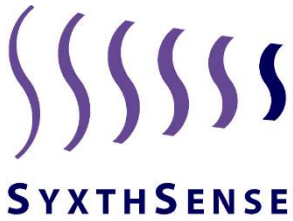
SYX660 Commissioning Guide



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1. INTRODUCTION

The SYX660 is a simple controller which is designed to suit the control needs of today's smaller commercial and larger domestic properties. It can be configured control one, two or multiple boilers (via 0-10v sequencer), or provide burner modulation. Plant control options are with optimum start/stop, direct boiler, direct valve or boiler and valve compensation. The heating circuit is easily configured for constant temperature as required.

A separate timed output channel is provided for the provision of hot water. The HWS control routines can be used independently or combined with the boilers. If combined with the boilers then the option of boiler demand by the Hot Water is provided by a digital input.

Fast installation and operation are key features of the SYX660. The controller has a base application that is adjusted during the commissioning phase by simple parameter choices. The use of practical default settings means that the system is ready to control a radiator system with minimal adjustments. Additional self-adapting features adjust the control settings to the buildings performance.

An override menu (Panel Switch) allows you to override the control mode without the need to change any settings. If set point and time settings of the unit is required these can be made using either the inbuilt display, optional remote colour touchscreen, or the in-built web browser that is compatible with any Laptop or Smart Device.

The info button provides direct access to visual indication of all input and output status.

The Malfunction button allows the alarms to be seen and actioned

There is a user button to quickly acknowledge and clear Alarms

The simple user screen is text based using simple language and is backlit for easy use in poor plant room lighting.

The internal web browser allows local site and remote site monitoring/supervision. Users can interrogate relevant parameters with 3 distinct user levels. Access levels are changed by entering the correct code between: Information Level (default), Change Level, Set-up level.

Historical records of temperature are taken at regular intervals and sensor are monitored for their operational condition. Performance can be assessed and savings increased through better information and analysis. Simple configuration and simple use are key features of the SYX660.

1.1 Important Information Regarding Product Safety

Safety Instructions

This document contains information on installing and commissioning the product "SYX660". Each person who carries out work on this product must have read and understood this document. If you have any questions that are not resolved by this document, you can obtain further information from the supplier.

If the product is not used in accordance with this document, the protection provided will be impaired.

Applicable regulations must be observed when installing and using the device. Within the EU, these include regulations regarding occupational safety and accident prevention as well as those from the

VDE (Association for Electrical, Electronic & Information Technologies). If the device is used in other countries, it is the responsibility of the system installer or operator to comply with local regulations.

Mounting, installation and commissioning work on the devices may only be carried out by qualified technicians. Qualified technicians are persons who are familiar with the described product and who can assess given tasks and recognise possible dangers due to technical training, knowledge and experience as well as knowledge of the appropriate regulations.

WARNING
Indicates a hazard of medium risk which can result in death or severe bodily injury if it is not avoided.

CAUTION
Indicates a hazard of low risk which can result in minor or medium bodily injury if it is not avoided.

CAUTION
Indicates a hazard of medium risk which can result in material damage or malfunctions if it is not avoided.

NOTE
Indicates additional information that can simplify the work with the product for you.

1.2 Notes on Disposal

For disposal, the product is considered waste from electrical and electronic equipment (electronic waste) and must not be disposed of as household waste. Special treatment for specific components may be legally binding or ecologically sensible. The local and currently applicable legislation must be observed.

1.3 INPUTS

Six temperature sensor inputs and two digital Inputs are available and are to be used as follows:

Terminal	Pin	Function	Details
13&15	**Pin 1**	**Outside Air Temperature** Sensor Part: TEU-KP10	• Outside economy • Compensation • Frost protection
14&15	**Pin 2**	**Compensator Flow Sensor** Sensor Part: TEAT-KP10 Immersion or TEP-KP10 Strap-On	• Heating Valve Compensation Control
16&15	**Pin 3**	**Boiler/Heating Return Sensor** Sensor Part: TEAT-KP10 Immersion or TEP-KP10 Strap-On	• Return Pipe Frost protection
17&15	**Pin 4**	**Boiler Flow Sensor** Sensor Part: TEAT-KP10 Immersion or TEP-KP10 Strap-On	• One or two boiler control • Boiler compensation • Boiler high temperature alarm and boiler cut out
31&33 **32&33**	**Pin 5** **Pin 6**	**Space Sensor 1** **Space Sensor 2** Sensor Part: TEHR-KP10	• Optimum Start/Stop • Averaging (when 2 used) • Day economy • Room Influence • Space Frost protection
27&28	**Pin 9**	**Remote Day Extend button for heating (and HWS if selected)** LAP5	• Closed contact extends the time schedule for as long as the contact is closed. Heating controls to day requirements as required, or not.
29&30	**Pin 10**	**Auxiliary Switch Input** **(Close switch to activate)**	• Multi-function input • Installer can select one of the following uses : 1.Frost Mode (Holiday Switch) 2.HWS Demand (Boiler Setpoint Request) 3.Summer Switch

1.4 ANALOGUE OUTPUTS

One 0-10v output is available. It can be set to offer one of three services.

Terminal	Pin	Function	Details
34 0-10 **36 Gnd**	**Pin 7**	**User Selectable Output** (Configured in Connections Menu)	• 0-10v signal for VT Valve • 0-100% boiler demand signal or sequencer demand signal • 0-10v scalable boiler set point signal (1 option allowed.)

1.5 OUTPUTS

All the relay outputs are 230Vac 5A rated SPST. The relay feeds can be Volt Free, 230v or 24v and are all derived from an external source. The HWS output requires an auxiliary relay to function (see wiring diagram). The outputs are allocated as follows:

Terminal	Pin	Function	Details
35 0v **30 Gnd**	**Pin 8**	**Hot Water**	• VFC Timed output either direct to HWS Heater or via a relay/contactor. See wiring, requires use of an IO-1RM relay.
3&4	**Pin 11**	**Boiler No. 1**	• VFC Control output either direct to boiler or via a relay/contactor
5&6	**Pin 12**	**Boiler No. 2**	• VFC Control output either direct to boiler or via a relay/contactor
7&8	**Pin 13**	**Pump** **Plant Start/Stop (Optimiser Mode)**	• VFC Control output either direct to Pump enable or via a relay/contactor • Can also be used to drive a twin pump set via the PMPCO Auto change over module from SyxthSense • Also used as the Optimiser Plant Start/Stop signal when Optimiser Only mode selected
9&10	**Pin 14**	**Valve Open**	• Actuator open signal VFC, 230V or 24v reversing actuator (supply to be provided)
11&12	**Pin 15**	**Valve Close**	• Actuator close signal VFC, 230V or 24v reversing actuator (supply to be provided)

1.6 WEB BROWSER CONNECTION

Customer Interface is possible using a Web Browser, Smart Phone (with SYX660 connected to a network with Wi-Fi access). Users can quickly:

- Check current status of control system
- Change User level
- Change of settings
- View historic information
- Time Schedule and Holiday Planning
- Configuration of the controller options
- Remote overrides and time extensions
- Observe Live Controller Operation

2 CONFIGURATION OVERVIEW

The SYX660 controller is configured by the installer to provide control of simple heating plant. The SYX660 is configured in specific phases. The phases are: Overrides, Heating, Hot Water, Boilers and Connections. The heating and hot water functions are independent of each other but may share some features such as the Boilers and Overrides. These options allow the controller to be easily adapted to best suit particular plant and building applications. The selection and behavior of an option is also further determined by the user settings inside the associated option itself. This allows a logical procedure through the controller configuration and fine tuning of specific sections in turn.

The heating mode options in the controller that can be selected during set-up are:

- Optimum Start/Stop of a plant start signal with Space Frost Protection and Space High Limit Protection
- Optimiser Compensator of valve and/or Boiler(s) with Frost Protection
- Day Compensation of Valve and/or Boiler(s) with Night Reduced Heating
- Day Compensation of Valve and/or Boiler(s) with Night Frost Protection

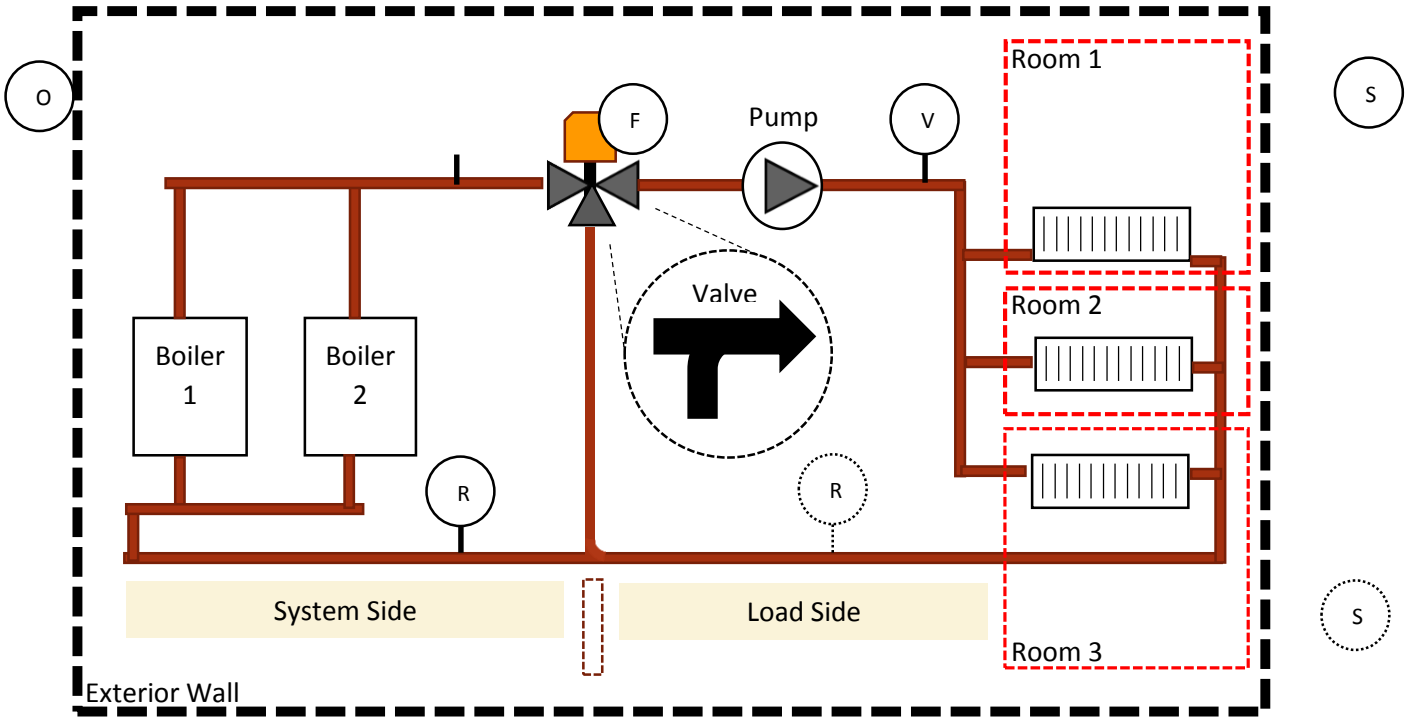
On start-up, the settings have been pre-set to give sensible values suitable for a Radiator VT Heating System.

All of the above Heating Modes are available with a Hot Water Service output that also has the following options:

- Boiler Linked with adjustable Primary Set point
- Boiler Linked with adjustable Primary Set point and HWS Demand control (Pin 10)
- Independent Hot Water Heating Time Channel.

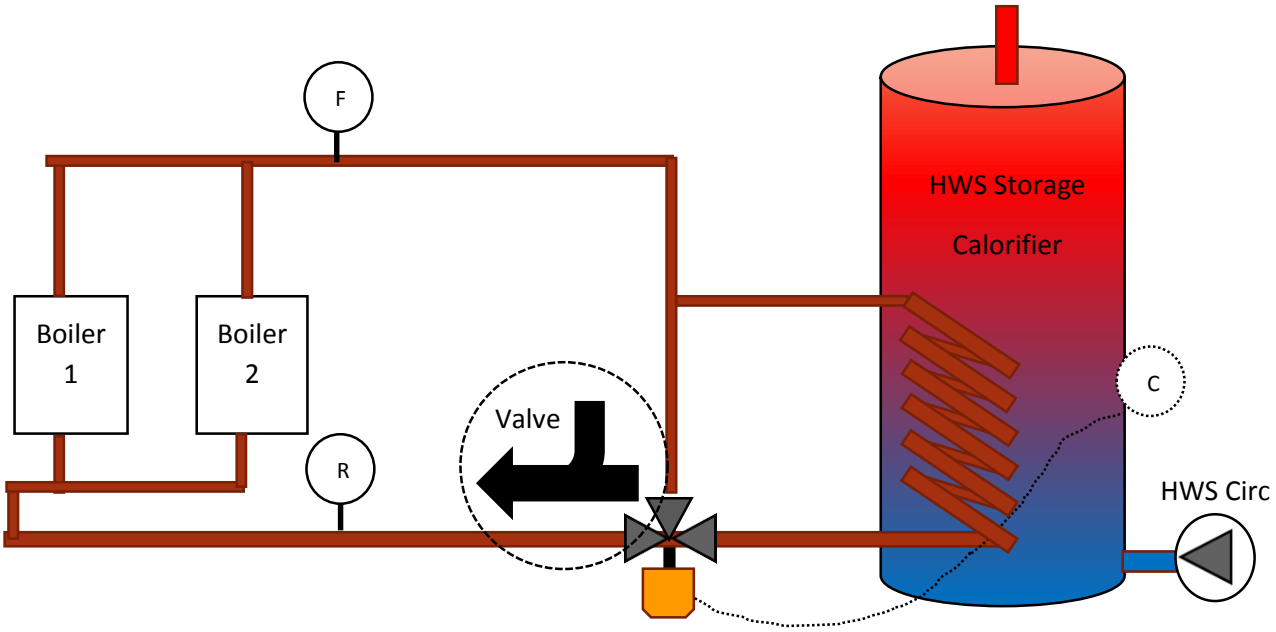
3 Equipment Selection and location

3.1 Heating Application Example



O	Outside Air Sensor located on North Facing wall shaded from direct sunlight
	Boiler Flow Sensor located in common flow pipe from boilers.
	Return Sensor located in main return pipe to boilers on system side.
V	Variable Temp Flow Sensor located in main flow pipe to radiators after pump
S	Space Sensor located in heated room that is always used for occupant purposes
Valve	Mixing Valve located in system flow, allows mixing with return from heating load
Pump	Heating Pump located in heating flow, circulates heat around the heating load
	Locate the Return Sensor on Load side if HWS is boiler linked so that heating load is protected during periods of non-use
	Second Space Sensor located in Heated Room that offers a balancing view of heating effect to the building.

3.2 HWS Application Example



The HWS Control Circuit is enabled from an IO-1RM relay connected on 30&35 (Pin 8). This output may also be used to provide a control signal to the HWS Circulation Pump enable circuit (by others).

The HWS Menu will be “Boiler Linked” for the above scheme.

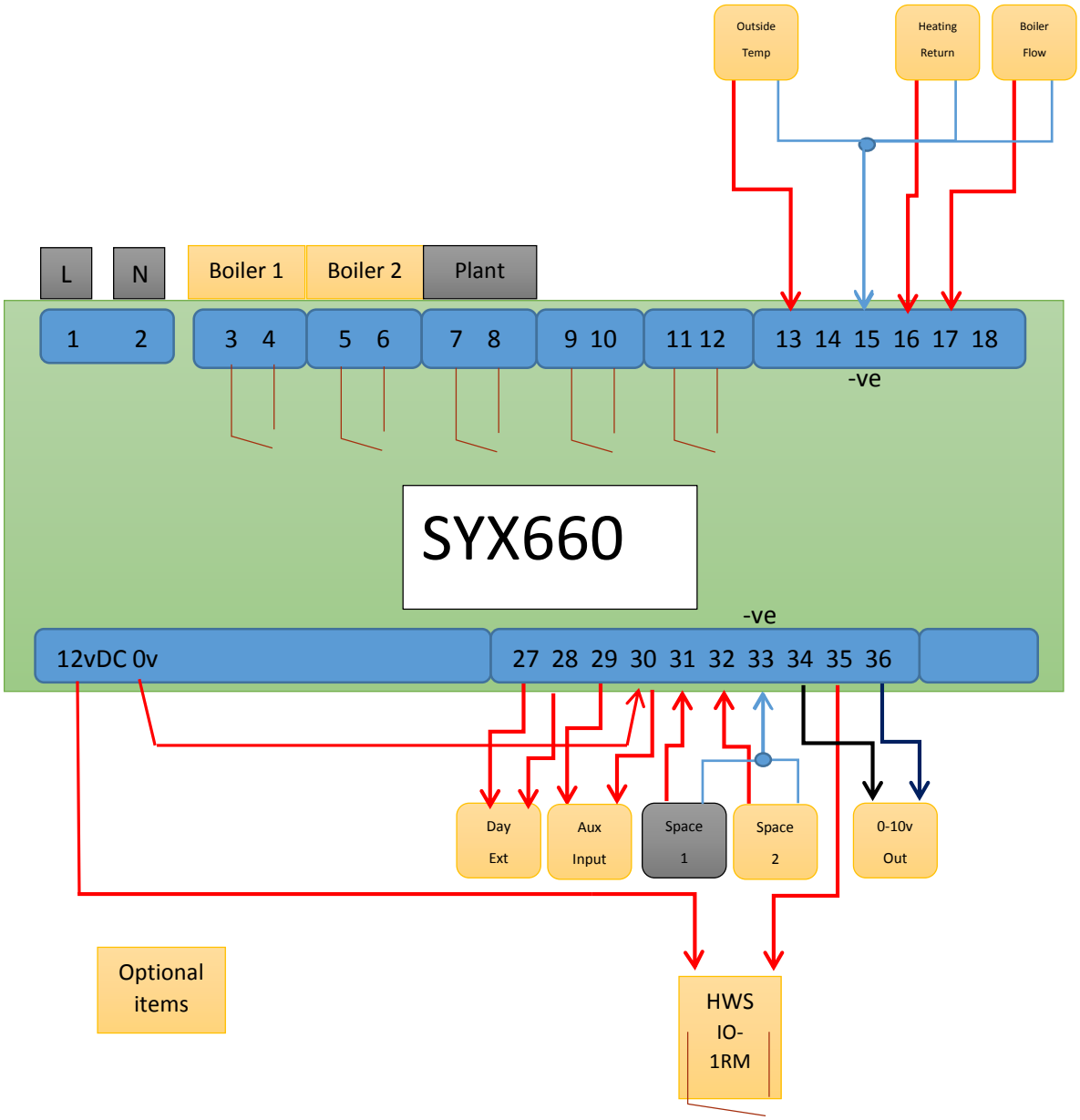
The Cylinder Thermostat is controlling the valve actuator. The Actuator opens to allow water through the heating coil. If the Auxiliary input is configured to “HWS Demand” the Actuator drives open and an auxiliary switch closes the contact to 29&30 (Pin 10). This requests the boilers to run to the Primary Set point. When the HWS is satisfied the thermostat opens and this closes the valve. The valve contact then opens and the boiler set point is relaxed. If there is no heating demand then the boilers will be switched off. The connection to the controller Pin 10 must be volt free.

