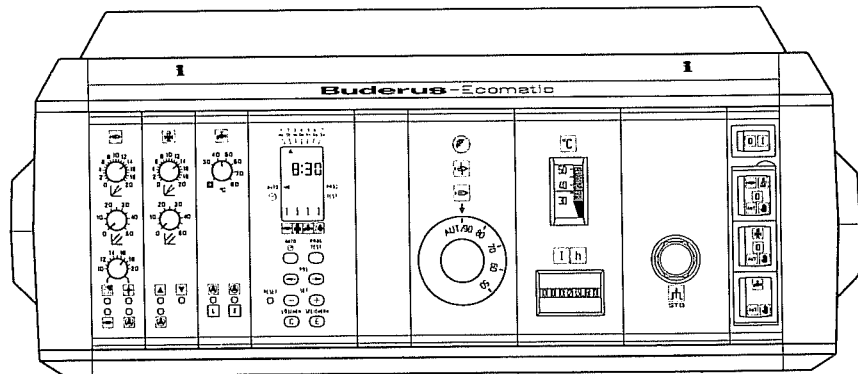


Homeowners Manual

Ecomatic HS 3220

Multifunction Electronic Controller for Hydronic Systems



Ecomatic-M

Dear Homeowner,

Please read these instructions carefully to acquaint yourselves with the operation and functions of the Ecomatic HS 3220. This will better enable you to fully utilize its many energy-saving features.

All user-adjustments can be made from the Ecomatic front panel. If internal settings are required, they should be carried out by a Buderus authorized technician only.

If you still have any questions please contact your installer.

About the Ecomatic HS3220...

The versatility and precise control that microchip technology has brought to so many aspects of modern life are finally available for hydronic heating system control. Fuel use economies of 30% become possible when compared to conventional hot water heating systems using traditional wall thermostat/ multi-zone configurations. Homeowner comfort is increased to a point never dreamed of before.

The Ecomatic HS 3220 is a fully modular 'intelligent' heating system controller that helps achieve maximum boiler and system efficiencies. This control offers the full benefits of sophisticated weather-responsive energy management controls designed for commercial equipment and makes these features available to the residential user. With over 1,800,000 Ecomatic controls installed worldwide, you can be confident that the performance and durability of the HS 3220 has been well proven in the field.

Features of the Ecomatic HS 3220 include:

1) Weather-responsive regulation (outdoor reset control)

Boiler and system operate at the exact temperatures required for efficient performance as dictated by actual outdoor temperatures. This means that for most of the heating season, temperatures are lower than with traditional all 'on' or all 'off' systems. Lower temperatures mean important fuel savings.

2) Advanced solid-state timer functions:

Although a factory schedule is already programmed for your convenience, you can custom program the Ecomatic HS 3220 micro-computer timer to switch from 'normal' heating mode to 'nighttime' heating mode up to times per week. Conscientious use of the reduced temperature 'nighttime' heating is another source of important fuel savings.

3) Domestic hot water control and priority:

When a Buderus Isocal hot water storage tank calls for hot water heating, space heating is put on 'hold' the few minutes it takes to heat more hot water. It is unlikely that you will notice that the heat is off for a short time (traditional heating system off-cycles are usually longer than an Ecomatic HS 3220 hot water production call).

Hot water production can (and, we suggest, should) be timer-controlled. This way, unnecessary boiler and hot water pump operation during periods of negligible hot water use are eliminated. The hot water already in storage guarantees a constant supply at all times.

A timed Thermal Disinfection function is built-in to the control's internal program and can be put into effect by an installer setting. This function periodically heats your hot water to 167°F (we recommend doing this for two hours, once a week, at night) to guard against the proliferation of the bacteria that causes Legionnaire's disease which can be present in any hot water tank.

4) **Function indicator lights** on the control panel show the state of system operation at all times. Override switches allow you to have continued heat and hot water even in case of an Ecomatic HS 3220 malfunction.

