

**Sema** Ltd.

# EPCFP3-11Plus Mk2 User Manual

For Mk2 Effluent Pump Flow controllers either with or without the optional pressure over-ride.

V 2.2.0





***This manual applies to all Sema Effluent Pump Controllers above 7.5Kw that operate by controlling the effluent flow and (optionally) pressure.***

### **Sema Part Numbers**

**EPC3-11** 11 Kw 400 Vac three phase flow controller c/w Flow Sensor

**EPCF3-15** 15 Kw 400 Vac three phase flow controller c/w Flow Sensor

**EPCF3-22** 22 Kw 400 Vac three phase flow controller c/w Flow Sensor

**EPCFP3-11** 11 Kw 400 Vac three phase flow and pressure controller c/w Flow Sensor and transducer

**EPCFP3-15** 15 Kw 400 Vac three phase flow and pressure controller c/w Flow Sensor and transducer

**EPCFP3-22** 22 Kw 400 Vac three phase flow and pressure controller c/w Flow Sensor and transducer

***The two sizes listed above are ex -stock. Larger sizes are ordered to suit. There are three delivery options with the larger sizes 5 week (standard) 3 week and 1 week.***

***The part number for larger sized controllers is EPCFP3– followed by the size of the drive in Kw. E.g. EPCFP3-45***

### **Contact details**

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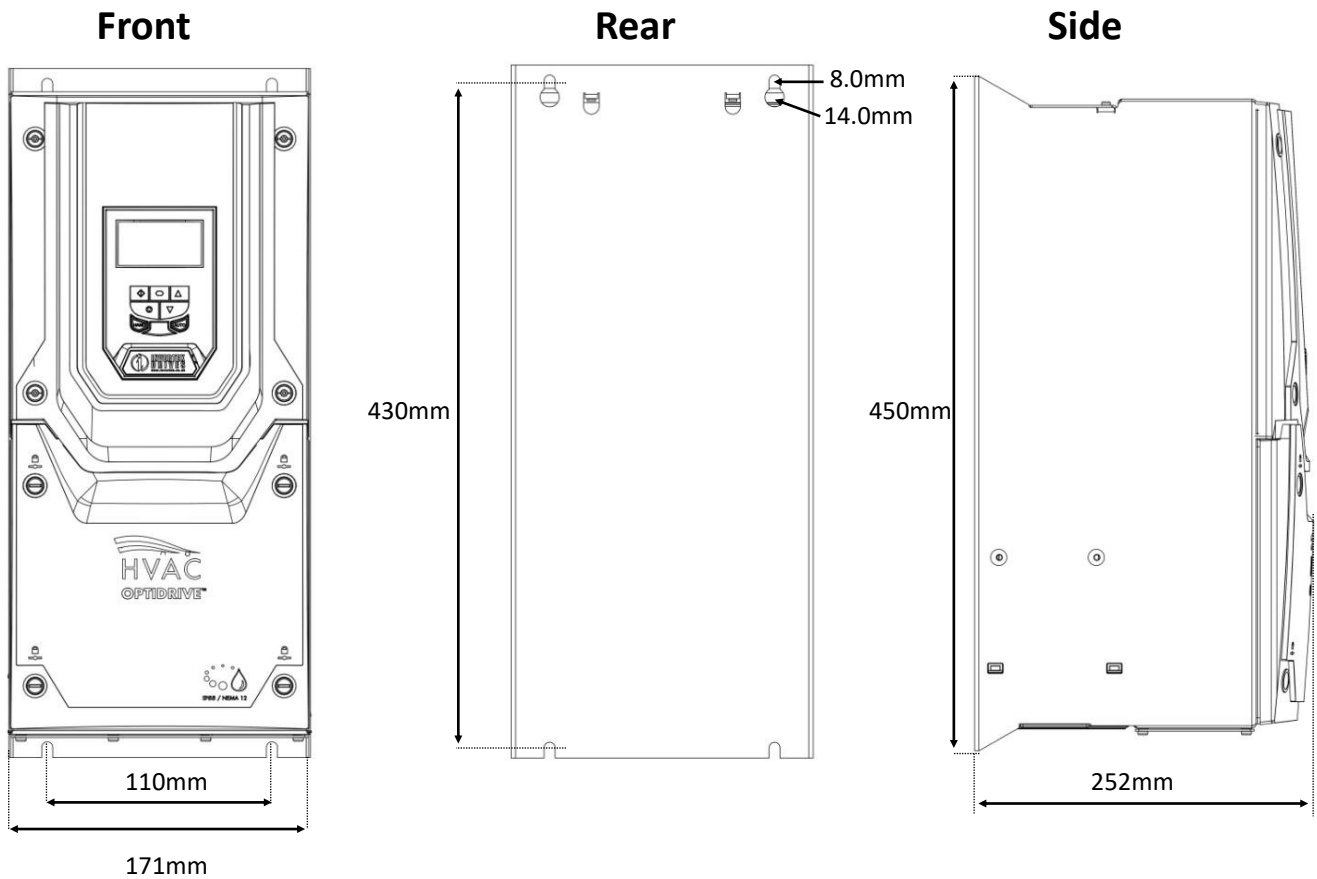
*Thanks very much for purchasing one of our effluent pump controllers. This controller has been designed and engineered to be as robust and reliable as a device of this kind can be. Please note though that this is an electronic device and so, by its very nature, is not failsafe. While the Maximum Run 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

