Limit	display	OFF	
	Cut In Level	unitless	0 - 9999	200
	Cut Out Level	unitless	0 - 9999	450
Note 4	HiLevel Shutdown	seconds	0 - 9999	650
Note 5	HiLevel Alarm	seconds	0 - 9999	650
Note 6	High Limit	display	OFF	
Note 7	Alt Cut In 2	unitless	0 - 9999	250
Note 7	Alt Cut Out 2	unitless	0 - 9999	500
Note 7	Alt Cut In 3	unitless	0 - 9999	300
Note 7	Alt Cut Out 3	unitless	0 - 9999	600
Note 8	Trip Point Low	unitless	0 - 9999	300
Note 8	Trip Point High	unitless	0 - 9999	400

General Note - No settings are displayed if system if programmed to operate in switched mode

Note 1 - LoPress Shutdown is displayed when "Low Limit Action" in CONFIGURE menu is set to "Shutdown"

Note 2 -LoPress Alarm is displayed when "Low Limit Action" in CONFIGURE menu is set to "Alarm"

Note 3 - Low Limit "OFF" is displayed when "Low Limit Action" in CONFIGURE menu is set to "OFF"

Note 4 -HiPress Shutdown is displayed when "HighLimit Action" in CONFIGURE menu is set to "Shutdown"

Note 5 -HiPress Alarm is displayed when "HighLimit Action" in CONFIGURE menu is set to "Alarm"

Note 6 -High Limit "OFF" is displayed when "High Limit Action" in CONFIGURE menu is set to "OFF"

Note 7 - Alternate Settings are displayed when input is programmed accordingly and only available in "Single Level" mode.

Note 8 - "Trip Point Low" & "High" are displayed when a "Digital Output" is set to "Trip Point"
Also the trip point function is not available if the "Sensing Input" is set to "Switched" mode in CONFIGURE menu.

Main Menu	Sub Menu	Units	Range	Initial setting
TIMING				
	Lo Level Delay	seconds	^ OFF, 0 - 250	120
	High Level Delay	seconds	^^ OFF, 0 - 250	4
	In Delay Timer	seconds	0 - 999	4
	Out Delay Timer	seconds	0 - 999	1
	Restart Delay	seconds	0 - 999	0
	No Flow Timer	seconds	0 - 250	0
	Input Delay Timer	seconds	0 - 999	120
Note 1	Level Trip Low Delay	seconds	0 - 999	0
Note 1	Level Trip High Delay	seconds	0 - 999	0
Note 2	Min Pump Runtime	seconds	0 - 240	60
Note 3	Max Pump Starts	per Hour	0 - 240	60
	Start Time 1	Hr:Min	OFF, 00:00 - 23:59	OFF
	Stop Time 1	Hr:Min	OFF, 00:00 - 23:59	OFF
	Start Time 2	Hr:Min	OFF, 00:00 - 23:59	OFF
	Stop Time 2	Hr:Min	OFF, 00:00 - 23:59	OFF
	Start Time 3	Hr:Min	OFF, 00:00 - 23:59	OFF
	Stop Time 3	Hr:Min	OFF, 00:00 - 23:59	OFF
	Start Time 4	Hr:Min	OFF, 00:00 - 23:59	OFF
	Stop Time 4	Hr:Min	OFF, 00:00 - 23:59	OFF

^ OFF is displayed in the "Lo Press Delay" screen when "Low Limit Action" in CONFIGURE menu is set to "OFF"

^^ OFF is displayed in the "Hi Press Delay" screen when "HighLimit Action" CONFIGURE menu is set to "OFF"

Note 1 - Level Trip delays are only visible if an OUTPUT is set to "Level Trip"

Note 2 - "Min Pump Runtime" Is displayed when "ExcessStart Prot" in CONFIGURE menu is set to "Minimum Run Time"

Note 3 - "Max Pump Starts" Is displayed when "ExcessStart Prot" in CONFIGURE menu is set to "Max Starts PerHr"

Main Menu	Sub Menu	Units	Range or Options	Initial setting
CONFIGURE				
	Set Time/Date		Hr:Min Year Month Day	
Note 1	Transducer Zero	unitless	Set to 0 at Zero Level	
Note 1	Adjust Pressure	unitless	Set to equal current level	
Note 1	Averaging	number	0 - 50	5
Note 1	Scale An Output	number		1000
	Pump Flow Rate	per Min	1-9999 /Min	5
	Auto Rotation	selection	Full, Pump 1, ^ Pump 2, Every 24 Hours, Low Hours.	Full
Note 2	High Level Restarts	selection	0 - 250	0
Note 3	Low Level Restarts	selection	0 - 250	0
	Sensing Input	selection	Analogue, Switched	Analogue
	ExcessStart Prot	selection	Minimum Run Time, Max Starts PerHr	Minimum Run Time
	Low Limit Action	selection	OFF, Alarm, Shutdown, Pump Start	OFF
	HighLimit Action	selection	OFF, Alarm, Shutdown, Pump Start	OFF
	User Access Code	number	0 - 250	21
	Modbus BaudRate	number	2400 - 230400	9600
	Modbus Address	number	1 - 128	1

^ Pumps 2 is only visible if "Number of pumps" is set to 2

Note 1 - "Transducer Zero", "Adjust Pressure"," Averaging" & "Scale An Output" are hidden when in "Switched" mode

Note 2 - "High Level Restart" will be displayed if the "Control Mode" is set to "Tank Filling"

Note 3 - "Low Level Restart" will be displayed if the "Control Mode" is set to "Tank Emptying"

Main Menu	Sub Menu	Units	Range OR Option	Defaults
JOCKEY PUMP				
	Jockey Pump	selection	----Off----, ===On===	----Off----
Note 1	JP Cut In Press		0 - 9999	250
Note 1	JP Cut Out Press		0 - 9999	400
Note 1	JP Run On Time	seconds	0 - 999	2
Note 1	JP In Delay Time	seconds	0 - 999	0

Note 1 - JP Screens are only visible if "Jockey Pump" is set to " ===ON==="
AND "Sensing Input" in CONFIGURE menu is set to "Analogue"

Main Menu	Sub Menu	Units	Options	Defaults
OUTPUTS				
	Digital Output 1	selection	Shutdown Fault, Lo Level Fault, Hi Level Fault, ^ Pump 1 - 2 Run, ^^ Pump 1 - 2 Fault, System Paused, Low Alarm, High Alarm, Any Alarm, Any Pump Shutdown, Any Pump Running, # Trip Point Alternate Trip, Aux Output 1, Aux Output 2, Any Fault	Shutdown Fault
	Digital Output 2	selection		Any Pump Shutdown
Note 1	Analogue Output	selection	System Press	System Level

^ Pump Run 2 is only visible if "Number of pumps" is set to 2

^^ Pump Fault 2 is only visible if "Number of pumps" is set to 2

Trip point function is not available if the "Sensing Input" is set to "Switched" mode in CONFIGURE menu.

Note 1 - "Analogue output" is only visible if the "Sensing Input" in CONFIGURE menu is set to "Analogue"

Main Menu	Sub Menu	Units	Options	Initial Setting
INPUTS				
	Program Input 1	selection	Any of the following options can be selected on any input and used multiple times. Not Used ^ Alt 2 Settings ^ Alt 3 Settings ^^ Cut In, ^^ Cut Out, # Cut In 1, # Cut In 2, # Cut Out 1, # Cut Out 2, Low Limit, High Limit, System Pause, < P1-2 Prot(Pause) < Pump 1 - 2 Stop, < Pump 1 - 2 Manual Run, Fire Mode, Cycle Pumps, Reset, No Flow, Aux 1, Aux 2, < Pump1-2 Fault(Stop) Low Lvl Pause	Cut In 1
	Program Input 2	selection		Cut Out 1
	Program Input 3	selection		Cut In 2
	Program Input 4	selection		Cut Out 2
	Program Input 5	selection		Low Limit
	Program Input 6	selection		High Limit
Note 1	Program Input 7	selection		P1 Prot(Pause)
Note 1	Program Input 8	selection		P2 Prot(Pause)

^ Alternate 2&3 level options are only available and visible if the "Operating Mode" in CONFIGURE is set to "Single Level" mode AND if the "Sensing Input" in CONFIGURE menu is set to "Analogue" mode.

^^ "Cut In" and "Cut Out" options are only available and visible if the "Operating Mode" in CONFIGURE is set to "Single Level" mode. (They will operate in both Analogue & Switched modes)

"Cut In 1-2" and "Cut Out 1-2" multi level options are only available and visible if the "Operating Mode" in CONFIGURE is set to "Multi Level" mode AND if the "Sensing Input" in CONFIGURE menu is set to "Switched" mode

< Pump 2 option is only visible if "Number of pumps" is set to 2.

Note 1 - Input function locked to pump protection.

SYSTEM STATUS

System Level

System Level		number	0 - 9999

The System Level is the direct measurement of the level in the system. It is read from the level transducer and is displayed on the Level Screen on the front of the panel.

System Level XXXX

This is the default display screen; it will display appropriate messages describing current conditions. These include in order of priority: Emergency Stop, Hi Press Shutdown, Lo Press Shutdown, No Flow Shutdown, Fault, Lo Flow Detected, and Pause Activated.

If the system is to be configured to run with floats or level switches this screen will show switched mode, pumps on standby or pumps running.

Switched Mode Pump/s on StdBy

After 25 minutes from the last key press the SumpMaster will revert to this screen automatically.

Flow Rate

Flow Rate /Min		number	0 - 9999

The SumpMaster can operate on a calculated flow rate

The Calculated flow rate uses information that is input into the Pump Flowrate screen to provide an estimation of the flow rate at any time. This calculation automatically compensates for the number of pumps operating - it is useful in determining the system capacity. This is a calculated flow and must be treated as such. (ie: an estimate only) The time base for this flow is in flow per MINUTES and is not adjustable.

Flow Rate / Min XXXXX*

FAULT HISTORY

FAULTS			
	Fault 1	display	None Logged Lo Level Shutdown, Hi Level Shutdown, No Flow Shutdown, # Pump 1 - 2 Protection # Pump 1 - 2 Fault Power Off Power Glitch Auto Reboot
	Fault 2	display	
	Fault 3	display	
	Fault 4	display	
	Fault 5	display	

When a system fault is registered a “NEW FAULT” message will appear on the main screen. It will also be logged in the FAULT HISTORY menu. There is space for up to 5 faults to be logged which scroll down as new faults are received.