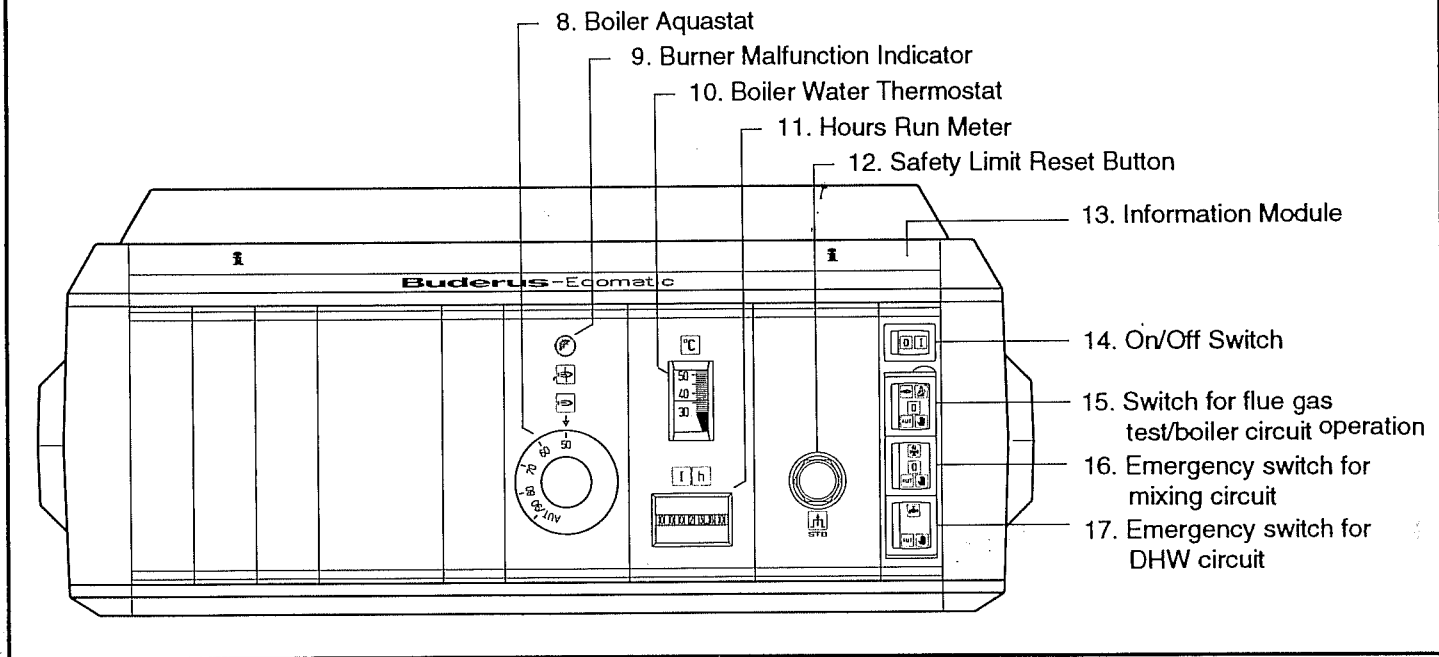
5) A **remote user control**, conveniently located in the living space, lets you set the day and night temperatures as well as select the desired heating mode.

6) **The Ecomatic HS 3220 is a modular control.** You can add control functions at any time, simply by having your installer plug in new function modules.

Over and above these 'basic', but sophisticated functions, the Ecomatic HS 3220 offers many special control possibilities that are discussed elsewhere in this guide and in the installer's technical manual.

<u>Contents</u>	<u>Page#</u>
General Information	...1
Primary Controls	...2
Calibration Controls	...3
Using Your Ecomatic HS 3220	...4
Space Heating Adjustments	...4
Domestic Hot Water Heating Adjustments	...5
Micro-Computer Timer Adjustments	...6-7
Emergency Operation	...8