Both the 15 and 22Kw drives share the same dimensions:

Please ask Sema for details on the larger units:



The controller must be mounted vertically with sufficient clearance above and below the drive to allow air to circulate freely.

The operating temperature range is  $-10^{\circ}\text{C}$  to  $40^{\circ}\text{C}$ .

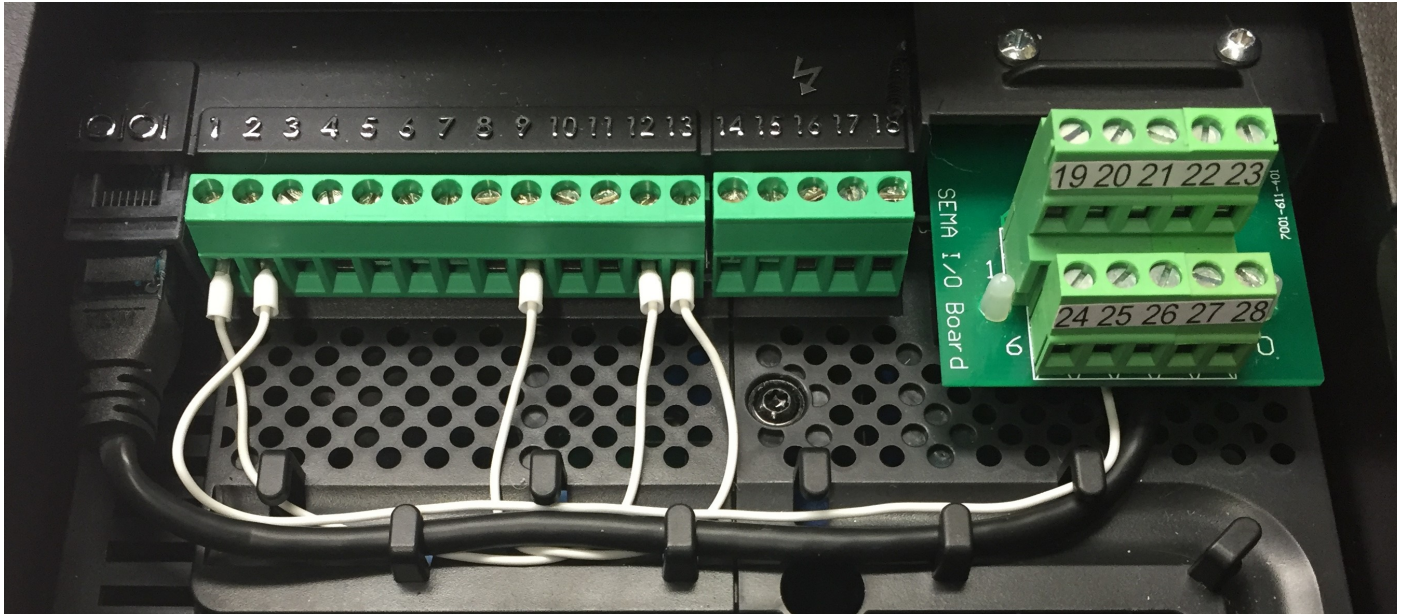
## Wiring

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.