In the event of a new fault, which has been automatically reset, the default screen will display the message “New Fault”. Go to the FAULT HISTORY to view this fault. Faults that are active will remain live on the screen until the ENTER Key is pressed to clear the fault.

****NEW FAULT****

Faults will appear in the Fault sub menu in the following format with the most recent fault being Fault 1.

Last Fault (No.1)
Lo Press Shutdown

Note: The FAULT HISTORY menu is clear when the system is first powered up.

Fault 2
No Flow Shutdown

“Pump 1 - 2 Shutdown” signifies that the corresponding “Pump protect 1-2” input has been activated for the period of the input delay time.

“Auto Reboot” denotes that the SumpMaster has automatically restarted due to an internal reset, whereas “Power Failure” records that the SumpMaster has recovered from a power supply disconnection. A very short disconnection of power will record a “Power Glitch” message, typically around 0.1seconds.

The FAULT HISTORY menu is always visible regardless of whether the Access Code is correct.
To reset the complete FAULT HISTORY, press the ENTER key then DOWN and then ENTER again when at Fault 1. Individual Faults can be reset by completing the same action while displaying the Fault screen required to be reset.

PUMP DATA LOG

Main Menu	Sub Menu	Units	Range
PUMP DATA LOG			
	Hours Run 1	hours	0 - 65535
Note 1	Hours Run 2	hours	0 - 65535
	Pump Starts 1	number	0 - 65535
Note 1	Pump Starts 2	number	0 - 65535
	Pump Starts Last Hr	number	0 - 65535
Note 2	Analogue Input 1	%	0.00 - 100.00
Note 2	Analogue Output 1	%	0.00 - 100.00
	Digital Input State	number	1 to 8 X for Active
	Digital Output State	number	1 to 2 X for Active
	Curr & Max Retry	number	0 to 21
	Temperature	number	0 to 100C

Hours Run Pump 1-2

Each pump has an hour run meter to record the actual run time for each pump. The hour log will accumulate all of the operation time for each pump in both AUTOMATIC and MANUAL modes.

Hours Run Pump 1
XXXXX

To reset the time press ENTER then DOWN and then ENTER again.

Pump 1-2 Starts

The SumpMaster registers the number of starts that each pump accumulates to assist in the tuning of the system. This number can assist in the selection of the Cut In and Cut Out Levels and the run time settings. The starts do not increment when selected in MANUAL as this is considered to be an override function.

Pump Starts 1
XXXXX

To reset press ENTER then DOWN and then ENTER again.

Starts Last Hour

This registers the numbers of starts that the TOTAL SYSTEM had over the past hour. This is the accumulation of all of the Starts for all of the pumps and is designed to assist in trouble shooting. The new number is accumulated over a 10-min period and is updated at 10-minute intervals. To get a true hourly reading the system must have been running for at least 1 hour. After the first hour the last 6 previous 10-minute readings are added together to get the Starts last hour reading.

To reset press ENTER then DOWN and then ENTER again.

Starts Last Hour
XXXXX

Analogue Input

This screen displays the actual Analogue Input reading in percentage.
It shows the actual possible full scale reading and is not zeroed or scaled to Level.
It is used to determine input functionality. It will not be displayed if operating in switched mode.

Analogue Input 1
XXX.XX%

Analogue Output

This screen displays the actual Analogue Output reading in percentage. This output mimics the Analogue 1 Input and can be re-scaled in the configuration settings.
It will not be displayed if operating in switched mode.

Analogue Output 1
XXX.XX%

Digital Input State

This screen displays the state of the Digital inputs
X = energised
- = de-energised
See INPUTS for configurable options for this item.

Digital Input State
X--X----X

Digital Output State

This screen displays the state of the Digital outputs
X = energised
- = de-energised
See OUTPUTS for configurable options for this item.

Digital Output State
X---

Curr & Max Retry

The number under “Curr” is the current number of times the main processor has not been able to communicate with the analogue system. If it is not at Zero it indicates that the analogue system has been subject to noise and may have had to restart itself. If this number continues to increment up to 20, then resets to 0, and continues incrementing again it indicates a possible major malfunction with the analogue system

The number under “Max Retry” is the maximum number of times the main processor has not been able to communicate with the analogue circuitry. If it is at 20 there may have been a major disruption in the analogue system and was unable to restart its self and the main processor has more than likely forced it to restart.

Curr & Max Retry
XXX XXX

Temperature

Displayed is the current temperature in degrees C, read via the temperature sensor on the circuit board.

Temperature
XXX degrees C

ACCESS CODE

Main Menu	Units	Range
Access Code	number	0 - 250

Press ENTER to edit the Access Code at this location. If correct this will then allow access to the “Sub Menus”. Once the Access Code is input it will remain active for 25 minutes after the last key press. Standard security will then resume and access into the submenus will require re-entering of the Access Code.

Access Code
XXX

The system will then automatically lock the use of the keys which control the ON/OFF and AUTOMATIC and MANUAL Functions. This is designed to protect the system from tampering.

KEY PAD LOCKED
Enter Access Code

If a message KEPAD LOCKED appears on the screen enter the ACCESS CODE to allow access.

SETTINGS

Main Menu	Sub Menu	Units	Range
SETTINGS			
	LoLevel Shutdown	seconds	0 - 9999
	LoLevel Alarm	seconds	0 - 9999
	Low Limit	display	OFF
	Cut In Level	unitless	0 - 9999
	Cut Out Level	unitless	0 - 9999
	HiLevel Shutdown	seconds	0 - 9999
	HiLevel Alarm	seconds	0 - 9999
	High Limit	display	OFF
	Alt Cut In 2	unitless	0 - 9999
	Alt Cut Out 2	unitless	0 - 9999
	Alt Cut In 3	unitless	0 - 9999
	Alt Cut Out 3	unitless	0 - 9999
	Trip Point Low	unitless	0 - 9999
	Trip Point High	unitless	0 - 9999

Low Level Shutdown
Low Level Alarm
Low Limit

This is the alarm Level point for low Level. If any pump is running and the system falls below this Level and remains there for the period of the “LoLevel Delay” time the system will act according to the setting in the “Low Limit Action” Sub menu.

- If Low Limit Action is set to OFF, then no action is taken.
- If Low Limit Action is set to Alarm, then an alarm is only logged.
- If Low Limit Action is set to Shutdown, then a shutdown is initiated.

For alarm and shutdown actions, an output relay can be set to the appropriate mode to turn it on.

An alarm message will show on the main screen showing that there is a low Level shutdown fault. The fault will also be recorded in the FAULT HISTORY sub menu. To clear the fault and restart the system press the ENTER key.

Note: All pumps will be shutdown including manual pumps.

If Low Limit Action is set to OFF the Low Limit and the Low Pressure Delay screens will then display ------OFF---- and can be not edited.

Cut In Level

The Cut In Level is the Level at which the system will restart or the next pump will start. This Level must be higher than the Low Level Shutdown. If the system is

re-starting, then the restart timer must have timed out before the first pump will start.

If there is a pump already running, then the Cut In timer must have timed out before the next pump will start. Pumps may also be prevented from starting if the Max starts per hour setting has been exceeded. A message will appear on the status screen letting you know that it has occurred.

(This option is set in- Configuration -> Excess Run Protection)

Cut In Level
XXXX

PUMP/S REACHED
MAX Starts Per Hr

Cut Out Level

The Cut Out Level is the Level at which the system will start to turn off pumps. This Level must be higher than the Cut InLevel. The Cut Out timer must have timed out before the next pump will be turned off.

Pumps may also be prevented from stopping if the Minimum run time for all pumps that are currently running, have not yet timed out.

(This option is set in- Configuration -> Excess Run Protection)

Cut Out Level
XXXX

Min Run Time ON
Pump Stop X Secs

High Level Shutdown

This is the alarm Level point for High Level. If any pump is running and the system rises above this Level and remains there for the period of the “HiLevel Delay” time the system will act according to the setting in the “High Limit Action” Sub menu.

High Press Shutdown
XXXX

- If High Limit Action is set to OFF, then no action is taken.
- If High Limit Action is set to Alarm, then an alarm is only logged.
- If High Limit Action is set to Shutdown, then a shutdown is initiated.

For alarm and shutdown actions, an output relay can be set to the appropriate mode to turn it on.

If the High Limit Action is set to “Shutdown” then another option becomes available to automatically restart the system after a High Level shutdown. This is called “High Press Restarts” and is located in the Configuration menu. It can be set at any value between 0 and 250 to suit the application.

Note: All pumps will be shutdown including manual pumps. If High Limit Action is set to OFF then the High Limit and the High Press Delay screens will then display ------OFF---- and cannot be altered.

Alt Cut In 2 / Alt Cut Out 2

In cases where the Cut In and Cut Out settings need to be changed via a remote control signal, activating the Alternate 2 settings will force the SumpMaster to operate on “Alt Cut In 2” & “Alt Cut Out 2” setting.

- Primary settings (Cut In - Cut Out)
- 2nd Settings (Alt Cut In 2 - Alt Cut Out 2)
- 3rd Settings (Alt Cut In 3 - Alt Cut Out 3)

Alt Cut In 2
XXXX

Alt Cut Out 2
XXXX

In order to run the alternate settings program one of the inputs to Alt Setting 2 and activate the relevant input.

Alternate Cut Ins and Cut Out options are not available in Switched mode or Multi level operation. See Inputs for detailed description.

Alt Cut In 3 / Alt Cut Out 3

In cases where the Cut In and Cut Out settings need to be changed via a remote control signal, activating the Alternate 3 settings will force the SumpMaster to operate on “Alt Cut In 3” & “Alt Cut Out 3” setting.

- Primary settings (Cut In - Cut Out)
- 2nd Settings (Alt Cut In 2 - Alt Cut Out 2)
- 3rd Settings (Alt Cut In 3 - Alt Cut Out 3)

Alt Cut In 3
XXXX

Alt Cut Out 3
XXXX

In order to run the alternate settings program one of the inputs to Alt Setting 3 and activate the relevant input.