Ecomatic HS 3220 Primary Controls



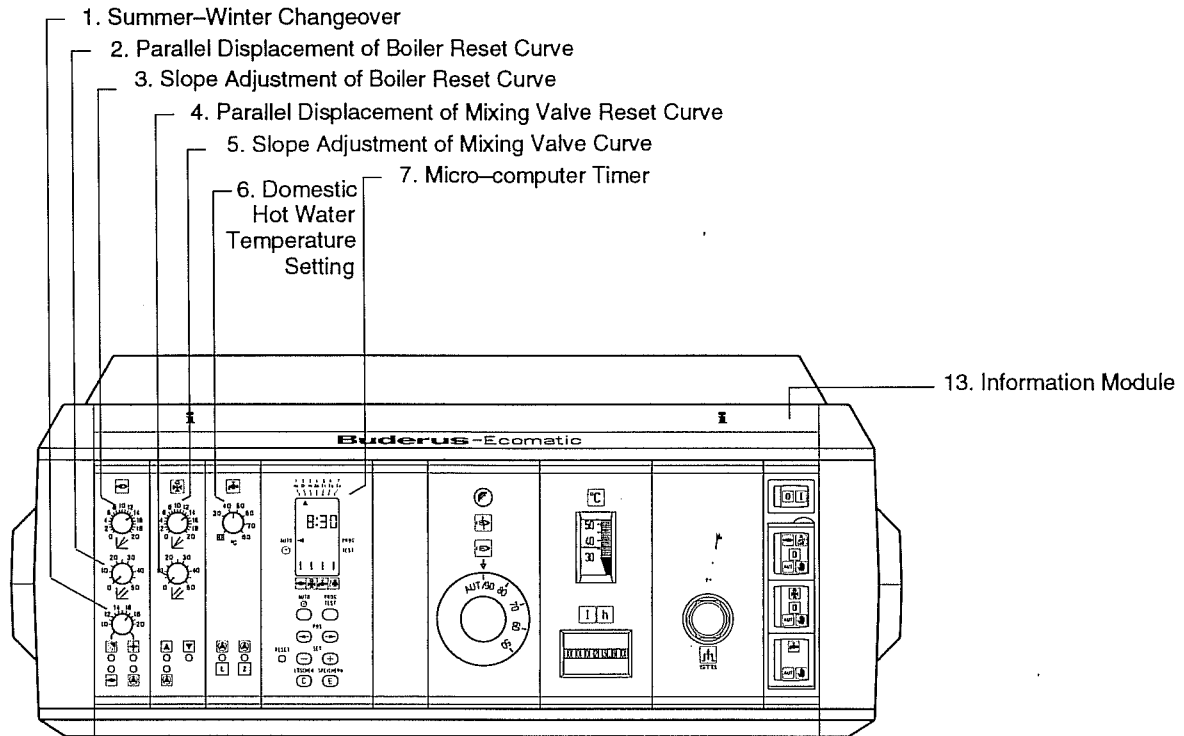
The principal user functions on the Ecomatic HS 3220 itself are located on the right half of the control face.

- TO:**
- Turn on (I) or off (O) the Ecomatic (as well as boiler and connected circulating pumps). → Use Switch ⑭
 - Bypass the Ecomatic electronic heating functions for testing and troubleshooting purposes or in case of control malfunction. (Boiler safety limit remains active.) → Use Switch ⑮
 - Bypass the Ecomatic electronic domestic hot water functions. (Boiler safety limit remains active.) → Use Switch ⑰
 - Set boiler operating temperature (by installer). → Use Switch ⑧



Building codes require the existence of a heating system safety switch at the entrance to the boiler room. In case of any heating system malfunction, use this switch to turn off system.

Ecomatic HS 3220 Calibration Controls



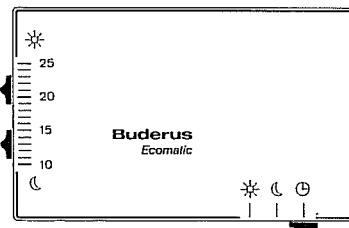
The calibration of the Ecomatic HS 3220 adapts the control's electronic functions to your particular heating system's needs and characteristics. The initial settings should be performed by your installer. Ask him to explain the settings to you and be sure they are noted in the Settings Log elsewhere in this manual.

Start-up Operation

- **Set master switch (14) to On (I) position.**
- **Set to 'AUT' position switches 15, 16, and 17 located under the cache panel.**
- **Set heating curve adjustment knobs 3 and 5 to the corresponding heating curve slope setting for your particular heating system. Typical settings are:**
 - Radiant floor heating = 6 – 9 (on 005 Module only)
 - Cast iron radiation = 12 – 14
 - Panel radiation = 16 – 18
- **Set heating curve parallel displacement knobs 2 and 4 to the '0' factory-set position.**
- **Set summer/winter changeover knob 1 to 17° C (62° F).**
- **Set domestic hot water temperature knob 6 to the desired storage tank temperature, i.e., 55° C (131° F).**

Hot water heating has priority over space heating. Turning knob to 'O' turns off hot water heating.

- **Verify timer display shows correct time.**
- **Set Remote User Control** ☀ slider to 20° C (68° F). Set ☾ slider to 15° C (59°). Set mode selector to ☺



The system is now ready for operation. The factory-installed program is in effect.