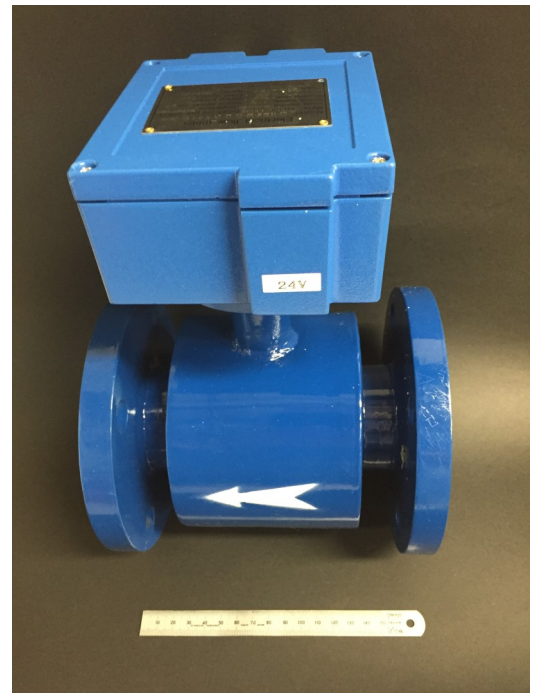
All wiring that exits the controller including low voltage control cabling must be screened.



The picture above shows the control terminals of the EPCFP. The terminals are numbered from 1 to 28 (**Note that, if you ordered an EPCF then only terminals 1 to 18 are present**) and their functions are shown on [page 8](#). 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.

## The Flow Transducer

Available in either 24VDC or 230VAC powered versions the flow sensor has a 50mm bore and outputs a 4 to 20ma control signal.



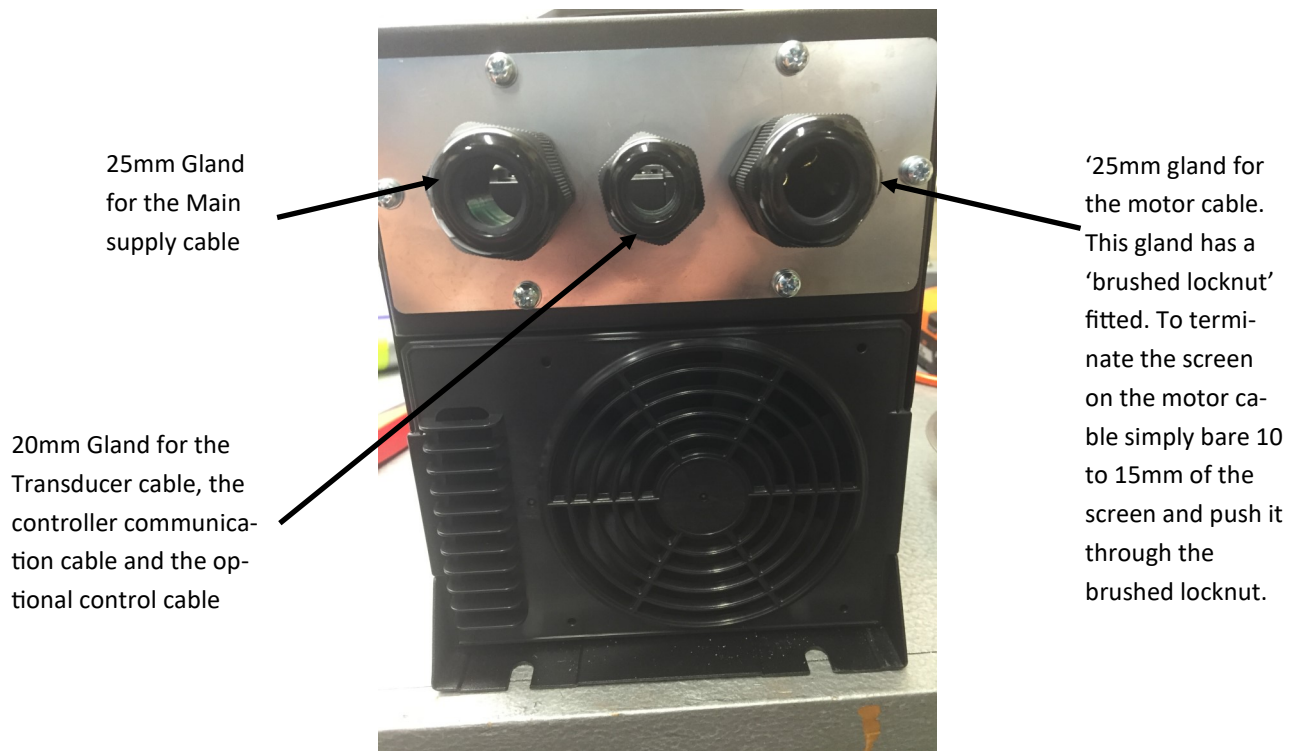
On the 24VDC powered units connect the power supply to the + and - terminals.. On 230VAC powered units connect the power supply to the L1 and L2 terminals.

