SeaChange

Consumer Module

Data Sheet D2

DHW Controller
with 3 x Triac Outputs

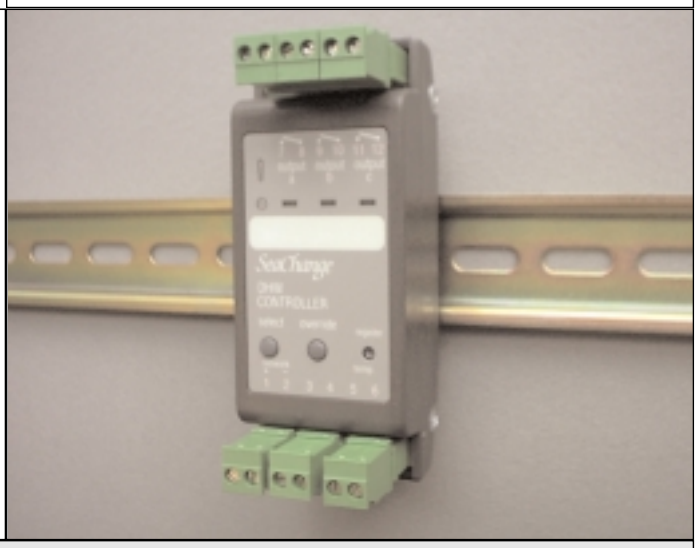
Main Features

Controls DHW Temperature

Optimum Start Control

On-board outputs can drive Plant Locally

LPHW, Electric or Direct Gas Fired Calorifiers can be controlled



Summary Features

General

The SeaChange DHW Controller provides control of Domestic Hot Water services. The DHW module will control LPHW heated from a central Boiler system, or its own direct-fired Gas systems or Electric heating. These may have no association with the Wet Heating plant, but can share Occupancy Times with heating zones.

The DHW module is capable of automatic changeover from LPHW to Electric immersion heating in the summer.

Configuration parameters can be set to allow the DHW operation to match the plant control requirements. A full table of configuration and monitoring parameters is detailed later in this data sheet.

A table of available DHW product versions is shown on the back page.

Temperature Sensors and Volt-Free Inputs

The hot water temperature can be controlled by one or two sensors connected directly to the DHW Controller. Optionally one input can be used as a digital status for remote occupation control or alarm input purposes.

Valve Control

The DHW module directly controls a *raise/lower* or *motor-open/spring-closed* valve.

An Actuator Submodule ACT/DIN/AOP/... can be used for applications where the DHW valve requires a 0 - 10Vdc control signal.

Secondary Pump Control

The DHW module directly controls a single pump using Occupation Switch output C.

An Actuator Submodule ACT/DIN/3T/... can be used to control a pump for applications where all three DHW outputs are used for heating.

A Changeover Submodule PCO/DIN/3T/... can be used for applications where the DHW secondary has a pair of pumps.

Control of Immersion Heater

A version of the DHW Controller is available that will control an Electric Immersion Heater as well as an LPHW valve. The Immersion Heater will be used when the Boilers are not running (either because no Space Heating is required, or perhaps because they are undergoing maintenance). The Immersion Heater may also be used to provide a boost to aid DHW temperature recovery when the Boilers are unable to cope with the load of Space Heating and Hot Water generation.

Features

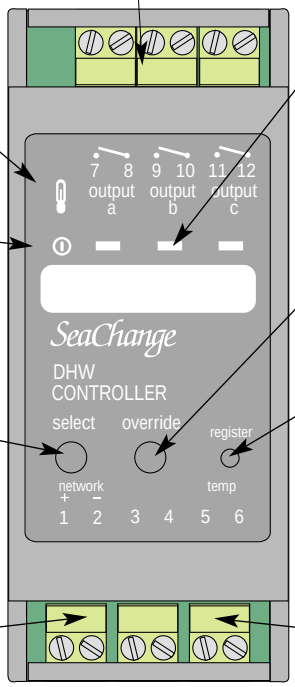
Temperature Indicator
indicates how far the controlled temperature is from setpoint.
Green = close to setpoint.
Amber = above setpoint.
Red = below setpoint.
Flashes in Setup mode and when Alarm present.
See SeaChange Design Guide

Status Lamp
indicates that the Controller is in Occupancy mode if lit steadily, also indicates that controller is in Configuration Mode (slow flashing) or Override Mode (see Manual Override section).

Select
is used during commissioning to allow a Zone Controller to display the Engineering Parameters of this controller, and to set the Timing Characteristics of the outputs.

Connections
for network. Belden 8205 Twisted pair, unscreened cable is required (or exact equivalent).

Connections
for triac outputs controlling actuator and plant.
See back page for details.



Triac Status Lamps
indicates the current status of the three output triacs.

