
**Universal control panel
incorporating SIMS™ technology HTG**
Installation and Maintenance Instructions



1. Safety information
2. General product information
3. Installation
4. Commissioning
5. Fault finding
6. Maintenance

All rights reserved

Spirax-Sarco Limited grants the legal user of this product (or device) the right to use the Work(s) solely within the scope of the legitimate operation of the product (or device). No other right is granted under this licence. In particular and without prejudice to the generality of the foregoing, the Work(s) may not be used, sold, licensed, transferred, copied or reproduced in whole or in part or in any manner or form other than as expressly granted here without the prior written consent of Spirax-Sarco Limited.

1. Safety information

Note: This document refers only to the mechanical installation and commissioning of packages that look like Spirax Sarco HTG packaged heat exchange system unit and should be used in conjunction with the relevant IMIs for the other system components and supplementary safety information for all the system components.

Warning

This product is designed and constructed to withstand the forces encountered during normal use.

Use of the product for any purpose other than its intended use could cause damage to the product and may cause injury or fatality to personnel.

Before any installation or maintenance procedure, always ensure that all primary steam and condensate return lines and secondary water lines are isolated.

Ensure any residual internal pressure in the system or connecting pipework is carefully relieved.

Allow hot parts to cool before commencing work, to avoid the risk of burns.

Always wear appropriate safety clothing before carrying out any installation or maintenance work.

Lifting

The packaged system should be lifted by a suitable forklift truck, from the base, placed in position and securely bolted to the floor.

Warning:

On no account is the packaged system unit to be lifted by any other part, other than the base.

Note: Sufficient space should be provided around the systems location to allow access for maintenance.

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11) in compliance with the operating instructions. General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. The packaged system HTG heating system compact heat transfer unit complies with the requirements of the European Pressure Equipment Directive 97/23/EC - For any product specific PED categorisation that is required for this unit or products used in the make-up of the unit please contact Spirax Sarco directly.

- i) The product has been specifically designed for use on steam, air or water/condensate which are in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.
- ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.
- iii) Determine the correct installation situation and direction of fluid flow.
- iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.
- v) Remove protection covers from all connections and protective film from all name-plates, where appropriate, before installation on steam or other high temperature applications.

1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk?

Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

1.8 Temperature

Allow time for temperature to normalise after isolation to avoid the danger of burns.

1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high/low temperature, radiation, noise, falling objects, and dangers to eyes and face.

1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions. Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.

Post 'warning notices' if necessary.

1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

Please note that if lifting straps are required we would recommend that they be fitted around the baffle plate legs to prevent damage to the unit.

2. General product information

2.1 General information

The packaged system HTG (Heating) incorporating S.I.M.S technology is a complete, compact and ready-to-use steam to water heat transfer solution that delivers superior energy efficient performance. It has been designed for applications with stable load conditions such as closed circuit heating applications.

The base unit of the packaged system provides the core of the system, while options (see Sections 2.2) provide additional features such as: high limit package, stop valve package and energy monitoring.

Spirax packaged system shown below is fitted with a plate and frame heat exchanger as an example (refer to Figure 1):

- A** Plate heat exchanger.
- B** Pneumatic or electrically actuated control valve and positioner.
- C** Universal control panel.
- D** Pipeline ancillaries.



Fig. 1 HTG compact heat transfer solution

Notes:

1. For additional information about any particular product used in the construction of this unit see the relevant product specific Technical Information (TI) sheet.

3. Installation

3.1 Steam and condensate connections

It is important that the steam supply (and compressed air if pneumatic actuation is selected) to the packaged system is supplied as dry and as clean as possible, in accordance with good steam engineering practice.

It should also be ensured that all connecting pipework is stress free and adequately supported. The steam supply should always be maintained at the specified design pressure and temperature for the unit. The packaged system must not operate above the maximum steam pressure and temperature indicated on the name-plate attached to the plate heat exchanger. The installation of an appropriately sized safety valve, to protect any lower pressured equipment on either the hot or cold side of the plate heat exchanger, is strongly recommended.

3.2 Air supply

If a pneumatic control system is installed, connect a compressed air supply (4.5 to 8 bar g (65 to 116 psi g)) to the pressure regulator mounted on the control valve.

3.3 Electrical supply

All electrical wiring and connections should be carried out in accordance with National Regulations.

A lockable isolator / switch disconnect should be fitted adjacent to the unit.

Mains supply is directly connected to the primary side of the incoming control panel isolator (shown with the IP2X cover removed) and main earth terminal as shown in Figure 2.

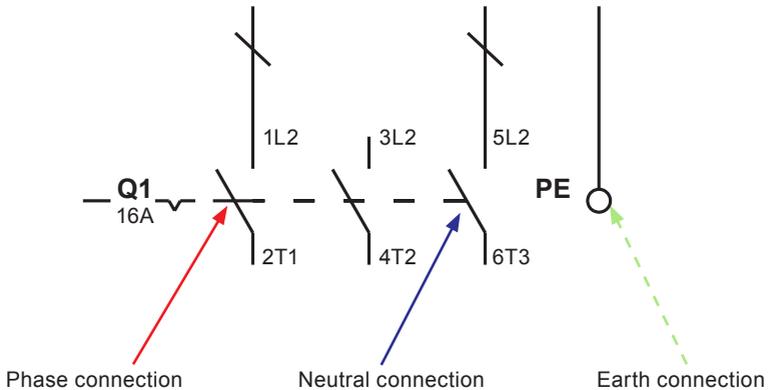


Fig. 2

3.4 Electrical specifications

Electrical supply: Refer to the name-plate on the unit

Control panel supply voltage	110 Vac/60 Hz
	240 Vac/50 Hz
Control panel load requirements	Internally fused at 5 amps
Electrical control actuator	24 Vac
	4 - 20 mA control
Pneumatic control actuator	-
	4 - 20 mA control
High Limit isolation valve (optional)	24 Vac
PT100 temperature sensors	3 wire

Note: Power supply 10 - 16 A

3.5 Electrical connections

The following are available for customer connection to the packaged system system if required:

Volt free contacts

Terminal designation	Description	Type
X14	Enabled/running signal	1 x N/O contact
		1 x N/C contact
X15	High Limit alarm	1 x N/O contact
		1 x N/C contact
X16	Band Alarm	1 x N/O contact
		1 x N/C contact

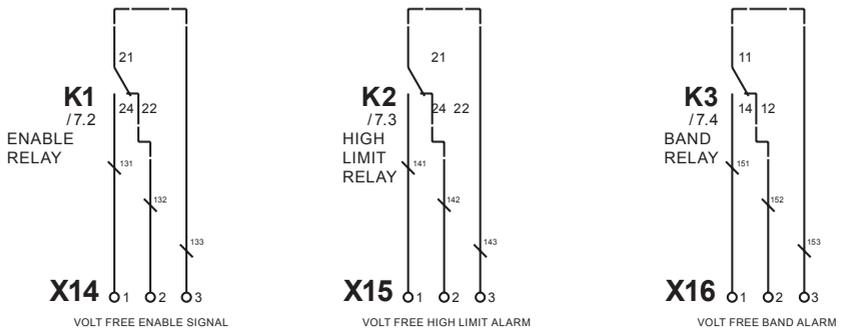


Fig. 3

Remote operation and retransmission connections

Terminal designation	Description	Type
X7	Remote set point	4-20 mA input
X17	Remote enable	24 Vdc signal
X9	Retransmission value	4-20 mA output

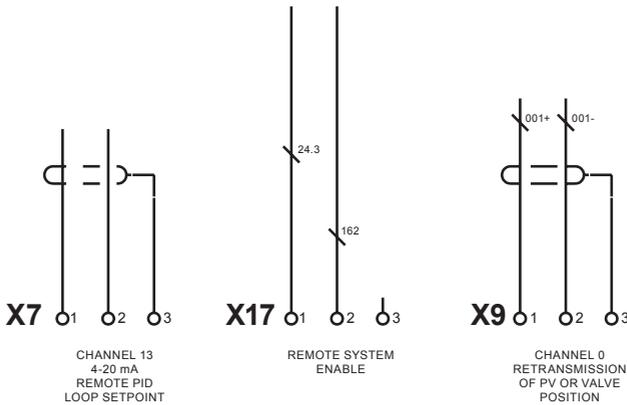


Fig. 4

Terminal layout overview

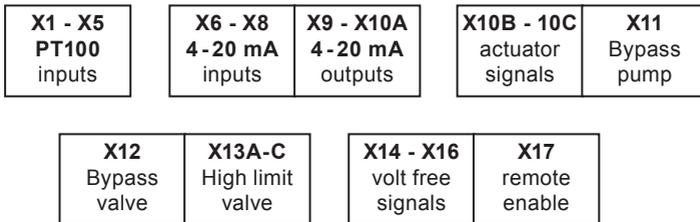


Fig. 5

Terminal layout detailed

Note: for detailed wiring schematic options please refer to the Individual wiring diagram supplied with control panel.

1. Basic
 2. Independent high limit
 3. Independent high limit with safety
 4. American standard
- X1 - Water temperature IN
X2 - Water temperature OUT
X3 - Steam temperature
X4 - Condensate temperature
X5 - High limit temperature

Group X6 to X10A

- X6 - Linear actuator feedback
X7 - Remote PID loop set point (requires a 4-20 mA input)
X8 - Digital flow switch
X9 - Retransmission value
X10A - Linear actuator control position

Group X10B to X11

- X10B - Linear actuator closed signal
X10C - Linear actuator supply voltage (Electric actuator only)
X11 - Bypass pump (DHW only)
X12 - Bypass valve (DHW only)
X13 - High limit valve
X13A - High limit valve control output signal
X13B - High limit valve supply voltage (electric actuator only)
X13C - High limit valve battery signal

Group X14 to X17

- X14 - Volt free signal for enabled
X15 - Volt free high limit
X16 - Volt free band alarm
X17 - Remote enable signal

4. Commissioning

We recommend that you use the service and support of a Spirax Sarco commissioning engineer. Details of this service can be found by contacting Spirax Sarco.

Note: Pre commissioning requirements:

- In most new installations, dirt collects in the steam pipeline during construction of the system. It is essential to flush this out prior to commissioning.
- Ensure the secondary (cold side) of the system is charged and all air is bled from the system.
- Ensure that all main isolation valves for both steam and water are isolated.
- Ensure that the electrical supply to the packaged system is isolated.
- Double check that all steam, condensate and water connections are correctly connected to the packaged system
- Check all flange bolts are tight.

4.1 Mechanical commissioning procedure:

- Check that all the electrical connections are secure and as per the wiring diagram (Section 3.3, Figure 2).
 - Dry commissioning valve stroke check - An initial valve stroke check should be carried out to ensure free movement of the valve stem.
1. For the electric actuated control valve, use the manual override on top of the actuator to raise and lower the actuator spindle between the two travel indicators located on the side of the pillar (Figure 6).
 2. For the pneumatic actuated control valve, remove the existing air supply and connect an independent air supply to the actuator (pressure not to exceed 6 bar g (87 psi g)), allow the valve to fully open, remove the air supply from the actuator allowing the valve to close. Reconnect the original pipework (Figure 7).
- Open the secondary (cold side) isolating valves downstream of the packaged system
 - Start the main secondary water circulating pump(s) if fitted.
 - Check and confirm there is secondary water circulation through the packaged system.
 - If the circulation is okay, switch on the main power to the control panel (local isolator).
 - Turn the control panel isolation switch to 'ON'.
 - Follow the quick start-up guide (WHERE) before opening the steam isolation valves.

