Glaxo Smith Kline Ltd.	
Royal Forest Factory, Coleford, Gloucestershire GL16 8JB	

Carbogel Pasteuriser

Functional Design Specification

Project:	**Carbogel Pasteuriser**		
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Equipment title	Pasteuriser		
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Revision History

The following revision system is utilised:

Revision "**P**"   (P1, P2, ... etc.) Preliminary issue, for TME/Customer design review.

Revision "**A**"   (A1, A2 ... etc.) Approved For Construction (AFC). The document at this stage is approved by the customer.

Revision "**B**"   As built

After the first issue, document revisions are indicated by a bar in the left margin against revised lines (Word compare feature).

Revision	Date	Initial	Description
P1	23rd May 2008	RAJ	Issued for Initial Review.
P2	27th June 2008	RAJ	Modified to incorporate design review 19th June 2008 comments. Incorporates rename of "Hot Divert" to "Under Pasteurisation", as per request 20th June 2008. Issued for approval.
A1	18th August 2008	RAJ	Modified to incorporate sequence tables and HMI screenshots.
B1	03rd September 2008	RAJ	Revised to "as built" status. Incorporates SV1 and CIP beacon.
B2	24th November 2008	RAJ	Added parameters "TTx2 Stabilisation Low" and "TTx2 Stabilisation High"

Document Holds

Hold	Date	Description
None		

Index

1 Introduction

This document has been produced by TME to detail the control phases required for the Carbogel Pasteuriser at GSK, Coleford.

1.1 Plant Overview

The system is to be started up and sterilised on water – changeover to product is to be a manual operation achieved by manipulating manual valves and moving hoses.

The system delivers product through the regeneration section of the pasteuriser, then through the heating section where it is heated to 92°C and held for 30 seconds. The carbogel is passed back through the regeneration section and is then cooled to 50°C in the cooling section. Once out of the cooling section, it is routed back to the feed vessel (cold divert) or forwards to the collection vessel.

After sterilisation has occurred, a low temperature seen at the end of the holding coil will trigger an under pasteurisation alarm (in lieu of a hot divert) which will ensure that forward is disabled until re-sterilised.

A CIP sequence is to be written, however will mainly be under manual control.

2   Software Structure

The code will be written to the S88.01 software structure and to the GAMP recommendations. This structure separates control to different tiers;

1. Control Modules (Lowest level – i.e. motor, valve or PID controller)

2. Equipment Modules (Group of Control Modules)

3. Phases (Sequences)

4. Procedures (Sequence of Phases)

5. Operations (Sequence of Phases or Procedures)

6. Process Cells (Highest Level – i.e. Line 3)

The Control and Equipment Modules are to be multiple call function blocks (FB's); where one block of code can be called many times for many instances of identical control. The control of motors, valves, PID loops and digital inputs are all done with the use of these aforementioned functions.

The software will be written using the ladder (LAD), statement list (STL) and GRAPH programming languages.

2.1   Control Modules

The following control modules will be configured:-

Tag	Type	Description
AV1	N/C Valve	COLD DIVERT VALVE
AV2	N/C Valve	STEAM ISOLATION VALVE
AV3	N/C Valve	CIP TANK CAUSTIC INLET VALVE
P1	DOL MOTOR	PRODUCT PUMP
P2	DOL MOTOR	HOT WATER PUMP
TTx2	AI	HOLDING TUBE OUTLET TEMPERATURE TRANSMITTER
TIC1	PID	COOLING TEMPERATURE CONTROLLER
TIC3	PID	HOT WATER TEMPERATURE CONTROLLER
ESR	DI	EMERGENCY STOP HEALTHY
MUTE	DI	SOUNDER MUTE PUSHBUTTON
LP1	DI	PRODUCT LOW LEVEL SWITCH
ALARM	DQ	AUDIBLE ALARM
CIP_BEACON	DQ	CIP BEACON ON PANEL TOP
SV1	DQ	P1 BYPASS VALVE SOLENOID

3   Parameters

A datablock will be configured holding all the following parameters, the sequences use these and also copy these to the control modules and equipment modules listed above.

All parameters in this section are to be of type REAL.