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

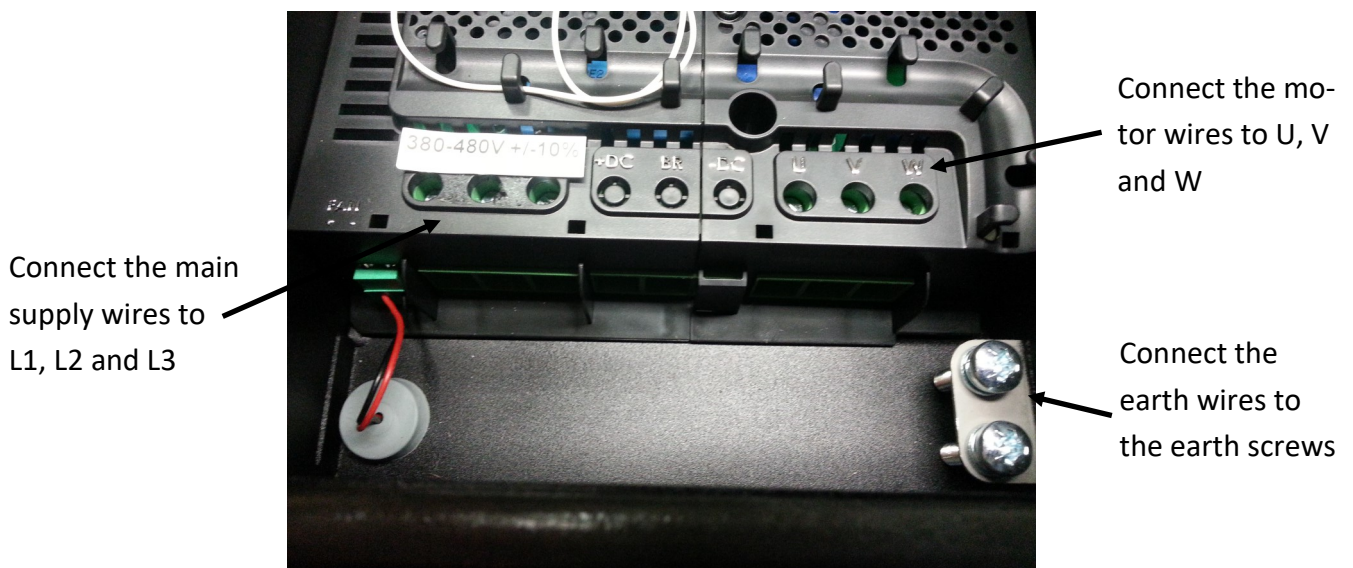
The 24VDC unit draws approximately 1 amp



**Three Glands are fitted to the bottom of the VSD.**



### **Power and Motor Connections**



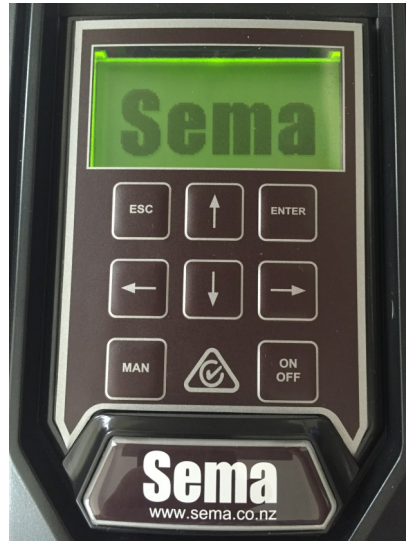
***To reverse the direction of rotation of the motor change over any two of the three motor wires (U,V and W)***