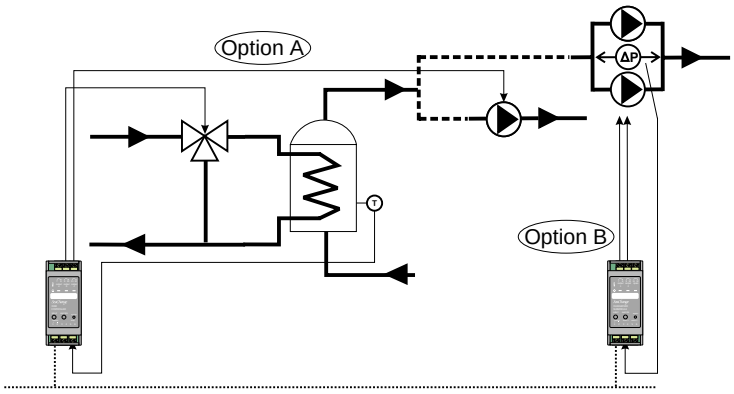
Override
is used to change from Normal to Override mode. Override mode will allow the plant to run without demand signals from the Zone Controllers, which is useful for plant maintenance purposes (see Manual Override section).

Registration Button
is used during the commissioning process to build logical links between controllers.

Terminals
are all of two-part construction to facilitate wiring connections.

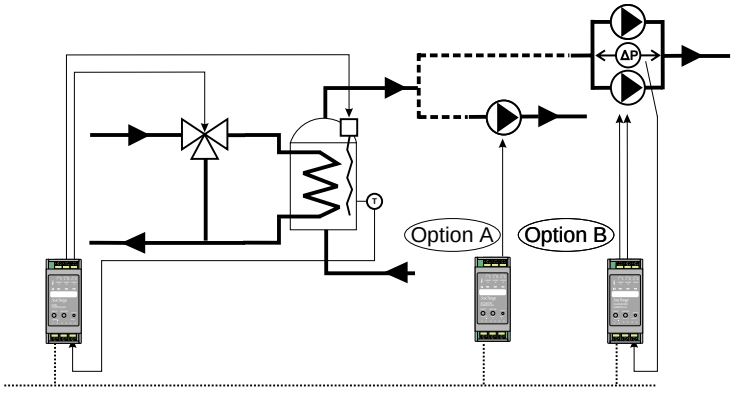
Connections
for DHW temperature sensor, VFC and optional DHW top sensor. Twisted pair, unscreened cable is required.

Typical Applications



Raise / Lower Valve with Secondary Pump
DHW / DIN / 3T / 105

Option A : Single Pump
Use DHW Occupation Switch output C
Option B : Pump Pair
PCO / DIN / 3T / 004

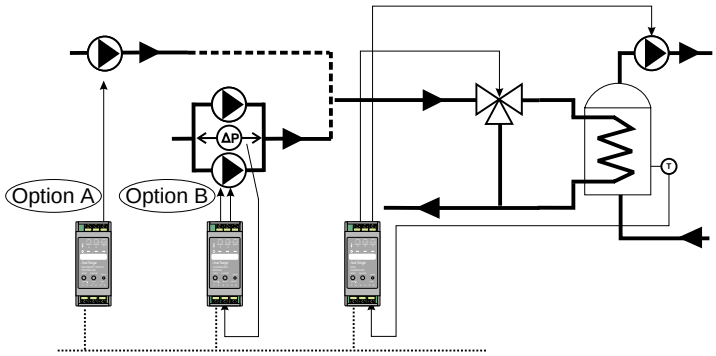


Raise / Lower Valve with Immersion Heater
DHW / DIN / 3T / 111

Optional pump control by submodule
Option A : Single Pump
ACT / DIN / 3T / 101
Use Occupation Switch output C
Option B : Pump Pair
PCO / DIN / 3T / 004
Pump solutions are also applicable where all three on/off stages are used for DHW heating.

Typical Applications

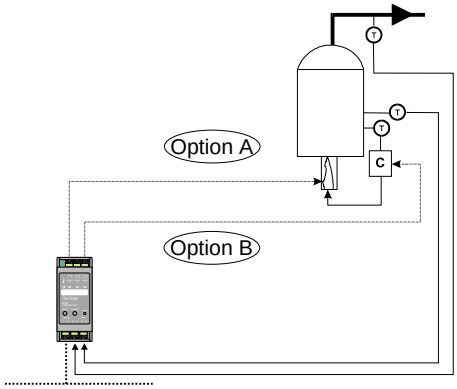
D2



Control of DHW circuit Primary Pumps

Option A : Single Pump
CTU / DIN / 3T / 101
Use Time Proportional output A

Option B : Pump Pair
CTU / DIN / PCO / 3T / 006



Direct Gas Fired Calorifier
Option A : Using Seachange temperature control
DHW / DIN / 3T / 101
Use Time Proportional output A, temperature sensor required

Option B : Using integral direct fired controls
DHW / DIN / 3T / 101
Use Occupation Switch output C, tank and top of tank sensors optional for monitoring

Detailed Features

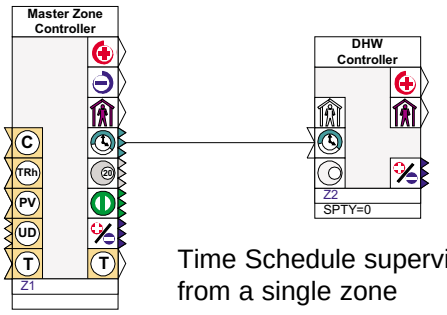
Time Control

A SeaChange Zone Controller must be used to set the operating times for the DHW Controller. This may be the same Zone Controller that is being used to control the building/space heating, or some other function. Alternatively a separate dedicated Zone Controller may be used to provide the DHW operating times if they differ from the building/space heating times.