Declaration	Description
TIC3 CIP Setpoint	Setpoint (°C) that the CIP phase moves to the hot water temperature controller.
CIP Temperature OK	CIP temperature healthy setpoint (°C).
TIC3 Sterilisation Setpoint	Setpoint (°C) that the sterilisation phase moves to the hot water temperature controller.
Sterilisation Temperature OK	Sterilisation temperature healthy setpoint (°C).
TIC3 Production Setpoint	Setpoint (°C) that the production phase moves to the hot water temperature controller.
Under Pasteurisation Setpoint	If TTx2 drops below this setpoint (°C) after sterilisation, forward is inhibited until the system has been re-sterilised (restart required). This is because there is no Hot Divert valve/route.
TIC1 Setpoint	Setpoint (°C) that the production phase moves to the outlet temperature controller.
Cold Divert Cooler Deviation	Divert to Hoyer Feed tank if TIC1.DEV (absolute) > this SP
Cold Divert Heater Deviation	Divert to Hoyer Feed tank if TIC2.DEV (absolute) > this SP
TTx2 Stabilisation Low	Stabilisation of TTx2 complete when within band
TTx2 Stabilisation High	Stabilisation of TTx2 complete when within band

All parameters in this section are to be of type TIME.

Declaration	Description
Pre Rinse Divert	Duration to pre rinse to cold divert
Pre Rinse Forward	Duration to pre rinse to forward
CIP Time Divert	Duration to CIP Cold Divert
CIP Divert Overtime	Sequence Overtime Alarm – CIP Cold Divert
CIP Time Forward	Duration to CIP Forward pipework
CIP Forward Overtime	Sequence Overtime Alarm – CIP Forward
Post Rinse	Duration to post rinse
Post Rinse AV1 Divert	During post rinse, AV1 toggles to rinse both routes, this defines the pulse duration to divert.
Post Rinse AV1 Forward	During post rinse, AV1 toggles to rinse both routes, this defines the pulse duration forward.
Sterilisation Time Divert	Duration to Sterilise Cold Divert
Sterilisation Time Forward	Duration to Sterilise Forward pipework
CIP Dose Time	Duration to open AV3 during make-up.
SV1 Pulse On Time	Duration to pulse SV1 On
SV1 Pulse Off Time	Duration to pulse SV1 Off

4 Control Breakdown

4.1 Manual Mode Interlocks

The interlocks detailed in this section are implemented to protect the plant in manual mode.

When an interlock is broken, the device is disabled automatically and an alarm detailing the interlocked control module is raised.

Control Module	Type	Description	Interlock
P1	DOL Motor	PRODUCT SUPPLY PUMP	LP1 Uncovered

4.2 CIP Sequence

Prior to start-up, the CIP tank is to be manually rinsed out, filled with water and have both outlet points coupled. The divert hose and the forward hoses are to be routed to drain. The operator ensures that both CIP tank outlet manual valves are closed and opens the manual water inlet valve.

Provided all the control modules are healthy and LP1 is covered (alarm only enabled when P1 running), the CIP sequence can be started from the HMI. If any control modules go into alarm while the sequence is running, the sequence is held until the alarm state is cleared.

Pump P1 is started and water is flushed around the pasteuriser to drain at the cold divert hose as in the relaxed state, AV1 will be to cold divert (fail safe). A timer with preset of "Pre Rinse Divert" is started.

Once the "Pre Rinse Divert" timer has elapsed; AV1 is activated and water is flushed to drain via the forward hose. A timer with preset of "Pre Rinse Forward" is started.

Once the "Pre Rinse Forward" timer has elapsed; AV1 is deactivated and P1 is stopped.

An HMI message is raised prompting the operator to close the water inlet valve, open both CIP tank outet valves and to couple both divert and forward hoses to the CIP tank.

Once the operator confirms the actions; P1 is started, AV2 is opened, TIC3 is enabled at "TIC3 CIP Setpoint" and P2 is started.