If the HWS Demand option is not configured then the boilers will run at the HWS primary Set point until the HWS Time Period Ends.

F	Boiler Flow Sensor located in common flow pipe from boilers.
R	Return Sensor located in main return pipe to boilers on system side.

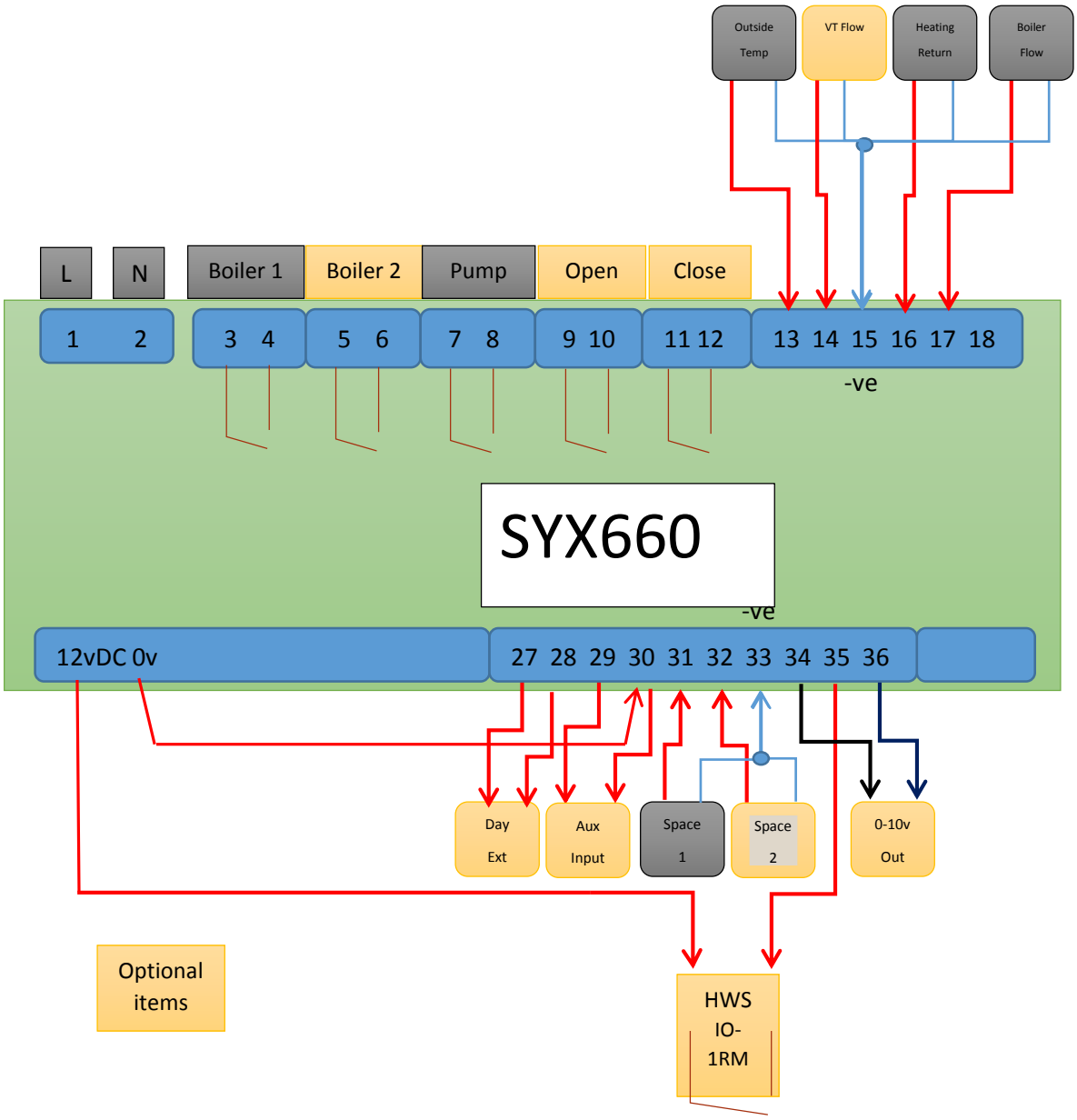
4 Connection Diagrams

4.1 Connection Diagram: Optimiser Mode



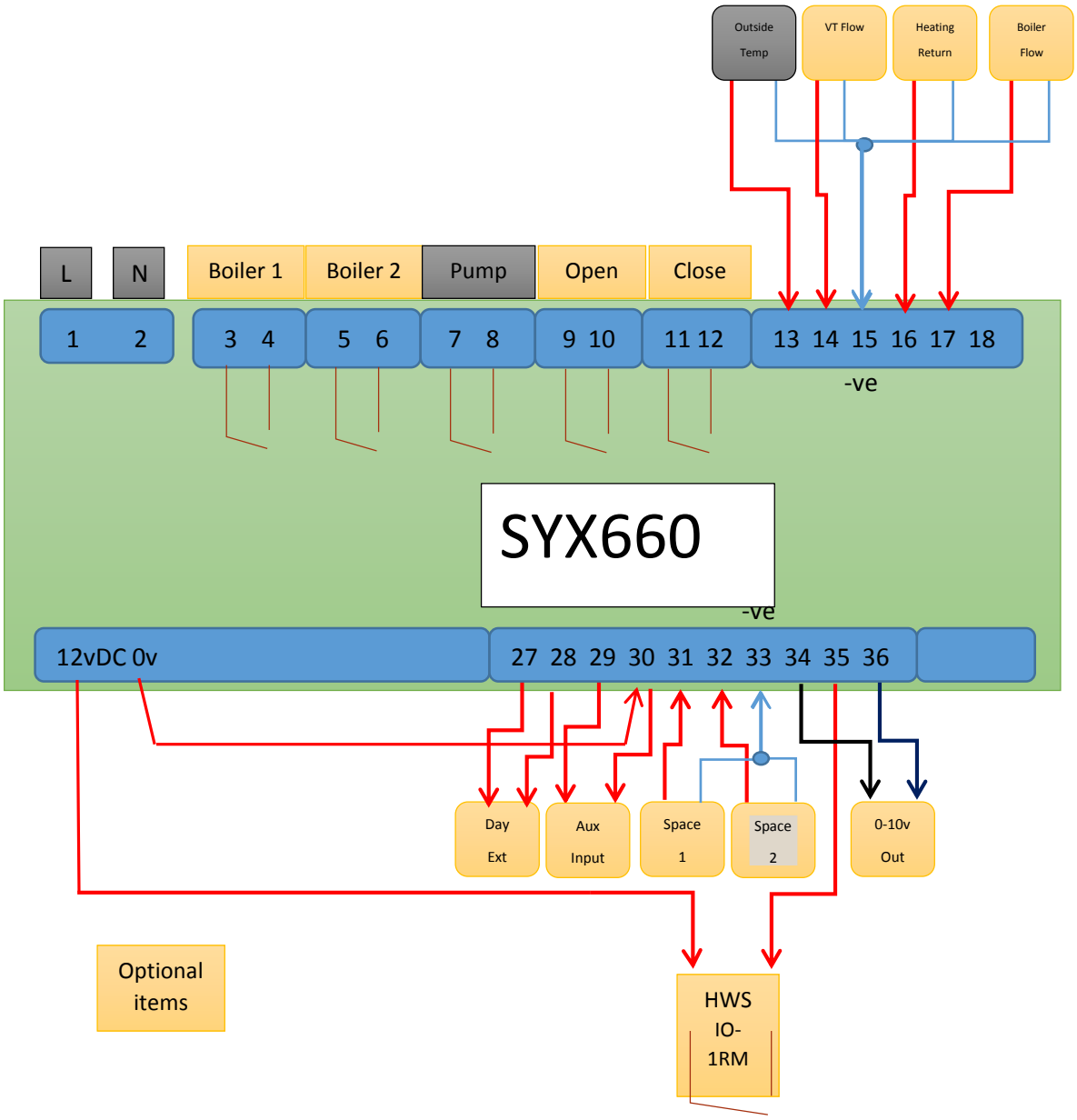
- One Space Sensor is required for the optimiser to function. The second is optional.
- The HWS Control and its options are optional.
- The boilers only serve the HWS Function (if linked) in Optimiser Only application
- Boiler Flow and Return Sensors are needed for HWS boiler control (if HWS boiler control required)
- The Optimiser Start/Stop Signal is provided from the Plant Start terminals
- Time Extend and Holiday features apply
- 0-10v Output option supported for the boiler demand or boiler set point control.
- VT Valve Control not supported
- Plant Start Connection is optimised on and optimised off as default. The plant connection remains closed through the occupied period. Optimum Off can be disabled meaning plant then turns off at end of occupied period on space High Temperature.
- Outside Air Sensor can be fitted to provide Outside High Temp Shutdown if required.
- Outside sensor will display as 0°C if not connected or if sensor is faulty when in Optimiser Mode.

4.2 Connection Diagram: Optimiser/Compensator Mode



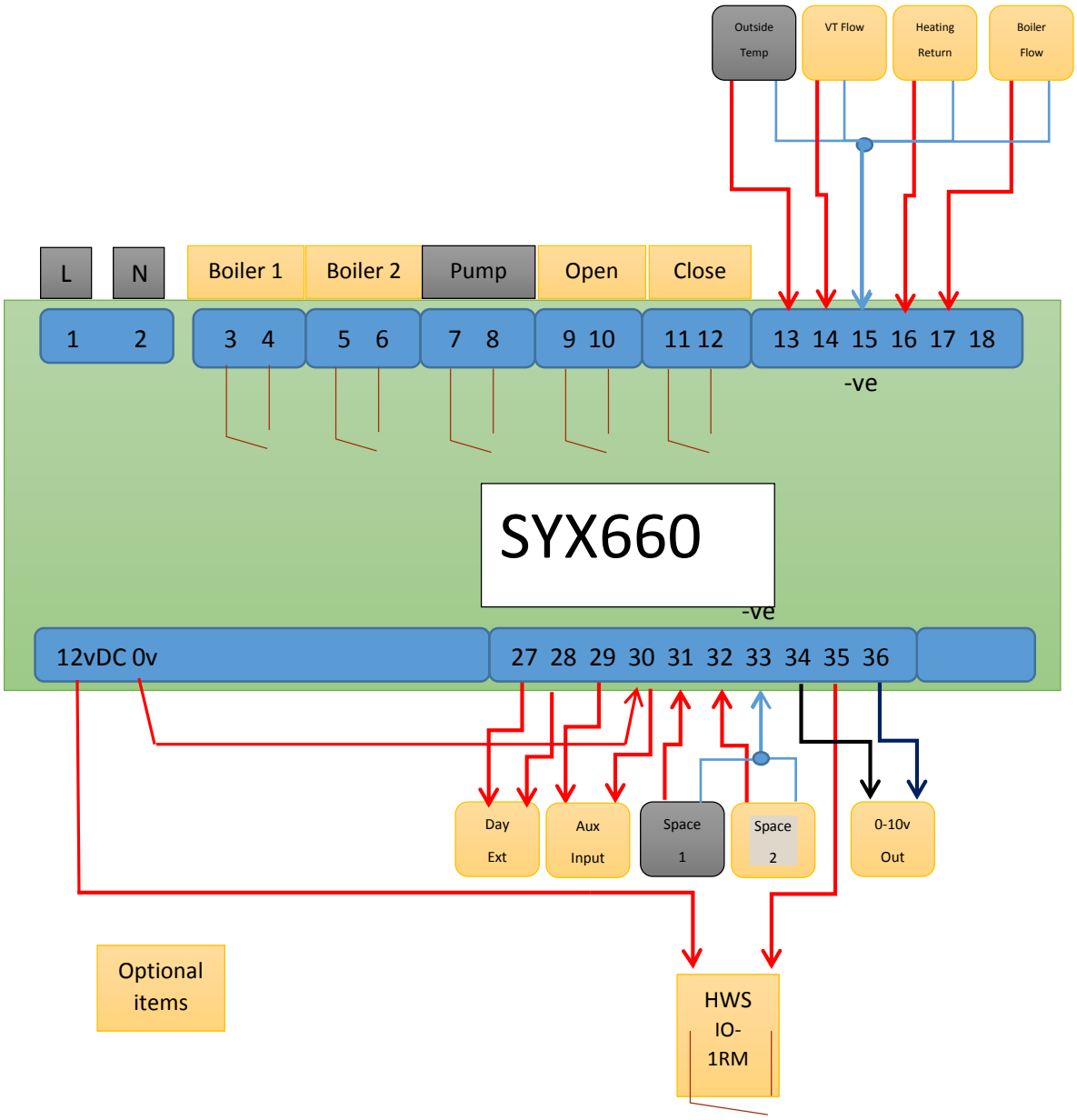
- One Space Sensor is required for the optimiser/compensator to function. The second is optional.
- The HWS Control and its options are optional. IO-1RM is required if HWS output to be used.
- The boilers serve the Heating and HWS Function (if linked)
- Boiler Flow and Return Sensors are needed for boiler control
- VT Flow Sensor required for Valve Compensation Control
- Time Extend and Holiday features apply
- 0-10v Output option supported for the VT Valve, boiler demand or boiler set point control.
- Heating is optimised on and optimised off as default. Optimum Off can be disabled meaning plant then turns off at end of occupied period on Space High Temperature.

4.3 Connection Diagram: Compensated Day/Night Reduced



- Space Sensors are optional. If fitted can provide room influence of heating flow temperature
- Room Sensor is needed if room frost protection is required during holiday periods.
- The HWS Control and its options are optional. IO-1RM is required if HWS output to be used.
- The boilers serve the Heating and HWS Function (if linked)
- Boiler Flow and Return Sensors are needed for boiler control
- VT Flow Sensor required for Valve Compensation Control
- Time Extend and Holiday features apply
- 0-10v Output option supported for the VT Valve, boiler demand or boiler set point control.
- Heating is time controller between day and night levels. Day Extend will hold day levels.

4.4 Connection Diagram: Compensated Day/Night Frost Protection



- Space Sensor provides room influence of heating flow temperature during the day
- Room Sensor provides frost protection is required during holiday periods.
- Two Room sensors may be fitted to provide an average temperature.
- The HWS Control and its options are optional. IO-1RM is required if HWS output to be used.
- The boilers if required serve the Heating and HWS Function (if linked)
- Boiler Flow and Return Sensors are needed for boiler control
- VT Flow Sensor required for Valve Compensation Control
- Time Extend and Holiday features apply
- 0-10v Output option supported for the VT Valve, boiler demand or boiler set point control.
- Heating is time controller between day and night levels. Day Extend will hold day levels.

5 Controller Configuration

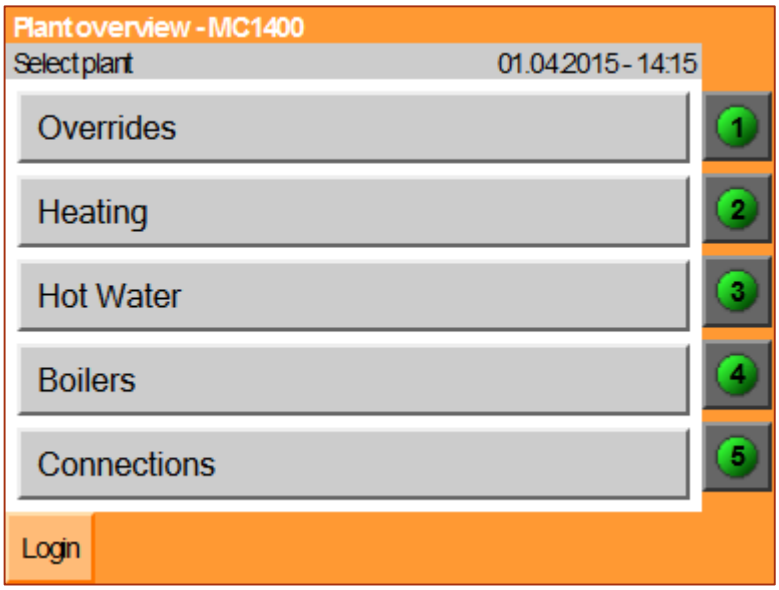
To Set-up the controller, the user must be logged into the SYX660 at level 2.

The passcode for Set-up level is 0112

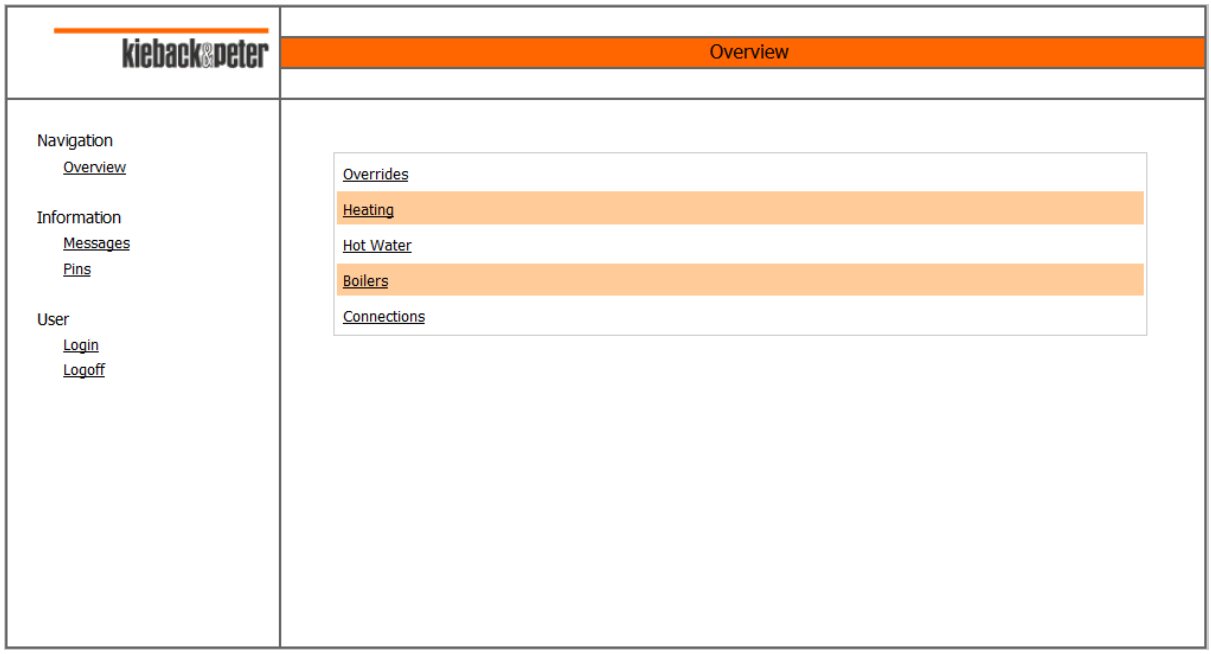
Once at this User Level the Set-Up Menu options are available to tune the controller to the application you have.

Each menu shown on the controller interface (shown below) has application Set-Up features inside.