See Inputs for detailed description

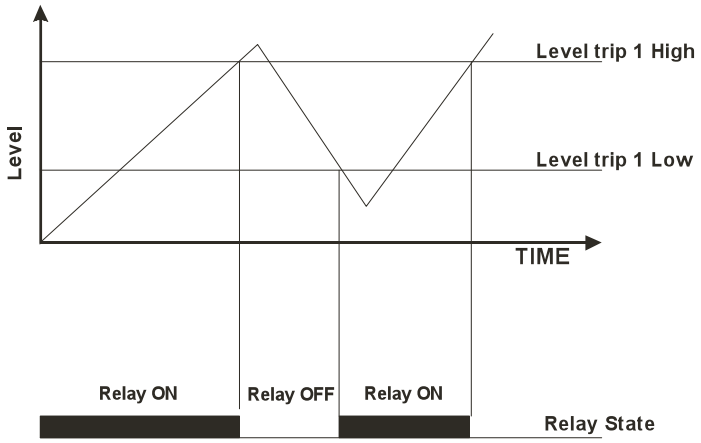
NOTE: These settings will also limit the adjustment of the High Level and Low Level settings. If Alt Cut In & Alt Cut Out 2 or 3 are not used, adjust these settings to be close to the “standard” CUT OUT, this should prevent them from limiting adjustment to the High Level and Low Level settings.

Trip Point Low

SumpMaster has the ability to energise an output relay based on specific system Level points. This can be useful for monitoring other functions through out the system that are not directly affected by the SumpMaster control. Trip Point High also has to be set, see below. See Output Relays section for more information on how to set this feature.

Note: The “Trip Point Low” and “Trip Point High” screens will only appear if an output is set to “Trip Point” within the OUTPUTS menu.

Triple Point Low
XXXX



Trip Point High

The Trip Point High is the mating pair to the Trip Point low. If a single trip point is required set the High and Low trip points to the same value.
Note: The settings of Trip Point High must be greater or equal to Trip Point Low. The system constrains settings outside this range.

Triple Point High
XXXX

Note: The “Trip Point Low” and “Trip Point High” screens will only appear if an output is set to “Trip Point” within the OUTPUTS menu.

TIMING

Main Menu	Sub Menu	Units	Range
TIMING			
	Lo Level Delay	seconds	^ OFF, 0 - 250
	High Level Delay	seconds	^^ OFF, 0 - 250
	In Delay Timer	seconds	0 - 999
	Out Delay Timer	seconds	0 - 999
	Restart Delay	seconds	0 - 999
	No Flow Timer	seconds	0 - 250
	Input Delay Timer	seconds	0 - 999
	Level Trip Low Delay	seconds	0 - 999
	Level Trip High Delay	seconds	0 - 999
	Min Pump Runtime Max Pump Starts	seconds per Hour	0 - 240 0 - 240
	Start Time 1	Hr:Min	OFF, 00:00 - 23:59
	Stop Time 1	Hr:Min	OFF, 00:00 - 23:59
	Start Time 2	Hr:Min	OFF, 00:00 - 23:59
	Stop Time 2	Hr:Min	OFF, 00:00 - 23:59
	Start Time 3	Hr:Min	OFF, 00:00 - 23:59
	Stop Time 3	Hr:Min	OFF, 00:00 - 23:59
	Start Time 4	Hr:Min	OFF, 00:00 - 23:59
	Stop Time 4	Hr:Min	OFF, 00:00 - 23:59

Low Level Shutdown Delay

Set this time to delay a Low Level Shutdown. It must time out before the system will shut down in Low Level mode. The range for this is “0-250 sec”.

Lo Level Delay
XXXX

If the Low Level shutdown needs to be turned OFF it can be done by accessing the “Low Limit Action” sub menu in the Configuration menu. If Low Limit Action is set to OFF the Low Limit and the Low Press Delay screens will then display ------OFF---- and can not then be altered. If OFF is selected then the system will ignore any low-Level shutdown commands. Be sure that you fully understand the repercussions of this setting as the Shutdown settings are designed to protect both the pump and the system from damage.

The Low & High Level delay timers are independent of each other and can be set to suit individual needs.

High Level Shutdown Delay

Hi Level Delay
XXX Seconds

Set this time to delay the High Level Shutdown. It must time out before the system will shut down in High Level mode. The range for this is “0-250 sec”.

If the High Level shutdown needs to be turned OFF it can be done by accessing the “High Limit Action” sub menu in the Configuration menu. If High Limit Action is set to OFF the High Limit and the High Press

Delay screens will then display ------OFF---- and can not be altered. If OFF is selected then the system will ignore any high-Level shutdown commands. Be sure that you fully understand the repercussions of this setting as the Shutdown settings are designed to protect both the pump and the system from damage.

In Delay Timer

In Delay Timer
XXX Seconds

The IN DELAY TIMER is used to delay the starting of additional pumps. When the system Level drops below the Cut In Level the system starts the first pump according to the “restart” timer. Any additional pumps required will be started if the Level remains below the Cut IN Level after the In Delay Timer has timed out. The In delay timer is used to start every pump apart from the first pump after a restart.

This timer is designed to assist in the reduction of Short Cycling and allowing the system to stabilise before additional pumps are started.

Out Delay Timer

Out Delay Timer
XXX Seconds

When the pumps are called to turn off the delay for this is governed by the OUT DELAYTIMER. It delays the shutting down of additional pumps when the system Level is above the Cut In and pumps are attempting to shut down. Take care in setting this timer as the increase in Level due to this delay can cause Level spikes.

Restart Delay

Restart Delay Timer
XXX Seconds

When the system Level drops below the Cut In Level the first auto pump to start will be delayed by the RESTART DELAY

No Flow Timer

No Flow Prot Delay
XXX Seconds

If a flow switch is fiited and connected to a programmable input which is programmed to “No Flow” and pumps are running there should be flow detected by the Flow Switch. If there is No flow the flow switch input is closed this timer delays a no flowshutdown by the given amount.

Input Delay Timer

I/P Delay Timer
XXX Seconds

The SumpMaster has the capacity to accept input signals for various processes. This timer sets the delay for reaction to those inputs. The specific inputs that are controlled by this timer are outlined in the “Programmable Input Options”

Level Trip Low Delay

This setting delays the activation of the relevant Output relay if programmed for Level Trip.

Pres Trip Lo Dely
XXX Seconds

Level Trip High Delay

This setting delays the deactivation of the relevant Output relay if programmed for Level Trip.

Pres Trip Hi Dely
XXX Seconds

Note: The screens “Level Trip Low Delay” and “Level Trip High Delay” are only visible if at least one output is set to “Trip point” in the OUTPUTS menu.

Min Pump Runtime

This setting is used to prevent switchgear and pumps from failing due to excessive cycling. Each pump is prevented from stopping until its own Minimum run timer expires.

Min Pump Runtime
XXX Seconds

A message will appear on the status screen letting you know that it has occurred.

Min Run Time ON
Pump Stop X Secs

This method of protection should only be used if the reticulation system can withstand maximum pump head.

Maximum Pump Starts

This setting is used to prevent switchgear and pumps from failing due to excessive cycling. Each pump is prevented from starting if the Max starts per hour setting has been exceeded.

Max Pump Starts
XXX Per Hr

A message will appear on the status screen letting you know that it has occurred.

PUMP/S REachED Max
starts Per hr

Note: The “Min Pump Runtime” and “Max Pumps Starts” screens are visible according to the setting of “ExcessRun Prot’n” sub menu in the “Configuration” Menu.

Integrated Start/Stop Function

This SumpMaster has four adjustable start and stop times

Starts Time 1-4

Start Time 1-4 determines when the system will be active.

Start Time 1
HH:MM

Stop Time 1-4

Stop Time 1-4 determines when the system will be inactive.
The display will show how long before the system will again restart.

Stop Time 1
HH:MM

Note- The start and stop times can be set to overlap each other which is intentional for future development, Be mindful that overlapping times can unintentionally set the controller to start or stop when it was not intended.

SCHEDULE PAUSE
xHrs, xMin Left

Correct multi start/stop time operation would be-

Start 1 06:00
Stop 1 13:00
Start 2 17:00
Stop 2 02:00
This setting would turn off the system from 1pm to 5pm and 2am to 6am.

Setting times to overlap each other such as shown below cause Incorrect multi start/stop time operation.

Start 1 06:00
Stop 1 02:00
Start 2 17:00
Stop 2 13:00
This setting would never turn off the system.

CONFIGURE

Main Menu	Sub Menu	Units	Range or Options
CONFIGURE			
	Set Time/Date		Hr:Min Year Month Day
	Transducer Zero	unitless	Set to 0 at Zero Level
	Adjust Level	unitless	Set to equal current level
	Averaging	number	0 - 50
	Scale An Output	number	
	Pump Flow Rate	per Min	1-9999 /Min
	Pump Rotation	selection	Auto, Pump 1, ^ Pump 2, Every 24 Hours, Lowest Hours.
	High Level Restarts Low Level Restarts	selection selection	0 - 250 0 - 250
	Sensing Input	selection	Analogue, Switched
	ExcessStart Prot	selection	Minimum Run Time, Max Starts PerHr
	Low Limit Action	selection	OFF, Alarm, Shutdown, Pump Start
	HighLimit Action	selection	OFF, Alarm, Shutdown, Pump Start
	User Access Code	number	0 - 250
	Modbus BaudRate	number	2400 - 230400
	Modbus Address	number	1 - 128

Set Time/Date

The time and date are required for correct operation on the independent Start and Stop times and Fault History recording.

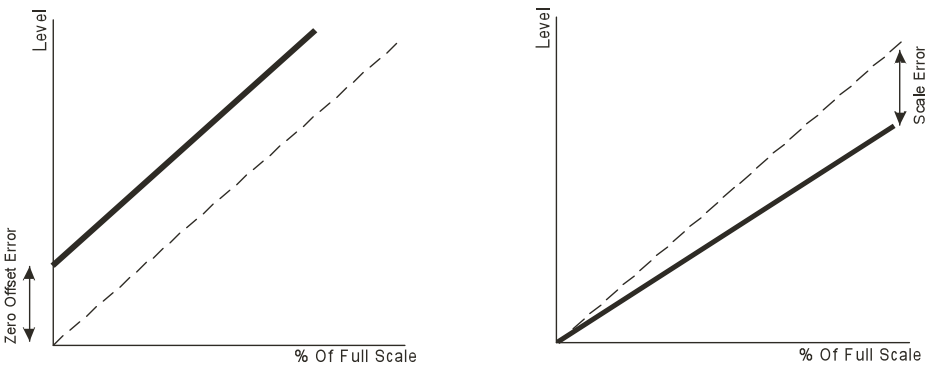
Set Time / date
08:51 2011 Oct

Transducer Zero

The Transducer Zero adjusts the zero offset in the Level sensor. Remove all Level in the system and then trim the display by pressing ENTER and then the UP or DOWN keys to set the reading to “0”. There are buffers in the system so the transition to the new reading may take some time to settle, wait at least 5 seconds before accepting the adjustment.