While the system is warming, an HMI message is raised prompting the operator to check the integrity of the system, dose chemicals and confirm. 2 pushbuttons are displayed on the HMI, "DOSE" and "CONFIRM". Should the operator press "DOSE", AV3 is opened and a timer of preset "CIP Dose Time" is started. Once the timer elapses, or if the operator presses the "DOSE" button again, AV3 is closed. The operator tests the strength of the CIP solution and if required adds more water or doses more chemicals. Once content with the strength, the operator presses the "CONFIRM" button.

Once confirmed, the cold divert route is being cleaned. While TTx2.PV and TIC1.PV are greater than parameter "CIP Temperature OK" a non retentive timer of preset "CIP Time Divert" is started.

If this step is active for a duration of "CIP Divert Overtime" then an alarm is raised, no action is taken by the control system.

Once timer "CIP Time Divert" elapses; AV1 is activated – the forward route is now being cleaned. While TTx2.PV and TIC1.PV are greater than parameter "CIP Temperature OK" a non retentive timer of preset "CIP Time Forward" is started.

If this step is active for a duration of "CIP Forward Overtime" then an alarm is raised, no action is taken by the control system.

Once timer "CIP Time Forward" elapses; P1 is stopped, AV1 is deactivated, TIC3 is disabled, AV2 is closed and P2 is stopped.

An HMI message is raised prompting the operator to open the CIP tank drain, close both CIP tank outlet valves and to open the water inlet valve. Once the CIP tank has drained, the operator is prompted to pulse in turn both CIP tank outlet valves to back flush caustic from the seats to drain via the CIP tank.

Once the operator confirms the actions; P1 is started and AV1 is pulsed according to parameters "Post Rinse AV1 Divert" and "Post Rinse AV1 Forward" – the system is being flushed to drain via the CIP tank. A timer of preset "Post Rinse" is started.

Once timer "Post Rinse Forward" elapses, the CIP is complete.

SV1 is pulsed using parameters "SV1 Pulse On Time" and "SV1 Pulse Off Time" during pre-rinse, caustic and post rinse steps.

When the CIP sequence is running, the CIP beacon is illuminated.

4.2.1 CIP Sequence Table

Text shown with ~~strikethrough~~ is not intended to be deleted, it is an aid to show which outputs / actions have been stopped or discontinued on this step.

Text shown in green are new outputs / actions on this step and are always added to the bottom of the cell.

Step No.	Outputs / Actions	Step-on Conditions	Comments
1		All control modules healthy & automatic **&&** LP1 Covered **&&** Start pushbutton pressed	Sequence Idle
2	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.SV1_PULSE	Step Time > parameter "Pre-Rinse Divert"	Pre Rinse Divert
3	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.SV1_PULSE VALVE_DB.AV1.REQ	Step Time > parameter "Pre-Rinse Forward"	Pre Rinse Forward
4	CIP_BEACON ~~MOTOR_DB.P1.AUTO_START~~ ~~VALVE_DB.P1.SV1_PULSE~~ ~~VALVE_DB.AV1.REQ~~	Operator Confirms Message	HMI Message "Close the water inlet valve, open both CIP tank outlet valves and to couple both divert and forward hoses to the CIP tank"
5	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START	Operator presses "DOSE", go to step 6. Operator Confirms Message, go to step 7.	Heat HMI Message "Check the integrity of the system, dose chemicals and confirm"
6	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START VALVE_DB.AV3.REQ	Step Time > parameter "CIP Dose Time" OR Operator presses "DOSE", go to step 5.	Dose Caustic
7	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START	AI_DB.TTx2.PV **&&** PID_DB.TIC1.PV **>=** parameter "CIP Temperature OK"	CIP Divert – Heating If step active for > parameter "CIP Divert Overtime" raise alarm. No action.

