DAVEY

MonsoonIQ

Booster Pump System



Installation and Operating Instructions

PLEASE READ IMPORTANT CAREFULLY

Please pass these instructions on to the operator of this equipment

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1. INTRODUCTION

1.1 DAVEY MONSOON IQ BOOSTER PUMP SYSTEM

The Monsoon IQ booster pump system is a fully integrated package which allows for greater control of a variable speed drive pumpset. The large screen with touch interface is intuitive to operate and makes vital data and key information easy to read. The user interface communicates with the variable speed drives to sustain a desired output pressure by varying the speed and consequent output from each pump.

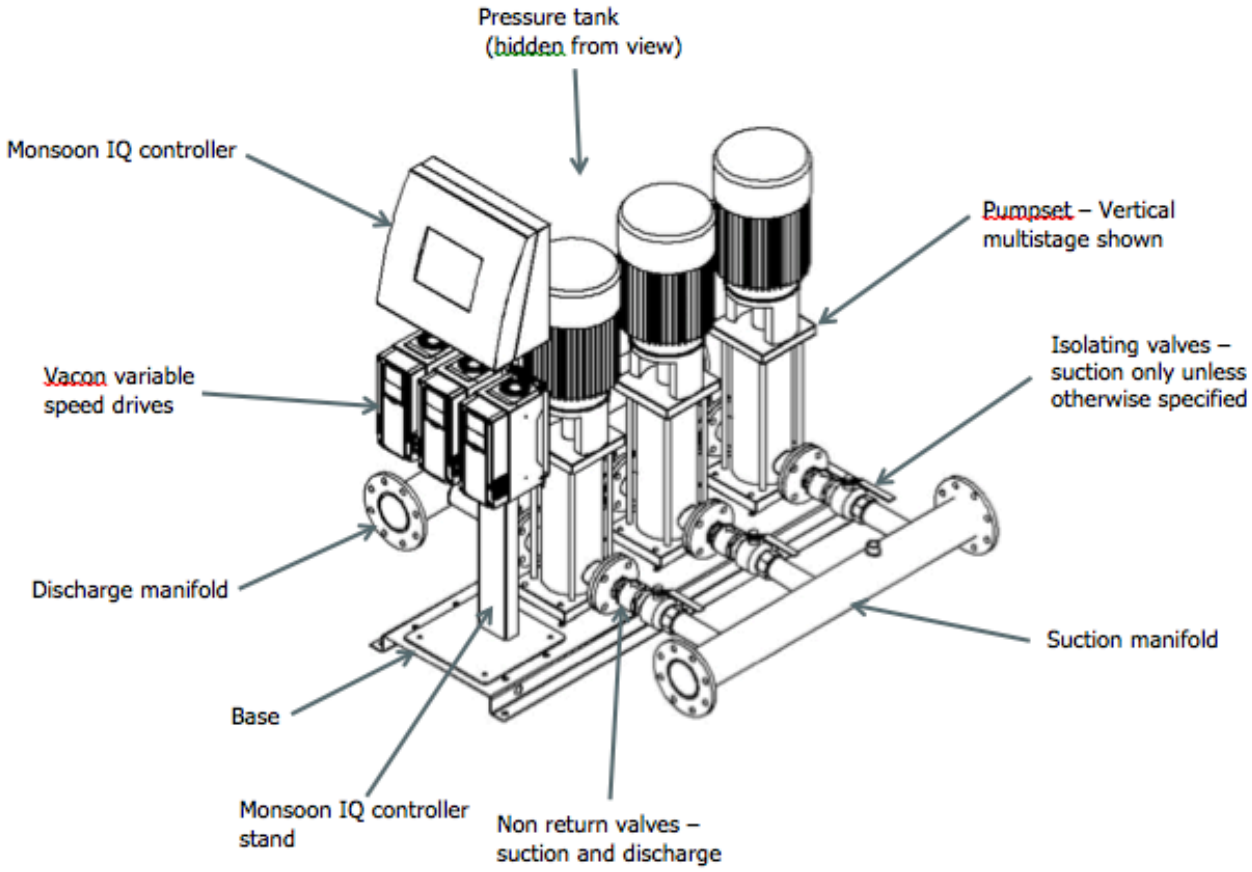


Figure 1. TYPICAL IQ BOOSTER PUMP SYSTEM

The system consists of a parallel pumpset, pump controllers, a touch screen, a wireless modem and the necessary mechanical fittings. It is suitable for 6 pumps of any type and the unique electronic – hydraulic control ensures each pump operates at its maximum performance level by allocating optimal power to each pump.

2. TERMINOLOGY

2.1 WARNINGS

SYMBOL	MEANING
	**IF THESE SAFETY INSTRUCTIONS ARE NOT FOLLOWED, IT MAY RESULT IN SERIOUS PERSONAL INJURY**
	**IF THIS INSTRUCTION IS NOT FOLLOWED, IT MAY RESULT IN ELECTRIC SHOCK THAT IT COULD LEAD TO SERIOUS PERSONAL INJURY OR DEATH**
Caution	**IF THIS INSTRUCTION IS NOT FOLLOWED IT MAY RESULT IN A MALFUNCTION OR DAMAGE TO THE UNIT OR SURROUNDS**
Note	**THIS IS A NOTE OR INSTRUCTION WHICH WILL ASSIST WITH THE TASK AND ENSURE SAFETY**



PRIOR TO INSTALLATION, PLEASE READ ALL INSTALLATION & OPERATING INSTRUCTIONS AND ENSURE THAT ALL WORK COMPLIES WITH LOCAL REGULATIONS, CODES AND BEST PRACTICE

2.2 NOMENCLATURE

The terms listed below are used throughout these instructions and most appear on the touch interface for the Monsoon IQ. This list provides the operator with an understanding of the meanings --

TERM	MEANING
Access permission	Permission to gain access to and change certain criteria in the operating system – usually protected by password.
BMS	Building Management System, refers to a monitoring and management network within a building
Charging pressure	The pressure which is applied internally to a pressure tank in order for it to perform certain functions
DDC	Direct Digital Control. Refers to a component of the BMS that is used for localised control in a building. Generally it can control and monitor local devices that are connected.
Discharge valve	A valve (commonly a ball valve or butterfly valve) which is positioned on the discharge side of a pumping system in order to isolate or regulate the flow
Float switch	An electrical switch which senses the fluid level in a tank in order to regulate it
Flooded suction	Where the intake (suction side) of a pump is below that of the standing fluid level
Flow switch	An electrical switch which senses whether there is fluid flow in a pipeline
Inputs and Outputs	The terms used in an electronic system to describe what information is input to the system and what resultant information is output.
Isolation valve	Isolation valves can be any valve that can be used to manual isolate the water. This can be most commonly a ball valve or butterfly valve
Limit delay	The time delay which is set to ensure a buffer to prevent the system shutting down instantly if an Upper or Lower limit is reached
Lower limit	The lower limit is the pressure set in the system which defines the lowest pressure at which the system will be allowed to operate. If reached, the system will shut down (once the Limit Delay time has been exceeded)
Manual mode	Manual mode allows the user to control the pumpset manually to achieve certain operations (like pipeline filling)
Mobile data antenna	An aerial which is installed to be able to send and receive data if the system is connected via the cloud
Non return valve	Also called a check valve. These valves only allow water to flow one way.
Online subscription	A payment which allows the user to log on, interrogate and operate their system/s via an inbuilt modem
Pipework	Pipes, which connect from the Monsoon IQ pumpset suction and discharge flanges to facilitate the distribution of water.
Priming	Process which involves the removal of any entrapped air from within the pumpset and suction pipelines to ensure correct pump performance
Pressure tank	A vessel with a bladder used to store water energy, also called a pressure vessel or hydro-pneumatic pressure vessel
Pump controller	The Monsoon IQ Controller which controls all aspects of the performance of the pump system
Pumpset	A set of pumps joined together as one skid. Can also be called an Array.

Rainbank	A Davey water harvesting system that switches between two sources of water. i.e. mains water and tank water.
Remote stop/start	The ability to stop and start the pump system without actually being on site to perform the task.
Setpoint	The pressure at which the system aims to maintain.
Sleep frequency	When the system recognises that the speed (frequency) has fallen to a certain set level, it will trigger a drive to go to sleep
Sleep delay	Sleep delay is a set period of time where the system detects that the system is below the sleep frequency, but waits for a short period before triggering the sleep mode for the system
Soft fill frequency	The soft fill frequency (Hz) is the speed at which the system will run the pumps during the soft fill process.
Soft fill timeout	This is the time period (set by the user) in which the system will attempt to run in the soft fill mode before shutting down and triggering an alarm.
Soft fill level	The soft fill level is the pressure that is set to ensure the pipelines in the system are filled slowly.
Spares	Spare parts, which are recommended by Davey that the user keep on hand to reduce the risk of unforeseen downtime.
Supercell pressure tank	Davey pressure tank, this document refers to tanks that are rated to 16 bar by default.
Suction lift	Where the intake side of the pumpset is above the standing water level, it is necessary for the pump/s to lift the water up to the intake as part of the pumping process.
Type key	A system of numbers and letters which describe the build configuration of a Monsoon IQ
Upper limit	The upper limit is the pressure set in the system, which defines the highest pressure at which the system will be allowed to operate. If reached, the system will shut down (once the Limit Delay time has been exceeded)
Variable speed drive	Also called a VSD or Variable Frequency Drive (VFD). It is an electronic means of varying the speed of the pump.
VM Multistage	Davey vertical multistage inline pump
Wake up level	Pressure setting which triggers the controller to wake up and start the system regulating up to the setpoint

Table 1. LIST OF NOMENCLATURE

2.3 LABELS

This section describes the labels you will find on the Davey Monsoon IQ system. There are two labels. One fixed to the base, which describes our pumpset part number, the description in the form of the type key (see section 2.4), our Davey serial number and the production date in the form of a Julian date.

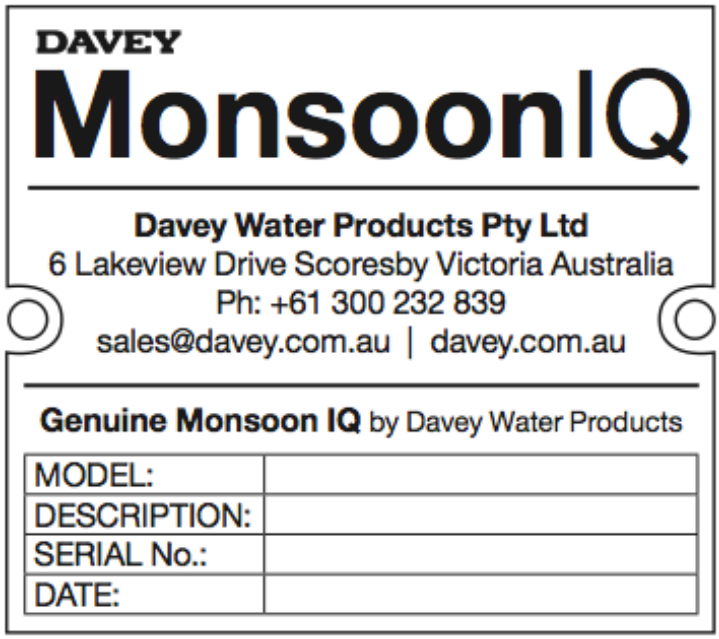


Figure 2. BASE LABEL

You will also find one on the controller enclosure. The label describes our part number and serial number, the production date in the form of a Julian date, who tested the Monsoon IQ at Davey and also what version of software was loaded into the Monsoon IQ at Davey.

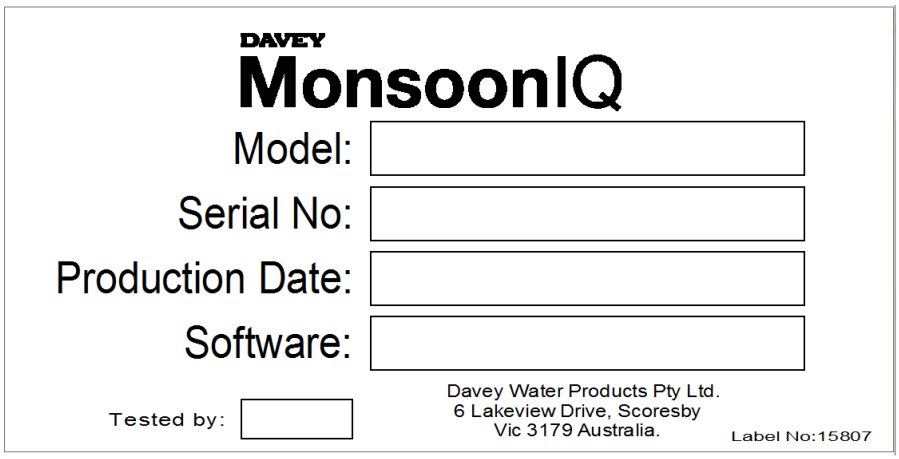
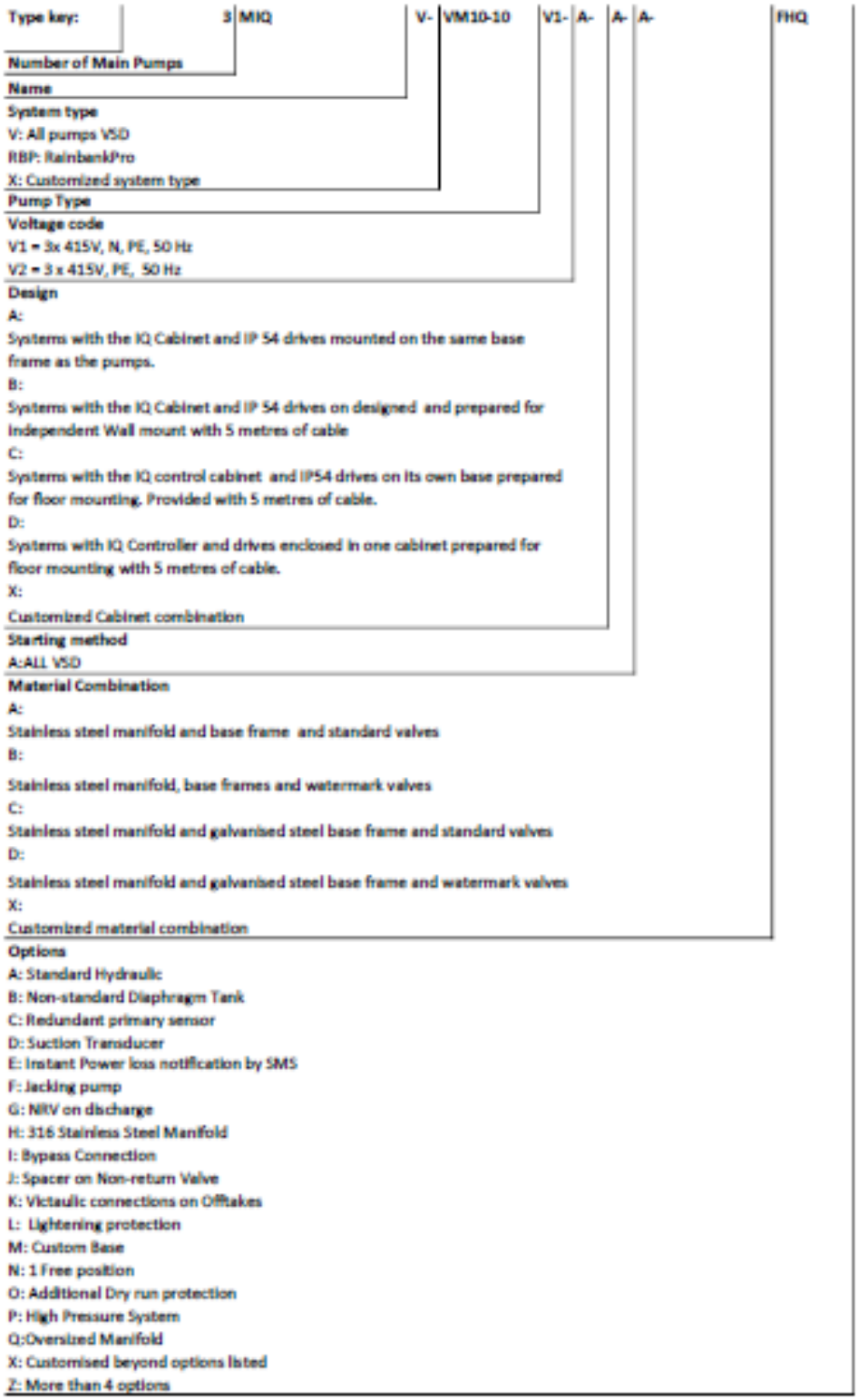


Figure 3. CONTROLLER LABEL

2.4 TYPE KEY

The type key is what we use to describe the system you have purchased. It is the system, we use to describe when we quote and invoice your product. It allows you to match what you have and to effectively communicate with Davey Water Products, should you have any questions. There are many options available for customisation at Davey. The type key does not capture them all, but it certainly captures most.



2.5 PANEL LAYOUT

Should you need to contact Davey during the installation process we have included a standard Monsoon IQ panel layout drawing with associated terms. Please note that there is also a touch screen that is mounted to the front door of the enclosure and an antenna. The front door and associated components have not been drawn in Figure 4. There is also a mini modem and sim card inserted onto the CN module.

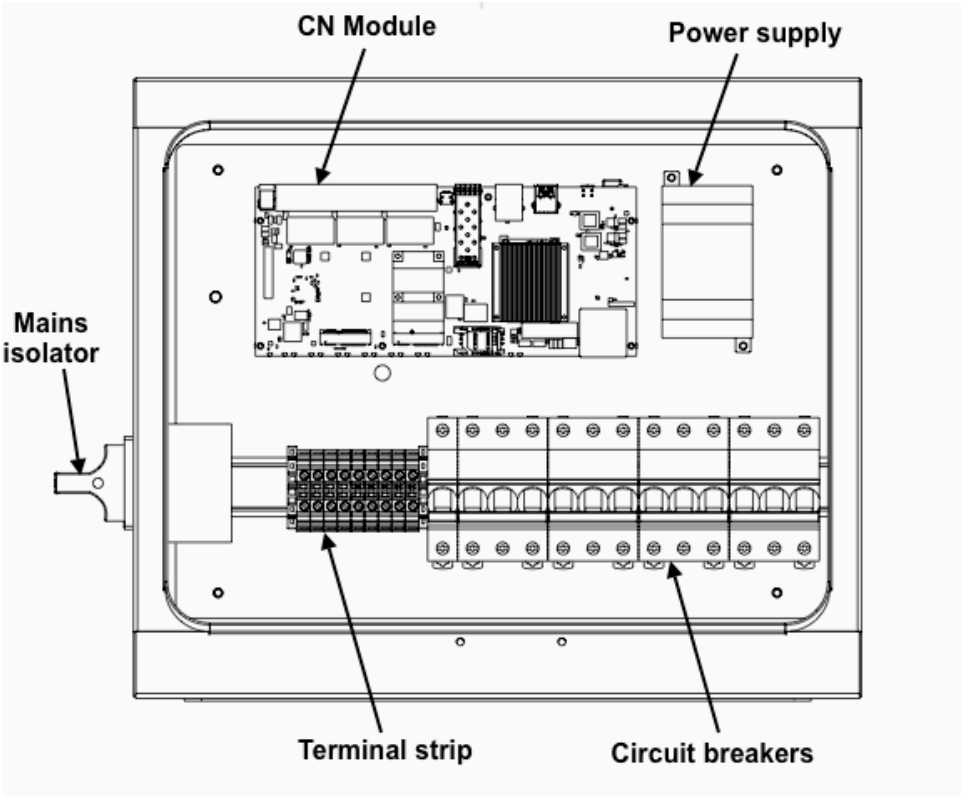


Figure 4. PANEL LAYOUT

3. REGISTRATION

Due to the nature of the Monsoon IQ, all systems need certain information upon placement of order for Davey to successfully register the product on Davey's Monsoon IQ Cloud. This is required regardless of use. When you order the system, Davey will be ask for various details including contact details for a site Administrator that will be able to control the system and receive potential system alerts, and an installation name.