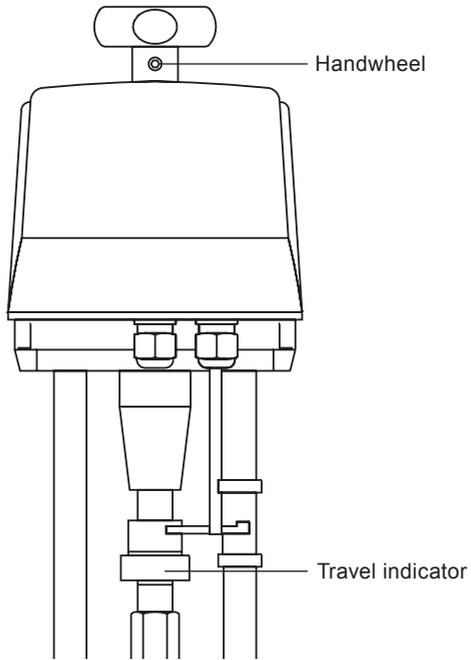


Fig. 6

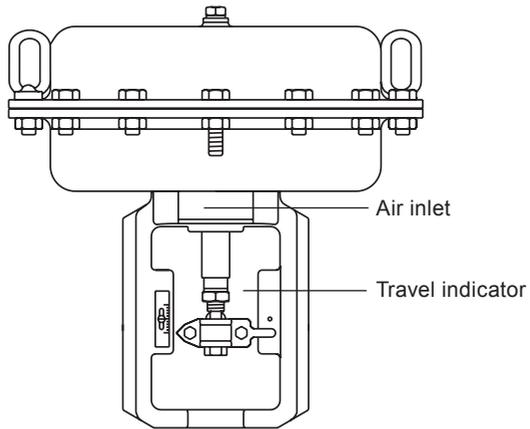


Fig. 7

4.2 HMI quick start commissioning procedure:

The HMI display is a 7" touch screen, and the following procedures detail a basic set-up of the control system from initial power up.

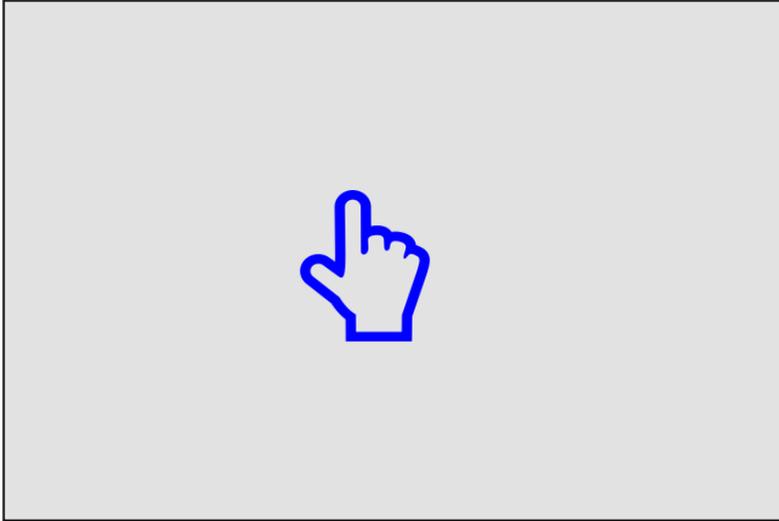


Fig. 8

When ready the above screen will appear - touch the screen. If the unit has not already been configured the following page will appear:

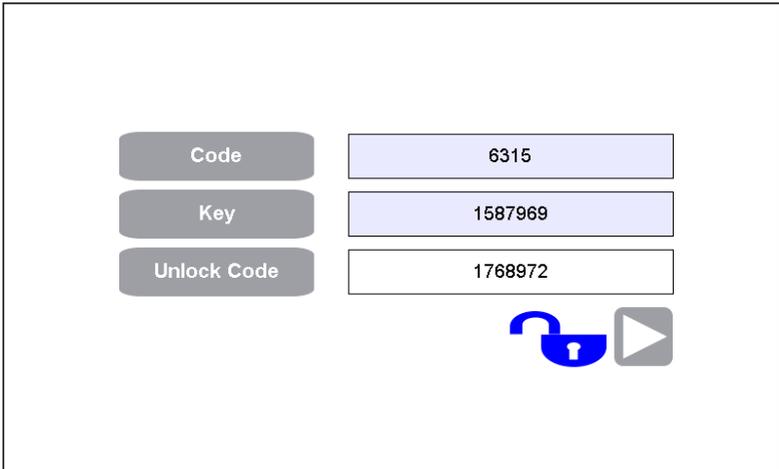


Fig. 9

To be able to move to next page the unlock code is essential, after entering the proper code (found on the software authentication document), the lock and the continue button will appear which will transfer you to the time / date setting page.

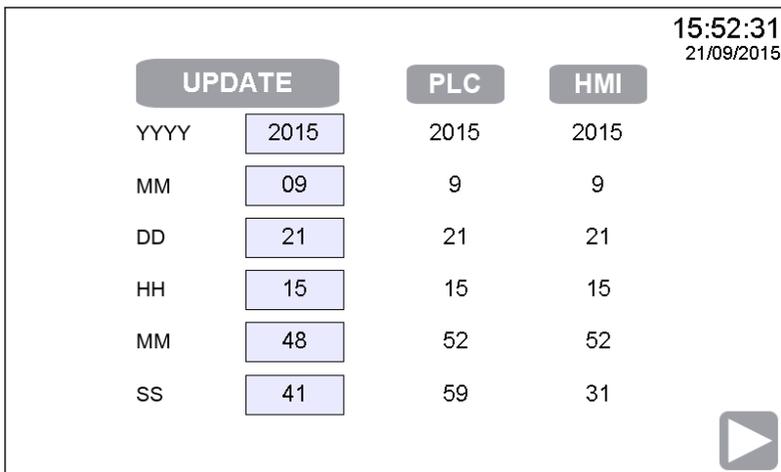


Fig. 10

After unlocking the system (by using the unlock code) and setting the time and date or if the unit has been returned to factory default one of the following four pages will appear (pre-configured for designated region):



Fig. 11



Fig. 12



Fig. 13

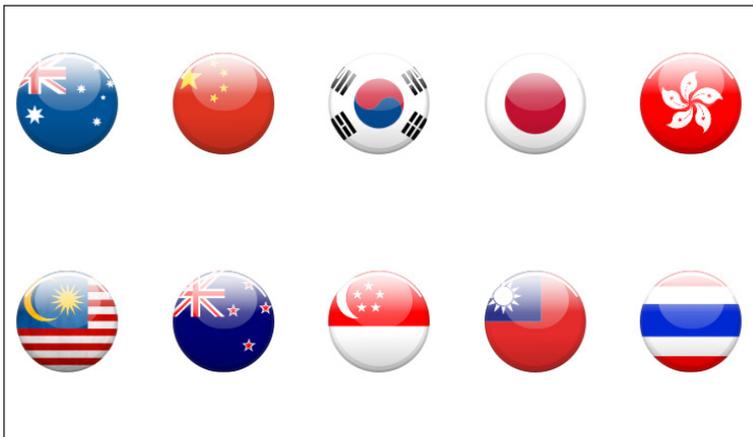


Fig. 14

By choosing the relevant flag for your Country the common default engineering units and language will automatically be selected for that region. These values can be changed after the initial commissioning set-up procedure has been completed (Section 4.4.3).