Step No.	Outputs / Actions	Step-on Conditions	Comments
8	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START VALVE_DB.SV1_PULSE	AI_DB.TTx2.PV **OR** PID_DB.TIC1.PV **<** parameter "CIP Temperature OK", go to step 7. Step Time > parameter "CIP Time Divert", go to step 9.	CIP Divert
9	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START VALVE_DB.P1.SV1_PULSE VALVE_DB.AV1.REQ	AI_DB.TTx2.PV **&&** PID_DB.TIC1.PV **>=** parameter "CIP Temperature OK"	CIP Forward – Heating If step active for > parameter "CIP Forward Overtime" raise alarm. No action.
10	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START VALVE_DB.AV1.REQ VALVE_DB.SV1_PULSE	AI_DB.TTx2.PV **OR** PID_DB.TIC1.PV **<** parameter "CIP Temperature OK", go to step 9. Step Time > parameter "CIP Time Forward", go to step 11.	CIP Forward
11	CIP_BEACON MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 CIP Setpoint" MOTOR_DB.P2.AUTO_START VALVE_DB.AV1.REQ VALVE_DB.P1.SV1_PULSE	Operator Confirms Message	HMI Message "Open the CIP tank drain, close both CIP tank outlet valves and to open the water inlet valve, confirm when drained".
12	CIP_BEACON	Operator Confirms Message	HMI Message "Pulse in turn both CIP tank outlet valves to back flush caustic from the seats to drain via the CIP tank, confirm when done".
13	CIP_BEACON MOTOR_DB.P1.AUTO_START Pulse VALVE_DB.AV2.REQ as per parameters "Post Rinse AV1 Divert" & "Post Rinse AV1 Forward". VALVE_DB.SV1_PULSE	Step Time > parameter "Post Rinse" – go to step 1.	Post Rinse

4.3   Production Sequence

Following CIP, both inlet points and the divert and forward hoses will be coupled to the CIP tank, and it's drain valve will be open. The operator opens the water inlet manual valve.

Provided all the control modules are healthy, the first pass alarm is false and LP1 is covered (alarm only enabled when P1 running), the Production sequence can be started from the HMI. If any control modules go into alarm while the sequence is running, the sequence is aborted.

No operator hold is available on this sequence.

Pump P1 is started and water is flushed around the pasteuriser to the CIP tank drain via the cold divert hose as in the relaxed state, AV1 will be to cold divert (fail safe). A timer with preset of "Pre Rinse Divert" is started.

Once the "Pre Rinse Divert" timer has elapsed; AV1 is activated and water is flushed to drain via the forward hose. A timer with preset of "Pre Rinse Forward" is started.

Once the "Pre Rinse Forward" timer has elapsed; AV1 is deactivated.

An HMI message is raised prompting the operator to close the CIP tank drain valve; water will be delivered to the CIP tank via the pasteuriser. The operator closes the water inlet valve and opens both CIP tank outlet valves once sufficient water level is achieved in the CIP tank.

Once confirmed, AV2 is opened, TIC3 is enabled at "TIC3 Sterilisation Setpoint" and P2 is started – the cold divert route is now being sterilised. While TTx2.PV and TIC1.PV are greater than parameter "Sterilisation Temperature OK" a non retentive timer of preset "Sterilisation Time Divert" is started.

> *Once the "Sterilisation Time Divert" timer has elapsed; the "Under Pasteurisation Alarm" is enabled. After this point, if the temperature seen at TTx2 drops below parameter "Under Pasteurisation Setpoint" the "Under Pasteurisation Alarm" is raised and forward production is disabled. The only way to re-enable forward production is to restart and re-sterilise. If the alarm occurs before stabilisation, the pasteuriser is stepped back to re-sterilise the cold divert, however if after stabilisation, the sequence stays running but forces cold divert – to permit the operator to exchange with water to recover the product back to the feed Hoyer before shutting down.*

AV1 is activated and sterilisation water is circulated via the forward hose. While TTx2.PV and TIC1.PV are greater than parameter "Sterilisation Temperature OK" a non retentive timer of preset "Sterilisation Time Forward" is started.

Once "Sterilisation Time Forward" timer has elapsed; parameter "TIC3 Production Setpoint" is moved to TIC3's setpoint and TIC1 is enabled at parameter "TIC1 Setpoint". The pasteuriser begins stabilisation.