4. DELIVERY AND HANDLING

4.1 DELIVERY

All Davey Monsoon IQ booster systems arrive in open wooden crates especially designed for transport. You will need to arrange for the booster to be unloaded from our delivery vehicle unless you requested and arranged otherwise prior to your order was placed. The crates come with provision for forklift transportation. Tines from forklift must extend thoroughly through designated holes to ensure the weight is evenly distributed onto the forklift. Ensure the pumpset is thoroughly inspected upon delivery to ensure no damage has taken place during unloading or delivery.

4.2 HANDLING

Our standard crates are not designed for independent crane lifting. Depending on the size and model of the unit, it may have lifting eyelets welded on the channel steel base – in this case it is permissible to lift the unit by slinging through these eyelets, taking all the necessary precautions to ensure correct balance and prevention of damage to the pumps and pipework etc. **(FIG 5a)**

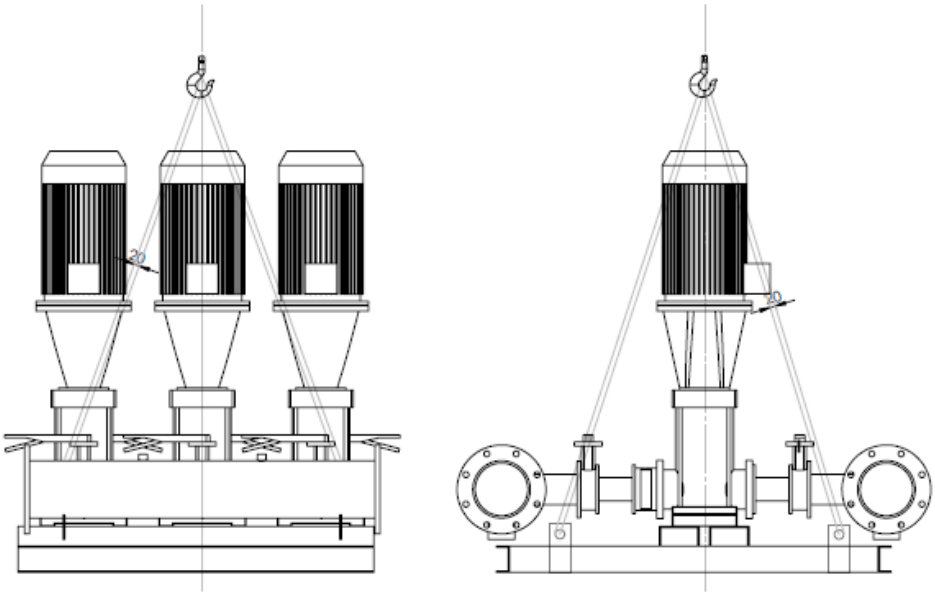


Figure 5a. LIFTING DIAGRAM (using base eyelets)

The lifting point must always be above the centre of gravity of the unit, and the lifting straps should be at least 3 metres long



UNDER NO CIRCUMSTANCES SHOULD THE UNIT BE LIFTED USING THE MOTOR EYEBOLTS OR THE MANIFOLDS / PIPEWORK

Units without lifting eyelets on the base ***must*** be lifted in a suitable container as per Figure 5b below.

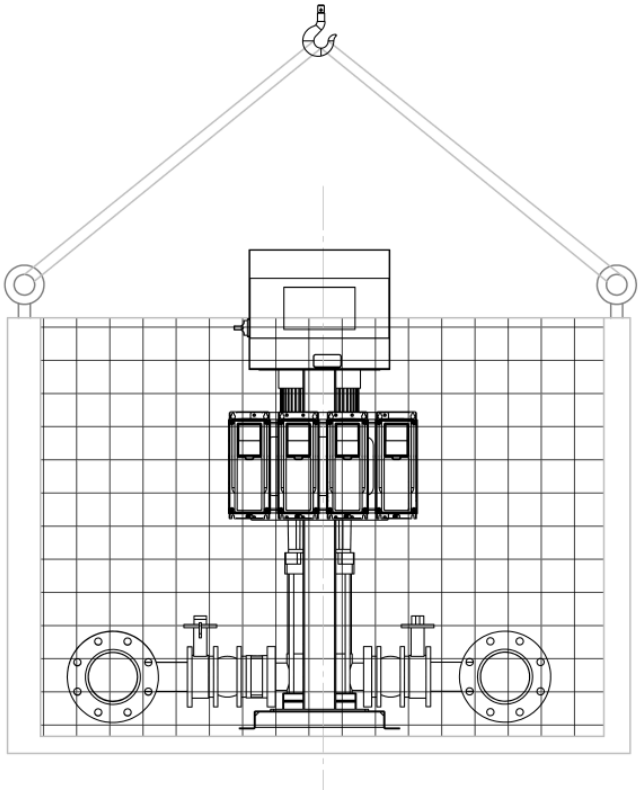


Figure 5b. LIFTING DIAGRAM (pumpset in cage)

Please consult Davey for lifting advice if necessary or for customisation at the design stage to suit your requirements

5. INSTALLATION

Caution Prior to installation remove any red transport plugs & associated seals / pipe sticker covers from the suction and / or discharge ports of the pump & manifold

Note Before installation check that the unit is as ordered and there is no visible damage to any components

5.1 LOCATION

Caution **The standard Monsoon IQ is not designed for outdoor installation and must not be exposed to direct sunlight. For outdoor installations, please consult Davey at design stage for the appropriate customisation recommendations.**

The Monsoon IQ should be installed in a room ensuring the appropriate ventilation for cooling of the motors and control unit and shelter from environmental elements where appropriate.

The system must have at least 1 metre clearance on one side of the booster. This space is required for maintenance, inspection and dismantling. Should the pumps and motor not be of suitable size for manual lifting out of position then either an overhead gantry/lifting point should be installed or alternatively allow 0.5 metres on opposing side for temporary gantry installation. You should also ensure that there is enough space and pathways for future transport of components (for example, motors) that may need to be thoroughly inspected, maintained or replaced at a later date.

5.2 PIPEWORK

The pipework connected to the booster system must be of adequate size to facilitate the correct flows, velocities and Net Positive Suction Head available (NPSHa). Suction and discharge points on the booster should have isolation valves installed, thus avoiding having to drain the system for maintenance and inspection purposes. When installing the pipes make sure the pump manifold / pumps are not stressed by the pipework. All inlet and outlet plumbing MUST be supported independent of the pumpset manifold. Make sure the pipes are adequately supported as close to the manifold flanges as possible, both on the suction and discharge side. The counterflanges should fit parallel with the manifold flanges so that there is no stress imposed. Install pipework so airlocks are avoided.

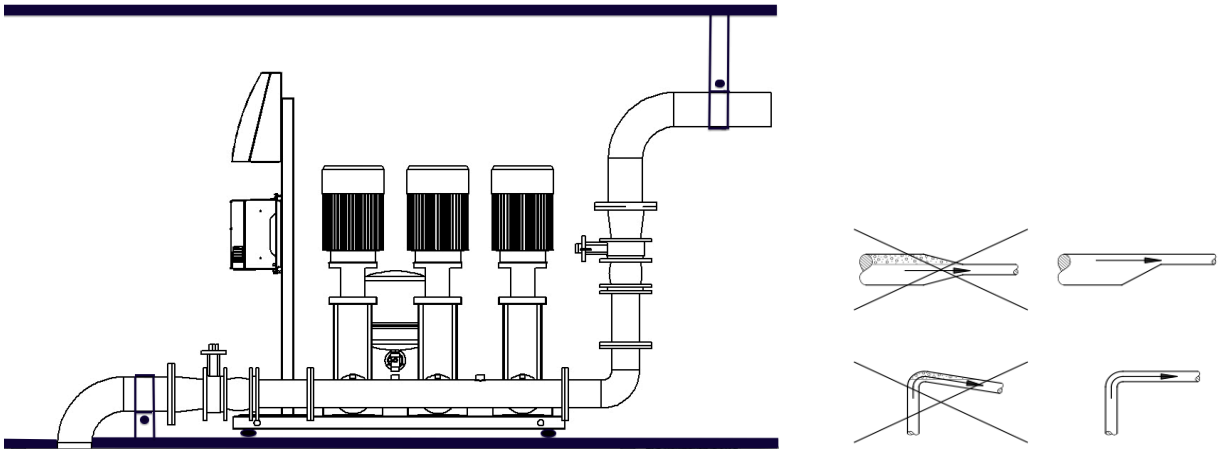


Figure 6. TYPICAL INSTALLATION AND PIPEWORK / SUPPORT REQUIREMENTS

5.3 FOUNDATION

The unit should be bolted to an even solid surface (e.g. concrete slab) of suitable strength and proportions matching the weight and size of the unit.

5.4 VIBRATION DAMPENING

Vibration elimination and noise reduction should be considered. The Monsoon IQ booster system may generate noise and vibration due to the rotation of the motors, pumps, the flow of water through various orifices/valves and harmonics generated from the motor and variable speed drives.
If it is desired to minimise vibrations in a building, it is recommended that the unit is isolated from the foundation using appropriate vibration dampeners. The supplier of vibration dampeners can provide information on the correct size and rating necessary for each particular installation.

Note

If vibration dampeners are fitted to the unit, expansion joints should also be fitted to the manifold flanges to ensure full isolation of the system. Vibration dampeners and expansion joints should be installed according to manufacturers instructions

5.5 ELECTRICAL INSTALLATION



ALL ELECTRICAL WORK MUST BE CARRIED OUT BY A LICENCED AUTHORISED PERSON IN ACCORDANCE WITH LOCAL REGULATIONS

The unit comes pre – wired within the system itself including a mains isolation switch but various other electrical connections need to be made to external components and fittings such as –

1. A suitable circuit breaker capable of handling the total pump & controller load to protect the supply cable to the Monsoon IQ in accordance with local regulations

2. Connections as required for remote stop /start & digital inputs/outputs as required

Refer wiring diagram below for mains connection –

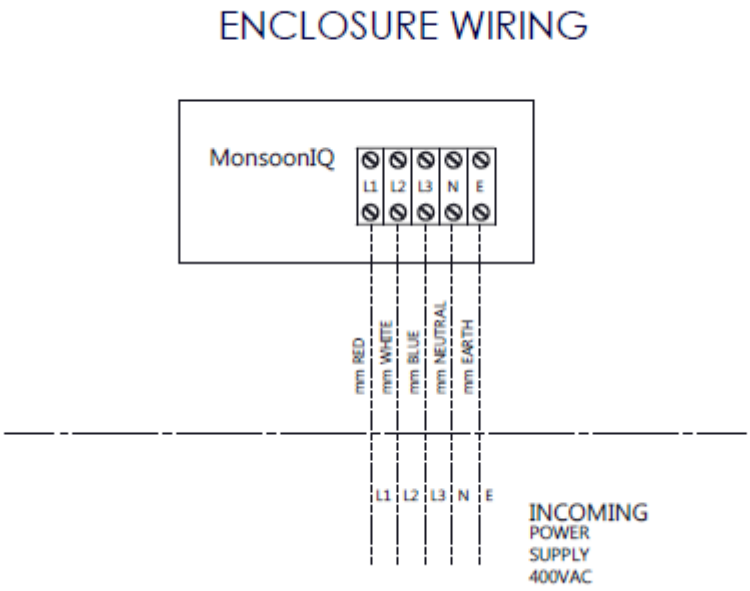


Figure 7. MAINS CONNECTION

Any switchgear used for connection to the Monsoon IQ on the mains side of the IQ system should be rated to handle DC current. This will prevent nuisance tripping from the variable speed drives -- the drive can cause a current in the protective earthing conductor. Use a residual current operated device (RDC) or a residual current operated monitoring device (RCM) to give protection against a direct or indirect contact. Use a Type B RCD or RCM device on the mains side of the drive.

Caution

If the Vacon Variable Speed Drives should be disconnected from the motors during installation or supplied not connected, it is extremely important to check the rotation is correct of the motors once the wires are reconnected. Failure to do so will cause damage and/or failure of the Monsoon IQ to operate correctly. If rotation is incorrect the phases must be swapped to correct rotation by a suitable qualified person in accordance with local regulations. Rotation for Davey VM vertical multistage pumps should be counter clockwise looking at the fan end of the motor.

5.5.1 INPUTS AND OUTPUTS

The digital inputs and outputs are designed to be daisy chained for default operation. Please see wiring details as per below. Should you require individual pump stop and outputs, please see Section 11.3 for wiring details.

Terminal Number	Signal	Technical information
4, 5	Analogue input 2 (Pressure Transducer)	4-20mA (Ri =250 Ω) Resolution 0.1%, accuracy ±1% 24 VDC
6, 12	24VDC power supply	24V DC, ±10%. Max 250mA
7, 13	I/O Ground	Ground for reference and controls (connected internally to frame ground through 1 MΩ)
8-10, 14-16	Digital inputs	Postive or Negative logic Ri = min 5k Ω 15-30 V DC
21 - 26	Digital (Relay) outputs	Change-over contact (SPDT) relay. 5.5 mm isolation between channels. Switching capacity • 24VDC/8A • 250VAC/8A • 125VDC/0.4A Minimum switching load • 5V/10 mA

Table 2. DIGITAL INPUTS AND OUTPUTS

5.5.2 GENERATOR CONNECTION

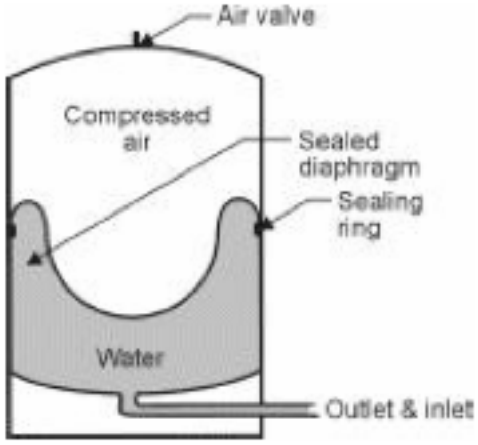
In some cases, such as connection of the Monsoon IQ to a generator, the harmonics generated from the drives may need to be considered. Davey recommends that you consult your generator manufacturer at design stage to consider if either additional harmonic suppression is required or whether the system is within the limits of the generators guidelines. This will vary from case to case and depends on many factors such as load profile, number of loads, size of loads, the local grid characteristics, local requirements/regulations etc.

5.5.3 3G MOBILE DATA ANTENNA

The standard Davey Monsoon IQ system comes with a 3G antenna to allow the built in modem to access the internet and Davey Monsoon IQ cloud. The antenna should be installed in an area where there is good mobile phone reception and should be installed pointing upwards. It should not be installed next to any device that may emit large amounts of EMI (like a VSD). The antenna is outdoor rated, a 3 metre lead and has a magnetic base for your convenience of installation. Should you have poor or no mobile phone reception in your area, please consult Davey.

6. PRESSURE TANKS

6.1 PRESSURE TANK REQUIREMENTS



A pressure tank is fitted to all complete Monsoon IQ systems. Its purpose is twofold –

- To provide supplemental pressure in the system to reduce the cycle time of the pump starts
- To reduce effects of any water hammer in the system

The tank has a capacity based on the following formula –

Minimum size of tank required (in litres) = 10% of the max flow rate (in litres / minute) of 1 pump in the pumpset
Example

One pump has a max flow rate of 1.5 L/sec = 90 L/min.
Min tank capacity = 10% x 90 = 9 litres

The Monsoon IQ is a high pressure booster system rated to 16 bar as standard and as such must be fitted with a 16 bar Supercell pressure tank -- either a 24018PHP16 (18 L capacity) or a 24080PHP16 (80 L capacity). The table below provides the tank minimum requirements if Davey VM vertical multistage pumps make up the pumpset.

PUMP MODEL	PRESSURE TANK FITTED	PART NUMBER
VM1	1 off -16 Bar 18 litre Supercell Tank	24018PHP16
VM3	1 off -16 Bar 18 litre Supercell Tank	24018PHP16
VM5	1 off - 16 Bar 18 litre Supercell Tank	24018PHP16
VM10	1 off -16 Bar 18 litre Supercell Tank	24018PHP16
VM16	1 off - 16 Bar 80 litre Supercell Tank	24080PHP16
VM32	1 off - 16 Bar 80 litre Supercell Tank	24080PHP16
VM65	2 off - 16 Bar 80 litre Supercell Tank	24080PHP16
VM90	2 off - 16 Bar 80 litre Supercell Tank	24080PHP16

Table 3. MINIMUM PRESSURE TANK TABLE

The above recommendations are the *minimum* requirement for normal application. Adding extra pressure tanks will always assist in smoother operation of the pumpset and may be required if you have a fast reacting system
Using the above formula, pressure tank requirements for a system using pumps other than VM multistage can easily be calculated.

6.2 CHARGING PRESSURE

The charging pressure depends on the system configuration –

1. If the system does not have a jockey pump, the charging pressure should be 10% below than the “wake up” pressure set for the main pumps.

2. If the system is fitted with a jockey pump the tank should be charged to a pressure 10% below the lowest “wake up” level which will be that of the main pumps (Jockey pump wake level should be higher than main pumps level)

(See section 8.4.4 of this manual for an explanation of “wake up” level).

The charging of the tank must be done when there is no pressure in the pipework system. It should be checked and maintained annually.

6.3 RAPIDLY CHANGING (UNPREDICTABLE FLOW) DEMANDS

Caution

The requirements for pressure tanks described above are the minimum standards to make the Davey Monsoon IQ operate correctly under common circumstances. There are many circumstances, due to the hydraulic nature of each connection, where a greater volume of pressure tanks is required. This section does not include an exhaustive description of all situations and each case should be considered on its own merits.

Should you have a system that can rapidly change to full flow, the Monsoon IQ system has a minimum response time to these rapid changes in flow demand. This time is 10 seconds for pump 1 and then 12 seconds for each subsequent pump. If the surrounding pipework can handle the sudden change in velocity, a larger pressure tank (or tanks) may be necessary to buffer the response time. In this case the pressure tank minimum sizing should be calculated using Boyles law as illustrated below -

Say the maximum predicted sudden change from sleep mode is to a flow rate of 5 l/s.

Assuming pump 1 can handle the increase in flow, the minimum response time for this pump is 10 seconds.
Therefore the increase in flow before the pump can respond is 10 x 2.5 l/s = 25 litres
Thus we need the pressure tank to cover that demand until the pump can respond.

The formula to determine the pressure tank requirement is –

$$V = \frac{(Ppc+100)\times C}{Pci+100} - \frac{(Ppc+100)\times C}{Pco+100}$$ where

Ppc = the pressure tank charge pressure in kPa = say 360 kPa
Pci = the nominated Wake Up pressure in kPa = say 400 kPa
Pco = the Setpoint in kPa = say 600 kPa
V = draw off required to cover pump response time = 25 litres as calculated above
C = tank capacity required

Therefore 25 = $\frac{(360+100) \times C}{(400+100)}$ - $\frac{(360+100) \times C}{(600+100)}$

25 = $\frac{460C}{500}$ - $\frac{460C}{700}$

25 = 0.92C - 0.66C

25 = 0.26C

Therefore required tank capacity C = $\frac{25}{0.26}$ = 96 litres. (96 litres should be rounded up to the tank size or sizes that are available to suit. In this case, it would be a Davey 100 litre tank if maximum pressure was under 10 bar)

This calculation does not allow for the take up from the pumpset during the ramp up but if we discount this, it allows for an appropriate buffer.

