



HI-TECH
enviro solutions

DAIRY EFFLUENT SPECIALISTS

MULTI CONTROLLER

EPCF(P) Flow and (Optionally) Pressure Control Type



V2.2.1

Hi-Tech Part Numbers

HITECH-EPCF MULT CONTROLLER-FLOW-SS CABINET

HITECH-EPCFP MULTICONTROLLER-FLOW-C/W PRESSURE OVERRIDE-SS CABINET

Either of the two models listed above can control any pump up to a maximum of 22kw

The models of flow sensor listed below are available for the EPCF(P) controllers

EFS-50 50mm bore. Flow Range 4.0-60 m³/h

EFS-65 65mm bore. Flow Range 6.0-120 m³/h

EFS-80 80mm bore. Flow Range 10.0-160 m³/h

EFS-100 100mm bore. Flow Range 16.0-250 m³/h

EFS-125 125mm bore. Flow Range 25-400 m³/h

EFS-150 150mm bore. Flow Range 40-600 m³/h

Contact details

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This manual covers both the EPCF and the EPCFP

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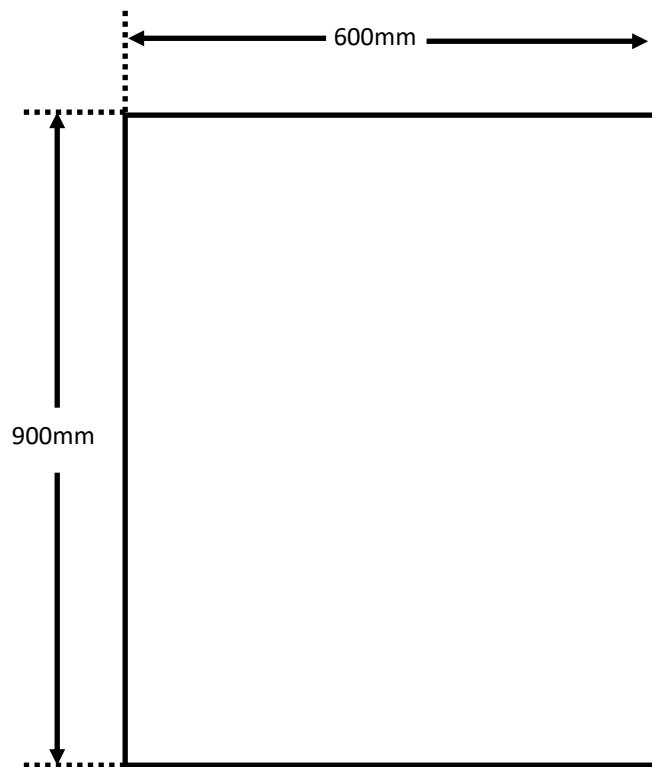
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Please read the important information below:

Thanks very much for purchasing one of our effluent pump controllers. This controller has been designed and engineered to be as robust and reliable as a device of this kind can be. Please note though that this is an electronic device and so, by its very nature, is not failsafe. While the Maximum Run Time, Loss of Prime, Blocked Pipe and Burst pipe protections are generally extremely reliable and effective they should not be relied upon as the sole source of protection against equipment damage or environmental contamination.

Installing

Mounting



Depth is 363.5mm

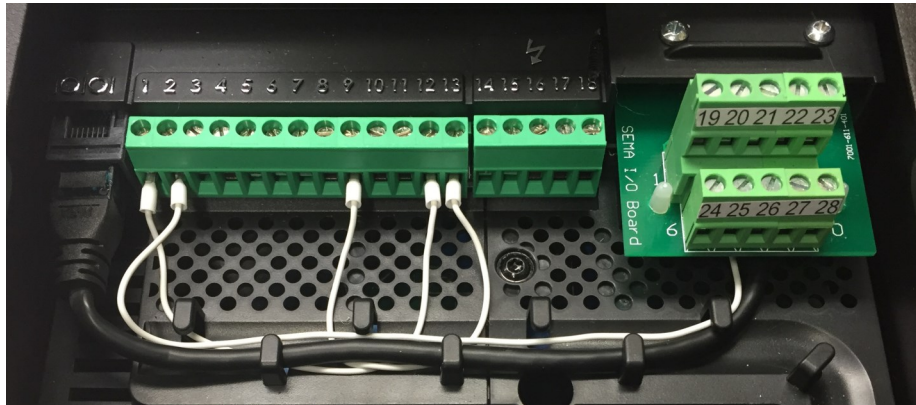
Wiring

All wiring must be performed by a suitably qualified person who is familiar with, and ensures compliance with, the appropriate Electrical Wiring Regulations.