Once TIC1 absolute deviation has stabilised to below parameter "Cold Divert Cooler Deviation", TIC3 absolute deviation has stabilised to below parameter "Cold Divert Heater Deviation" and TTx2.PV is between parameters "TTx2 Stabilisation Low" and "TTx2 Stabilisation High", the system is stabilised and in forward production on water. Provided the TIC's stay within deviation limits and the under pasteurisation alarm remains false, the operator may freely toggle between forward and divert from the HMI. If a TIC deviation occurs, or as detailed above an under pasteurisation alarm occurs; AV1 is forced to cold divert and the operator can no longer select forward.

The operator waits for the CIP tank to cool to circa 50°C. The operator then closes one leg of the CIP tank outlet (both ends), removes it and couples it to the feed Hoyer. The operator removes the cold divert hose from the CIP tank (currently in forward) and points it to drain.

> *For the following steps, until the pasteuriser is charged and settled in divert, it may be pertinent to expand the deviation setpoints on both the heater and cooler loops to prevent automatic divert/forward while manually manipulating hoses and purging the pasteuriser. This will still revert to divert on the under pasteurisation alarm. This cannot be automated as the PLC does not know what is happening.*

The operator selects cold divert, then opens the feed Hoyer outlet valves, closes the remaining CIP tank outlet valve and de-couples the forward hose from the CIP tank and points it to drain.

Once carbogel begins to exit the cold divert hose (tested by a hand held brix refractometer) the operator selects forward, then couples the cold divert hose to the feed Hoyer.

Once carbogel begins to exit the forward hose (test with a hand held brix refractometer is not required) the operator selects cold divert, then couples the forward hose to the collection Hoyer. The system is stabilised and in production on carbogel.

When the level in the feed Hoyer drops to nearly empty, the operator can add a new feed Hoyer or perform a "run out". To "run out", the operator exchanges product in the pasteuriser with water from the CIP tank, which should still be warm enough not to cause an under pasteurisation alarm.

SV1 is pulsed using parameters "SV1 Pulse On Time" and "SV1 Pulse Off Time" during pre-rinse, and sterilisation steps.

4.3.1 Production Sequence Table

Text shown with ~~strikethrough~~ is not intended to be deleted, it is an aid to show which outputs / actions have been stopped or discontinued on this step.

Text shown in green are new outputs / actions on this step and are always added to the bottom of the cell.

Step No.	Outputs / Actions	Step-on Conditions	Comments
1		All control modules healthy & automatic **&&** LP1 Covered **&&** Start pushbutton pressed	Sequence Idle
2	MOTOR_DB.P1.AUTO_START VALVE_DB.SV1_PULSE	Step Time > parameter "Pre-Rinse Divert"	Pre Rinse Divert
3	MOTOR_DB.P1.AUTO_START VALVE_DB.SV1_PULSE VALVE_DB.AV1.REQ	Step Time > parameter "Pre-Rinse Forward"	Pre Rinse Forward
4	MOTOR_DB.P1.AUTO_START ~~VALVE_DB.P1.SV1_PULSE~~ ~~VALVE_DB.AV1.REQ~~	Operator Confirms Message	HMI Message "Close the CIP tank drain valve; water will be delivered to the CIP tank via the pasteuriser. Close the water inlet valve and open both CIP tank outlet valves once sufficient water level is achieved in the CIP tank"
5	MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Sterilisation SP" MOTOR_DB.P2.AUTO_START	AI_DB.TTx2.PV **&&** PID_DB.TIC1.PV **>=** parameter "Sterilisation Temperature OK" **&&** "Under Pasteurisation Alarm" FALSE	Heat If jumped to this step from steps 7, 8 or 9 then the "Under Pasteurisation Alarm" needs to be reset before stepping on and retrying.
6	MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Sterilisation SP" MOTOR_DB.P2.AUTO_START VALVE_DB.SV1_PULSE	AI_DB.TTx2.PV **OR** PID_DB.TIC1.PV **<** parameter "Sterilisation Temperature OK", go to step 5. Step Time > parameter "Sterilisation Time Divert", go to step 7.	Sterilise Divert
7	MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Sterilisation SP" MOTOR_DB.P2.AUTO_START ~~VALVE_DB.P1.SV1_PULSE~~ VALVE_DB.AV1.REQ Enable "Under Pasteurisation Alarm"	AI_DB.TTx2.PV **&&** PID_DB.TIC1.PV **>=** parameter "Sterilisation Temperature OK", go to step 8. If "Under Pasteurisation Alarm" raised, go to step 5	Heat "Under Pasteurised Alarm" raised if enabled and AI_DB.TTx2.PV < "Under Pasteurisation Setpoint". This may only be reset when disabled, i.e. steps 1-6.