7. MONSOON IQ OVERVIEW

7.1 CONTROL SYSTEM OVERVIEW

The Monsoon IQ is designed to automatically cater for varying demand in a water supply system by maintaining a set pressure regardless of the flow requirements (up to the maximum capacity of the pumpset). Once the desired pressure has been set (set point pressure) the Monsoon IQ will ramp up the pump/s until the desired pressure is reached. The variable speed drives will then control the speed of *all* the active pumps to maintain that set point pressure.

Example of standard system operation.
A monsoon IQ system is supplying an irrigation system with water from a dam. The operator decides to turn on one bank of sprinklers. The master pump will start once the pressure falls to the "wake up" level – then the pump will continue to ramp up slowly to the set point pressure. If demand increases to a level above the first pump's capacity, a slight drop in pressure will trigger the "staging" (starting) of the next pump. Once both pumps are operating, the system will adjust both VSDs so the two pumps are sharing the demand equally. If demand increases again the same process applies.

Similarly once the demand is reduced the system will ramp down all VSD's together until a slight dip in pressure combined with the VSD speed dropping below the sleep speed, triggers the "destaging" (shutting down) of one pump. The system will then again adjust all the remaining VSDs to load share, and so on.

If the speed (frequency) of the last pump operating becomes low enough, the system will determine the flow has stopped and will shut down the system (sleep) until the demand again appears.

This system provides much smoother hydraulic performance with varying flows than systems which simply bring on line (or remove) additional pumps to match demand.

This process can be illustrated by referring to Figure 8 below. A table explaining the terms used follows --

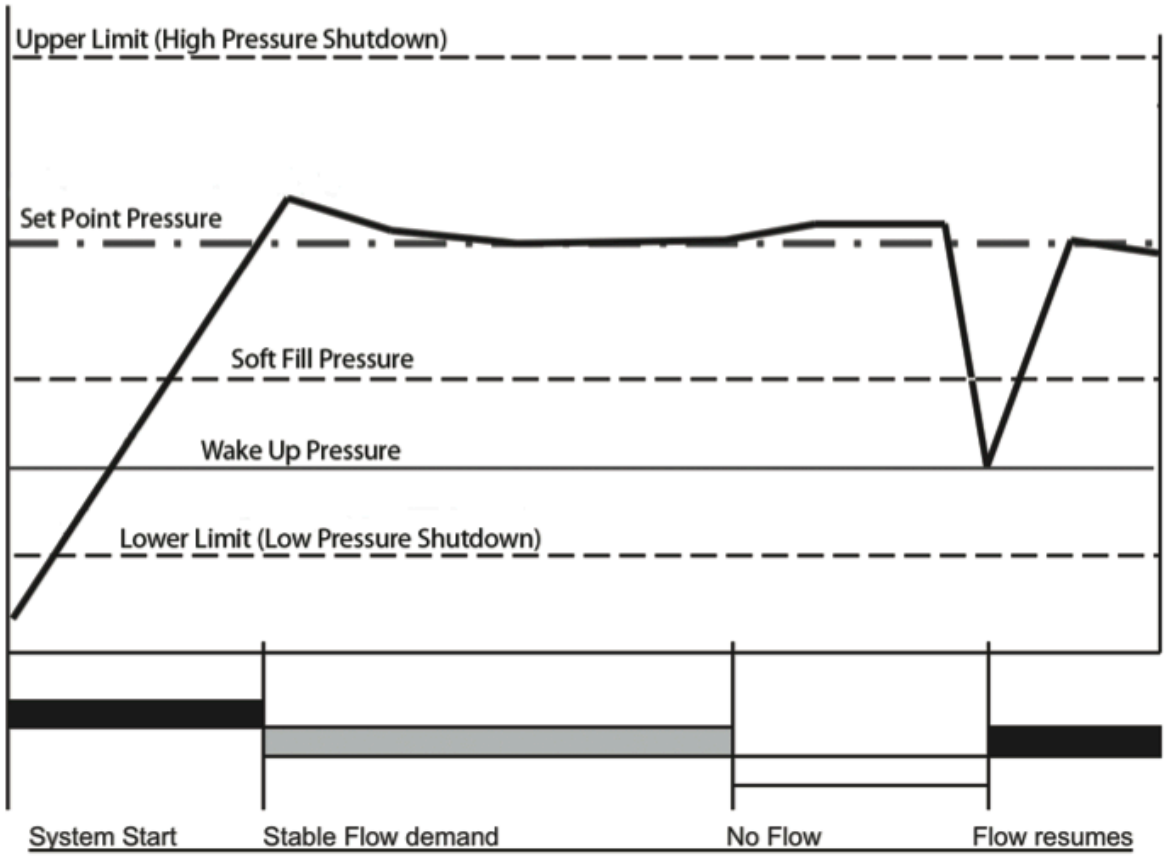


Figure 8. CONTROL DIAGRAM

TERMINOLOGY	MEANING
Upper limit	The pressure at which the system will shut down due to the pressure being too high (alarm triggered)
Lower limit	The pressure at which the system will shut down due to pressure being too low (alarm triggered)
Set point pressure	The pressure at which the system has been selected to operate and aims to maintain
Wake up pressure	If the pressure falls to this level, the system will automatically restart a pump (jockey pump if fitted - or one of the main pumps) to bring the pressure back up to the set point
Soft fill pressure	This pressure can be selected to allow slow filling of the pipelines (in most cases on initial commissioning but occur be during a normal startup)

Table 4. CONTROL TERMINOLOGY

7.2 STARTING THE SYSTEM

Before applying power to the system ensure that all on site external electrical wiring is correct as per the wiring diagram and that it complies with the relevant local codes and regulations.

Caution

Before starting the system ensure that all external pipework connected to the unit is complete, secure and the position of all valving is understood prior to commencing line filling

7.3 THE CONTROL PANEL OVERVIEW

The Monsoon IQ control panel is a “touch screen” and all inputs and adjustments to the system can be made simply by touching the icons / information on the screen. The large data fields make it easy to read and makes navigation easy. Depending on the access permissions of the user, multiple screens and levels of information / control adjustments are available.

7.4 ACCESS PERMISSIONS

There are three access levels available to users of the Monsoon IQ on the touchscreen –

1. **ACCESS LEVEL 0** - This level requires no password and allows the operator to make non critical adjustments and obtain system status information both current and historical from multiple screens. Figure 9 below shows the initial status screen.

   See Section 8 for a detailed description of system / operator interaction

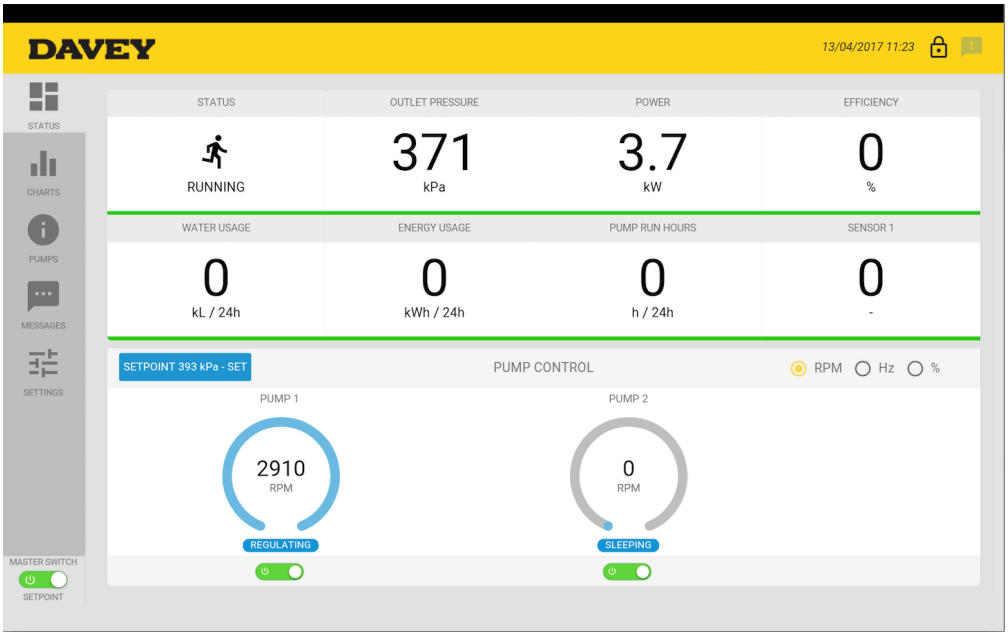


Figure 9. CONTROL PANEL OVERVIEW

2. **ACCESS LEVEL 1** – This level is password protected and available to trained personnel with an understanding of the system and provides access to greater information plus the ability to make system changes via the touch screen. Whenever a user taps on a protected element, it will bring up a keypad dialog which requires the four digit PIN code 1212 to be entered to proceed further. When the password is required, the screen will be as shown in Figure 10 below–

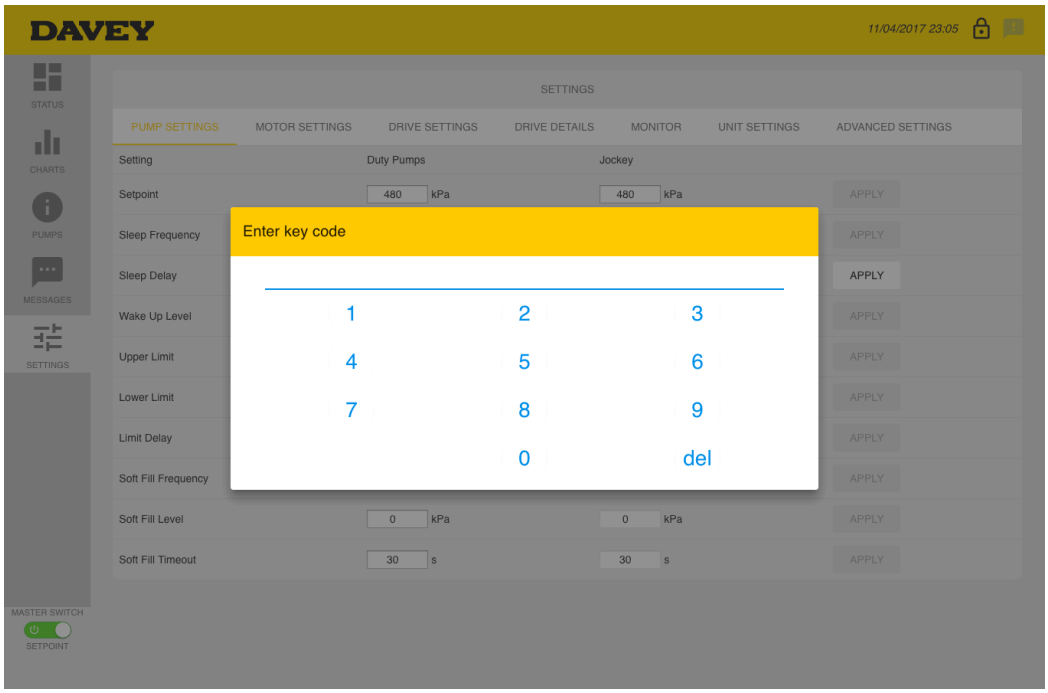


Figure 10. PASSWORD SCREEN

Caution **Do not operate the settings on Level 1 unless you have read this manual and understood the implications of the settings**

3. **ACCESS LEVEL 2** – This level is also password protected but is only available to Davey Water Products. (either on site or by wireless access, if activated) to monitor, change or upgrade aspects of the system.

7.5 PRIMING AND OPERATION

As with all installations it is advisable to fill all lines slowly to ensure all air is expelled and there is no risk of water hammer which could damage the system. With the Monsoon IQ, there are two means of controlling the pump set when filling the line slowly – either manual or soft fill, see 7.5.1 below. Note that line filling can only take place after the vertical multistage pumps have been primed. The principles for ISOspec end suction pumps are very similar. Please consult the ISOspec manual or Davey Water Products for further clarification.

7.5.1 CONTROL MODES

7.5.1.1 MANUAL MODE

The Monsoon IQ can run in manual mode and with this feature the pump speed can be set by the user for easy manual control. Switching the master switch on and off triggers a question as to whether the system should run in set point mode or manual mode. Selection of Manual Mode allows the user to set the pump speed for line filling. Screen appears as shown below –

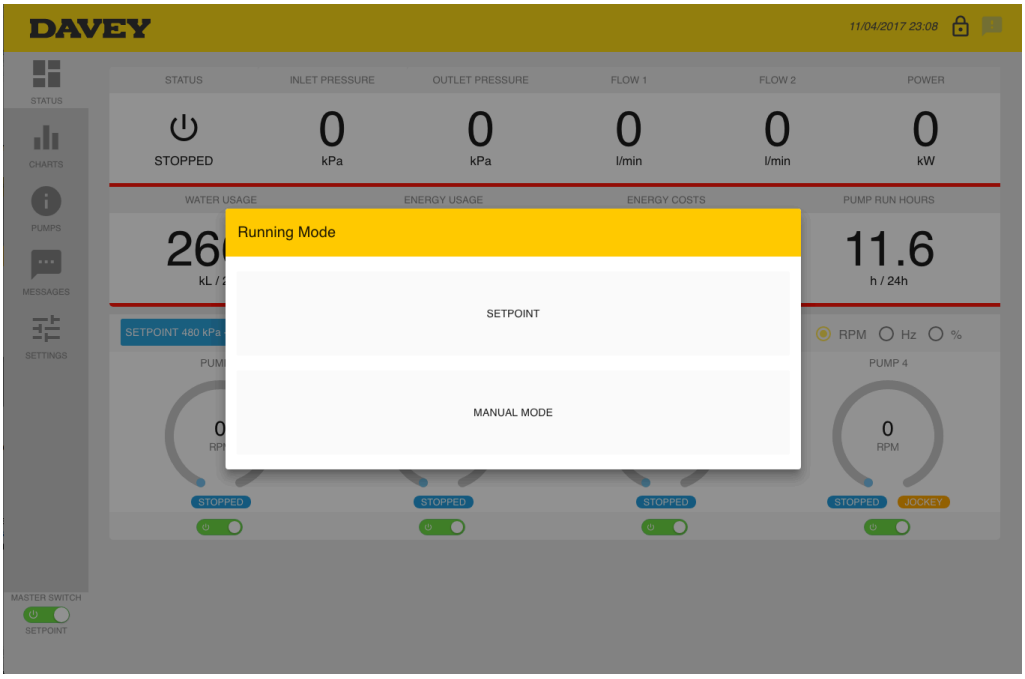


Figure 11. RUNNING MODE

In this mode each pump can be individually manually turned on and off to ensure control and correct priming.

7.5.1.2 SOFT FILL

The Soft Fill feature is Level 1 protected and is available under the SETTINGS screen. It allows the user to set the desired soft fill pressure, the time the operator wants the system to run to completely fill the lines and the speed at which the pumps will operate while line filling. Users can calculate the volume of the lines and using the pump flow rate determine for how long (with a margin) soft fill should run.

Example

A mainline consists of 1.5 Km of 150mm PVC pipe Class 12

Internal diameter of pipe – 142.7mm

Say the selected line fill flow rate is 30 L/sec.

Diameter of pipe in metres $= \frac{142.7}{1000} = 0.1427$ m

Volume of pipeline in litres $= \frac{\pi d^2}{4}$ x Length (m) x1000

$$= \frac{3.1416 \times .1427 \times .1427 \times 1500 \times 1000}{4} = 23989 \text{ Litres}$$

Therefore time to fill line = $\frac{23989}{30}$ = 780 seconds = $\frac{780}{60}$ minutes

= 13 minutes

Thus the Soft Fill run time should be set in excess of 13 mins to ensure complete line fill. We recommend at least two minutes on top of the calculated time, however this may require minor adjustment based on experience.

Once the soft fill pressure (level), soft fill frequency and the soft fill timeout is set, the system will go into soft fill mode any time the Monsoon IQ system is started/stopped and the initial pressure is below the soft fill level. The system will run the pumps at the speed set under the “soft fill frequency” until the pressure rises above the set soft fill level. Then the system will resume normal control, aiming at maintaining the setpoint pressure.

Should the system take too long to fill (i.e. the set soft fill time has been exceeded) the system will stop and go into alarm.

The process can be illustrated in the diagram below –

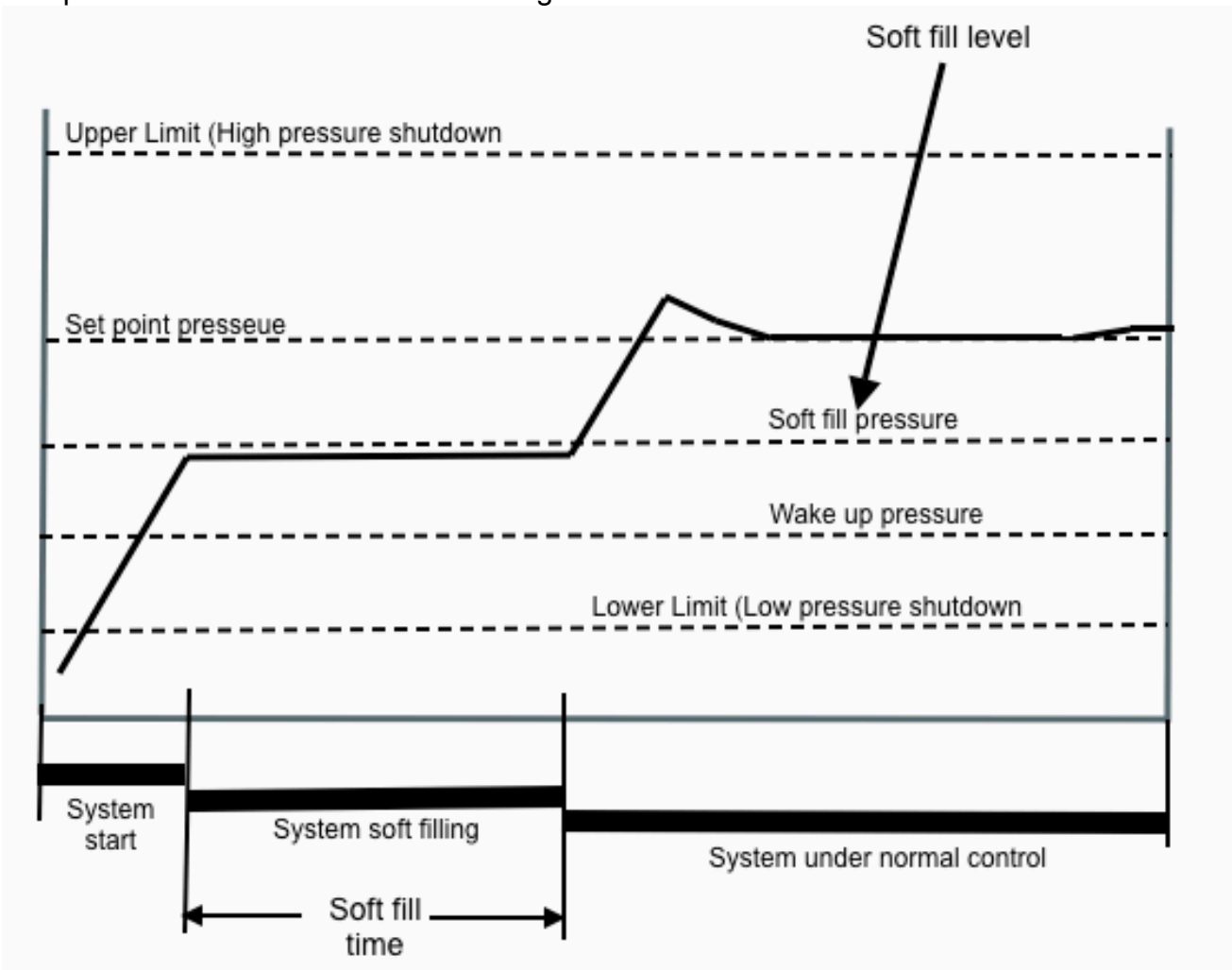


Figure 12. SOFT FILL DIAGRAM

7.6 FILLING OR PRIMING VM PUMPS

7.6.1 PUMP IN FLOODED SUCTION

1. After pumpset installation is complete and you have access to a water supply
2. Close the discharge valves on all pumps.
3. Unscrew the bleed plug fitted to pump heads
4. Open the suction valves progressively and completely fill the pump.
5. Screw the bleed plug back in only after water flows out and all air has been eliminated.
6. Open discharge valves.