The controller offers a menu structure and the navigation can be made using the controller interface or the web browser. The controller offers two different browser options as shown below with and without /mo/ after the IP address of the controller and either can be used:



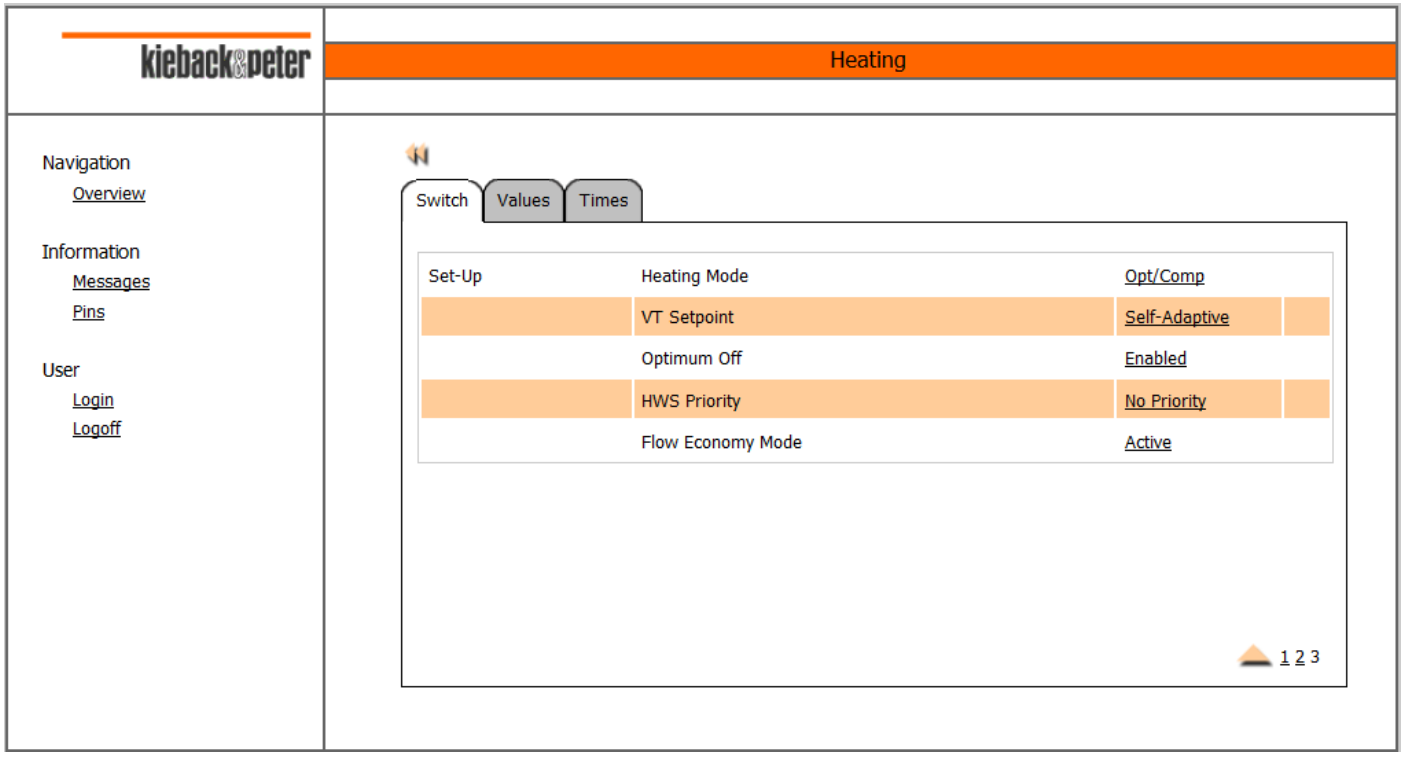
Above: example 192.168.1.99/mo/



Above: example using basic browser on 192.168.1.99

Once logged into the controller at Level 2 select each menu in turn and configure the Set-Up options as discussed below. Only the Set-up options should be configured at this time, do not worry about the other parameters as these may not be required.

The following tables show the application configuration settings for each Set-Up menu option. For example, Select Overrides then navigate to the menu Option Set-Up. Complete as required then move onto the Heating Menu and navigate to the Set-up option etc etc.



After these have been set you can go back into the menus and adjust the other associated parameters as required to get the best application performance. These are listed in the Parameter Summary page 15.

Menu	Set-Up Option	Description	Options
Overrides	HWS Extend	If the time extension input (Pin 9) is closed for heating extend, do you want the HWS to also extend?	**Enabled** (Default) – When the switch is closed then the HWS will be time enabled **Disabled** – The HWS is not linked to the switch on Pin 9.
	Auxiliary Switch Input	You can chose the function of this input to suit your scheme. Only one use can be selected. The switch connected to Pin 10 must be closed to activate. When the switch opens the controller returns to Auto.	**Frost Mode** (Default) – Fixes the controller into Frost protection level control. The HWS is also disabled. **HWS Demand** – If the HWS Time channel or override are on this input must be closed to request the boiler to heat the HWS to the Primary Set Point. **Summer Mode** – Fixes the controller into Summer Mode – this puts the Heating into Frost Mode but the HWS remains active. ***Note: HWS control if available is always recommended to save energy. Frost and Summer Mode can be set using the controller mode switch in the Overrides Menus.***

Heating	Heating Mode	Select the Mode of control that best suits the occupation pattern and use of the building	Night Setback – Uses a compensated curve for Day and a reduced heating curve for night periods. Typically used in 24hr occupied facilities. Typically used when replacing older controllers like CSC with time clock. Also used automatically if the Room Sensor reading is not available when in the Opt/Comp mode. Opt/Comp – Optimised compensation typically used in part occupied buildings such as schools or offices. Used when replacing older products like CSMC/DC1100/CMC/RVL45/Aquatrol Timed On/Off – Used when optimisation is not possible/required and night setback is not required. Can be used when replacing older controllers like Satchwell CSC Optimiser – Used to start/Stop external systems based on heat up rates and cool down rates. Typically used when replacing older products like Satchwell SVT
	VT Set point	The controller can adjust the heating curve between the min and max limits configured based on the room conditions. This is otherwise known as Room Influence.	Non-Adaptive (Default) Self-Adaptive
	Optimum Off	You can allow the controller to turn the heating off early subject to the time schedule, space temperature and cooling down rate of the building being aligned. Sometimes Optimum off is not required due to fan heaters or AHU being on the same pipe circuit.	Enabled (Default) Disabled
	HWS Priority	If the boilers are linked to the HWS and the HWS Control option is selected you can allow the HWS to have priority over the heating system given certain conditions or site limitations. The method of gaining priority is either to close the VT Valve for a period of time or to turn the heating pump off for a set period. E.g. Can be used when boilers struggle to heat all services at the same time.	No Priority (Default) On Valve On Pump
	Flow Economy Mode	Flow Economy will turn the heating off during an occupation period if the space temperature is at or above the *Space Set point* and the current heating flow set point is within 7 degrees of the *Space Set point*.	Active (Default) Inactive

HWS	Boiler Link Option	You can request the boilers to run when the HWS time schedule is active.	Independent (Default) – The boilers will not run when the time schedule or time override is on Boiler Linked – The boilers will be allowed to run when the time program or time override is On. If the Auxiliary Switch input is set to HWS Demand Mode then the Demand Mode input must also be closed for the Boiler to run in Boiler Linked mode. The HWS Demand input would typically be linked to the status of the control stat, the primary pump or the HWS control valve. When the HWS is satisfied then the contact will open and the boiler will not run to heat the hot water thus saving energy.

Boilers	Number of Boilers	Choose the number of Boilers being enabled by the controller. Note this does not affect the 0-10v output if used for boiler set point or boiler demand	1 (Default) 2
	Rotate Boilers	Choose if the lead boiler can be changed over. This reduces the wear on the lead boiler as this will run more than the other. If you only have one boiler then this setting has no effect. You should disable the rotation if a) the 1st boiler is more efficient than the other boiler e.g it is condensing and the other is not. B) if the boiler is low/high fire, the high fire stage can be seen as the 2nd boiler so this must not be rotated	Disabled (Default) Enabled
	BPRO Used	If using the 0-10v Output for boiler demand you can select to use a sequencer such as the BPRO-4, BPRO-4A or BRPO-10. Yes removes the initial 2v demand required for most condensing boilers.	No (Default) Yes

Connections	0-10v output	The controller offers a 0-10v output and you can chose its purpose. (Boiler set point can be scaled to suit the boiler being used by setting the range required over the signal)	VT Valve (Default) 0-100% - For direct 0-10v control of the VT valve. (The Open Close Signals from the relays are not affected) Boiler Setp (Scalable) (e.g. 0-10v = 0 to 82'C see your boiler manufacturers manual) Boiler Demand (0-100%) – can be connected to boiler(s) or step controller like BRPO range. Note: 0v = 0%, 10v = 100%

5. Controller Principles and Operational Features in detail

5.1 Optimum Start

The optimum start facility is a self-learning routine which will search for the latest time to start in order to achieve the desired *Space Set point* at the start of occupation. The performance of the optimiser is continually monitored throughout the pre-heat period and updated to ensure an accurate response in all conditions. Four programmable occupation periods for each day of the week are available. Each of the four daily periods will be individually optimised on and off as required.

The optimum start preheat time is limited to a minimum rate 0.5 hours C/Hr. This limit will at optimum start the boiler(s) and heating pump are switched on and the controller enters a boost mode. If two boilers are being used they are fired at a 10 second interval. If used as an optimiser only then during boost the flow temperature will be limited to the boiler(s) thermostat setting or the *Boiler Flow Set point* value, whichever is lowest.

If used as an optimiser/compensator controller, the flow temperature will be limited to the *Compensated Flow High* value. The boost mode will continue until the required space temperature is achieved.

The self-learning process of the optimiser will be inhibited if the controller is in an alarm mode. It is essential that the *Space Set point* temperature can be achieved to allow compensation to begin and prevent the self-learning optimum start routine progressively advancing the start time.

If the heating room set point is not achieved then the adapted limit will be reached in approximately 14 days operation. If this limit is evident (alarm activated) please investigate the following:

1. The room sensor is located in a space where adequate heat source is available
2. The heat source (Fan Heater, Radiator) is operating when required
3. The heat source is effective (blocked filters, air locked, covered over)
4. The heat source is not being controlled by another control device (thermostat)
5. The thermostat must be set to operate above the SYX660 optimiser set point
6. The boost heated flow temperature is being achieved at the location of the heat emitter and is being enabled by the optimiser for the zone in question.
7. The time of the controller is correct
8. The time schedule is correct
9. The maximum flow temperature set point is at the correct value for the system
10. The heat source (boilers) thermostats are set above the SYX660 maximum flow set point

5.2 Optimum Stop

Optimum stop is a self-learning routine that predicts how long before the end of the occupation period the heating can be switched off, whilst ensuring that the space temperature does not drop more than one degree below *Space Set point* before the end of occupation. When heating is switched off by optimum stop, pump run-on will commence. If the space temperature drops more than 1 degree below the day set point then heating will switch back on and the controller will learn from this. Optimum Stop can be disabled in Heating Set-up options should this feature not be required.

5.3 Outside High Shutdown

The Outside High feature will disable the heating if the Outside Air Temperature goes above this Set point. The Outside Air Temperature will need be two degrees below the *Outside High Set point* before the heating will be re-enabled. If this feature is not required then the *Outside High Set point* should be set to a high value.

5.4 Flow Economy Mode

Flow Economy will turn the heating off during an occupation period if the space temperature is at or above the *Space Set point* and the current heating flow set point is within 7 degrees of the *Space Set point*. The Flow Economy mode is evaluating if there is a real need for the heating to run. When the heating is switched off by day economy, pump run-on will commence. The mode can be enabled or disabled in the Heating Set-up.

If Flow Economy is active and the space temperature drops more than 1 degree below Room day set point or the calculated flow temperature is no longer within 7 degrees of the *Space Set point* then the heating will switch back on.

5.5 Frost Protection

This is potentially a three stage system if the associated sensors are connected.

The first stage will bring on the heating pump and open the mixing valve (if connected) if the outside temperature falls below the *Outside Frost* setting. The Outside sensor must be fitted during commissioning for this to be activated.

The Second stage is when the Heating return falls below the *Heating Return Frost Limit* setting. The heating is enabled in Day mode until the return temperature has risen by 35 degrees. A Heating Return Sensor must be fitted during commissioning for this to be activated. Should the Heating Return Sensor be faulty then the Return Frost Mode will be activated until the sensor is repaired.

The Third stage will bring on the pump and boiler(s) if the space or average of the two sensors falls below the *Space Frost* setting, with flow temperature being fixed to the *Compensated Flow High* value to increase the space temperature by 2 degrees as quickly as possible.

Frost protection operates during holidays, summer and when the Panel Switch setting is in the frost position.

5.6 Pump Run On

Pump run-on allows for the dissipation of heat from the boiler to the system by allowing the heating pump to continue running after the end of any heating period. Pump run-on will operate at the end of any programmed time period, extended time period, frost period or when the manual switch overrides the heating off. During the run-on period, the compensated mixing valve (if fitted), is fully opened and the pump will run for a user selected period of time. At the end of the run-on period, the valve will be closed to prevent gravity circulation during heating off periods.

The boiler(s) will be switched off for the duration of pump run-on. If not required, pump run-on can be disabled by setting the run on time to 0 minutes.

5.7 Boiler Control

Boiler control allows for controlling 1 boiler, or 2 boilers in sequence. The lead boiler is rotated weekly on Sunday at Midday unless rotation is disabled or only 1 boiler is in use. The boiler flow sensor must be fitted for the boilers to control and operate. The controller uses the highest demand set point from the heating zone and/or HWS boiler linked operation and modulates the boilers to maintain the required flow set point. A boiler offset is provided to allow for a lift on boiler flow temperature to accommodate any system losses. This offset is ignored if the Compensated Flow Sensor is not fitted. A minimum and maximum set point can also be programmed. The lead boiler will run when the flow temperature is falling below the set point and will turn off when risen sufficiently above the set point. The boilers are subject to a minimum run time and a minimum time between re-starts. When first starting, the lead and lag boiler will start when required, if asked to run once more but inside a timer of 40 minutes of the previous firing period, the boilers will not start until a 5 minute delay has passed. If outside the 40 minute period then the boilers will fire without a start delay.

Additionally the controller offers a user selectable 0-10v output. This can be assigned to one function only but there are a choice of three functions, two of these relate to boiler control options.

1. VT Valve
2. Boiler Set Point scaled over a 0-10v signal

3. Boiler % Demand 0-100% over 0-10v output this can be used direct to a condensing boiler or boilers or can be sued to drive a step controller such as the BPRO range from SyxthSense.

Note: Option 2 Boiler set point option does use the Boiler Flow Sensor for High Temp purposes. The set point will be set to 0v when the boiler temperature is in an alarm condition.

5.8 Valve Exercise

The Valve will be driven, aiming for the mid position for 1 minute every inactive day at Midday.

5.9 Pump Exercise

The Heating Pump will be run for 2 minutes at midday during periods of non-use.

5.10 Service Mode

Using the Panel switch in the Override Menu, the Service Option is available. Selecting the Service mode will set in motion a boiler check feature. Boilers will be set to maximum output and the control system will run on full heat for a period of 30 minutes. The service mode can be cancelled by setting the Panel Switch to any other mode e.g. Auto.

5.11 Heating and Hot Water Time Extension

Both the heating and HWS have dedicated software time extension features. The user can program the 1 to 10 hours additional heating required and then initiate the time extension period. If this is actioned when the time program is in an occupied condition then the indicator on the interface or web browser will flash to say that it is waiting. When the time schedule period ends then the time extend period will commence and the indicator will stay on.

An extend period may be cancelled at any time by setting the override status to reset.

An external button (latching type like SyxthSense LAP5) connected to pin 9 will directly start a time extend period when the input closes. The controller will show the extension period as active when either the software timer or external button is pressed. The external timer/input is not interlocked with the time schedule and acts directly.

If both methods are used at the same time then the controller will return to Auto when both methods have expired.

5.12 Summer Winter Time Change and Leap Years

This is fully automated. Leap years are fully accommodated into the Calendar and no user adjustment is required.

6. Parameter Summary

Parameter	Default	Range	Description
Heating Times	07:00 – 16:00 Monday to Friday	00:00 – 24:00	Periods of occupation. Up to 4 periods per day
Hot Water Times	06:00 – 15:00 Monday to Friday	00:00 – 24:00	Time periods for the Hot Water channel. Up to 4 periods per day.
Holidays	None	Any date/time in the future	Please see User Guide for settings

Parameter	Default	Range	Description
Heating Override Period	1h	0 to 10h	Time Extension Period in Hours
HWS Override Period	1h	0 to 10h	Time Extension Period in Hours
VT Set point Self Adaption	Adaptive	Adaptive – Non-adaptive	If selected, the compensator will self-adapt with Space Influence.
Optimum Stop	Enabled	Enabled - Disabled	Turns off the heating early under certain conditions.
Origin	20°C	10°C - 80°C	The base flow temperature set point during the day when the outside air temperature is 20°C
Space Frost Set point	10'C	5°C – 25°C	Minimum Space Temp allowed before heating is enabled
Space Frost Set point	10°C	5°C – 35°C	If space temperature falls below the Space Frost limit, the valve will be controlled to the compensated flow high value and pump and boiler will switch on.
VT Ratio	3	0 – 10	Influence on the Heating Flow Set point based on 1'C change in Outside air temperature.
Compensated Flow Low	35°C	0°C – 85°C	Minimum value of compensated flow temperature during compensation.
Compensated Flow High	82°C	10°C – Boiler High Value	Maximum value of compensated flow temperature during compensation. Occurs when the outside temperature is at or below its low value. Also used to control the valve during frost protection and optimum start (heating up)
Flow Night Setback	-15°C	0°C to -50°C	Compensated flow depression – this will cause the subtraction from the calculated compensated flow temperature of x°C.
Space Set point	20°C	5°C – 50°C	The desired temperature for the controlled space.
Space Night Set point	16°C	5°C – 50°C	The space temperature below which night setback control operates.

Building Warm Up Rate	1.5	0.5 to 10 °C/Hour	Calculated rate of room temperature rise for the building when heating is first turned on
Parameter	**Default**	**Range**	**Description**
Building Cool Down Rate	0.5	0.1 to 10 °C/Hour	Calculated rate of room temperature fall for the building when heating is turned off
Space Influence	3°C	0°C – 20°C (for every 1°C in room error)	This will cause the +/- adjustment of the calculated compensated flow temperature set point for each 1°C error in space temperature.
Outside High Set point	18°C	10°C - 50°C	Turns off heating if outside air temp goes above this value. Turns back on 1°C below this value.
Outside Frost Set point	2°C	-10°C – 35°C	If outside temperature falls below the Outside Frost limit, the valve will be opened and the heating pump will switch on.
Pump Run On	15 mins	0 – 60 minutes	Pump overrun time period. Setting to 0 will disable overrun for next event
VT Valve Time (0 to 100%)	120s	10 to 600s	Time for the valve to move from closed to open (seconds)
HWS Primary Set point	82°C	0 to Boiler High Value	Set point issued to the boilers when the HWS is in demand for heat and the boiler linked option is made
Rotate Boilers	Disabled	Enabled - Disabled	Allows the controller to rotate the lead boiler on a weekly basis. If enabled, users can manually rotate the lead boiler using the Sequence option in Boilers Switch Menu
Number of Boilers	1	1 – 2	Sets the number of boilers or stages to be controlled.