Step No.	Outputs / Actions	Step-on Conditions	Comments
8	MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Sterilisation SP" MOTOR_DB.P2.AUTO_START VALVE_DB.AV1.REQ Enable "Under Pasteurisation Alarm" VALVE_DB.SV1_PULSE	AI_DB.TTx2.PV **OR** PID_DB.TIC1.PV **<** parameter "Sterilisation Temperature OK", go to step 7. Step Time > parameter "Sterilisation Time Forward", go to step 9. If "Under Pasteurisation Alarm" raised, go to step 5	Sterilise Forward
9	MOTOR_DB.P1.AUTO_START VALVE_DB.AV2.REQ PID_DB.TIC3.LOOP_ENABLE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Sterilisation SP" MOTOR_DB.P2.AUTO_START VALVE_DB.AV1.REQ Enable "Under Pasteurisation Alarm" VALVE_DB.P1.SV1_PULSE PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Production SP" PID_DB.TIC1.LOOP_ENABLE PID_CONFIG_DB.TIC1.AUTO_SP;= "TIC1 SP"	PID_DB.TIC1.DEV **<** "Cold Divert Cooler Deviation" **&&** PID_DB.TIC3.DEV **<** "Cold Divert Heater Deviation" **&&** Both TIC1 & TIC3 setpoint ramps are complete **&&** AI_DB.TTx2.STATUS.PV > "TTx2 Stabilisation Low" **&&** AI_DB.TTx2.STATUS.PV < "TTx2 Stabilisation High" go to step 10. If "Under Pasteurisation Alarm" raised, go to step 5	Stabilisation

10	MOTOR_DB.P1.AUTO_START
	VALVE_DB.AV2.REQ
	PID_DB.TIC3.LOOP_ENABLE
	MOTOR_DB.P2.AUTO_START
	VALVE_DB.AV1.REQ *
	Enable "Under Pasteurisation Alarm"
	PID_CONFIG_DB.TIC3.AUTO_SP;= "TIC3 Production SP"
	PID_DB.TIC1.LOOP_ENABLE
	PID_CONFIG_DB.TIC1.AUTO_SP;= "TIC1 SP"
	
	* Interlock Conditions for AV1
	VALVE_DB.AV1.REQ is interlocked by the SFC if ANY of the following conditions are true:-
	   • Under Pasteurisation Alarm
	   • Operator Selects Divert
	   • PID_DB.TIC1.DEV **>=** "Cold Divert Cooler Deviation"
	   • PID_DB.TIC3.DEV **>=** "Cold Divert Heater Deviation"
		Operator Selects End, go to step 1.	Production
			
			If "Under Pasteurisation Alarm" is raised, it is not possible to reset on this step (see above). The operator must recover product, end the sequence and restart the pasteuriser.

4.4   Miscellaneous Logic

Any new alarm will raise an alarm sounder, and will pop up an alarm on the HMI. Either pressing the mute pushbutton or acknowledging the alarm on the HMI will cause the sounder to stop sounding.

When LP1 raw digital signal is uncovered but the debounced status is still covered while P1 is running, the alarm sounder is blipped. This informs the operator that P1 will imminently become interlocked and enter a fault state. This tells the operator, for instance, to switch feed Hoyers.

5 TP277 HMI

The HMI is a Simatic TP177B 6" colour touchscreen. The HMI connects to the S7313C over MPI. The following pages will be configured:-

1) Start Screen

2) Main Menu

3) Alarm Summary

4) Alarm pop-up & indicator triangle

5) Parameter Pages (see section 3, above)

6) CIP Control Page

7) Production Control Page

8) Mimic Page

9) Faceplate pages – providing manual control

10) Trend pages

11) Admin page (Shut down to WindowsCE, calibrate touchscreen, user admin etc…)

5.1 User Groups & Access Rights

The following user groups and access rights will be configured.