The available methods of interconnection are described as follows. There are three types selectable by configuration parameter **SPTY**.

Occupancy times from a single Heating Zone

The DHW can be driven by the Time Schedule of the Master Zone Controller using **SPTY** = 0 (default). The DHW has its own Optimum Start control (see later section). The Master Zone may be used for other systems functions and control.

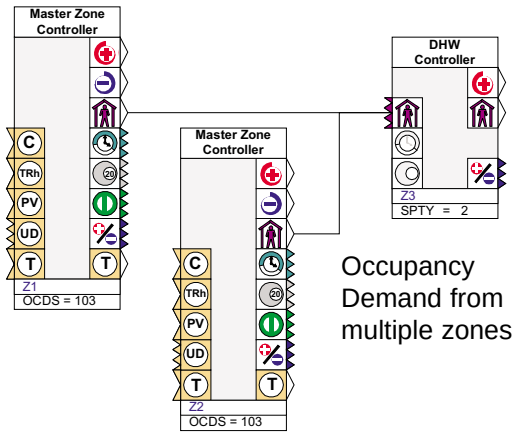


Time Schedule supervision from a single zone

Time Control (Continued)

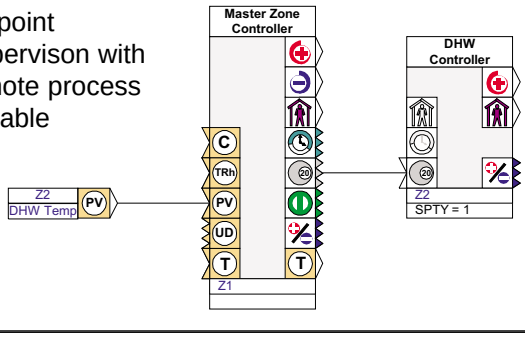
Occupancy determined by multiple Zones

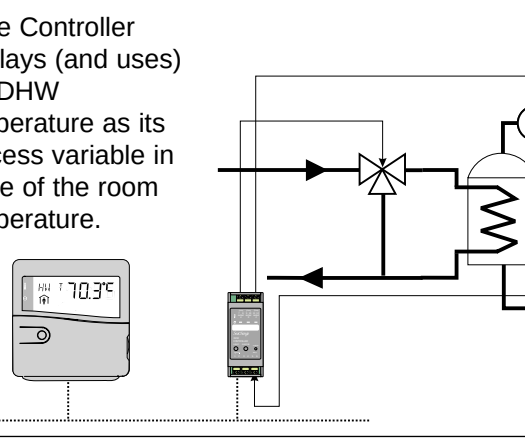
The DHW can be driven from one or more Zone Occupation Demands using **SPTY** = 2. The DHW runs only when any of the calling demands is present, and does not have its own Optimum Start.



Dedicated Zone Controller

The DHW can be driven by the Setpoint of a Master Zone Controller using **SPTY** = 1. The DHW runs when the Zone Controller is in Occupancy or Optimum Start. The Zone controller can be configured to set the DHW setpoint from its adjustment knob, and display the DHW temperature using the remote process variable feature (remote PV). In this dedicated application, the Zone Controller cannot be used for space temperature control as well as DHW.



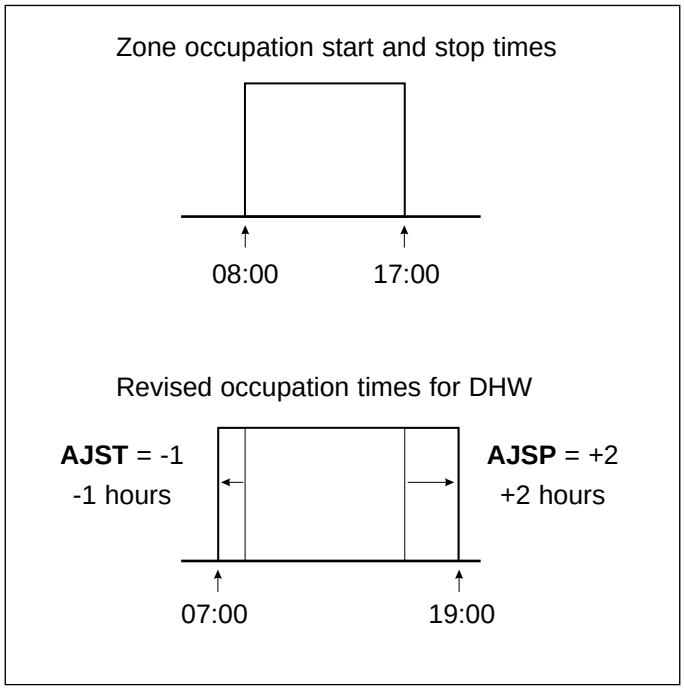


Optimum Start/Stop

The DHW has its own start and stop optimisation control used only when **SPTY** = 0. This is based on the occupation times provided by the Zone, with the ability to provide local timing offsets using the **AJST** and **AJSP** parameters. These can be useful when DHW times need to start earlier or stop later than the heating zone times eg: for cleaners, kitchens etc.

The optimised start and stop times can be limited by monitoring parameters **MXOS** and **MXOF**.

The Optimum Start feature may be disabled by setting **OCCO** = 1; this means that the pump will remain off and valve will remain closed until the start of Occupancy.



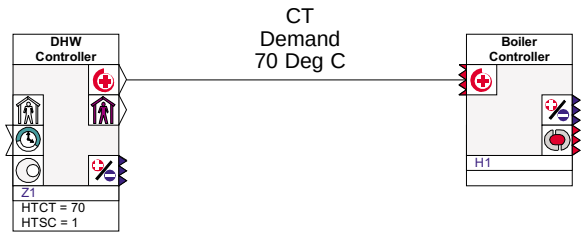
Demand Interconnects

Connections to Zone controller and up to 8 optional submodules are achieved by interconnect registration. The process is described in our 'Design Guide' publication.

Heating Demand Interconnects

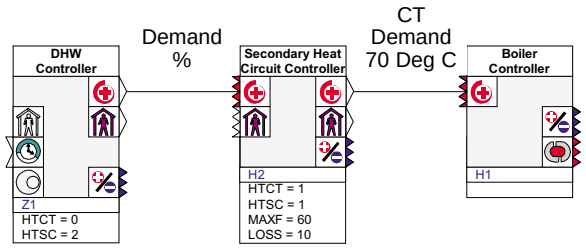
There are three methods of interconnecting DHW demands to boilers. The Boiler controller can discriminate between Zone controller demand (% = VT demand, compensation etc) and secondary circuits requiring CT (Deg C).

DHW registered to a Boiler module



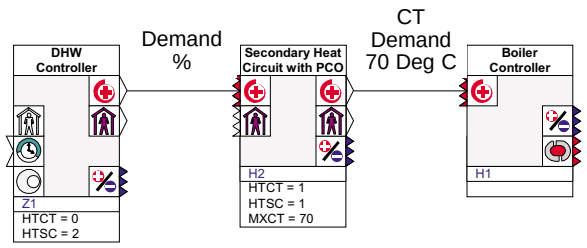
When registering the heat demand interconnect direct to a Boiler Controller, set the desired CT setpoint with parameter HTCT in DHW controller (default = 70 Deg C).

DHW registered to a Secondary Circuit Controller with Temperature Control



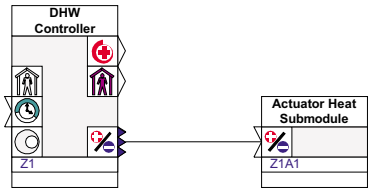
When registering the heat demand interconnect via a Secondary Circuit Heating Controller, set the HTCT parameter in the DHW controller to 0. Set the desired CT setpoint with the Secondary Circuit controller's parameters MAXF plus LOSS, and set the HTCT parameter to 1.

DHW registered to a Secondary Circuit with Pump Changeover

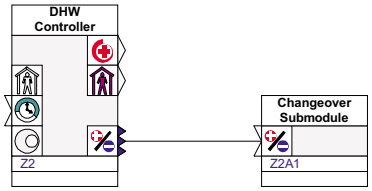


When registering the heat demand interconnect via a Secondary Circuit Pump Changeover Controller, set the HTCT parameter in the DHW Controller to 0. Set the desired CT setpoint with the Secondary Circuit Controller's parameter MXCT, and set the HTCT parameter to 1.

Submodule Interconnects



e.g: Single pump or 0 -10Vdc valve control



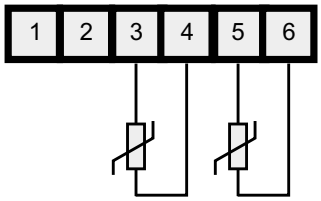
e.g: Twin pump set control

Up to 8 submodules (of any type using the generic Control Demand interconnect) may be registered to a DHW Controller

Temperature Sensors and Inputs

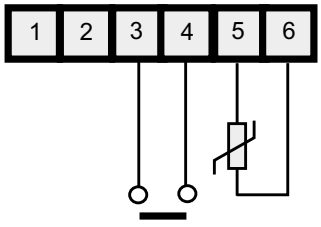
Depending on the application, one or more sensors can be used for temperature control. The standard tank temperature sensor is connected to input **'temp'** on terminals 5 and 6. The optional input on terminals 3 and 4 can either be used for a top of tank temperature sensor or alternatively a VFC input. The behaviour of the two inputs are configured by parameters **SACT** and **INMD**.