| Terminal Number | Signal              | <b><u>Control Terminal Description</u></b>  |
|-----------------|---------------------|---|
| 1               | +24VDC              | The common for the remote run switch on terminal 3 should be connected here   |
| 2               | Controller          | The white wire that comes from inside the controller should connect here.   |
| 3               | Remote Run          | As supplied by Sema there is a link between terminals 1 and 3. A remote stop switch may be connected in place of this.                      |
| 4               | No user connection  |   |
| 5               | No user connection  |   |
| 6               | 4 to 20 ma analogue | The wire from terminal "I" on the flow sensor should connect here   |
| 7               | 0V                  | The wire from terminal "C" on the flow sensor should connect here   |
| 8               | No User connection  |   |
| 9               | 0V                  |   |
| 10              | No User connection  |   |
| 11              | No User connection  |   |
| 12              | No User connection  |   |
| 13              | No User connection  |   |
| 14              | Relay 1 Common      | Relay 1 turns on for a short time 5 minutes after the drive has stopped<br><br>It is intended to be used as a self isolating system.        |
| 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              | AIN                 | If a pressure transducer is fitted the black (or blue) wire is connected here   |
| 20              | 0V                  | The screen on the transducer cable can go to any 0v terminal  |
| 21              | +24VDC              | If this unit is an EPCFP with a pressure transducer the red wire connects here.<br><br>This is also the common terminal for inputs 27 & 28. |
| 22              | 0V                  |   |
| 23              | No User connection  |   |
| 24              | No User connection  |   |
| 25              | No User connection  |   |
| 26              | No User connection  |   |
| 27              | Setpoint 2          | When this input is on Setpoint 2 is selected  |
| 28              | Setpoint 3          | When this input is on Setpoint 3 is selected  |



## 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.

There are 11 steps in the setup routine and they are as follows:-

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.

***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.***



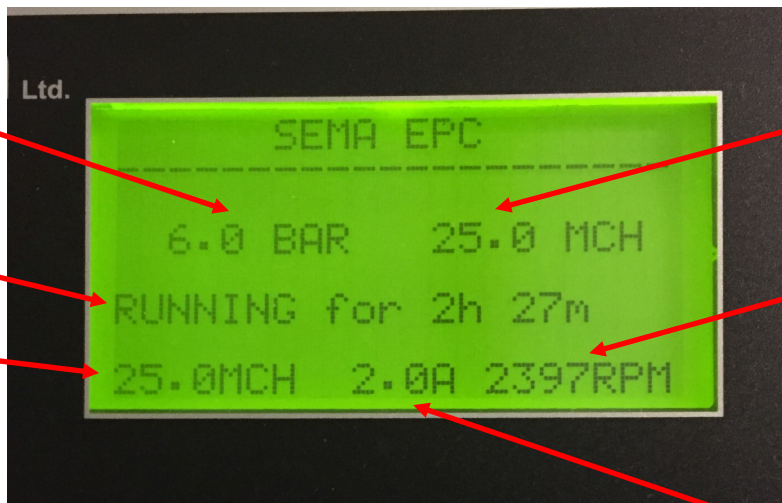
## Running

### The Running Screen:

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

MODE

The set flow rate



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

Motor RPM

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" button is pressed 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 00004**

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.

## Password Protected Parameters:

Once the password has been entered correctly in Parameter 0 the password protected functions 11 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.

**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.



# SUPPLIER DECLARATION OF CONFORMITY (SDoC)

In accordance with ISO/IEC 17050-1:2004

SDoC Identification Number<sup>1</sup>: Sema Pump Controllers

## Issuer details

Name<sup>2</sup> (of New Zealand manufacturer or importer):

Sema Ltd.

Telephone: +64 9 3580800

New Zealand Company No. (if applicable): 4305878

Email Address: info@sema.co.nz

Contact Address:

P.O.Box 374  
Pukekohe  
Auckland 2340

## Medium Risk Article – Details<sup>3</sup> (Product name, type, rating, brand, model, batch numbers, and serial numbers, as applicable):

This document covers all Sema product which is based upon the 'Invertek' brand of Variable Speed Drives. Namely: MPC, WPC, VPC, EPC, FPC and DPC. It also covers any Invertek drives that are used as slaves to any of the products mentioned above or that are used as stand-alone VSD's.

## The Medium Risk Article listed above, fully complies:

With cited standard(s), as listed<sup>4</sup>:

Standard number and issue year: As/Nzs 3100:2001

Edition / Amendment status: 1

Standard title:

General requirements for electrical equipment

Standard number and issue year:

Edition / Amendment status:

Standard title:

AS/NZS ZZ modified Yes ☐ No ☐ N/A ☐

AS/NZS ZZ modified Yes ☐ No ☐ N/A ☐

OR Complies with the Conformity Cooperation Agreement<sup>5</sup> Yes ☐ No ☐

## 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<sup>6</sup>:

## Declaration (signed for and on behalf of)

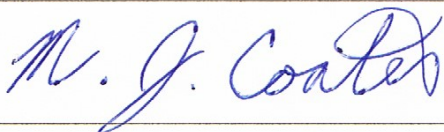
Name and position as authorized by the issuer<sup>7</sup>:

Maurice Coates (Director)

Issuer Identification (as affixed to the article):

Sema Ltd.

Signature:



Date:

14/September/2014

## **NOTES**