In a hot-water application, a stream of water may escape from the bleed port. Do what is necessary to protect persons and the motor.

7.6.2 PUMP WITH SUCTION LIFT

1. Close the discharge valves
2. Open the suction valve if fitted.
3. Remove the bleed plug on the main body of the pump.
4. Unscrew the bottom drain and priming plug on the pump casing four or five turns.
5. Put a funnel into the bleed plug of the highest pump and slowly and completely fill the pump and the suction pipe.
6. When water flows out and all air has been eliminated, filling is complete. If you have a jockey pump, the lowest priming points will need to be filled first. You may need to replace the bleed plugs from lowest to highest pump to ensure all pumps in a system are correctly primed.
7. Screw the bleed plug and the bottom drain and priming plug back in.

The following must be done in addition after the filling plug has been screwed back in for both scenarios --

1. Start the motor briefly.
2. Unscrew the prime plug again and top up the water in the pump.
3. If necessary, repeat this operation until all air is expelled from pump

7.6.3 GENERAL INSTRUCTIONS FOR OTHER STYLE PUMPS

1. After installation is complete, shut the discharge valve. If a master discharge valve has been fitted to the system, this also should be shut.

2. Fill the pump/s, suction and discharge lines with water via the priming ports. On flooded suction simply open the suction valve to the pumps. When full, fit priming plugs and tighten.

3. Ensure an outlet nearest to the pump is open.

4. Ensure all valves in the suction line are open

5. Switch pump to manual mode and partially open the discharge valve

6. After prime has been established a strong flow of water should be evident from the outlet which was opened near the pumpset. Allow water to flow for approx.. 20 seconds to expel air.

7. Once water flow has been established, open and close all outlets in the system to ensure air has been expelled.

ONCE THE PUMP SYSTEM IS OPERATIONAL, ALL PERSONNEL MUST BE AWARE OF THE FOLLOWING SAFETY CONSIDERATIONS



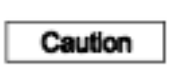
The pump system can start automatically and without warning



Always disconnect the pumps and controller from the electrical supply before maintenance or repairs are carried out. Allow time for any capacitors to discharge



When servicing or attending the pumps or controller always ensure power is switched off and any leads unplugged. Electrical connections should be serviced only by qualified persons.



Do not use hydrocarbon based or hydrocarbon propelled sprays around the electrical components of the pumps or controller.



The pumps and associated pipework operate under pressure. Under no circumstances should the pump or associated pipework be disassembled unless the internal pressure of the unit has been relieved. Failure to observe this warning will expose persons to the possibility of personal injury and may also result in damage to the pump, pipework or other property.

Caution

DO NOT USE petroleum based fluids or solvents (e.g. oils, kerosene, turpentine, thinners, etc.) on the plastic or seal components.

In accordance with AS/NZS 60335.2.41 we are obliged to inform you that this pump is not to be used by children or infirm persons and must not be used as a toy by children.

Care should also be taken when servicing or disassembling pump to avoid possible injury from hot pressurised water. Unplug pump, relieve pressure by opening a tap on the discharge side of the pump and allow any hot water in the pump to cool before attempting to dismantle.

8. SYSTEM / OPERATOR INTERACTION

The Monsoon IQ is a fully interactive screen based system. Multiple screens allow the operator to view, and depending on their access permission, change certain parameters of the system operation. This section also describes the process to achieve the initial start up of the system.

8.1 INITIAL STARTUP

The following steps are necessary when starting the system for the first time –

1. Turn the power OFF at the mains isolator (see Figure 13)
2. Open the Monsoon IQ controller cabinet

WARNING – this must be done by a suitably qualified person according to local regulations

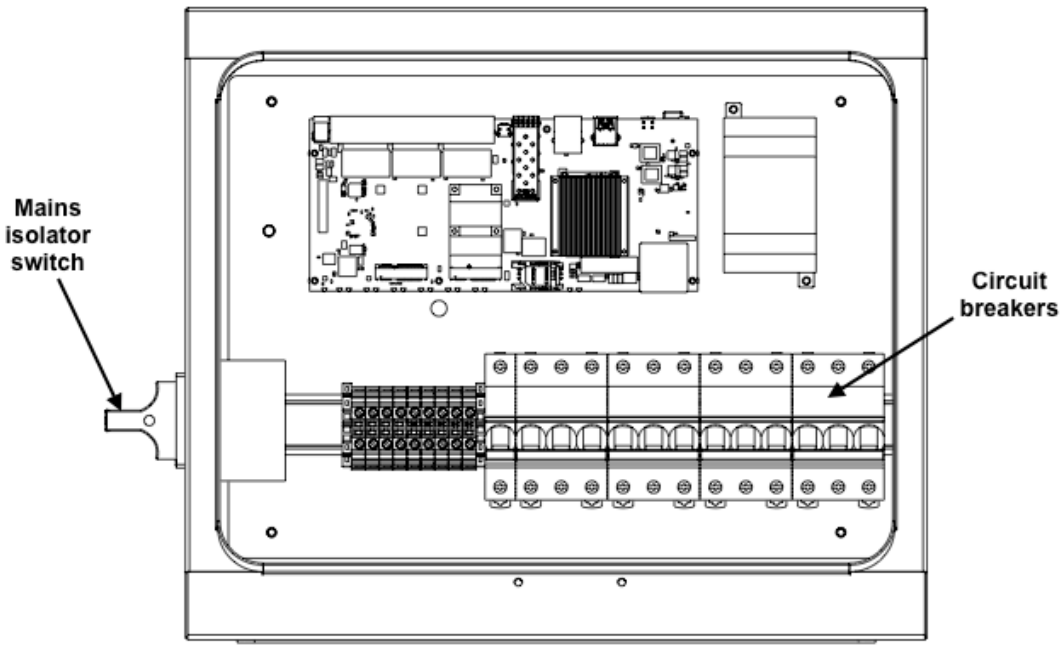


Figure 13. INSIDE CONTROLLER CABINET

3. Turn on the tablet – switch is at the back of the controller door (See Figure 14)

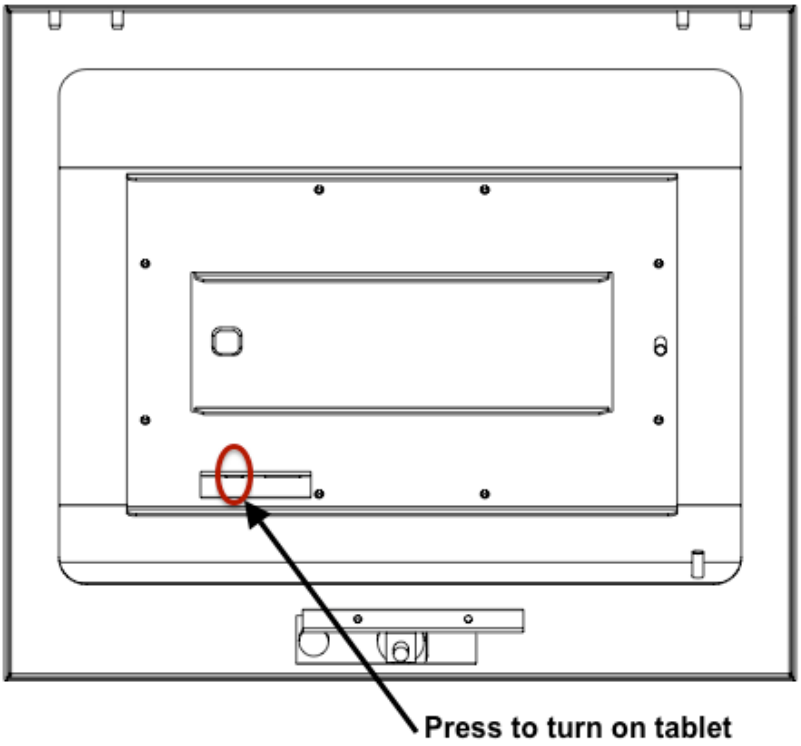


Figure 14. BACK OF CONTROLLER DOOR

4. Check that the circuit breakers are ON (see Figure 13)
5. Close cabinet and lock door
6. Turn mains isolator ON (see Figure 13)
7. Wait for 2 minutes to allow the system to boot

When the system has booted it will display the START UP screen (Figure 15) below

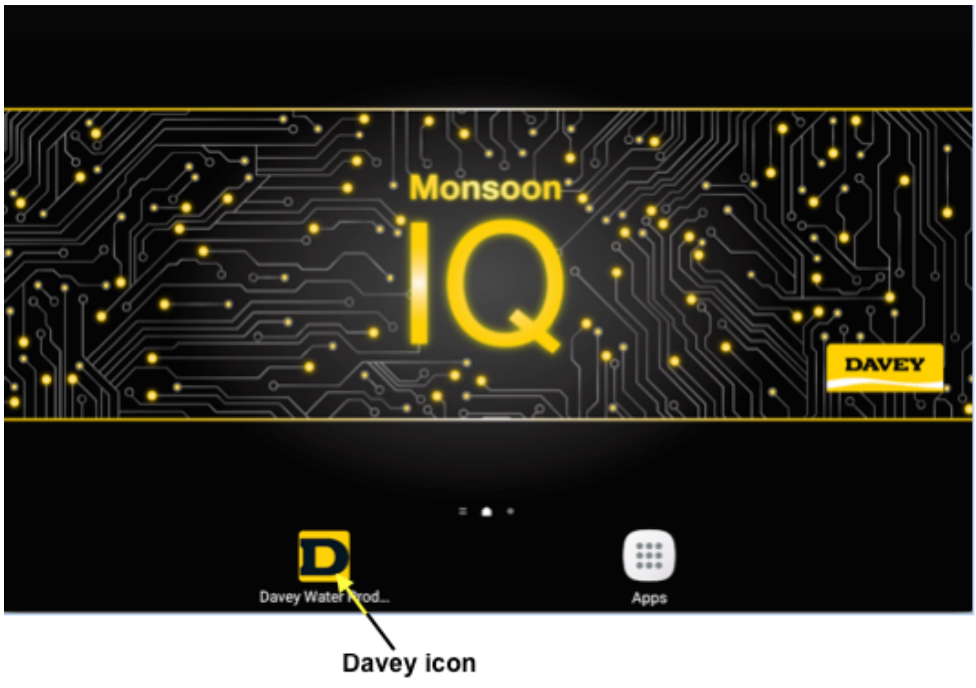


Figure 15. START UP SCREEN

8. On the tablet, tap on the Davey icon (See Figure 15)
9. Wait for the STATUS screen to be displayed as per Figure 16 below

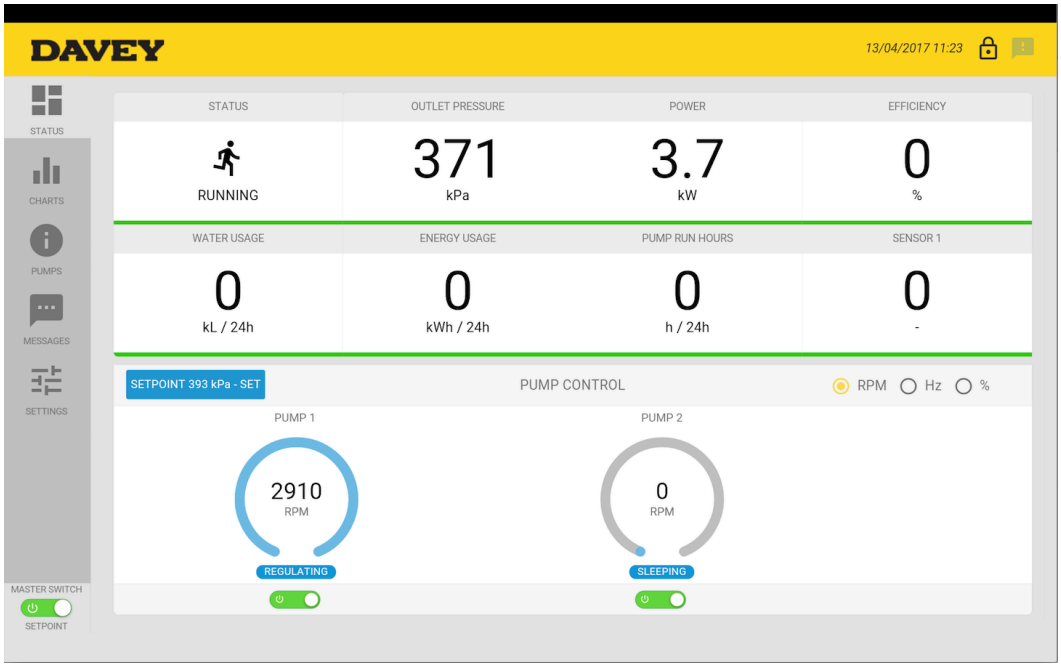


Figure 16. STATUS SCREEN

Note If the STATUS screen does not load after 2 minutes, swipe finger down screen to reload

10. Turn on Master switch (See Item 22 Figure 17)
11. Adjust pressure tank pre-charge to required level (see Section 6.2) while there is no pressure in the pipework.

8.2 SETTING THE SYSTEM PARAMETERS

After the system is “live” it is then necessary to set the system parameters by going to the SETTINGS screen and adjusting the setpoint, sleep frequency, wakeup level, sleep delay, upper and lower limit, limit delay, soft fill settings etc. (see Section 8.4)

8.3 THE SYSTEM SCREENS

This section provides information on the appearance of the tablet screens and defines the operator access level. (For access level definitions see Section 7.4)
Five tablet screens allow the user to understand the system performance and make the adjustments necessary to operate the system. The desired screen is selected by tapping one of the 5 icons down the left hand side of the pad. (1,2,3,4 or 5 – see Figure 17)

8.3.1 STATUS SCREEN

ACCESSABILITY

ACCESS LEVEL	VIEWING	CHANGE CAPABILITY
0	Yes	Turn pump master & individual pumps on and off (22 & 17) Change setpoint by tapping on pump icon (20) or blue setpoint bar (21)
1	Yes	Turn pump master & individual pumps on and off (22 & 17) Change setpoint by tapping on pump icon (20) or blue setpoint bar (21)

On Start up, the STATUS screen as shown below appears.

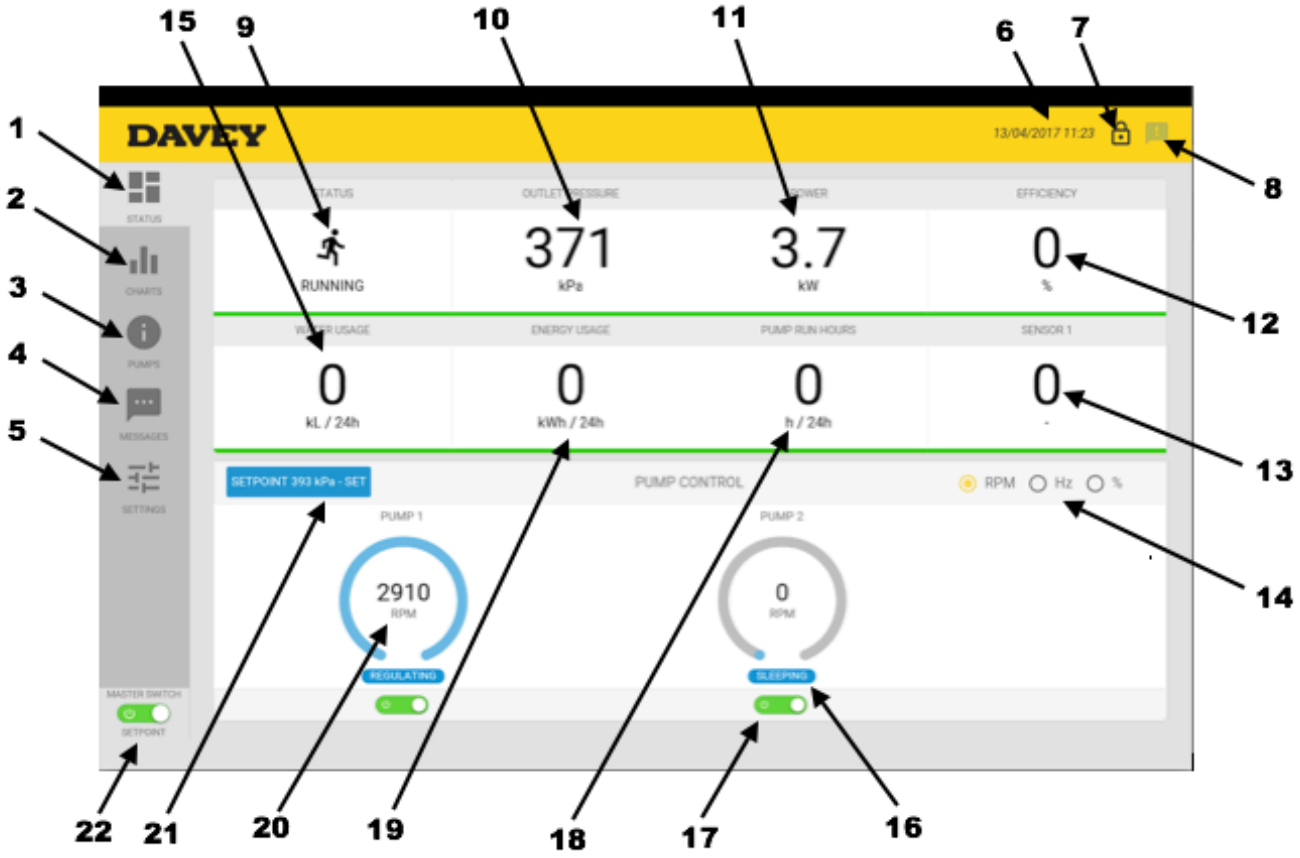


Figure 17. STATUS SCREEN ICONS

No.	DESCRIPTION	
1	STATUS screen selected	
2	Tap to view CHARTS	
3	Tap to view PUMP data	
4	Tap to view system MESSAGES	
5	Tap to view SETTINGS	
6	Date and time	
7	Shows system is locked unless password access is used	See note 1
8	System messages indicator	See note 2
9	System Mode (i.e. running, asleep)	
10	Actual pressure at which system is operating	See note 3
11	Power being consumed by the system	
12	System efficiency	
13	Actual system flow (providing flow sensor is connected)	
14	User can select pump display to show RPM, Hz or % of full power	
15	Water usage in last 24 hours (kl)	
16	Individual pump status (regulating, sleeping, off)	
17	Pump on/off	
18	Pump run time in last 24 hours	
19	Energy use in last 24 hours	
20	Visual representation of pump status showing RPM	
21	Pressure at which system is set to run (set point)	
22	Master on/off	See note 4

Table 5. CONTROLLER TERMS

Note

1. Once the required password has been entered, the icon will show “unlocked” and will remain unlocked for 2 mins. It will then automatically relock after that time.

Note

2. If icon is dull grey there are no messages. Icon will turn red when there are new unread messages waiting.

Note

3. This will match the system set point at stable demand

Note

4. If the master is switched off, any pump which was running at that time will still show “green on” even though it will not actually be running. This indicates which pump/s will still be in run mode once the master is turned on and which pumps have been individually isolated.

