In Vessel Composter Operating Manual

Food Waste to Resource

imc

Contents

Introduction

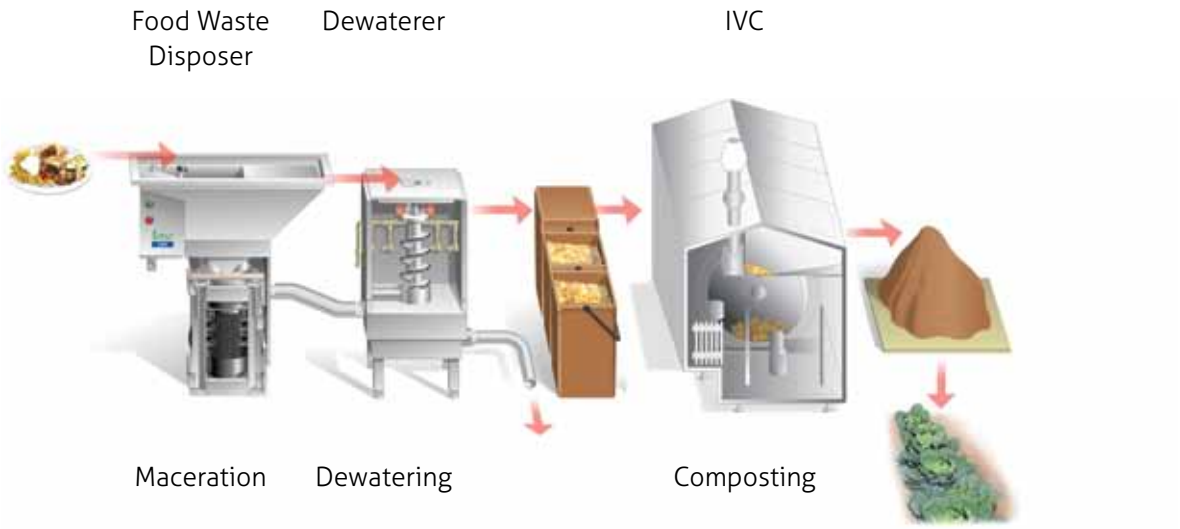
Congratulations on purchasing your new IMC In Vessel Composter (IVC).

By using this machine you are able to eliminate your food waste disposal costs and convert the waste into a valuable resource whilst also caring for the environment in a responsible way.

Your IVC recycles catering food waste, that has first been macerated and dewatered, into a high quality compost.

IMC manufactures a range of models to handle the varying amounts of food waste that is produced by differing sizes of catering establishment. Your chosen model of IVC has been selected to reflect the amount of food waste that you produce.

All IMC IVCs operate in exactly the same way and are equipped with the same functions. Model IVC7000 is additionally fitted with a heater blanket as standard.



This Manual provides comprehensive information on how to operate the IVC and includes a number of Appendices and Working Documents that should be referenced on a daily basis by the operator of the IVC.

Overview

Your IMC In Vessel Composter (IVC) comprises a horizontally aligned drum with fixed ends. The drum is rotated periodically in order to aerate the contents and enable the contents to gradually move from one end of the IVC to the other.

Macerated and dewatered food waste is first mixed with compressed sawdust pellets before being loaded into the IVC. The biological process by which the food waste is converted into compost creates heat which is sufficient to destroy any pathogens present, thereby enabling all food waste, including raw and cooked meat and fish, to be processed.

It takes approximately 6 to 10 weeks for the material to move along the full length of the drum during which time it is converted into compost that dispenses automatically from the IVC.

The composting process, including maceration and dewatering, reduces the volume of waste material by over 90% - so one tonne of wet, kitchen food waste is typically converted into between 20kg and 50kg of compost.

Your resultant compost will be biologically safe to handle. However, it will need to be further matured for up to 12 weeks before being used.

Remember, though, that if you put rubbish in, you'll get rubbish out. Bottles, cans and rubber bands do not compost!

Capacities and specifications

IVC model capacities & specifications

Model	IVC2700	IVC4100	IVC7000
Max Capacity (kg)*	859	1,305	2,227
Capacity volume (cu m)	1.534	2.329	3.977
Capacity volume (litres)	1,534	2,329	3,977
No. kgs food waste (dewatered) / day*	27-40	40-60	80-125
No. kgs food waste (dewatered) / week*	189-280	280-420	560-875
Pellets - weekly max (kg)*	47-70	70-105	140-219
No. tonnes food waste (dewatered) / annum*	10-15	15-22	29-46
Measurements - IVC			
Length (mm)	2,960	3,960	4,400
Width (mm)	1,080	1,080	1,400
Height (mm)	1,284	1,284	1,690
Weight – empty (kg)	575	700	1,150
Max weight – full (kg)	1434	2,005	3,377
Measurements - hopper			
Length (mm)	785	785	785
Width (mm)	800	800	800
Height (mm)	1,284	1,284	1,450
Loading height (mm)	930	930	1,020
Capacity volume (cu m)	0.052	0.052	0.052
Capacity volume (litres)	52	52	52
Capacity (kg)	40	40	40
Connections			
To ventilation (mm)	110	110	110
To drainage (mm)	54	54	54
Outlet height (mm)	660	660	705
No. feet	6	8	10
Electrical supply & Operation			
Voltage range	380-415	380-415	380-415
Phase (5 wire) supply	3 phase	3 phase	3 phase
Frequency (Hz)	50	50	50
Amps (max)	10	10	16
Decibel (dB) during operation	55	55	55
Memory stick capacity (Gigabyte, GB)	1	1	1
Motor – compost cylinder (kW)	0.37	0.37	1.1
Motor – hopper auger	0.55	0.55	0.55
Fan (kW)	0.04	0.04	0.04
Air Heater (kW)	0.5	0.5	0.5
Heater blanket - optional for IVC 2700 & 4100 (kW)	2	2	2
Total (kW)	1.46	1.46	4.19
Energy consumption - typical winter (total kW/day)	60.48	60.48	60.72
Energy consumption - typical summer (total kW/day)	0.48	0.48	0.72
Running Cost with heater (total 24hr period)	£3.33	£3.33	£3.34
Running Cost) without heater (total 24hr period)	£0.05	£0.05	£0.08

Energy consumption figures assume a run time of 1 minute and a wait time of 2 hours during which the fan runs at 20%. The thermostatically controlled air heater switches on when the ambient temperature falls below 6ºC.

* The above max capacities are an indication only and should be calculated for each individual site.

The max capacity of the IVC is influenced by a number of variable factors including but not limited to:-

– content / mix of food waste

– WastePro auger screen type

– IVC fill level

– IVC drum stir time, dwell time and filling ratio

– IVC fan speed

– biological process

Safe use

Safe Use

IMC IVCs are manufactured to ISO9001 Standards and are CE-marked. They therefore meet a high standard of quality and safety.

It is the responsibility of the customer to ensure that the IVC is located in an area where it will not create a hazard to users or passers-by and where it will satisfy any legislative requirements. The customer should also ensure that the food waste can be transported efficiently from its place of origin to the site of the IVC.

Safety Information

Mains Isolator

The cable delivering mains power supply to the IVC must be fitted with a CE plug or lockable switch upon installation (Mains Isolator).

Whenever accessing the inside of the drum or hopper, the Mains Isolator should be turned off.

Safety Interlocks

The IVC is fitted with safety interlocks on the drum inspection hatches. Whenever these parts are opened, power to the motors is shut off.

Emergency Stop

The IVC is fitted with an Emergency Stop button, located on the same side of the IVC as the Inspection Hatch(es).

Warning System

The IVC is equipped with a "Traffic Light" Warning System that enables users to easily establish the operational status of the IVC.

Thermal Protection

At temperatures in excess of 60°C the air heater is automatically switched off.

Time Delay

The in-feed hopper auger screw operates only when the hopper lid is closed.

Safety Instructions

Safety Messages are displayed on the screen of the Control Panel; for more information please refer to the section under "Control Panel".

The IVC should be installed by qualified personnel only.

The IVC should be operated by personnel holding a valid IMC Training Certificate only and not under any circumstances by children.

The Mains Isolator should be off and the lock-off system implemented whenever the IVC is serviced or repaired or the covers of the IVC are removed.

The contents of the drum should be emptied before performing any work on the inside of the drum.

The drum should not be filled above the recommended filling level.

Materials other than those described in Section 8 should not be loaded into the IVC.

Gloves should always be worn when handling the IVC, the waste food or the compost.

Safety Protection

IMC can supply food waste collection bins which, when full, meet UK Health & Safety regulations for lifting and carrying.

Risk Assessments

The customer should ensure that all required Risk Assessments are prepared.

Legislation

It is the responsibility of the customer, irrespective of country of location, to ensure that the site fulfils its local and/or national obligations to satisfy the appropriate legislation that impacts on the management of its food waste.

Further information can be found in the Supplement.

Safe System of Work

It is the responsibility of the customer to identify, implement and monitor a Safe System of Work.

IMC provides a list of daily, weekly and monthly checks and actions that should be followed. These are detailed in this Manual and can also be accessed through the IVC's Control Panel.

IVC Operational Risks

The IVC operates on a pre-programmed timer basis and power should be cut to the IVC before any works can be performed on it.

See above Safety Information and Safety Instructions for further details.

Food Waste Spillages

Accidental spillage of wet food waste should be cleared up as soon as practicable in order to prevent any possibility of slipping on the waste or attracting vermin and flies (after prolonged exposure).

The flooring on which the IVC is located should be easily washable with easy access to a water supply and efficient dispersal to drain.

Pest Control

Any food waste stored prior to loading into the IVC should be contained within lidded bins in order to prevent its attraction to vermin and flies.

Food Waste Pathogens

Food waste should only ever be handled using gloves. It is recommended that protective clothing should also be worn.

The composting process achieves temperatures above the level at which pathogens ecoli and salmonella can survive.

Biohazards

Unlike large, municipal scale In Vessel Composters, IMC IVCs are very small and any exposure to any fungus or spores etc present in food waste is minimal. Inspections of the biological process, by opening up the hatches to the cylinder, should be conducted according to the details of the Check List.

Foreign Objects

Care should be taken to ensure that there are no non-food items in the food waste, such as glass, can lids and utensils. However, gloves should be worn at all times to minimise any risk of injury.

How does it work?

How does it work?

Maceration and dewatering

Performance of the IVC is optimised by first macerating and dewatering the food waste using an IMC Food Waste Disposer and Dewaterer.

By homogenising the waste particle size and reducing the moisture content, the food waste is presented to the IVC in a form on which the micro-organisms that decompose the waste can flourish.

Composting

The IVC uses aerobic conditions to allow the bacteria that are naturally present in food waste to decompose the material. This biological process is facilitated by the provision of 5 key elements:- **oxygen** and **heat**, provided by the IVC, and the right balance of **carbon, nitrogen** and **moisture** supplied by the dewatered food waste and by the addition of compressed sawdust pellets at the prescribed ratio.

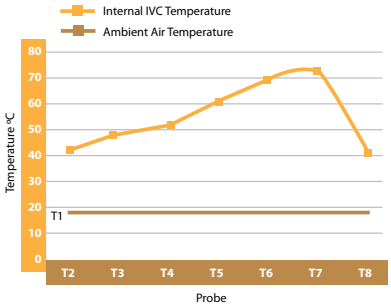
Oxygen

A fan draws the air from the void between the drum and shell of the IVC into the cylinder in order to aerate the material in the vessel. Periodic rotation of the drum provides further aeration of the contents.

Heat

The biological activity in the drum generates temperatures of up to, and sometimes even beyond, 70ºC, thereby easily surpassing the temperatures at which pathogens such as ecoli and salmonella can survive. Temperatures are recorded by probes along the length of the inside of the drum and displayed on the Control Panel screen which can be used to establish if the biological process is functioning efficiently. The first probe in the IVC records the ambient temperature and activates the on-board air heater if the temperature falls too low.

Hot zones within the IVC are not always picked up by the probes. By opening the inspection hatches the temperature can be manually recorded using a hand-held probe.



Typical in-vessel temperatures

Carbon and Nitrogen

Food waste in its natural form is too rich in nitrogen to be used to produce compost which typically requires a ratio of around 25 to 30 parts carbon to one part nitrogen. To increase the naturally present carbon : nitrogen ratio of food waste, it is necessary to add a carbon rich material to the mix.

Compressed sawdust pellets, from untreated softwoods such as spruce and pine, provide the most suitable, low cost source of carbon.

Pellets from sustainably managed forests are available from IMC tel 01978 661155

Moisture

The moisture absorbent properties of the compressed sawdust pellets reduce any excess moisture content in the food waste to a level that best meets the requirements of the biological process.


Fan
Traffic Light
Warning System
Ventilation Filter
USB Port
Adjustable Feet
Control Panel Screen
Operator Control Box
Hopper Drainage Outlet


Hopper lid
Emergency
stop button
Inspection door
Hopper
Hopper
drainage
filter
Compost
outlet
chute

The composting process

The Composting Process

Food waste that has been macerated and dewatered, together with compressed sawdust pellets, are loaded into the hopper from which an auger screw pushes the waste mix into the front end of the drum. Rotation of the drum enables the contents to displace over the course of several weeks from one end to the other.

The resultant compost material is discharged automatically and collected. It should then be stored for subsequent maturation as required.

One or more inspection hatches along the length of the IVC enable checks to be made on the progress and performance of the biological process.

The hopper is equipped with a drainage hole and filter, through which any excess moisture from the food waste or cleaning fluids can be dispensed to drain.

The air filter can be simply unclipped and removed for periodic cleaning.

Operating Parameters

Key Operating Parameters

IMC IVCs have been designed to be very easy to operate. Each function is controlled by a simple to use Control Panel, with a large digital display for easy legibility.

The composting process is managed through the control of a number of basic operating parameters. These are:-

Stir time

Dwell time

Filling ratio

Fan speed

Each of these parameters is explained in more detail below.

Stir time

This relates to the rotation of the drum during which the material inside is aerated using the air that is drawn in by the fan operating at full speed. It takes approximately 110 seconds for the drum to rotate one full turn.

As a result of rotation the temperature in the drum can change temporarily by up to 5ºC. However, bacterial activity subsequently increases rapidly following rotation.

Normal (default setting) Stir Time = 1 minute

Note: Without oxygen, the biological process may die and the temperature will drop. However, rotating the drum too often can result in a fall in temperature. Please consult the Chapter on "Trouble Shooting" for further guidance.

Dwell time

This relates to the period for which the drum remains stationary in between rotations.

The increased biological activity following rotation results in a rise in temperature. After approximately one to two hours the temperature may start to fall as the oxygen supply declines.

Normal (default setting) Dwell Time = 2 hours

Filling ratio

The drum should be filled to around ¾ of its total capacity. This provides the appropriate level of oxygen to optimise the biological process.

The fill level can be controlled by setting the frequency with which compost material is emptied from the drum by rotating the drum in an anti-clockwise direction. Under normal conditions the drum is set to rotate at a ratio of once anti-clockwise for every five clockwise rotations.

Consequently, the lower the setting of the filling ratio (for example 1:3), the more frequent the emptying, the higher the setting of the filling ratio (for example 1:7), the less frequent the emptying.

Normal (default setting) Filling Ratio = 1 : 5

Fan speed

During wait time the fan rotates at a variable percentage of its full speed.

This is set to help ensure that the material in the cylinder becomes neither too wet, through insufficient aeration, or too dry, through excessive aeration.

Normal (default setting) Fan Speed = 20%

Control Panel

Control Panel

The operation of the IVC and, therefore, the composting process is controlled through the Control Panel that is normally located at the front end of the IVC and can be seen above the in-feed hopper.

Data logging

Your IVC is able to store operating parameters and temperature data.

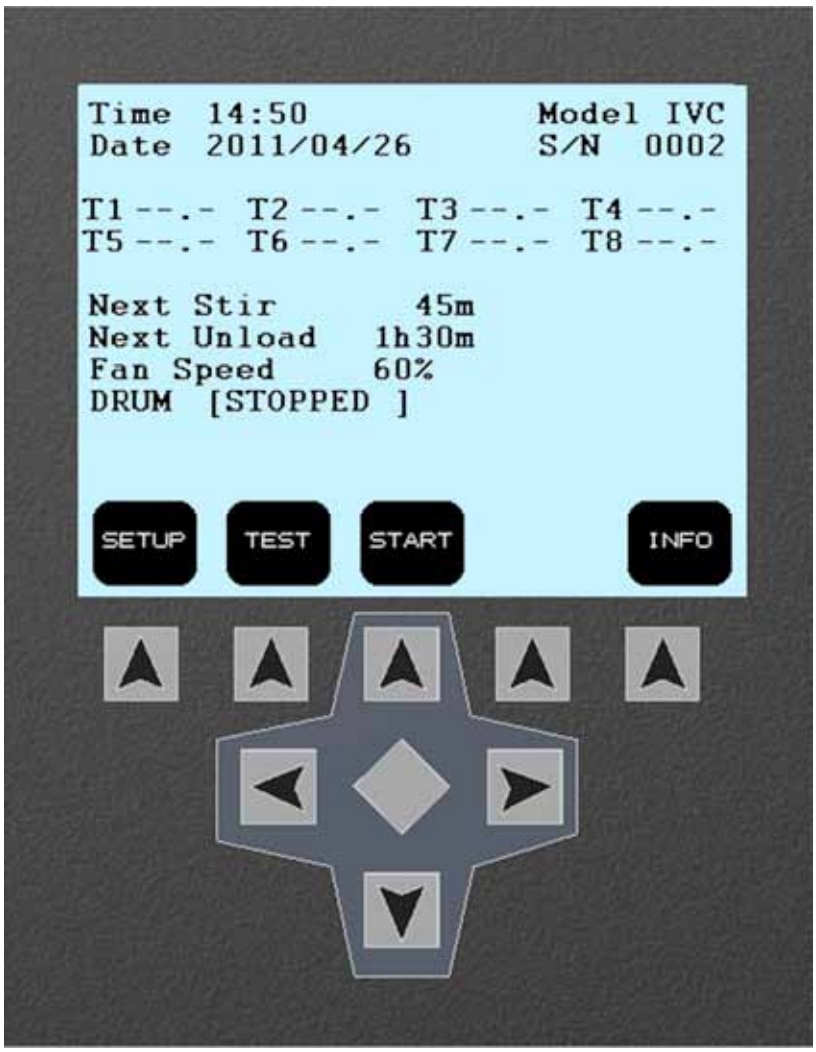
Please refer to the Section under System settings for more details.

Pass Code – Factory pre-set

The Control Panel is equipped with a Pass Code (aka Service Code) to prevent access by unauthorised personnel. Access to the controls requires the correct input of the Code.