The system will advance automatically to allow the selection of the relevant packaged system unit - The type of packaged system unit that is available is dependent on the flag selection.

The next screen (Figure 15) requires confirmation of the heat exchanger installed.



Fig. 15

Select the appropriate heat exchanger as installed on the package. The selection shall be confirmed by the icon becoming highlighted with a red surround and a continue button shall be revealed.

System configuration is required on this page (retrofit option with no water return sensor selected). Selections are highlighted by a red surround to the icons.

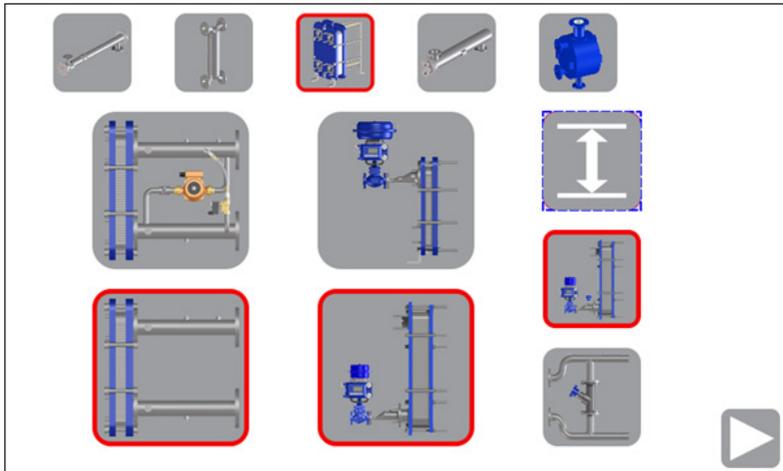


Fig. 16



Option to select differential control if water return sensor fitted.



Include condensate control temperature sensor (standard option)



Option to select bypass system.

The system configuration is now required to be entered on this page; again a selection is highlighted by a red surround around the icon.

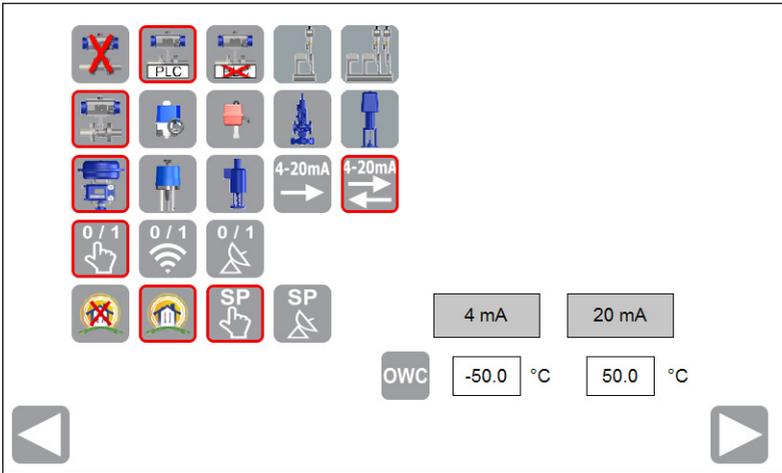


Fig. 17

The system configuration should match the mechanical configuration of the packaged system and control system of the plant, correct configuration will show or hide options that are available after configuration. Some of the screens may contain additional options which with specified configuration may be hidden; all the options are described in this document.

The packaged systems mechanical and control system configuration options are detailed below.

Fig. 18
High-limit selection



Not installed



PLC controlled



Independently controlled



Single safety interlock



Double safety interlock

Fig. 19
¼ turn actuator selection



BVA



PSA



Valpes



DP27E



EN12828

The packaged systems mechanical and control system configuration options continued:

Fig. 20 Linear actuator selection



Electrical



Pneumatic



Siemens

Fig. 21 Linear actuator control signals



No position
feedback



Position
feedback

Fig. 22 Enable control selection



Local



Remote



BACnet

Fig. 23 PID set point (Outside weather compensation)



Local



OWC



Local set
point



Remote
set point



BACnet

4.4 Global navigation buttons



Home
mimic



PID set
points



Settings
menu



Alarms menu



Trend
menu



Service
menu



4.4.1 Home mimic

This button will always navigate you back to the overview of the packaged system that has been selected and configured.

From this home screen the overall status and control of the packaged systems operation can be performed, depending on the security level access.

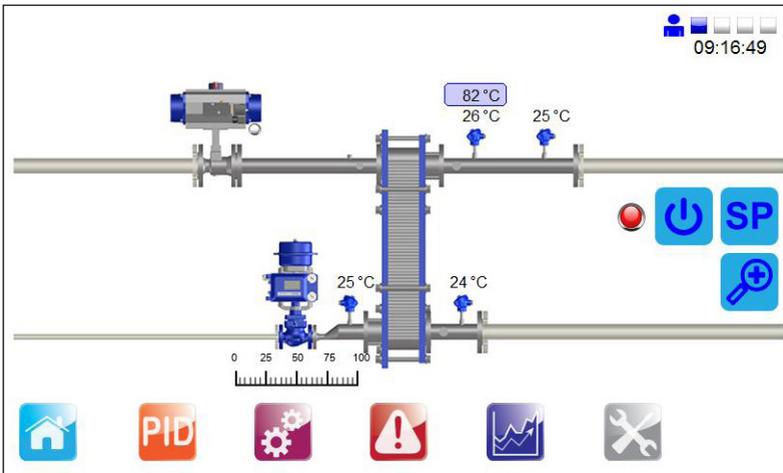


Fig. 24

Images shown below are dialogue pages that are only available for engineers access, which allow control over the valves, it is possible to enter those dialogs by pressing the screen surface at one of the unit devices (valves). This will allow the setting of the operation mode AUTO or MANUAL in which we are able to open/close the valves.

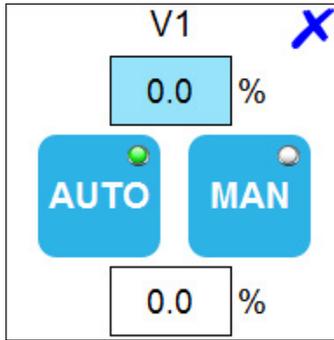


Fig. 25

V1 dialog page contains two value fields, the top one show the actual control valve position, and the lower one can be used to move the valve to requested position in manual mode.



Automatic Mode



Manual Mode

The light indicator shows what mode is selected.



PID set point

This pop-up menu allows the entry of the packaged system target PID set point and the associated ramp-up and ramp-down time bases.

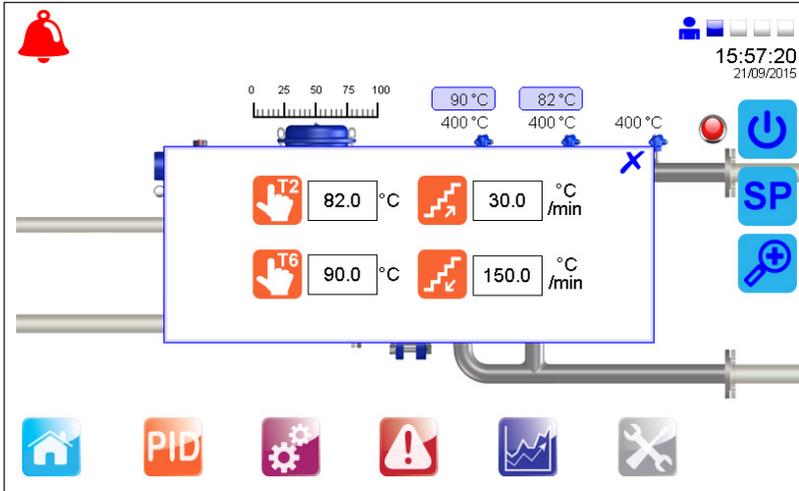


Fig. 26



Local temperature set point



Ramp-down temperature set point



Pre blended water temperature



BACnet temperature set point override with local temperature set point (DHW and BACnet selection only)



Outside weather compensation set points (Outside weather compensation only)



Ramp-up temperature set point



Enable control

This pop-up menu depending on the configuration, allows the user to select one of three control modes for the packaged system or view the remote or BACnet enable status. If the configuration were set to BACnet, it is possible to override the configuration and change it to local enable configuration.

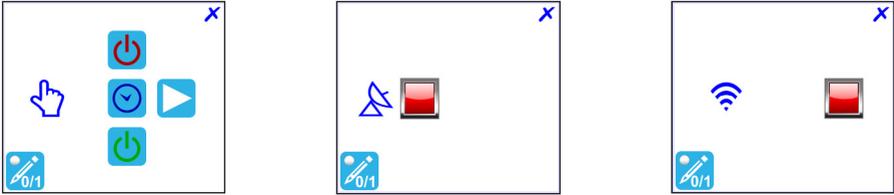


Fig. 27



The packaged system OFF mode



The packaged system timed mode



The packaged system ON mode



Timed mode set points (run schedule settings, HTG only)



Remote or BACnet the packaged system enable



BACnet enable override with local packaged system enable (BACnet selection only)



Zoom

The zoom pop-up provides a more detailed view of the key process parameters.

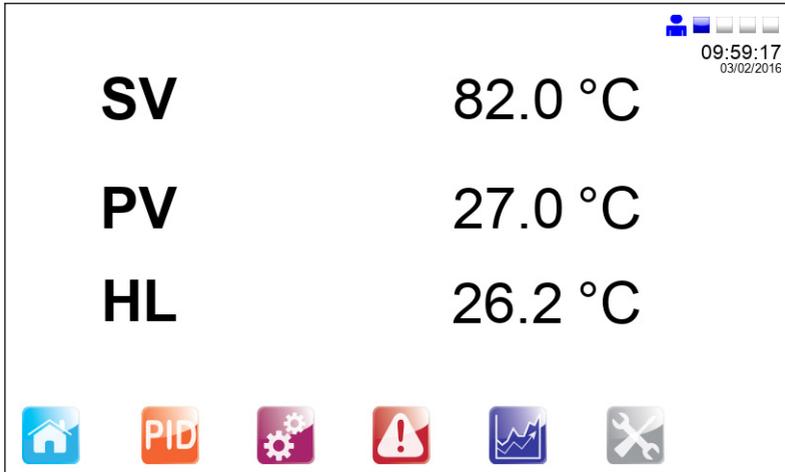


Fig. 28



4.4.2 PID set points

This page allows you to set the PID control factors (Changes at level 2 access).



Fig. 29



Proportional band
(P factor of the PID control)



Proportional gain
(P factor of the PID control)



Integral factor
(I factor of the PID control)



Derivative factor
(D factor of the PID control)



Set value
(local, remote or BACnet
set point)



Current value of the
controlled variable
(T2 temperature)



Manipulated value (valve
position request)



PID real time trend page
(Allows to configure the
PID set points with view of
the actual signals)



Current value of the controlled variable (T2 temperature)



Manipulated value (valve position request)



PID real time trend page
(Allows to configure the PID set points with view of the actual signals)



Outside weather compensation set points page
(Outside weather compensation only)

The following screen is accessible from PID Loop Set Points page (available only for engineers). We are able to switch between proportional band and proportional gain. Trend shows us PID loop real time responses. The SV, PV and CV values at PID Real Time Trend are scaled to percent.

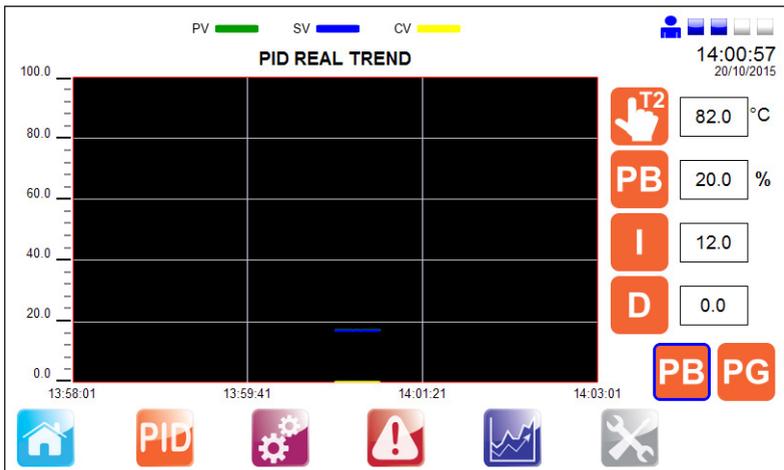


Fig. 30

The following page allows the outside weather compensation set points to be input. This can be accessed from PID Loop Set Point Page or from Set Points Dialog Page only for engineer level users.

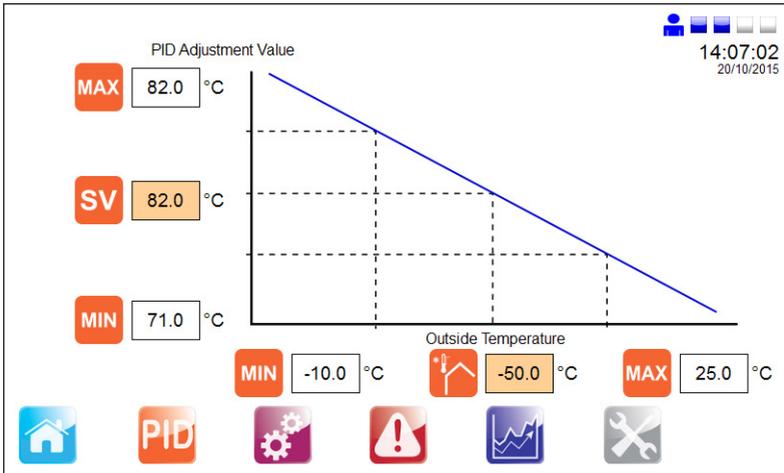


Fig. 31



4.4.3 Settings menu

The settings displayed (with blue surround) are default settings after the country flag has been selected, changes can be made if required.

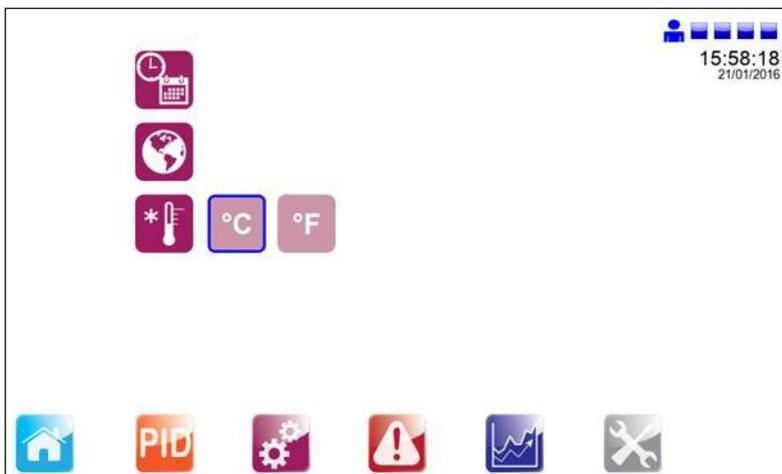


Fig. 32



Time / date configuration page



Language selection page



Temperature units selection

There is also the possibility of changing the language (from the pre-configured options) by using the following selection menu without affecting the engineering units:



Fig. 33

In addition, engineers are able to set or change the actual time and date for PLC and HMI.

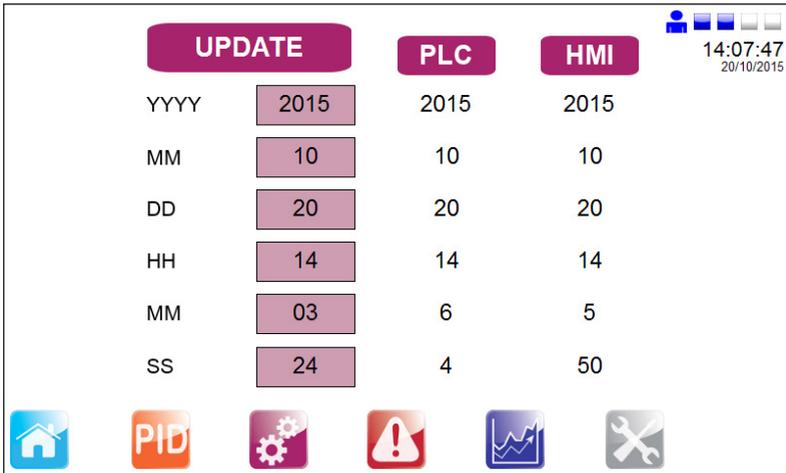


Fig. 34



4.4.4 Alarms menu

The following page shows all active alarms, an active alarm is indicated on all the mimic screens via the alarm bell in the top left hand corner of the screen.

State	Description	Date	Time
Triggered	Pre-Blended Water Temperature Over Range	03/02/2016	05:54:51
Triggered	V1 Position 4 - 20mA Under Range	03/02/2016	05:48:09
Triggered	T5 High Limit Alarm	03/02/2016	05:54:50

Fig. 35

There are also navigations to further alarm set point pages as well as the historical alarm list, located on the right of the display. Press each of them to view or alter.