There is no need to use screened mains cabling.

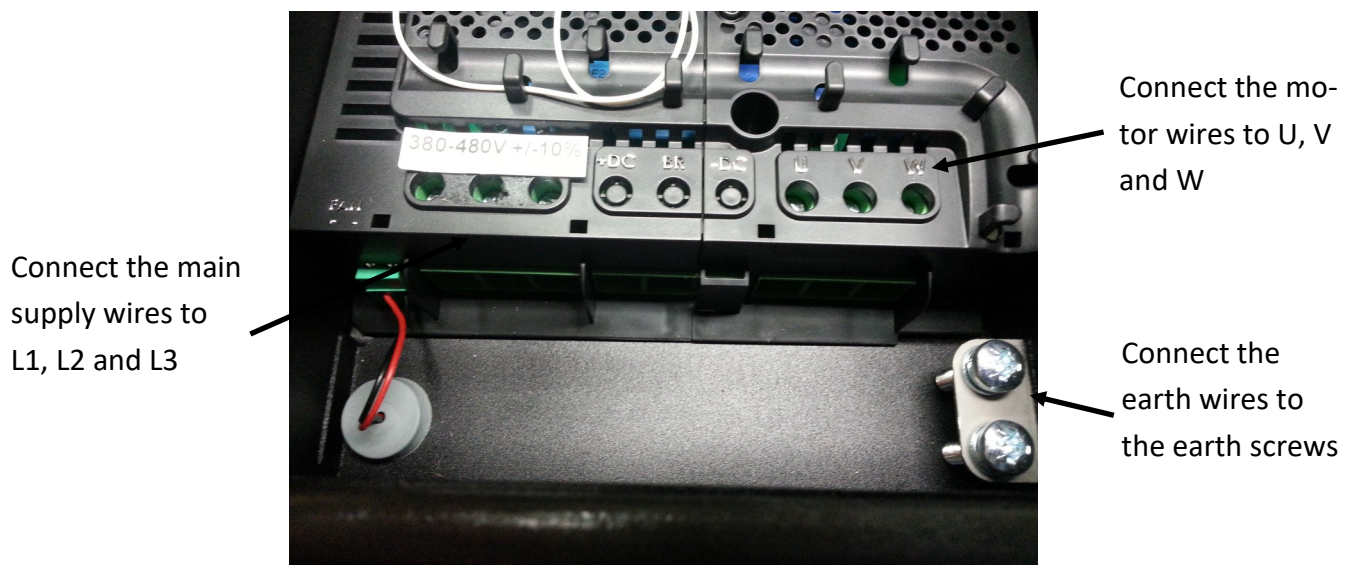
EMC screened cable must be used to connect the controller and motor. An EMC gland must be fitted to the motor and the preinstalled EMC Gland must be used in the controller.

All wiring that exits the controller including low voltage control cabling must be screened.