Your IVC's Pass Code has been pre-set at **1111**

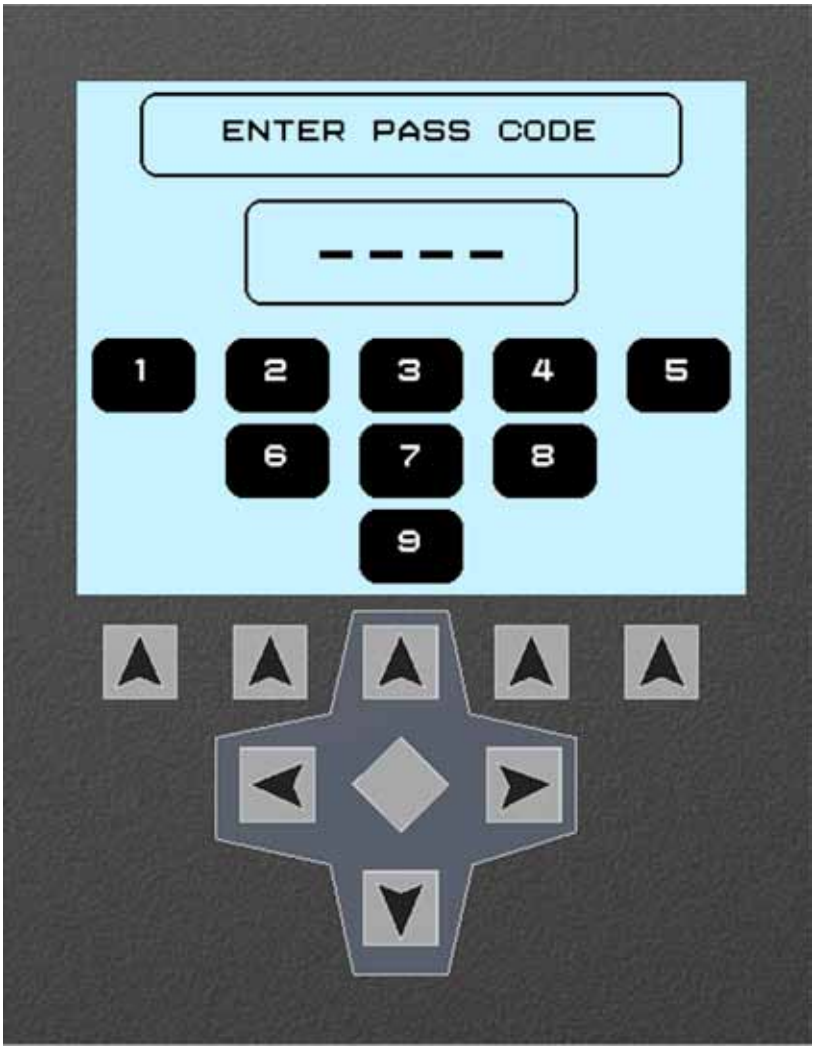
Before you can operate the IVC please enter this Pass Code by following the instructions below:



Keypad Operation

Each of the boxes on screen is accessed by pressing the arrow key positioned immediately beneath the box.

From the screen press **SET UP**.



The position of the figures on screen matches the position of the keys on the keypad.

Use the keys to enter the Pass Code number **1111**.

Please note that if no Control Panel buttons are pressed within 15 seconds the Pass Code must be re-entered.

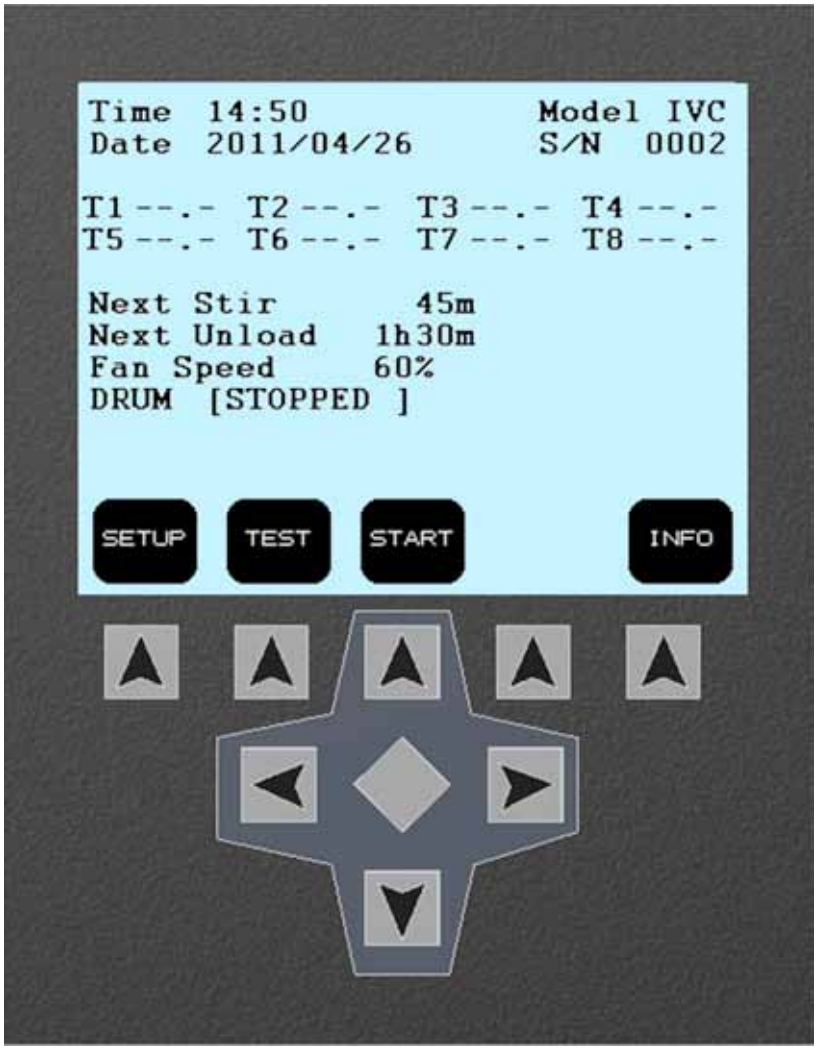
Pass Code – personalisation

To set the Pass Code to your own 4 digit number please refer to the section under System Settings – SYS – "Pass Code Personalisation".

Operating Procedure

Operating Instructions

Access to all of the operating commands via the Control Panel is described in this section.



The home screen displays the current temperature readings for each of the temperature probes and shows the current setting for the IVC for each of the key operating parameters:-

- Next Stir – the period of time before which the drum will next rotate (in a clockwise rotation)
- Next Unload – the period of time before which the drum will next rotate (in an anti-clockwise rotation) and unload compost
- Fan Speed – the speed of rotation of the fan
- DRUM - Current Status of Drum

Control of the settings, and access to all of the information stored by the IVC's computer, can be accessed through the 4 buttons:-

- **SET UP**
- **START**
- **TEST**
- **INFO**

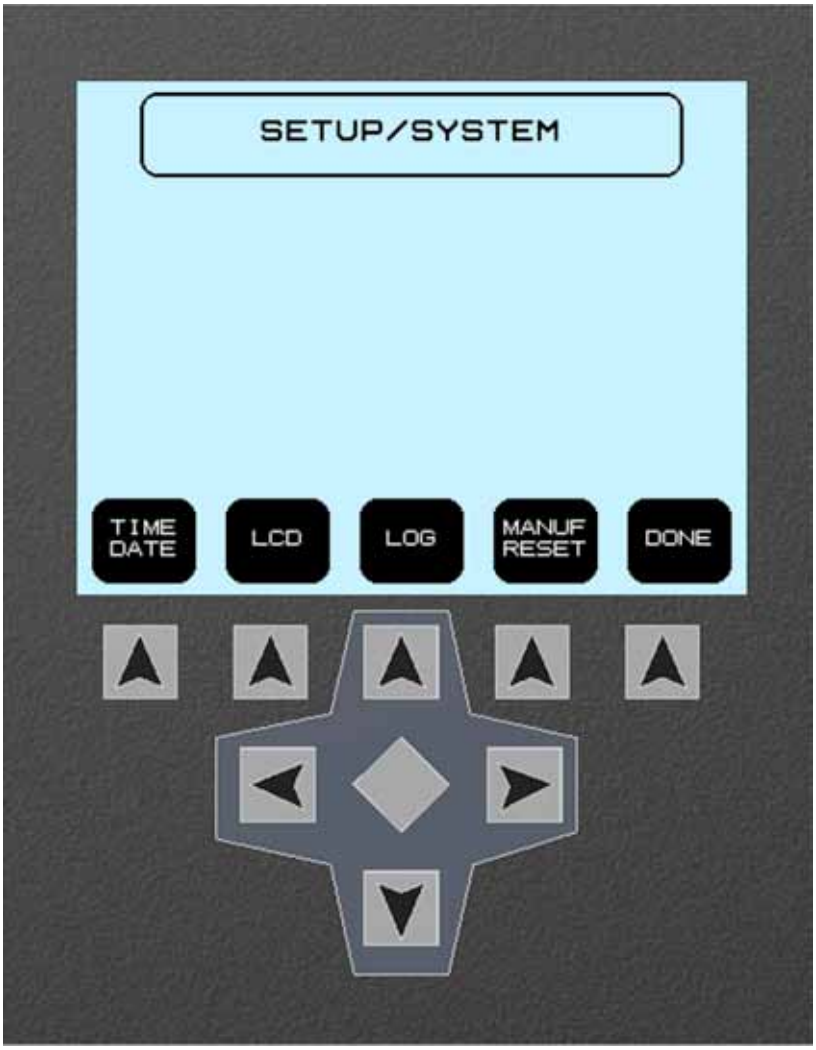
IMPORTANT: Please consider carefully any changes made to the settings as they may have a significant impact on the in vessel composting process.

SET UP

This enables the following key parameters to be set:-

- **SYS** – back light, default settings reset, password change
- **CYCLE** – the frequency of drum rotation
- **AUGER** – the duration of in-feed hopper auger screw rotation
- **FAN** – the speed of fan rotation
- **DONE** – confirms the completion of the above settings

SYS

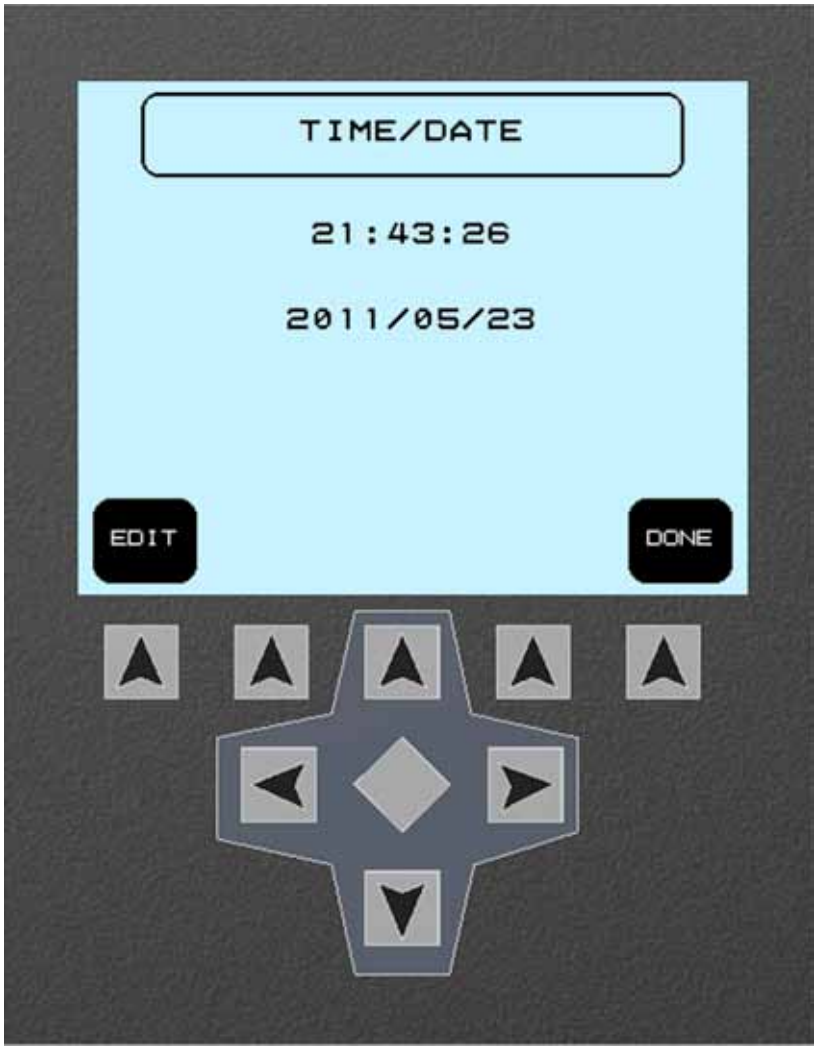


From the SET UP screen press **SYS**.

This enables the following settings to be made:-

- **TIME & DATE** – the current time and date
- **LCD** – the control panel screen display levels
- **LOGGING** – the frequency of data logging
- **MANUF RESET** – the restoration of manufacturer default operating parameters
- **DONE** – confirms the completion of the above settings

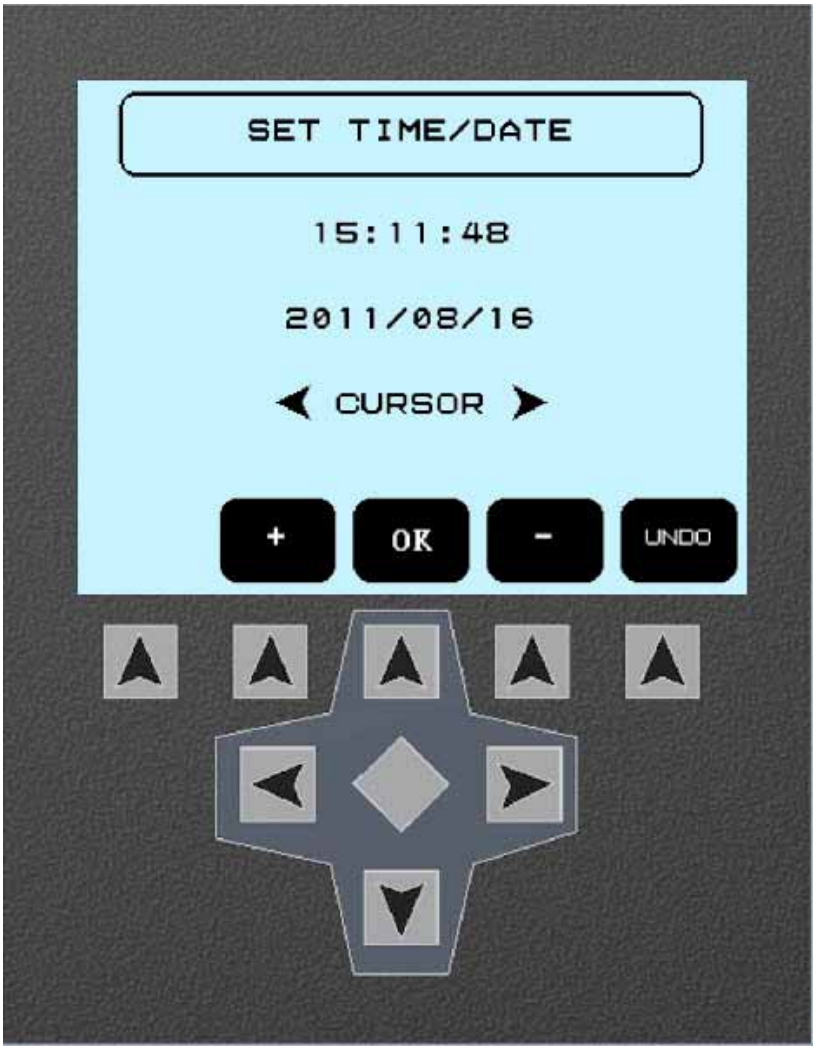
TIME & DATE



Both the time and date are displayed.

The time and date can be set by pressing the **EDIT** key.

SET TIME & DATE

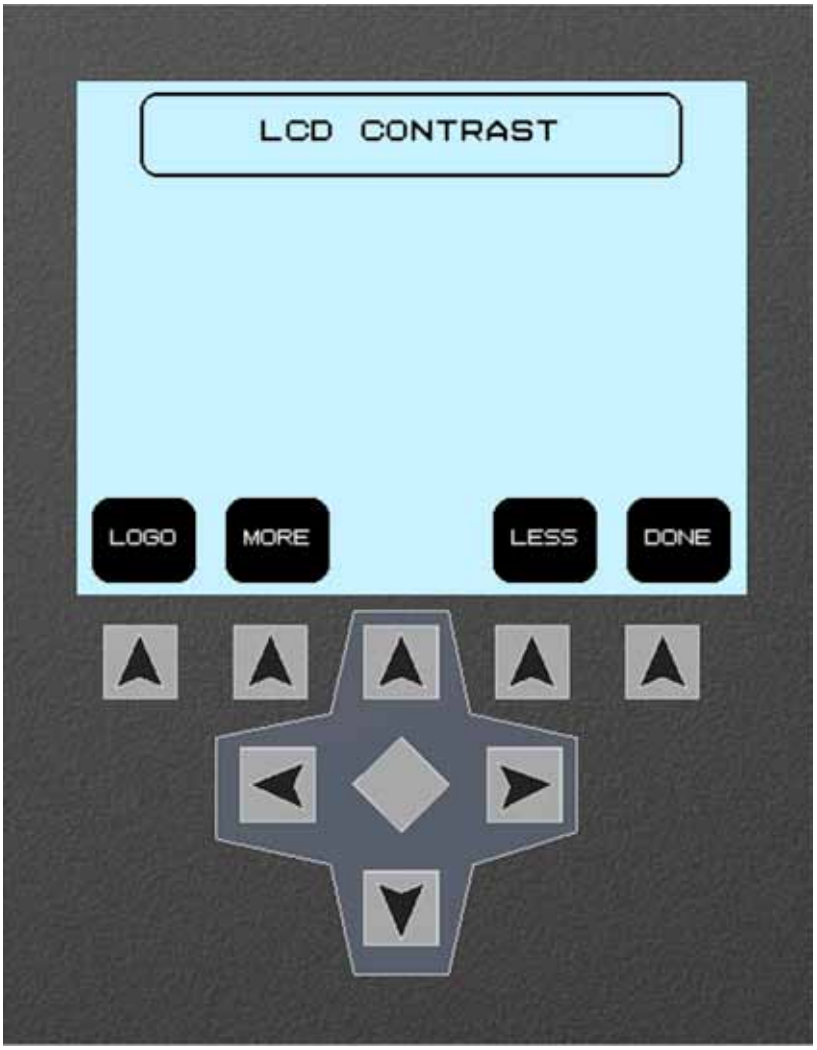


The time and date can be set by using the + or – keys.

Settings can be confirmed by pressing **OK**, followed by **DONE**. See the previous screen.

To start again, for example when an incorrect setting has been entered, press **UNDO**.