Transducer Zero
XXXXX KPa

If SumpMaster senses that the adjusted zero input is lower than can be accepted, a message will come up on the screen stating “VALUE TOO LOW”. If this message appears, increase the setting slowly by pressing ENTER and then UP, press ENTER again to confirm. Exit out of the menu to store the value.



Note: This screen will not be displayed if the SumpMaster is running in switched mode.

Adjust Level

The calibration of the analogue sensor is achieved by adjusting the Level reading on this screen to match a reading from a Level gauge.

Adjust Level
XXXXX

Once the system Level has stabilised, press the ENTER key and then either UP or DOWN keys to match the reading on this screen to suit a Level gauge reading. Once the readings are matched the system Level is calibrated. Press ENTER again and then exit out of the menu to store the data.

There are buffers in the system so the transition to the new reading may take some time to settle, wait for 5 seconds before accepting the adjustment.

Note: This screen will not be displayed if the SumpMaster is running in switched mode

Averaging

To allow the system Level to be displayed without significant Level bouncing, the SumpMaster averages the readings taken.

Averaging
XX

To damp the Level Reading insert a high number.

Note: The “Transducer Zero”, “Adjust Level” and “ Averaging” screens are not visible if the “Sensing Input” sub menu in the “Configuration” Menu is set to Switched.

Note: This screen will not be displayed if the SumpMaster is running in switched mode

Scale An Output

This allows the analogue input to be re-scaled and sent to other devices.

1000 = 1:1 2000 = 2:1 (Output twice the input value)

Scale An Output
XXXX

Pump Flow Rate

This figure is the flow rate of the pump at a nominated Level. It is read from a manufacturers pump curve and input as a flow rate / minute. Any units can be used for this figure however the time units are fixed at MINUTES.

Pump Flow Rate
XXXX / Min

Each time the operating range of the controller is changed this figure must be modified to maintain a more accurate figure.

Pump-Rotation

This menu allows SumpMaster to call on one pump to be the lead pump or to allow for a new pump to be the lead pump after each time all of the pumps have shutdown.

Pump Rotation
Auto

Note: The lead pump is the name given to the first auto pump to start (if available). The options are Auto, Pump 1, Pump 2, Every 24 Hours and Lowest Hours. If a pump number is selected then that pump will always be the lead pump. If Auto is selected then the lead pump will cycle after system shutdowns or PAUSE events.

If set to “Every 24 Hours”, once every 24 hours the system will shutdown all auto pumps (including jockey) and force a cycle of the lead pump. Selecting “Lowest Hours” will start the next available pump with the lowest hours according to the individual Hours Run meters as seen in PUMP DATA LOG. The aim of the setting is to get an even wear through all of your pumps.

Note: A forced rotation can be activated by setting one of the programmable inputs to “Cycle Pumps” and closing the relevant input terminals- see Programmable Inputs.

Low Level Restarts / High Level Restarts

Low Level Restarts XXX

If the Control Mode is set to Tank Emptying then this display will show LoLevel Restarts, if set to Tank Filling then this display will show HiLevel Restarts.

This setting allows the operator to set the number of times that the system can shutdown and then automatically restart after a Low or High Level Shutdown.

The range is from 0-250. Select 0 to make the system shut down immediately after the Low/High Level delay timer trips. This is the safest setting and the default for the system. After each automatic restart the fault is logged in FAULT HISTORY and the message “New Fault” appears on the main screen.

The restart number is based on a 1 hour time period. i.e. if the Restarts number is 5 then the system will allow 5 restarts in the 1 hour time frame starting from the time of the first LoLevel/HiLevel Fault.

Sensing Input

Sensing Input Analogue

The SumpMaster can accommodate a variety of inputs. It is divided in to two categories.

- **Analogu e**- These are signals which change proportionally over time. Most sensors and transducer have an analogue output. Analogue is also divided in to two categories.
    - o Standard Analogue- This is where a Level rise will cause a rise in the output of the transducer.
    - o Reverse Analogue- This is where a Level rise will cause a fall in the output of the transducer. (These are very rare in Level control applications)
- **Switched**- These are signals which change instantaneously. Typical switched products are:
    - o Floats, Level switches and toggle switches.

Excess Run Protection

Excess run Prot’n Min Run Time

Min Run Time ON Pump Stop X Secs

PUMP/S REACHED MAX Stop X Secs

There are two options to prevent excessive pump cycling or starting.

- **Min Run Time** If this setting is used then each pump is prevented from stopping until it’s own Minimum Run Timer times out. This method of protection should only be used if the reticulation system can withstand maximum pump head. A message will appear on the status screen letting you know that it has occurred.
- **Max Starts PerHr** If this setting is used then each pump from starting if the Max starts per hour setting has been exceeded. The down side of this is that if all pumps have exceeded the number of starts per hour then the reticulation Level will fall to zero. A message will appear on the status screen letting you know that it has.

Low Limit Action

Low Limit Action
OFF

The Low limit action allows the user to select an appropriate action in the event of a sustained low level condition. There are four possible settings:

- **OFF** This setting completely turns OFF Low Level. Be aware that if set to OFF there would be no Low Level protection for the system.
- **Alarm** This setting turns OFF Low Level protection but will generate an alarm which can be used for telemetry . Be aware that if set to Alarm there would be no Low Level protection for the system
- **Shutdown** This setting turns ON Low Level protection and also generates a fault alarm which can be used for telemetry. Typically used in Tank Empty mode to shut down the pump/s should the Cut Out Float/s fail to activate. This is the safest action for Tank Empty mode.
- **Pump Start** This setting turns ON all available pumps and will generate an alarm which can be used for telemetry. Typically used in Tank Fill mode to prevent overflow should the Cut In Float/s fail to activate.

High Limit Action

High Limit Action
OFF

The High limit action allows the user to select an appropriate action in the event of a sustained high level condition. There are four possible settings:

- **OFF** This setting completely turns OFF High Level. Be aware that if set to OFF there would be no High Level protection for the system.
- **Alarm** This setting turns OFF High Level protection but will generate an alarm which can be used for telemetry. Be aware that if set to Alarm there would be no High Level protection for the system
- **Shutdown** This setting turns ON High Level protection and also generates a fault alarm which can be used for telemetry. Typically used in Tank Fill mode to shut down the pump/s should the Cut Out Float/s fail to activate. This is the safest action for Tank Fill mode.
- **Pump Start** This setting turns ON all available pumps and will generate an alarm which can be used for telemetry. Typically used in Tank Empty mode to prevent overflow should the Cut In Float/s fail to activate

User Access Code

Access Code
XXX

The access code is used to limit access to the settings menus.

The user access code has the range “off, 0 – 250”. Off will disable the access code and allow unlimited access. Once a number is selected then access to the settings screens or any other editable screen will require the inputting of this number to progress. To edit press enter and then up or down keys to edit the new number. Press enter again and exit the menu to store the changes.

JOCKEY PUMP (JP)

Main Menu	Sub Menu	Units	Range OR Option
JOCKEY PUMP			
	Jockey Pump	selection	----Off----, ===On===
Note 1	JP Cut In Press		0 - 9999
Note 1	JP Cut Out Press		0 - 9999
Note 1	JP Run On Time	seconds	0 - 999
Note 1	JP In Delay Time	seconds	0 - 999

The Jockey pump is typically a smaller auxiliary pump that is outside the flow range of the main pumps. The jockey pump will turn on when there are no main pumps on and the Level is below Jockey Cut In Level.

Jockey Pump
----------OFF---------

To enable the jockey pump and allow viewing of the rest of the jockey pumps screens change to Jockey Pump ON.

Jockey Pump
----------ON---------

JP Cut In Level

The JP Cut In Level is the Level below which the pump defined as Jockey pump will restart.

JP Cut in Press
XXXX

JP Cut Out Level

The Set Point is the Level that the Jockey Pump will be turned off.

JP Cut Out Press
XXXX

JP Run On Time

The Jockey pump can be forced to run on after the main system has started by the time detailed in this screen.

JP Run On Time
XXXX

JP Restart Delay

When the Level drops below the JP Cut In Level and remains there the Jockey pump will start after this period. If the level continues to fall and the main pump is started the Jockey Pump turn off again after the JP run on time has expired.

JP Restart Delay
XXXX Seconds

NOTE: If the jockey pump is turned “on”, pump 1 will automatically be assigned as the jockey pump.

OUTPUTS

Main Menu	Sub Menu	Units	Options
OUTPUTS			
	Digital Output 1	selection	Shutdown Fault, Lo Level Fault, Hi Level Fault, ^ Pump 1 - 2 Run, ^^ Pump 1 - 2 Fault, System Paused, Low Alarm, High Alarm, Any Alarm, Any Pump Shutdown, Any Pump Running, # Trip Point Alternate Trip, Aux Output 1, Aux Output 2, Any Fault
	Digital Output 2	selection	
	Analogue Output	selection	System Press

SumpMaster has two programmable outputs that can be used to communicate with external sources such as Telemetry or Building Management Systems (BMS). As each system requires different combinations of information all output relays are configurable in software. All outputs are Voltage Free – Change Over contact outputs and capable of 5 amps 240 VAC.

You can view which outputs are currently activated within the PUMP DATA LOG menu, under Digital Output State. The status of the analogue outputs is also available within this menu.

Digital Output Options

No.	Delay	Option
1	As per delay timer	Shutdown Fault,
2	As per delay timer	Lo Press Fault,
3	As per delay timer	Hi Press Fault,
4	Instantaneously	Pump 1 Run,
5	Instantaneously	Pump 2 Run,
6	As per delay timer	Pump 1 Fault,
7	As per delay timer	Pump 2 Fault,
8	Instantaneously	System Paused,
9	As per delay timer	Low Alarm,
10	As per delay timer	High Alarm,
11	As per delay timer	Any Alarm,
12	As per delay timer	Any Pump Shutdown,
13	Instantaneously	Any Pump Running,
14	As per delay timer	Trip Point
15	Instantaneously	Alternate Trip,
16	Instantaneously	Aux Output 1
17	Instantaneously	Aux Output 2
18	Instantaneously	Any Fault

• Shutdown Fault
This output is used to indicate that there has been an event that has shut down the system. This can be a High or Low-Level Shutdown, No Flow Shutdown.

• Low Level Fault
A shutdown based on a Low Level Shutdown.

• High Level Fault
A shutdown based on a High Level Shutdown.

• Pump 1-2 Run
Pump 1-6 running.

• Pump 1-2 Shutdown
Pump 1-6 shutdown on individual pump protection.

• System Paused
The “system pause” input is activated

• Low Alarm
If a Low Level circumstance has occurred then the output will turn on.

• High Alarm
If a High Level circumstance has occurred then the output will turn on.

• Any Alarm
If there are any Fault Re-starts active or general faults/alarms that do not cause a system shutdown, this output will activate.

• Any Pump Shutdown
If any pump is shutdown this will then will activate the relay.

• Any Pump Running
Any pump running will activate the relay.

• Trip Point
When the system Level reaches the nominated Trip Point Low and High, this relay will energise or de-energise. See Level Trip in SETTINGS.

• Alternate Trip
Each time the system shuts down the energised state of the relay will change. E.g. If the relay on one cycle is closed during operation then the next cycle this relay will be open.
The relay will change on the following: - Low Level Shutdown, High Level Shutdown, No Flow Shutdown and Pause.

• Aux Outputs 1 - 2
Any output can be set to be an auxiliary output. Setting an output to become an auxiliary output allows the SumpMaster to use an input to turn on a Digital Output. To do this the input has to be set up to be an Auxiliary input. There are three auxiliary functions available.

Aux Input 1 operates Aux Output 1
Aux Input 2 operates Aux Output 2

• Any Alarm
If there are any Faults active that has caused a system or pump shutdown then this output will activate.
Alarm/Fault light and buzzer
If an alarm strobe light and buzzer are fitted an output will be set as Any Fault. To reset the fault and turn off the alarm and buzzer the Enter key must be pressed.

*** RELAY RATINGS**
The relays are rated at 5 amp 250VAC. Consideration of inrush current, inductive loads and cycling must be taken into account when applying current to these relays.

INPUTS

Main Menu	Sub Menu	Units	Options
INPUTS			
	Program Input 1	selection	Any of the following options can be selected on any input and used multiple times Not Used ^ Alt 2 Settings ^ Alt 3 Settings ^^ Cut In, ^^ Cut Out, # Cut In 1, # Cut In 2, # Cut Out 1, # Cut Out 2, Low Limit, High Limit, System Pause, < P1-2 Prot(Pause) < Pump 1 - 2 Stop, < Pump 1 - 2 Manual Run, Fire Mode, Cycle Pumps, Reset, No Flow, Aux 1, Aux 2, < Pump1-2 Fault(Stop) LoLevel Pause
	Program Input 2	selection	
	Program Input 3	selection	
	Program Input 4	selection	
	Program Input 5	selection	
	Program Input 6	selection	
Note 1	Program Input 7	selection	
Note 1	Program Input 8	selection	

There are 8 inputs with the SumpMaster that control the external sensing functions.
They all require VOLTAGE FREE contacts and as such should **NOT HAVE ANY VOLTAGE APPLIED.**

- All inputs operate on a **CLOSED CONTACT** for registration. This contact needs to be made between the input common and the relevant input. There are three terminals for the input Common to allow for multiple connections.

You can view which inputs are activated by the LED's on the front of the unit and also within the PUMP DATA LOG menu under the "Digital Input State" screens. See PUMP DATA LOG for more information.

PROGRAMMABLE INPUT OPTIONS

Not Used

When this is selected the input will not respond to any activation.

Any input can be selected for any of the above options and multiple inputs can have the same option.

Program Input X
Alt 2 Setting

Alt Setting 2 & 3

If an input is programmed as a means of selecting the Alternate Setting, then closing of the contact to either of these inputs will activate an alternate cut in and cut out. If two inputs are activated at the same time, then Alternate Setting 3 will be the selected option.

Program Input X
Low Limit

Low Limit

An input can be programmed to function as a switched low limit even when the system is operating in Analogue mode. Closing of the contact on this input will start the action programmed for the low limit as set in the Configuration menu.

Program Input X
High Limit

High Limit

An input can be programmed to function as a switched high limit even when the system is operating in Analogue mode. Closing of the contact on this input will start the action programmed for the high limit as set in the Configuration menu.

Program Input X
System Pause

System Pause

An external switch/float/sensor can be used to PAUSE the system. When the system receives a PAUSE command on the input the system operation will be paused. The system turns off all running pumps and a message will be shown on the main screen.

PAUSED ACTIVATED

The Pause message will displayed when the input is active and if operating in analogue mode the current level will be displayed on the bottom line.

After the PAUSE input has been deactivated the system will restart under normal operations. If the Auto-rotation is selected to FULL the lead pump will rotate.

Pump 1-2 Prot(Pause)

SumpMaster has inputs for each pump to allow for individual pump protection. In the event of a pump going into a fault condition the input for that pump should close. This will pause the pump after the time set by the Input Delay Timer.

Program Input X
Pump X Protection

Note: The pump will become available again when the Input contact is opened. This protection is ideal for the following pump protection sensors:

- Temperature probes
- Thermal Overloads
- Moisture sensor for oil bath pump seals
- Any individual pump protection device.

Pump 1-2 Stop

Activation of this input will instantly stop the operation of the relevant pump. This can be used as an Off Override switch in the system or if the remote control of a pump is required.

Program Input X
Pump X Stop

Note: This input will override the relevant “Pump 1-6 Manual Run” input if both are active.

Pump 1-2 Manual Run

Activation of this input will instantly start the relevant pump. All automatic control of the pump is ceased at this stage.

This action can cause an alarm or shutdown condition. (See Manual operation)

Fire Mode

The FIRE MODE allows the system to ignore all shutdown protection features so the pump will continue running under all conditions.

The system will still operate as per normal turning on pumps when below the Cut In setting and Turning off pumps when above the Cut Out setting. The following protection features are disabled:

- High Level Shutdown
- Low Level Shutdown
- System Pause
- No Flow
- Pump 1-2 Pump Protection
- Pump 1-2 Stop
- Pump 1-2 Pump Fault

The operational consequences for activating Fire Mode are substantial so be sure to understand the repercussions of activating this Input.

It should only be used if the risk of the pump stopping is greater that letting it run to destruction.

Hardware items such as circuit breakers, Thermal Overloads and any other switchgear protection are not effected by this mode and will continue to provide switchgear protection.

Cycle pumps

Activation of this input will shutdown and then cycle the pumps to the next available pump as the lead pump. If pump 1 started first on the last start-up, the toggling of this input will switch the lead pump to pump 2 instantly on receipt of this signal.

Program Input X
Cycle Pumps

Reset

The reset input allows remote resetting of SumpMaster after a shutdown fault. If SumpMaster has shutdown due to a fault - for any reason - closing the reset contact will reset all current faults and restart the system.

Program Input X
Reset

No Flow

An input can be set up to monitor a flow switch. If the system detects that there is a No Flow signal from an external flow switch and there are pumps running, then the SumpMaster will display the message “Low Flow Detected”. If this input remains on for the period of the No flow delay timer, then the SumpMaster will shut down all pumps. This is optional and requires a flow switch to be connected into the input programmed for No Flow and will only operate if there is at least 1 pump selected to AUTO.

Once the No Flow Delay Timer has expired then the screen message changes to “No Flow Shutdown”

Program Input X
No Flow

Low Flow Detected
XXXXX

No Flow Shutdown
XXXXX

Aux Inputs 1- 3

Any input can be set to be an auxiliary input. Setting an input to become an auxiliary input allows the SumpMaster to use this input to turn on a Digital Output. To do this the output has to be set up to be an Auxiliary output. There are three auxiliary functions available.

Aux Input 1 operates Aux Output 1
Aux Input 2 operates Aux Output 2
Aux Input 3 operates Aux Output 3

Program Input X
Aux Input X

Pump 1-2 Fault(Stop)

SumpMaster has inputs for each pump to allow for individual pump fault detection. In the event of an individual pump input activating such as losing prime or flow for some reason. This will shut down the pump after the time set by the Pump Fault Delay Timer. The pump will be permanently disabled until reset by the operator or remotely via the reset input.

This protection is ideal for the following pump protection sensors.

- Temperature probes
- Individual Loss of prime Level switches
- Any individual pump protection device.

Program Input X
Pump X Fault

LoLevel Pause

An input can be programmed to inhibit the controller from operating should the level in the tank or reservoir fall to a point that may cause damage to the pumps or cause loss of prime. Typically this will be via a float but could be via an electronic level monitoring system with programmed set point.