BPRO Used	No	Yes - No	Select YES if using a BPRO sequencer from the 0-10v Output
Parameter	**Default**	**Range**	**Description**
Schedule Difference	10°C	0°C – 50°C	Used for valve/boiler systems only. This value is used to determine when the boiler can be switched off. If the boiler temperature is greater than the required compensated flow temperature plus the schedule difference, then the boiler will switch off.
Boiler Low	35°C	5 - 95°C	Sets a Minimum set point limit that the Boilers could run at under normal control
Return Frost Limit	10°C	0°C – 60°C	If the return temperature falls below the return frost limit, the heating will be controlled to the day set point value and boiler and pump will switch on. The return sensor must be fitted for this feature to be active. If the sensor is disconnected or faulty the return frost mode will be activated until the sensor is fixed. The Frost condition will clear when the return temperature has risen 35'C above the return limit set point or the faulty sensor is replaced.
Boiler High	82°C	5 - 95°C	Sets a Maximum set point limit that the Boilers could run at under normal control. In built Safety High Limit feature adds 10'C to this limit and will shut boilers down until flow temp falls by 15'C
Boiler IA	10 min	DEL (---) to 600 mins	Sets the integral action time for the control loop. Typically the time required to raise the flow temp to high from low under light loads.
Boiler PB	50	1 to 200	Sets the temp range of the boilers from min to max on flow temp.

Boiler 1 Hours Run	0	0 to 99999 hours	Count of the number of hours that the boiler relay has been enabled. Can be re-set by setting the value to 0
Boiler 2 Hours Run	0	0 to 99999 hours	Count of the number of hours that the boiler relay has been enabled. Can be re-set by setting the value to 0
Connections	0-10 Output	Boiler Set point, Boiler Demand or VT Valve Control	Selection for the use of the 0-10v Output
0-10v Boiler Set point Scaling	Set point Low Set point High Voltage Low Voltage High	0 – 100 °C 0 – 100 °C 0 – 100 % 0 – 100 %	If the output is used as a boiler set point then it scaling can be adjusted to suit the boiler(s) being used

7. Menu Pages and Methods to Access Them

This manual shows all the menus and the settings contained on each page. The information is the same no matter the interface method used:

- Basic Web Browser
- Web Broswer with /mo/ feature
- Colour Touchscreen
- Controller LCD Interface

The images show on the following pages are from the Basic Web Browser. A Computer is not required to set the controller up however it is easier this way. No matter the option used, the information at Level 2 Access is the same.

The main application settings can be changed in Level 2 only.

7.1 Starting the Controller

The controller goes through an initialisation procedure as it starts up. The outputs are all switched off until the controller is ready.

The controller detects the connected sensors when it is powered up for the first time and it remembers the connected sensors so that it may report alarms and correctly control the plant connected.

If you decide to remove sensors or have made errors in the wiring then the sensor allocations will need to be reset. Please see page 49 for the procedure.

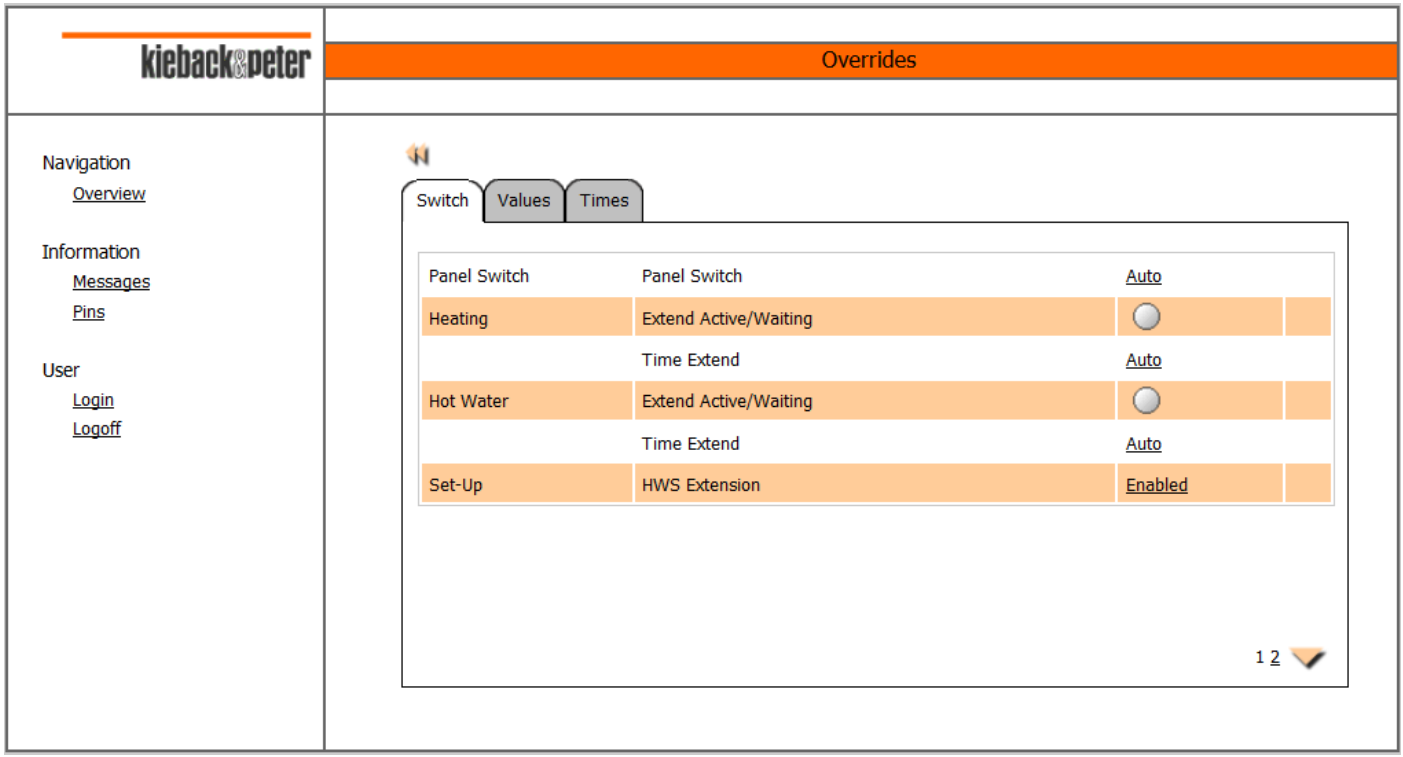
7.2 Factory Defaults

Do not try to reset the controller. There is no factory default reset feature. Once parameters have been changed they will be remembered by the controller even after power loss. The small number of settings are documented in this manual and they can be returned to default by setting them back to the values as shown on the following pages.

A controller that has been damaged in any way will not be covered under warranty.

8. Overrides Menu Pages

8.1 Switch Page



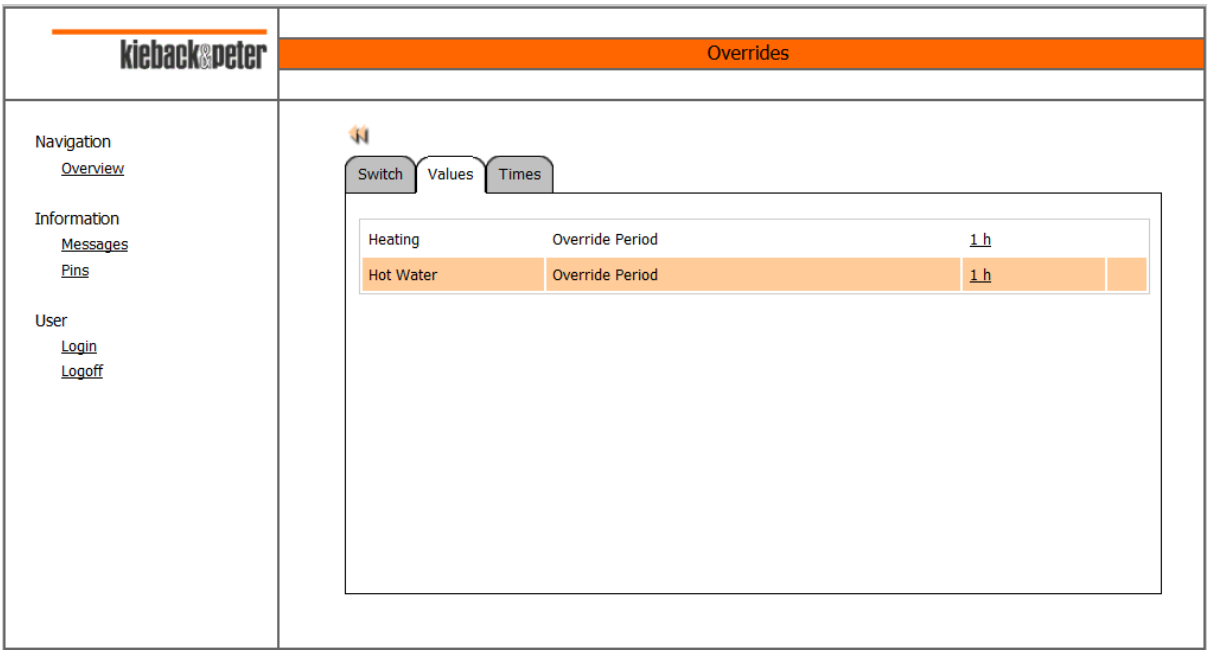
Panel Switch - This allows the user to fix the mode of the controller – Auto, Summer, Continuous, Frost, Service

Extend Active/Waiting Indication – This will be active when a time extension has been requested. If the actual time program is still active then the indicator will flash. When the time program has ended then the extension period will commence and the indicator will turn on. The active indicator will turn off when the extension period has ended or has been cancelled. The extension Active indicator will also turn on if the time extend external input is used. The HWS Extend Active indicator will not illuminate during the external override condition unless the HWS is linked to use the override input.

Time Extend – Auto/Extend/Reset – The user can trigger and extended period of heating or Hot Water by setting to Extend. The period of time to be extended for is set on the Values page. The value should be set to the required number of hours before triggering the extension period. The setting will automatically revert to the Auto condition after 3 seconds ready for the next request. A period of extension can be cancelled by setting the Time Extend setting to the Reset option. This can be used to cancel both waiting and active overrides. An extension can be set during the day period in advance of the time schedule finishing. The controller knows that the time schedule is active and so will enter into a Waiting Condition until the end of the active period.

Set-up HWS Extension – Enable/Disable – The engineer has the choice to use the Time Extend input (PIN 9) to be used as a time extension timer such as the LAP5 or LAP10. Closing this contact will bring the heating on into a Controlled Day mode condition. Should you also require the HWS to be brought into action then you must select to enable the HWS Extension. When using the external timer the cancel feature of Time Extend switch on the controller are not applicable as the controller has no influence over the external timer

8.2 Values Page

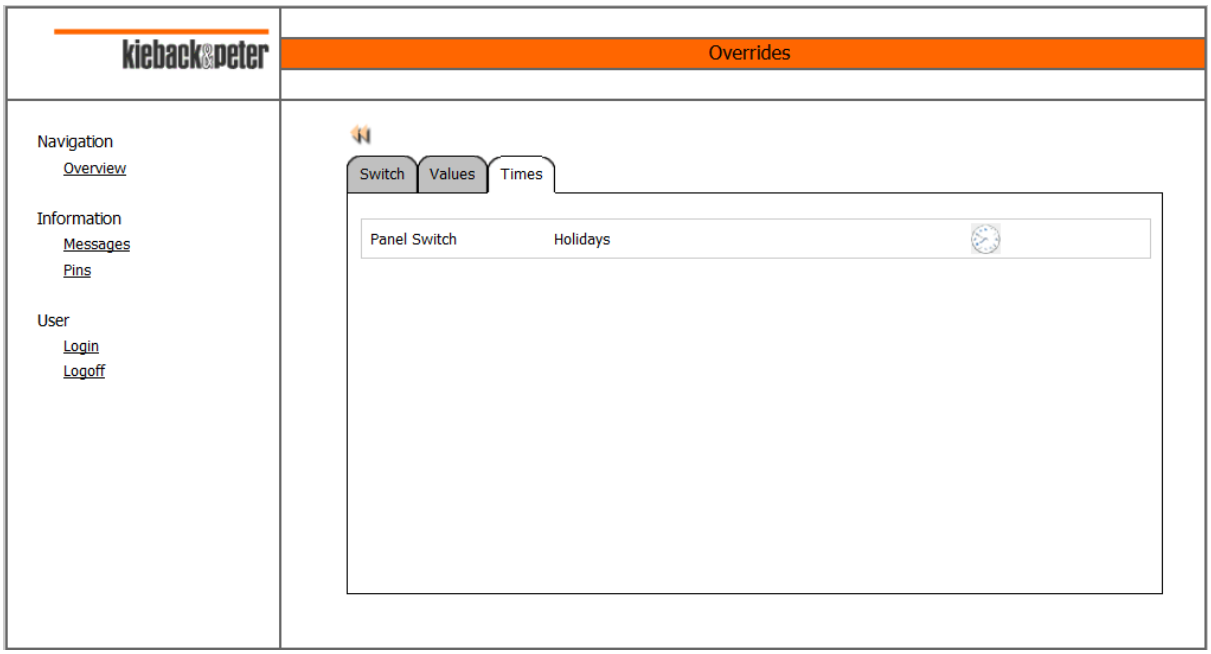


Heating Override Period – Set the number of hours required for heating time extension (1 to 10 Hours)

Hot Water Override Period – Set the number of hours required for heating time extension (1 to 10 Hours)

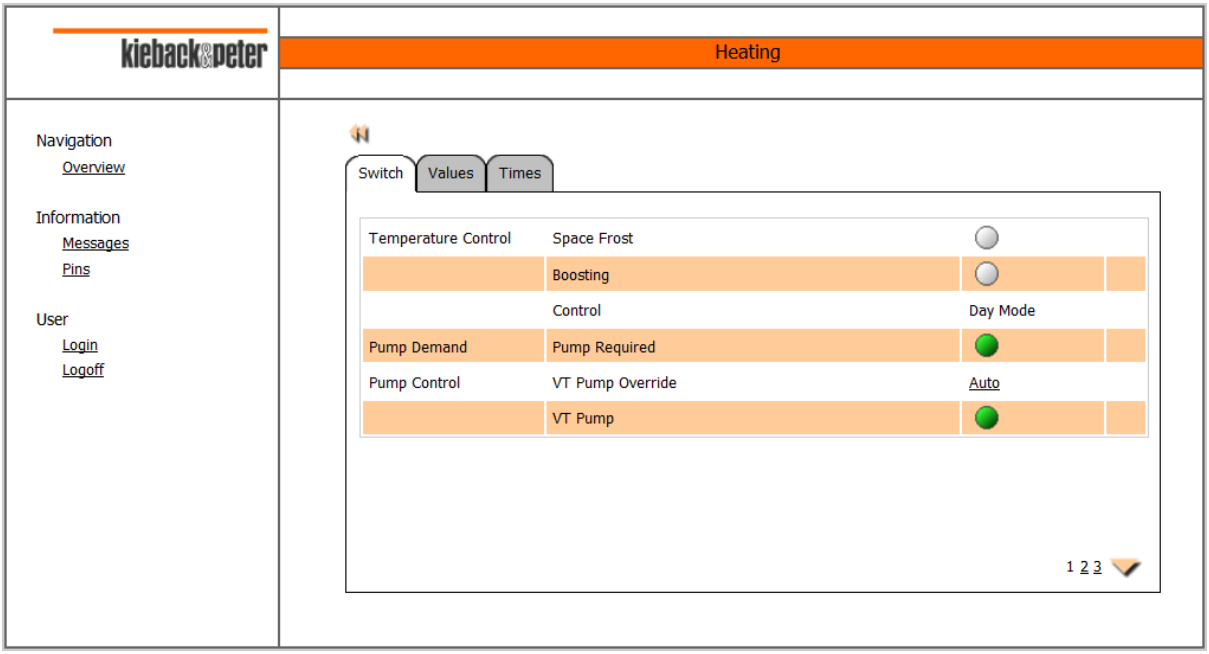
8.3 Times Tab

Here you can program the Holidays that will place the Heating into Frost protection and the HWS will be switched off also.



9. Heating Menu Pages

9.1 Switch Page



Temperature Control – Space Frost – This will indicate the presence of a space frost condition. The controller as detected a low space temperature and will have initiated the heating system. This will clear when the space sensor has increased by 2'C above the night set point.

Boosting – This indicates that the controller is in its boost mode and is trying to heat the building to the target day set point ready for the occupancy time programmed.

Control – This shows the current status of the heating system. This can display several status conditions as follows:

Day Mode – The controller is inside the occupancy period

Night Mode – The controller is outside the occupancy period and watching for frost conditions

Optimum Off – The controller has turned the heating off early due to the space temperature being above the day set point and the calculated cool down rate of the building means that the space set point can be maintained until occupation ends. If the space temp falls at a faster rate then the heating will be re-started if required.

Frost Active – This indicates the low space temperature has been detected

Heating Up – This indicates the boost phase

Premature – This indicates that the heating was started too early and that the controller is learning a new run up characteristic.

Economy – The controller has been asked to provide a very low flow setpoint that is very close to the current room temperature. The heating need not run.

Outside High – The outside high limit has been reached and the heating has been switched off. The heating will come back on again if the outside temperature falls 1'C below this limit.

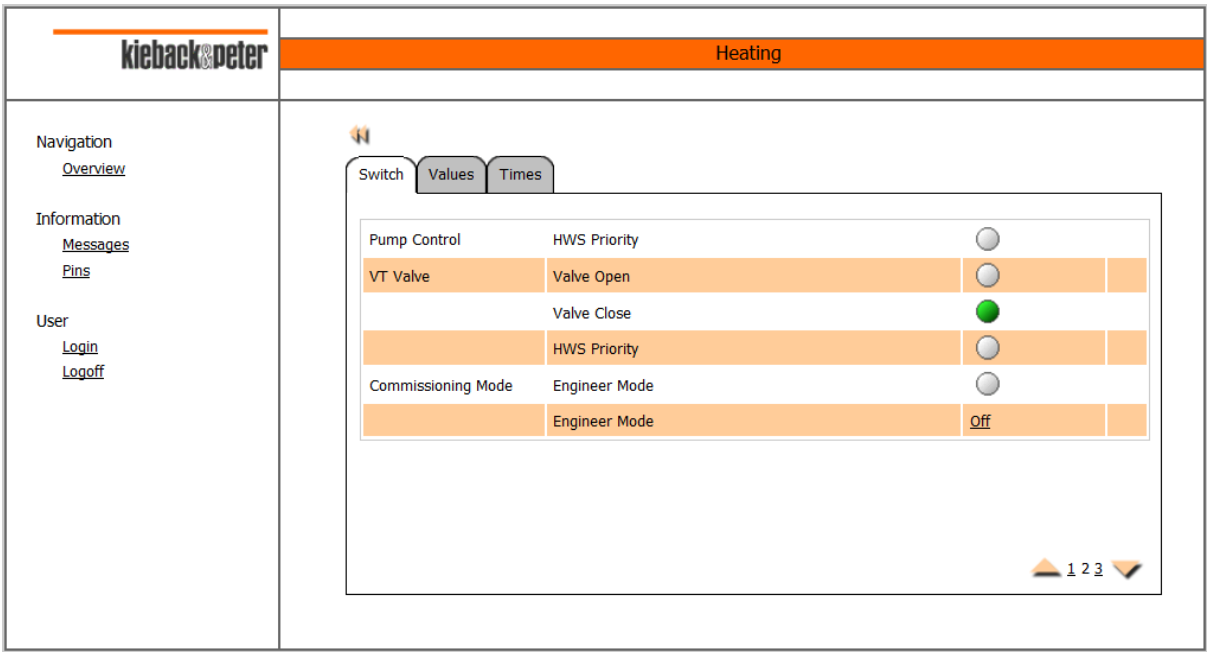
Setback Mode – The controller is outside the occupation period but running in a reduced flow temperature mode.

Off – The controller is not required. Frost protection is active

Pump Required – Indicates the controller's requirement for the heating pump. This indicator will be Yellow if running only due to an outside frost condition.

VT Pump Override – The user can force the pump On or Off if required. The Hand LED will illuminate on the controller facia. After an override is used it should be left in Auto and the hand LED will turn off.

VT Pump - This indicates the current status of the VT Pump – Green means running.



HWS Priority – If the pump has been disabled to give priority to the HWS then this indicator will be Active during the override period (30 mins).

VT Valve Open – Indicates the output status for opening the valve

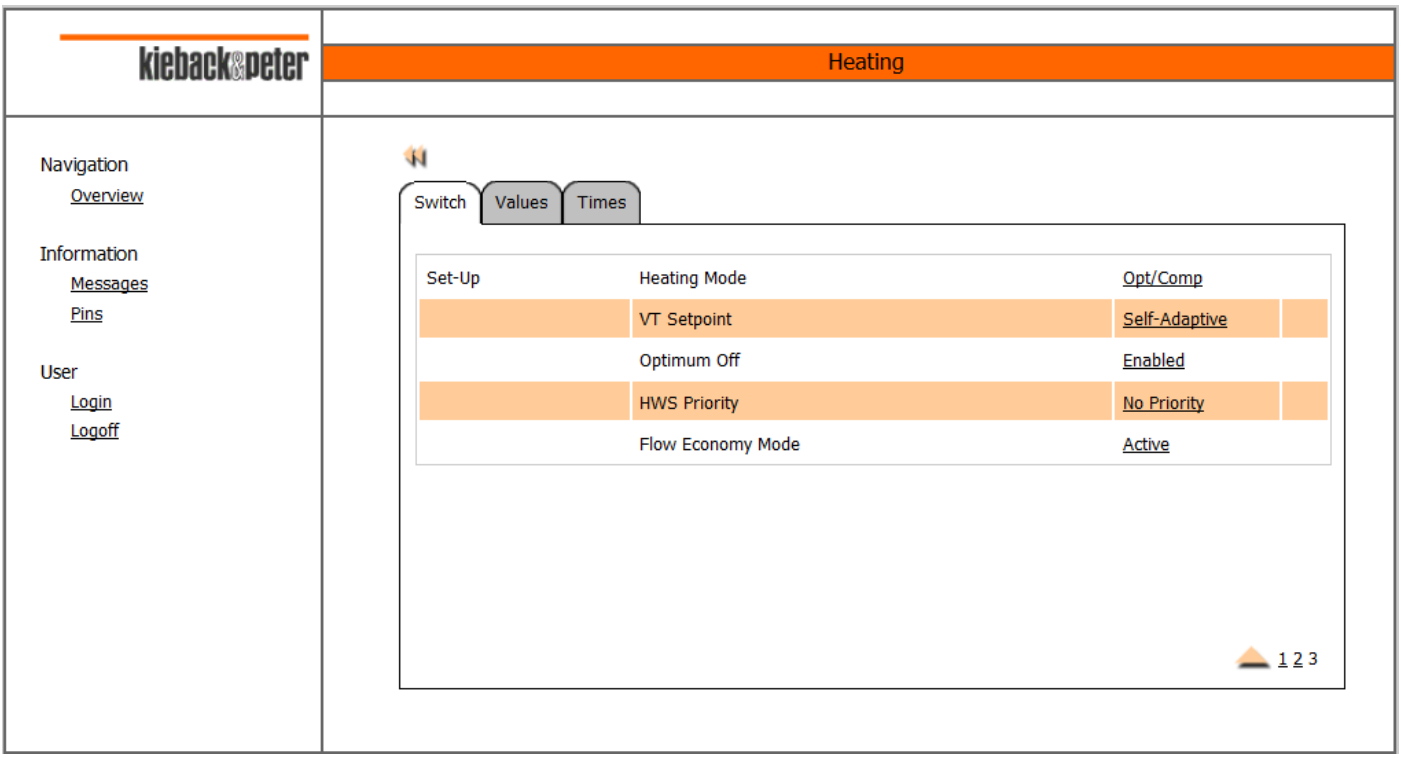
VT Valve Close – Indicates the output status for closing the valve

HWS Priority - If the VT Valve has been closed to give priority to the HWS then this indicator will be Active during the override period (30 mins).

Engineer Mode Status – This will flash to inform all users that the Engineer Mode is active. This should not be the case unless under engineer request.

Engineers Mode Switch – Off = Normal, On = Forces the outside sensor to 0’C and the room sensor to 18’C. This allows commissioning during the summer period.

Note: 0’C will also be displayed for the Outside Air Sensor should it become faulty or become disconnected. The controller will go into a Day Mode should this be the case.



Set-Up Heating Mode - Night Setback, Opt/Comp, Timed On/Off, Optimiser

Night Setback operation uses the time schedule to decide between day and night mode. When in night mode the controller maintains the required night setpoint and applies a reduced compensated flow set point.

Opt/Comp operation uses the time schedule to switch the heating on and off (off if required) in advance of the time program to achieve the required occupancy temperature at occupancy time and also maintain the occupancy temperature until the end of occupancy time.

Timed On/Off operation used the time schedule to enable the heating during the day period but will turn off the heating during the evening subject to frost protection and a space sensor being fitted.

Optimiser operation provides no boiler control control for heating (HWS boiler call remains optional) it is used to drive the pump output to start and stop external services according to an occupancy requirement.

Set-up VT Set point – Self Adaptive/Non-adaptive the engineer can select to configure the heating curve manually or can let the controller tune the curve to suit the system performance. No adaptive value can be displayed.

Optimum Off – Disabled – the controller will not self learn the heating up rate of the building. This applies to the Opt/Comp and Optimiser Modes only. The adaption should be left enabled unless the application cannot support sensible warming up rates or can remove influences from the performance. Enabled – The controller will self learn and adjust the warming up rates based on actual performance factors. Heavily reliant on a good room sensor location and effective heating in that location. TRV or Fan convectors must be set to allow the target space temperature to be achieved. The adapted warming rate will generate an alarm if the value falls below 0.5'C per hour. At that time the adaption will be halted and an investigation into the long warm up time is needed. This can result in saving energy and improving plant performance.

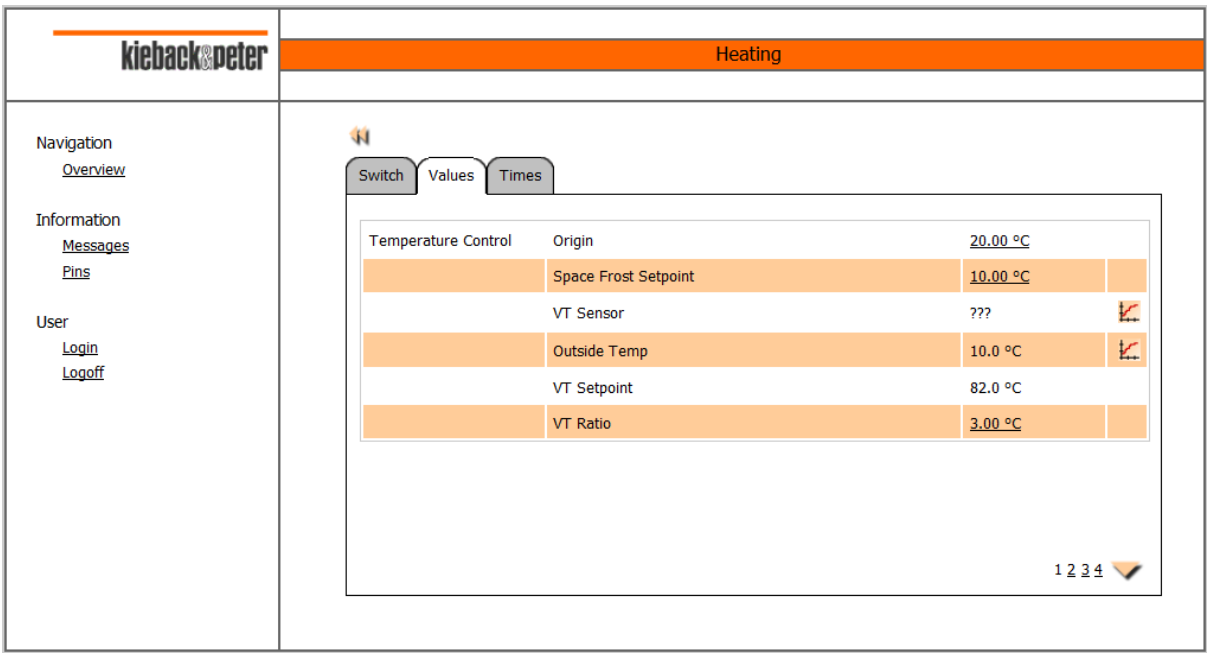
The adaptive values are to be treated as a measurement of your building performance and so adaption should be enabled. It should not be turned off without good reason and the customer informed as to why. Notes on why should be left with the customer.

For more information on Optimiser performance and getting the best out of your control system please read. "Optimising your control system" from SyxthSense. It is full of information on how to understand controllers and how to fix issues perceived to be their making.

HWS Priority – No Priority, On Pump, On Valve (See HWS Control)

Flow Economy Mode – Enabled – Turns the heating off if the flow temp set point is very close to the room temp.

9.2 Values Page



Origin – this is the base temperature of the heating set point (flow temperature) when the outside air temperature is at 20'C.

Typical settings for this depend on the system being used. For example:

Underfloor Heating Systems: 30'C

Radiators in a school: 20'C

Radiators in a care center: 30'C

Fan Convectors: 60'C

Space Frost Setpoint – This is the setpoint during non-occupation at which the heating will be switched on. The Heating will return to Auto when the space temperature has risen by 2'C

VT Sensor – This shows the current VT flow temperature. Users can view a log of this also by selecting the graph icon

Outside Temp Sensor – This shows the current Outside Air temperature. Users can view a log of this also by selecting the graph icon

VT Setpoint – This shows the current target VT Setpoint

VT Ratio – this is the shift increase in flow temperature setpoint for each degree below 20'C outside.

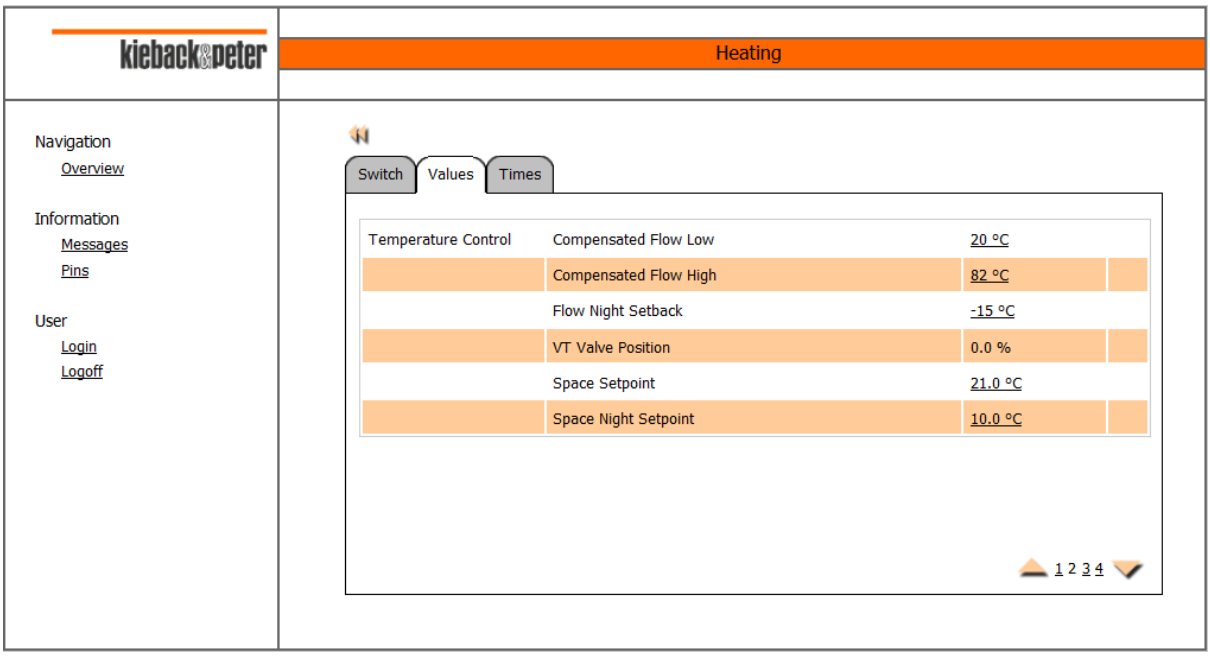
Typical settings for this depend on the system being used and the available range between the min and max permitted set points:

Underfloor Heating Systems: 1.5

Radiators in a school: 3

Radiators in a care center: 2.5

Fan Convectors: 1



Compensated Flow Low: This is a limit that sets the minimum calculated setpoint

Typical settings for this depend on the system being used and if there is a need to quickly inject more heat without adjusting the origin and ratio:

Underfloor Heating Systems: 30

Radiators in a school: 20

Radiators in a care center: 30

Fan Convectors: 60

Compensated Flow High: This is a limit that sets the maximum calculated setpoint.

This is also the supplied heat setpoint during an optimised boost phase.

Typical settings for this depend on the system being used and if there is a need to quickly inject more heat without adjusting the origin and ratio:

Underfloor Heating Systems: 55

Radiators in a school if uncovered: 60 if covered 82

Radiators in a care center: If uncovered: 60 (or less) if covered 82

Fan Convectors: 82

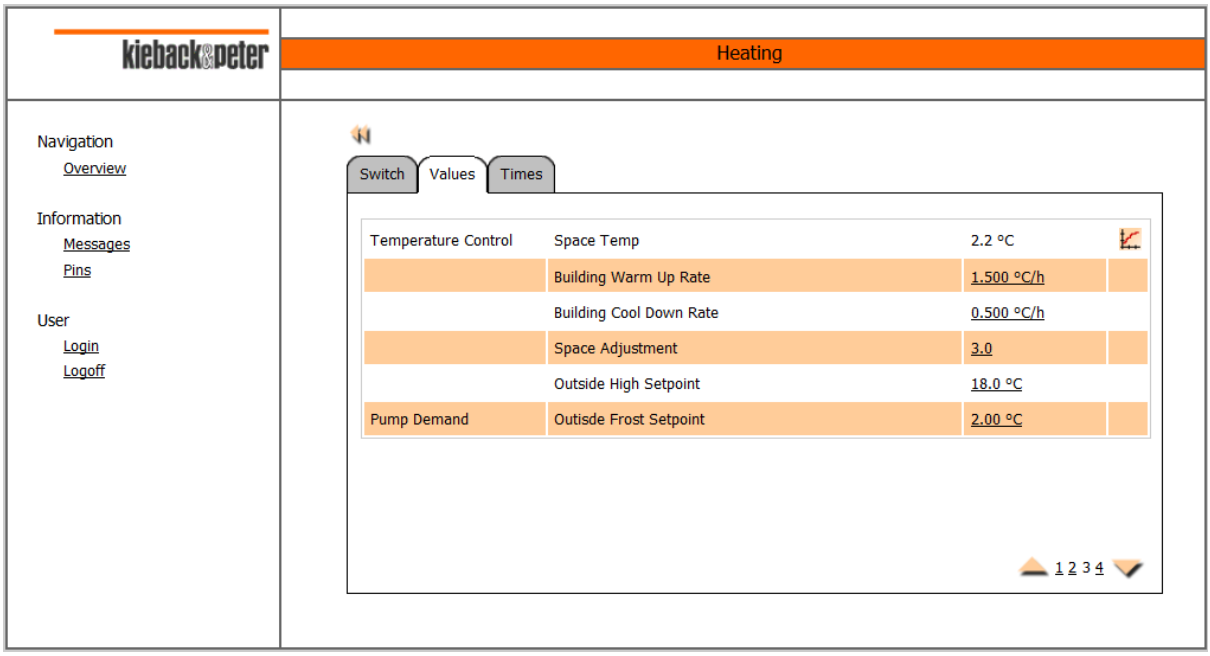
Note: Max temp setting should always be considered in relation to the radiator types/surface exposure and risk to occupants. Any reduced flows below maximum design will ultimately reduce building heat up times and heating output during cold periods. Warming up rates will be reduced if flow temps cannot meet the design requirement

Flow Night Setback – The is the flow set point offset for night time operation when the Day/Night Setback heating mode is active

VT Valve Position - The current required position of the VT Valve

Space Set point – The target room set point for the Optimiser and Heating control room influence control. If no room sensor is used/available users can still adjust the room set point if too hot or too cold to make an effect on the heating flow set point.

Space Night Set point – When in Night Setback mode the heating will control to this night space set point, this will also be used to influence the heating flow set point. When night setback mode is not being used this value is set to the space frost set point automatically to avoid confusion.



Space Temp - This shows the current Room Air temperature. Users can view a log of this also by selecting the graph icon. This may be the average reading is two sensors are used. To view individual readings please look at the info button and view the Pin readings.

