

The EcoShield™ range
High Efficiency Gas Fired
Condensing Water Heaters
User & SMART SYSTEM
Control Guide

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Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

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1.0 USER GUIDE

1.1 GENERAL REQUIREMENTS

- This equipment must be installed by a competent person, registered with a H.S.E. approved body. All installations must conform to the relevant Gas Safety and Building regulations. Health & safety requirements must also be taken into account when installing any equipment.
- Failure to follow these instructions may lead to severe injury, serious property damage or death.
- A competent person must also undertake any alterations that require the gas train or flue system to be broken.
- Any interference with a sealed component is forbidden.
- Failure to comply with the above may lead to prosecution.
- Incorrect use may result in injury and will also invalidate the warranty

1.2 PROCEDURE FOR LIGHTING

1. Ensure that the gas-inlet appliance isolating valve, provided by the installer, is in the "On" position.
2. Press the power rocker switch, positioned inside the service access front cover see section 2 . to the on position.
3. Press the Enter/Reset button on the user control interface panel to initiate the burner.
4. The combustion fan should ramp up to full speed to purge the combustion chamber and then drop back to half rate in order to light. The spark generator should create a spark, visible through the burner sight glass. The appliance will attempt to light 4 times (SHW35-210-SHW116-410) or once (SHW146-410) if the unit does not light it will go to lockout, if this occurs please contact a qualified Gas service Engineer
5. Once a flame is established, the LCD display will change to display the Temperature and Setpoint..

1.3 PROCEDURE FOR SHUTTING DOWN

To take the appliance out of service, the **Enter/Reset** button should be pressed. If the appliance is to be shut down for a long period of time, the power supply should be isolated using the rocker switch on the back and the gas supply should be isolated at the gas inlet appliance isolating valve.

1.4 TEMPERATURE ADJUSTMENT PROCEDURE

The setpoint can be adjusted using the Up and Down buttons on the Smart System control panel. Once the desired setpoint is displayed, the Enter/Reset button should be pressed to store the value.

The setpoint should be adjusted to ensure that the water is stored at 60°C and distributed at 50°C within 1 (one) minute at all outlets. Care is needed to avoid much higher temperatures because of the risk of scalding. At 50°C the risk of scalding is small for most people, but the risk increases rapidly with higher temperatures and for longer exposure times. The risk to young children and to those with a sensory or mobility loss will be greater. Where a significant scalding risk has been identified, the use of thermostatic mixing valves on baths and showers should be considered to reduce temperature, these need to be placed as close to the point of use as possible.

1.5 MAINTENANCE

The Lochinvar EcoShield must be serviced by a competent engineer at a maximum interval of every 12 months by law, location and usage patterns could require service intervals more frequently.

Details of the necessary maintenance work can be found in the Installation, Commissioning and Maintenance Instructions. If these instructions are not available, a copy should be obtained from the Lochinvar website www.lochinvar.ltd.uk or by using the contact details on the back cover of this document.

1.6 FROST PROTECTION

If the temperature of the water at the inlet side of the heat exchanger drops below 7°C, the primary pump will be energised. If the temperature of the water at the inlet side of the heat exchanger drops further and reaches 3°C the burner will fire. If the temperature rises above 10°C the burner and the pump will shut down.

1.7 AIR SUPPLY

- When installed as a conventionally flued appliance, the room in which the appliance is installed must be ventilated.
- **Blocking these air vents may lead to severe injury, serious property damage or death.**
- The area in which the appliance is installed should not be used to store any other materials.

1.8 CONDENSATE DRAIN

The condensate drain must not be blocked or modified in any way. If fitted with a neutralisation kit, this must be replaced at least every 12 months to ensure correct operation. Due to its design, no further maintenance should be necessary.

2.0 SMART SYSTEM CONTROL

2.1 USER CONTROL INTERFACE PANEL

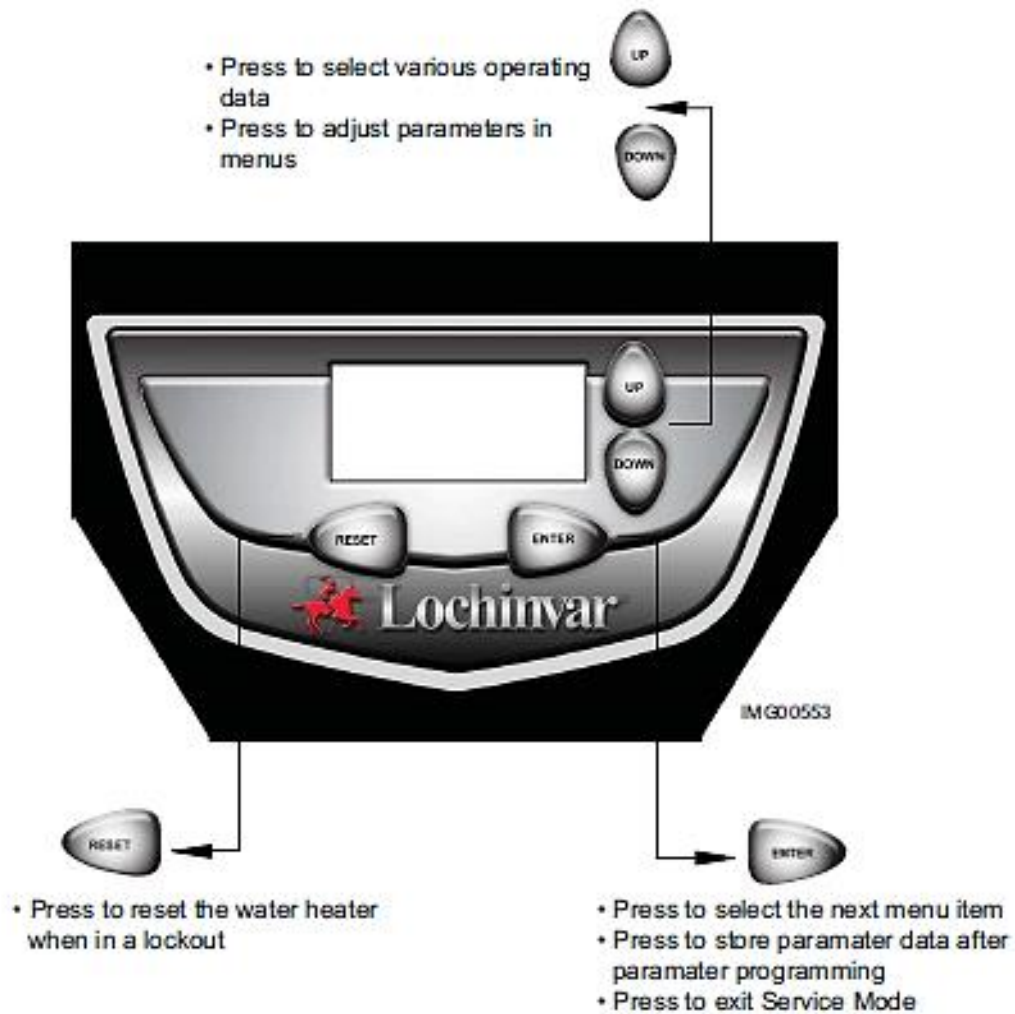
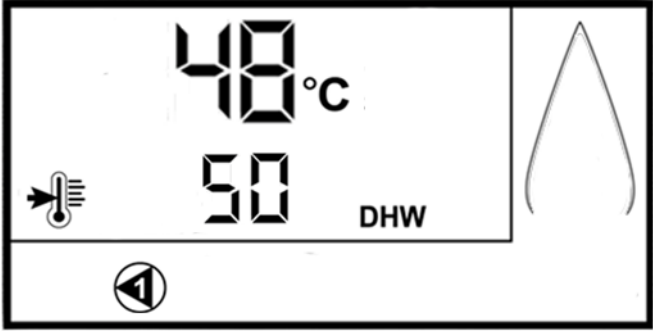
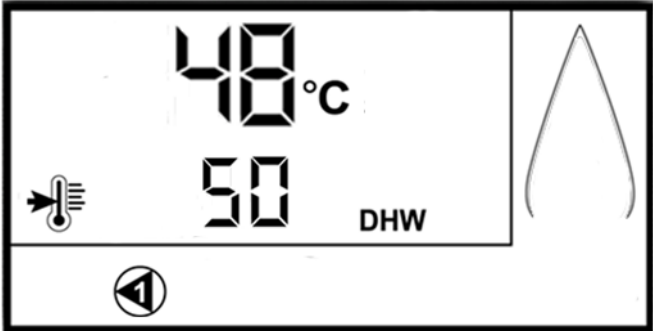
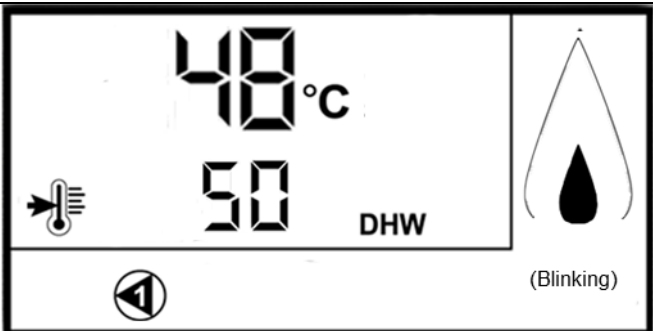

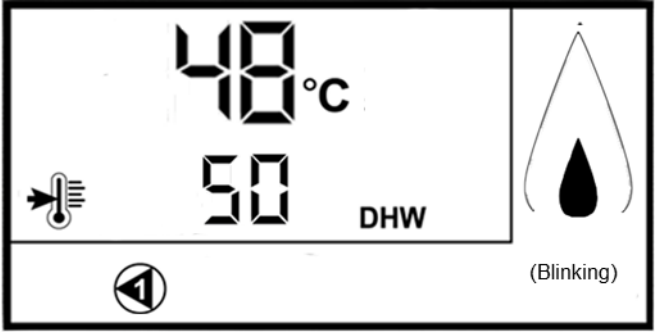

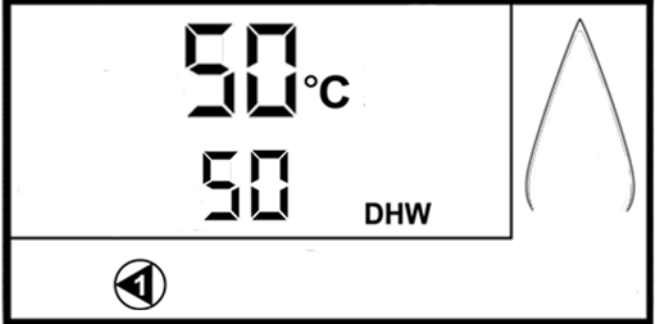
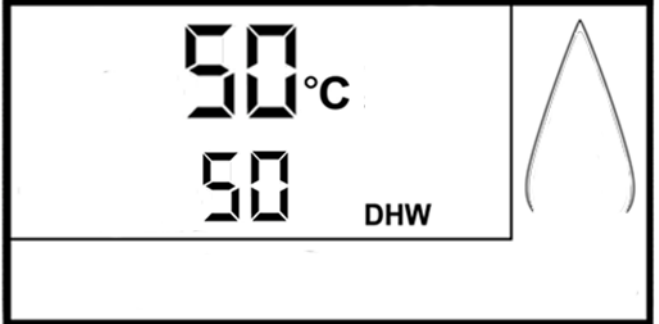


FIGURE 2.1 USER CONTROL INTERFACE PANEL

2.2 SEQUENCE OF OPERATION

Operation	Display
1. Upon call for heat the control turns on the integrated pump.	
2. The control connects 230 VAC to the fan. The fan does not run at this time. <ul style="list-style-type: none"> • If the unit is equipped with a low water cut-off, it must be closed before the control powers up the fan. • If the unit is equipped with a manual reset high limit, it must be closed before the control powers up the fan. • If there is a louver device connected to the unit, the unit will provide 24 VAC to its enable relay. If the louver device has a proving switch, it must be closed before the sequence continues. 	
3. The control starts a 10 second pre-purge cycle.	
4. Once the pre-purge cycle is complete, and the blocked drain and auto-reset high limit are closed, the control starts the 5 second trial for ignition by sending spark voltage to the spark electrode and opening the gas valve.	

<p>5. If the control does not detect flame by the end of the trial for ignition, the control performs a 10 second post-purge. On the SHW35 CE to SHW116 CE models, the control will perform another pre-purge and try to light the burner again. If the burner does not light after 4 trials, the control will lockout for 1 hour and then try another set of 4 trials. On the SHW146 CE the unit will lockout until manually reset.</p>	
<p>6. If the control detects a flame before trial ignition ends, it begins to modulate the burner in order to maintain the set point.</p>	
<p>7. Once the call for heat is satisfied, the control will turn off the burner. The fan will remain on for the 10-second post-purge cycle. The integrated pump will continue to run for its respective pump delay time., and then turn off</p>	
<p>8. The integrated pump switched off.</p>	

3.0 USER SETTINGS

3.1 USER ADJUSTABLE PARAMETERS SCREEN

To access the User Adjustable Parameters screen press and hold the **ENTER** button for 5 seconds. Once pressed the user code u01 should be shown in the lower digits. There are seven parameters that can be set. Use the **UP** and **DOWN** buttons to scroll and the **ENTER** button to make selection. Once you have cycled through all of the parameters, the new values will be set.

16.1.1 CODE u01

Temperature units (°C/°F) – Press **UP** or **DOWN** to display the desired temperature unit and then press **ENTER** to make selection.

16.1.2 CODE u02

Hot Water Set Point – The factory default setting is 52°C. The target temperature can be set between 16°C and 85°C. Press **UP** or **DOWN** to display the desired temperature and then press **ENTER** to make selection.

16.1.3 CODE u03

Year – Press **UP** or **DOWN** to display the current year and then press **ENTER** to make selection.

16.1.4 CODE u04

Month – Press **UP** or **DOWN** to display the current month and then press **ENTER** to make selection.

16.1.5 CODE u05

Day – Press **UP** or **DOWN** to display the current day and then press **ENTER** to make selection.

16.1.6 CODE u06

Hour – Hours are displayed as 24 hour format. **UP** or **DOWN** to display the current hour and then press **ENTER** to make selection.

16.1.7 CODE u07

Minute – Press **UP** or **DOWN** to display the current minute and then press **ENTER** to make selection.

3.2 PASTEURISATION FUNCTION (USING NIGHT SET BACK FACILITY)

3.2.1 The procedure for a weekly high temperature (70°C) pasteurisation is as follows:

- Access the installer menu (**Down & Enter** for 5 seconds).
- Set parameter **p02** to 15°C (this is a deduction from the pasteurisation temperature and can be reduced to 10°C if a 65°C storage temperature is required instead of 60°C).
- Set parameter **p03** to 75°C (this is the maximum setpoint).
- Exit the installer menu.
- Access the user menu (**Enter** for 5 seconds)
- Set parameter **u02** to 75°C (this is the pasteurisation temperature)
- Check that parameters **u03** to **u07** give the correct date and time.
- Exit the user menu.
- Access the setback function menu (**Up & Down** for 5 seconds).
- Set the trigger values as follows:

Trigger	Day	Time
On 1	1	00:00
Off 1	1	23:59
On 2	2	00:00
Off 2	2	23:59
On 3	3	00:00
Off 3	3	23:59
On 4	4	00:00
Off 4	4	23:59
On 5	5	00:00
Off 5	5	23:59
On 6	6	00:00
Off 6	6	23:59
On 7	7	02:00
Off 7	7	23:59

- Exit the setback function menu (**Enter** for 5 seconds)

This will cause the water heater to operate at the reduced temperature between 00:00 and 23:59 each day with the exception of Sunday morning when the reduced temperature will not become active until 02:00 i.e. from 23:59 on Saturday night until 02:00 on Sunday the setpoint will be 75°C

3.2.2 The procedure for a daily pasteurisation when supplying domestic hot water at less than 60°C:



Systems must always comply with the requirements of L8, running the water heaters at low temperatures may encourage the growth of legionella bacteria.

- Access the installer menu (**Down & Enter** for 5 seconds).
- Set parameter **p02** to temperature required less than standard pasteurisation setting of 65°C (if the daily set point is to be 50°C for example then this would be set at 15°C).
- Set parameter **p03** to 65°C (this is the pasteurisation setting).
- Exit the installer menu.
- Access the user menu (**Enter** for 5 seconds)
- Set parameter **u02** to 75°C (this is the pasteurisation temperature)
- Check that parameters **u03** to **u07** give the correct date and time.
- Exit the user menu.
- Access the setback function menu (**Up & Down** for 5 seconds).
- Set the trigger values as follows:

Trigger	Day	Time
On 1	1	23:59
Off 1	1	00:59
On 2	2	23:59
Off 2	2	00:59
On 3	3	23:59
Off 3	3	00:59
On 4	4	23:59
Off 4	4	00:59
On 5	5	23:59
Off 5	5	00:59
On 6	6	23:59
Off 6	6	00:59
On 7	7	23:59
Off 7	7	00:59

- Exit the setback function menu (**Enter** for 5 seconds)

This will cause the water heater to operate at the reduced temperature between 00:59 and 23:59 each day with the exception of the period from 23:59 until 00:59 when the setpoint will be 65°C



During the pasteurisation period, any outlets without temperature limiting devices fitted will have very hot water, suitable precautions should be taken to inform all potential users.

3.3 NIGHT SETBACK SCREEN

To access the Night Setback screen press and hold the **UP** and **DOWN** buttons simultaneously for 5 seconds. Once pressed the trigger type, On/OFF, should be shown in the upper digits of the display.

- 1) Use the **UP** and **DOWN** buttons to display the desired trigger type, On or OFF and then press **ENTER** to make selection.
- 2) The trigger number will then appear, On1 or OFF1 depending on previous selection, in the upper digits on the display. On1 is the first trigger to lower the tank set point to the selected Night Setback Offset, see section 16.2.2. Press **ENTER**.
- 3) Next the day of the week will appear in the lower digits of the display, (1 = Monday, 2 = Tuesday, ect.). Press **UP** or **DOWN** to display the desired day of the week and then press **ENTER** to make selection.
- 4) The time for that trigger will then appear in a 24 hour format with the hour digits flashing in the lower digits of the display. Press **UP** or **DOWN** to display the desired hour and then press **ENTER** to make selection.
- 5) The minutes digits will then start flashing. Press **UP** or **DOWN** to display the desired minutes. If all triggers have been set, press and hold the **ENTER** button for 5 seconds. When Night Setback triggers are saved the burner will shut off and automatically re-ignite. Otherwise press the **ENTER** button once.
- 6)

3.4 ERROR LOG SCREEN

The water heater automatically stores the 10 most recent errors. To access the error log screen press and hold the **DOWN** button for 5 seconds. Once pressed the upper digits should display "1", being the most recent. The lower digits will display the following information in 2 second intervals.

- 1) Error Code
- 2) Hour and Minute of the error
- 3) Date of the error
- 4) Year of the error

To view the next errors press the **UP** button. To pause the information in the lower digits press and hold the **ENTER** button, when released the next piece of information will display again in 2 second intervals. To exit the error log screen press and hold the **DOWN** button for 5 seconds.

3.5 ERROR CODES

The user interface screen gives information on Error codes; these can be one of three types:

1. Lockout codes, this may require a user reset and/or investigation by a service engineer
2. Blocking codes, this may require investigation by a service engineer
3. Notification codes, the unit will continue to operate but a service engineer will be required

Lockout Codes			
E00	Invalid lockout	E11	No flame running
E01	Memory lockout	E12	No flame ignition
E02	Fan speed fault	E13	Flue temperature limit
E04	Flow switch fault	E15	Manual reset High limit
E05	Flame out of sequence	E18	Outlet sensor Differential
E06	Auto reset Hi limit	E19	Flue sensor short/open
E07	Wiring fault	E21	Outlet sensor short/open
E08	Louvre proving switch	E22	Inlet sensor open
E09	Blocked condense drain	E23	Inlet sensor shorted
E10	Air pressure switch/HEX Limit-contacts are open	E15	Manual reset High limit

TABLE 3.41 LOCKOUT CODES

Blocking Codes	
b01	Setpoint met
b02	Anti-cycling
b03	Outlet temperature too high
b04	Delta T too high
b05	Flue temperature too high
b06	Low voltage

TABLE 3.42 BLOCKING CODES

Notification Codes	
n01	Fan limited due to no flue sensor change
n02	Fan limited due to high outlet temperature
n03	Fan limited due to high Delta T
n04	Fan limited due to high flue temperature
n05	Fan increased due to low flame current
n06	Tank sensor is open
n07	Inlet sensor open
n08	Inlet sensor shorted

TABLE 3.42 NOTIFICATION CODES

4.0 ErP SPECIFICATION DATA SHEET

Water Heater Type:		SHW35-245	SHW46-325	SHW61-325	SHW86-410	SHW116-410	SHW146-410
Manufacturer	Lochinvar Limited						
Load Profile		XXL	XXL	3XL	3XL	3XL	3XL
Energy Efficiency	%	76%	73%	81%	79%	78%	79%
Daily Electricity Consumption	Qelec	0.333	0.382	0.541	0.517	0.531	0.552
Daily Fuel Consumption	Qfuel	31.398	32.893	56.180	58.399	59.236	57.952
Mixed water V40 @40°C	litre	∞	∞	512	1352	∞	∞
Emmissions of Nitrogen Oxides (EN15502)	mg/kwh	56	58	59.7	59.8	61.6	63.3
Sound Power Level (EN 15036-1:2006)	LWA(db)	56	58	60	62	64	66



IMPORTANT INFORMATION

These instructions must be read and understood before installing, commissioning, operating or maintaining the equipment.



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