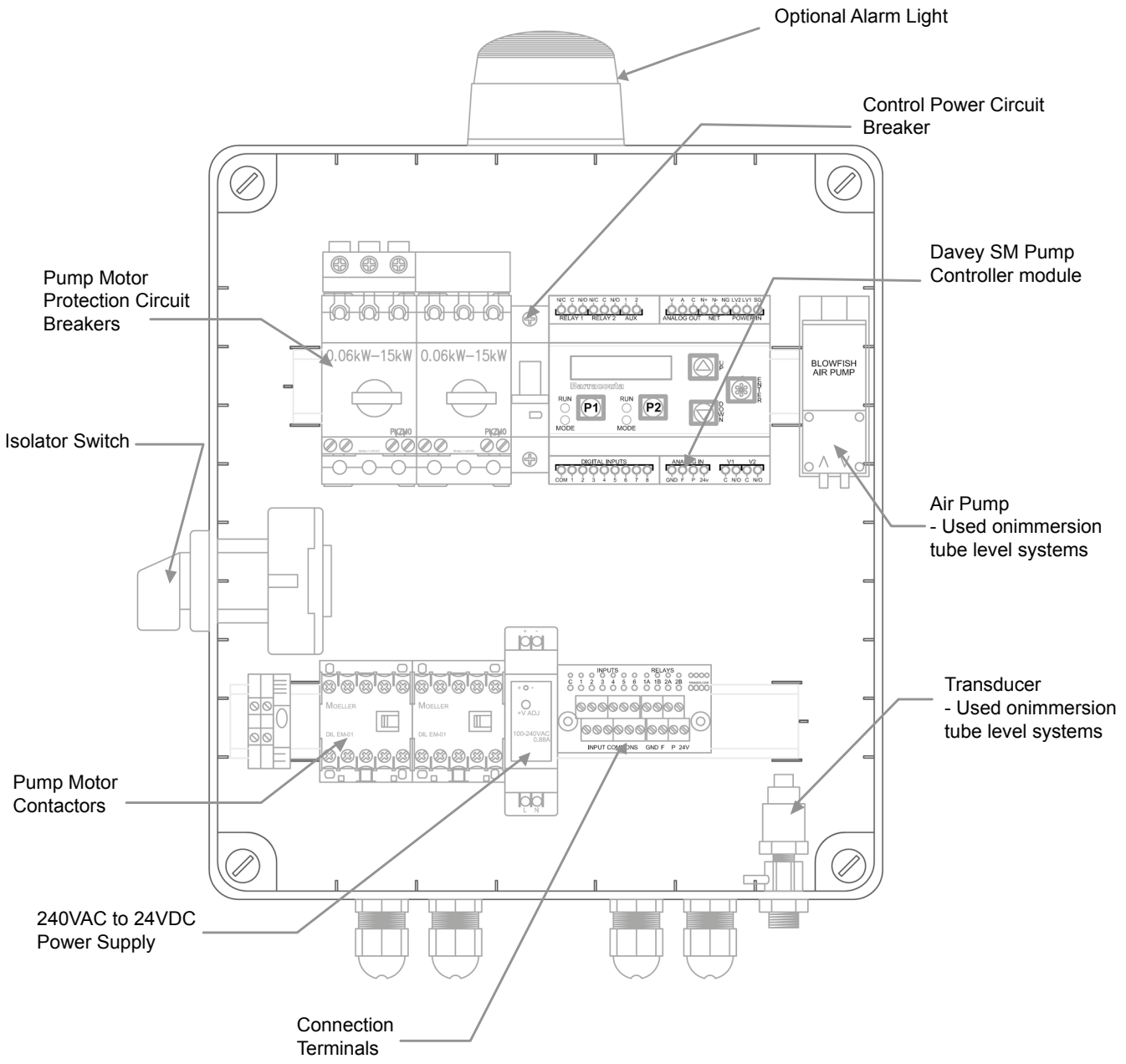
The LoLevel Pause message will displayed when the input is active and if operating in analogue mode the current level will be displayed on the bottom line.

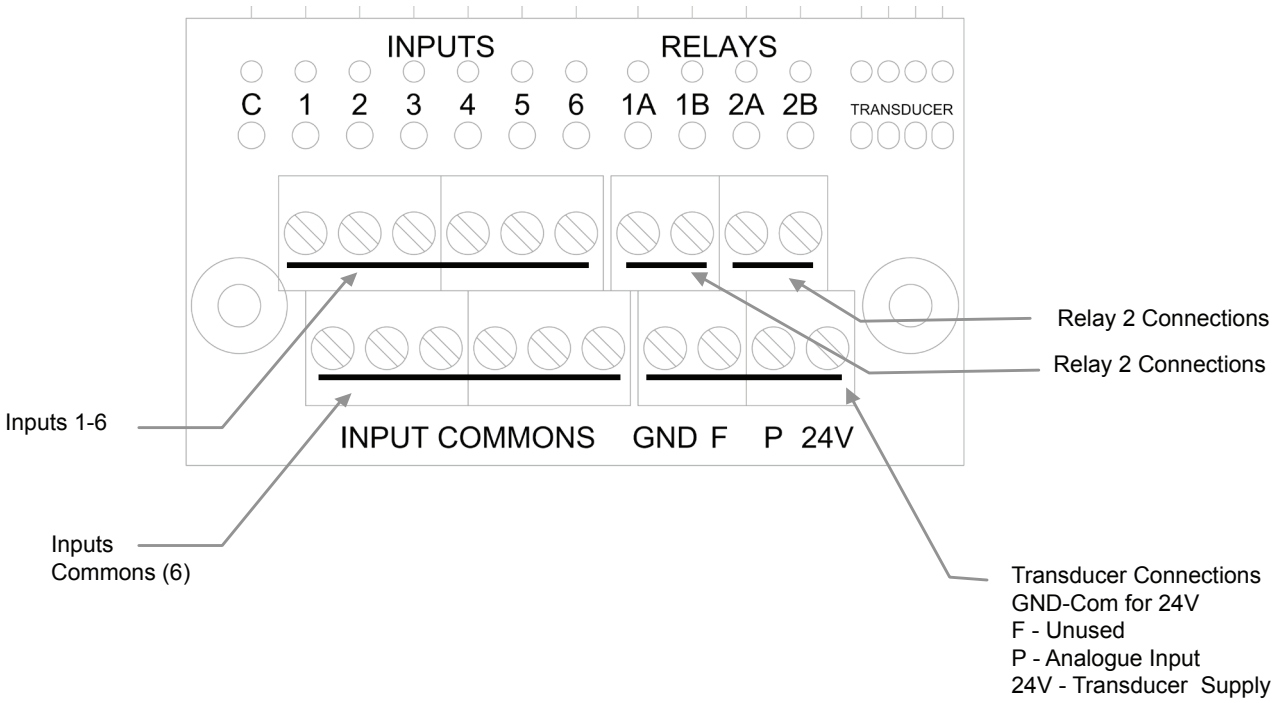
NOTE- External contacts must be VOLTAGE FREE - any applied voltage can cause damage to the system.

Program Input X
LoLevel Pause

LoLevel Pause
XXXXX

PANEL LAYOUT





FLOAT SWITCH CONNECTIONS

Davey Water Products can supply float switches for SumpMaster Level panel.
They are not supplied as standard and need to be ordered separately.
P/No: FS750-10 includes 10 metre lead and counter weight.

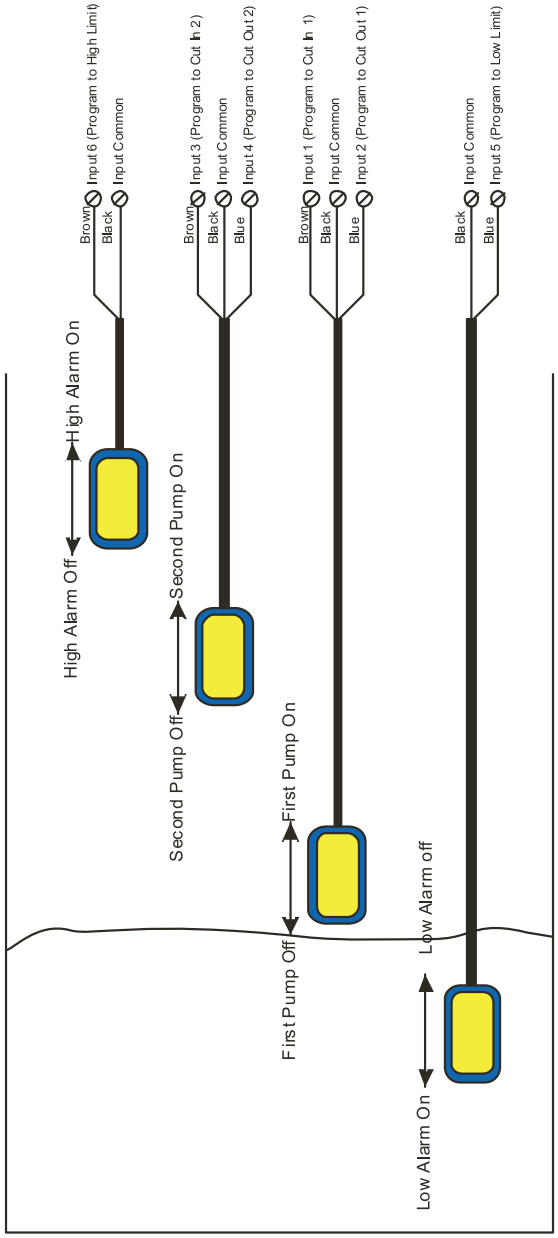
OPERATION



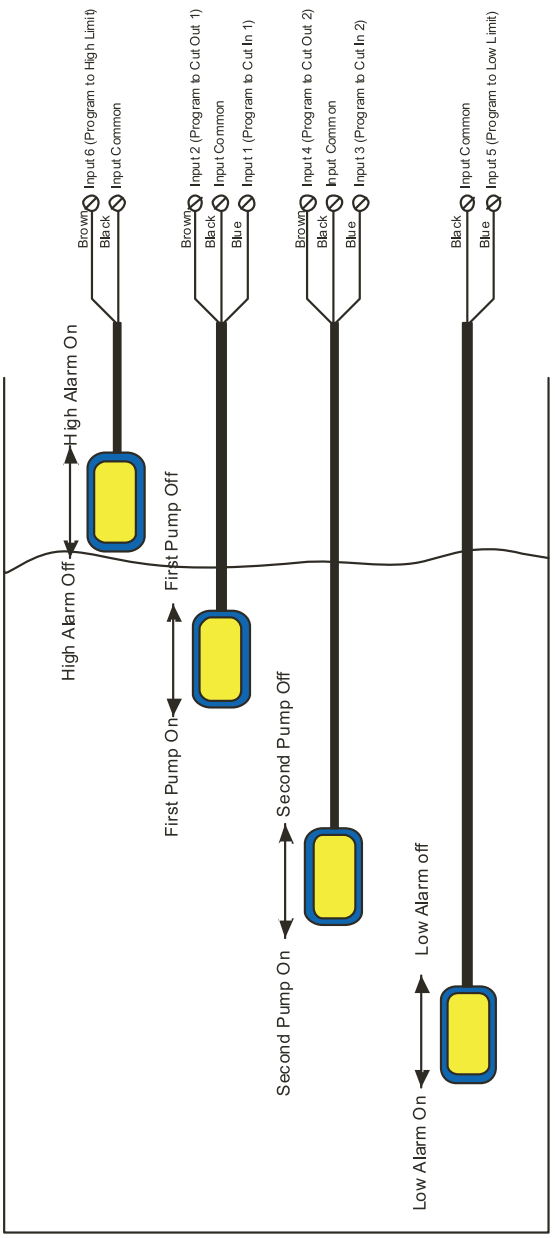


- Black and Blue closed contact when float is vertical down
- Black and Brown closed contact when float is vertical up