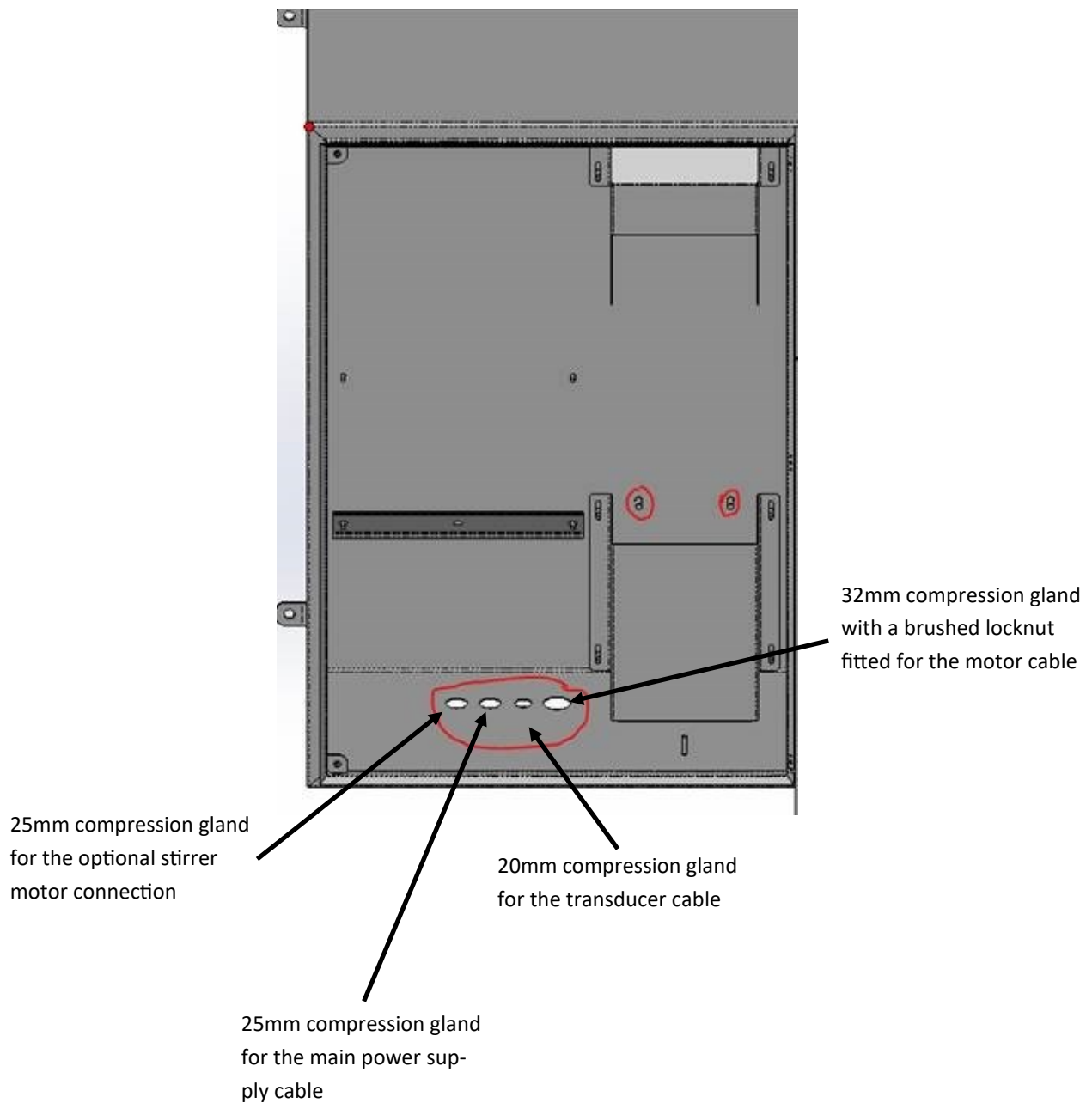
The picture above shows the control terminals of the EPCF(P). The terminals are numbered from 1 to 28 and their functions are shown on [page 9](#). The wiring and links shown in the picture are installed by Sema and are necessary for the correct functioning of the controller. Please do not remove or alter any of these.

Power and Motor Connections



To reverse the direction of rotation of the motor change over any two of the three motor wires (U,V and W)