Access Right	Users	Engineers	Administrators
Monitor	Yes	Yes	Yes
Operate	Yes	Yes	Yes
Manual Control		Yes	Yes
Parameter Modification		Yes	Yes
Administration			Yes

One Administrator account will be shipped with the HMI so that GSK can add or remove users, engineers or administrators as required.
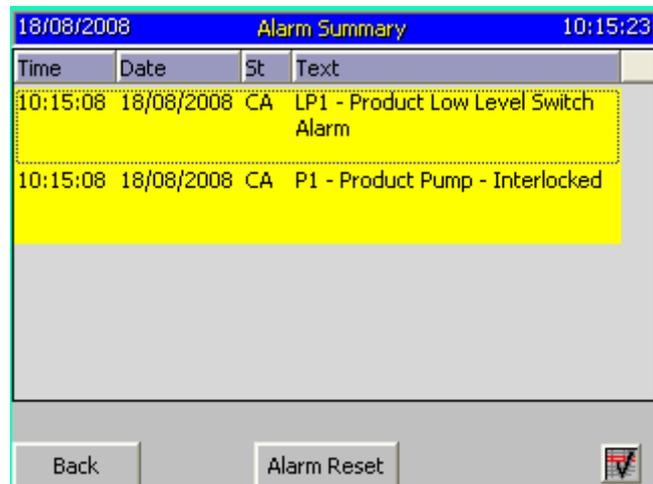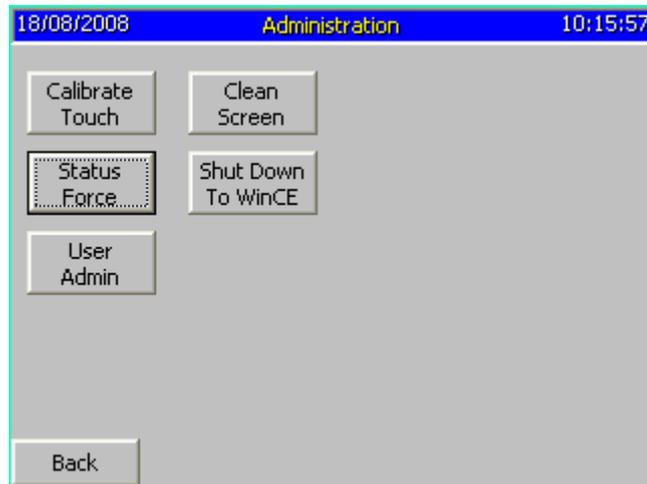
5.2 Screenshots
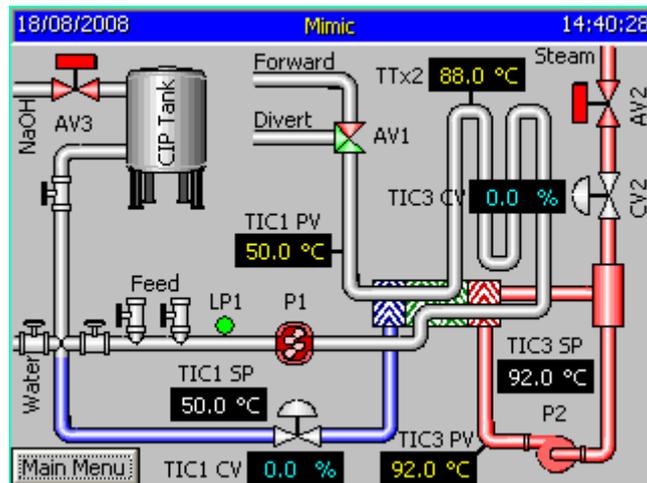
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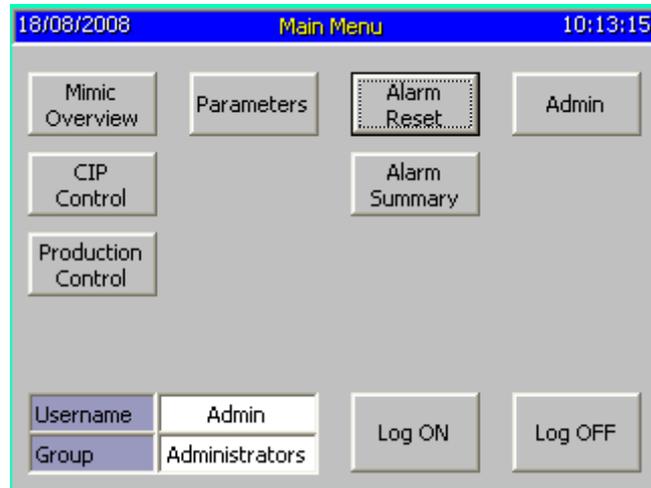
Parameter Page 1 of 3
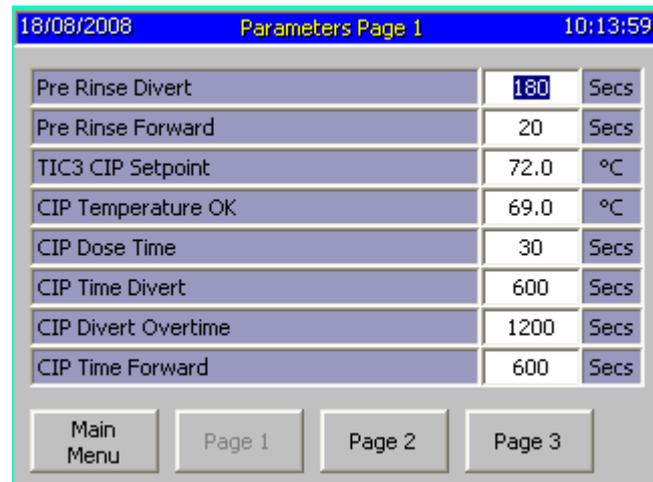
Alarm Summary Screen