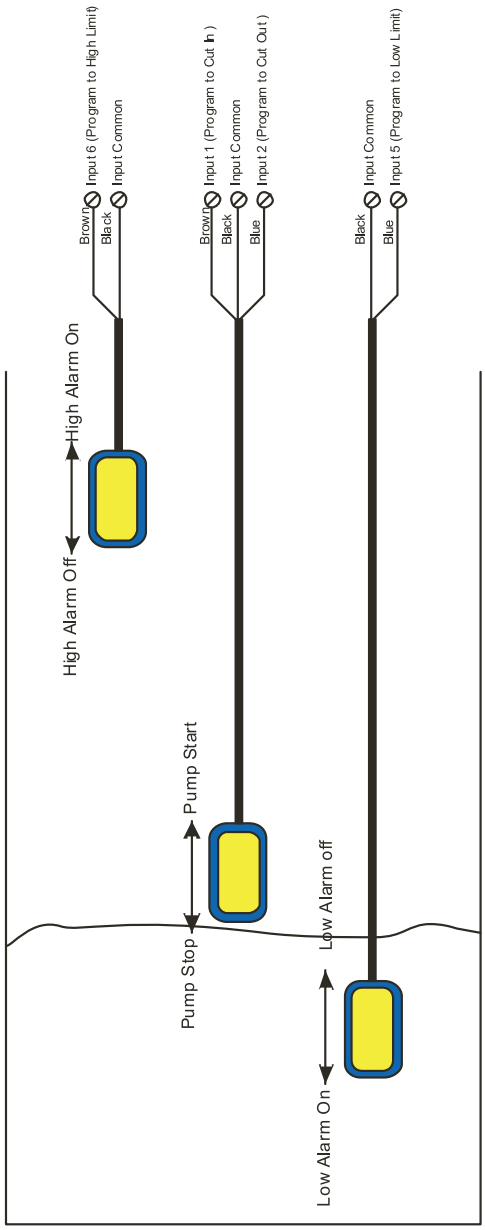
TANK EMPTYING
Dual Pump
4 Float Operation (Multi Level)
Low or High floats can be removed if not essential.



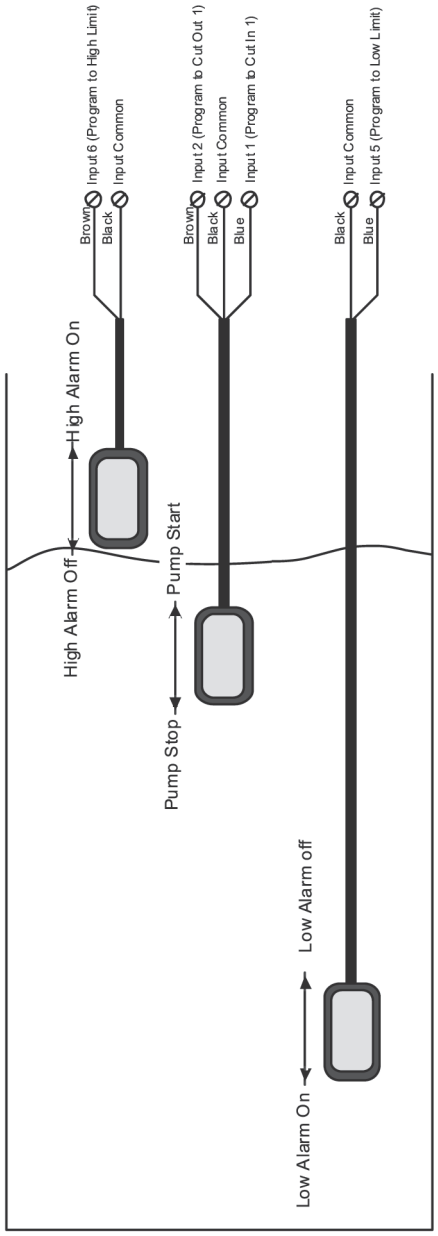
TANK FILLING
Dual Pump
4 Float Operation (Multi Level)
Low or High floats can be removed if not essential.



TANK EMPTYING
Dual Pump
3 Float Operation (Single Level)
Low or High floats can be removed if not essential.

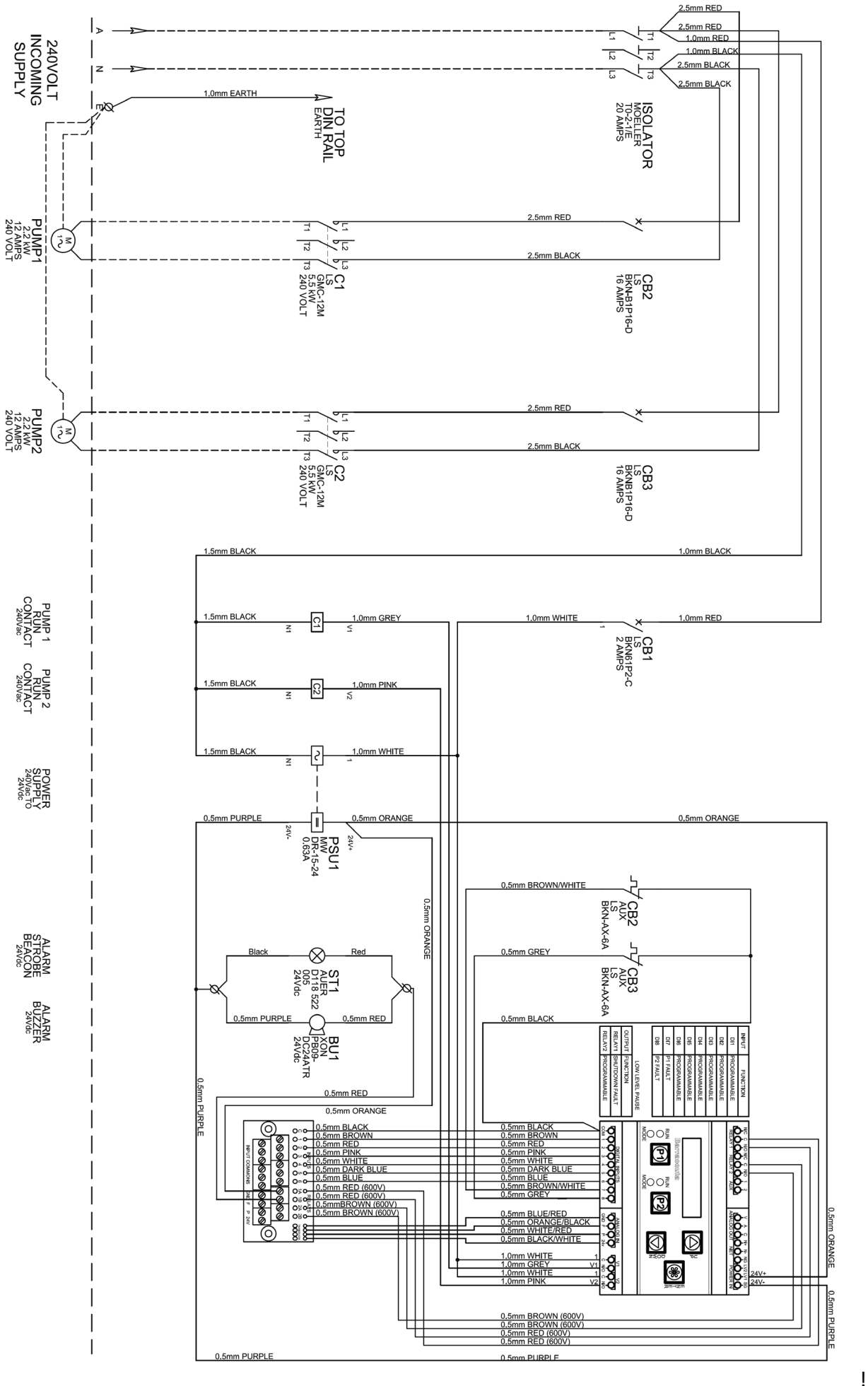


TANK FILLING
Dual Pump
3 Float Operation (Single Level)
Low or High floats can be removed if not essential.



The above two configurations are also applicable for single pump operation.

WIRING DIAGRAMS



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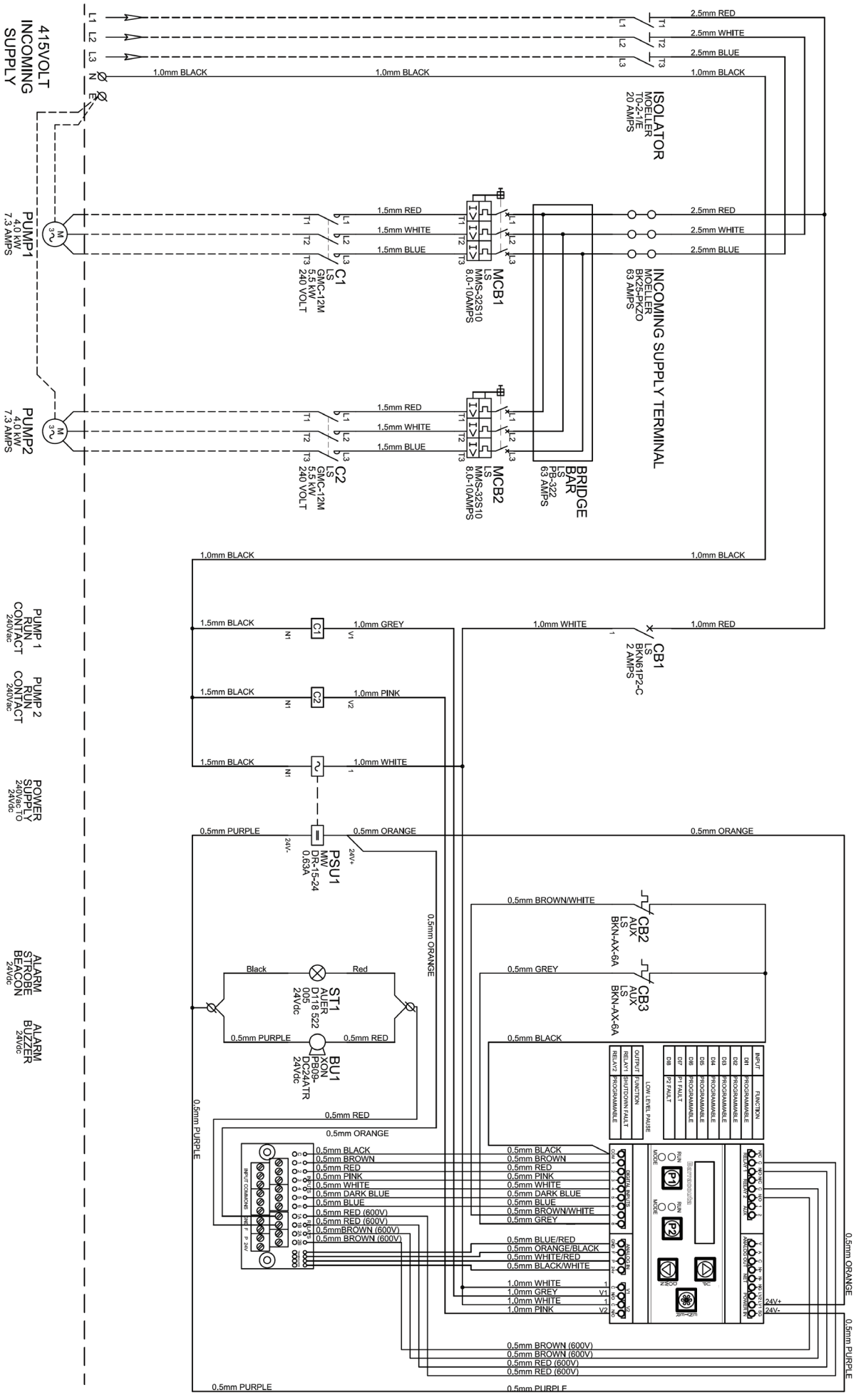
WIRING DIAGRAMS