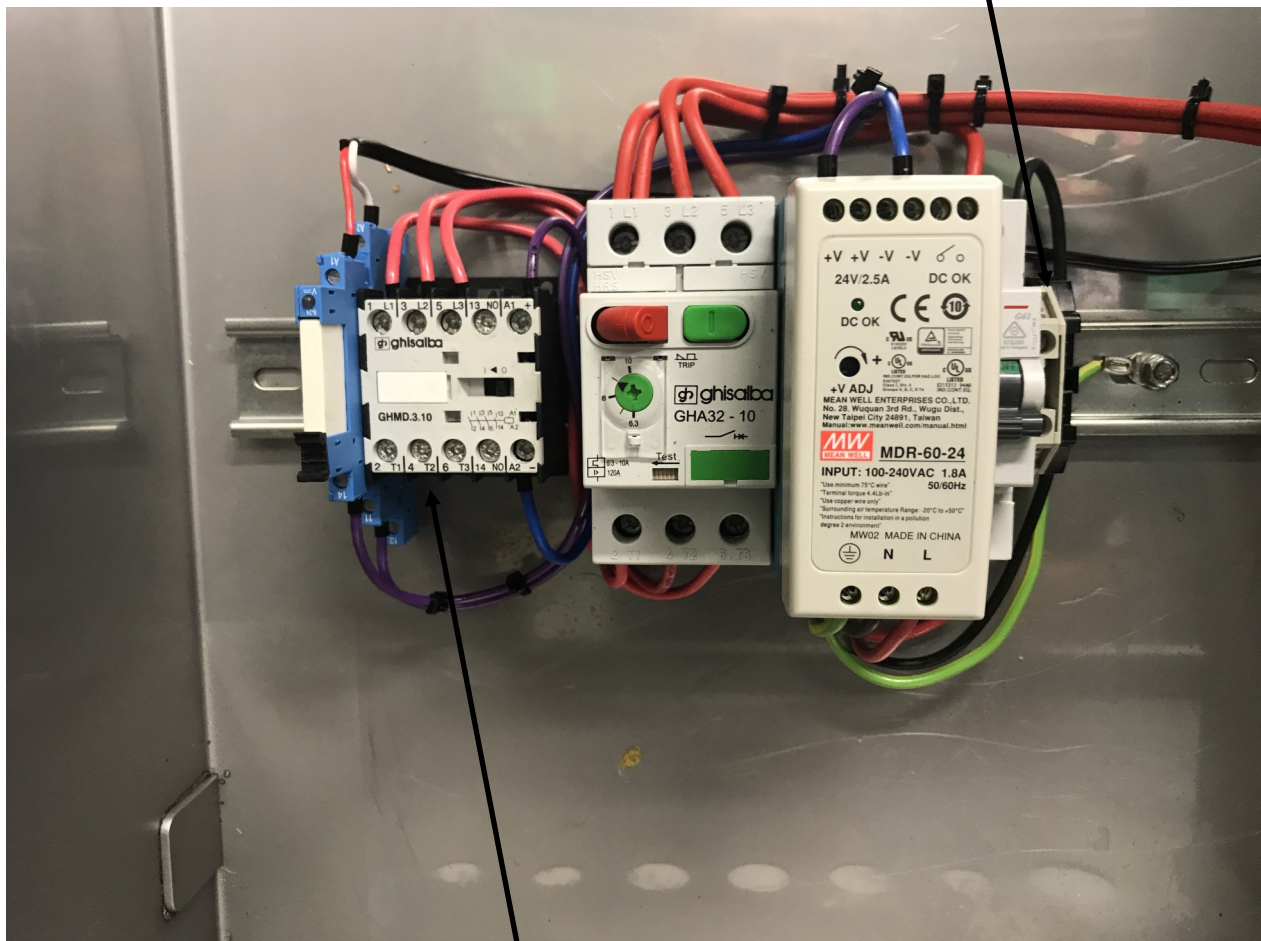
The glands shown below will be pre fitted to the cabinet



The motor cable gland has a brushed locknut fitted to it (see below). Sometimes well intentioned installers remove this gland and locknut and replace it with an EMC gland. Please note that the brushed locknut has an equal or greater performance to an EMC gland and that there is nothing to be gained by replacing it. To terminate the screen of the motor cable to the brushed locknut simply strip back enough of the plastic sheath so that the screen can contact the brush before inserting the cable through the gland. This will make an extremely effective EMC earthing connection and also maintain the units waterproofing rating through the use of an IP68 gland.



The photograph below shows the optional hardware that runs the stirrer. It is pre-wired and ready to operate. The only additional wiring that is required is to connect the stirrer motor to the contactor. Note that, if the stirrer kit is fitted then the main supply must include a neutral which must be connected to the terminal on the right hand side of the stirrer kit.



Connect the stirrer motor cable to the left hand 3 terminals labelled T1, T2 and T3

Please refer to the control terminal connection table on the following page.

- Terminals 1, 12 and 21 are all +24V terminals. Any wire that needs to be connected to a +24 can be connected to any of these terminals
- Terminals 7,9,13,20 and 22 are all 0v terminals

The Hitech unit is set up for 3 wire control. Links are installed to new units between 1 and 3 and 1 and 4 which allows them to start automatically as soon as they receive power. To control the unit from a remote switch or switches use these connections.