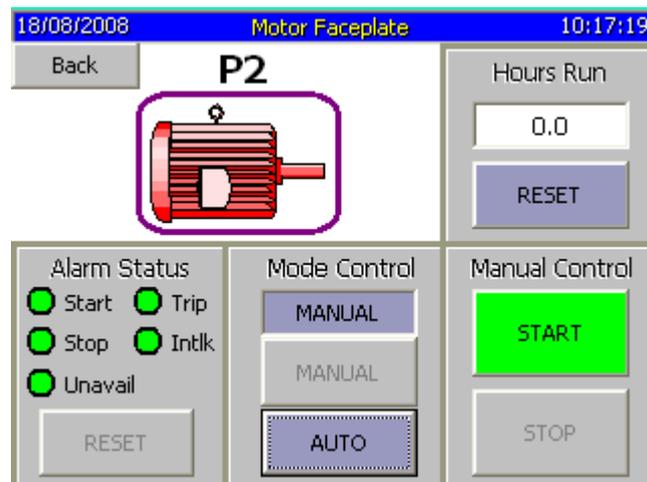Admin Screen

Mimic Overview

Motor Faceplate

Trend View

CIP Control Page - Idle

CIP Start/Run Permissive Page

CIP Control Page – Running (172 seconds remaining – counts down)

18/08/2008	CIP Control	10:19:36

Control & Status

START · ABORT · HOLD · Alarm Reset

2 | Pre Rinse Divert | 172

Permissives

Main Menu · ● Run/Hold · Details

CIP Control Page – Message

18/08/2008	CIP Control	14:42:51

Control & Status

START · ABORT · HOLD · Alarm Reset

5 | Heat

Check OK to add chemicals - then press DOSE
Dosing will run until timer elapses or
DOSE is pressed again.
Confirm dosed when complete.

CONFIRM · DOSE

Permissives

Main Menu · ● Run/Hold · Details

Production Control Page – Idle

18/08/2008	Production Control	10:21:59

Control & Status

START · ABORT · Alarm Reset

1 | Sequence Idle

Permissives

Main Menu · ● Run · Details

Production Control Page – Forward

AV1 is deactivated to divert if any of the AV1 forward interlocks become true, this is indicated by a red lamp, as shown below.

Or interlocked by deviation: