

Sema Ltd.

EPCP3-11Plus Mk2 User Manual

For Mk2 Effluent Pump Pressure Controllers 11Kw and above.

V 2.4.0



This manual applies to all Sema Effluent Pump Controllers above 7.5Kw that operate by controlling the effluent pressure.

Sema Part Numbers

EPCP3-11 11 Kw 400 Vac three phase controller c/w transducer

EPCP3-15 15 Kw 400 Vac three phase controller c/w transducer

EPCP3-22 22 Kw 400 Vac three phase controller c/w transducer

The three 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 numbers for larger sized controllers are EPCP3– followed by the size of the drive in Kw. E.g. EPCP3-45

Contact details

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Index

Sema Part Numbers & Contact Details	2
Installation Instructions	4
Wiring	5-8
Emergency Mode	7
The Keypad	9
Initial Set-Up	10-11
The Running Screen	12
Changing Parameters	12-14
Faults	15
Supplier Declaration of Conformity	16

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.

These controllers have an IP rating of 55 which means that they do not need to be installed in a cabinet. Please note, however, that they are not U.V. proof and must be protected from exposure to direct sunlight. Note also that, as rainwater can be extremely acidic, they should be protected against constant exposure to rain.

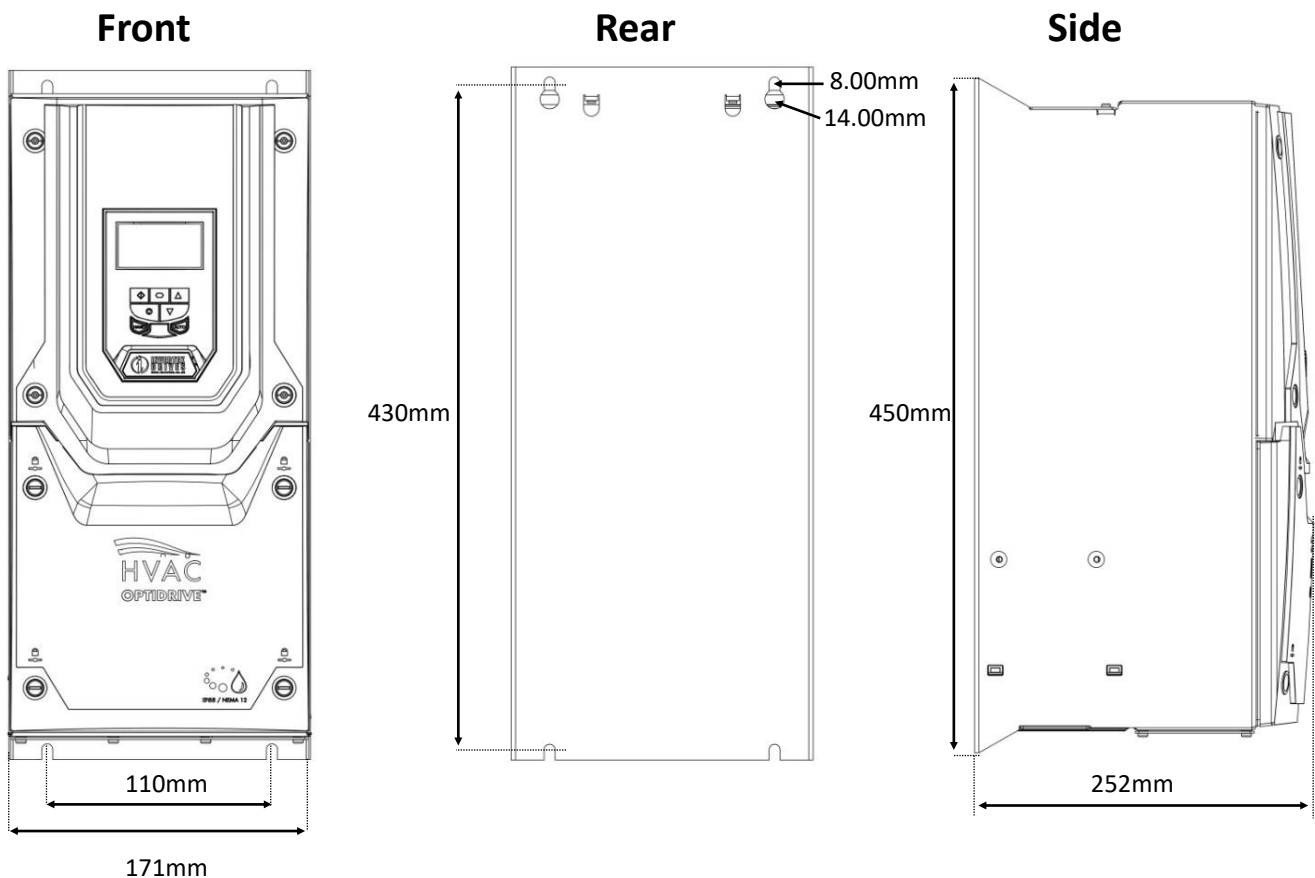
If installing one of these units in a cabinet please ensure that the cabinet has sufficient fan forced ventilation to limit its temperature rise to a maximum of 2 degrees Celsius above the ambient air temperature

Installing

Mounting

The 11, 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°C to 40°C .

If installing this unit in a cabinet ensure that enough fan forced ventilation is installed to limit the temperature rise in the cabinet to no more than 2 degrees above the ambient air temperature.

High temperatures drastically reduce the life expectancy of all electronic devices. The cooler that you can keep your EPC the longer it will last.

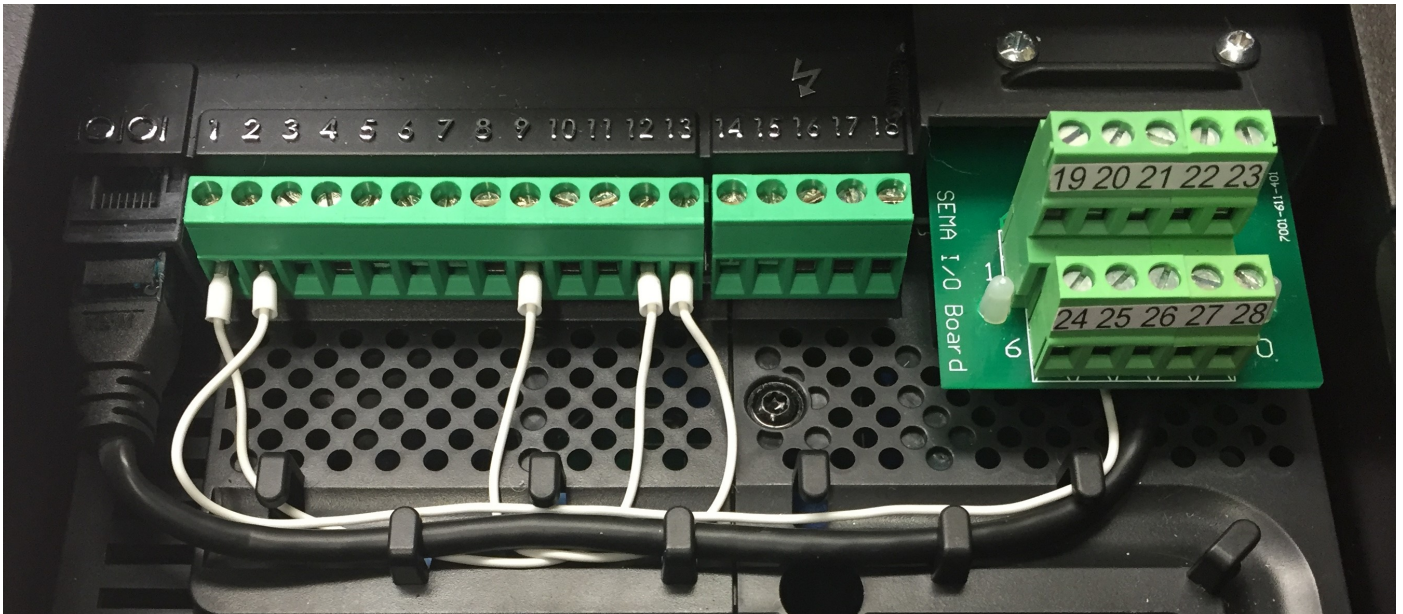
Wiring

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 EPCP. The terminals are numbered from 1 to 28 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.

While there are other optional components which may be wired to these terminals (see page 8) the only additional piece of wiring which is essential to make the unit operate is from the transducer. Connect this as follows:

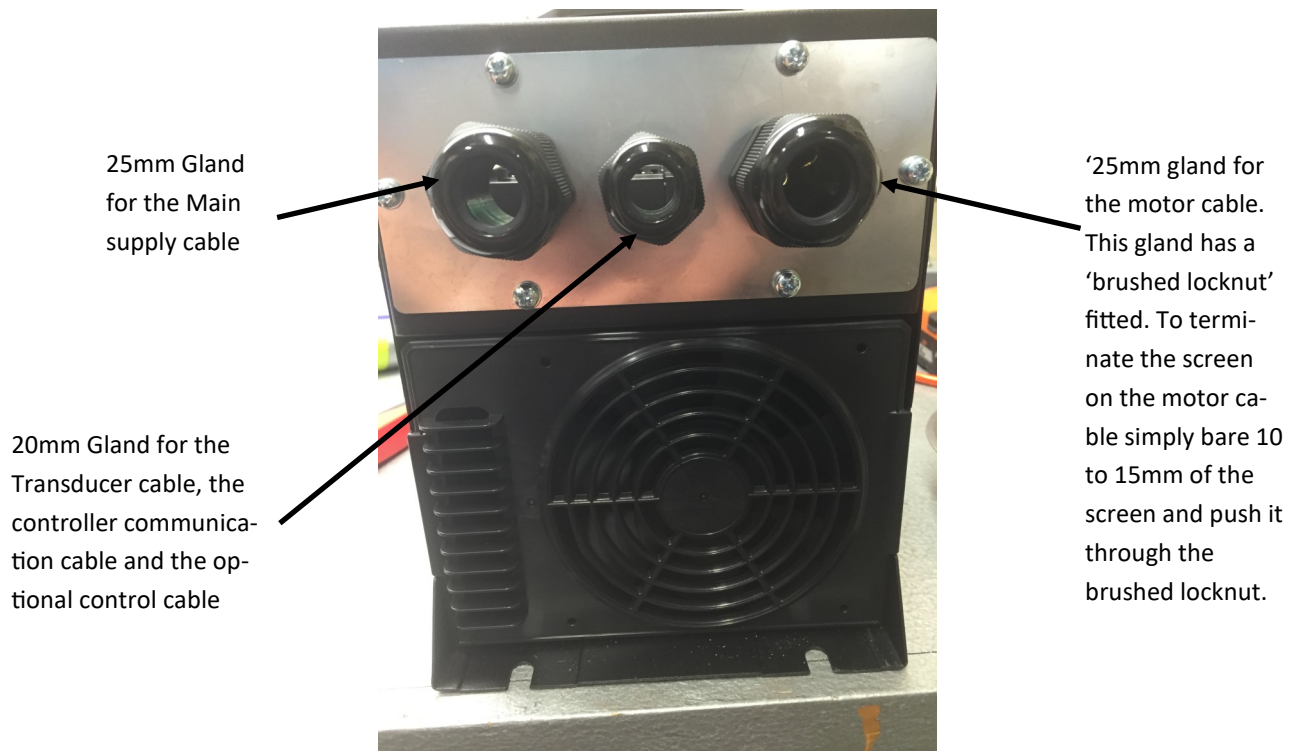
RED wire to terminal 1.

BLACK (in some cables this may be blue) wire to terminal 6.

Green/Yellow striped (in some cables this may have a clear covering) wire to terminal 7 or 9



Three Glands are fitted to the bottom of the VSD.



The motor 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.

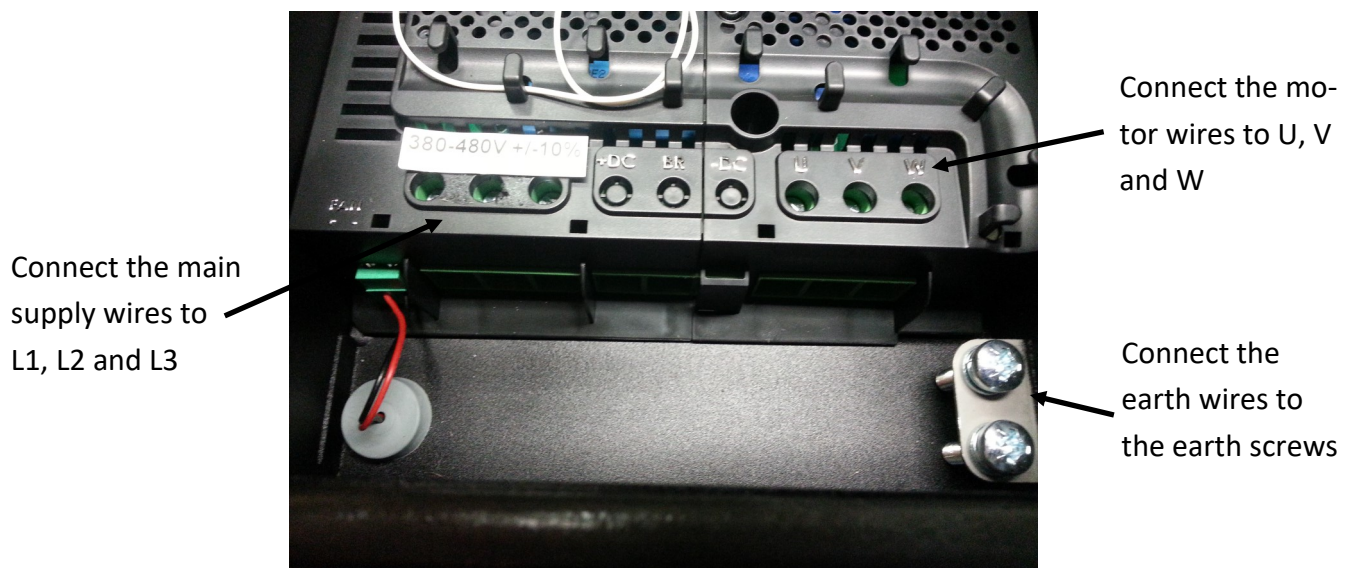


Emergency Mode: If the Transducer fails the EPCP will stop. This is done to prevent possible over pressurising of the system. Because a Transducer isn't a device which is readily available in all parts of the world an Emergency Mode has been provided to enable the unit to run from a pressure switch.

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.

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	<u>Control Terminal Description</u>
1	+24VDC	The RED wire from the transducer should be connected here or to terminal 21
2	Controller	The white wire from the controller communications cable is connected 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 BLACK (In some cables this may be Blue) transducer wire is connected here
7	0V	The CLEAR (In some cables this may be a green and yellow stripe) transducer wire is connected here. This is the screen.
8	Analogue Output	The analogue output puts out a 0 to 10VDC signal. It is programmable in function 10
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 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	No User connection	
20	0V	
21	+24VDC	The commons for the Optional remote pressure select switches should be connected here or to terminal 1.
22	0V	
23	Priming Solenoid Output	A priming solenoid may be connected between here and any 0V terminal
24	No User connection	
25	No User connection	
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.

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 16 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. First Set-Point. Enter the pressure (in Bar) that you would like the system to operate at when the inputs connected to terminals 27 and 28 are OFF.

8. Second Set-Point. Enter the pressure (in Bar) that you would like the system to operate at when the input connected to terminal 27 is ON.

9. Third Set-Point. Enter the pressure (in Bar) that you would like the system to operate at when the input connected to terminal 27 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. LoP (Loss of Prime). This step is for checking the current that the motor draws when the pump is not pumping water, you can run the pump by pressing and holding the MAN key. This figure can then be used in the next step as the Loss of Prime level for the motor. To obtain this figure either run the pump empty or block off its outlet so that it is not pumping water. Note that, if the feed to the pressure vessel cannot be shut off, then the pump must be run until the pressure vessel is completely up to pressure. You will be able to tell when this has happened as the motor current will stop reducing.

12. LoP Current Level. Enter the figure that was obtained in step 11. To turn off the LoP function set this figure to zero.

13. Burst Pipe Detection. The controller uses its own built in logic to determine if a pipe has burst. This function may be enabled or disabled here. **Please note that burst pipe detection is an aid only, it is not failsafe and should not be relied upon as the sole means of burst pipe detection.**

14. Maximum Pressure. If this pressure is exceeded the unit will shut down and display a blocked pipe fault. This setting can be used if the travelling spreader has a shut off valve which operates at the end of its travel.

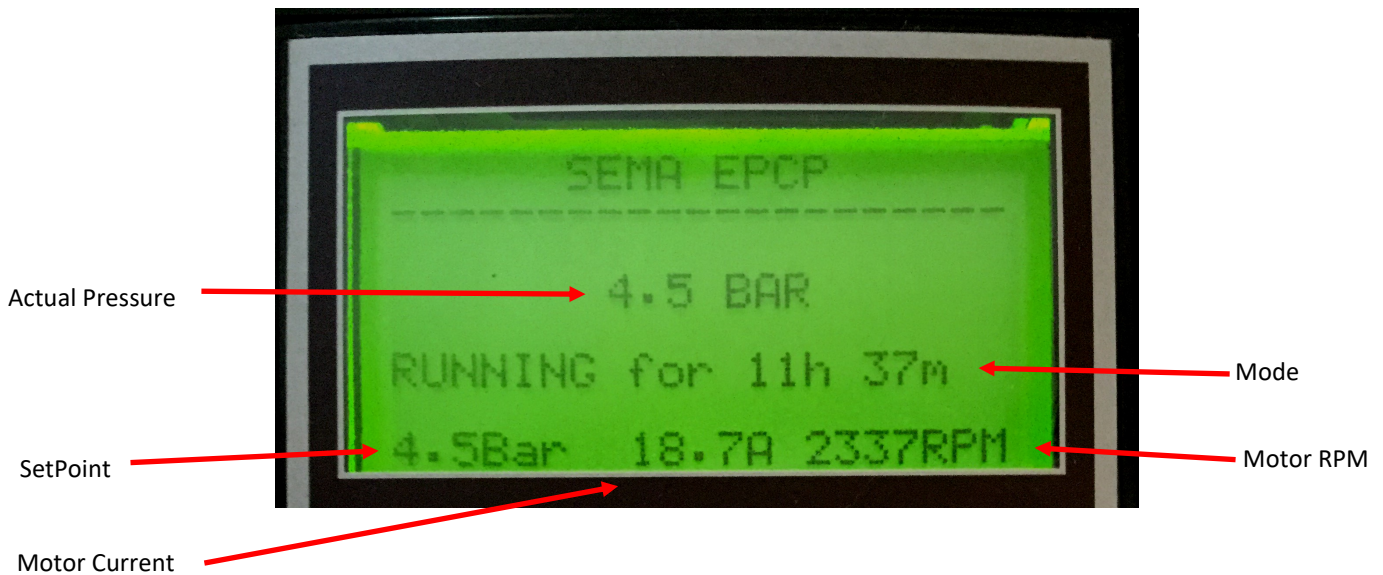
15. Fill Pipe Delay. This suppresses most faults and keeps the pump at minimum speed for the number of minutes entered to allow the system to start and fill the pipes.

16. Startup Delay. This delays the start of the pump for the number of seconds entered to allow a stirrer and/or priming solenoid to operate before the pump starts. Note that if an optional priming solenoid is connected to output 23 it will continue to operate until the pump reaches the setpoint pressure.

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:



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 pressure set-point when inputs 27 & 28 are OFF

4.) Setpoint 2 This is the pressure set-point when the input 27 is ON

5.) Setpoint 3 This is the pressure set-point when the input 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 9 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.

9.) START DELAY. This delays the start of the pump for the number of seconds that is entered. This is to allow a stirrer and/or a priming solenoid to operate before the pump starts

10.) ANALOGUE OUTPUT CONFIGURATION. The controller can be programmed to output a 0 to 10VDC on terminal 8. This signal can be set to give a proportional output to one of the following.

A.) Motor Speed (0 to 100%)

B.) Motor Current (0 to 200% of the motors nameplate current. i.e. 5 volts would equal the motors nameplate current)

C.) Motor Torque (0 to 200%)

D.) Motor Power (0 to 200%)

11.) BURST PIPE DETECTION. The controller uses its own built in logic to determine if a pipe has burst. This function may be enabled or disabled here. **Please note that burst pipe detection is an aid only, it is not failsafe and should not be relied upon as the sole means of burst pipe detection.**

12.) MAX PRESSURE. For constant displacement pumps the pressure that must not be exceeded can be entered here.

13.) Fill Pipe Delay. This suppresses most faults and keeps the pump at minimum speed for the number of minutes entered to allow the system to start and fill the pipes.

14.) Control Method. By default this is set to 'Conventional'. Ripple control is a Sema Ltd., invention which introduces a small pressure ripple into the pressure set-point and measures the time that it takes for the pressure to drop to determine if there is sufficient flow for the pump to be kept running. If you would like to operate the pump in Ripple control mode (with the ripple) then change this mode to 'Ripple Control'.

15.) Pressure Averaging. By default the EPC performs a rolling average of multiple readings from the pressure transducer over a 2 second period to determine the effluent pressure. This is to make the reading more stable and reduce the influence of air bubbles in the effluent stream. If this is considered undesirable it can be turned off here.

16.) 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.

17.) Lop (Loss of Prime) Current. This is set to the current that the motor draws when the pump is not pumping (i.e. when it is running dry) If the motor current is at or below this figure for more than 10 seconds the pump will be stopped and an error message displayed.

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 pump shed or a new pump is installed on the same controller then the controller should be re-initialised and the setup routine redone. 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 WPC 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 Number¹: Sema Pump Controllers

Issuer details

Name² (of New Zealand manufacturer or importer):

Sema Ltd.

Telephone:

+64 9 3580800

New Zealand Company No. (if applicable):

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Contact Address:

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Auckland 2340

Medium Risk Article – Details³ (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 listed⁴:

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 ☐

No ☐

N/A ☐

AS/NZS ZZ modified

Yes ☐

No ☐

N/A ☐

OR Complies with the Conformity Cooperation Agreement⁵

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 information⁶:

Declaration (signed for and on behalf of)

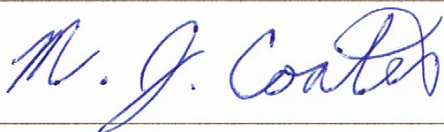
Name and position as authorized by the issuer⁷:

Maurice Coates (Director)

Issuer Identification (as affixed to the article):

Sema Ltd.

Signature:



Date:

14/September/2014

NOTES