EES70 Treatment System Controller Manual

V1.05
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1 Contents

2 Introduction

The EES70 Waste Treatment Controller is a generic control system intended for replacing the control electronics of a variety of waste treatment systems. This manual will explain how to install and operate the EES70 controller. Please follow all instructions carefully.

The EES70 in its standard form (as described here; other functions and applications can be programmed upon special order) will operate a aerated waste treatment system with a single blower (aerator) and effluent pump. The blower operates according to the on and off timers configured through the user interface (LCD and keypad). Optionally, outputs for decant and sludge solenoids, a dosing pump and strobe light can also be used.

For further information on the operation of the unit please consult section 4.

This manual makes use of the following symbols to indicate warnings that must be paid specific attention to:

  Damage to equipment or personal harm may occur if this instruction is not followed.

  Electrical risk (electrocution hazard) may occur if this instruction is not followed.

3 Operation Description

Operation of the EES70 is based around the standard aeration – settling – decant sequence used in many waste treatment plant designs. The following diagram provides an overview of this process.

The EES70 has a separate timer setting for each of the three phases.

Aeration

During the aeration phase the blower output is continuously activated, providing aeration to the untreated sewage. This oxygenates the good bacteria living inside the treatment plant and then begin to multiply and eat solid matter and bad bacteria.

Priming
Some treatment systems require the decant solenoid to be energised for a period of time at the beginning of the aeration phase. This is called *priming* and the EES70 provides this function.

Sludge
Some treatment systems use an air operated "sludge lift" mechanism. The EES70 provides this function as the *sludge* setting, which will operate the sludge solenoid output for the set time at the beginning of the aeration phase.

Dosing
The EES70 supports installations that use a chemical dosing system to further disinfect the treated sewage. The *dosing* function activates when the sludge operation completes and runs for the set time.

Settling

During the settling phase the blower is switched off and the system remains idle. This allows the solid particles in the water to settle to the bottom of the tank, leaving the clean water in a layer at the top of the tank. All solenoid/dosing outputs are also switched off and remain off until settling completes.

Decant

During the decant phase the clean water at the top of the tank is removed into an irrigation tank/chamber. This occurs by activating the decant solenoid while the blower is off.

Decant Solenoid On Time

In many treatment systems it is not necessary to leave the decant solenoid active for the entire decant period. This reduces electrical wear on the solenoid coil. The EES70 allows the decant solenoid on time to be set as desired and begins from the beginning of the decant phase.

Some people have expressed confusion regarding the decant settings. On older Ozzi Kleen controllers the settling time is determined by the Decant Delay and the decant time is determined as Blower Off minus the Decant Delay. Note that this is different on the EES70.

Irrigation Pump

The EES70 provides a second switched 240VAC output designed for operating an irrigation pump. There are two operation modes for this irrigation pump output: automatic and manual.

Automatic

Setting the *pump mode* to "auto" will deactivate the pump output. A normally open (close on rise) float switch is wired into the controller and this is used to activate the pump. The pump will continue to run while the float switch is up.

Once the float drops the EES70 will keep the pump output on for the *pump run time* setting.

Manual

Setting the *pump mode* to "man" will cause the controller to keep the pump output energised continuously while the controller has power. This is intended for use with a submersible pump that has a built-in working level float switch.

Fault Detection

In order to ensure that the treatment plant continues to operate correctly, the EES70 is able to detect fault conditions.

Blower Fault

A pressure switch is used to detect whether adequate air pressure is being supplied by the blower when the blower is operating. If an entire aeration phase is completed without any air pressure then a blower alarm is triggered.

During a blower alarm condition the controller will continue to operate normally. The blower alarm is reset by following the prompt on the LCD while the alarm is active.

High Water Level

A second pressure switch is used as a hydrostatic level detector for sensing a high water level. If the high water pressure switch is activated and the system is in the aeration phase then it will immediately skip to the settling phase. From there the system performs a standard settling phase and the enters decant.

If the system reaches the end of the normal decant cycle time and the high water level condition still exists then the high level alarm will be activated. The high level alarm will automatically clear itself if the high level condition subsides.

While ever the high water condition is active the system will be unable to return to the aeration phase. Instead, it will simply remain in decant (the decant timer will stop once it reaches the end of its normal period).

Pump Fault

This fault condition only applies when the irrigation pump is being use in "auto" mode and a working level float switch is connected to the EES70. If the pump runs continuously for more than one hour then the pump alarm will be triggered. This can only be reset by following the prompts on the LCD when the alarm is active.

Output Fault

In addition to the standard fault conditions outlined above, the EES70 also continuously monitors all of its extra-low voltage outputs (decant solenoid, sludge solenoid, dosing pump, strobe, remote alarm). If these outputs exceed the maximum available combined current limit then all outputs will be switched off and locked out. The LCD will report this as an "output fault".

During an output fault lockout condition the EES70 will attempt every 60 seconds to restore the outputs. If the fault still exists then the outputs will all lock out again, however if the fault has cleared then the unit will resume normal operation.

Alarm Indication

Since the EES70 can detect the aforementioned fault conditions it needs some way of alerting the owner and/or operator of an alarm. All alarms will be displayed on the LCD main screen (it will scroll through them) and the following visual/audible cues will draw attention.

Strobe Light

During any alarm condition the strobe light output will be activated. It is designed to operate a 12VDC (nominal) strobe with a current draw of up to 350mA (3W).

Remote Alarm Plate

The more common option is to use a remote alarm plate. This is a switch-plate sized unit which mounts away from the treatment plant (i.e. inside the dwelling) and is connected to the EES70 controller by two wires. A special signal is sent over these wires, allowing the remote alarm plate to indicate to the owner/operator any alarm conditions.

Further information about the operation of the remote alarm plate can be found in section 7.

Alarm Test

It is generally desirable to test the alarm functions when performing a service on the treatment system. This can be done via the "alarm test" menu. Activating the alarm test will cause the unit to activate the strobe and all alarms on the remote alarm plate. The system will remain in this state for 2 minutes or until the alarm test is manually deactivated.

4 Operator Interface

The EES70 has been designed with a very user friendly operator interface in mind. A backlit liquid crystal display (LCD) and 5-button keypad provide operator feedback and allow all configuration to be performed.
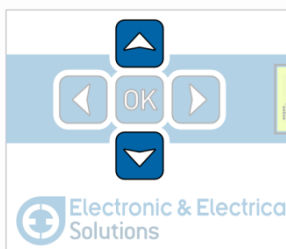
The operator interface layout is shown in the following diagram:
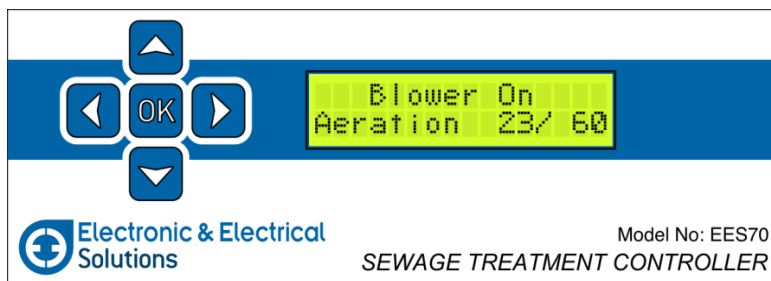
In general, each of the 5 keys will have a standard function regardless of which screen is currently being displayed on the LCD. The LCD itself features a backlight which is always on and makes the display readable in all conditions.
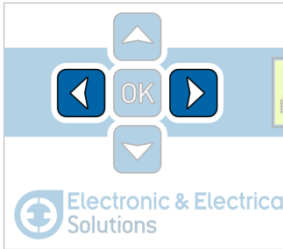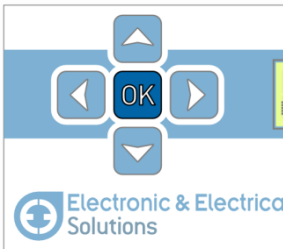
Keypad

Up and Down Keys

The up and down arrow keys cycle through each of the various menu screens.

Left and Right Keys

The left and right arrow keys are generally used to change settings on some the editing screens. Holding down these keys will cause the value to be changed rapidly.

OK Key

The OK key is used to acknowledge alerts from the controller and activate certain menu features. Where the *OK* key is valid the LCD will display a prompt along the lines of "Press OK to …".

Display

The LCD module use d on the EES70 is a quality, high contrast, backlit unit. This means that it will be readable in all conditions, from bright sunlight to the dark of night.

Any text that does not fit on one line of the LCD will repeatedly scroll across the screen.

5 Installation

The EES70 has been designed to make installation as simple as possible. Most of the connections are plug and socket style, although depending on the installation some wire connections may be necessary.

> Always use a licensed electrician if any repairs or modifications to the fixed 240V mains are required.

> There are no user-serviceable parts inside the EES70. For servicing and repairs of the EES70 controller please contact Electronic & Electrical Solutions.

Location

Although the EES70 features basic weatherproof construction, it **must** be protected from direct contact with the weather. The most common mounting location is inside the treatment plant motor box (adjacent to the blower).
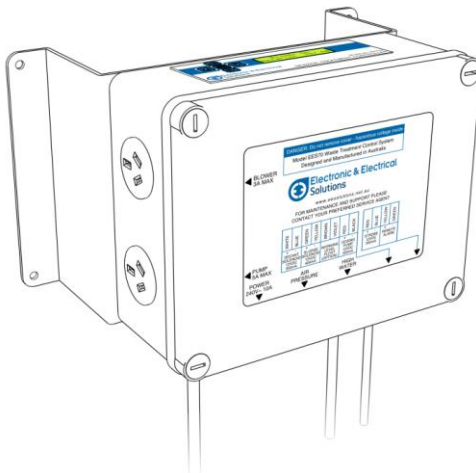
> Ensure that the EES70 is mounted in a location that cannot be exposed to water.

Mounting

The EES70 is provided with two options for wall mounting: flat mounting tabs or a mounting bracket which spaces the unit out from the mounting surface by 45mm. The following figure depicts these two mounting methods.
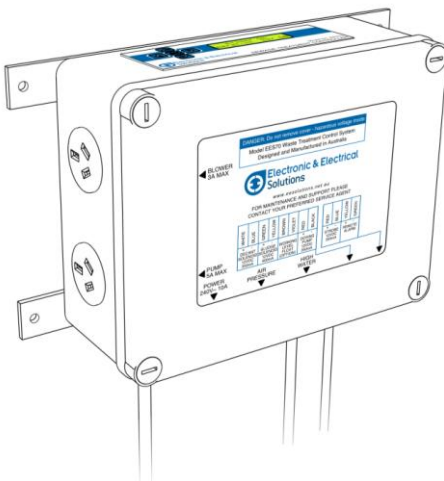
Above: Mounting tabs. Below: Mounting bracket

Both mounting methods utilise 6mm diameter mounting holes, spaced at 267mm horizontally and 156mm vertically (as shown in the following mounting hole spacing diagram).

When ordering the EES70 please use the right part number to indicate the mounting requirements: EES70-A for mounting tabs and EES70-B for mounting bracket.
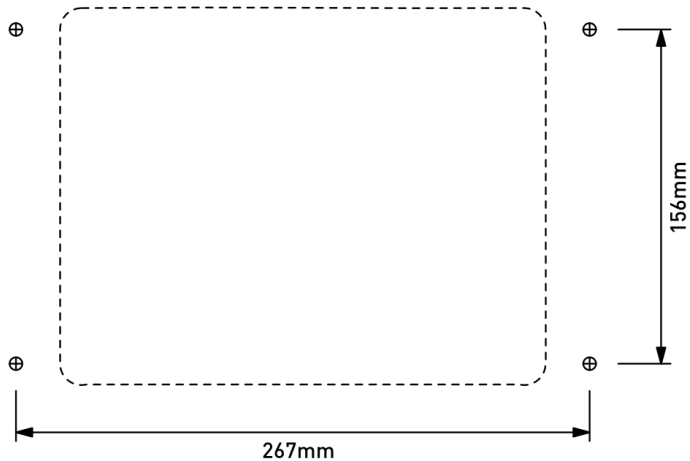
Mounting hole spacing

Connections

| ⚠ | Before connecting any device to the EES70 first ensure that it is compatible by referring to section 8. |

The front side of the EES70 features a wiring diagram showing how to connect all of the cables. This is useful for reference in the field. All mains connections are plug-in. Extra-low voltage connections are made via the grey 8-core and 4-core cables that exit from the bottom of the unit.

240V Connections

The 240V mains connections to the EES70 are standard 10A types. Power to the unit is supplied via the 1m long plug lead and output to the blower and pump are provided by the sockets on the left end of the unit.

The combined maximum current draw of both the blower and the pump must not exceed 10A.

Pump Float

If using a pump that does not have an integral float switch one can be connected to the brown and purple wires of the 8-core cable. This is a normally open input (contacts close when float rises).

Decant Solenoid

The decant solenoid is connected between the white and blue wires of the 8-core cable. White is positive, blue is negative. Output is 12VDC (nominal), 350mA max.

Sludge Solenoid

The sludge solenoid (if used) is connected between the yellow and green wires of the 8-core cable. Yellow is positive, green is negative. Output is 12VDC (nominal), 400mA max.

Dosing Pump

The dosing pump (if used) is connected between the red and black wires of the 8-core cable. Red is positive, black is negative. Output is 12VDC (nominal), 350mA max.

Strobe

A strobe light may be connected to the red and blue wires of the 4-core cable. Red is positive, blue is negative. Output is 12VDC (nominal), 250mA max.

Remote Alarm Plate

The yellow and green wires from the 4-core cable are used for connection of a remote alarm plate. This does not output a constant voltage but rather a 12VDC serial signal (if it is measured with a multimeter the voltage will be constantly changing). The yellow wire is positive, but the remote alarm plate is not polarity conscious so it doesn't matter which way around it is connected. See section 7 for further installation instructions.

Air Pressure

The air pressure switch is used to detect operation of the blower and air lines. There is an internal 13mBar pressure switch that accepts a press fit 4mm PVC hose.

High Water Level

The high water level input is also a 13mBar pressure switch which operates as shown in the following diagram. Connection is also via a press fit 4mm PVC hose.
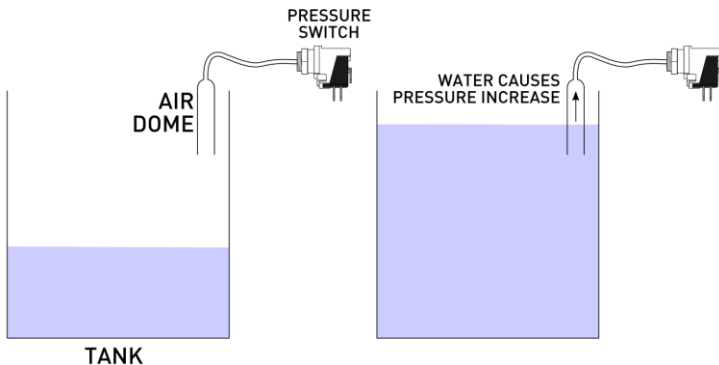
Output Protection

All 12V outputs (decant, sludge, dosing, etc.) are continuously monitored by the controller and in the event of excessive current draw all outputs are temporarily shut off. The controller will trigger an overload fault alarm.

Every 60 seconds the controller will attempt to reactivate the outputs, shutting them down again if the overload condition persists.

6 Menus & Configuration

The EES70 menu system has been designed to be fast and easy to use. The up and down arrows cycle through the various menu screens, each providing specific information or adjustments.

Settings are automatically saved into EEPROM when adjusted, so that the setting can be restored following a power loss.

Standard Menu

The following screenshots show the standard menu screens in the order they appear when pressing the down arrow.

Main Screen

```
    System OK
Aeration  23/ 60
```

The main screen provides an overview of the current system state. The top line provides status information, scrolling through each reported item one by one. The bottom line reports timing information for the current phase.

```
Press OK to rese
Aeration   23/ 60
```

```
   BLOWER ALARM
Aeration  23/ 60
```

If an alarm such as a blower alarm is active then the option "Press OK to reset alarms" will be presented in the scrolling list.

```
Blower On: Primi
Aeration  23/ 60
```

Aeration Time Screen

```
Aeration Mins:
[ 60]
```

This screen allows the aeration time slider (in minutes) to be adjusted by pressing the left and right arrows.

Settling Time Screen

```
Settling Mins:
[ 30]
```

This screen allows the settling time slider (in minutes) to be adjusted by pressing the left and right arrows.

Decant Time Screen

```
Decant Mins:
[ 30]
```

This screen allows the decant time slider (in minutes) to be adjusted by pressing the left and right arrows.

Sludge Time Screen

```
Sludge Secs:
[ 20]
```

This screen allows the sludge time slider (in seconds) to be adjusted by pressing the left and right arrows.

Dosing Time Screen

```
Dosing Secs:
[ 30]
```

This screen allows the dosing time slider (in seconds) to be adjusted by pressing the left and right arrows.

Pump Mode Screen

```
Pump Mode:
  AUTO    [MANUAL]
```

This screen allows the pump mode to be changed by pressing the left and right arrows.

Alarm Test Screen

```
Alarm Test:
Press OK to star
```

This screen allows an alarm test to be performed. Press the OK button to start the test.

```
Alarm Test:   112
Press OK to canc
```

The alarm test will run for 120 seconds unless the OK button is pressed again to cancel.

Phase Skip Screen

```
Skip to Settling
     Press OK
```

This screen allows the user to make the system skip to the next operating phase. Press the OK button to skip between aeration, settling and decant.

Special Menu

The special menu provides access to advanced settings for the system. Only trained technicians should adjust these settings.

To access the special menu go to the main screen and then press and hold the down arrow for 2 seconds. To exit the special menu simply press the down arrow until the menu returns to the main screen.

Priming Time Screen

```
Priming Mins:
◄[  5]■■■■■■■■■■■■
```

This screen allows the priming time slider (in minutes) to be adjusted by pressing the left and right arrows.

Decant On Time Screen

```
Decant On Mins:
■■◄[ 15]■■■■■■■■■
```

This screen allows the decant on time slider (in minutes) to be adjusted by pressing the left and right arrows.

Reset Screen

```
Reset all values
    Press OK
```

Pressing OK will reset all settings to their default values, as outlined in section 8.

Menu Timeout

If no key is pressed for 5 minutes the menu will automatically revert to the main screen. This ensures that when a person approaches the unit they are always presented with the appropriate status information, rather than settings.

This function is only available on firmware version 1.04 onwards.

7 Remote Alarm Plate

Introduction

The remote alarm plate allows the owner/operator of the waste treatment system to monitor the system status from a location up to 100m from the treatment plant. It is designed as a standard Clipsal 2000 series wall plate so that it suits a domestic location.

The following diagram shows the remote alarm plate layout.
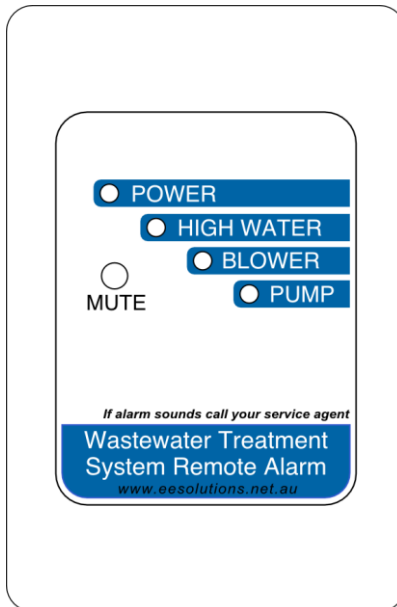
Installation

> The connections between the EES70 and the remote alarm plate may be run in the same conduit as the mains power supply to the treatment plant, so long as **both** cables are insulated for mains voltage.

> Poor electrical connections and/or connections exposed to moisture can result in intermittent operation of the remote alarm plate.

The remote alarm plate is designed for ease of installation and as such only has two wires to connect. Power and a signal is sent over the same pair of wires, which are not polarity conscious so it does not matter which way around they are connected.

The remote alarm plate can be located up to 100m from the treatment controller. In order to avoid excessive voltage drop it is recommended that a minimum of 1mm² cable is used. Ensure that the cable insulation is rated for a minimum of 300VAC.

Because a data signal is sent to the remote alarm plate, it's important that good connections are maintained. Ensure that screw terminals are free of corrosion and tightened appropriately and that there is no opportunity for moisture to enter the conduit or junction boxes. Both of these can cause intermittent problems with the alarm plate operation.

Operation

The remote alarm is powered up whenever the treatment controller is on. During normal conditions the green power LED will be lit and blink approximately twice per second.

If any of the three alarms is activated then the corresponding LED on the remote alarm plate with also be lit and the inbuilt buzzer will begin to sound.

The buzzer can be muted at any stage by pressing the mute button. In order to comply with Australian Standards the mute is self resetting and after 12 hours if the alarm is still present the alarm will begin to sound again. Pressing the mute button again repeats the process.

If the system loses power then an onboard backup battery will allow the alarm plate to continue functioning for up to 24 hours. All LEDs (including the power LED) are switched off to conserve power, but the power LED will flash once every few seconds and the buzzer will sound to indicate a power failure.

Custom Labels

The front face of the remote alarm plate uses a specially produced, hard wearing label supplied as shown in the previous diagram. For service operators who service a number of systems EE Solutions can design and produce custom labels with the service operator's logo, preferred colours and phone number.

The adjacent diagram is an example of such. Please contact Electronic & Electrical Solutions for more information and pricing.
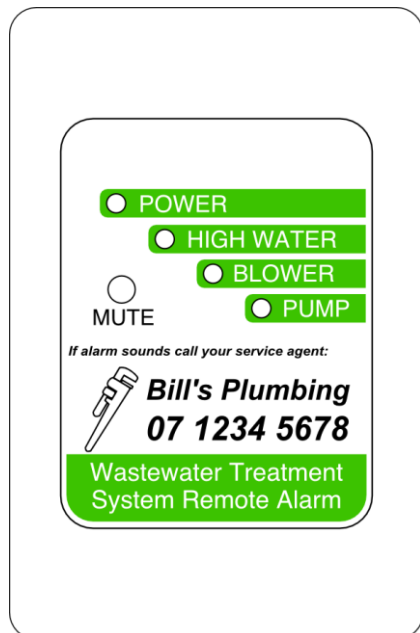
8 Specifications

Size (excluding mounts):	230 x 222 x 90mm
Weight:	1850g
IP rating:	IP51 (only valid when blower and pump are connected)
Supply voltage:	230VAC +/- 10%, 50Hz
Power draw (controller only):	30W Max
Blower output:	230VAC, 3A max current
Pump output:	230VAC, 5A max current
	Note: Blower and pump combined current draw must not exceed 8A
Decant output:	12VDC nominal. 350mA max current
Sludge output:	12VDC nominal, 400mA max current
Dosing pump output:	12VDC nominal, 350mA max current
Strobe output:	12VDC nominal, 250mA max current
Remote alarm output:	100Hz asynchronous serial signal superimposed on 12VDC nominal. Current limited to 90mA.
Float switch input:	12VDC into 1200Ω input impedance

Default Settings

New units will be supplied with the following settings. In addition, all settings will be changed to the following when "Reset all values" is selected.

Aeration Time	60 minutes
Settling Time	40 minutes
Decant Time	30 minutes
Pump Mode	Manual
Pump Run Time	30 seconds
Sludge Time	0 seconds (disabled)
Dosing Time	0 seconds (disabled)
Prime Time	5 minutes
Decant On Time	15 minutes

9 Warranty

Standard Warranty Terms and Conditions: Manufacturers Warranty

1. Electronic & Electrical Solutions Pty Ltd warrants that, during the warranty period this product will be free from faulty parts, manufacture or workmanship when used within normal operating conditions.

2. The warranty period for the EES70 Waste Treatment Controller is 12 months from the date of purchase.

3. The warranty does not apply where damage is caused by other factors, including:

    (a) abuse, mishandling, accident or failure to follow operating instructions.
    (b) exposure to liquid or infiltration of foreign particles exceeding the IP rating of the unit.
    (c) servicing or modification of the EES70 other than by Electronic & Electrical Solutions.
    (d) use of the EES70 with other accessories, attachments, parts or devices that do not conform to the specifications laid out in this manual.
    (e) damage during shipment.

4. Any repair work carried out will receive a further 12 month warranty. A fresh warranty does not apply to any parts not repaired.

Warranty Claim Procedure

1. You must inform Electronic & Electrical Solutions as soon as the warranty claim arises.

2. Once authorised, return the unit (at the customer's cost) to Electronic & Electrical Solutions to be assessed and repaired. Ensure that all contact information and a written fault description are included.

3. The unit will be assessed and, as appropriate, either repaired or replaced. It is then returned to the customer at the cost of Electronic & Electrical Solutions.