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SPECIFICATIONS

Item	Description
Power supply	Control - 24 VDC- 20mA min 120mA max
External transducer power supply	24 VDC- 50mA max. Auto reset fuse protected
EMC/ EMI filtering	Designed to minimise conducted and radiated emissions.
Standard Transducer	N/A
Time based functions	±5% of real time
Output Relays	5 amp 250VAC changeover software configurable
Switched inputs	Voltage free - internal supply 24VDC - read threshold - 2mA
Operating temperature	0 to 50 degC
Enclosure	IP55
Contactors	Rated voltage - 690Vac Coil – 240VAC cycles mech. - 10x 10^6 elec. - 2 x 10^6 cycles/hr - 3600 auxiliary contacts - 1 x NO Standard - IEC947
Motor circuit breakers	Standard - IEC947 – Start current 10x FLC
Wiring	Standard - AS3000
Input supply Voltage - 3 phase	230 - 440V
Input supply tolerance - 3 phase	-20% + 10%
Input frequency range	48 to 62 Hz
Enclosure size	320W x 360H x 140D (mm)
Dimensions including light, buzzer & isolator.	360W x 410H x 140D (mm)

REMOVING FRONT COVER

Removing the front cover is necessary if the test mode is to be accessed.

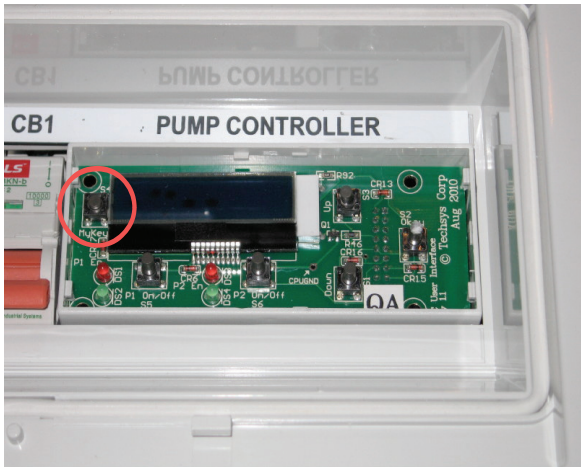
Place a small screw driver in the slot on the left hand side of the front cover and lever up the cover.



The display, switches and LED indicators will then be exposed. The switch to the left hand side of the display is the test mode switch. To enter the test mode this switch must be pressed when powering up the system.
When the system shows “Test Mode”, release the button.

Activating one of the inputs will display an “X” for the applicable input.

Pressing and holding “P1” will activate Pump 1 output and then Relay 1 in a continuous sequence. .



TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Can't enable pumps	1. Screen Stated – "KEY PAD LOCKED" 2. One of the Inputs is set to Pump STOP.	1. Input Access Code- typically 21 2. Check Input LED's for activation. 3. Check Input Menu for Pump Stop setting.
Pump/s won't start	• Pump not enabled.(Turned OFF) • Motor circuit breaker tripped or off • Control circuit breaker tripped or off • Level above Cut In Level • System Pause Active • Float/s defective – possible water ingress	4. Press pump mode switch for at least 1 second. 5. Reset circuit breaker. 6. Reset Circuit breaker 7. De-power and re-power the system. 8. Allow the system Level to drop 9. De-activate Pause Input 10. Replace float/s
Pump won't turn off	• Manual selected for that pump (Running LED flashing) • Pump Manual Run input active • Cut Out set too high	1. Press pump mode switch once to turn OFF. 2. De-activate Manual Run input 3. Adjust Cut Out Level
No display screen	• Control circuit breaker tripped • High voltage or current has tripped the surge protection fuse	4. Reset Circuit breaker 5. Turn off power, wait 20 seconds and re-apply power.
No Level or wrong Level displayed	• Incorrect Sensing Input selected • Calibration incorrect for sensor	6. Change Sensing Input to suit sensor that is being used 7. Calibrate sensor (Refer to calibration section)
Pumps cycling excessively	• IN delay too low • Pause Input activating • Voltage being applied to the Inputs. • Cut In & Cut Out are incorrect.	8. Extend IN Delay timer 9. Check Pause input 10. Make sure that the Inputs are Voltage Free 11. Adjust Cut In lower and/or Cut Out higher
Pump shutting down on Pump Protection	• Pump Protection or Fault input is active. • Fault in protection sensor	12. Determine cause of fault, reset fault. 13. Replace or adjust sensor
Controller powers on and off continuously	• Voltage being applied to the Inputs. • Excessive current being drawn from the external Level sensor	14. Make sure that the Inputs are Voltage Free 15. Check external sensor current 100mA max.
System Displays won't initialise Loading Data message cycles continuously	• System needs to be initialised.	16. Press the "Up and Down" Keys whilst powering up the system to initialise the program.
System Level not displaying	• Transducer not connected properly. • Transducer type is incorrect. • Analogue circuits not functional	• Check transducer connections. Refer to Analogue Input section. • Change from Float Inputs to Analogue. • Ensure that a 4-2-mA transducer is connected correctly to the P analogue input
Pumps do not seem to operate	• Outputs or Inputs possibly defective.	• Use the "Test mode" function to visually test the Inputs and Outputs without the use of a meter.

INSTALLATION NOTES

General Installation information can be obtained from Davey Water Products regarding the site-specific requirements however there are some “GOLDEN RULES” in site installation that should be followed.

Site Installation

- Standard SumpMaster requires a NEUTRAL
- Select the site most shaded and out of direct sunlight.
- NEVER allow direct exposure to the sun on to the display, it will cause permanent damage.
- Ensure there is sufficient air flow around the control panel to keep it cool.
- The earth connection needs to be close and not laid parallel with High Voltage cables

Inputs

- Use shielded wire for all analogue inputs
- Connect the shield to EARTH at the controller end.
- Never apply voltage to the Inputs.
- Never run wires for the inputs with motor or supply cables.
- Take care in running inputs for long distances. (15Mtr max)
- The inputs use a 24VDC signal as the carrier voltage- use compliant sensors.

Outputs

- 5 amp maximum switching load
- Check the programming on each output before trying to troubleshoot

Start-up

- CHECK ROTATION
- Calibrate transducer
- Input Level settings

SITE RECORD

Main Menu	Sub Menu		Date	
		/ /	/ /	/ /
Set Point & Actual Level				
Flow Rate /Min				
FAULT HISTORY	Fault 1			
	Fault 2			
	Fault 3			
	Fault 4			
	Fault 5			

PUMP DATA LOG	Flow Total			
	Hours Run 1			
	Hours Run 2			
	Pump Starts 1			
	Pump Starts 2			
	Pump Starts Last Hr			
	Curr & max retry			
	Temperature			
Access Code	21			

SETTINGS	LoLevel			
	Cut In Level			
	Cut Out Level			
	HiLevel			
	Alt Cut In 2			
	Alt Cut Out 2			
	Alt Cut In 3			
	Alt Cut Out 3			
	Trip Point Low			
	Trip Point High			

TIMING	LoLevel Delay			
	HiLevel Delay			
	IN Delay Timer			
	OUT Delay Timer			
	Restart Delay			
	No Flow Timer			
	Input Delay Timer			
	Press Trip Low Delay			
	Press Trip High Delay			
	Min Pump Runtime			
	Max Pump Start			
	Start Time 1			
	Stop Time 1			
	Start Time 2			
	Stop Time 2			
	Start Time 3			
	Stop Time 3			
	Start Time 4			
	Stop Time 4			

CONFIGURE	Operating Mode			
	Transducer Zero			
	Adjust Level			
	Averaging			
	Scale An Output			
	Pump Flow Rate			
	Auto Rotation			
	Hi Press Restart			
	Sensing Input			
	Cycle Protection			
	Low Limit Action			
	High Limit Action			
	User Access Code			
	Modbus BaudRate			
	Modbus Address			

JOCKEY PUMP	Jockey Pump			
	JP Cut In Press			
	JP Cut Out Press			
	JP Run On Time			
	JP In Delay Time			

OUTPUTS	Digital Output 1			
	Digital Output 2			

INPUTS	Program Input 1			
	Program Input 2			
	Program Input 3			
	Program Input 4			
	Program Input 5			
	Program Input 6			
	Program Input 7			
	Program Input 8			

Commissioned by……..Date……

Agent……

Contact details……

Panel Serial Number …….

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For a complete list of Davey Dealers visit our website (davey.com.au) or call:

DAVEY

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*** Installation and operating instructions are included with the product when purchased new. They may also be found at davey.com.au**