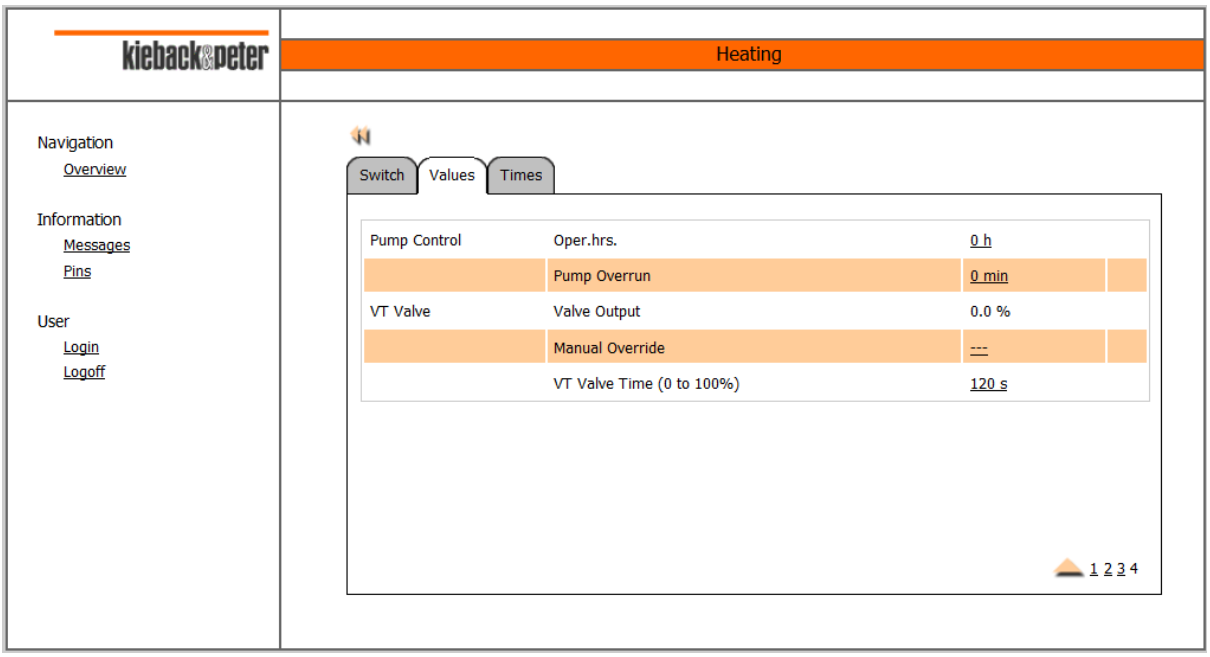
Building Warm Up Rate – This is the current warming up rate of the building during the boost phase of the optimiser. This is a learned value and it is an adapted value based on an algorithm inside the controller. The Warm Up rate will not go below 0.5 or an alarm will be raised. The alarm indicates that the building is taking too long to heat up and a problem is likely. An engineer should be called to investigate the issue and once rectified this value can be reset back to a new start value of 1.5. The controller also learns how much time it takes for the boilers to heat up and the time needed for the heating to affect the room sensor as a part of the adaption system.

Building Cool Down Rate - This is the current cooling rate of the building once the heating has been switched off. This is a learned value and it is an adapted value based on an algorithm inside the controller. The lower the cool down rate value the better the insulation of the room that the room sensor is located in.

Space Adjustment – For every 1’C the room sensor is above or below the Space Set point the flow set point of the compensated heating will be adjusted by this value (up or down) but only between the min and max flow set points. If this is not required set the value to 0

Outside High Set point – If the outside air sensor goes above this value then the heating circuit will be switched to Outside High Mode. The heating will come back on if the outside air sensor falls more than 1’C below this set point.

Outside Frost Set point – Below this temperature outside the Heating Pump will be asked to run in Frost Mode. Frost mode ends when the outside air temperature rises 1’C above this set point.



Oper. Hrs – This is an hours run count of the time that the heating pump has been running. This timer can be reset to another value if required if for example the pump has been replaced or a service visit made.

Pump Overrun – When the heating is no longer required or an override has ended the pumps may need to run on to dissipate residual heat in the boilers. During the overrun the heating valve will open. During overrun the boilers and signals to them are disabled.

Valve Output – This is the current position in Auto for the VT Valve Actuator 0% = Closed (recirculation from/to radiators), 100% = Open (full boiler flow) under normal conditions. The valve is opened for Pump Overrun periods. It will also undergo an exercise routine every day at midday for 1 minute during periods of non-use.

Manual Override – Enter any value between 0 and 100 to fix the VT Valve Actuator in that position. When an override is no longer needed you must delete the override value in order to return the Actuator to Auto.

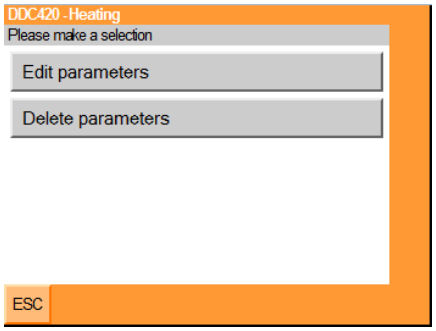
Valve Time 0-100% - Enter the time in seconds needed for the Valve Actuator to drive the valve from fully closed to fully open.

Note:

To delete the Valve Override value using the controller wheel and buttons turn the wheel to select the Manual Override parameter then press the SET button and then select DELETE Value. This will return the valve position to Auto.

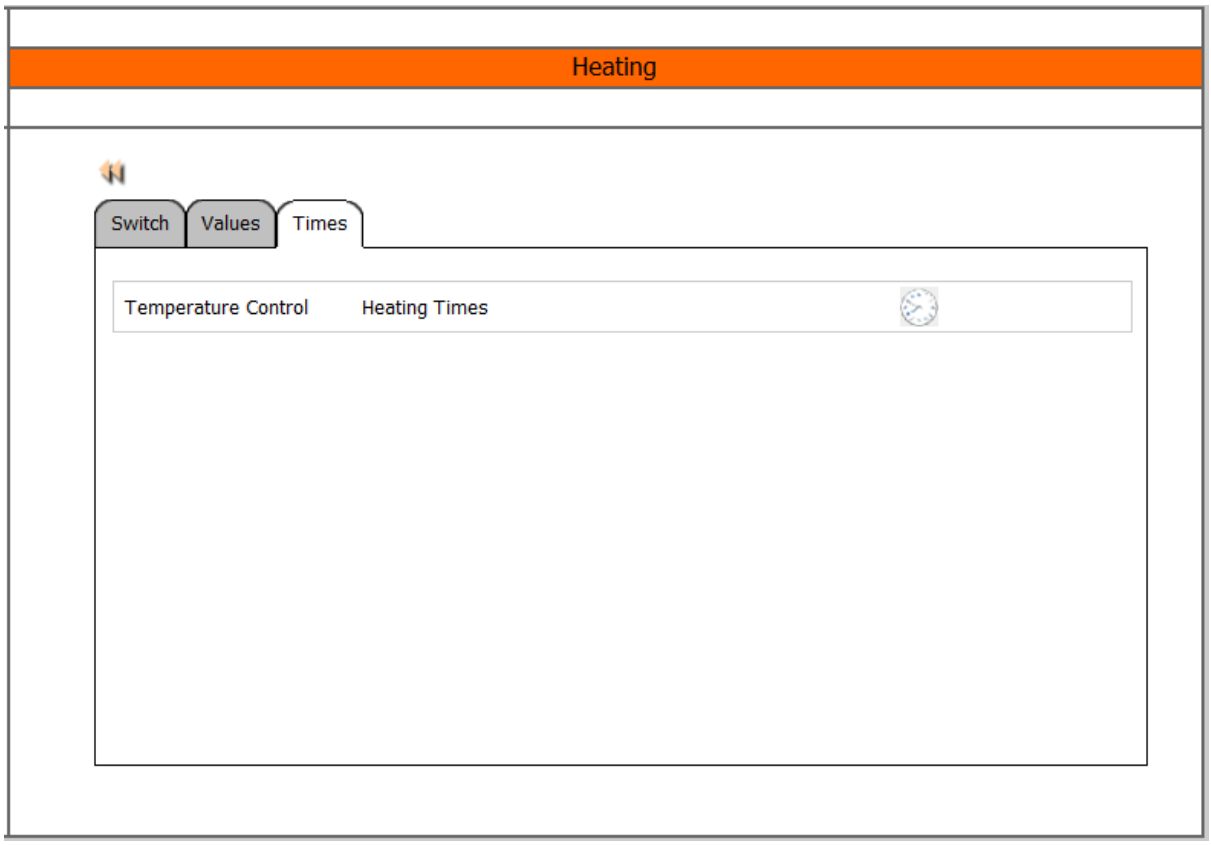
To delete the value using the controller basic browser (above) you must enter ---

To delete the value with the Touchscreen or the MO Web Browser as below select the Manual Override Value and the edit screen will appear. Simply Select DELETE



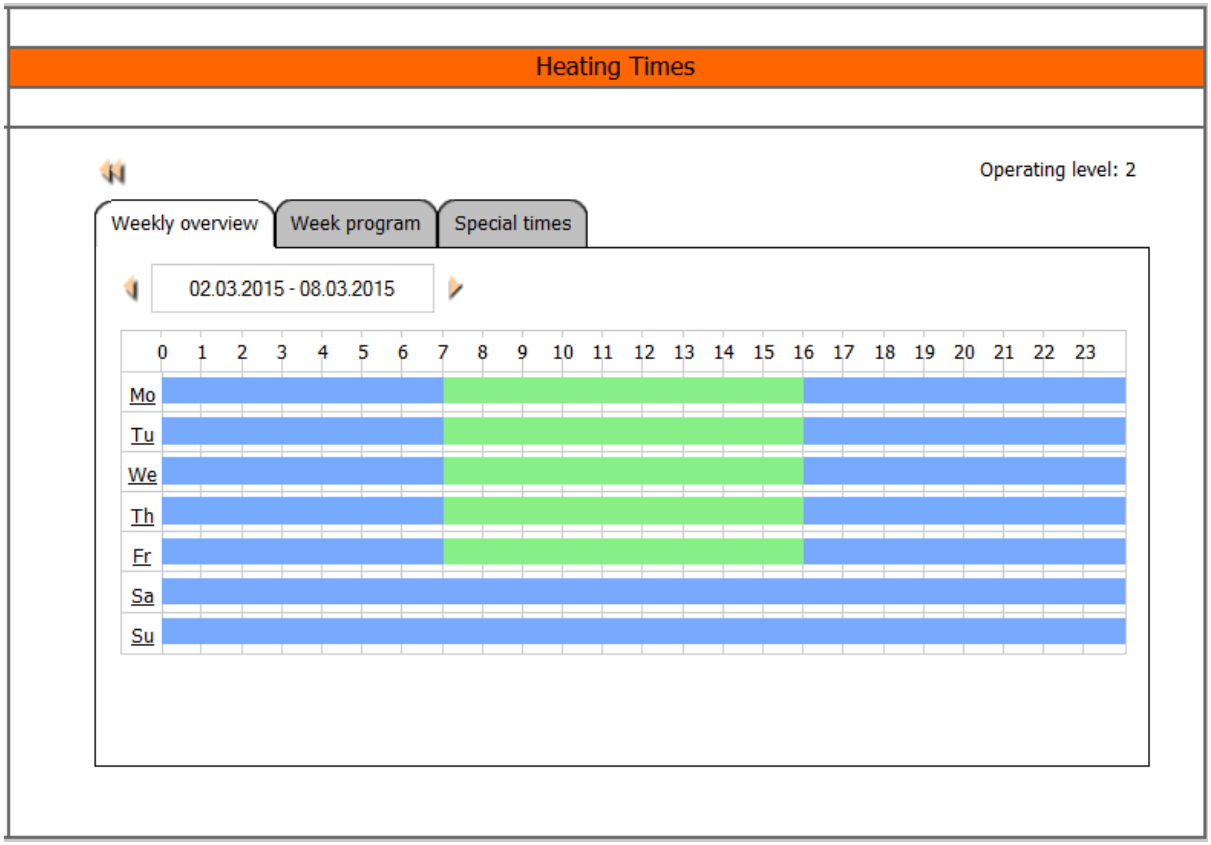
VT Valve Time (0 to 100%) – Enter the time in seconds that it takes for the VT Valve to move from the fully closed position to the fully open position. This can be timed by using the controller manual Valve Manual override feature and driving the valve to the fully closed position (0%). When the actuator has stopped, enter the override value to be 100% and start timing the actuator. When the actuator stops moving note the time taken and enter it into the VT Valve time parameter. Alternatively some actuators will state the running speed for the distance to be travelled in there literature. If there is no VT Valve fitted then the setting can be ignored.

9.3 Time Page



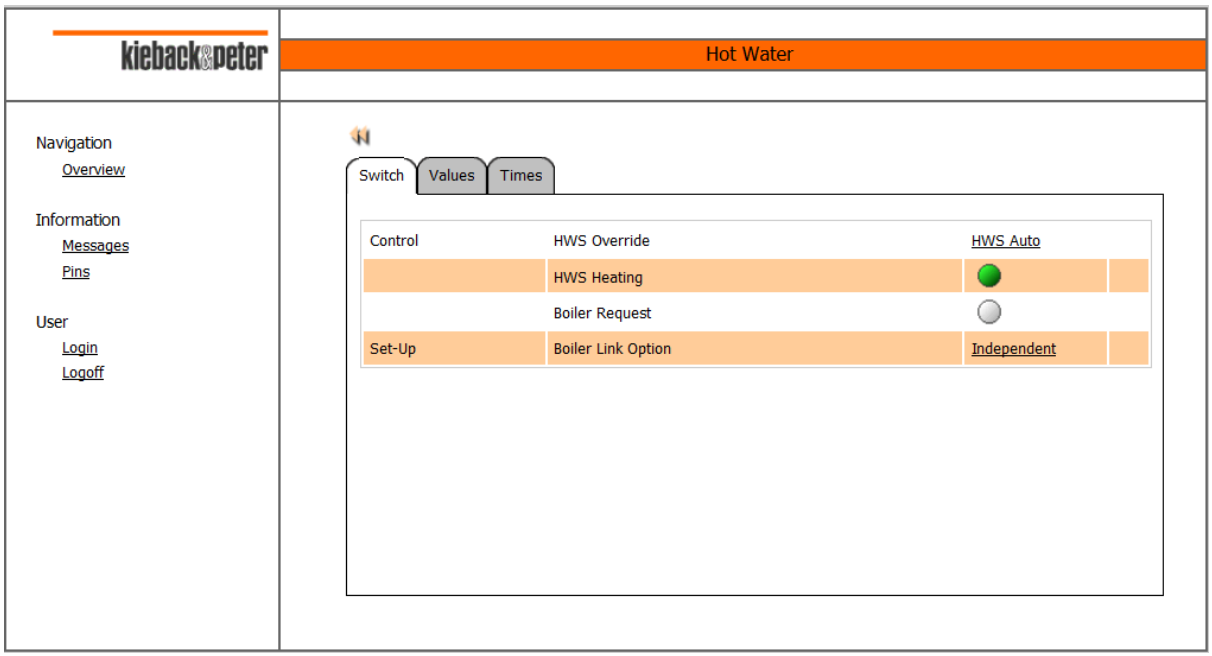
To access the Heating Time, select the times Tab .

You can edit the times by clicking on individual days or by selecting the Week Program Tab. Enter a Special time/Holiday or Period by selecting the Special Times Tab



10. HWS Menu Pages

10.1 Switch page



HWS Override – This allows the user to override the HWS System independently of the heating system. The HWS Times can be overridden On or Off. This will be the case until the HWS is set back to Auto. Setting the controller to Auto will allow it to follow the Time Schedule and extension overrides.

HWS Primary Set point – If the HWS is dependent on the boilers for the supply of Primary water then the boiler linked option must be set. When the boilers are running they require a set point to meet. The HWS Primary set point value should be entered to ensure the HWS is heated appropriately. Please note that if there is no VT Valve fitted then this flow temperature will also be distributed to the Heating Circuit.

If the HWS Heat Demand (Control Stat or Valve Auxiliary Switch) is monitored on Pin 10 then you may also consider the use of HWS Priority.

The controller has the option to enable a HWS priority feature and this is given to help with undersized boilers when the boilers are linked to the HWS as well as for heating the building. For example if the HWS Cylinder is struggling to heat up to the required temperature in an adequate time (e.g. 30 minutes) then the heating can be reduced to afford the HWS a faster recovery time. This is called HWS Priority.

HWS Priority can be enabled in two ways

1. Heating Pump Control

2. VT Valve Control

Note: Only when the boilers are linked to the HWS and HWS Heat Demand Control Input is selected and is asking for heat (closed contact)

No Priority – There is no HWS Priority Required. Default Setting

On Pump – If there is no VT Valve installed then the highest set point between the VT and HWS Primary Temperature will be issued to the building from the boilers when the pump is running (standard operation). This however could cause under or overheating of the building when long HWS times are in effect. This could be inefficient and wastes energy as we may not need such a high flow temperature in the building areas. The On Pump mode will disable the pump when the HWS takes longer than 30 minutes to become satisfied. The pump will return to Auto when the HWS is satisfied. The maximum time the heating pump will be turned off is for is 30 minutes or until the HWS is satisfied.

Note: If the heating system is not rated for the Primary Flow Set point then a system design review is needed e.g. a VT Valve may need to be installed. Do not permit a high primary flow temperatures into heating areas serving young children or old people unless adequate measures to protect against surface contact is made. This controller is not responsible for the settings left for safe and continued operation. If in doubt ask. The Primary flow set point can be adjusted but this will affect recovery times and also the available tank temperatures.

This also assumes that the HWS system has its own pumps servicing the boilers with adequate overrun and interlocks.

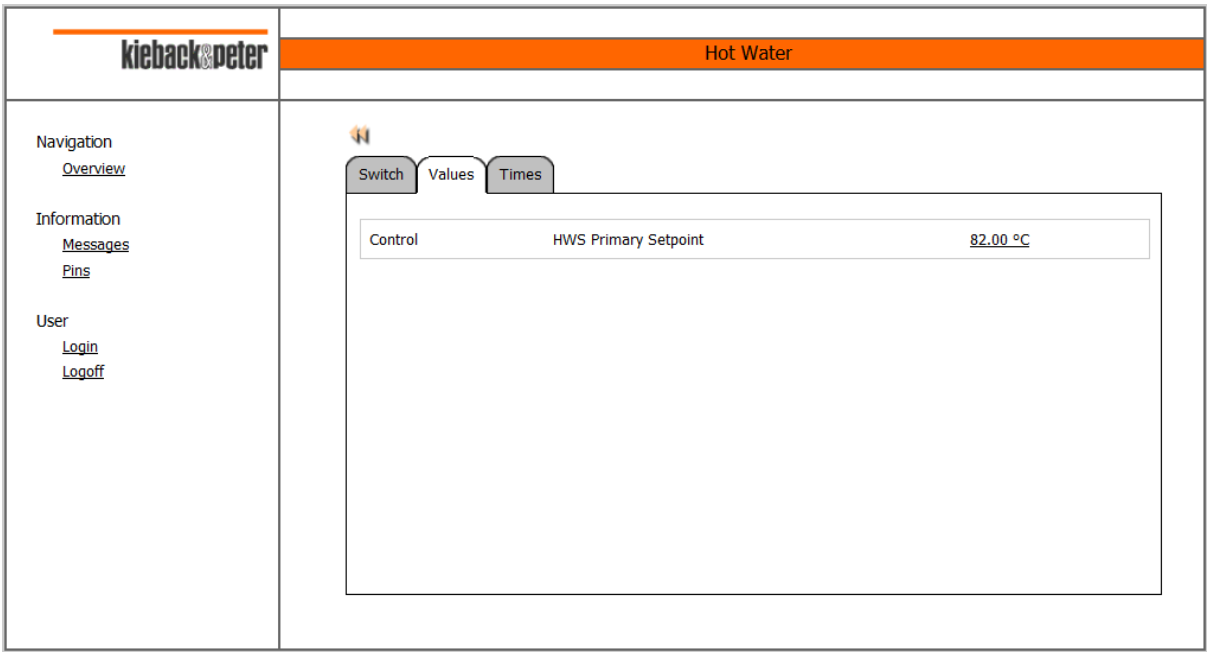
On Valve – If there is a VT Valve being used then the valve can be closed to afford full heat to the HWS Cylinder. The Heating Pump is not affected. If after 30 minutes of HWS and VT heating the HWS Tank is not fully satisfied then the VT Valve will be closed. It will close for a maximum of 30 minutes or until the HWS is satisfied.