8.3.2 CHART SCREEN

ACCESSABILITY		
ACCESS LEVEL	**VIEWING**	**CHANGE CAPABILITY**
0	Yes	N/A
1	Yes	N/A

Access to this screen is gained by tapping the CHART icon near the top left hand side of the pad. This is realtime and historical data for viewing by all operators. By touching the headings*, charts are available for information on –

1. PRESSURE
2. FLOW (will only provide reading if connected to a flow sensor)
3. POWER
4. VOLTAGE
5. CURRENT
6. PUMP SPEED
7. WATER USAGE (will only provide reading if connected to a flow sensor)
8. ENERGY USE (see Note)
9. FAULTS
10. RUN HOURS
11. PUMP STARTS

**Depending on the customisation ordered with your Monsoon IQ, other variables/headings may be present.*

Note

ENERGY USE IS ALWAYS MEANT FOR A GUIDE ONLY. IT IS NOT DESIGNED FOR THE PURPOSES OF BILLING AND IT DOES NOT ACCOUNT FOR POWER LOSSES/POWER CONSUMPTION THAT MAY OCCUR BETWEEN YOUR METER AND THE MONSOON IQ SYSTEM

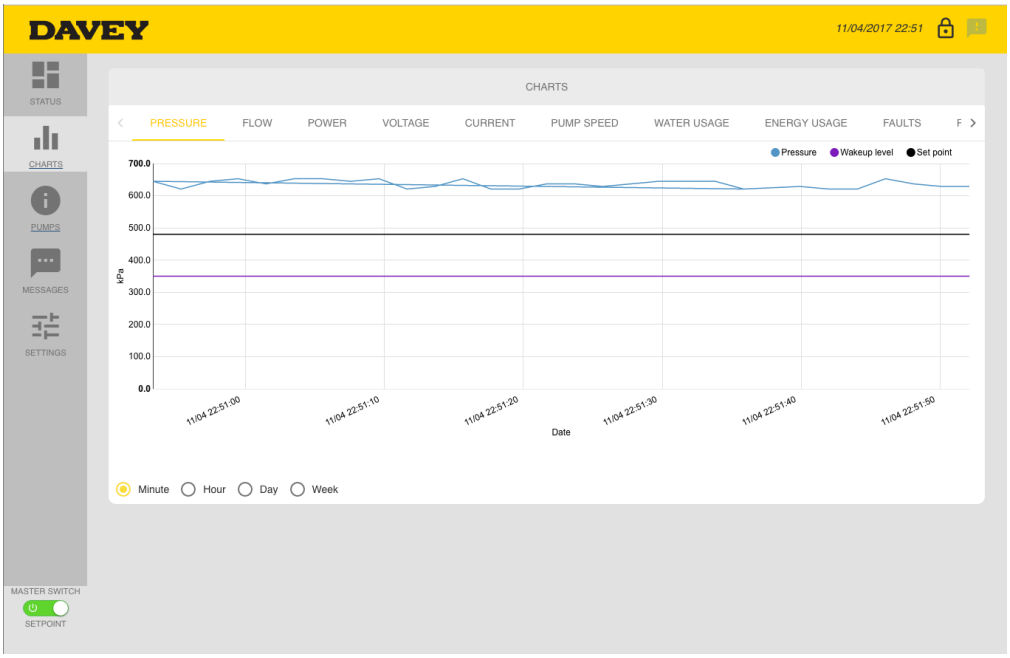


Figure 18. CHART EXAMPLE

This screen can be set to look at the range of the scale of a minute, hour, day or week (Minute range is not available on the Monsoon IQ cloud). These selections will set the range or field of view. The range for the minute and hour works by looking at the “range” ending in now and showing the “minute” or “hour” of history. The day and week range is always displayed at the start of the period (i.e. Midnight or Monday midnight) and shows until the present time. For example, in week view, 9 pm Monday would only show 21 hours of data from 12 am.

8.3.3 PUMPS SCREEN

ACCESSABILITY		
ACCESS LEVEL	**VIEWING**	**CHANGE CAPABILITY**
0	Yes	N/A
1	Yes	N/A

Access to this screen is gained by tapping the PUMPS icon near the middle left hand side of the pad. This is data for every pump in the system & is for viewing by all operators and provides instantaneous data on each pump in the system

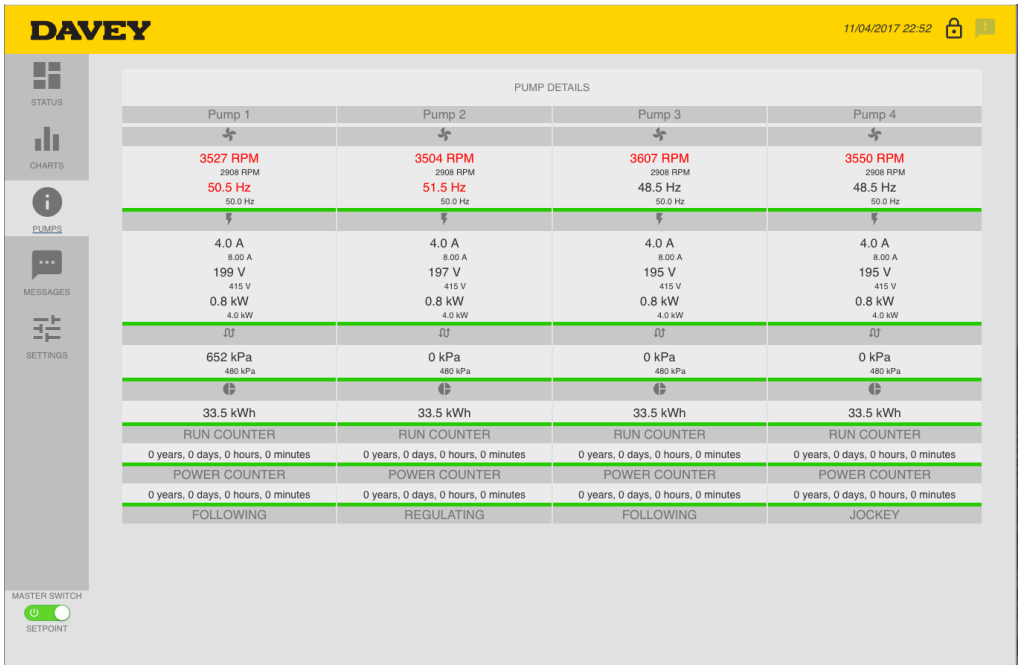


Figure 19. PUMP DATA

8.3.4 MESSAGES SCREEN

ACCESSABILITY		
ACCESS LEVEL	**VIEWING**	**CHANGE CAPABILITY**
0	Yes	N/A
1	Yes	N/A

Access to this screen is gained by tapping the MESSAGE icon near the bottom left hand side of the pad. System messages appear on this screen. Past messages are stored unless they are reset, and new messages are flagged via the icon (item 8 Figure 17) on the top right of the pad which turns red if there is a system message waiting. Messages can also be accessed by tapping on this icon.

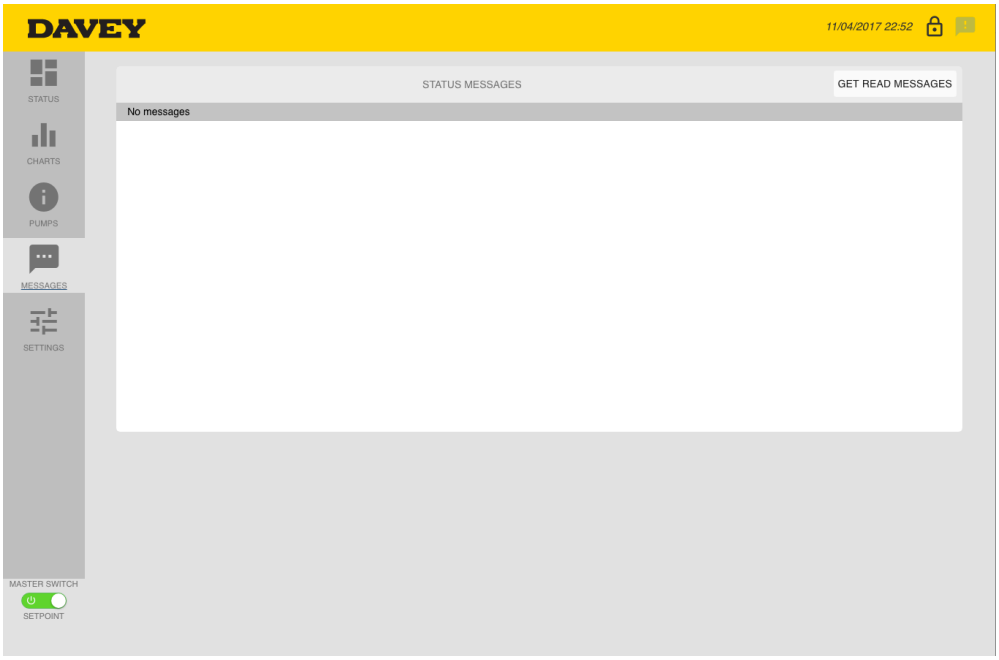


Figure 20. MESSAGES SCREEN

If the message is displayed as a fault, the operator can leave a manual note about the rectification or findings from the investigation and save this against the fault as a log. Once you have logged text, the “clear fault” button will mark the fault as both “read” and fixed. The system will attempt to start the pump again.

8.3.5 SETTINGS SCREEN

ACCESSABILITY		
ACCESS LEVEL	**VIEWING**	**CHANGE CAPABILITY**
0	Yes	UNIT SETTINGS column only (see Note 1)
1	Yes	PUMP SETTINGS, UNIT SETTINGS & ADVANCED SETTINGS tabs (see Note 2)

Access to this screen is gained by tapping the SETTING icon on the bottom left hand side of the pad. The following column data can be viewed –

1. PUMP SETTINGS
2. MOTOR SETTINGS
3. DRIVE SETTINGS
4. DRIVE DETAILS
5. MONITOR
6. UNIT SETTING
7. ADVANCED SETTINGS

Note

1. Changing values in the UNIT SETTINGS column allows the operator to view the status in varying units of measure e.g. PSI instead of kPa etc.

Note

2. The DRIVE DETAILS are factory input and cannot be changed. MONITOR column allows viewing of real time / historical data. A Level 1 operator can make changes under the PUMP and ADVANCED tabs by altering the data and then tapping “apply”. This will bring up the keypad dialog which requires the entry of the security PIN 1212 before the change will apply.

Note

3. To obtain correct data on running costs etc., it is important that the system has the local price per KWh at that location embedded. This figure can be inserted under the ADVANCED SETTINGS column (Level 1 operator access), but for accurate logging it must be inserted on the cloud.

Note

4. If any of the data boxes in the SETTINGS screen are highlighted in red, this indicates that parameter may be out of limits and should be investigated and corrected if necessary. It does not mean that it is necessarily incorrect, but is simply drawing the user’s attention to it.

Note

5. To ensure even run time for all pumps in the system (excluding the jockey pump if fitted), every six hours of run time the Monsoon IQ will keep selecting a different pump in the pumpset (on a rotation basis) as the primary pump i.e. the pump that runs first when the system starts and does the majority of run time.

Note

6. More information about any of the fields can be found on the display by touching the field label. For example, touching “Setpoint” will display a description about the setpoint and some potential “Help” information.

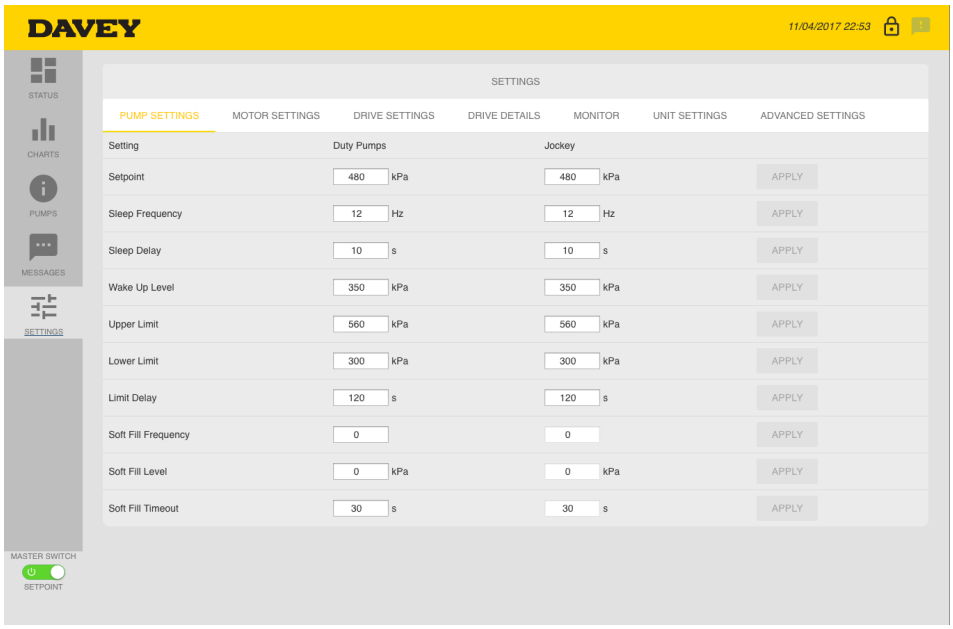


Figure 21. SETTINGS SCREEN

8.4 SETTINGS SCREEN DETAIL

A detailed description of the items listed under the PUMP SETTINGS tab follows. As a level 1 operator, it is important to understand the function of each of these topics and their relationship.

8.4.1. SET POINT

This will adjust the pressure the system aims to maintain. This is the pressure at which the system should ideally operate. It should be the setting that is optimum for system performance but takes into account the design on the selected monsoon IQ. See FIGURE 20 below --

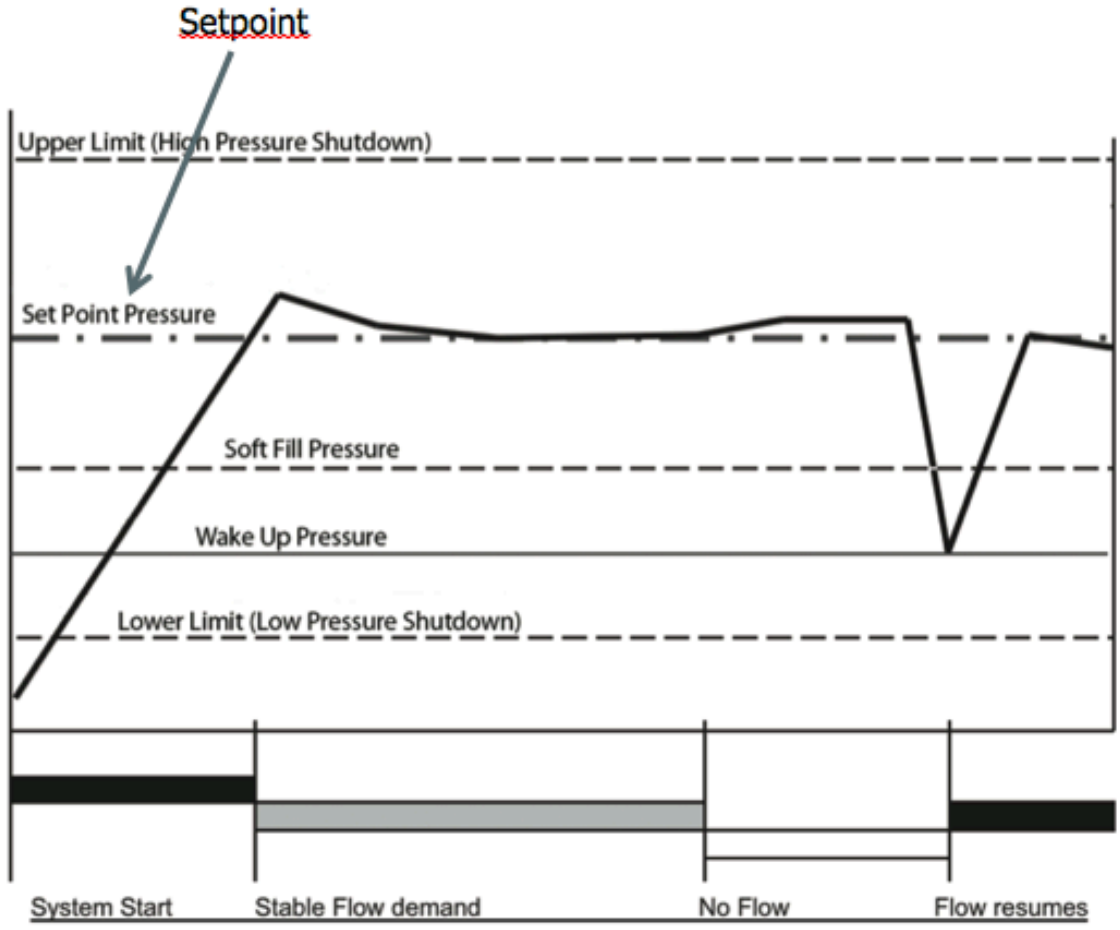


Figure 22. SETPOINT RELATIVE TO OTHER SETTINGS

8.4.2. SLEEP FREQUENCY

When the system recognises that the speed (frequency) has fallen to a certain set level, it will trigger a drive to go to sleep
To set the sleep frequency it is necessary to consult the multispeed curves for the particular pump model fitted to the pumpset. In referencing the Figure 21 below, if the setpoint pressure is set at 60M, then it can be seen that the point where the pumps theoretically contribute no flow is at 2300 rpm. We recommend a small buffer and to set the sleep frequency at approxianlty 5 % below this speed. That would be a recommended setting of 2185 rpm in this case. If there is a jockey pump in the system, the sleep frequency for it should be individually set for the jockey pump according to its own setpoint. Correctly setting this figure is very important as an incorrect frequency setting may prevent the system going into sleep mode or result in a reduction of system efficiency.

NOTE – The Sleep Frequency in the PUMP SETTINGS screen has to be entered in Hz. Conversion to Hz from rpm is as per the following formula Hz= $\frac{rpm}{60}$

In this case 2185 rpm, therefore $\frac{2185}{60}$ = 36.4 Hz

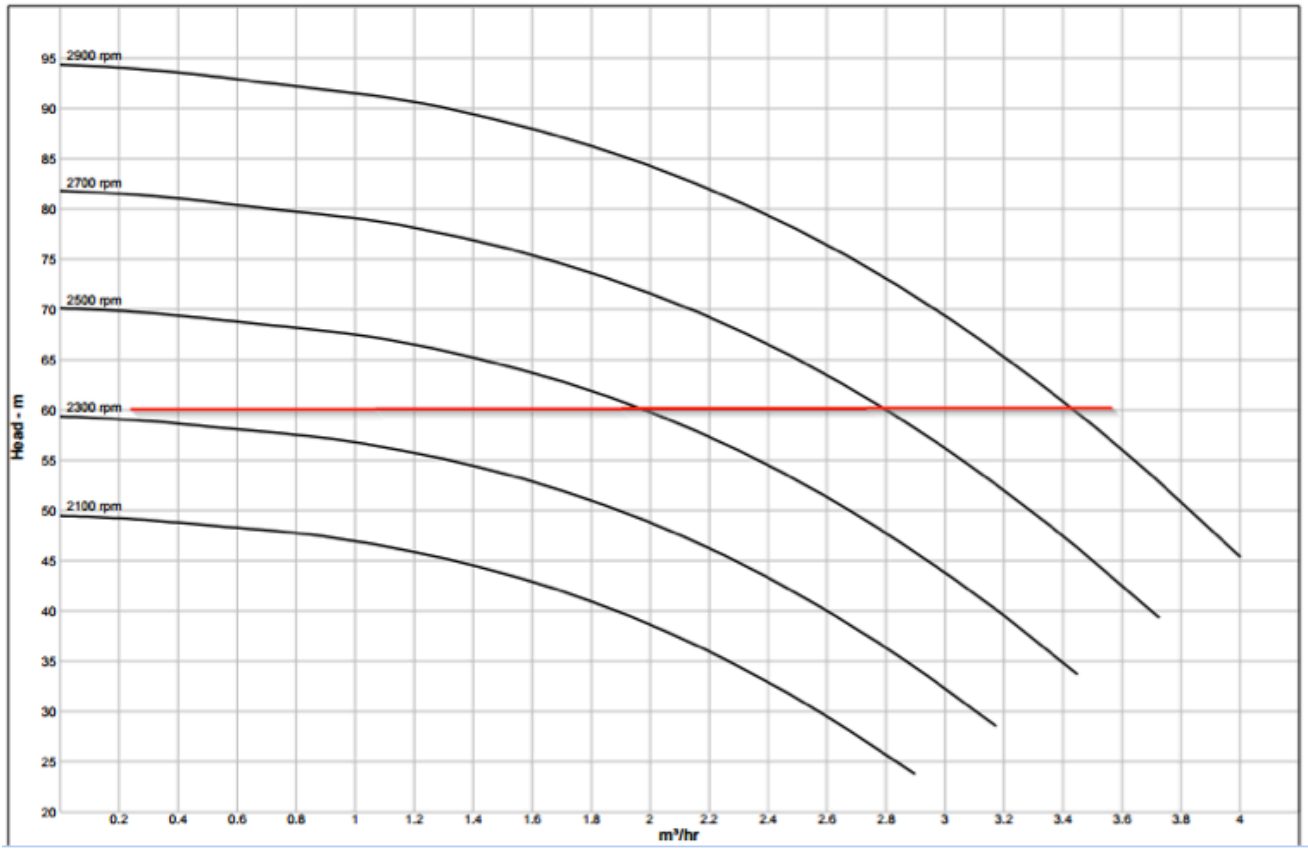


Figure 23. MULTI-SPEED PUMP CURVE

8.4.3. SLEEP DELAY

Sleep delay is a set period of time where the system detects that the system is below the sleep frequency, but waits for a short period before triggering the sleep mode for the system.