LCD CONTRAST

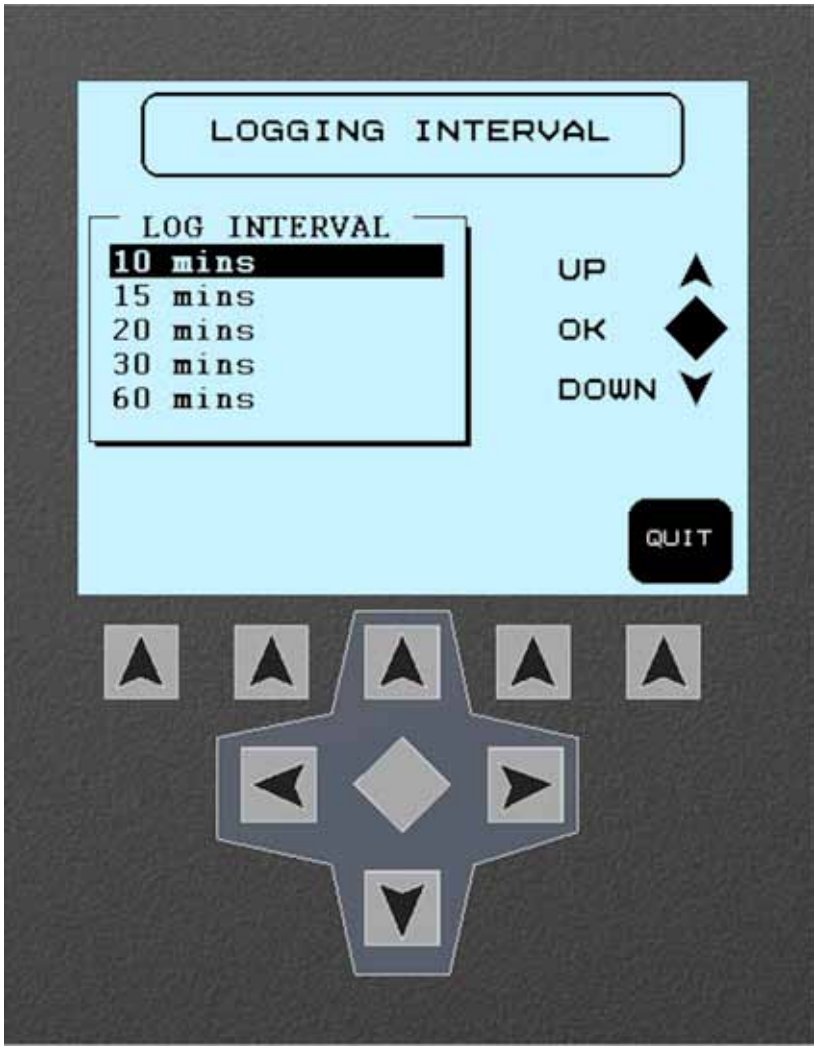


The clarity of the control panel screen display can be adjusted with the **MORE** key (to increase contrast levels) or **LESS** key (to decrease contrast levels) and confirmed by pressing **DONE**.

LOGO

The logo can be viewed as a screensaver by pressing **DONE**.

LOGGING INTERVAL



Your IVC is able to record temperature data for all 8 of the temperature probes as well as any changes that are made to any of the settings.

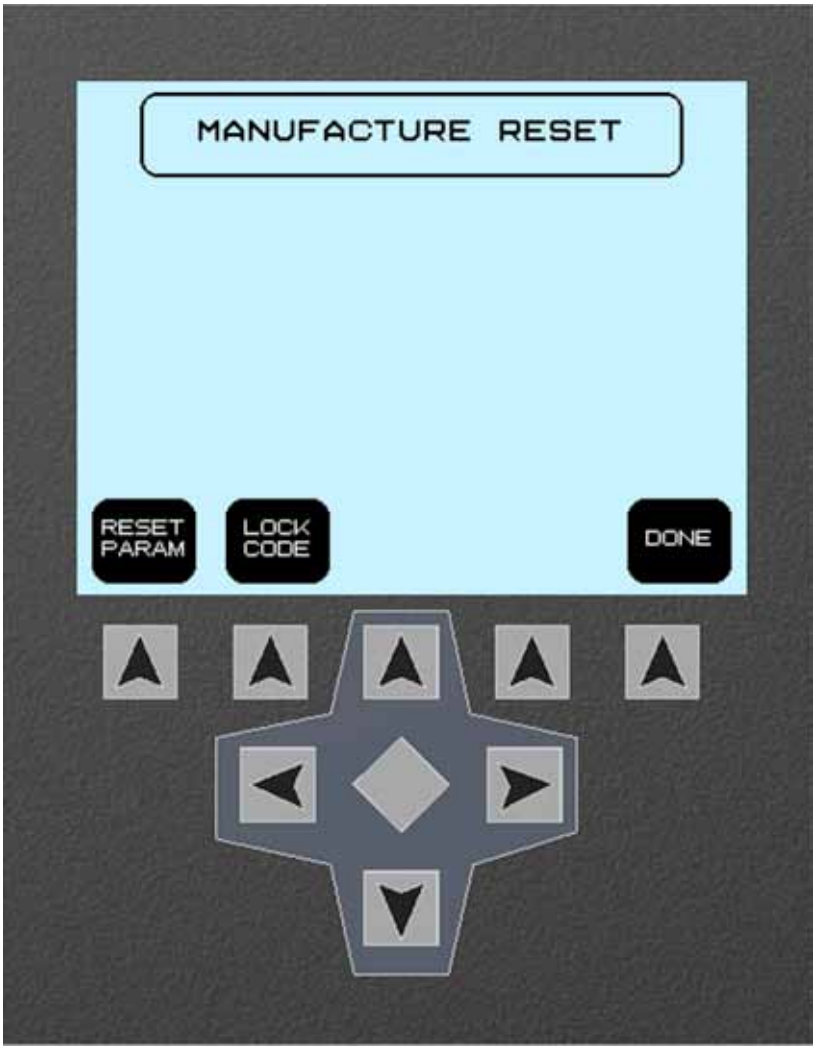
The frequency with which this data is logged can be set at any of the following intervals:-

- 10 mins
- 15 mins
- 20 mins
- 30 mins
- 60 mins

Access to the required setting is made using the **UP** and **DOWN** keys and confirmed using the **OK** key.

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

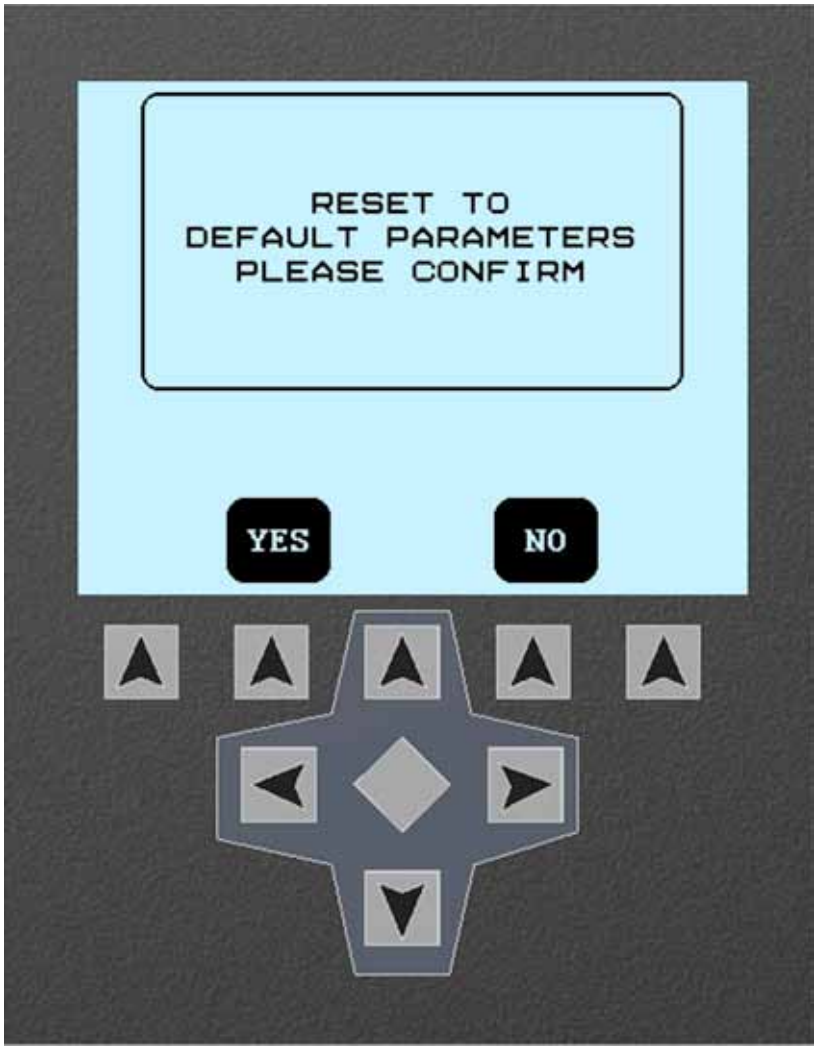
MANUFACTURER RESET



The IVC's operating parameters can be reset. Press **RESET PARAM** to access this facility.

To set your own Pass Code press **LOCK CODE** and follow the instructions under "Pass Code – personalisation".

RESET



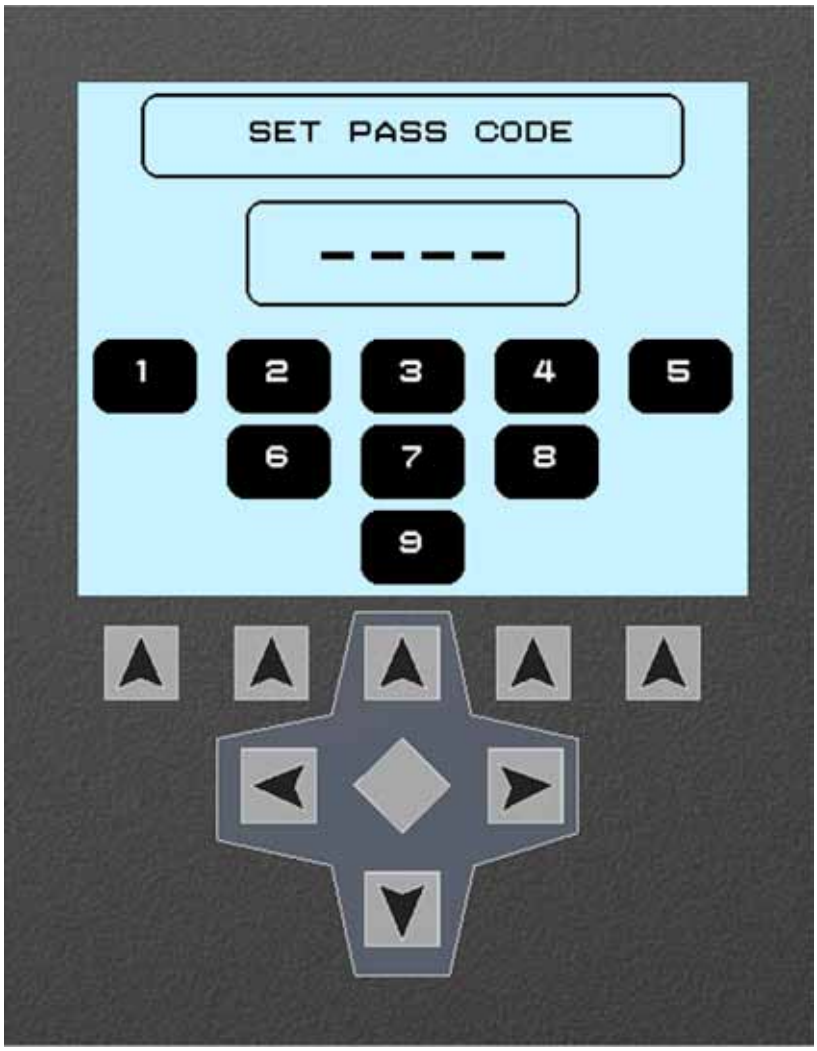
Press **YES** to return to the manufacturer default settings or **NO** to keep the existing settings.

PASS CODE – PERSONALISATION

HOME > SET UP > PASS CODE > SET UP > SYS > SET UP/SYSTEM

MANUF RESET > **LOCK CODE**

To set the Pass Code to your own 4 digit number, please follow these instructions.



The Pass Code can be changed to a user defined code to prevent unauthorised access.

From the **MANUF RESET** screen press **LOCK CODE**.

Use the numbered keys to enter your own 4 digit Pass Code number. (Please note that you can not use the digit "0").

Press **LOCK CODE** to complete the re-setting of the Pass Code.

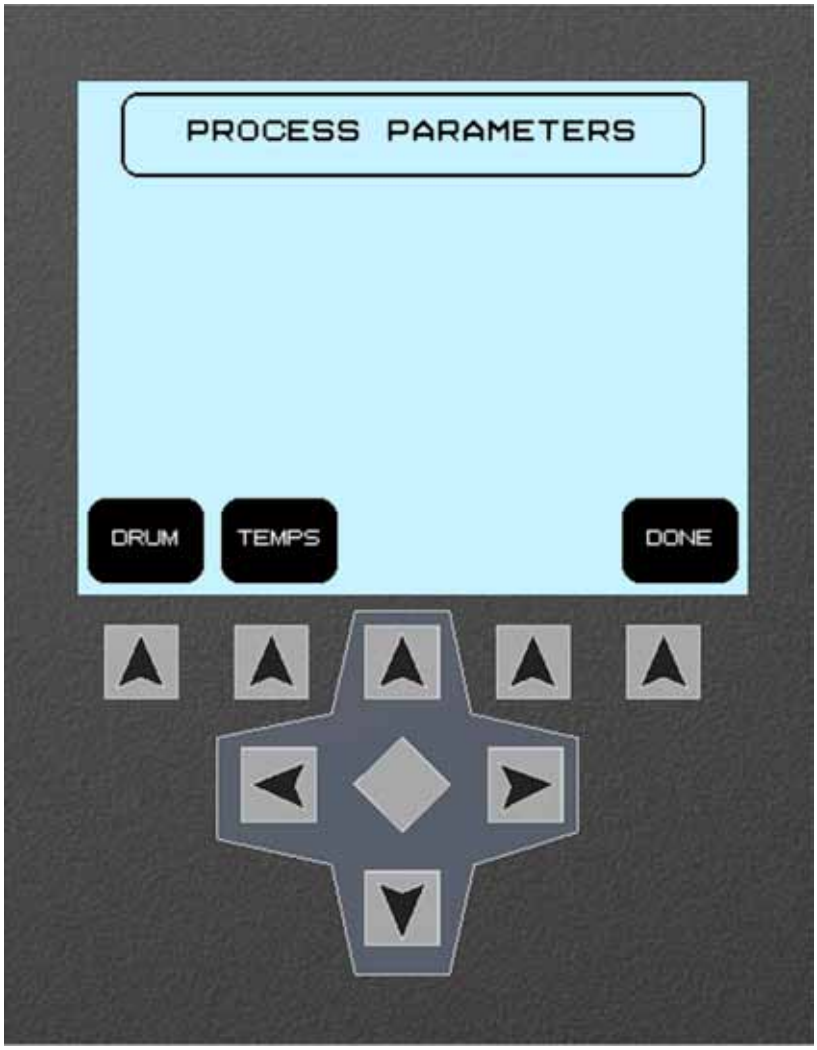
Write down your chosen Pass Code number somewhere safe for future reference.

IMPORTANT – Please record your personal code as only a Service Engineer can re-set the Pass Code.

CYCLE

Press **CYCLE** to be able to access the operating parameters of the drum and the various temperature settings.

PROCESS PARAMETERS



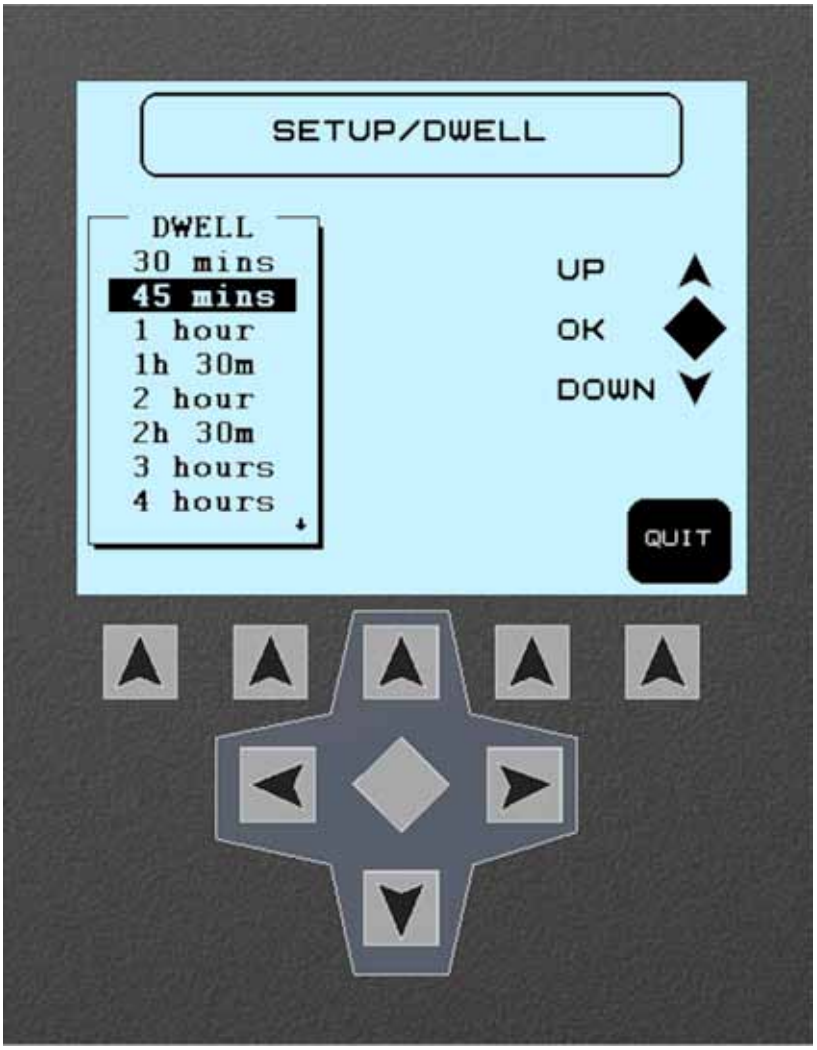
Press **DRUM** to be able to set the operating parameters of the drum.

Press **TEMPS** to be able to adjust the temperature settings.

DRUM CYCLE

From here the following settings can be made:-

• DWELL

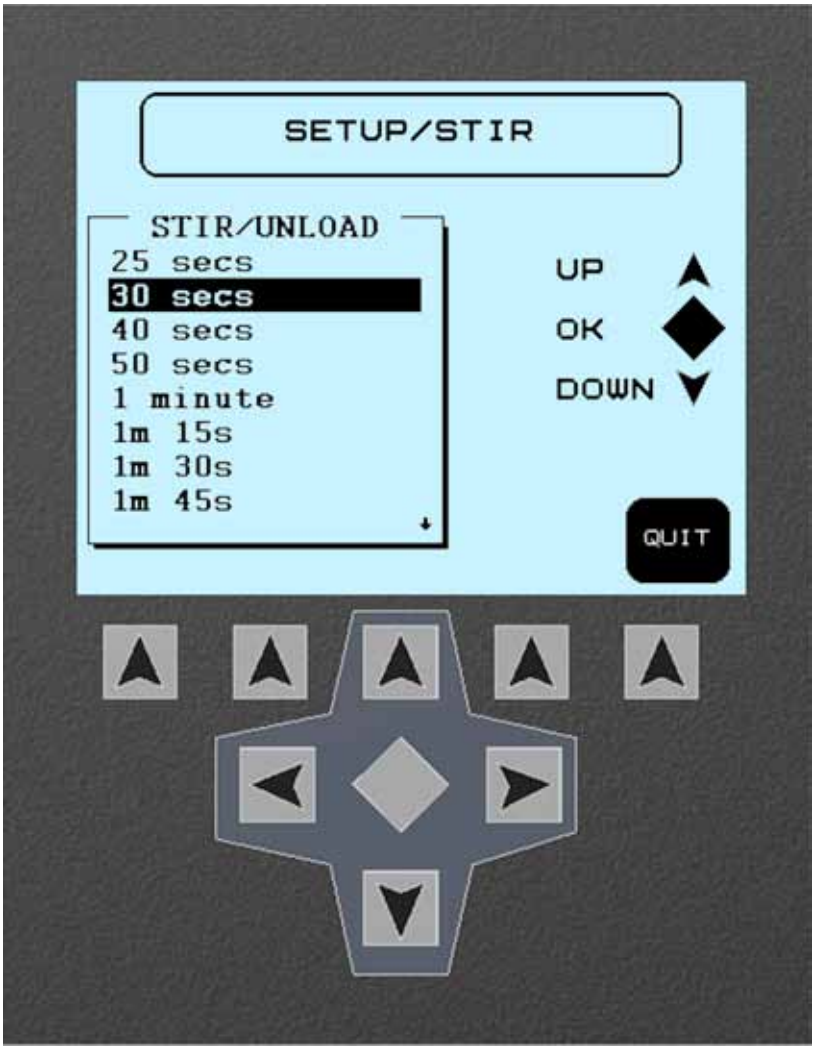


The duration for which the drum remains stationary can be set at any one of the following intervals:-

- 30 mins
- 45 mins
- 1 hour
- 1 hr 30 mins
- 2 hours
- 2 hours 30 mins
- 3 hours
- 4 hours
- 6 hours
- 8 hours
- 16 hours

Access to the required setting is made using the **UP** and **DOWN** keys and confirmed using the **OK** key.

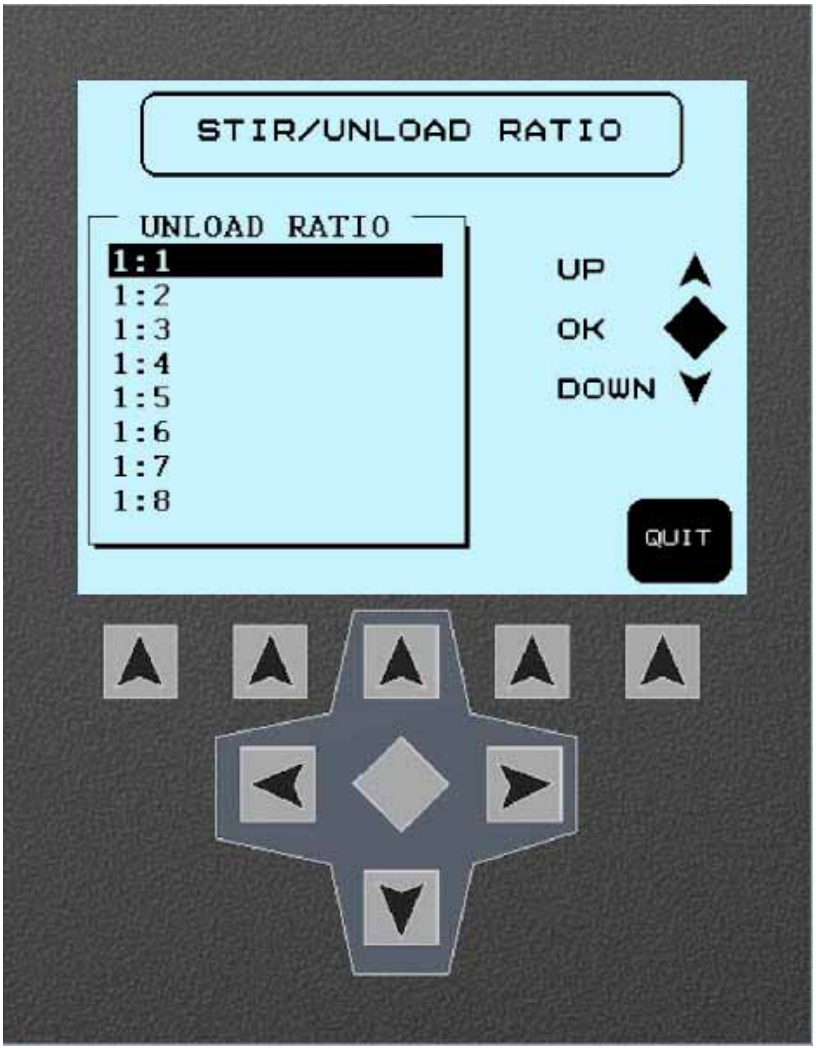
• STIR



The duration for which the drum rotates can be set at any one of the following periods:-

- 25 secs
- 30 secs
- 40 secs
- 50 secs
- 1 min
- 1 min 15 secs
- 1 min 30 secs
- 1 min 45 secs
- 2 mins
- 4 mins
- 5 mins
- 6 mins
- 7 Mins
- 8 Mins

• RATIO

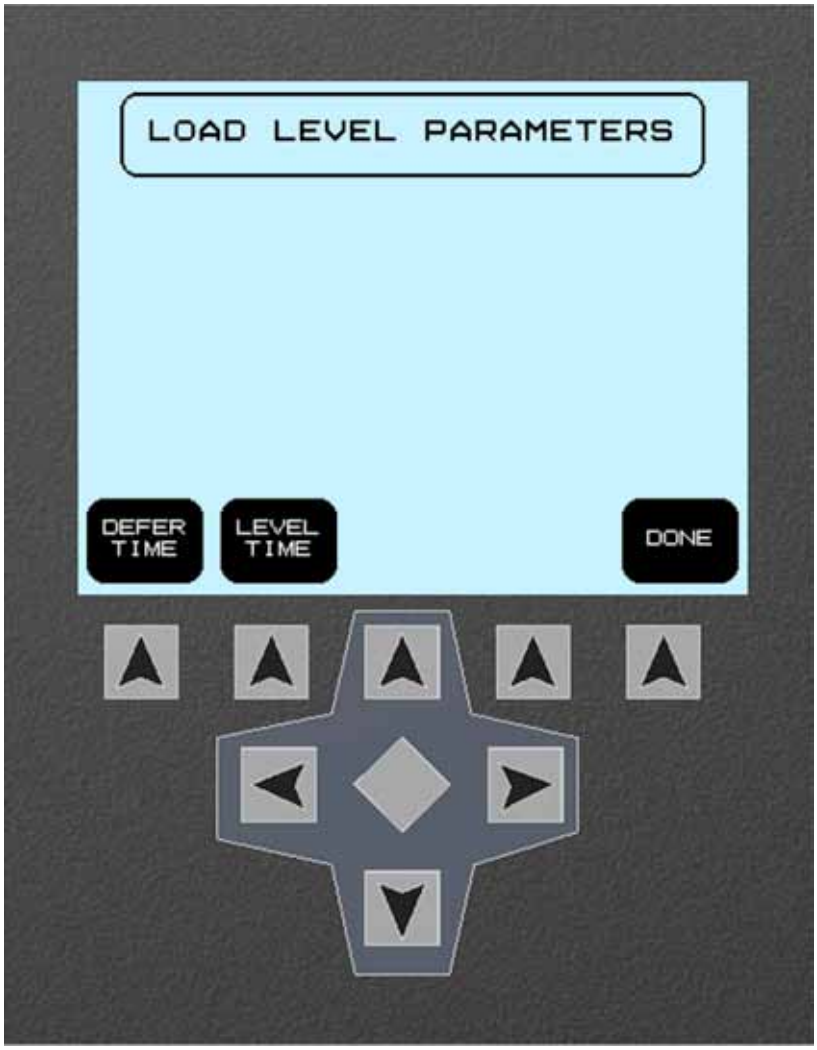


The ratio of the number of fill (clockwise) rotations of the drum to the number of unload (anti clockwise) rotations can be set at any one of the following levels:-

- 1:1
- 1:2
- 1:3
- 1:4
- 1:5
- 1:6
- 1:7
- 1:8

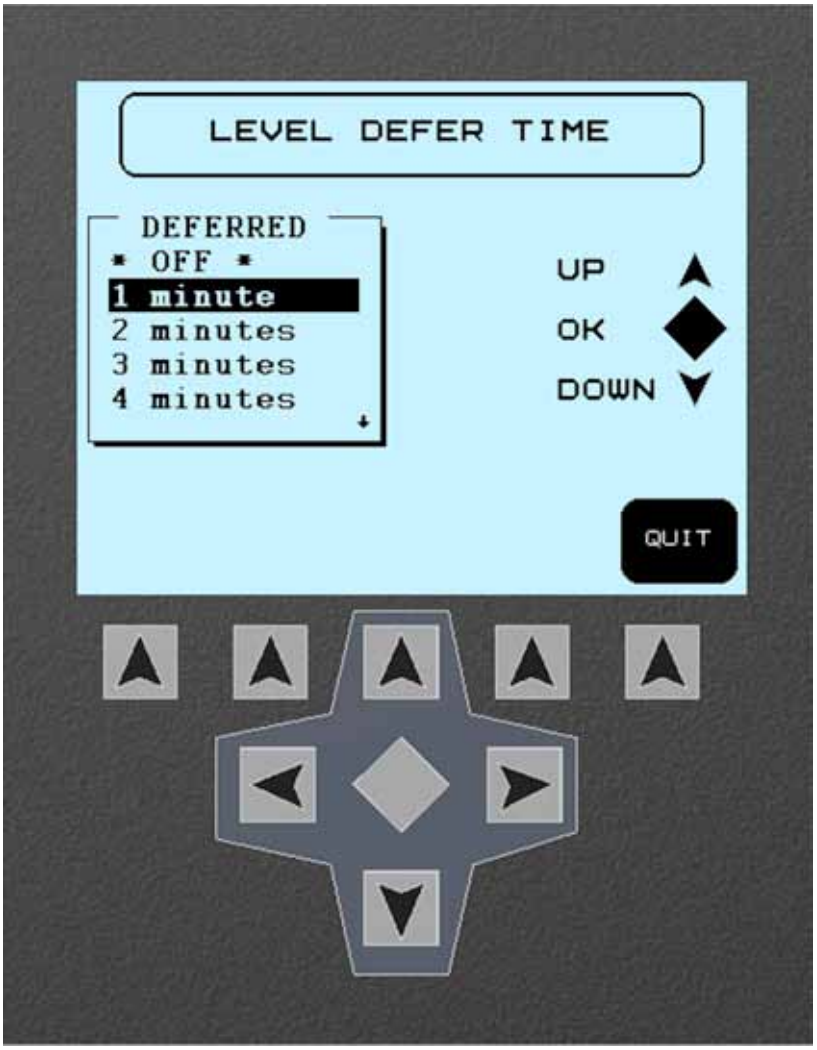
For example a fill ratio of 1:5 means that the drum will rotate anti-clockwise (unload) once for every 5 clockwise (fill) rotations.

• LOAD LEVEL



Both the **LEVEL DEFER TIME** and the **LEVEL RUN TIME** can be set in order to provide greater management control of the settling of the contents of the drum following rotation.

• LEVEL DEFER TIME



It is possible to set the amount of time following drum rotation that should lapse before the drum is rotated in the opposite direction. This procedure allows the contents of the drum to resettle to a flat level.

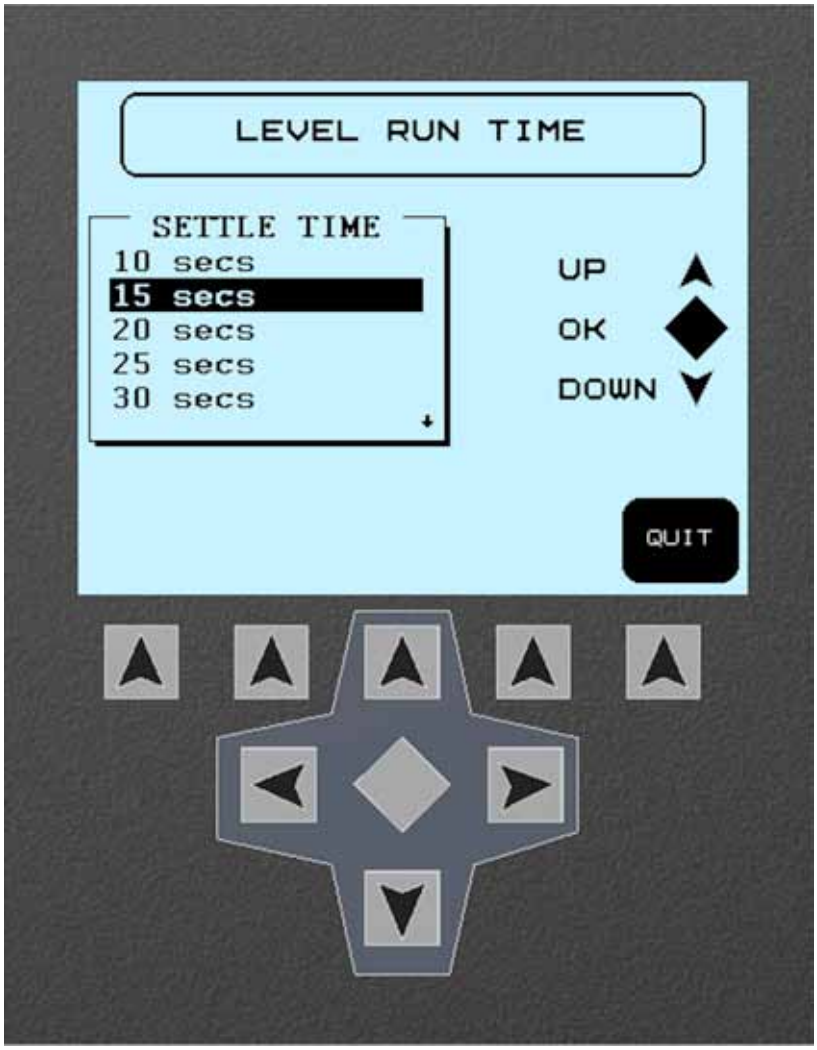
Settings can be made at any of the following:-

- 1 min
- 2 mins
- 3 mins
- 4 mins
- 5 mins
- 6 mins
- 7 mins
- 8 mins
- 9 mins
- 10 mins

Settings are confirmed by pressing **OK**.

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

• LEVEL RUN (SETTLE) TIME



It is possible to set the amount of time following drum rotation for which the drum is rotated in the opposite direction. This procedure allows the contents of the drum to resettle to a flat level.

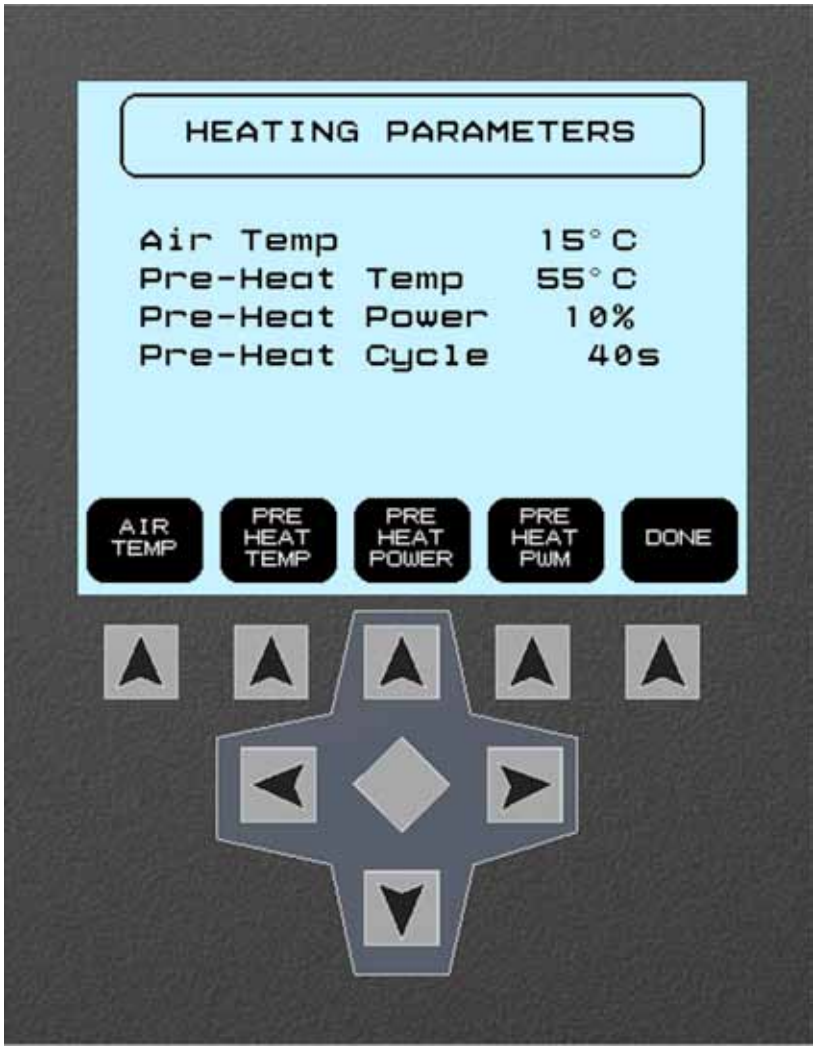
Settings can be made at any of the following:-

- 10 secs
- 15 secs
- 20 secs
- 25 secs
- 30 secs
- 35 secs
- 40 secs
- 45 secs
- 50 secs
- 55 secs
- 60 secs

Settings are confirmed by pressing **OK**.

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

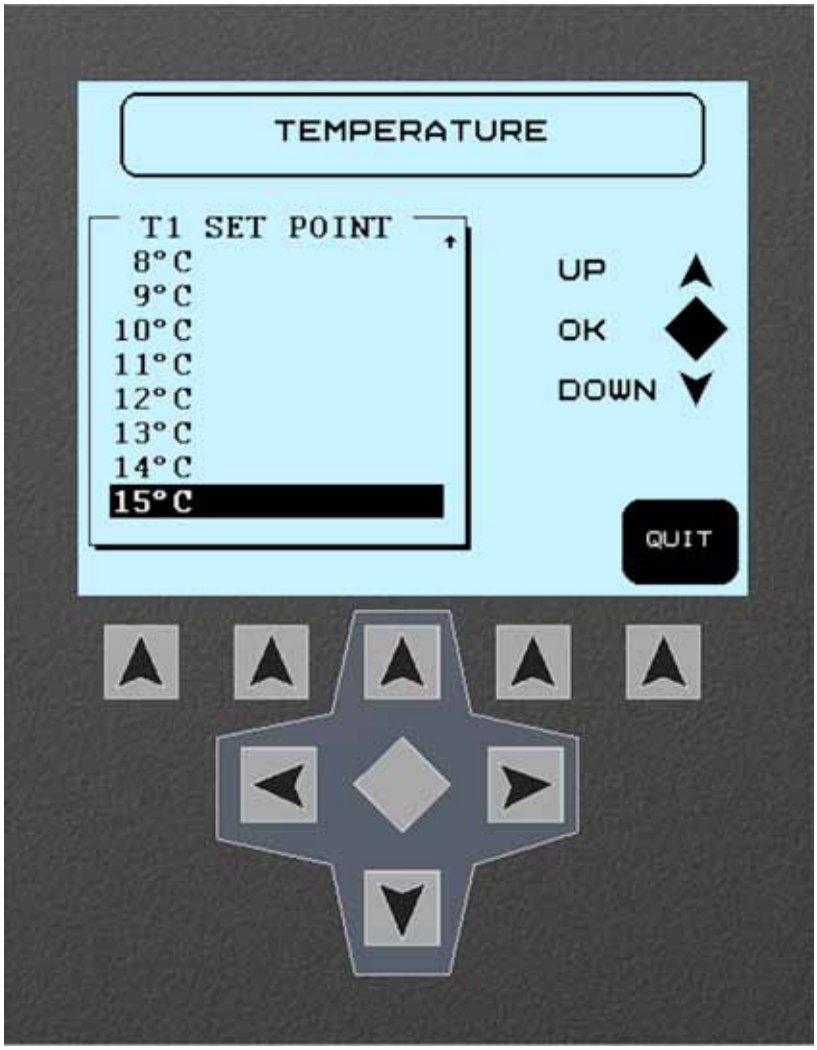
TEMPERATURE



This screen provides information on the various temperatures that can be set.

From here the following settings can be made:-

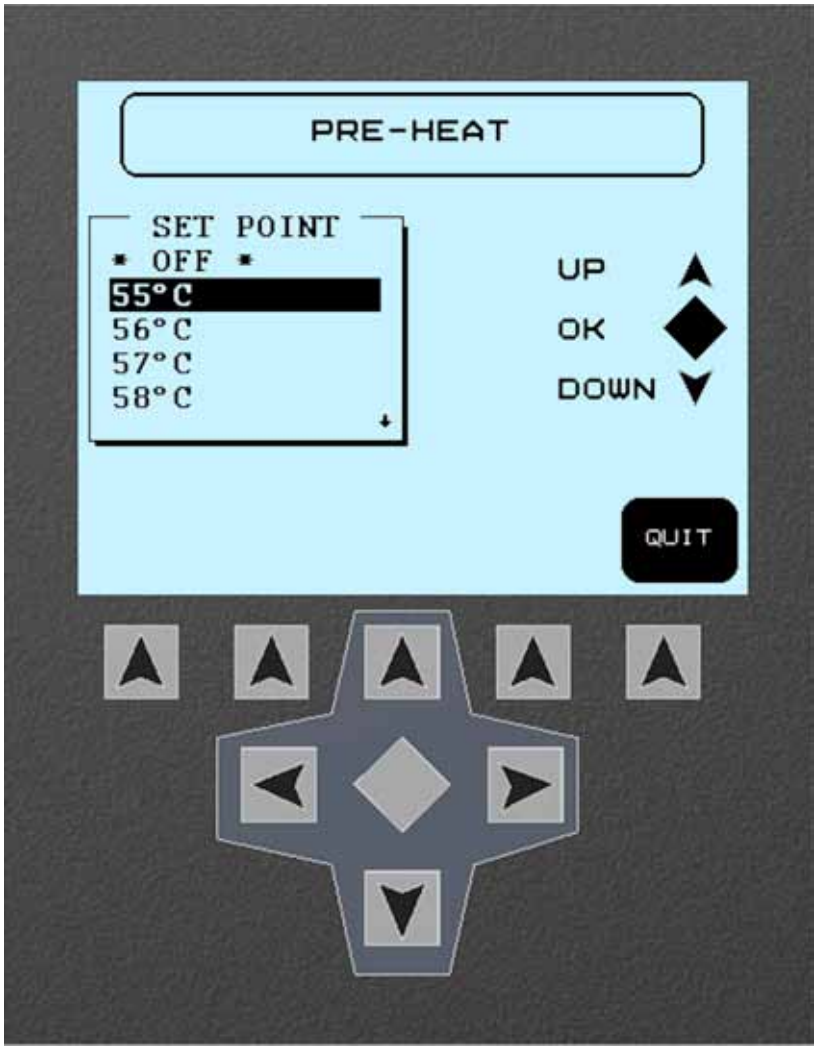
• AIR TEMPERATURE



The ambient temperature level at which the air heater comes on can be set in 1°C increments from 0°C to 15°C

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

• PRE-HEAT

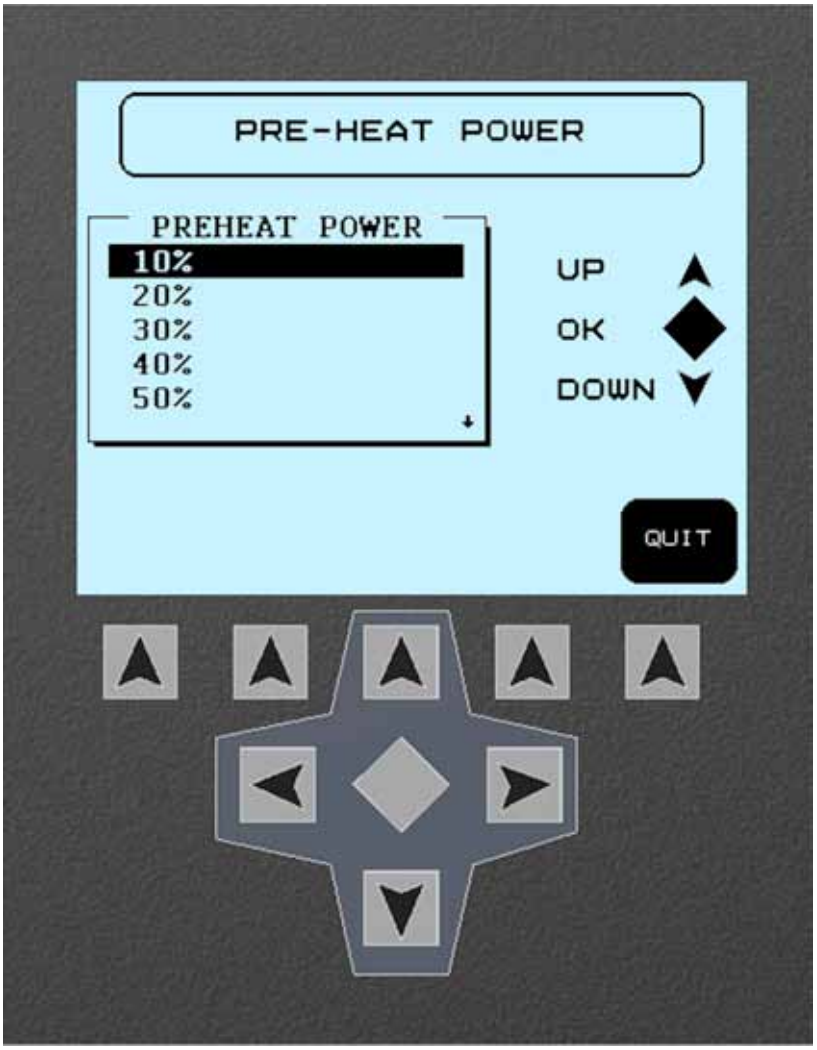


The temperature at which the heater blanket will turn off at can be set in 1°c increments from 55°c to 75°c.

The default setting is 55°C.

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

• PRE-HEAT POWER

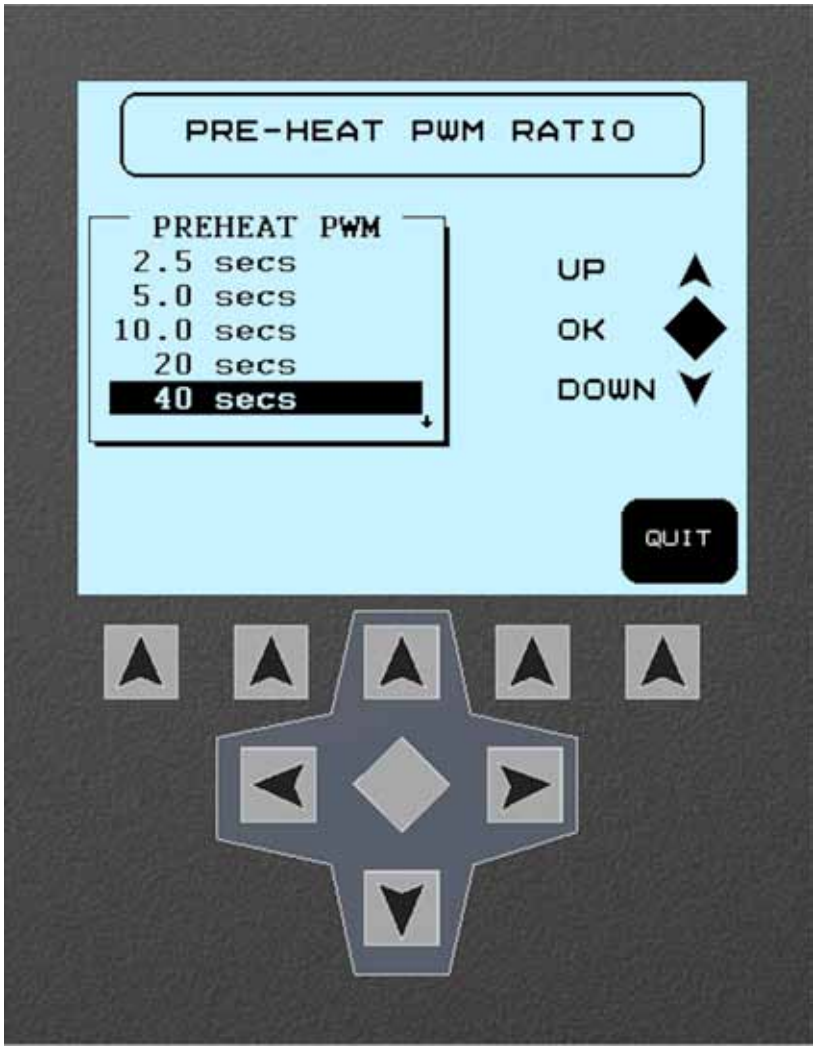


The amount of the heat blanket's (standard on model IVC7000) maximum heating capacity that is utilised can be set in 10% increments from 10% to 100%.

The default setting is 50%.

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

• PRE-HEAT PWM RATIO



The pre-heat PWM facility provides control of the rate at which heating power is delivered to the material in the drum. Adjustment of the setting allows fine tuning of the temperature depending on the water content and temperature of the food waste being processed.

The level is pre-set at 30 seconds and can be set at any one of the following increments :-

- 2.5 secs
- 5 secs
- 10 secs
- 20
- 40 secs
- 80 secs
- 160 secs
- 320 secs

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

From here the following settings can be made:-

SYSTEM SETTINGS - AUGER

AUGER RUN TIME

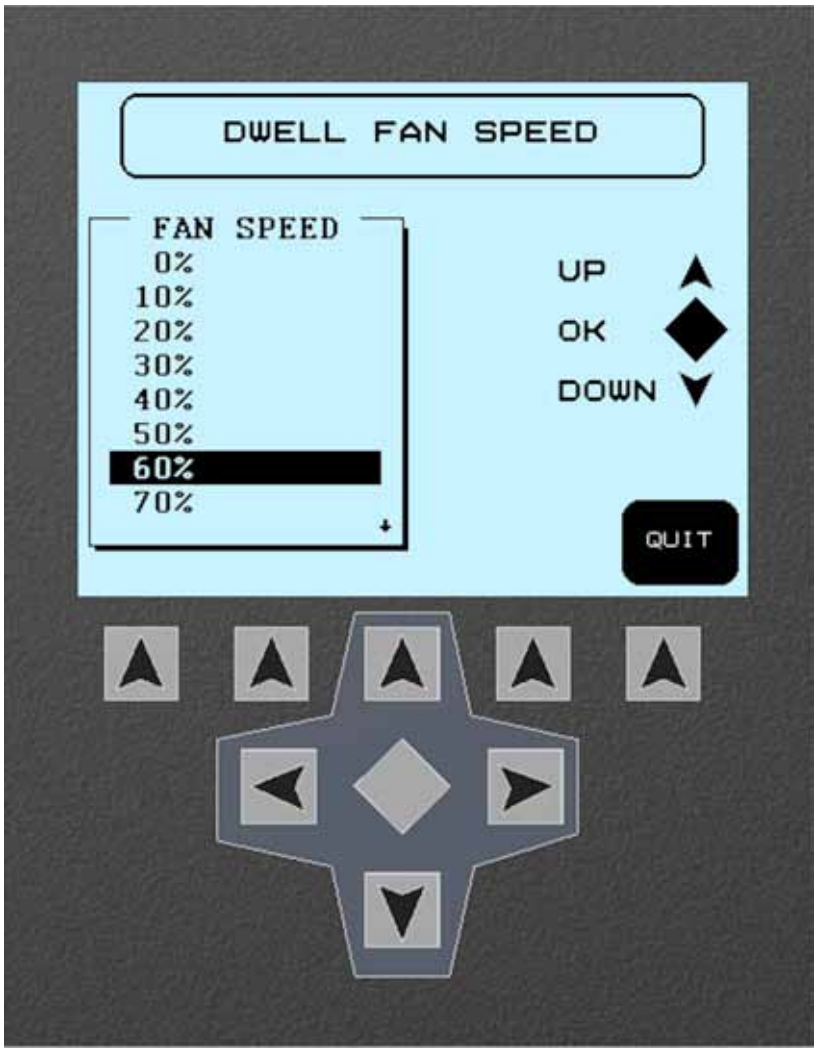
The duration for which the in-feed hopper auger screw rotates can be set at the following intervals:-

- 10 secs
- 20 secs
- 30 secs
- 40 secs
- 50 secs
- 1 min
- 2 mins
- 4 mins
- 5 mins
- 30 mins

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

SYSTEM SETTINGS - FAN

DWELL FAN SPEED



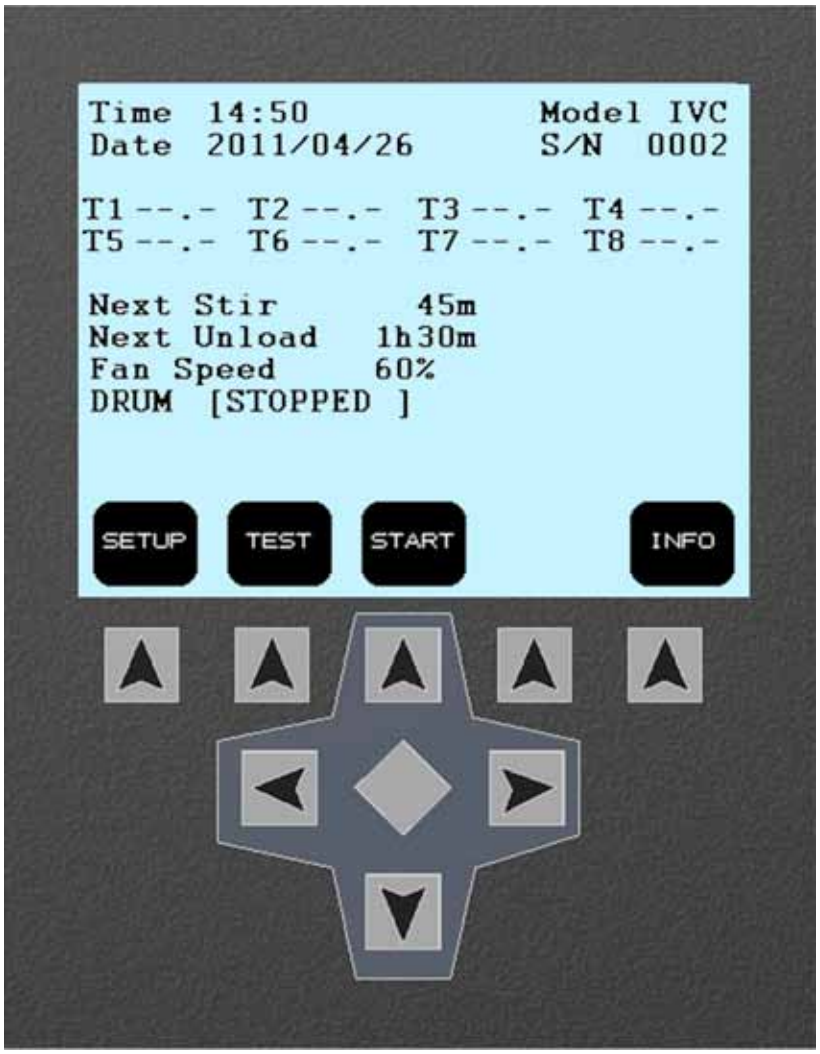
The speed at which the fan rotates during idle (i.e. between **STIR/ EMPTY** cycles) can be set as a percentage of its maximum capability in 10 % point increments from 0% to 100%.

Incorrect settings can be cancelled by pressing **QUIT** and starting again.

SYSTEM TEST

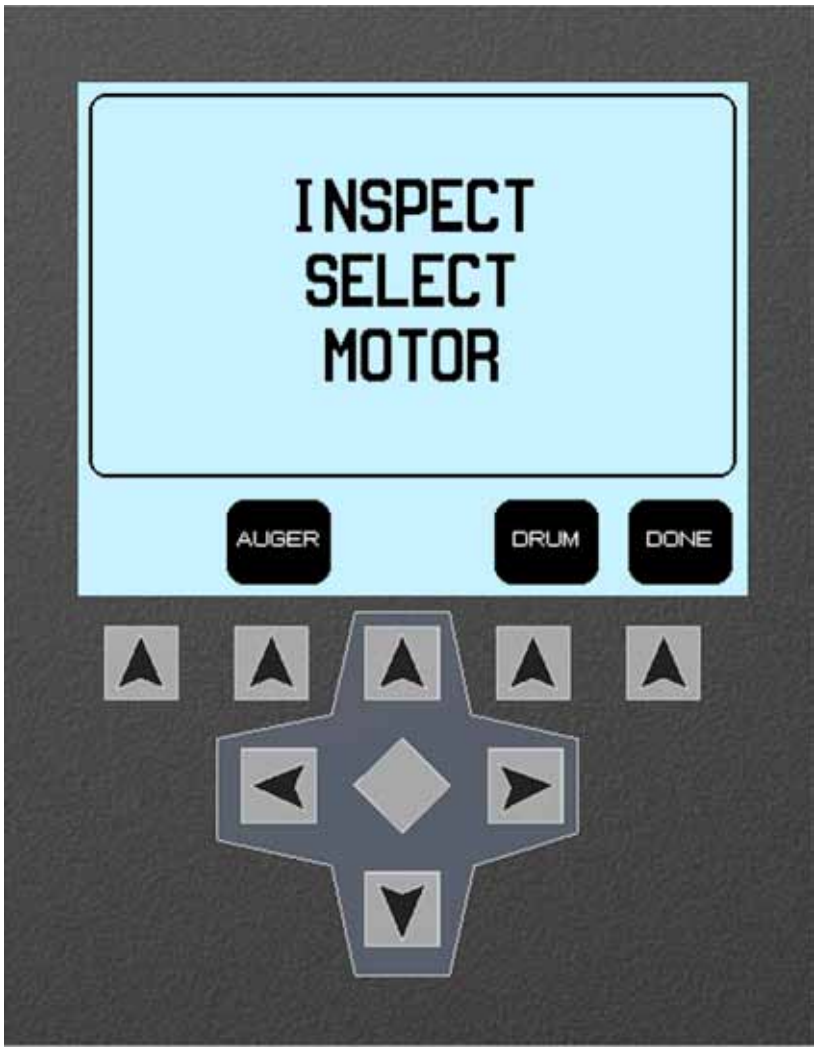
HOME TEST

SYSTEM TEST



To test that the in-feed hopper auger screw and drum are operating correctly press **TEST**.

INSPECTION



Select **AUGER** or **DRUM**

AUGER

Press and hold down **FWD** or **REV** to rotate the auger in the required direction.

Press **DONE** when finished.

DRUM

Press and hold down **FWD** or **REV** to rotate the drum in the required direction.

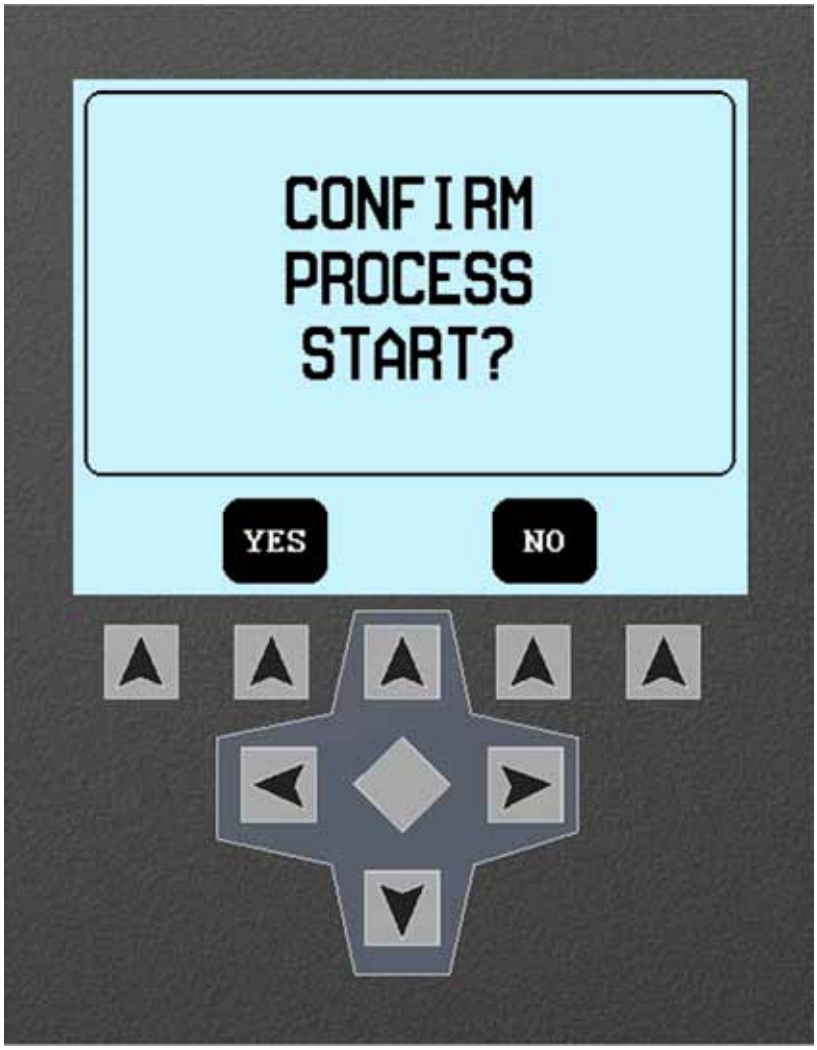
Press **PARK** to position the drum inspection hatches for access.

When finished press **DONE**.

SYSTEM START

HOME START

SYSTEM START



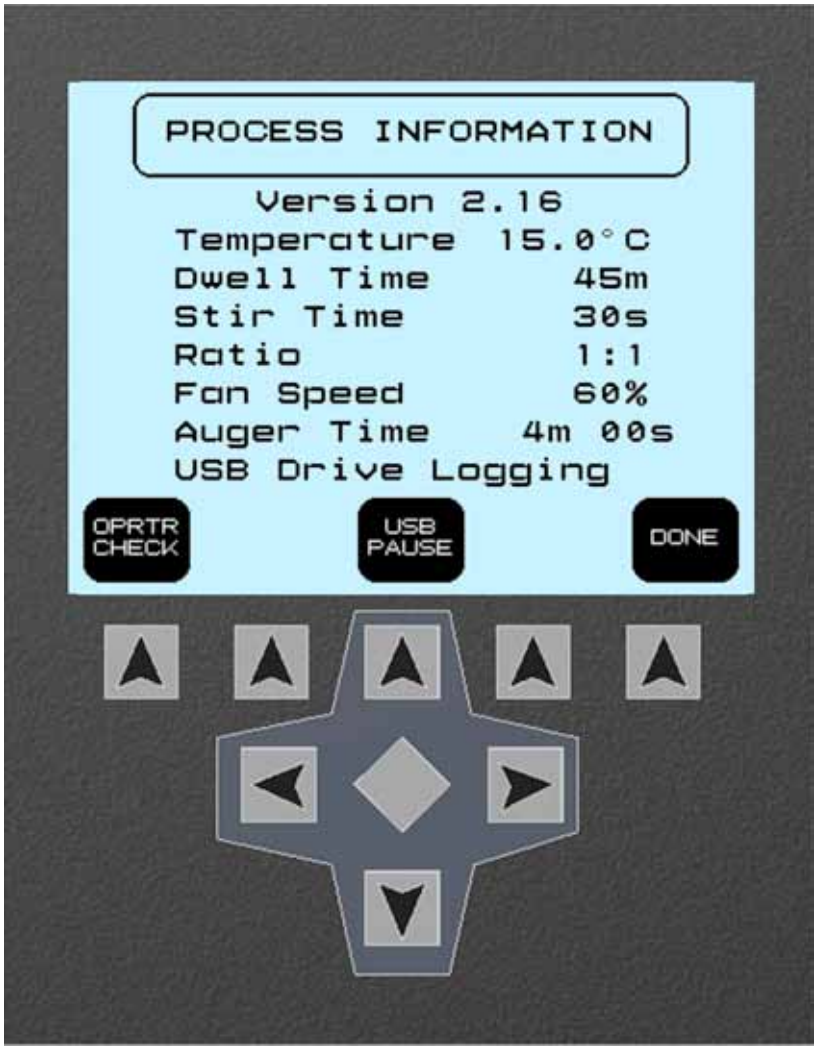
To start or stop the IVC, for example after a break in the power supply, press **START** or press **STOP**.

To start the process press **YES**. All current settings can be obtained by pressing **INFO**.

To stop the process press **STOP** and confirm **YES** or **NO**.

PROCESS INFORMATION

HOME INFO



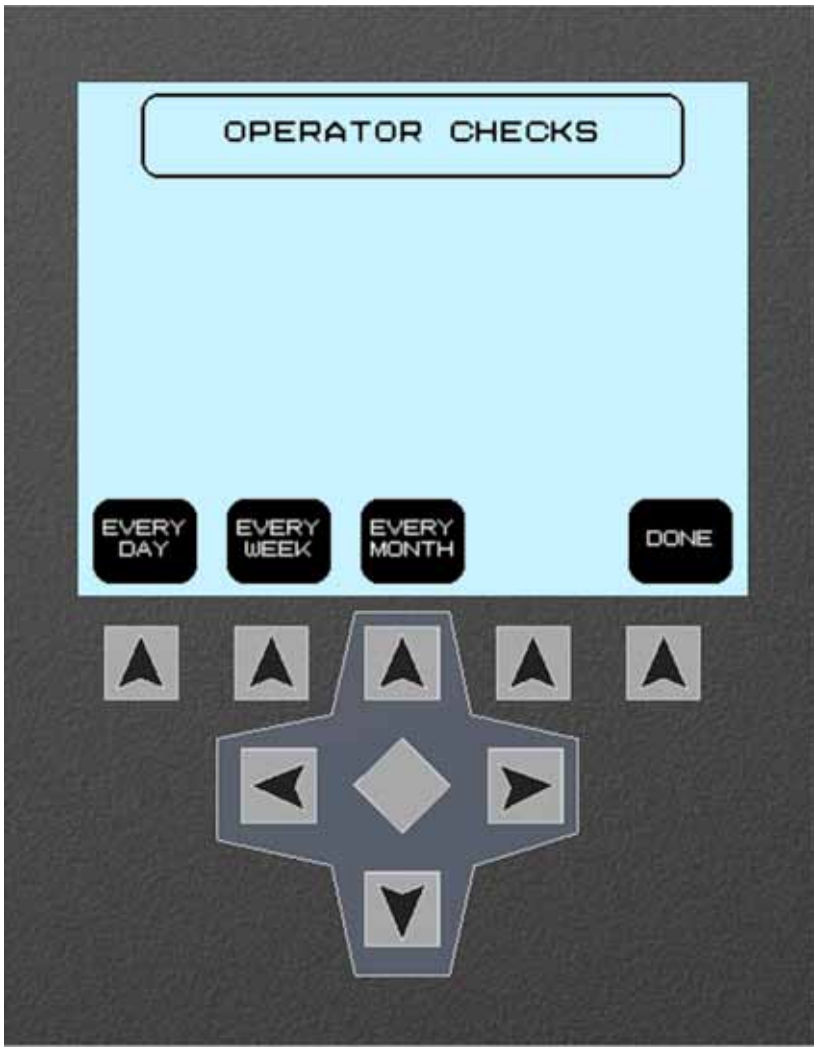
Detailed information on the current settings of the IVC can be obtained by pressing **INFO** on the home page.

This provides details of:-

- Ambient temperature (ºC)
- Duration of drum in stationary position (mins)
- Duration of drum rotation (secs)
- Ratio of clockwise to anti clockwise rotations of drum
- Speed of fan rotation during idle (% of max available)
- Duration on in-feed hopper auger rotation (secs)
- USB logging (yes/no)

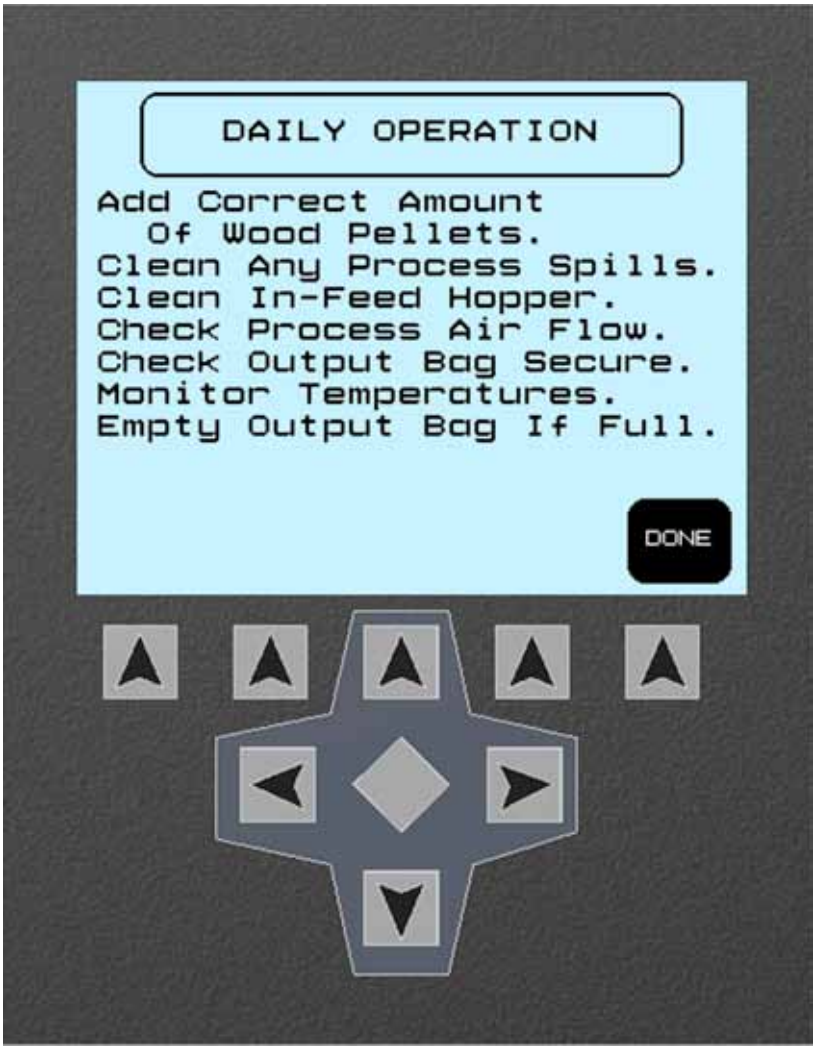
From here, details of operators checks can be obtained and the status of the USB Port can be controlled.

OPERATOR CHECKS



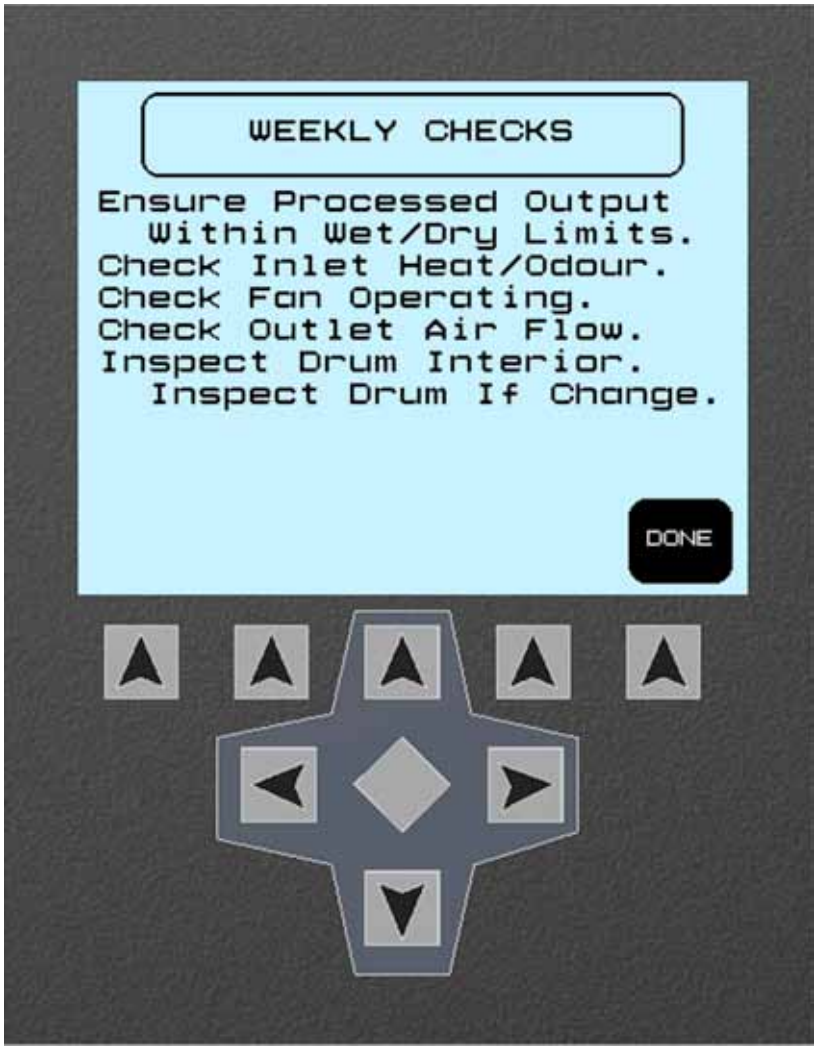
For a check list on regular actions and maintenance required press **OPRTR CHECK**.

DAILY OPERATION



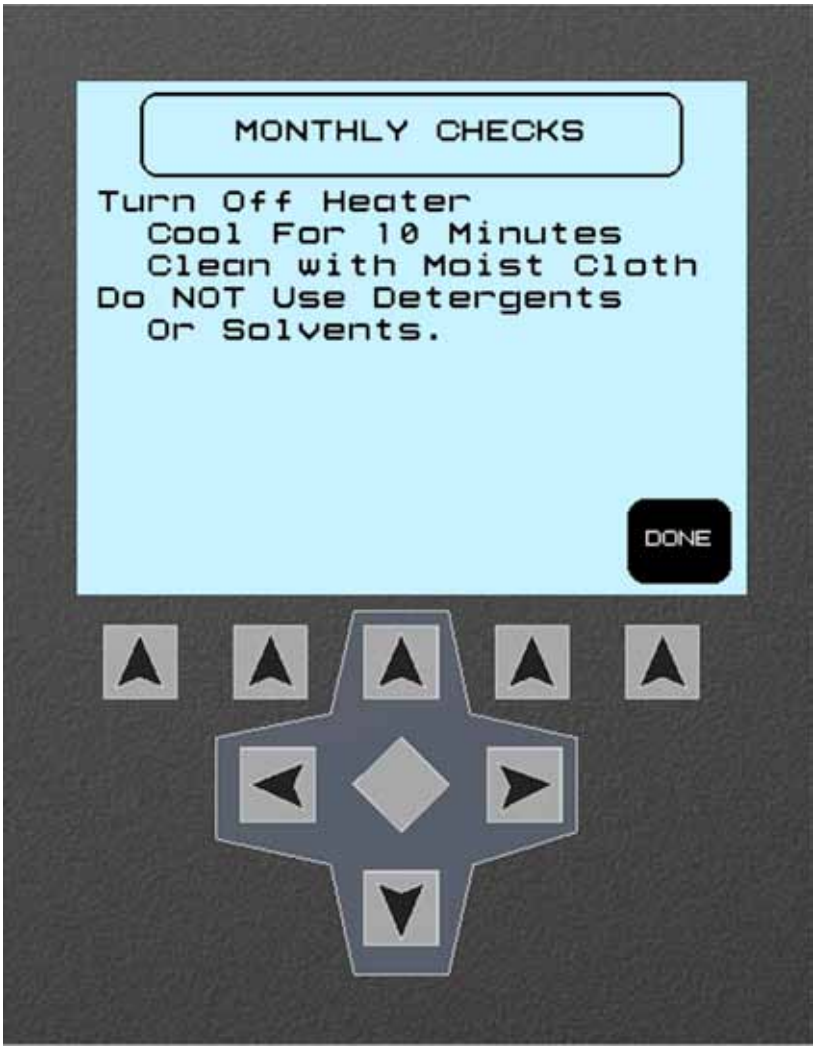
For a list of actions required on a daily basis press **EVERY DAY**.