3 Wire

N.C. stop button between 1 and 4

N.O. start button between 1 and 3

2 Wire.

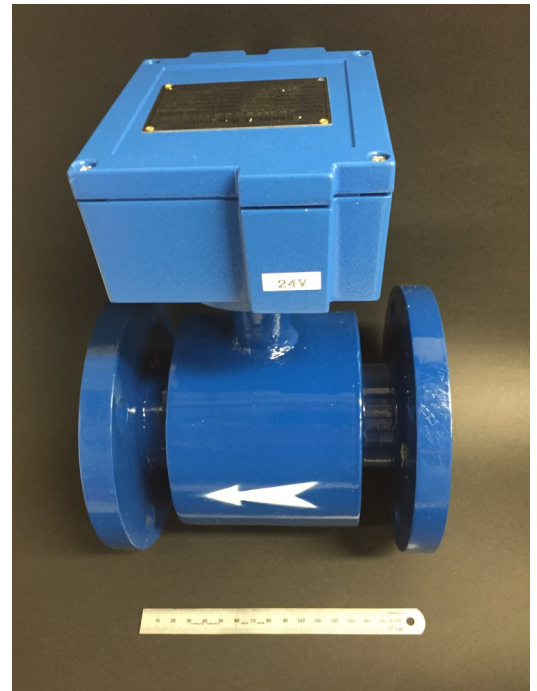
Link between terminals 1 and 3

Close to run switch between 1 and 4

Terminal Number	Signal	<u>Control Terminal Description</u>
1	+24VDC	Max 50m.a.
2	Controller	The white wire from the controller communications cable is connected here
3	Remote Start	As supplied by Hi-Tech there is a link between terminals 1 and 3. A remote start switch may be connected in place of this.
4	Remote Stop	There is a link connected between terminal 1 and 4. A remote stop may be con-
5	No user connection	
6	4 to 20 ma analogue	The signal form the flow sensor should be connected here
7	0V	The screens from the transducer cable(s) may be connected to any 0V terminal
8	No User connection	
9	0V	
10 to 13	No User connection	
14	Relay 1 Common	Relay 1 turns on when the controller has a fault
15	Relay 1 N.O.	
16	Relay 1 N.C	
17	Relay 2 Common	Relay 2 turns on when the unit is running
18	Relay 2 N.O.	
19	4 to 20m.a analogue	The signal wire from the optional pressure transducer should be connected here. Depending on the cable used this will be either black or blue.
20	0V	
21	+24VDC	The commons for the <i>Optional</i> remote pressure select switch should be connected here or to terminal 1. Max load 50m.a. The optional pressure transducers red wire should also be connected here
22	0V	
23	No User Connection	
24	Stirrer Output	This output will turn on and supply 24vdc to run a stirrer motor contactor
25	Priming Solenoid Output	A priming solenoid may be connected between here and any 0V terminal
26	No User connection	
27	Setpoint 2 Switch	The switch that selects setpoint 2 should be connected here.
28	Setpoint 3 Switch	The switch that selects setpoint 3 should be connected here.

If you are using a HiTech Flow transducer the connections are as shown below

The flow sensors are available in various bore sizes (see page 2) they all output a 4 to 20ma control signal.



On the 24VDC powered units connect the power supply to the + and - terminals.

The 4 to 20ma signal is present between the I and C terminals.

The 24VDC unit draws less than 1 amp

Setting up and Operation

Using the keypad

Description:

- ♦ **ESC** The escape key functions in the same manner as the escape key on a computer it allows you to exit without saving parameters and also allows you to go back a step when going through the initial setup routine.
- ♦ **UP ARROW** Increases the digit immediately above the cursor when entering parameter values and scrolls through a menu list.
- ♦ **ENTER** Accepts and saves a value which has been entered. ***Press and hold for 3 seconds to access the Function menu from the main running screen.***
- ♦ **MAN** Short for Manual this will run the pump manually for as long as it is pressed. It will also put the controller in 'Emergency' mode if it is held down when the power is turned on.
- ♦ **LEFT ARROW** Moves the cursor one position to the left when entering parameter values.
- ♦ **DOWN ARROW** Decreases the digit immediately above the cursor when entering parameter values and scrolls through a menu list.
- ♦ **RIGHT ARROW** Moves the cursor one position to the Right when entering parameter values.
- ♦ **ON OFF** Press once to turn the controller off, press again to turn the controller on. After power up the controller will always start in the 'on' state.