Ecomatic Symbols:

○ Off	☀ Hot Water	AUT Automatic Operation
⊕ On	☀ Summer Operation	☺ Circulator Operation
☀ Burner/Heating	☀ Winter Operation	↘ Slope Adjustment
☀ Mixing Valve	☀ Emergency (override)	↘ Parallel Shift Adjustment

Using Your Ecomatic HS 3220

The Ecomatic HS 3220 comes from the factory ready for operation. All timer functions are already pre-programmed. Your installer has adjusted the control to fit your particular heating needs. You are ready to experience the comfort, reliability and savings that the Ecomatic HS 3220 offers.

There are situations, however, where you might want to change control settings. For example:

- You would like the heating or hot water temperatures set differently.
- The Buderus factory program is not appropriate to your needs.
- You think the Ecomatic HS 3220 is not functioning correctly. You want to know what to do until the serviceman arrives.

Space Heating Adjustments

Each building has different heating requirements based on its insulation levels and the type of radiation used. The initial settings may have to be fine-tuned.

1. Weather-Responsive Regulation

The Ecomatic HS 3220 regulates heating water temperature according to the outdoor temperature. This provides the most comfortable and economic type of control available.

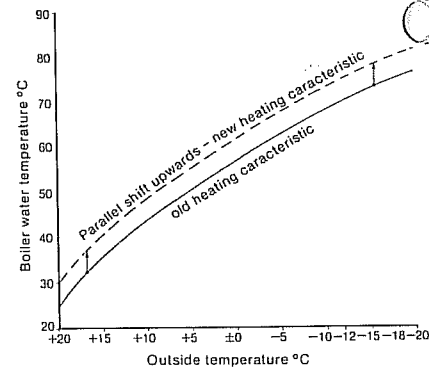
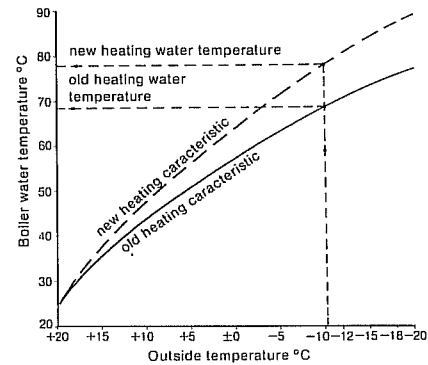
A relationship exists that charts what the heating water temperature should be for a given outdoor temperature. It is called the reset curve. This curve has two characteristics that can be modified to adjust heating system output:

The first changes the slope or gradient of the curve. It can be adjusted by dial 3 on boiler module #004. On controls furnished with mixing valve module #005, the slope of the mixing valve curve can be adjusted by dial 5. Because the heating difference is greater at lower outdoor temperatures (see diagram), changing the slope of the heating curve is justified when room temperatures are generally too low only when the outdoor temperatures are low.

The second shifts the whole curve up or down (See diagram). It can be adjusted with dials 2 and 4. During the daytime heating mode, changing the temperature setting on the Remote User Control accomplishes the same thing within a smaller range.


- ! **Either type of adjustment in the heating curve takes a certain time to become effective. Make adjustments in small increments and wait 24 hours before continuing.**

Slope Adjustment




COMMON TEMPERATURE ADJUSTMENTS	Adjust:	
	Gradient	Parallel Shift
If room temperature is too cold and...	↙	↖
Outside temperature is below 22° ➡	1 mark higher i.e. 14 to 15	no change
Outside temperature is above 40° ➡	1 mark lower i.e. 14 to 13	1 mark higher i.e. 0 to 5
If room temperature is too warm and...		
Outside temperature is below 22° ➡	1 mark lower i.e. 14 to 13	no change

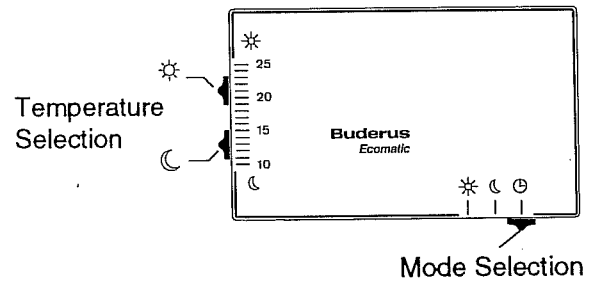
2. Day and Night Modes

The desired **daytime (or normal)** heating temperature is set at the Remote User Control (RUC) installed in the living space by the slider marked .