8.4.4. WAKE UP LEVEL

The Wake Up level is the setting that determines at what pressure the system will wake up and start the system regulating up to the setpoint. This is triggered by a pressure drop below the Wake Up level. If there is a jockey pump installed, this means that initially it will wake up and start bringing the system up to the setpoint. If there is no flow it will go into sleep mode once that pressure is stabilised. If there is flow, the other pump/s in the system will wake as required to meet that demand. The Wake Up level must be set lower than the setpoint and above the Lower Limit.

Note

1. If there is a jockey pump installed, its wake up level should be set 10% above the pressure tank pressure.

Note

2. If there is a pressure tank fitted, its pressure setting should be 10% below the lowest Wake Up Level in the system. i.e. if there is a jockey pump the tank should be charged to a pressure 10% lower that that of the jockey pump – otherwise 10% lower than that of the pumpset setting.

8.4.5. UPPER LIMIT

The Upper Limit is the pressure at which the system will shut down if any pump is running above this setting for longer than the Limit Delay time. In doing so it will trigger an alarm.

Note

This value must be higher than the system setpoint or it will cause false alarms and errors..

8.4.6. LOWER LIMIT

The lower limit is the pressure at which the system will shut down (once the Limit Delay time has been exceeded) due to the pressure being too low. In doing so an alarm will be triggered. The Lower Limit must be set below the Wake Up level. This setting is also used as the standard loss of prime protection.

Note

It is very important that this is below the Wake Up Level.

8.4.7. LIMIT DELAY

The limit delay is a time which is set to ensure that the system does not instantly shut down if the system hits the Upper or Lower Limit and assists by providing an appropriate buffer.

8.4.8. SOFT FILL FREQUENCY

The soft fill frequency (Hz) is the speed at which the system will run the pumps during the soft fill process. The pumps will run at this speed until the pressure rises above the set Soft Fill level, then the system will resume normal control in order to maintain the setpoint.

8.4.9. SOFT FILL LEVEL

The soft fill level is the pressure that is set to ensure the pipelines in the system are filled slowly. Set correctly, this will greatly assist with reducing water surges from a power outage event. The system will go into soft fill mode any time the Monsoon IQ system in started/stopped and the initial pressure is below the soft fill level. The system will fill the lines at this pressure until the pressure rises above this point – then the system will resume normal control to aim to maintain the set point. See Figure 22 below

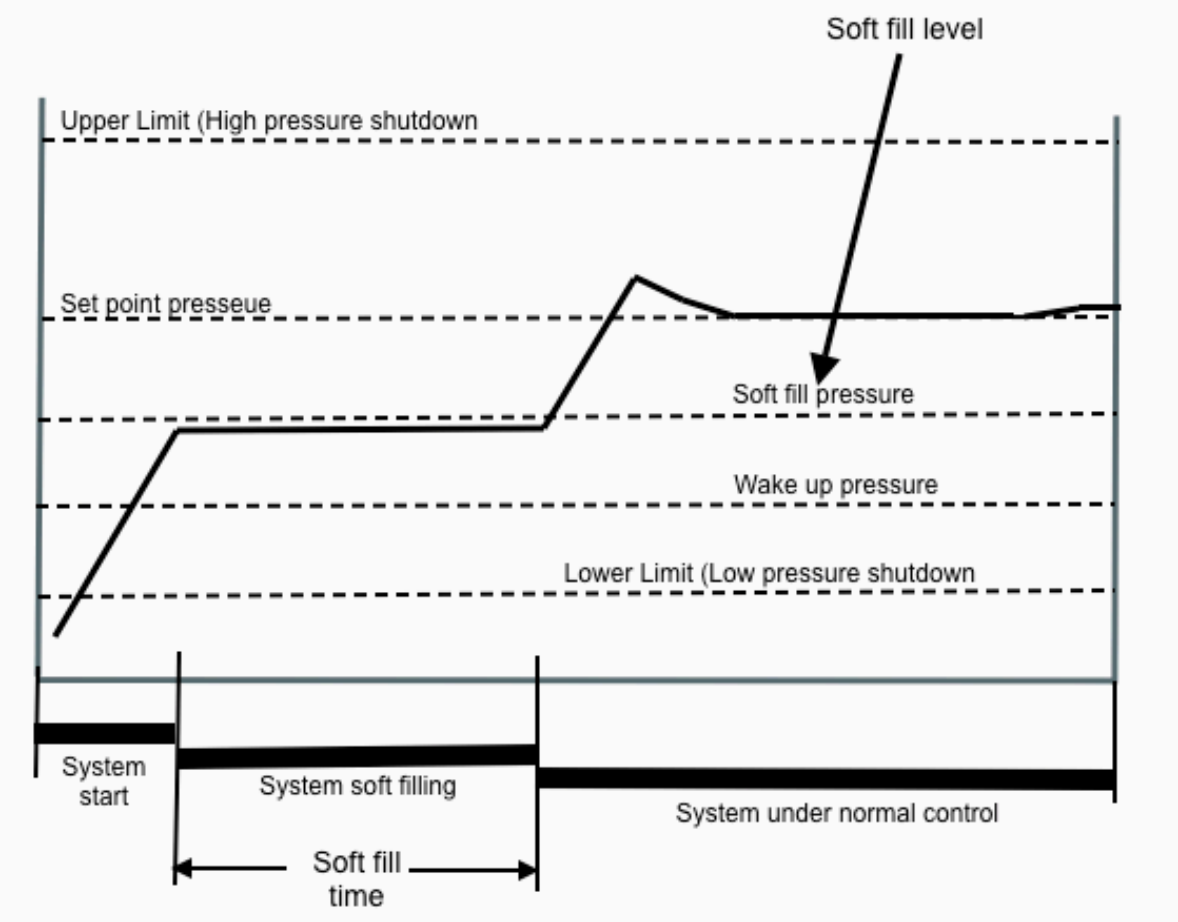


Figure 24. SOFT FILL TIME

8.4.10. SOFT FILL TIMEOUT

This is the time period (set by the user) in which the system will attempt to run in the soft fill mode before shutting down and triggering an alarm. It is important that firstly, the time necessary to fill the pipelines is calculated accurately and a margin allowed (see Section 7.5.1.2). Then the Soft fill timeout figure should be set in excess of that figure to provide sufficient margin to avoid a timeout.

8.4.11. FLOW SWITCH FAULT DELAY (Optional)

This is only applicable if a flow switch is used and connected to the main discharge line for additional run dry protection. It must be is connected to the Monsoon IQ digital inputs. The system will go into alarm and stop the system if it detects no flow and no pressure. For connection instructions, please see section 12.1.

If the flow switch is detecting no flow and the system has no pressure for the duration of the “Flow switch fault delay” time, the system will alarm and stop. This function assists in preventing false tripping.

8.4.12. FLOW SWITCH BYPASS AT START (Optional)

The is only applicable if a flow switch is connected to the digital inputs, as described in section 12.3, and works in conjunction with the “Flow Switch Fault Delay” time. This function allows for a period to bypass the flow switch signal when the system starts. In certain applications, it can take a small amount of time for flow to occur. This function also assists in reducing nuisance tripping in these circumstances.

9. ON LINE SUBSCRIPTION (Optional but highly recommended)

9.1 INFORMATION VIA THE DAVEY MONSOON IQ CLOUD

The Davey Monsoon IQ cloud subscription service allows the user to log on, interrogate and operate their system/s via the inbuilt modem. The service allows you:

1. To analyse in detail your pumps and system performance, (There is no historical limit on data of your pumps, you can access data right back to when you first installed it - many years of data if required.)

2. Export this data for use in third party analytical software

3. Fully control your pumps remotely, including settings adjustment and detailed system monitoring of hundreds of parameters.

4. Set alerts based on many variables, to alert you by email or mobile text of specific system actions or faults.

5. Give remote access to many users and adjust their access levels accordingly.

6. Generate quick overview reports for easy system review

7. Access logged events and messages from multiple sites from a single logon.

8. Easily diagnose remotely problem sites, with quick filter mechanisms for multi-site users

9. Allow Davey to easily and remotely assist, because Davey can see your system on-line and assist with the analytics, which will minimise downtime

10. Allow Davey to remotely update software on request in consultation with the end user

11. Future proof yourself to enable upgrades to future Davey Monsoon IQ cloud service offerings

Note

To access the Davey Monsoon IQ cloud remotely you will need your own internet connected device. This can be a touchscreen interface, smart phone, laptop or Desktop or any web browser enabled device connected to the internet. If your remote device has a touchscreen interface (i.e. Ipad tablet with a sim card), the user can tap on the screen as usual, and if the remote device is a desktop computer connected to the internet, the same result can be achieved by clicking on the desired icon.
Browsers supported by Davey Monsoon IQ are Chrome, Safari, Microsoft Edge, Firefox (including Mozilla). Of all these we recommend using Chrome updated to the latest version for optimal use.

Internet Explorer is not supported and not recommended.

9.2 USERNAME AND PASSWORD

When you purchase a Davey Monsoon IQ cloud subscription, you will have nominated a site "administrator". The administrator is responsible for all non-Davey staff access and the levels of access. It is the policy of Davey Water Products that access permissions and denials are not Davey's responsibility - it is the purchasers' responsibility. The nominated administrator will receive an email from Davey with their username and password. They can then set up and control the nominated users for that site. Please keep usernames and passwords secure.

9.3 LOGGING ON

To log on remotely –

1. **Visit this web address – http://my.daveywater.com**
   A log on screen appears as below –

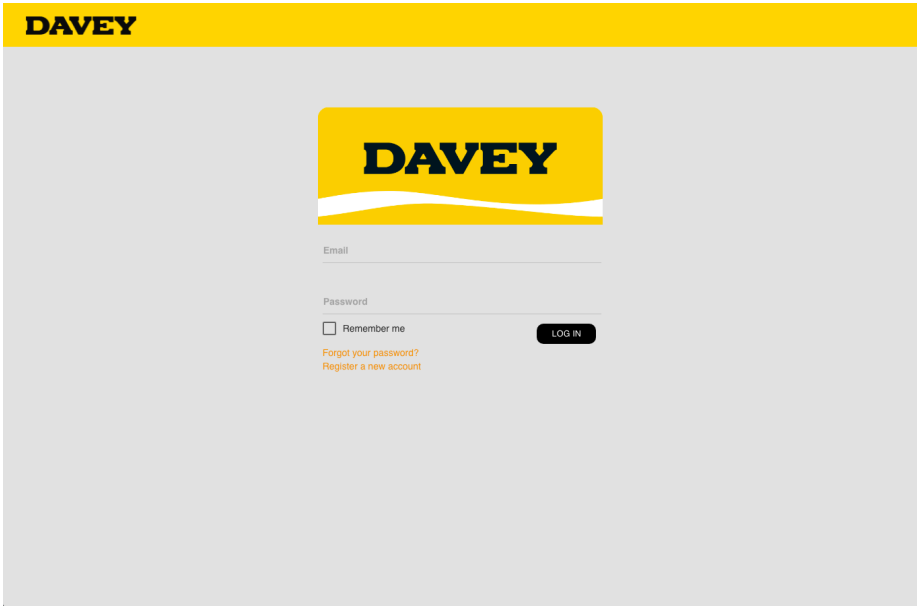


Figure 25. LOG ON SCREEN

2. **Insert username (email address) and password**

This will then show the screen below –

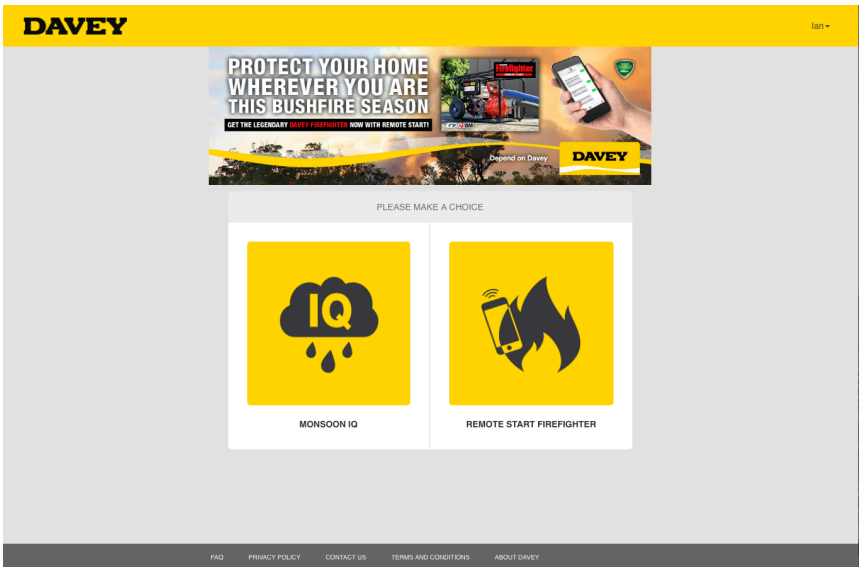


Figure 26**. SYSTEM SELECTION**

3. **Tap on “Monsoon IQ”**

This will allow the user into his system and initially shows the OVERVIEW screen as shown below which lists the users system/s, advises of any faults or messages, and provides dynamic information on the system/s status.

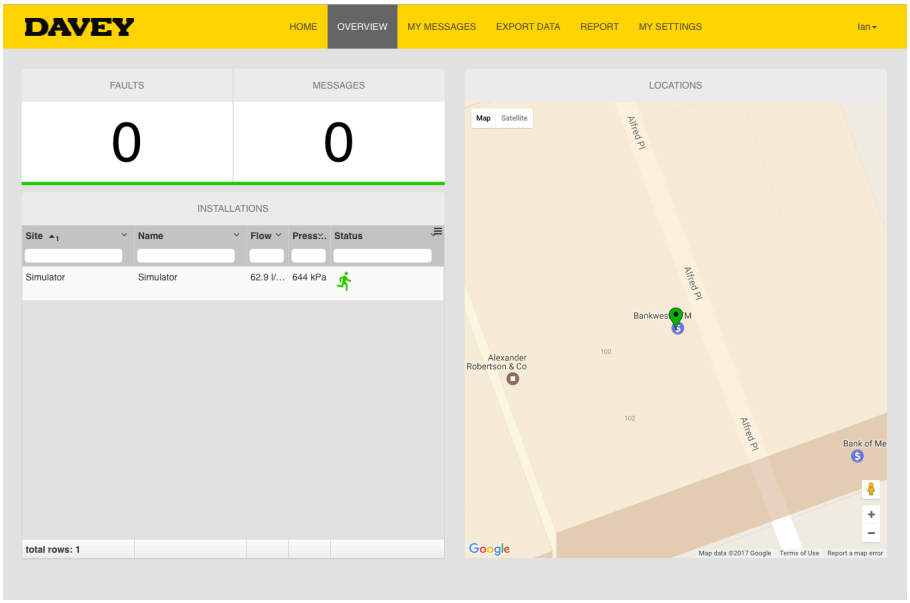


Figure 27. INSTALLATION SELECTION

By tapping on the name of a particular location or system, the user is taken to the familiar STATUS and subsequent screens as described in Section 8. The user interaction with these screens is exactly the same as “on site” use, however there are some addition topics which are listed along the top of the screen to assist in accessing and transmitting data as required. The STATUS screen is as shown below --

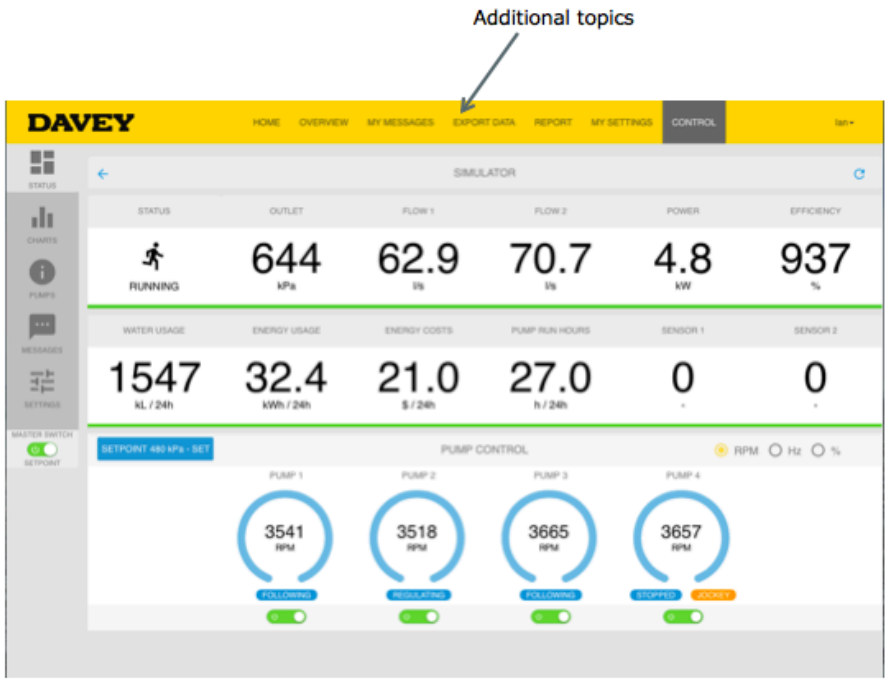


Figure 28. STATUS SCREEN

The additional topics are –

1. HOME
2. OVERVIEW
3. MY MESSAGES
4. EXPORT DATA
5. REPORT
6. MY SETTINGS

10. SYSTEM / OPERATOR INTERACTION – ADDITIONAL TOPICS

10.1 HOME

Tapping on this tab returns the user to the post login page.

10.2 OVERVIEW

Tapping on this tab shows the screen below. This provides a list of the users system/s plus lists any faults or messages. In addition it provides some basic information regarding the system/s by showing the current flow rate, pressure and the status (running, asleep etc) as well as showing the map location of each system.