High-limit alarm set point
(PLC controlled only)

95.0 °C

1 secs

High-limit temperature set point

High-limit temperature mask time



Band alarm

 °C

 secs

 secs

Band alarm temperature set point

Band alarm delay time set point

Band alarm reset time set point



Differential alarm (HTG only)

 °C

 °C

Temperature differential alarm set point

Temperature hysteresis set point



Reset high-limit alarm latch
(PLC controlled high-limit only)



Historical alarm page

Following page provides access to historical alarm list. This allows the user to view previously triggered alarms.

Alarm Time	Description	Alarm State
20/10/2015 13:16:34	TSI Independent High Limit 4 - 20 mA Under Range	Not Triggered
20/10/2015 13:16:36	Remote PID / Outside Weather 4 - 20mA Under Range	Not Triggered
20/10/2015 13:19:01	Remote PID / Outside Weather 4 - 20mA Under Range	Triggered
20/10/2015 13:19:01	TSI Independent High Limit 4 - 20 mA Under Range	Triggered
20/10/2015 13:19:16	TSI Independent High Limit 4 - 20 mA Under Range	Not Triggered
20/10/2015 13:19:17	Remote PID / Outside Weather 4 - 20mA Under Range	Not Triggered

Fig. 36



Alarms indication icon



Manual alarm indication icon



Caution - high-limit setting:

- If fitted, the high-limit controller should be set at a suitable level to protect plant, process and personnel.
- Care should be taken to ensure sufficient difference between the process set point and the high-limit set point, to avoid any unwanted high limit tripping.
- Check temperature rises to set value and controls satisfactorily.
- If necessary adjust PID settings. We would strongly recommend that only a suitably trained controls engineer adjust these parameters.
- Check operation of steam traps/condensate pump.



4.4.5 Trend menu

This menu provides historical trend monitoring of the process values, useful for analysing the historical reactions of the packaged system to process conditions.

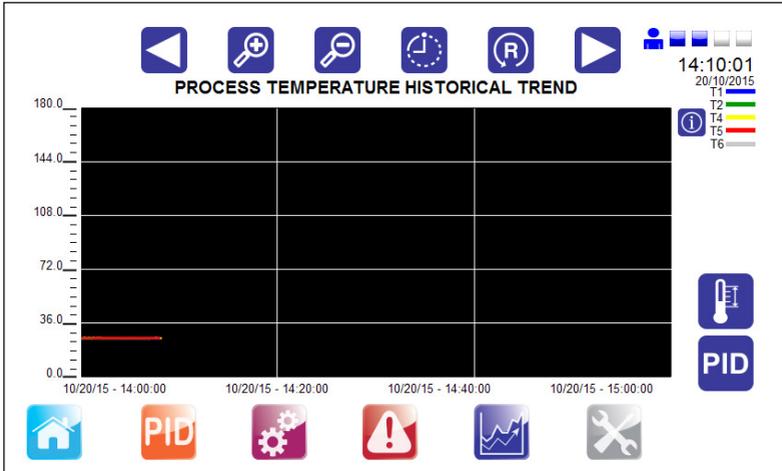


Fig. 37



Temperature trend page button



PID process trend page button



Scroll trend left



Zoom in trend



Zoom out trend



Move trend to actual position



Refresh trend



Scroll trend right



4.4.6 Service menu

The following page provides service information and allows engineering level users to navigate to pages containing process information.

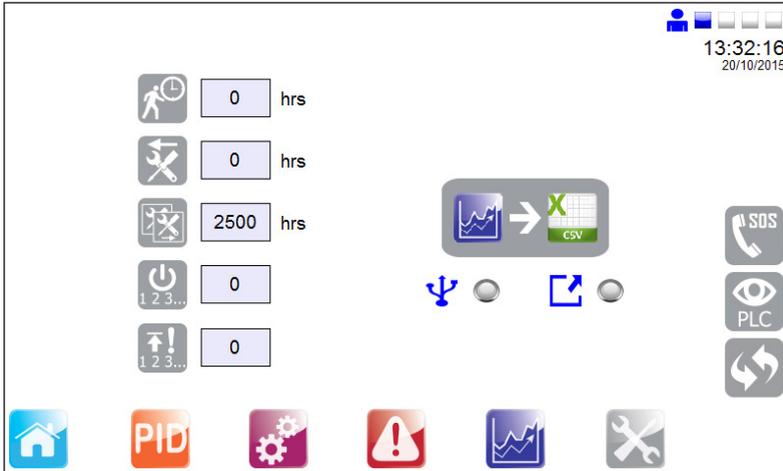
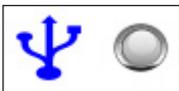


Fig. 38



Save trends to USB memory stick



This LED if green confirms that the memory stick is connected and the data format is correct (FAT32 only allowed).



This LED is switched on only during the trend dump, do not remove the memory stick before it is switched off or data may be lost.



Total unit runtime



Last service due at number of hours



Next service due at number of hours



Process enable event count



High-limit event count



Local Spirax Sarco engineer contact details dialog page



Hardware monitoring pages (input/output overview)



Restore commissioned set points



4.4.7 Hardware monitoring

The following pages provide only an overview of the input and outputs; it is not possible to set any set points.



Fig. 39

Figures 40, 41, 42 and 43 (on page 38) display the analogue input and output values.