Tank Sensor and Top of Tank Sensor



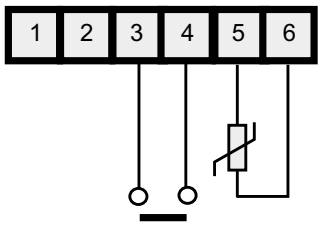
Input 3-4	Top of Tank / additional Sensor
Input 5-6	Tank Sensor
INMD = 0	
SACT = 0	Control on tank sensor only Top of Tank sensor for monitoring or high limit (using **SPMX** parameter)
SACT = 1	Control on average of two sensors
SACT = 2	Control on maximum of two sensors
SACT = 3	Control on minimum of two sensors

Tank Sensor and external Control Status input



Input 3-4	External occupancy VFC input
Input 5-6	Tank Sensor
SACT = 0	
INMD = 1	Occupancy determined by Time Schedule **AND** external i/p Use for Interlock with high limit stat
INMD = 2	Occupancy determined by Time Schedule **OR** external i/p Use for external occupancy override
INMD = 3	External occupancy signal only Use for external timeclock control where no Zone controller used

Tank Sensor and external Alarm Monitor input



Input 3-4	External monitor / alarm VFC input
Input 5-6	Tank Sensor
SACT = 0	
INMD = 4	Monitor Input if **ALRM** = 0 Alarm Input if **ALRM** > 0
INMD = 5	Pump readback monitor Generates alarm if no status readback from pump (via DP switch etc) within 30 secs (set **ALRM** > 0)
ALST = 0	0 = Alarm State, 1 = Normal
ALST = 1	0 = Normal, 1 = Alarm State

Sensor calibration

The resultant control sensor value (Tank sensor input alone, or Tank and Top of Tank sensors combined as set by **SACT**) can be adjusted by calibration parameter **SCAL**.

High Temperature Limit

A configuration setting **SPMX** allows a high limit to be put on the DHW water temperature, this will shut down the DHW control if the high limit is exceeded by either of the temperature sensors. This feature is useful where an immersion heater is used in systems with no secondary or anti-stratification pumps, as dangerously high temperatures can build up at the top of the tank. The feature also prevents excessive temperatures if the controller is left in Manual Override.

The high limit feature is enabled by setting **SPMX** to the required high limit temperature. A value less than 5.0 disables the feature. A second sensor should be fitted, at the top of the tank or on the DHW flow pipe, so that if the highest sensor exceeds **SPMX** then the DHW controller will be shut down until the temperature drops by 2 degrees. Input I5 **HILM** reports the state of the HIgh LiMit. The high limit sensor can be monitored on sensor 7 **HWT2**.

Control of DHW Heating Valve

The configuration parameter **VMDE** can be set to override the DHW valve. The setting of 0 will keep the DHW valve closed until boiler flow temperature is greater than current DHW temperature. The setting of 2 is designed for systems where the DHW is heated from a Variable temperature circuit as well as electric immersion. If the VT temperature is higher than the DHW temperature it is used, otherwise the water circuit is closed and the Electric heater used. Set heat source **HTSC** to zero for this option, as it is not appropriate for the DHW demand to influence the Boiler Controller. The default value for **VMDE** is 1 where the value of the boiler flow temperature is ignored.

Control of Immersion Heater

The Immersion heater will be used in preference to the DHW heating coil when the Outside Temperature is above the **SUMR** Summer Temperature **AND** the flow temperature from the appropriate heat source is below the Low Flow temperature **LOFL**. The immersion heater is also used to 'boost' the DHW recovery time. If after 15 minutes the Boiler Flow Temperature is not higher than the DHW Temperature and the DHW control is still calling for maximum heat, then the Immersion heater is enabled as well as the heating coil. These features will only operate correctly when the heat source receiving DHW demands (i.e. Boiler Controller or Secondary Circuit Controller) has a valid flow temperature.

Frost Protection - Secondary side

If the DHW measured temperature falls below the non-occupied setpoint then the controller becomes 'occupied'. The controller remains in this mode until the temperature has risen by the amount specified by the parameter **FRSE**, at which point the controller reverts to non-occupied. If **FRSE** is set to zero, the controller will control to the non-occupied setpoint **SPNO**.

Frost Protection - Primary side

The DHW Controller can be made aware of the Frost protection status of the Boiler controller. If the Boiler controller is in Frost Protect this is communicated to the DHW controller which will open the heating valve to 50% (to primary coils and bypass) and run the pump if desired, as set by the parameter **FRPT**.

Pump Control Interlock

When a single pump is driven from the occupation output, **INMD** = 5 and **ALRM** = 2 or 3, the control outputs are disabled if the pump readback signal goes into alarm. The pump remains disabled until the readback signal is fixed, the Override button is pushed or the **ALRM** parameter is set to zero

Pump Time Interlock Settings

The pump can be set to run at a different time to the heater. The pump start can be delayed after the heater has started, or the pump can be made to run on after the heating output shuts down by configuring the parameter **HDLY**. Negative values for **HDLY** will start the pump the defined number of minutes after the heating driver has been enabled, positive values will cause the pump to run on after the heating driver shuts down.

Alarm Handling

The DHW Controller may be set to ignore alarm conditions, report them to a SeaChange Doorway Supervisor (either locally connected to the system, or via an autodialling modem), or to both report alarms and take some control action. The **ALRM** parameter is used to select the desired Alarm Mode.

The DHW Controller generates an alarm if the sensor fails and also if the external alarm input is used. The sense of the alarm input can be set by parameter **ALST**.

The DHW Controller may be set to respond to the **STOP** System Stop Alarm which is generated by a Boiler Controller; this can be used to shut down the entire control system, or parts of it, if a particularly critical event occurs. See Boiler Controller datasheets B1 or B2 for more details about the System Stop Alarm.

Alarm codes as they appear at Doorway Supervisor and InSite tool:

NOAL No Alarms.
All alarm conditions cleared in this Module.

SENF Sensor Failed.

RPVF Remote Process Variable Failed.
Not used in this module.

EXTN External alarm generated by VFC input.

PMPF Pump Fail (readback alarm) generated by VFC input (**INMD** = 5).

STOP System **STOP** alarm received.
All outputs shut down if **ALRM** = 3 or 4.

Local Indication of Alarms

Alarms are indicated by red flashing of the Temperature Indicator (Thermometer) LED, if the alarm results in a control action (e.g. shutting down the pump/valve). If **ALRM** is set to 0 (ignore alarms) or 1 (report alarms to supervisor only) then no control action will be taken, and the thermometer LED will not flash.

Commissioning

Setup Mode : Timing Characteristics of Output Channels

It is possible to set the stroke time (for Raise/ Lower type Actuators) and the minimum on/off time (for Time Proportion type Actuators) using pushbuttons.

Raise/Lower Types - Setting Stroke Time

1 Hold down Select until Temp lamp flashes

Temperature indicator will flash red at one second intervals.
Release select button; output B will energise to close valve.

2 When valve is closed press Select

Temperature indicator will flash green and output A will energise to open valve. The controller is now measuring the stroke time.

3 When the valve is open press Select

Flashing will stop and stroke time is now set and stored in non-volatile memory. This time will be retained until the procedure is repeated.

Note: if a Stroke Time of less than 30 secs is set using pushbuttons then the setup process is aborted. Temp indicator flashes amber rapidly for 5 secs indicating an invalid period. This allows checking of wiring without affecting Stroke Time setup. Stroke Times less than 30 secs can be entered manually via Zone Controller or InSite tool.

TP Types - Setting Minimum Time On/Off

1 Hold down Select until Temp lamp flashes

Temperature indicator will flash green at one second intervals and relay A will energise. Release select button.

2 When minimum on/off time has elapsed, press select

Flashing will stop and this time will be set and stored in non-volatile memory. This time will be retained until the procedure is repeated. Note that the full TP period will be 10 times this value.

The times can also be viewed and changed using parameters **HPRD** (heating) and **CPRD** (cooling).

Manual Override

Allows the outputs to be exercised during commissioning and maintenance activities. Holding the *override* button pressed until the Status Lamp flashes green will cause the controller to be switched from automatic control to *Override Mode*. Subsequent pressings of the manual override button will cycle through the available Override modes.

1) Hold down Override until Status lamp flashes

Controller changes to Override Mode and becomes Occupied, controlling to current Occupied Setpoint.

2) Press Override again

Controller changes to Manual Mode and output is set to 100%, temperature lamp shows red.

3) Press Override again

Controller cancels Manual Override and reverts to automatic control.

As this feature does not time out, care should be exercised to ensure the module is returned to the automatic mode on completion of the commissioning or maintenance activities.

Occupancy Override can also be achieved via Doorway and InSite; using **AUTO** and **OVRD** monitoring parameters. The status lamp indication shows a different sequence.

Override from Off to ON :

Status lamp flashes long ON, short Off

Override from ON to Off :

Status lamp flashes long Off, short ON

See our 'Design Guide' publication for details of the Override features.

Registration

Registration is the simple process by which logical connections are made between Controllers in a SeaChange system; it is done during commissioning and involves pressing buttons on the Controllers in a specific sequence.

For further details of the registration process, see our 'Design Guide' publication.

Address Allocation and System Housekeeping

Like all SeaChange Controllers, the DHW Controller must be registered with other modules in order to create a working system. During the Registration procedure, the address of each Controller is allocated by the module that contains *System Housekeeping.* Check that you have an appropriate System Housekeeping Module; see our 'Design Guide' publication.

Interconnects

The DHW Controller must receive signals from a Zone Controller, either Time Schedule Supervision, Setpoint Supervision, or Occupancy Demand signals (see **Time Control** section). It may also send signals to other modules (e.g. a Changeover Submodule when the DHW secondary circuit has a twin pump set).

These Interconnects are put in place by Registration; again, see our 'Design Guide' publication.

D2 Monitoring Parameters

Label	Doorway / InSite Code	Description	Units	Default Value	Range
FRST	I1 (C30)	Frost Protection Mode (SPNO violated)	-	-	0 to 1
OCC	I2 (C31)	Occupied	-	-	0 to 1
OSRT	I3 (C32)	Optimum Start in Operation	-	-	0 to 1
EXTI	I4 (C33)	External Input State	-	-	0 to 1
HILM	I5 (C34)	DHW High Limit exceeded	-	-	0 to 1
RLYA	I6 (C35)	Triac A Status	-	-	0 to 1
RLYB	I7 (C36)	Triac B Status	-	-	0 to 1
RLYC	I8 (C37)	Triac C Status	-	-	0 to 1
AUTO	W1 (C38)	Automatic/Manual Status	-	-	0 to 1
OVRD	W2 (C39)	Override	-	-	0 to 1
HAND	W5 (C42)	Manual Hand; use with MANL to set output level	-	0	0 to 1
POT	W6 (C43)	not used in this application	-	0	0 to 1
SERV	W7 (C44)	Service Pin Message (to Doorway and InSite, self resetting)	-	-	0 to 1
CGST	W8 (C45)	Configuration Mode Status	-	-	0 to 1
HWT	S1* (C50)	Hot Water Temperature	Deg C	-	0 to 95
DMND	S2* (C51)	Control Demand	%	-	0 to 100
HWSP	S3 (C52)	Hot Water Setpoint	Deg C	-	10 to 95
HTOP	S4 (C53)	Heating Output to actuator	%	-	0 to 100
OPST	S5 (C54)	Optimum Start Time	hours	-	0 to 24
OPOK	S6 (C55)	Optimum Start Completion	hours	-	0 to 24
HWT2	S7 (C56)	Hot Water Top Temperature	Deg C	-	0 to 95
SPOC	K1 (C60)	Occupation Setpoint	Deg C	55	10 to 95
SPNO	K2 (C61)	Non-Occupation Setpoint	Deg C	10	5 to 95
SPSV	K3 (C62)	Supervised Setpoint from Master Controller	Deg C	-	0 to 95
SPMX	K4 (C63)	Maximum Temperature high limit	Deg C	0	0 to 95
MXOS	K5 (C64)	Maximum Optimum Start time	hours	6	1 to 24
MXOF	K6 (C65)	Maximum Optimum Stop time	hours	2	0 to 4
		Engineering Parameters; only accessible via Doorway and InSite			
NOAL	C90	No Alarms; all alarms cleared when set to 1	-	-	0 or 1
SENF	C91	Sensor Failed (when set to 1)	-	-	0 or 1
RPVF	C92	not used in this application	-	-	0 or 1
EXTN	C93	Volt-Free Contact alarm (when set to 1)	-	-	0 or 1
PMPF	C94	Pump Failed (when set to 1)	-	-	0 or 1
STOP	C95	STOP alarm received (when set to 1)	-	-	0 or 1
OPST	C160	Optimum Start time	hours	-	0 to 24
OPOK	C161	Optimum Start Completion	hours	-	0 to 24
MXOS	C162	Maximum Optimum Start time	hours	6	1 to 24
MXOF	C163	Maximum Optimum Stop time	hours	2	0 to 4
OPTE	C164	Optimum start Error allowed	Deg C	1	0.5 to 5
DI A	C180	Input 3-4 digital status	-	-	0 or 1
DI B	C181	Input 5-6 digital status	-	-	0 or 1

* 24 hour plots available for these values by default
Plotting interval and plotted variable changeable via Doorway or InSite

Parameter details were correct at product software revision 4C1. Details of current version can be seen on website.