Hint: When entering numbers use the left and right arrow keys to move the cursor and the up and down arrow keys to change the number above the cursor.

Initial Set Up

A few seconds after powering the unit up for the first time, or after re-initialising it, the screen below will be displayed.



The only valid key which can be pressed is the ENTER key and the only way of stopping this screen from appearing is to complete the setup routine.

Please note that, if you make a mistake and enter the wrong value in one of the steps, the ESC key can be used to go back a step. You can go back as many steps as you like even right to the start of the setup routine if necessary.

The settings that you enter are only saved after you complete the last step so, providing you haven't completed the final step, you can always start setup again by turning off the power and then powering up again.

The controller can also be re-initialised. See the 'Changing Parameters' section for instructions on how to do this.

1. **ENTER THE MOTORS NAMEPLATE VOLTAGE:** Use the arrow keys to alter the value.
2. **ENTER THE MOTORS NAMEPLATE CURRENT:** Use the arrow keys to alter the value.
3. **ENTER THE MOTORS NAMEPLATE RPM:** Use the arrow keys to alter the value.
4. **ENTER THE MOTORS MAXIMUM SPEED:** Here you can enter the maximum operating RPM of the motor. This figure may be adjusted up to double the motors rated nameplate RPM but please note that very few pumps can be operated at this sort of speed. If you are in doubt about the maximum speed that your pump can be operated at then please set this figure to the same value as the Motors Rated Nameplate speed. Note that this is the value that appears by default.
5. **ENTER THE MOTORS MINIMUM SPEED:** This figure is also determined by the minimum speed that your pump can successfully run at. If you are in doubt then the default figure can safely be used.
6. **MOTOR DIRECTION CHECK:** Pressing the up arrow will cause the motor to run at low speed for a couple of seconds so that you can check that the direction of rotation is correct. If it isn't then turn off the power and, after the controller screen goes completely dark, remove the controller terminal cover and swap any two wires connected to U,V and W. Once this is done turn the power on again and you will be brought back to this step, all of your previous programming will have been saved. Confirm that the direction is now correct and then press ENTER to continue.

7. Setpoint 1. Enter the desired flow rate in 1,000's of litres per hour. (i.e. Mega Cubes per hour or MCH) This setpoint is active when both inputs 27 & 28 are off

8. Setpoint 2. Enter the desired flow rate in 1,000's of litres per hour. (i.e. Mega Cubes per hour or MCH) This setpoint is active when input 27 is on

9. Setpoint 3. Enter the desired flow rate in 1,000's of litres per hour. (i.e. Mega Cubes per hour or MCH) This setpoint is active when input 28 is on.

10. ENTER THE MAXIMUM ALLOWED RUN TIME. Enter the maximum time (in HOURS) that the controller is allowed to run continuously for before it will shut down and display an error. Setting this to 0 disables this function.

11. BURST PIPE FLOW. If this flow rate is exceeded when the pump is at minimum speed then a pipe is assumed to have burst and the unit will shut down and display an error.

12. FILL PIPE DELAY. This is a time in minutes during which the pump will be held at minimum speed and most alarms will be ignored. This is to allow time for the pump to prime and the pipe to fill.

13. Maximum Pressure. Only active if the optional pressure transducer is fitted. If the pressure gets to within 0.5bar of this setting then the unit stops controlling the flow and switches to pressure control. If the pressure rises to this limit then the pump will be switched off and an error displayed.

14. Start Delay. This delays the starting of the pump for the number of seconds entered

This completes setup, the controller is now fully configured and customised for this installation Please read the following sections which describe the running screen and how to alter parameters on a controller which has already been configured.