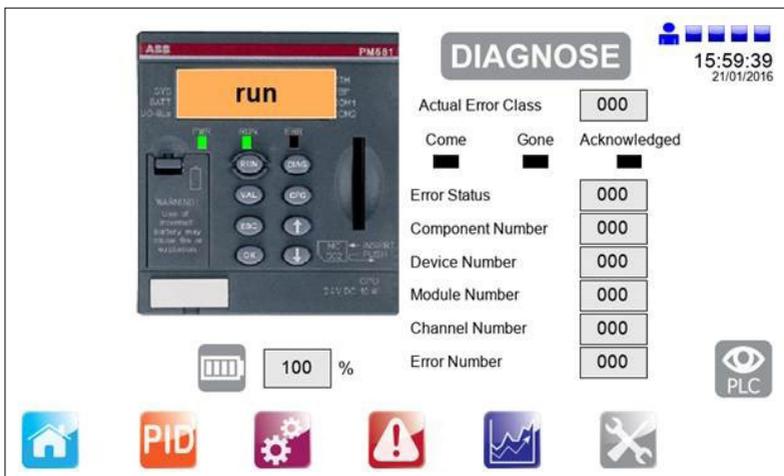


Fig. 40 PLC



Fig. 41 Digital Input

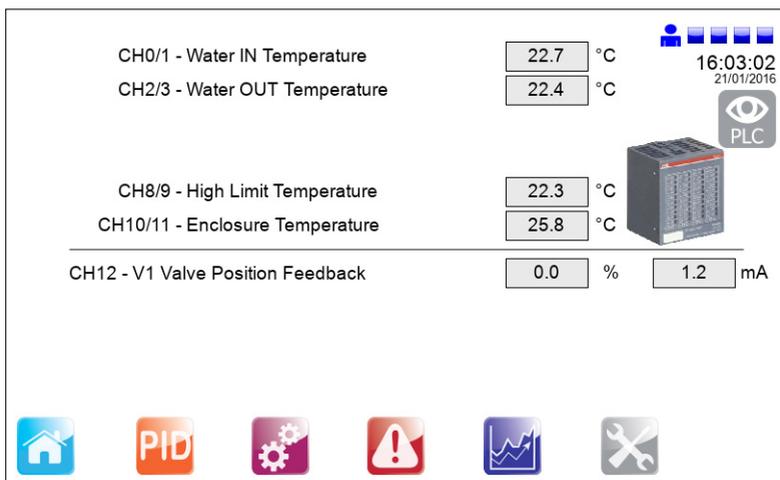


Fig. 42 Analogue inputs

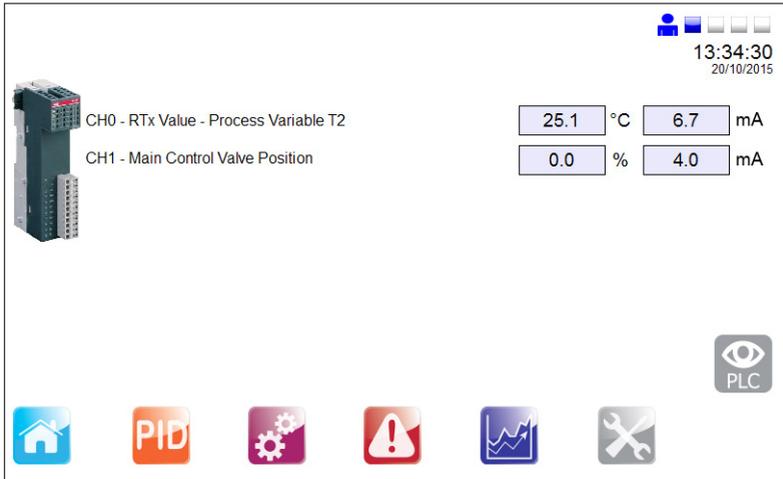


Fig. 43 (Analogue outputs)



Local Spirax Sarco engineer contact details dialog page

✕

Please Contact your local Spirax Sarco Agent, this can be found at www.spiraxsarco.com

Agent Name:

Spirax Sarco UK

Telephone:

00441242573342

Fig. 44

To finalise the mechanical commissioning of the system:

- Open all condensate drain valves.
- Slowly open the steam inlet valve.
- Monitor the process temperature to ensure that it is within the acceptable limits.

The packaged system unit is now ready for service.

5. Fault finding

Fault	Possible cause	Remidial action
Unit does not power up	Loss of incoming supply	Check incoming supply
	Internal fuse blown	Check all mains fuses F1 - F4 and Control fuses AF1, CF1 - CF7
Loss of 24 Vdc supply	Internal fuse blown	Check all mains fuses F1 - F3 and Control fuses CF1 - CF7
	Field wiring fault	Sequentially disconnect the field wiring for all 24 Vdc supplies to see if supply is restored
Loss of 24 Vac supply	Internal fuse blown	Check all mains fuses F1 and F2 and Control fuses AF1
PT100 signal not reading correctly (T1 - T5)	Field wiring fault	Check termination of 3 wire PT100 terminats (X1 - X5) and PT100 head
	Faulty PT100	Check compensated resistance
Remote set point is not showing correctly	Scaling value incorrect	Ensure that the minimum and maximum engineering units from the remote set point match those on the HMI (this data is found on the Spirax Sarco engineers 4-20 mA page)
	Polarity of 4-20 mA incorrect	Reverse polarity and wire as per electrical drawings
	No 4-20mA input detected.	Provide a 4-20mA input

6. Maintenance

Note: Before actioning any maintenance observe the 'Safety information' in Section 1.

6.1 General

For maintenance of the individual components that make up the system, please see the relevant product specific IMI's for the components concerned.

6.2 High-limit device testing

The purpose of the test is to ensure that the system operates satisfactorily when required to do so.

Method:

1. High-limit set point test - The set point of the high-limit controller should be lowered, to simulate a high temperature situation. Test personnel should ensure the high-limit device operates in a satisfactory manner.

2. Electrical power failure test - The unit should be turned off at the PLC controller switch to simulate power failure. Examination should be made to ensure the high-limit system has switched to its fail-safe mode, isolating the primary steam supply.

Frequency

It is essential that a competent person tests the high-limit device on a frequent basis. Intervals between tests should not exceed a six month period.

We do not recommend the installation of a self-acting high-limit control to the Spirax Easiheat™ system.

6.3 Scale formulation

Within open systems, where there is continual make-up water, there is a risk of scale formation. The extent of the scale will depend largely upon the water quality, which varies greatly from area to area. A test, conducted by a water treatment specialist, is recommended to determine the local water quality and whether problems are foreseen.

After extended service, the plate heat exchanger can be easily dismantled for cleaning. If scale becomes a persistent problem, regular chemical cleaning should be considered. ¼" ports are available on the secondary inlet and outlet piping to allow easy connection for CIP 'Clean in Place' apparatus. It should be noted that raising the steam pressure could result in an increase of scaling.