OPERATOR CHECKS WEEKLY



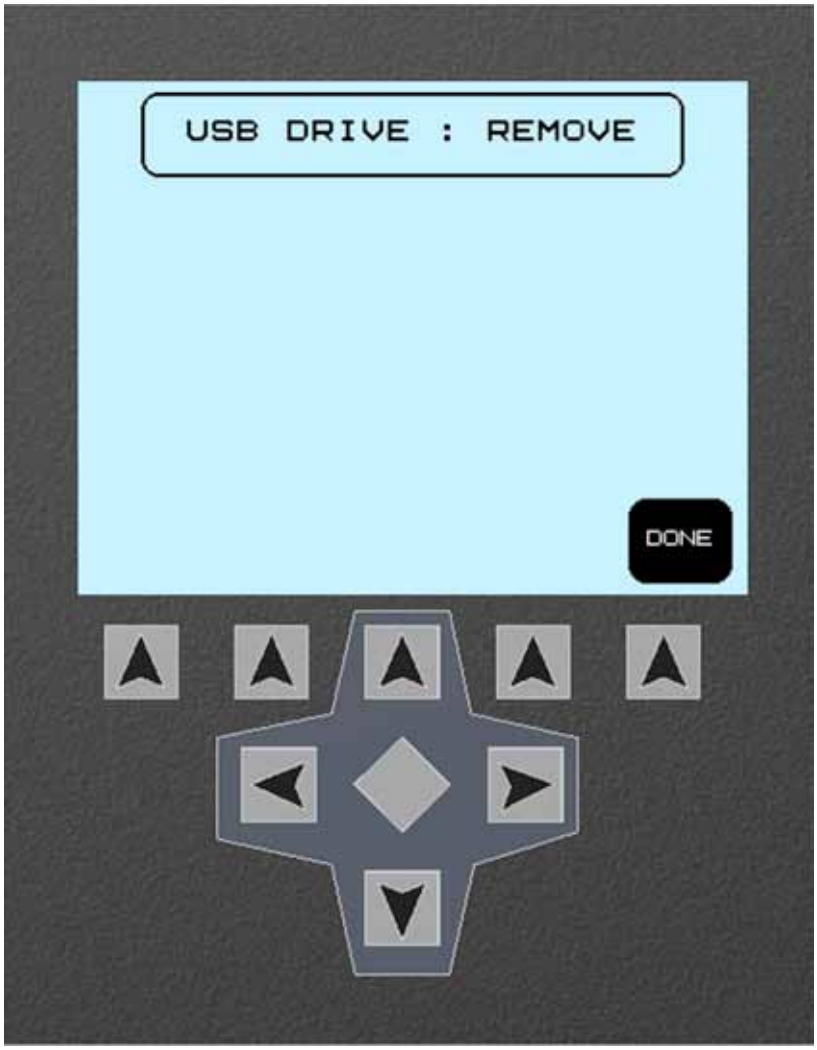
For a list of checks and actions required on a weekly basis press **EVERY WEEK**.

OPERATOR CHECKS MONTHLY



For a list of checks and actions required on a weekly basis press **EVERY MONTH**.

USB DRIVE



Pressing **USB PAUSE** enables the **USB** to be removed without risk of losing any data stored.

This process should be reversed when installing the USB.

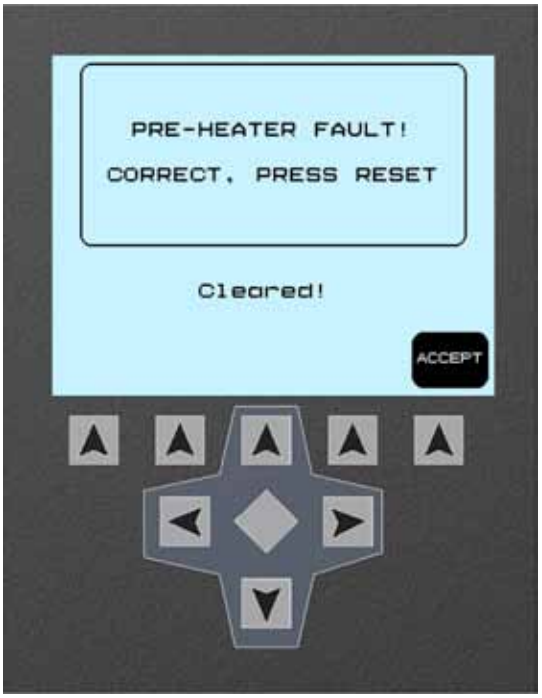
SAFETY SYSTEM

Your IVC incorporates a Safety System whereby the machine is stopped whenever a hatch is opened or the emergency stop is activated. If there is a fault with the air heater / blanket this screen will be displayed.

SAFETY FAULT – SAFETY CIRCUIT

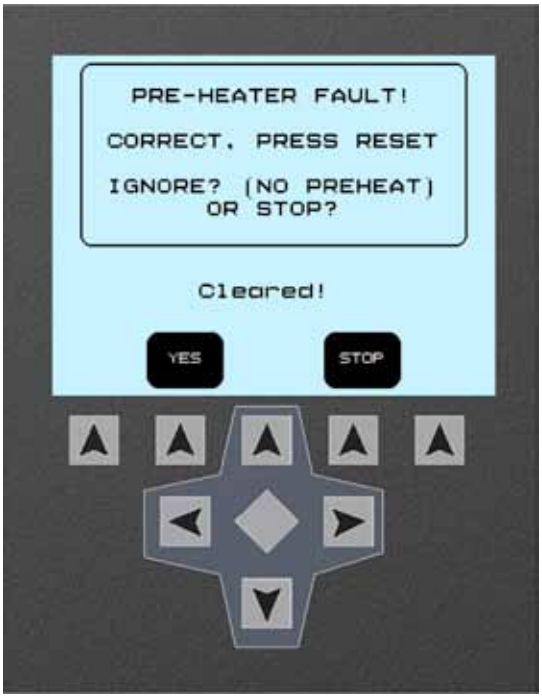
The nature of the fault will be described on screen as either a break in the Safety Circuit having been made (OPEN) or a problem with a sensor (CLOSED).

SAFETY FAULT - PRE-HEATER

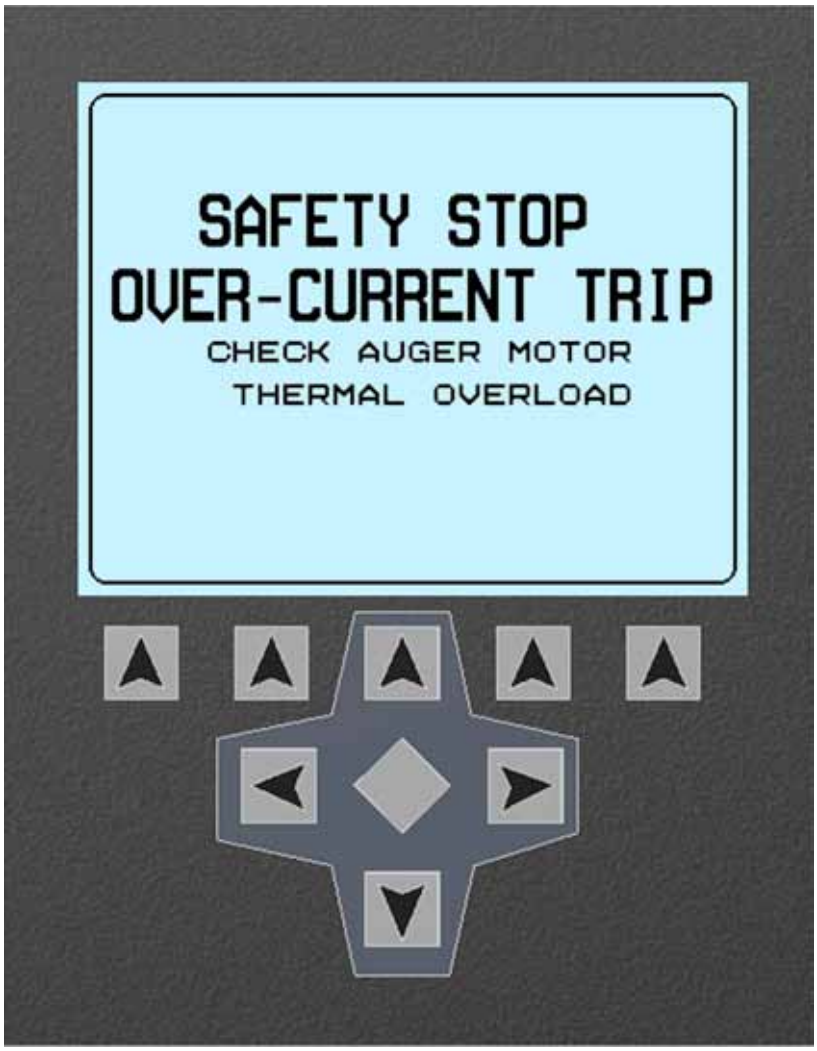


Alternatively the Safety Fault may be caused by a fault with the air heater / blanket which will be described on screen as **PRE-HEATER FAULT.**

Press the Reset (green) button, then press **ACCEPT**.



SAFETY STOP



This message is displayed if the safety stop has been triggered by an over-supply of electrical current.

SAFETY HOLD

Upon rectification of the fault the above screen will be displayed which confirms that the IVC can be restored to its current settings.

The power can be restored to the IVC by pressing the **RESET** button.

SAFETY RESTART

On pressing the **RESET** button the above screen will appear to confirm that the **RESET** button can be released in order to restore power.

By pressing the **YES** key the IVC can be returned to its latest operating parameters.

Pressing **NO** will return the screen to its HOME display and the IVC will remain in its current stopped position.

Operating procedure

Food waste material is normally loaded into the IVC once a day and should not exceed the prescribed amount.

	IVC2700	IVC4100	IVC7000
Max daily amount of dewatered waste (kg)	40	60	125
Max daily amount of wood pellets (kg)	10	15	31

The above max capacities are an indication only and should be calculated for each individual site.

The max capacity of the IVC is influenced by a number of variable factors including but not limited to:-

– content / mix of food waste

– WastePro auger screen type

– IVC fill level

– IVC drum stir time, dwell time and filling ratio

– IVC fan speed

– biological process

The dewatered food waste should be mixed with the prescribed quantity of wood pellets (compressed sawdust pellets at a rate of 1 part pellets to 4 parts food waste) and loaded into the hopper of the IVC. Do not overfill the hopper.

Closing the hopper lid activates the auger screw in the hopper which pushes the waste into the drum. The duration for which the auger screw is rotated depends on the amount of waste that is emptied into the hopper and can be set using the Control Panel. To adjust the time, refer to the section under System Settings **CYCLE**.

Opening the Inspection Hatch(es)

Opening the inspection hatch(es) enables visual and odour checks to be made on the status of the material in the drum and any objects that should not have been loaded into the IVC to be removed.

To access the hatch press **STOP** so that the drum moves to the "auto park" position.

The drum is automatically rotated so that the hatch on the drum is in the upright position and can be accessed from the door on the shelf of the IVC.

WARNING: Gloves must be worn as these hatches could be hot.

Insert the key into the lock of the access door, unlock and open the door.

Unclip the hatch fasteners and lift the hatch door from its mountings and
position safely.

To replace the hatch and access doors reverse the above instructions.

"Traffic Light" Warning System

All IMC IVCs are equipped with a "Traffic Light" beacon that helps users to identify from a distance the operational status of the IVC.

Details of the colour codes are as follows:-

Green – the IVC is functioning correctly and requires no operator input (other than normal house-keeping routines)

Amber – the IVC's operating parameters have been interrupted and the IVC is in standby mode.

Press **RESET** button to continue.

Red – the safety system has been tripped and the IVC is therefore not operating; an error message will be displayed on the Control Panel screen. In order to return to the prescribed settings the IVC requires the action of the operator.

Compost

Temperatures

Once the biological process has been established temperatures recorded by any of the probes in the front two thirds of the drum (ie Probes 2 to 5) should record in excess of 50ºC plus.

If temperatures at this level are not being achieved please follow the instructions in the section on "Trouble-shooting."

Air Heater

All IMC IVCs are equipped with an air heater that regulates the temperature of the air that is fed into the drum. If external air temperatures are sufficiently low for a sustained period of time it is possible that the temperature of the air supplied to the drum will be too low and will require automatically heating by the radiator. The air heater is pre-set to switch on when the ambient temperature (measured by probe 1) falls below 6ºC.

To set the air heater to switch on, refer to the section under TEMPERATURE AIR HEATER

Compost

To remove the compost collection sock, remove the clamp for the sock on the outlet pipe.

The compost exiting the IVC will improve still further when allowed to mature for several weeks prior to being applied.

We suggest you use bays to divide up the compost by its age, for example by using one bay per month or per quarter, depending on the amount of compost being produced. It is best to store the compost on the earth rather than on a concrete base.

For general application to flower beds, container plants, vegetable crops and kitchen gardens, for example, the compost is best mixed in as a rich fertiliser.

Remember, the older the compost the less biologically active it will be.

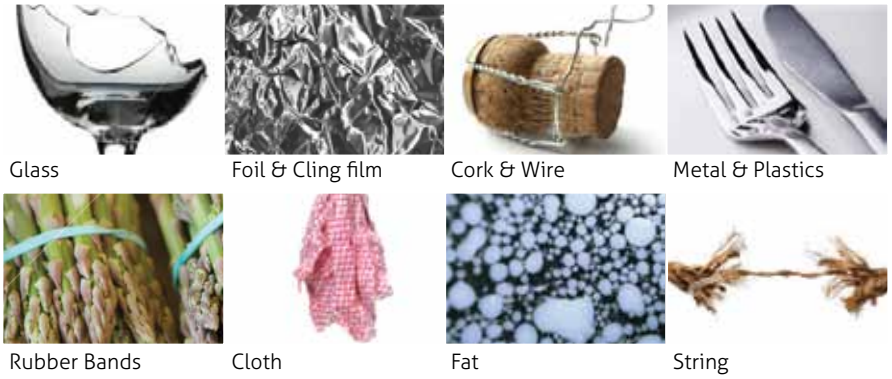
Do's & Don'ts, Handy Tips

Do's and Don't's

The IVC can only be used to compost organic waste. Virtually all kitchen food stuffs can be processed provided that they have first been macerated and dewatered.

Materials that can be put in the IVC:-

Materials that can **not** be put in the IVC:-



Glass | Foil & Cling film | Cork & Wire | Metal & Plastics

Rubber Bands | Cloth | Fat | String

Handy Tips

Mixed food waste ensures a good biological process.

Levels above 10% of meat and fish, which are rich in protein, in the waste can create a bad smell during composting and may require additional pellets.

If the highest temperatures are recorded towards the output end of the IVC it may be possible that the IVC has been over-filled. In this case, the material exiting the IVC should be reloaded in the hopper of the IVC.

If the temperature in the drum does not exceed 50°C at any point it is likely that there is too little waste in the IVC and / or the waste consists only of fruit and vegetables.

Use the quality of the compost to judge the performance of the biological process.

Further details on how to check the performance of your IVC can be found under "Trouble-shooting."

Cleaning

Cleaning

In order to maintain your IVC at its maximum efficiency, it is recommended that you carry out the cleaning regime as detailed below.

Action	Daily	Weekly	Monthly	Image
Wipe down the exterior of the hopper with a damp cloth.	Yes			A1
Swill and clean out the inside of the hopper with a bucket of warm, soapy water. WARNING: Take care to ensure that water is not allowed to enter the drum or spill over the front lip of the hopper.	Yes			A2
Sweep up the floor around and beneath the IVC.	Yes			
Wash the floor to remove any spillages that may occur with a mix of warm water and a light detergent.	Yes			
Remove and wash out the hopper drainage filter.	Yes			B
Slide the auger screw towards the drum and remove in 2 or 3 pieces (depending on the model). Clean the auger screw and hopper using warm soapy water before replacing the auger screw. Slide the auger in the direction of the drum, twist and release the left hand section of the auger. Remove first the left hand section of the auger from the hopper, then remove the right hand section(s) of the auger.	Yes			C
Clean the exterior of the IVC.		Yes		
Unclip the air filter remove and wipe clean any dust.		Yes		
Remove the front panel using Allen key supplied and check and remove if necessary any leakage from the front gable.			Yes	
Allow the air heater to cool, disconnect and wipe with a clean, damp cloth.			Yes	D
Remove any dust from the air heater / heating blanket and bottom plate.			Yes	

Ensure any removed parts are returned to their original position before switching the IVC on.

Note: Never use strong detergents or solvent based cleaning products on the IVC or any component part of the IVC.

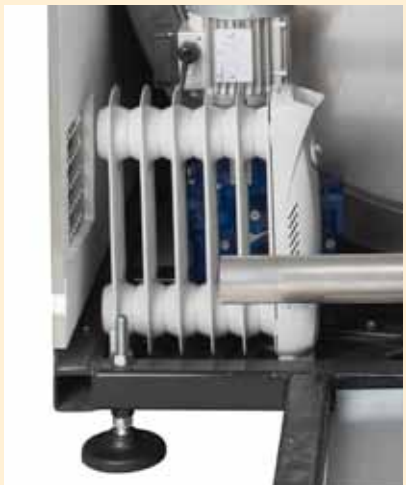
A1 : Hopper access door open

A2 : Hopper with Auger Screw removed

B Hopper Drainage Filter

C Hopper with Auger Screw fixed in place

C Auger Screw - shown in two pieces



D Air Heater

Routines

Check-up routines

Start-up phase

In order to ensure that the biological process in your IVC is progressing correctly during the start-up phase please conduct the following activities.

	Daily	Weekly	
Record temperatures at all probes	Yes		Use temperature recording sheet provided in Manual Supplement.
Download temperatures at all probes		Yes	Use USB stick supplied.
Open inspection hatch(es) and check: • Material consistency • Level of decomposition • Smell		Yes	
Empty hopper filter	Yes		
Check fan operation		Yes	

Post Start up

A routine of regular check-ups will help to ensure that the IVC is operating at maximum efficiency.

Please follow the instructions below.

Action	Daily	Weekly
Observe and analyse temperatures	Yes	
– If significant variances (>40ºC variance between lowest and highest) temperatures recorded open inspection hatch to check material in drum		
Email temperature data download to composter@imco.co.uk		Yes
Check if compost collection bin requires emptying	Yes	
Check that outlet chute is not blocked	Yes	
Ensure sock is securely affixed to outlet	Yes	
Check and remove any blockage from the hopper to the drum	Yes	
Check fan is working	Yes	
Check compost for excess moisture or dryness		Yes
Inspect material in drum through all inspection hatches and ensure neither too dry nor too wet		Yes

Trouble-shooting

Trouble-shooting

It is important to maintain the conditions in which the bacteria can perform at their optimum levels. A biological process that is functioning correctly is evidenced by the following:-

- The compost material as it exits the IVC has a sponge-like quality when squeezed by hand
- The temperatures recorded at some point in the drum are above 50ºC
- The material inside the IVC does not smell very strongly of ammonia
- There is no liquid leaching from the IVC

The table below describes the key areas in which the composting process may not be functioning correctly and the measures that can be taken to address these. As soon as the IVC's performance returns to normal it should be returned to its normal operating parameters.

Symptom	Cause / Solution
Noise: The drum is very noisy when rotating	The drum may be overloaded. • **Reduce** the amount of material in the drum to approx 75%.
Drum is not rotating	• **Check** for error messages and follow on screen instructions. • **Check** that there is power to the IVC. • **Check** that the safety fuses have not blown. • If still not resolved please contact IMC

NOTICE: Whether as a result of breach of contract or guarantee or alleged negligence or strict liability, under no circumstances shall IMC be responsible for any special, incidental, financial, consequential or personal injury damages including, but not limited to, loss of profits or revenue, loss of use of the IVC or any associated equipment, cost of capital, substitute equipment, facilities or services, downtime or costs incurred by a third party.

Symptom	Cause / Solution
Smell The area around the IVC is very smelly.	*Excess meat and fish is most likely to create bad smells.* • **Ensure** there is a mix of food waste being loaded. • **Add** some extra pellets to the front end of the drum. *The ventilation system is designed to remove any smells and gas from the cylinder.* • **Check** that the fan is working and the filter is clean. • **Check** that the drum is not over-filled. • **Check** that the hopper inlet is not obstructed and is clean. • **Increase** the fan speed. • **Select** a longer duration of rotation. • **Reduce** the wait time (to rotate the drum more often). **Check** that the material is not too wet.
Wet compost Liquid comes from the compost when it is squeezed.	• **Check** that the fan is is operating and the filter is clean. • **Add** some extra pellets to the material in the cylinder and rotate the drum. • **Select** a longer duration of rotation. • **Increase** the fan speed.
Dry compost The compost can be easily blown from the hand.	• **Reduce** the amount of pellets. • **Reduce** the fan speed. • **Select** a shorter duration of rotation. • **Add** some warm water through the inspection hatches and rotate the drum.
Low temperatures The material is too wet	• **Check** that the fan is operating and the filter is clean. • **Check** that the ventilation is unobstructed. • **Add** some extra pellets to the material in the drum via the hopper and inspection hatches and rotate the drum. • **Set** a longer duration of rotation. • **Increase** the fan speed.
Low temperatures The material is too dry	• **Reduce** the fan speed. • **Reduce** the amount of pellets. • **Select** a shorter duration of rotation. • **Add** some warm water through the inspection hatches and rotate the drum. *Note: it is possible that the low temperatures may be a symptom of the material having been in the drum too long and the biological process having been completed; in this case, fresh waste material and pellets should be loaded.*

Note: Only one adjustment should be made at a time and the effects of the adjustment monitored by regular checking of any changes in performance of the IVC.

Telephone Support

Telephone support

IMC offers assistance over the phone or by email in order to help effect a speedy resolution to any problems or difficulties that the user may be experiencing.
In order to assist IMC to correctly diagnose the cause of the problem please have the following information to hand:-

Is the fan working?

What are the current settings?

- Fan time
- Run time
- Wait time
- Filling level

How much food waste (kg) has been loaded into the IVC for each of the last 7 days?

How much wood pellets (kg) has been loaded into the IVC for each of the last 7 days?

How much compost (kg) has been collected for each of the last 7 days?

What colour is the compost material?

Is the compost material fully decomposed?

Is the material in the drum too wet or dry?

Is there any liquid leaking from the IVC?

What have been the temperatures for each of the past 7 days?

How full is the drum?

IMC Contacts

Service enquiries:

Kevin Baldwin, Service Supervisor, **tel 01978 661155**

Sales enquiries –

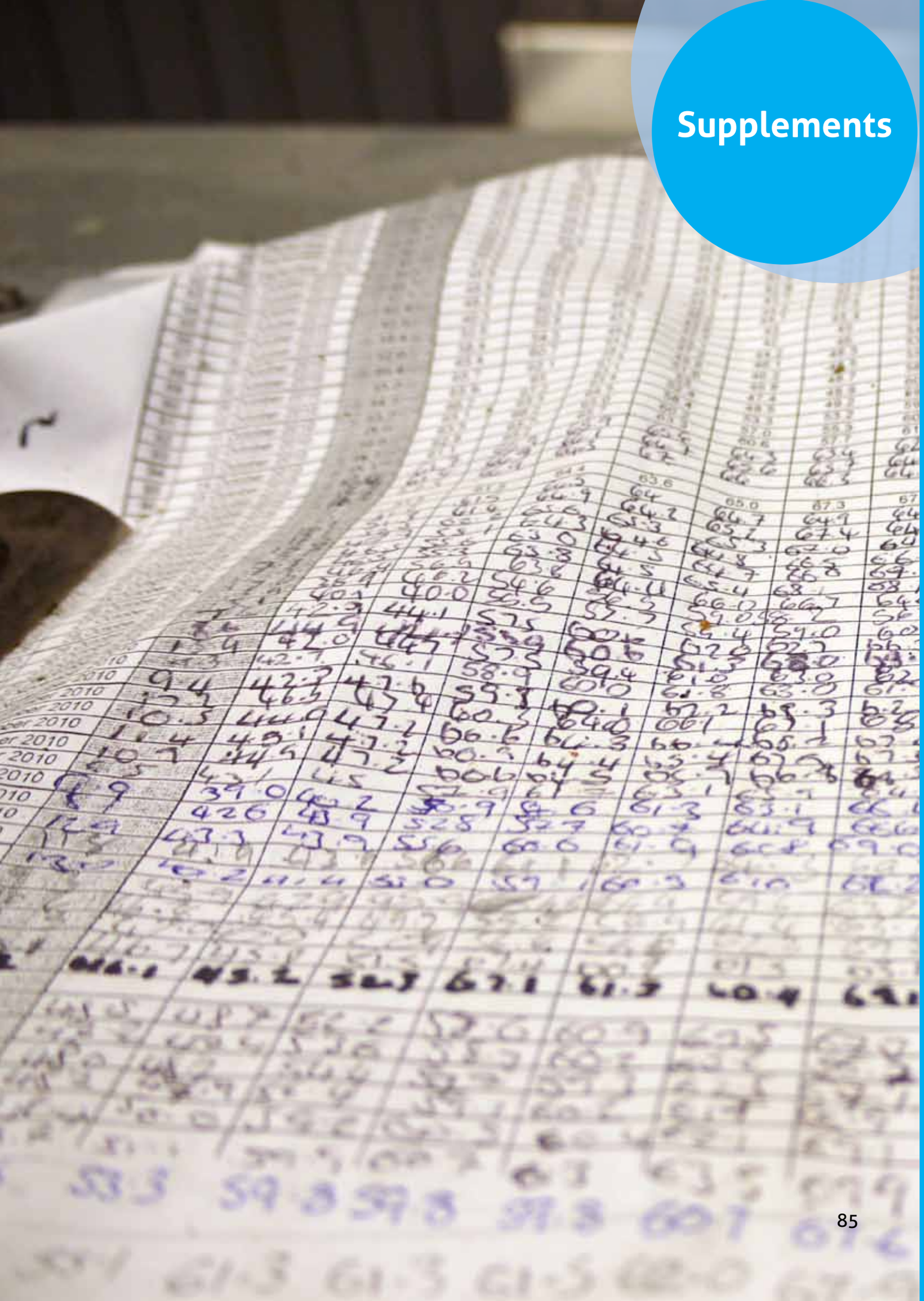
Dennis Moore, Business Development Manager, **mob 07989 547570**

Food Waste to Resource

Imperial Machine Company Limited
Unit 1 Abbey Road, Wrexham Industrial Estate
Wrexham LL13 9RF United Kingdom
Tel: +44 (0)1978 661155 Fax: +44 (0)1978 729990
Email: sales@imco.co.uk Web: www.imco.co.uk

imc

Supplements



Supplementary Information

Supplement 1 (i)

Legislation - Summary

It is the responsibility of the customer, irrespective of country of location, to ensure that the site fulfils its local and/or national obligations to satisfy the appropriate legislation in force that impacts on the management of its food waste.

The items below relate to the UK in general and are for guidance only; it should be noted that the Devolved Administrations of England, Wales, Scotland and Northern Ireland may each have their own regulatory controls.

Duty of Care

Legislation in the UK requires that anyone who imports, produces, carries, keeps, treats or disposes of waste is subject to a Duty of Care whereby they must take all reasonable and applicable measures:-

- to prevent another person illegally treating, keeping, depositing or otherwise disposing of the waste.
- to prevent the escape of waste.
- to ensure that transfer of the waste only occurs to an "authorised person" and that the transfer is accompanied by a written description of the waste.

HACCP

For the purposes of best practice, IMC recommends that the customer / operator produces, and adheres to, a "Hazards Analysis and Critical Control Points" Plan for each site of installation.

HACCP is a process that identifies, evaluates and controls hazards which are significant for product safety.

Where the customer's premises are not exempt from Animal By Products Regulations (ABPR), the satisfactory auditing of the HACCP Plan is critical to the ultimate approval given by the Animal Health Department of DEFRA (The Department of Environment Food and Rural Affairs) of the operator's composting system.

Animal By Products Regulations (ABPR)

In sites where ABPR / ABP Order certification is required, the end of the IVC at which the compost is discharged, ie the clean area, should remain uncontaminated by the activities at the front end of the IVC, ie the dirty area. This is normally achieved by the installation of a physical barrier and boot wash between the two ends of the IVC and the adherence to hygiene standards.

IMC will provide guidance but it is the responsibility of the customer to ensure the site's compliance with any legislative requirements.

* The above information is correct at the time of going to print and may change without prior notice.

Supplement 1 (ii)

Legislation – extended information

The information below provides greater detail on **waste legislation in the UK** and should be referred to in conjunction with the summary information contained within Supplement 1 (i).

Waste Framework Directive

The Waste Framework Directive has been implemented in the UK through national legislation that requires anyone who treats, keeps, deposits or disposes of waste to need a waste management licence (unless exempt or excluded), which is issued by the Environment Agency.

Waste management licences include conditions relating to operations at the site and the Environment Agency monitors activities to ensure compliance with the licence conditions. A key objective of the licensing system is to ensure that waste is recovered or disposed of without endangering human health and without using processes or methods which harm the environment. It is also an offence to transport controlled waste unless registered with the Environment Agency. Registered carriers and the holder of a waste management licence are authorised persons for the purposes of the Duty of Care. (see below for further information).

Proper use of the provisions of the Waste Framework Directive is a legally binding approach for EU member states from 12 December 2012.

Duty of Care

The Duty of Care is a law introduced under the Environmental Protection Act which states that the waste producer must take all reasonable steps to keep waste safe.

Anyone who imports, produces, carries, keeps, treats or disposes of waste is subject to a duty of care whereby they must take all reasonable and applicable measures:-

- to prevent another person illegally treating, keeping, depositing or otherwise disposing of the waste.
- to prevent the escape of waste.
- to ensure that transfer of the waste only occurs to an "authorised person" and that the transfer is accompanied by a written description of the waste.

One of the aims of the Duty of Care is to prevent the practice of waste producers simply handing their waste over to anyone prepared to take it away, without giving consideration to where it is going and whether it will be dealt with properly.

Any establishment that handles waste must have the correct permit, license or exemption. In England and Wales this means an Environmental Permit.

The Duty of Care was amended in February 2003 to allow Waste Collection Authorities, in addition to the Environment Agency, to check whether businesses are completing and retaining their Duty of Care transfer notes correctly.

HACCP (Hazards Analysis and Critical Control Points)

HACCP is a process that identifies, evaluates and controls hazards which are significant for product safety. The satisfactory auditing of the HACCP Plan is critical to the ultimate approval given by Defra's Animal Health Dept of the operator's composting system where the operator's premises are not exempt from ABPR.

Satisfactory assessment of the HACCP Plan will result in a site inspection by Animal Health. Final validation will only be given after microbiological testing of the resultant compost material to ensure the destruction of appropriate pathogens, ie salmonella and ecoli.

For premises that are not exempt, or where the compost is intended to leave the site, Animal Health approval also requires that there is a physical barrier, eg a wall, that separates the clean and dirty reception areas of the process (ie so that there can be no contamination of the compost at the clean end by untreated food waste at the dirty end).

Animal By Products Regulations

The EU ABPR has applied since 1 May 2003 and permits the treatment in approved composting and biogas plants of catering waste containing or contaminated by meat and other low risk (Category 3) animal by-products.

A revised ABPR has applied from 14 March 2011 and includes a third option of "novel treatment to deal with food waste." This gives recyclers a third option as to how they treat food waste; currently, it is possible to treat the waste to EU guidelines and heat it to 70 degrees C or to treat it to national guidelines to 60 degrees C. Whilst subject to strict testing and regulation it allows waste producers to choose their own parameters for treating food waste.

"Catering waste" is defined in the Regulations as "all waste food including used cooking oil originating in restaurants, catering facilities and kitchens, including central kitchens and household kitchens." Catering waste which does not contain meat, and which does not come from a premises handling meat, is not controlled by the Regulations.

A composting plant treating Category 3 catering waste, ie containing / contaminated by meat, to one of the UK national standards must have a two-stage composting system. The first stage must be done in a closed vessel, the second stage need not be enclosed.

Regulation 16 of ABPR means that premises are exempted from the composting requirements of the Regulations where the catering waste is generated, composted and then used all on the same premises. Establishments where this exemption does not apply include university campuses, shopping centres and caravan parks; those where it does apply include schools, prisons, hospitals, offices and apartment blocks.

Compost derived from catering waste may only be used on non-pasture land. This means that livestock must not be allowed access to land to which compost has been applied for the following minimum time periods:- in the case of pigs, 8 weeks and, in the case of other farmed animals, 3 weeks. Similarly, animals must also not be fed with anything cropped from land to which compost has been applied, for the same time period.

The EU treatment standard for composting and anaerobic digestion is 70ºC for 1 hour with a maximum waste particle size of 12mm (in one plane). Only the single stage, closed reactor stage is required.

In the UK the requirement of time temperature parameters in a closed vessel composter is 60ºC for a minimum 2 days with a maximum particle size of 400mm. The Regulations also require that the compost must be windrowed as a second, barrier process, although this does not need to be an enclosed windrow.

Pre-treatment of non-hazardous waste

Legislation was implemented on 30 October 2007 that requires non-hazardous waste to be pre-treated prior to landfill and involves satisfying a 3-point test:-

1) treating must be physical, or biological, or chemical, or thermal, including sorting

2) the characteristics of the waste must change

3) the process must:- reduce its volume, or reduce its hazardous nature, or facilitate its handling, or enhance its recovery.

By separating out elements such as cardboard, paper, plastics, glass or dewatering food waste, all 3 elements of the requirements can be met because the waste will have been treated by sorting, changed its characteristics and reduced its volume.

(Note: Compaction is not pre-treatment as it doesn't change the characteristics of the waste. However, if the waste has been sorted, eg with cardboard and plastics removed, before going into the compactor, the waste will be deemed to have been pre-treated).

It is generally accepted that pre-treatment, when fully implemented, doubles disposal costs (ie those costs charged by the landfill operator and passed on, through the waste contractor, to the waste producer in addition to Landfill Tax).

New guidance from DEFRA on the Duty of Care, published in 2009, encourages all businesses that produce waste, and especially those in the waste management industry who handle this waste, to record information on waste transfer notes about the nature of any pre-treatment that has been carried out.

Diversion from landfill of raw meat and fish from retail premises

From 1 January 2006, retail premises may not dispose of any raw meat or fish waste to landfill. Instead, it should be disposed of separately in a marked bin and sent to an approved processing plant.

Diversion from landfill of liquid wastes

From 30 October 2007, it has been illegal to landfill any waste in liquid form, defined as:-

(i) Any waste that near instantaneously flows into an indentation void made in the surface of the waste, or
(ii) Any waste load containing free draining liquid substance in excess of 250 litres or 10% of the load volume whichever represents the lower amount.

The second interpretation should be used where liquids are known to be present in small amounts in a generally solid waste, for example mixed kitchen food waste.

Composting permits

Composting is classified as a waste recovery operation under the Waste Framework Directive. In practice, this means that it is carried out under a waste management licence issued by the Environment Agency or a licensing exemption registered with the Agency.

After remaining essentially unchanged for a period of almost 15 years the exemption system has been recently revised.
Customers should contact their local EA Officer for more details.

Compost Quality Protocol – BSI PAS100

Tightening recycling and landfill diversion targets will require ever larger quantities of compost to be produced turning the organic fraction of waste into an increasingly significant source of compost. However, the potential contamination of bio-waste by mixed waste collection can introduce hazardous substances such as heavy metals and impurities, eg glass, to the soil.

The use of good quality compost helps to improve soil structure, moisture infiltration, water-holding capacity, soil micro-organisms and supply with nutrients. Compost from kitchen waste contains important elements including nitrogen, phosphorous and potassium.

British Standards Institution Publicly Available Specification (BSI PAS) 100 has been developed for compost quality in order to help standardize the market for compost materials.

The Compost Quality Protocol, which came into force in May 2007, applies in England and Wales and sets out the criteria for the production of quality compost from different types of source segregated bio-waste such as food and garden plant waste.

The compost produced to the satisfaction of the Protocol will no longer be classed as a waste thereby making it a more marketable product for example as a desirable quality product for use in key markets such as landscaping, agriculture and horticulture.