The temperature sensor incorporated in the RUC detects if there are any unusual heat gains or losses in the heated space that cannot be predicted by the heating curve alone. These include solar gains, an operating fireplace, an open window, etc. The Ecomatic will temporarily shift the water temperature up or down until the desired room temperature is reached. This is called Room Temperature Compensation.

The **nighttime (or setback)** heating temperature is set with the slider marked .




In this economy mode room temperatures are reduced. Additional energy savings are also obtained because the burner and circulators are not allowed to operate in this mode unless room temperature falls below the RUC setting. However, if outside temperature falls below 34° F, the circulator(s) will operate as an anti-freeze protection.



Temperature Settings (left side slide controls)

-  = normal heating temperature selection (daytime mode)
-  = setback heating temperature selection (nighttime mode)

Mode settings (bottom right switch)

-  = continuous normal heating
-  = continuous setback heating
-  = automatic timer operation

Domestic Hot Water Heating Adjustments

Domestic hot water temperature in the Isocal storage tank will be maintained at the temperature set on the dial of the 006 module in the Ecomatic HS 3220. When there is a call for hot water heating, the heating system circulator(s) are shut off and the mixing valve (if installed) is driven to the closed position. This gives priority to domestic hot water heating.

Ask your installer to change the Ecomatic HS 3220 default settings if:

- you do not desire hot water priority heating. (only possible with module 005).
- you desire domestic hot water temperatures higher than the Ecomatic HS 3220 default limit of 140° (60° C)
- you want to modify or eliminate the factory timer energy-saver program which tells the boiler to stop heating the domestic hot water storage tank during the night setback period.

Domestic Hot Water Setting



Hot Water Circulator Operation

Recirculation Pump Operation

Micro-Computer Timer Adjustments

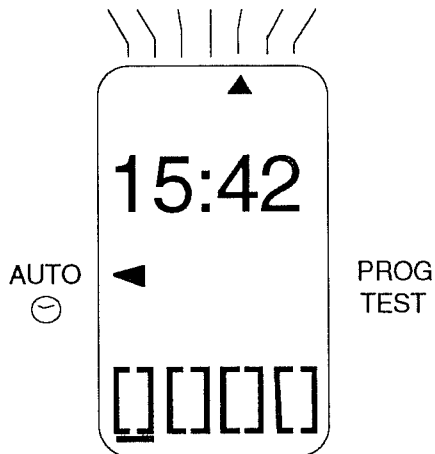
At start-up, the 071 Module timer will display the current time, and thanks to the power reserve incorporated in the Ecomatic HS 3220, the standard factory program will immediately take effect.



This program can be partially or entirely modified. The homeowner disposes of 84 switch points per week to set up customized programs for the four output channels built-in to the timer computer.


In case of a power outage, the timer program is safeguarded. The liquid-crystal display will, however, temporarily turn off.





The standard factory program is shown on page 8.

At start-up the display will appear like this:



From the start-up display you can press  to bring the arrow cursor to clock mode for programming hour, minute, or day of week. Pressing  again will return to AUTOMatic operation.

From the start-up display you can also press  to (1) PROGRAM the timer or (2) review programmed settings (TEST).

Lastly, from this initial display, you can choose the individual channel you want to test or program from the four available at bottom of display. Pressing   moves the underline cursor to select the different channels. Once selected, pressing the  or  will manually switch that channel's program state from 'normal' (I) mode to 'setback' (O) mode or vice-versa. This is a way to temporarily override program operation without reprogramming the control. The program will return to its automatic mode at that channel's next programmed switchpoint.


Modifying The Standard Program

Switchpoints incorporated in the factory-installed program may be modified or deleted entirely, as required. Before examining the programming examples on the next page, please familiarize yourself with the diagram above right and follow these guidelines:

Day of Week

Day Cursor and Indicator

Time Display

Arrow (Mode) Cursor
 AUTO = Program active
 = Set clock
 PROG = Set program
 TEST = Verify program

Channel Status Display + Channel Selection Cursor

Select mode: Auto or Clock

Select mode: Set program
Test program

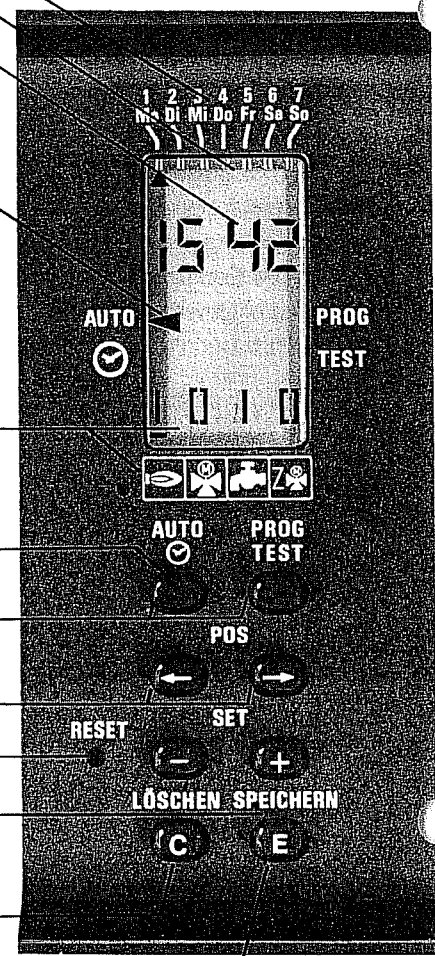
Move Cursor left, right

Delete all data (except standard program)

Change cursor position; change a setting to higher/lower value; turn channel on/off

Delete displayed switch point

Store displayed switch point



1 Day of Week

2 Day Cursor and Indicator

3 Time Display

4 Arrow (Mode) Cursor

5 Channel Status Display + Channel Selection Cursor

6 Select mode: Auto or Clock

7 Select mode: Set program / Test program

8 Move Cursor left, right

9 Delete all data (except standard program)




10 Change cursor position; change a setting to higher/lower value; turn channel on/off

11 Delete displayed switch point


12 Store displayed switch point




Mo = Monday Di = Tuesday Mi = Wednesday
 Do = Thursday Fr = Friday Sa = Saturday So = Sunday

1) To page through an existing program:


Press . Arrow cursor aligns opposite 'TEST'. Successive program switchpoints are displayed when  or  are pressed.

2) To Delete switchpoints:





Incorrect switchpoints must be deleted when entering new switchpoints. First display switchpoint to delete. Then press . (The next switchpoint will appear on the display.)

- If a switchpoint is inadvertently deleted, it may be restored by pressing  to move arrow cursor to PROG. Successively press  and . The deleted switchpoint is restored to memory.
- The button marked 'reset' deletes all program information and reverts to factory program. Current time must be re-entered.

3) If two conflicting switchpoints are present, (i.e., 6 AM 'ON' and 6 AM 'OFF') the switchpoint entered last will be active.



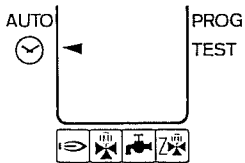



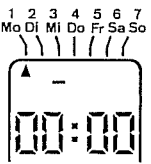


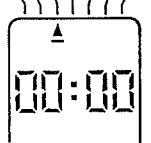


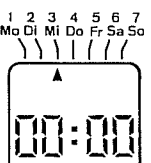


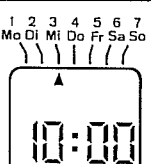

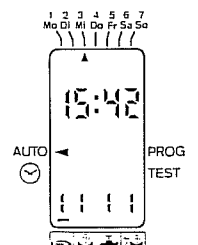
• If no button is pressed for approximately two minutes, timer automatically reverts to automatic ('AUTO') operation. Pressing  also reverts to automatic operation.

4) Temporary override of 'Normal' or 'Setback' modes


The programs in the four separate channels can be overridden while in 'AUTO' mode. Press  and  to move line cursor to channel to be changed. Press  and  to toggle the operating mode from 'O' (setback mode) to 'I' (normal heating mode).


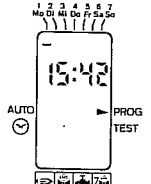


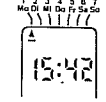





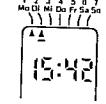




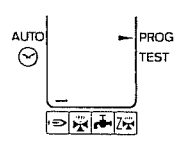


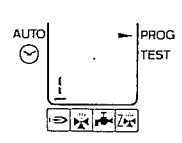

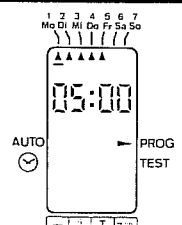
Examples:

I. To set clock to Wednesday, 15:42 hours

Item	Button	Display	Explanation
1	AUTO  		Position arrow cursor to  • Line cursor positions under hour display
2	POS  		Line cursor moves to Mi (Wednesday)
3	SET  		Arrow cursor moves to Mi
4	POS  		Line cursor moves to first hour column
5	SET  		Sets first hour column to '1'
Following the procedure outlined in steps 4 and 5, set second hour column to 5, and minute columns to 4 and 2.			
12	SPEI-CHERN 		All input data is stored. Standard program is active. Colon flashes.

II. Creating a Program

Programming switchpoint times is identical to setting the clock, but is carried out in the PROG mode, not the  mode. To set 'Normal' heating mode to 5 AM Mon – Fri:

Item	Button	Display	Explanation
1	PROG TEST 		Set mode to PROG
2	SET  		Select Monday
3	POS  		Move line cursor to Tuesday
4	SET  		Select Tuesday
Wednesday, Thursday, and Friday should be selected and entered in the same way. In PROG mode several days may be selected at once. Proceed to select the hour and minute display with the line cursor using   . Set time to 5 AM as in example I.			
17	POS  		Move line cursor to burner symbol
18	SET  		Set burner channel to 'On' (I)
19	SPEI-CHERN 		Set changes

Modes	Controls						Call your installer
	Operation switch (13)	Button for setting DHW temperature (6)	Boiler water thermostat (8)	Covered by Cache			
				Switch for flue gas test (14)	Emergency switch for mixing circuit (15)	Emergency switch for DHW heating (16)	
To operate space heating only in override mode	I	30°-60°C	50°-90°C			AUT	
To operate domestic hot water heating only in override mode	I	30°-60°C	AUT/90	AUT	AUT		
To operate space and domestic hot water heating in override mode	I	30°-60°C	50°-90°C				

**DEGREES CENTIGRADE
TO DEGREES FAHRENHEIT**

C	F	C	F	C	F
-40	-40.0	+10	+50.0	+50	+122.0
-38	-36.4	+11	+51.8	+55	+131.0
-36	-32.8	+12	+53.6	+60	+140.0
-34	-29.2	+13	+55.4	+65	+149.0
-32	-25.6	+14	+57.2	+70	+158.0
-30	-22.0	+15	+59.0	+75	+167.0
-28	-18.4	+16	+60.8	+80	+176.0
-26	-14.8	+17	+62.6	+85	+185.0
-24	-11.2	+18	+64.4	+90	+194.0
-22	-7.6	+19	+66.2	+95	+203.0
-20	-4.0	+20	+68.0	+100	+212.0
-19	-2.2	+21	+69.8	+105	+221.0
-18	-0.4	+22	+71.6	+110	+230.0
-17	+1.4	+23	+73.4	+115	+239.0
-16	+3.2	+24	+75.2	+120	+248.0
-15	+5.0	+25	+77.0	+125	+257.0
-14	+6.8	+26	+78.8	+130	+266.0
-13	+8.6	+27	+80.6	+135	+275.0
-12	+10.4	+28	+82.4	+140	+284.0
-11	+12.2	+29	+84.2	+145	+293.0
-10	+14.0	+30	+86.0	+150	+302.0
-9	+15.8	+31	+87.8	+155	+311.0
-8	+17.6	+32	+89.6	+160	+320.0
-7	+19.4	+33	+91.4	+165	+329.0
-6	+21.2	+34	+93.2	+170	+338.0
-5	+23.0	+35	+95.0	+175	+347.0
-4	+24.8	+36	+96.8	+180	+356.0
-3	+26.6	+37	+98.6	+185	+365.0
-2	+28.4	+38	+100.4	+190	+374.0
-1	+30.2	+39	+102.2	+195	+383.0
± 0	+32.0	+40	+104.0	+200	+392.0
+1	+33.8	+41	+105.8	+205	+401.0
+2	+35.6	+42	+107.6	+210	+410.0
+3	+37.4	+43	+109.4	+215	+419.0
+4	+39.2	+44	+111.2	+220	+428.0
+5	+41.0	+45	+113.0	+225	+437.0
+6	+42.8	+46	+114.8	+230	+446.0
+7	+44.6	+47	+116.6	+235	+455.0
+8	+46.4	+48	+118.4	+240	+464.0
+9	+48.2	+49	+120.2	+245	+473.0