The On Pump and On Valve time cycles will repeat to allow heat into the rooms and afford priority until the HWS or Heating are no longer in demand.

HWS Priority Modes only operate when the Mode selection is in Auto or Continuous.

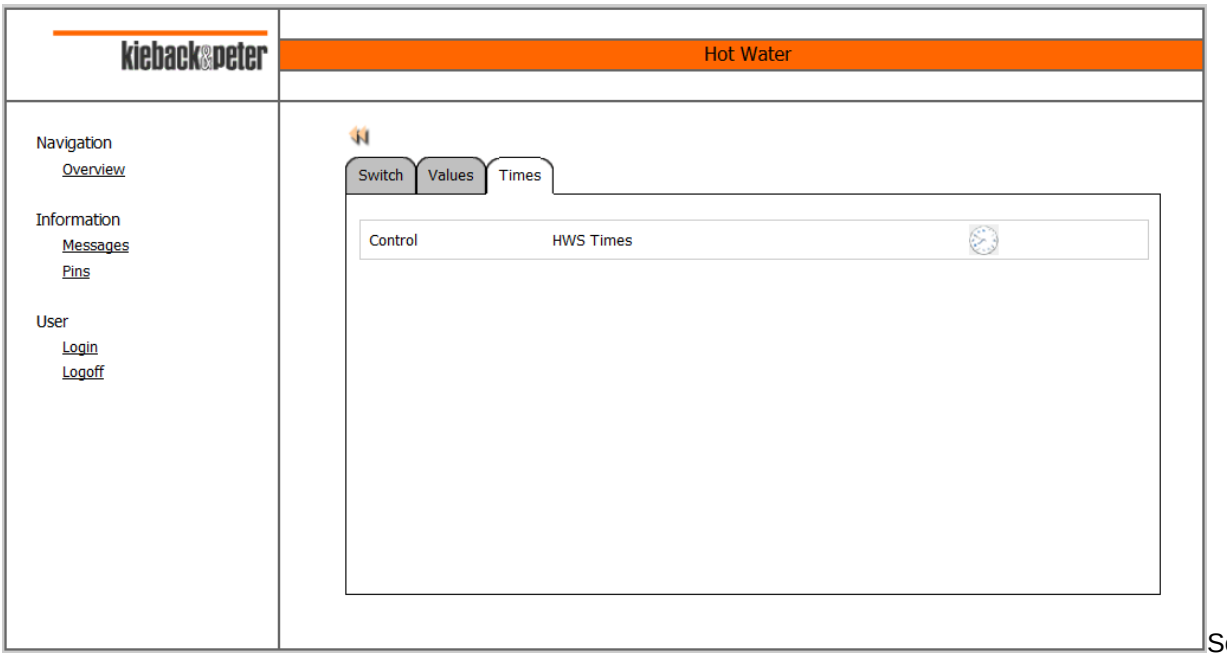
During priority active periods the Optimiser Adaption is inhibited and the indicator lamp will illuminate respectfully of Valve or Pump Priority being active.

10.2 Values Page



Control – HWS Primary Set point – If the HWS is linked to the boilers then when the HWS is running this set point will be issued to the boilers. If the HWS Demand function is also selected on the Auxiliary input, then the Auxiliary input connection is typically connected to a volt free status of the HWS control stat or HWS valve actuator confirming that it is open and requiring heat from the boilers. When this input closes only then will the boilers be requested to run to heat the HWS system.

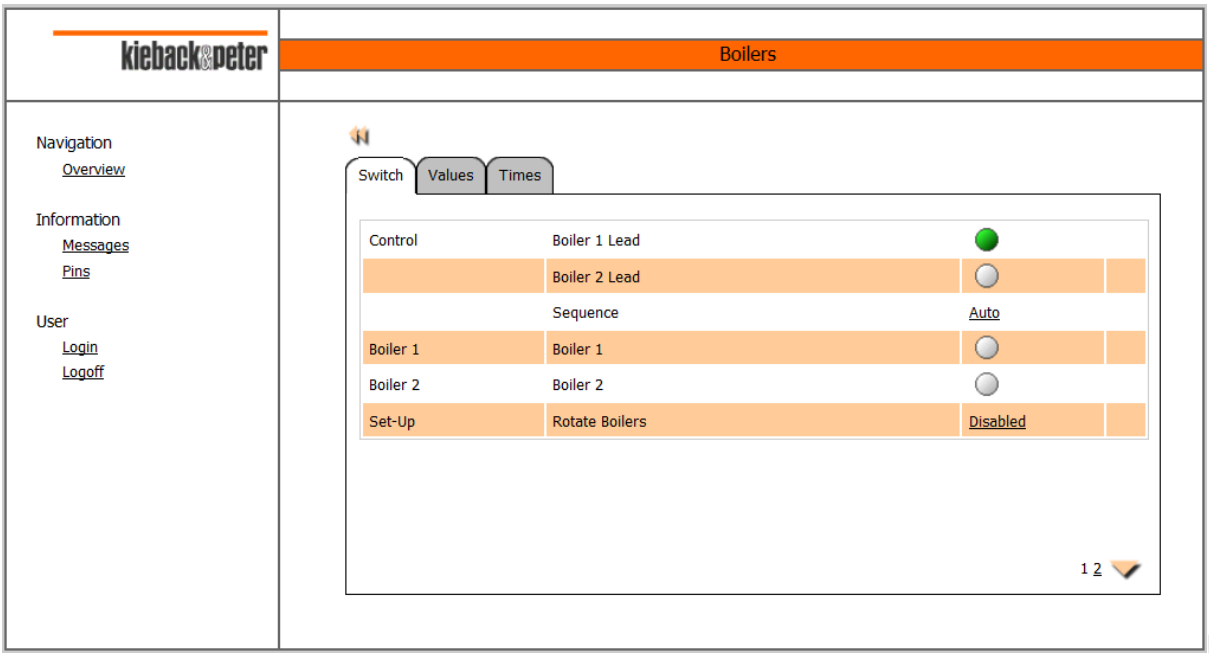
10.3 Time Page



Select the Times Tab to access the time schedule for the HWS

11. Boilers Menu Pages

11.1 Switch Page



Boiler 1 Lead – The indicator will be green when Boiler 1 is lead (the first boiler to fire)

Boiler 2 Lead – The indicator will be green when Boiler 2 is lead (the first boiler to fire)

Sequence – Auto the controller will rotate based on the schedule (weekly). The sequence menu gives the option to rotate now can be actioned to force the change of lead boiler within the next 10 to 15 seconds.

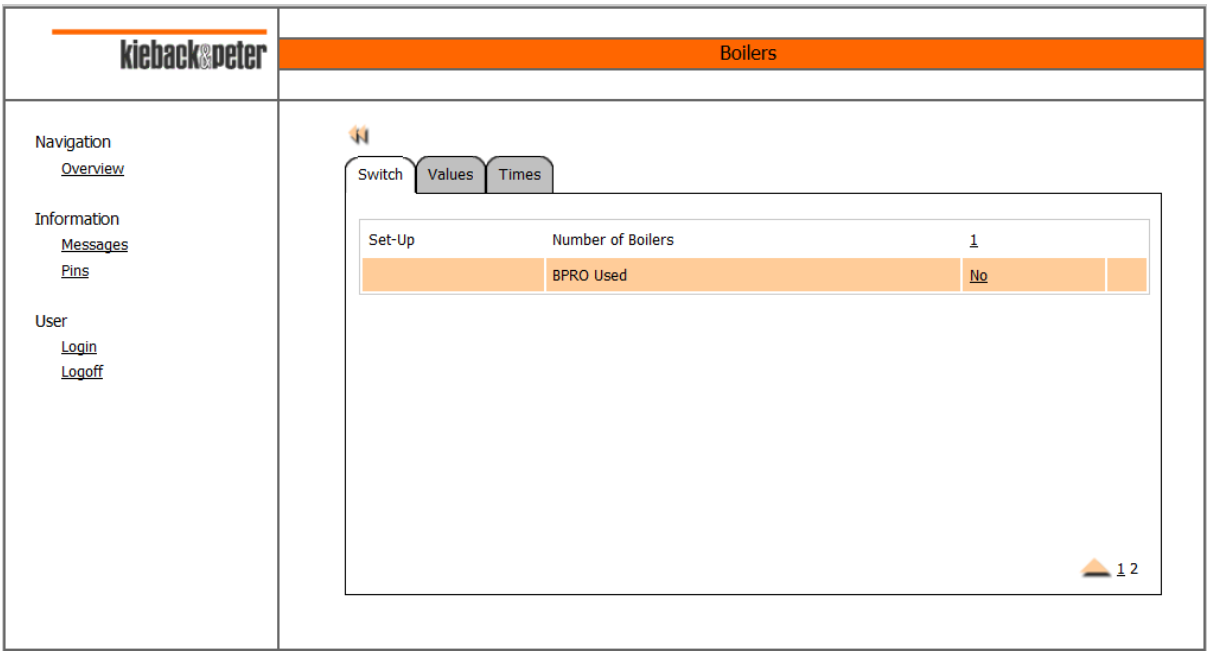
Boiler 1 – The indicator will be green when Boiler 1 is running, this will flash Red if boiler frost mode is active

Boiler 2 – The indicator will be green when Boiler 2 is running, this will flash Red if boiler frost mode is active

Set-Up Rotate Boilers – During set up you can decide if you would like to rotate the boilers. If set to disabled then the boilers will not rotate either manually using the Sequence menu option or in Auto.

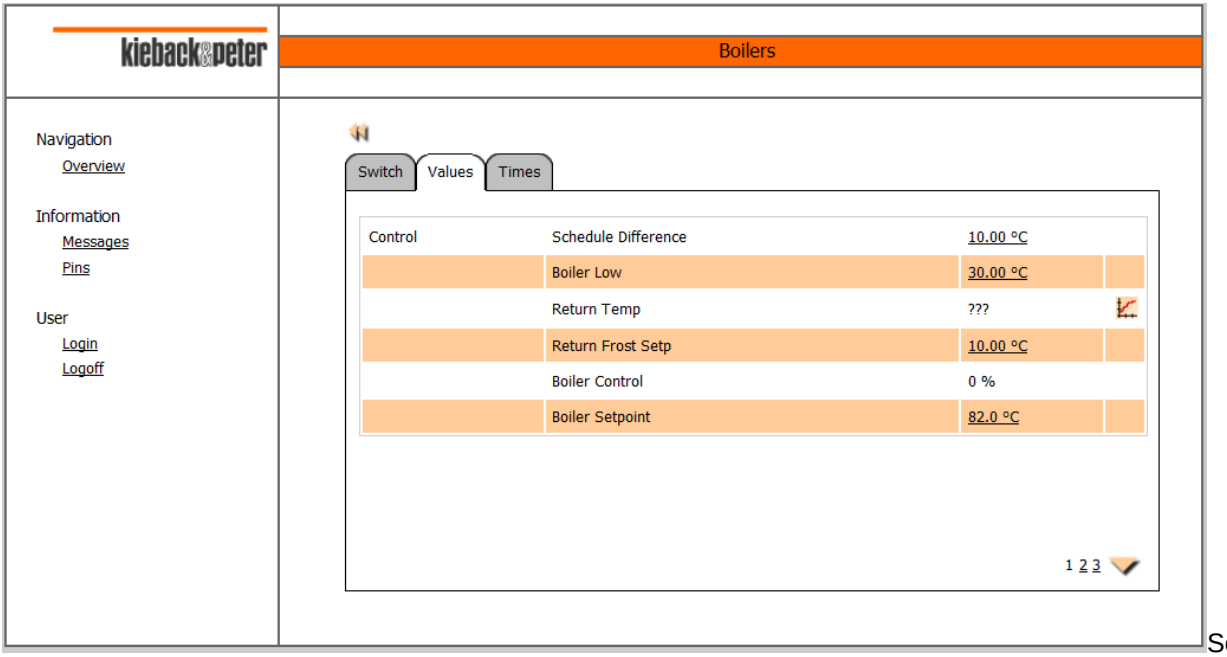
Note: If you have one boiler but this has two stages (e.g. Low/High Fire) then leave the option Disabled and Set Number of Boilers to 2.

Number of Boilers – Chose between 1 and 2 On/Off Boilers. This sets the control and option to rotate is enabled. If you have more than two boilers then you can use the 0-10v output and connect a suitable sequence module



BPRO Used – Yes/No – Have you used a Boiler Pro Sequence Module to control multiple Boilers? If “No” is selected then the boiler demand signal has as 2v DC starting condition to the ramp when the lead boiler is required. If YES then the signal starts at 0v for correct operation of the Boiler Pro sequencers.

11.2 Values Page



Schedule Difference – This is the added offset to the boiler set point when the boilers are feeding a VT Valve. This offset is designed to overcome system losses in the distribution thus ensure the heating demand is being met.

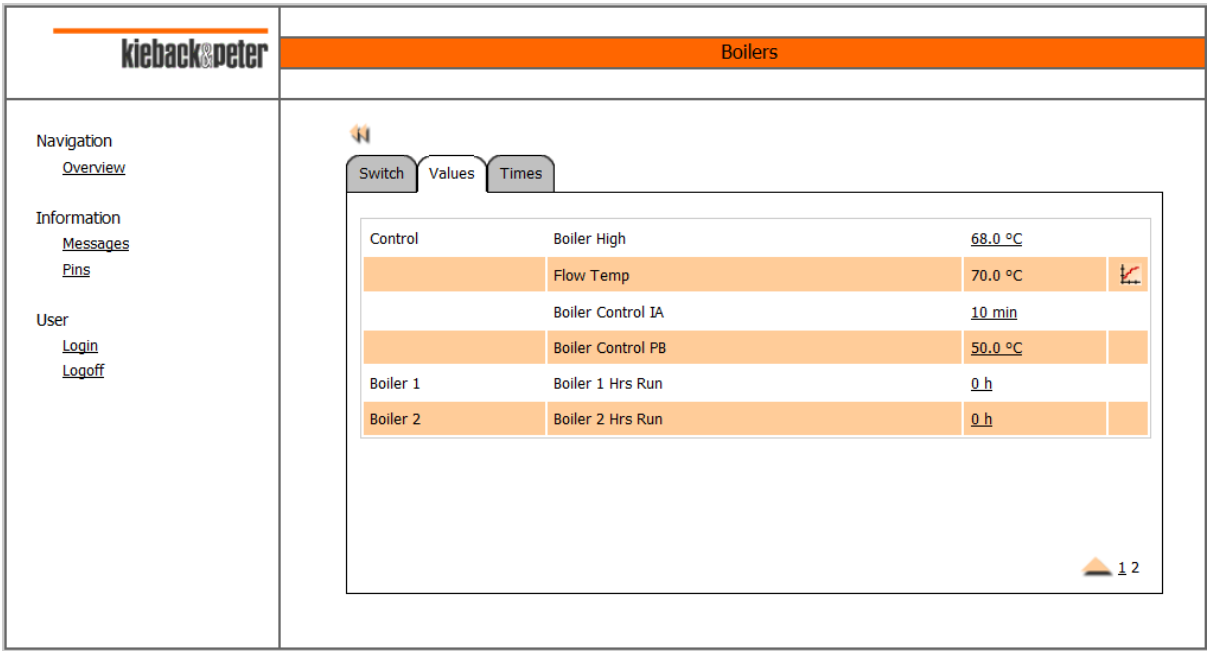
Boiler Low – The minimum set point when the boilers are in demand

Return Temp – The current system return temperature

Return Frost Set point – The temperature below which boiler frost protection will become active. This will bring on the heating until the return temperature has risen above 45'C. Pump Overrun will be active after this period. When a boiler frost period is active, the Boiler Status lamps will flash Red

Boiler Control – This is the current boiler demand signal over the range 0-100%

Boiler Set point – This is the current boiler set point that is the target for the controller to meet.



Boiler High – The maximum flow set point that the controller will try to achieve. Note the boiler thermostat/control will need to also be set to allow this.

Flow Temp – The current common boiler flow temperature. The boiler controls will not run if this is not connected or working.

Boiler Control IA- This is the integral action time for the control loop in Minutes. The time it would take to achieve the control range. Boilers firing to get the flow to set point.

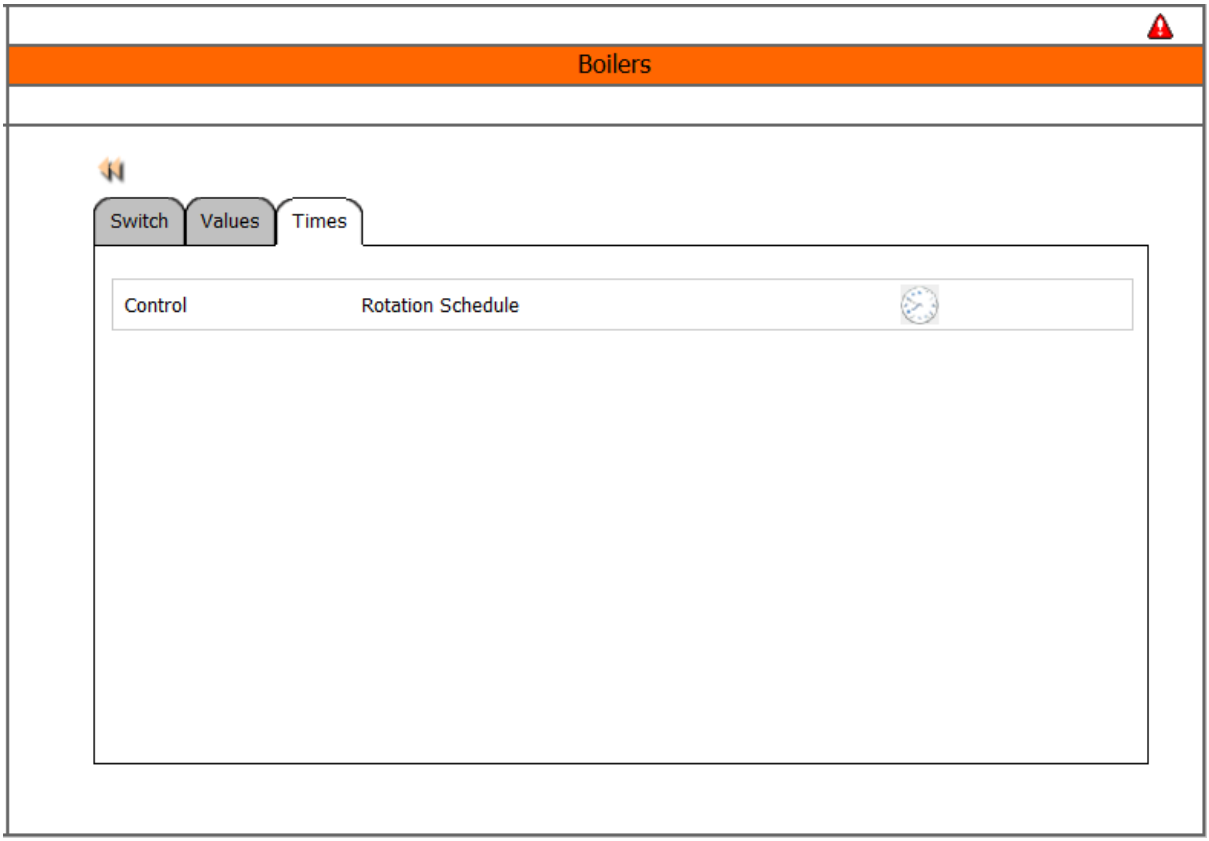
Boiler Control PB – This is the proportional Band for the boiler control loop in ‘C (the control range in temperature)

Boiler 1 Hours Run – An operational count of the time that Boiler 1 has been enabled. This value can be reset by the user if required to help note maintenance events or daily activity etc. This is just a guide as it reflects the enable and not the actual running time should the boiler be in fault etc.

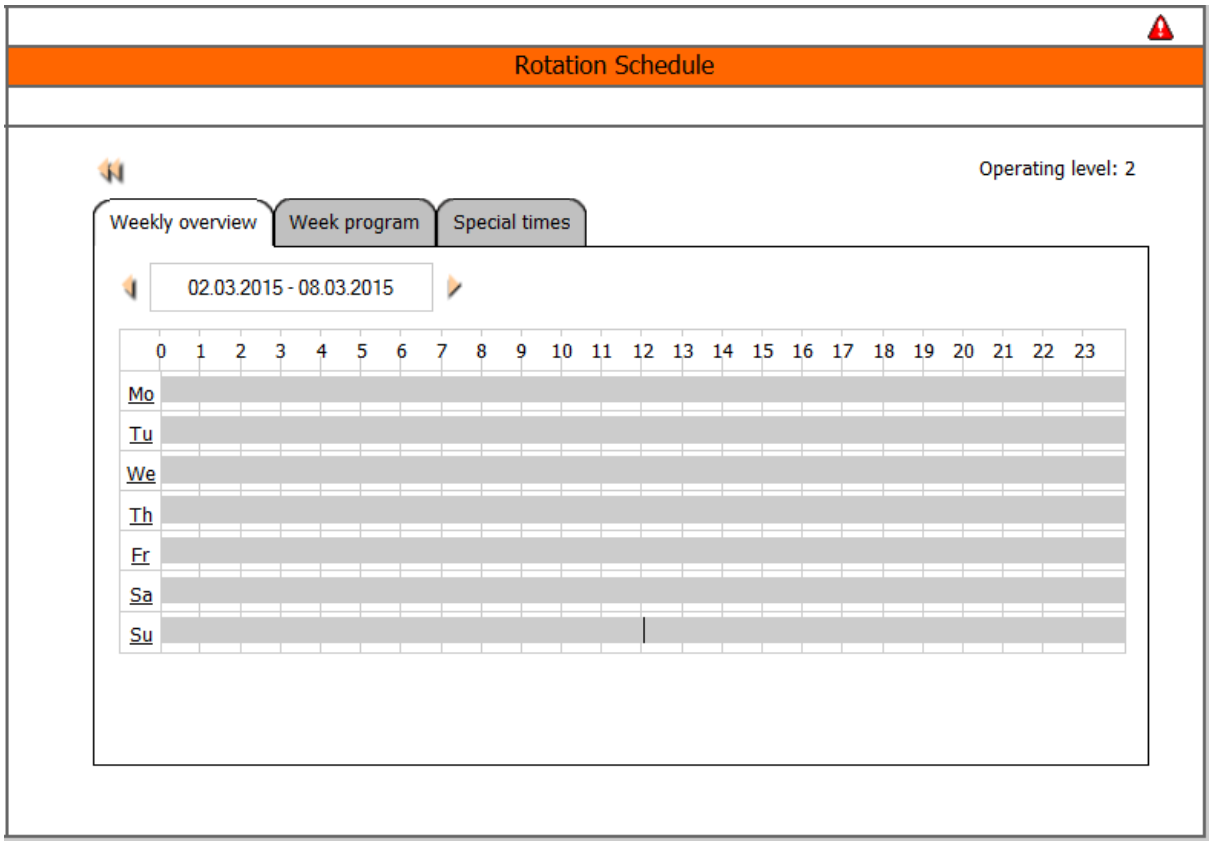
Boiler 2 Hours Run - An operational count of the time that Boiler 2 has been enabled. This value can be reset by the user if required to help note maintenance events or daily activity etc. This is just a guide as it reflects the enable and not the actual running time should the boiler be in fault etc.

11.3 Times Page

Chose the Times Page to view the Boiler Rotation Time.

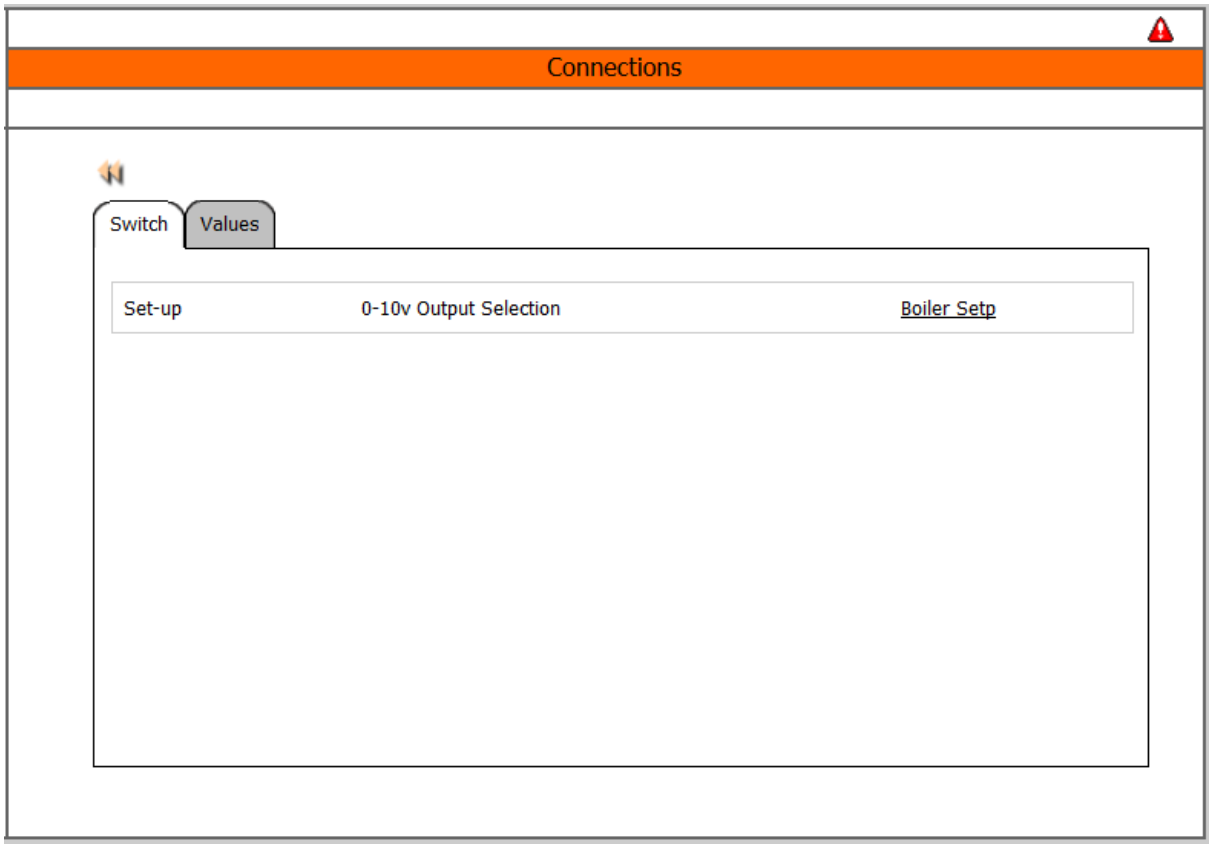


The times are not user adjustable. A manual force of rotation is provided in the Switch Menu with the Rotate Now Option. If only manual rotation is needed, then Auto rotation must be disabled and then re-enabled to allow manual rotation to work.



12. Connections Menu Pages

12.1 Switch Page



The installer can select the use of a 0-10v Output available from Pin 7 on the controller. The options are freely selected using the switch in level 2 access. The singular options are as follows:

VT Valve – This provides a 0-10v signal to the VT Valve Actuator. The VT Valve can be overridden in the Heating Control Menu and the signal will follow this request.

Boiler Setp – This provides a direct output to the boiler(s) that can accept a 0-10v signal for the provision of a set point. Please check with your boiler manufacturer about the sharing of the signal and the scaling of the output required. E.g. 0v = 20'C, 9v = 87'C etc. This value is directly calculated from the maximum of HWS Primary and VT Heating Set point.

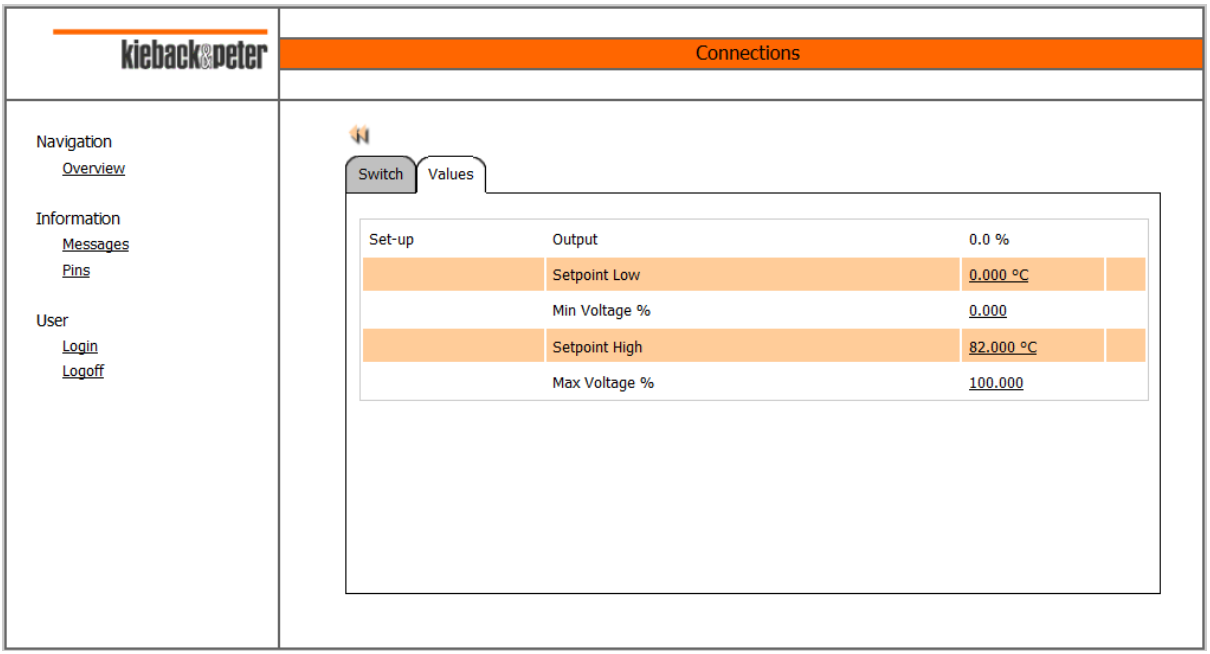
Boiler Demand % - This provides a 0-100% control signal for direct to condensing boilers. When the lead boiler is in demand the signal will be raised to 2v then a ramp will increase over the signal range to 10v. This signal will only be generated when there is a demand for heating and the boiler flow sensor is connected and working.

Always check the input impedance and rating of the signal to the boilers. 0-10v Amplifiers are available from SyxthSense if required.

Note: 0-10v Signal is not suitable to drive 1RM 12v Coil relays.

If the Boiler Demand signal is being used for direct connection to a step controller such as the BPRO4, BPRO4-A, or BPRO10 then the BPRO option must be selected to YES in the Boilers Set-Up menu. The removes the 2v starting limit.

12.2 Values Tab



Setup Output – The Current Signal reading irrespective of the signal purpose

This relates to Option 2 Boiler Set point and the scaling of the value

This controller provides a direct reading of the current boiler set point but scaled over a 0-10v signal. This equates as follows:

0v = 0'C

10v = 100'C

The controller offers the ability to rescale this signal to suit the boiler(s) as required using the following settings available in Level 2 in the Connections area.

Set point Low

Set point High

Min Voltage %

Max Voltage %

If a boiler had a set point range of 20 to 85'C over a 4v to 8v range then the settings would be as follows:

Set point Low = 20

Set point High = 85

Min Voltage = 4v

Max Voltage = 8v

If using set point control to multiple boilers are not reliant on the Boiler Flow Sensor for control purposes. The Boiler flow sensor will be used for information only.

13. Alarms and Management

13.1 Sensor Alarms

All Sensors are monitored for correct connection. Messages will be populated based on the time and date of disconnection. It is essential that wiring of sensors is made when the controller is isolated from a power supply to avoid unwanted alarms.

13.2 Sensor Allocation Reset

Any sensors that have been connected to the controller will then be used by the application and monitored onward for ongoing faults.

If an error is made during the wiring of the sensors during commissioning or during a service visit then the sensor allocations may need to be re-set to avoid sensor alarms.

To do this, first complete any wiring changes required.

Press Once the Alarm Reset (lower button on the left of the controller facia) this will bring the backlight of the controller waking it into action.

When the back light of the controller has come on then hold the same Alarm Reset Button on the controller facia for 30 seconds. Once this process has completed the Manual Override Lamp on the controller facia will flash for 3 seconds to confirm this is complete (This will not affect any manual override conditions in place). You can then release the Alarm Acknowledge button.

Once this process is complete, the sensor alarms in the memory may take up to 2 minutes to clear. The message history can then be fully cleared by holding the Alarm Reset button once more but for 5 seconds. The Malfunction LED will turn off when this process is complete.

Your currently connected sensors will then be as you require them and no unwanted sensor alarms will be monitored.

13.3 Optimiser Alarm

If the controller detects that the warming up rate is below 0.5°C/Hour then the controller will stop any further adaption and raise a system malfunction message.

The rectification for this malfunction message is for the user to manually reset the optimiser Warming rate to a new value greater than 0.5. This is achieved by logging in at level 2 and setting the Warming Up rate to the new value (e.g. 1.5).

The reason for the slow run up rate should then be investigated. Typical reasons are as follows:

- Faulty Heating Plant (Boiler/Pump)
- Isolated or disabled heat source in the room where the sensor is located.
- TRV set too low
- Secondary controls not permitting the Day Set point to be achieved (TRV, Room Thermostat for Convectors or Underfloor System for example)
- Room Sensor in poor location and not being influenced by heating system being controlled

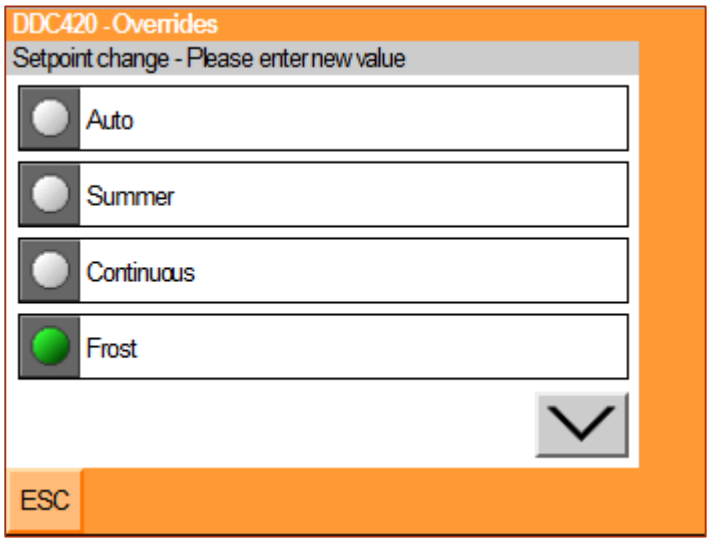
14. Maintenance and Warranty

The controller itself requires no maintenance. The controller is covered by a 12 month warranty.

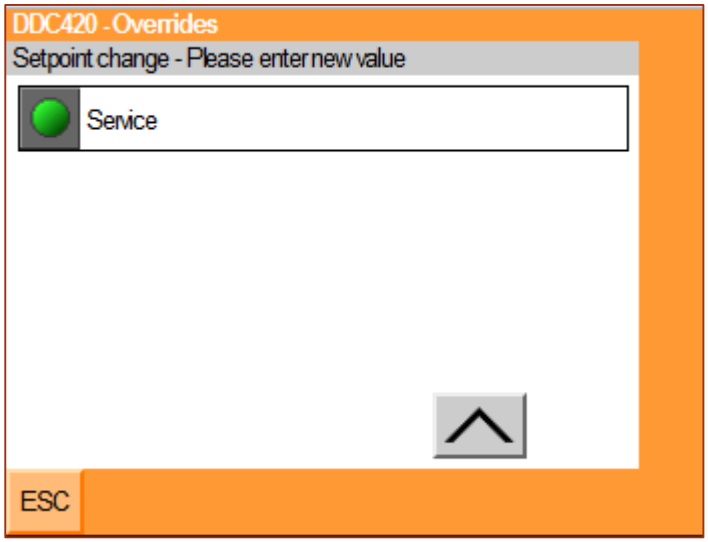
15. Using the colour touchscreen

Below is an example image when using the colour touchscreen. Shown are the levels when the panel switch is selected in the overrides menu.

The panel switch (shown when accessed by the web browser) allows changes to the system operation without changing internal settings. This can be useful to quickly override the system operation when unusual circumstances occur.



Note: The Service mode is shown when the down arrow is selected to avoid accidental selection.



AUTO

The heating and hot water are controlled by their respective time clocks or overrides.

In this condition an optimised start and stop to the heating times is in operation and compensated control is also in action, (subject to these options being enabled).

The hot water is fully operational providing a timed output, and if dependent is selected, can also provide a set point for the boiler plant to supply.

A full range of control features are enabled such as holidays, time extensions, 7 day with 4 periods per day time controls on both heating and hot water.

Frost protection routines are enabled outside of the heating periods.

SUMMER

The normal hot water controls are operating as in Auto but the heating controls are set to be in frost mode. Full frost protection of the heating system is in place, safeguarding the building.

Note: If the summer mode is manually selected during a heating time period and pump run-on is enabled, the boiler(s) will be switched off for the duration of pump run-on with the VT valve opened. When the pump overrun is finished (15 minute default) the boilers will return to Auto and the Valve will remain closed.

The Pump and VT valve will be exercised daily at Midday for 1 minute to prevent seizure.

CONTINUOUS

The heating is continuously in a Time ON condition providing controlled temperatures to the programmed set points. The HWS output is continuously ON also. This will also request the boiler(s) to run if the HWS is set to dependent.

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FROST

The heating and hot water channels are switched OFF unless a frost condition is detected. Frost protection is maintained at all times.

SERVICE

The service mode will bring on Boiler No. 1, Boiler No. 2 (if selected), pump and HWS outputs. Service Mode overrides all temperature control for the duration set. This function will self-cancel and the controller will revert to the AUTO condition after 30 minutes or the function will be cancelled as soon as the Mode Switch is put into another position.

ALARM ACKNOWLEGDE AND CLEAR

Users can Press the Malfunction Messages button on the controller facia to view all alarms.

Alarms can be acknowledged by pressing the Bottom Button on the controller facia.

Cleared Alarms can be cleared from the memory by pressing the bottom left button on the facia and holding the Alarm Acknowledge button in for more than 5 seconds.

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