Running

The Running Screen:

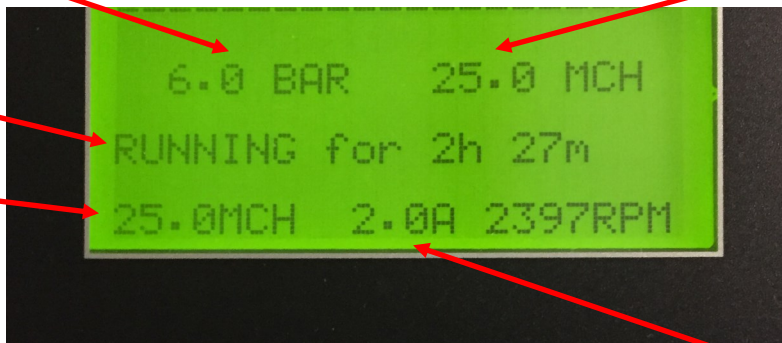
If the optional pressure transducer is installed then the actual pressure will be displayed here

The actual flow rate will be displayed here or in the centre of the screen if the pressure transducer isn't installed.

MODE

Motor RPM

The set flow rate



Motor Current

MODE Six different modes may be displayed here:

1. **STOPPED** If the on/off button is pressed this will be displayed.
2. **RUNNING** When the pump is running this will be displayed followed by a time showing how long it has been running for.
3. **READY TO RUN** If the pressure is above the setpoint when the unit is powered up ready to run will be displayed as an indication that the unit will start as soon as the pressure drops.
4. **MANUAL** When the "Man" and the up arrow buttons are pressed simultaneously on the keypad this is displayed and the unit will ramp up to full speed.
5. **EMERGENCY MODE** Indicates that the unit is operating in emergency mode (See page 7)
6. **REMOTE STOP** Indicates that the remote run input on terminal 3 is off

Changing Parameters:

To access the parameters (also called functions) menu press and HOLD the ENTER key for between 2 and 3 seconds. (A screen will be displayed telling you to remove your finger after this time)

Non Password Protected Parameters:

- 0.) Password Enter the password here which unlocks the protected parameters (11 to 19) **The password is 01111**
- 1.) Minimum Speed The minimum speed of the pump can be adjusted here.
- 2.) Maximum Speed The maximum speed of the pump can be adjusted here.
- 3.) Setpoint 1 This is the Flow rate that the unit will try to maintain when both inputs 27 & 28 are off
- 4.) Setpoint 2 This is the Flow rate that the unit will try to maintain when input 27 is on
- 5.) Setpoint 3 This is the Flow rate that the unit will try to maintain when inputs 28 is on
- 6.) Maximum Run Time. This is the time in hours that the pump is permitted to run continuously for. If it is exceeded the pump will be stopped and an error message displayed. Set it to 0 to disable this function.
- 7.) Start Delay. The starting of the pump can be delayed by the number of seconds entered here.

Password Protected Parameters:

Once the password has been entered correctly in Parameter 0 the password protected functions 13 to 19 become visible. Some of them require the pump to be stopped before they can be adjusted, if you try to adjust one of these with the pump running you will be asked to stop it before proceeding

Leaving the parameter menu resets the password.

- 13.) BURST PIPE Flow. If the flow rate is above this setting when the pump is at minimum speed then a pipe is assumed to have burst.
- 14.) Fill PIPE DELAY. This is a time, in minutes, after starting where the pump will run and most alarms will be ignored to give the pipe a chance to fill
- 15.) MAXIMUM PRESSURE. If the optional pressure transducer is installed this is the pressure which must not be exceeded.
- 16.) FLOW AVERAGING. When this is on a multiple readings from the flow sensor are averaged to give a smoother output.
- 17.) Control Loop Delay. The EPC waits for this length of time after starting before it tries to control the pressure. This is to give it a few seconds of 'settling time' at minimum speed. This time may be adjusted here or even set to 0 if this is considered desirable.
- 18.) Motor Current Adjust the motor current here if necessary to avoid nuisance tripping.
- 19.) Re-Initialise If the controller is moved to a new location or a new pump is installed on the same controller then the controller should be re-initialised and the setup routine re done. Follow the prompts on the screen to achieve this.

FAULTS

If a fault occurs that stops the controller running the backlight on the screen will flash rapidly and the fault description and fault number will be displayed. Please write down this number as it will provide Sema Ltd., with important information about the cause of the fault.

If a fault occurs turn off the power, wait until the controller screen is completely dark and then turn the power back on again. If the fault is still present then contact your Dealer or Sema Ltd.