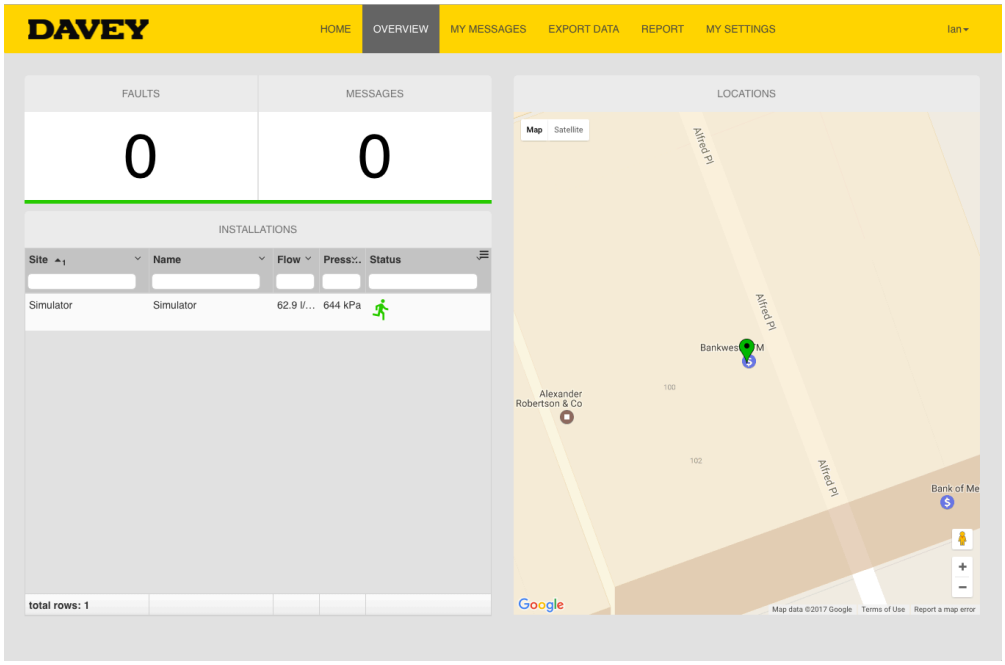


Figure 29. OVERVIEW SCREEN

10.3 MY MESSAGES

This tab provides a screen as shown below which list all messages chronologically. It is a complete log of the activities of each system (installation start times, changes in any settings, faults etc.) and allows the user to respond by acknowledging whether the message has been read and provides further detailed information if the user taps on the “info” icon.

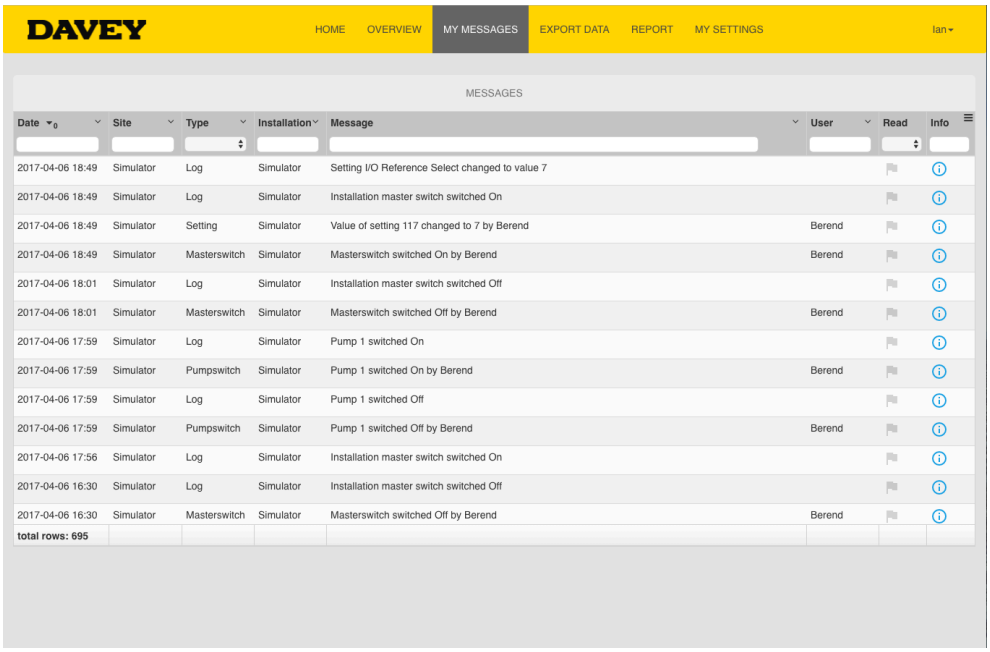


Figure 30. MY MESSAGES SCREEN

10.4 EXPORT DATA

Tapping on this tab produces the screen below. It allows the user to select a date field (from / to) and to have the system collect data on any or all of the categories listed by turning each switch as shown on to green. The topics are –

1. Run hours
2. Pump starts
3. Pressure
4. Flow (If connected)
5. Energy usage
6. Energy costs
7. Water usage (If connected)
8. Faults

The user can then create an .xls file (Microsoft Excel file) for the particular installation and save it -- then use this file as desired.

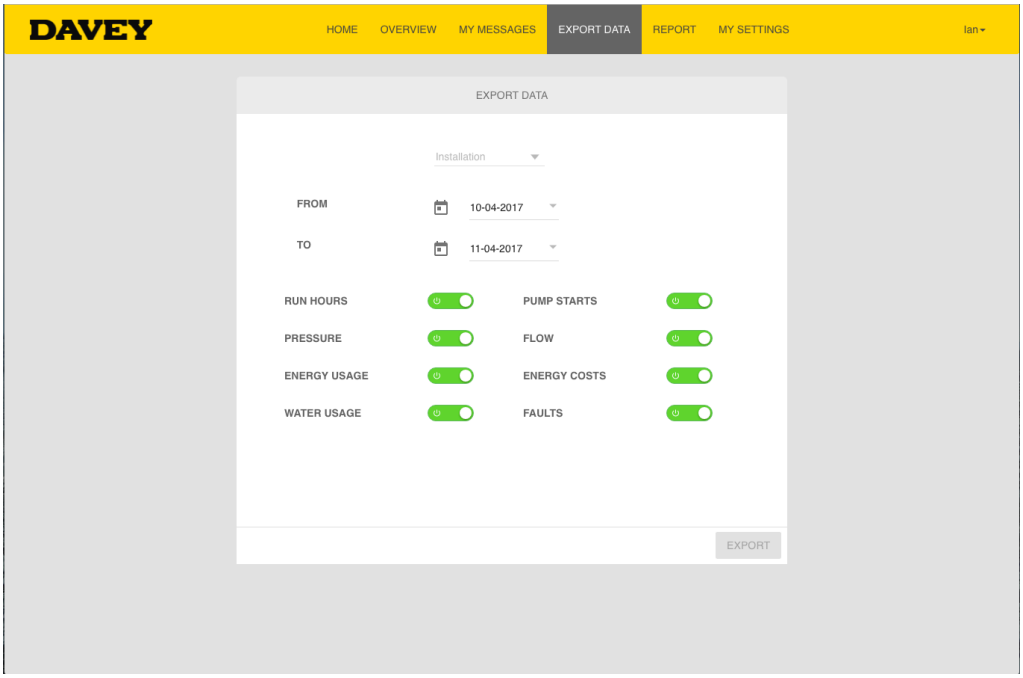


Figure 31. EXPORT DATA SCREEN

10.5 REPORT

Allows the user to generate reports using the filters as required. Anyone who has user access can use them to diagnose the system behaviour on a month by month basis.

The REPORTS screen is shown below --

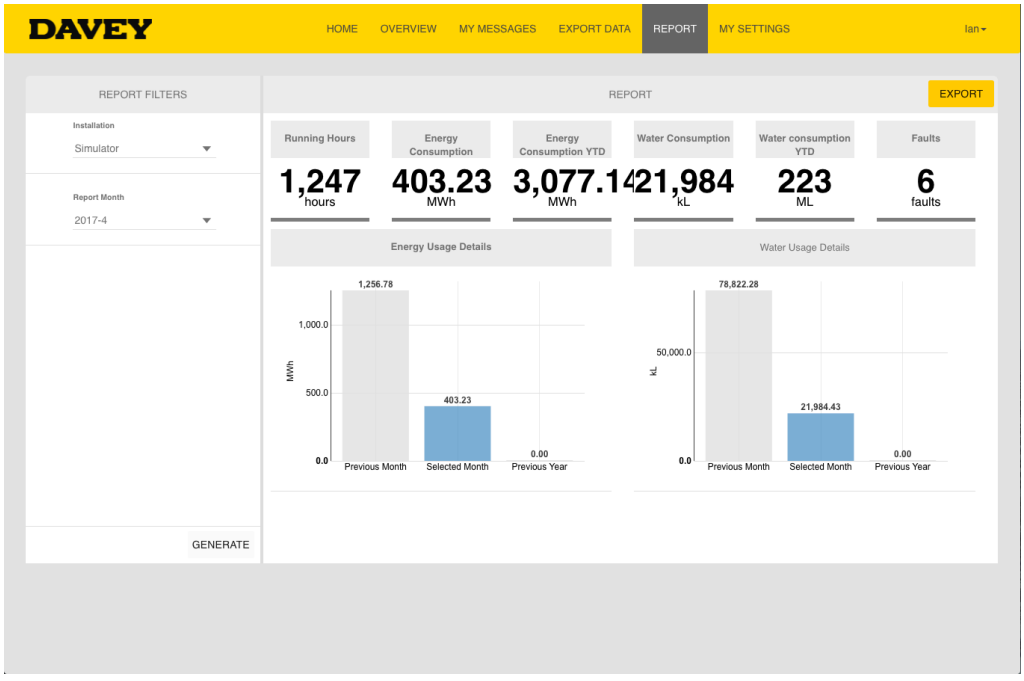


Figure 32. REPORT SCREEN

10.6 MY SETTINGS

The My Settings screen shows customer details and allows access to historical information regarding their system/s performance / invoicing etc. The user can see and edit their profile, the sites and installations, and the alerts they have set up as well as their status. The audit trail shows all logs and fault messages relevant to their installations, invoice history for subscription payments and also allows payment for subscription through this portal. This screen also allows for a change of user password if so desired. The alerts section is where you can set up specific action alerts by SMS or by email depending on your preference. (For example, such as a fault alert, or a pump start alert).

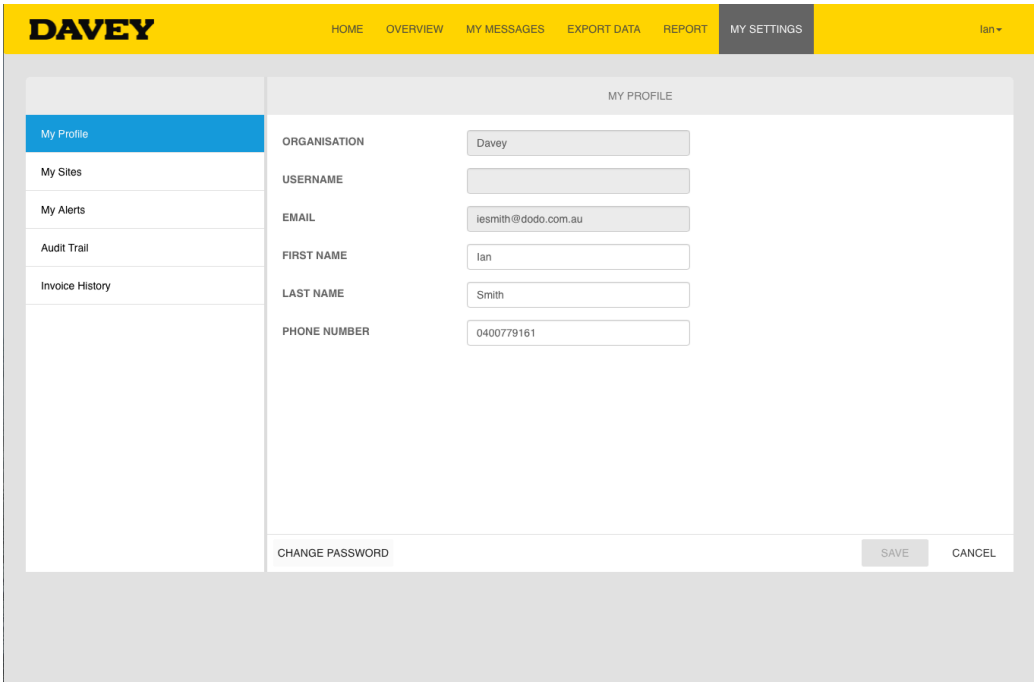
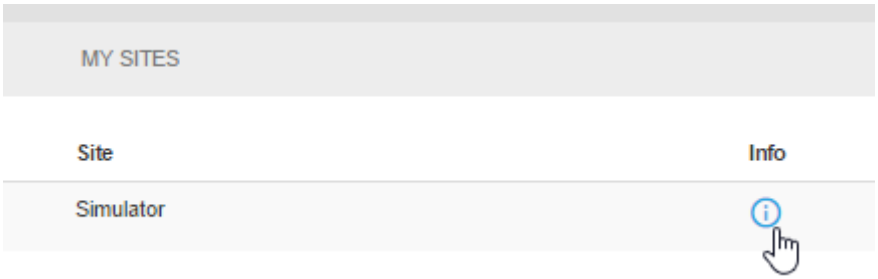


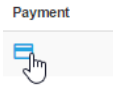
Figure 33. MY SETTINGS SCREEN

10.7 MY SITES

This section can be accessed from “My settings”. From here you can access the administration level of the sites you have access to. Depending on your Davey Monsoon IQ cloud access level you will either have read or write access to these areas. To access a particular site, open “My sites” screen and select the blue information icon to open the site.



In this section you have access to;

1. Site details; Address and site information
2. Installations; Specific pumps on a site and information about their individual subscription. This is also where you renew your subscription by following the credit card icon. 

3. Users; setting of site users and level of access
4. Invoice history; Site specific invoice history
5. Energy Costs; This is where you can set in detail your costings on your electricity consumption.

10.8 SUBSCRIPTION PAYMENT

Depending on your original purchase, you may have a subscription that has come with your Monsoon IQ booster pump system. Under my sites, you can check the expiry date and renew the payment. With the exception of subscriptions ordered with a new booster pumpset, all subscription payments are done in this manner. Once you have processed a payment you will receive a confirmation email of your payment.

11. PUMP CONTROLLERS

11.1 PUMP CONTROL (ADVANCED USERS ONLY)

Under normal circumstances there will be no requirement for the user to make any adjustments to the individual pump controllers, as parameters in these units are factory set. Any adjustments to the system operations are to be undertaken via the Monsoon IQ controller as described earlier in this manual. If the need arises to switch one of the controllers off and/or on, the start and stop buttons are as shown on the illustration below -

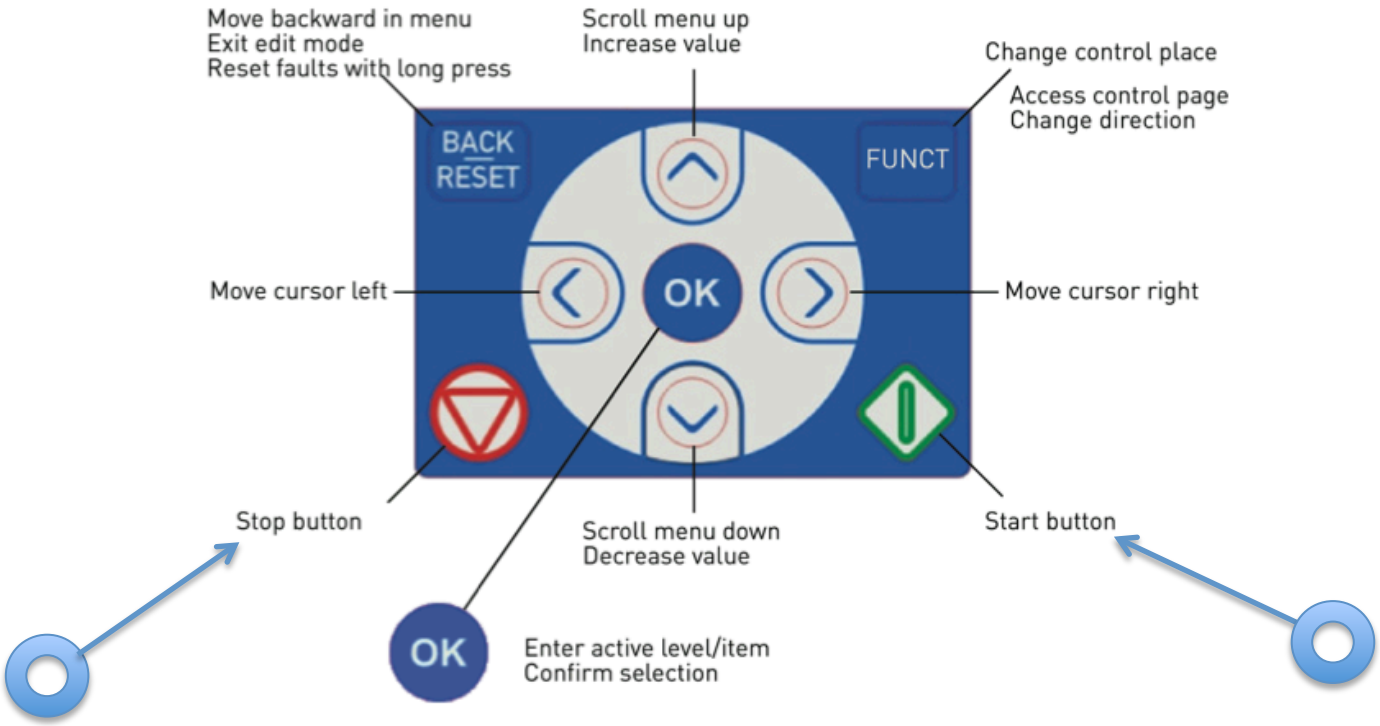


Figure 34. VSD CONTROL PAD

12. OPTIONAL FEATURES

12.1 FLOW SWITCH

A flow switch can be installed in addition to the normal pressure transducer to protect against loss of prime, pipe blockages or any other situation which could cause lack of flow in the system. This flow switch must be installed as per the manufacturers recommendations and should have no time delay with a Normally Open contact that can operate in a 24V DC circuit. The flow switch will trigger an alarm notification once the Limit Delay time has been exceeded.

To install the flow switch in the drive remove the links between terminals 12 and 16 on each drive. You will then connect a flow switch contactor in parallel with the same terminal numbers on all drives and subsequently link the ground terminal (7) across all drives as per the following schematic example for a three pump system (each pump is marked P1 or P2, etc).