Configuration Parameters

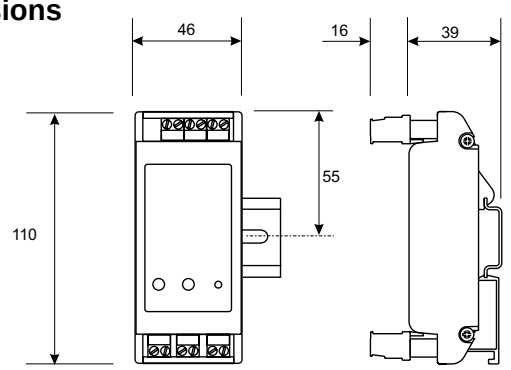
D2

Label	Doorway / InSite Code	Description	Units	Default Value	Range
SACT	C1	Sensor Action 0: Use 'temp' sensor for control, input 3-4 for high limit/VFC 1: Use average of valid sensor values (INMD = 0) 2: Use maximum of valid sensor values (INMD = 0) 3: Use minimum of valid sensor values (INMD = 0)	-	0	0 to 3
SCAL	C2	Sensor Calibration	Deg C	0	-5 to +5
SPMD	C3	Midpoint of Setpoint Adjustment	Deg C	55	10 to 95
SPRG	C4	Setpoint Adjustment Range	Deg C	25	0 to 50
SPTY	C5	Setpoint Type 0: Setpoint set locally on parameter K1, occupancy supervised from a master Zone Controller using Time Schedule supervision 1: Setpoint (and occupancy) supervised from master Zone Controller using Setpoint Supervision 2: Setpoint set locally on parameter K1, occupancy controlled by multiple zone controllers using Occupancy Demand	-	0	0 to 2
SUMR	C6	Summer Immersion Heater Temperature Immersion enabled if LOFL allows and Outside temp > SUMR	Deg C	15	0 to 30
LOFL	C7	Low Flow (used with SUMR) Immersion enabled if SUMR allows and Boiler flow < LOFL	Deg C	30	10 to 70
VMDE	C8	DHW Control Valve Mode 0: DHW Valve closed until boiler flow temp > DHW temp 1: Boiler flow temp ignored 2: DHW heated from VT circuit (set HTSC Heat Source to 0)	-	1	0 to 2
XHRS	C9	Hours Extension when Override set from Dooway / InSite	Hours	1	0 to 8
FRSE	C10	Fabric/Frost Rise	Deg C	0	0 to 10
INMD	C11	Input Mode for input terminals 3 and 4 0: Additional temperature input for max, min, ave using SACT 1: External occupation (input linked = Occupied) AND with internal Occupation 2: External occupation (input linked = Occupied) OR with internal Occupation 3: External Occupation signal only 4: Alarm input 5: Pump alarm	-	0	0 to 5
MIND	C12	Minimum Demand for occupation output to operate 0: When demand drops to zero, pump continues to run MIND > 1: When demand drops to zero, pump stops	-	0	0 to 10
OCCO	C13	Occupied Only (select Optimum Start or Occupation Switch operation) 0: Occupancy starts at Optimum Start time 1: Occupancy starts at Occupation Start time	0	0 to 1	
HPRD	C14	Heating Driver Stroke/Minimum On Time	secs/10	18	1 to 240
HDLY	C15	Heating Interlock Delay	mins	0	-30 to 30
CPRD	C16	Electric Heating Minimum on Time	secs/10	6	1 to 240
CDLY	C17	Immersion Heater Interlock Delay Negative value delays pump after immersion heater starts Positive value runs pump on after immersion heater stops	mins	0	-30 to 30
FPRT	C18	Frost Protection Mode 0: No action 1: Open DHW valve 50% 2: Open DHW valve and run pump	-	0	0 to 2
MANL	C19	Manual Level, set by Doorway and InSite	%	0	0 to 100
STAT	C20	Thermostatic control mode 0: Normal Fuzzy Logic Control 1: Thermostatic action with +/- 4 Deg C deadband	-	0	0 to 1
AJST	C21	Adjust Start Time. Offsets DHW start from supervising zone	hours	0	-10 to 10
AJSP	C22	Adjust Stop Time. Offsets DHW stop from supervising zone	hours	0	-10 to 10
ALRM	C23	Alarm Mode 0: Ignore alarms 1: Report all alarms to Doorway/InSite, no control action, no flashing Temp indicator 2: Report all alarms, shut down all outputs on alarm 3: Report all alarms, shut down on STOP alarm or local alarm 4: Report all alarms, shut down on STOP alarm only	-	0	0 to 3
ALST	C24	Alarm report sense 0: Alarm if input = 0 (contact open), pump running if input = 1 (closed) 1: Alarm if input = 1 (contact closed), pump running if input = 0 (open)	-	1	0 to 1
HTSC	C25	Heat Source	-	1	0 to 8255
OCDS	C26	Occupation Destination	-	0	0 to 8255
HTCT	C27	Heating Demand sent as CT	Deg C	70	0 to 100

Parameter details were correct at product software revision 4C1. Details of current version can be seen on website.

D2 Specification

Dimensions



all dimensions in mm

Electrical

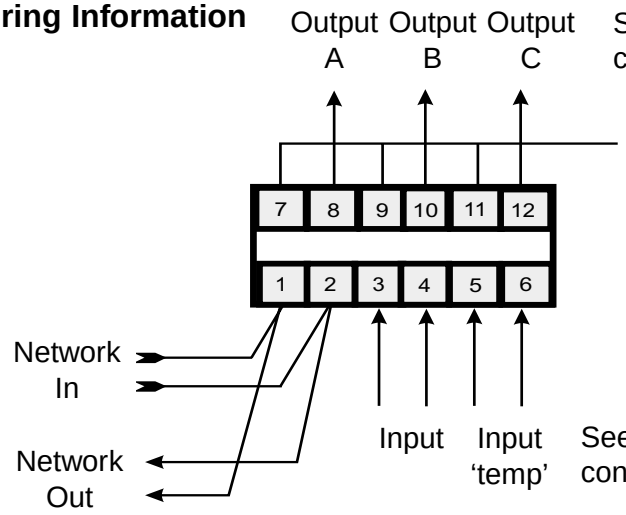
Inputs	2 Thermistors or 1 Thermistor + 1 VFC.
Outputs	3 Triacs - 1A at 230V
Consumption	25mA from network

Physical

Weight	0.15 kg
Cover Material	PC/ABS alloy Self extinguishing to UL 94 V0/1.60
Base Material	Polyamide 6.6 Self extinguishing to UL 94 VO
Colour	Dark Grey to Pantone 425

CE Conformant product

Wiring Information



See below for output configuration

250Vac maximum supply voltage. dc voltage not suitable

IMPORTANT
All network and input cable from temperature sensors or VFC to be unscreened, twisted pair cable, 20AWG - Belden 8205 or direct equivalent

See below for input configuration

If inputs are not being used, leave open circuit

Options and Product Codes

Domestic Hot Water Controller Module

DHW / DIN / 3T / [driver option]

Driver options

Option	Output A	Output B	Output C
/ 101	Time Proportional Heat	Not used	Occupation Switch or Optimum Start Switch
/ 105	Valve Open	Valve Close	Occupation Switch or Optimum Start Switch
/ 108	Sequence 2 triacs at 33% and 66% of demand		Occupation Switch or Optimum Start Switch
/ 109	Sequence 3 triacs at 25%, 50% and 75% of demand		
/ 110	Time Proportional Heat	Immersion Heater	Occupation Switch or Optimum Start Switch
/ 111	Valve Open	Valve Close	Immersion Heater

Input Configuration	Input 3-4	Input 5-6 'temp'
	DHW Top Sensor (optional) or VFC status / alarm / occupancy	DHW Sensor

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