Possible Faults:

Short Circuit. Check the motor cable and the motor for electrical faults

Motor Overloaded. Check that the pump isn't jammed. Attempt a reset by turning the power off and back on again. When the motor starts observe its running current (middle figure on the main running screen) and ensure that it is less than the nameplate current.

Over Voltage. Contact your power company. This will damage the controller if it's allowed to continue.

Under Voltage. The controller cannot run because there is insufficient power. Contact your power company.

Too Hot. The controller is overheated. Check that the cooling fins are not blocked and that the air temperature is not above 40 degrees Celsius.

Too Cold. The controller must be above -10 degrees Celsius before it will start. If the air temperature is less than this then gently warm the controller until it is able to start, once it has started it should generate enough internal heat to keep running.

Maximum Run Time Exceeded. The pump has run continuously for more than the maximum allowed run time. Usually this is caused by a water leak. Pushing the on/off button restarts the pump and resets the timer.

LoP (Loss of Prime or Pump Running Dry). Make sure that the pump has effluent available. Press the On/Off button to restart the pump.

BURST PIPE DETECTED. The pressure fell below the level set in Function 11.

PIPE BLOCKED. The controller has detected a lack of flow most probably caused by a blocked pipe.

Transducer Fault. Either the Transducer is faulty or there is a fault in the Transducer wiring (Might pay to check the plug on the transducer to make sure that it's properly plugged in!). If you can't rectify the problem then you can run the controller in 'Emergency Mode' from a pressure switch. See below:

Emergency Mode: If the Transducer fails the EPC will stop. This is done to prevent possible over pressurising of the system. Because a Transducer isn't a device which is readily available in all parts of the world an Emergency Mode has been provided to enable the unit to run from a pressure switch.

To activate Emergency Mode:

1. Turn off the power and wait until the screen is dark .
2. Connect a Pressure Switch between terminals 1 & 2 (It doesn't matter whether you leave the pre-installed white wire in terminal 2 or not.)
3. Turn on the power and the unit will now detect the Pressure Switch, it will respond by activating its emergency mode and act as an on/off controller in response to the input from the pressure switch.

NOTES

SUPPLIER DECLARATION OF CONFORMITY (SDoC)

In accordance with ISO/IEC 17050-1:2004

SDoC Identification Number¹: HiTech branded Effluent Pump Controllers Manufactured by Sema Ltd.

Issuer details

Name ² (of New Zealand manufacturer or importer): Sema Ltd.	Contact Address: P.O.Box 374 Pukekohe Auckland 2340
Telephone: +64 9 3580800	
New Zealand Company No. (if applicable): 4305878	
Email Address: info@sema.co.nz	

Medium Risk Article – Details³ (Product name, type, rating, brand, model, batch numbers, and serial numbers, as applicable):

This Document covers all product manufactured by Sema Ltd and sold under the HiTech Enviro Solutions name where the core component of that system is an Invertek brand Variable Speed Drive.

Where any auxiliary componentry has been supplied by Sema Ltd for use in this product, Sema Ltd., asserts that it has been sourced from reputable sources and is compliant with the applicable standards.

The Medium Risk Article listed above, fully complies:

With cited standard(s), as listed ⁴ :	
Standard number and issue year: As/Nzs 3100:2001	Standard number and issue year:
Edition / Amendment status: 1	Edition / Amendment status:
Standard title: General requirements for electrical equipment	Standard title:
AS/NZS ZZ modified Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>	AS/NZS ZZ modified Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
OR Complies with the Conformity Cooperation Agreement ⁵ Yes <input type="checkbox"/> No <input type="checkbox"/>	

Names and addresses of any testing organisation or body

Name(s):	Address(es):
Name(s):	Address(es):

Reference to relevant test reports/certification and the issue date that show how compliance is achieved

Standard(s) or document(s) used, to show how compliance with cited standard is achieved: Declarations of Conformity from Invertek Drives Ltd Extensive compliance and conformity documentation is available from Invertek Drives limited.	Report Certification or Document reference N°(s): 1.03	Issue date(s): 01/10/2007
Reference to any management quality system involved: ISO 9001		
Additional information ⁶ :		

Declaration (signed for and on behalf of)

Name and position as authorized by the issuer ⁷ : Maurice Coates (Director)	Signature: 
Issuer Identification (as affixed to the article): HiTech Enviro Solutions	Date: 09/May/2018