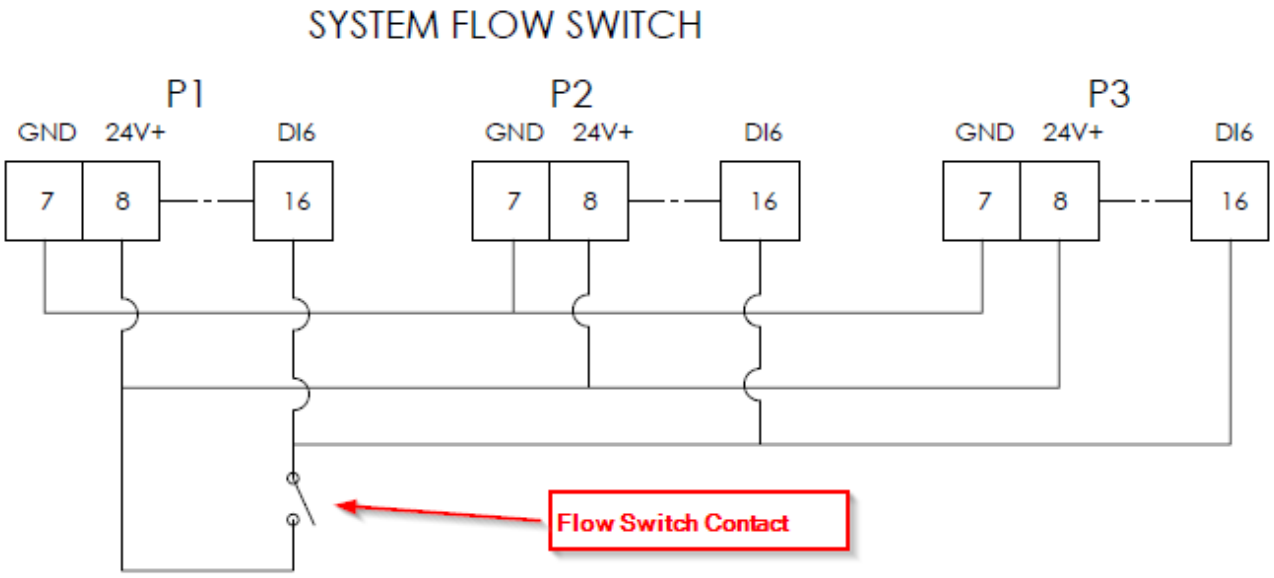


Figure 35. FLOW SWITCH SCHEMATIC

12.2 RAINBANK

A water harvesting feature known as Davey Rainbank® is available. This can only be ordered as a complete system from Davey. The complete system comes with the appropriate solenoid and float switch pre-wired. To install this option, the float switch is required in the actual rainwater tank. The solenoid valve will automatically switch between mains water and rainwater but referencing rainwater when available

For correct float switch installation you can view our comprehensive information online at the following address.
http://www.davey.com.au/media/custom/upload/DWP0347_Sub_Float_Switch.pdf

The lowest “switch level” should at least 100mm above tank outlet that leads to the pump suction.

12.3 FLOAT SWITCH

A separate dedicated digital input is available for the float switch. This feature is used by connecting a normally open float switch that is rated for 24V DC current to terminal 15 on each drive on each pump (i.e. P1, P2, etc). This terminal is connected to terminal 12 (the 24V DC supply) through the float switch to activate the digital input. Please note that it important to connect terminal 7 (Ground) between all drives on the pump set. Please see schematic below –

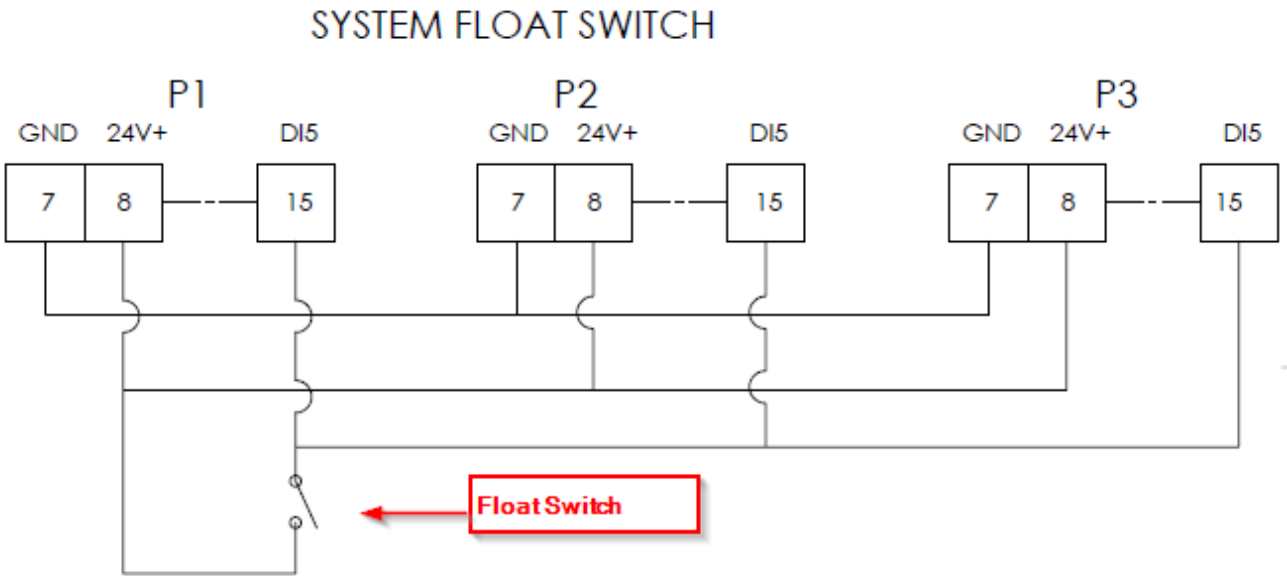


Figure 36. FLOAT SWITCH SCHEMATIC

12.4 REMOTE STOP / START

A remote STOP/START feature is available for users who wish to remotely start and stop the system, such as controlling via a Building Management System (BMS) or via an irrigation installation. In either case you need to have a relay to switch the 24V DC circuit on and off to the remote stop/start digital inputs. This feature can be used for turning either the complete pump set on and off or each pump. Please see following schematics.

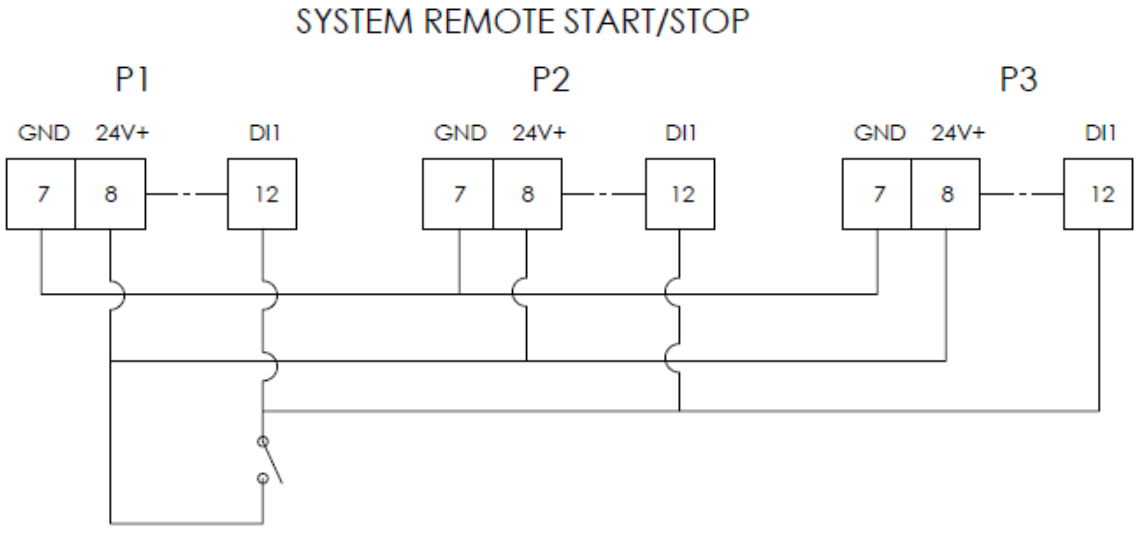


Figure 37. SYSTEM REMOTE START/STOP SCHEMATIC

12.5 BMS STATUS INDICATION

The monsoon IQ can also have System Fault and “OK” status connected to a DDC on the BMS system. Moreover, if individual pump status is required this can also be achieved. The status indicators are simply relay outputs that are available on each drive. Should you require system fault and “OK” status indication, please connect drive (P1, P2, etc) to your DDC according to the following schematic.

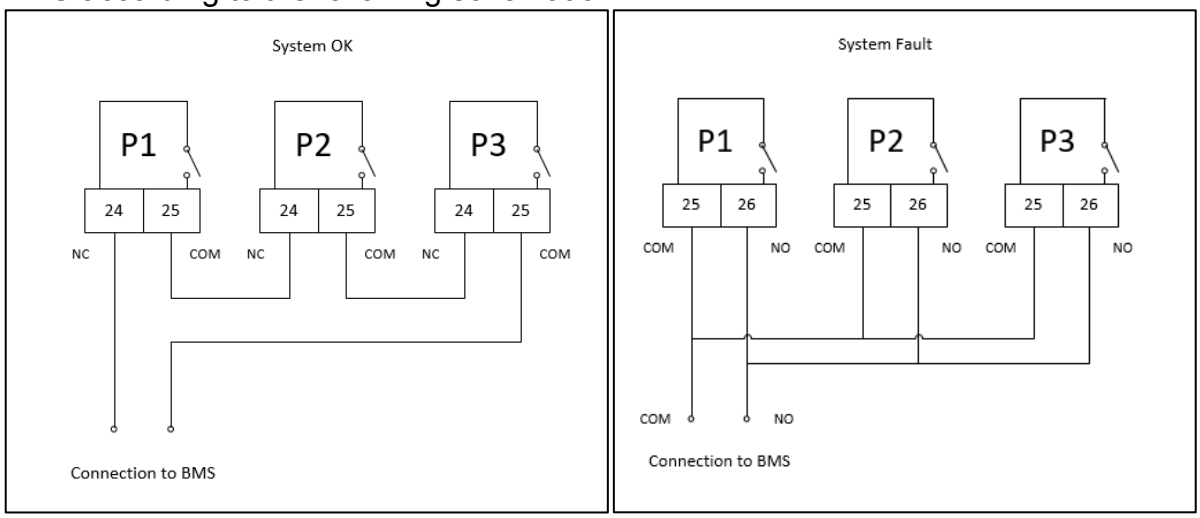


Figure 38. SYSTEM OK AND FAULT SCHEMATIC

Should you require individual pump status indication, please connect each drive individually up to the DDC as per the following schematics.

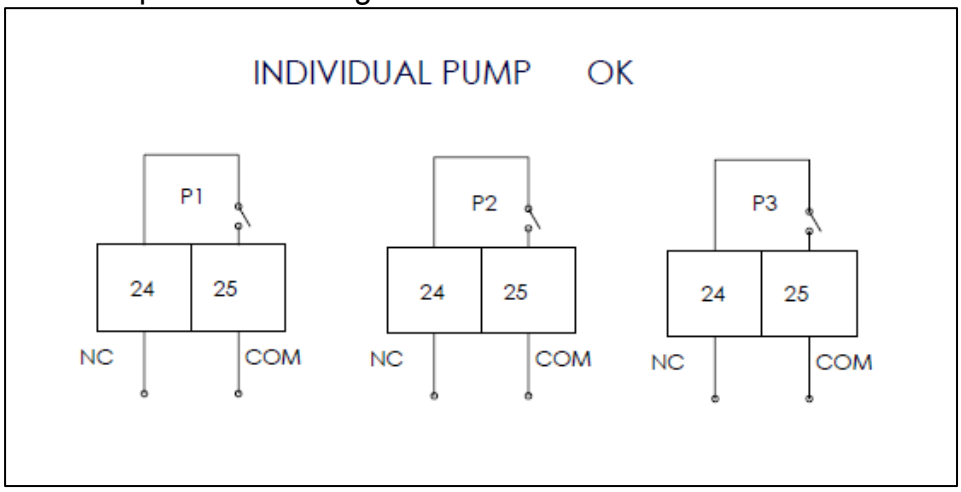


Figure 39. PUMP OK STATUS SCHEMATIC

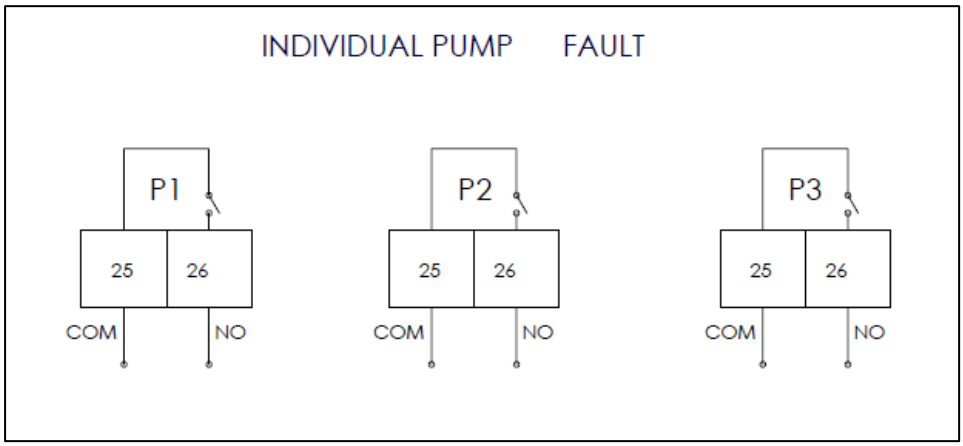


Figure 40. PUMP FAULT STATUS SCHEMATIC

13. RECOMMENDED SPARES

The following is a list of recommended spare parts which should ensure minimum system downtime in the unlikely event of a failure. The following table considers the potential needs for a VM multistage unit over a 2 year and 5 year period together with special consideration for a remote site where transportation is difficult. This table has been assembled with the intention of reducing risk and downtime. It is not the intention to dictate the life span of these nominated spare parts. Moreover, the table is intended to indicate periods that it would be reasonable to expect, under normal operating conditions, that there is a chance that these parts may be required under normal wear and tear.

PART / KIT	2 YEARS	5 YEARS	5 YEARS (Remote site)	PART No.
Shaft seal kit	1/pump	2/pump	2/pump	
“O” ring kit	1/pump	2/pump	2/pump	
Bottom bearing	1/pump	1/pump	1/pump	
Motor bearings kit		1/pump	1/pump	
Chamber stack		1/pump	1/pump	
Flange gasket	2/pump	2/pump	2/pump	
Non return valve	1	2	2	
Inlet ball valve	1	2	2	
Pressure transducer		1	1	
Pressure gauge		1	1	
Nut & Bolt kit	1	1	1	
Thread sealant	1	1	1	
CN Module		1	1	
Power supply		1	1	
Capacitor for 1 phase	1	1	1	
IQ screen			1	
Complete pump			1	
Vacon VFD			1	

Table 6. RECOMMENDED SPARES

14. TROUBLE SHOOTING

Symptom	Possible Cause	Action
Pumps do not run	Mains Isolator is switched Off	The IQ system touchscreen interface has an independent built in battery. So in the event of power failure remember to check the drives also have power. If not, rectify the source of power failure.
	Circuit breakers have tripped and Drives have no power	
	Site has no power	
	VSD fault	Read fault message and contact Davey
	Pressure is still above wake up level	Allow pressure to drop below wake up level
	Remote Start/Stop is active	Check if remote start/stop signal is correct, if not, fix source of signal
	Float Switch is stopping pumps	Check Float Switch
Pumps start but after some time, no pressure is created and system goes into Alarm	Pumps are running dry or you have a discharge line burst.	Check water supply and that pumps are primed. Once water supply is re-established, close a master isolation valve near to the pumps on discharge side, restart the pumps and slowly open valve. If system will still not create pressure, check the discharge line for a burst.
	Status is still in “Low Pressure Alarm” and it has not been cleared.	Check system is primed and clear alarm.
Very frequent starts and stops	Wrong pressure tank size and pre charge	Fix pressure tank size and pre charge
Pumps will not stop	Wrong pre charge pressure	This should be 10% below wake up level
	Pumps are in manual mode	Turn pumps onto Setpoint mode
	Wake up level is set too close to set point	Wake up level should be at least 10 to 20% below set point (but you should also consider the end of curve of the pump at full speed as well).
	Sleep delay is too long	Adjust sleep delay
	Limit delay is too long	Adjust limit delay
	Faulty/Blocked Check Valves	Inspect Non-return valves for correct installation and any faults/blockages. Remove faults. Further inspection can be done by checking that the system will hold pressure on the discharge or with a stethoscope on the valve.
	Incorrect suction and discharge plumbing	Correct plumbing
No pressure reading	Transducer fault	Check sensor and contact Davey
Pressure Gauge reads a different pressure to the Controller pressure.	There is a normal difference expected due to the accuracy difference. (The Transducer has a higher accuracy). But should there be a large difference you may have a faulty pressure gauge.	Replace Pressure Gauge
No Display on the screen	No Power	Fix Power Supply issues
	Contrast on screen is set to Low	Swipe down and adjust the contrast up.
Newly selected screen does not load	Page has failed to load	Swipe finger down screen to reload page
Pump is hot and plant room ambient temperature is warmer than expected.	Poor Ventilation. The motors and the VSDs generate heat that needs to be dissipated.	Correct ventilation. Contact Davey if you need assistance with requirements
	Pumps have been dry running	Check that the pumps are primed and that there is no air in the pumps.
High or Low pressure alarm	High pressure alarm is set too close to Set point	High pressure limit should be at least 10% above set point.
	Valves and hydraulics downstream are causing a high pressure surge to come back to the pump	Contact Davey
	Low pressure alarm is set too high	Low pressure alarm should be below wake up level and consider the pump curve. Contact Davey if you need assistance.

Table 7. TROUBLE SHOOTING TABLE

15. FURTHER INFORMATION

Further information can be found online at www.davey.com.au and at the specific web address; http://www.davey.com.au/products/pump-systems.html

You can also contact Davey Water Products on PH: 1300 232 839 or by Email: sales@davey.com.au. Our friendly Customer service staff are happy to assist with your technical or sales inquiries.
Alternatively, you can speak to your local authorised Davey Dealer. We take pride in our training and support of our dealer network in order to provide you with the best possible timely advice and solutions.

16. THE DAVEY REPAIR OR REPLACEMENT GUARANTEE

In the unlikely event in Australia or New Zealand that this Davey product develops any malfunction within one year of the date of original purchase due to faulty materials or manufacture, Davey will at our option repair or replace it for you free of charge, subject to the conditions below.

Should you experience any difficulties with your Davey product, we suggest in the first instance that you contact the Davey Dealer from which you purchased the Davey product. Alternatively you can phone our Customer Service line on 1300 232 839 in Australia, or 0800 654 333 in New Zealand, or send a written letter to Davey at the address listed below. On receipt of your claim, Davey will seek to resolve your difficulties or, if the product is faulty or defective, advise you on how to have your Davey product repaired, obtain a replacement or a refund.

Your Davey One Year Guarantee naturally does not cover normal wear or tear, replacement of product consumables (i.e. mechanical seals, bearings or capacitors), loss or damage resulting from misuse or negligent handling, improper use for which the product was not designed or advertised, failure to properly follow the provided installation and operating instructions, failure to carry out maintenance, corrosive or abrasive water or other liquid, lightning or high voltage spikes, or unauthorised persons attempting repairs. Where applicable, your Davey product must only be connected to the voltage shown on the nameplate.

Your Davey One Year Guarantee does not cover freight or any other costs incurred in making a claim. Please retain your receipt as proof of purchase; you **MUST** provide evidence of the date of original purchase when claiming under the Davey One Year Guarantee.

Davey shall not be liable for any loss of profits or any consequential, indirect or special loss, damage or injury of any kind whatsoever arising directly or indirectly from Davey products. This limitation does not apply to any liability of Davey for failure to comply with a consumer guarantee applicable to your Davey product under the Australian or New Zealand legislation and does not affect any rights or remedies that may be available to you under the Australian or New Zealand Consumer Legislation.

In Australia, you are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Should your Davey product require repair or service after the guarantee period; contact your nearest Davey Dealer or phone the Davey Customer Service Centre on the number listed below.

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

DAVEY

Davey Water Products Pty Ltd
Member of the GUD Group
ABN 18 066 327 517

AUSTRALIA

Customer Service Centre
6 Lakeview Drive,
Scoresby, Australia 3179
Ph: 1300 232 839
Fax: 1300 369 119
Email: sales@davey.com.au
Website: davey.com.au

NEW ZEALAND

Customer Service Centre
7 Rockridge Avenue,
Penrose, Auckland 1061
Ph: 0800 654 333
Fax: 0800 654 334
Email: sales@dwp.co.nz
Website: daveynz.co.nz

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* Installation and operating instructions are included with the product when purchased new. They may also be found on our website.

DAVEY

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ABN 18 066 327 517

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