

Tetra Therm[®] Aseptic Flex 1 TPOP-E



WARNING Read and follow all safety precautions before working on or near this equipment.

Read all safety precautions throughout this manual and on safety signs attached to this equipment. Failure to follow all safety precautions could result in death or serious injury.



Copyright © 2004 Tetra Pak Group

All rights reserved. No part of this document may be reproduced or copied in any form or by any means without written permission from Tetra Pak Dairy & Beverage Systems AB

A Tetra Pak and all Tetra Pak products are trademarks belonging to the Tetra Pak Group.

The content of this manual is in accordance with the design and construction of the machine or equipment at the time of publishing. Tetra Pak reserves the right to introduce design modifications without prior notice.

This document was produced by:

Tetra Pak Dairy & Beverage Systems AB Ruben Rausings gata S-221 86 LUND Sweden

Additional copies can be ordered from Tetra Pak Parts or the nearest Tetra Pak office. When ordering additional copies, always provide the document number. This can be found in the machine specification document. It is also printed on the front cover and in the footer on each page of the manual.

Doc. No. OM-1218635-0101

Issue 2005-02

This manual is valid for:

Series No./ Machine No.

Sign.

OM Operation Manual

Tetra Therm[®] Aseptic Flex 1 TPOP-E

Tubular heat exchanger

- 1 Introduction
- 2 Safety Precautions
- 3 General Description
- 4 Process Description
- 5 Control Panel
- 6 Alarm and Troubleshooting
- 7 Preparations
- 8 Operation
- 9 Care and Cleaning

Doc. No. OM-1218635-0101

Issue 2005-02

\land Tetra Pak

Tetra Pak Dairy & Beverage Systems AB

Valid for:

1 Introduction



Equipment 1 - 5
Intended Use of This Tetra Pak Equipment 1 - 5
Service 1 - 5
Manufacturer 1 - 5
Unit Identification 1 - 5
Document 1-6
Operation Manual (OM)
Design Modifications
Further Copies 1 - 6



Equipment

Intended Use of This Tetra Pak Equipment

This unit is intended for use according to the specifications in **Technical data** (see **Technical Manual**) and related documents. All other use is prohibited.

Tetra Pak will not be held responsible for injury or damage if the equipment is used for any other purpose.

Service

If problems are encountered when operating the unit, contact the nearest Tetra Pak service station.

Manufacturer

This Tetra Pak equipment was produced by:

Tetra Pak Dairy & Beverage Systems AB Ruben Rausings gata S-221 86 LUND Sweden

Unit Identification

All units carry a machine plate stating:

- unit identification
- data unique to the unit

Have this information available before contacting Tetra Pak concerning this particular unit.



Document

Operation Manual (OM)

The purpose of this Operation Manual is to provide the operator with information on how to operate the machine.

Tetra Pak recommend that you study it carefully, and - above all - ensure its availability to those who will be operating the unit.

Furthermore, it is important that you:

- keep the manual for the life of the equipment
- pass the manual on to any subsequent owner or user of the equipment.

Tetra Pak will not be held responsible for any breakdown of the equipment caused by the owner's failure to follow the instructions given in this manual.

Design Modifications

The information given in this document is in accordance with the design and construction of the machine at the time it was delivered by the Tetra Pak machine production facility.

Further Copies

Additional copies can be ordered from the nearest Tetra Pak service station.

When ordering technical publications, always quote the **document number** printed on the front cover of the document concerned.

2 Safety Precautions



Safety Messages Description 2 - 5
Personnel Requirements 2 - 6
Skilled Person 2 - 6
Instructed Person 2 - 6
Safety Signs 2 - 7
Locations of Safety Signs
Safety Devices
Emergency Stop 2 - 10
EMERGENCY STOP Push-Buttons
Safeguards 2 - 12
Warning Lamp 2 - 13
Personal Protection 2 - 14
Noise Hazard 2 - 14
Entanglement Hazard 2 - 14
Hazardous Materials 2 - 15
Supply Systems 2 - 16
Electrical Cabinet 2 - 16
Socket Outlet 2 - 17
Power Supply 2 - 18
Air Supply
Steam Supply
Water Supply 2 - 19



Safety Messages Description

A safety message is always accompanied by a safety alert symbol and a signal word.

This is the **safety alert symbol**. It is used to alert about potential personal injury hazards. To avoid hazards, obey all safety messages that follow this symbol.

The following safety alert symbols and signal words are used in this manual to inform the user of hazards.

DANGER

Danger indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Warning indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Caution indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION

Caution without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Personnel Requirements

Note! Personnel includes all persons working on or near this equipment.

Only skilled or instructed persons are allowed to work with this equipment.

Skilled Person

A skilled person must have relevant education and experience to enable him or her to identify hazards, analyse risks, and avoid hazards which electricity, machinery, chemicals, other energies, and supply systems on this equipment can create.

Skilled persons must meet local regulations, such as certifications and qualifications for working with electricity, mechanical systems, and so on.

Instructed Person

An instructed person must be adequately advised or supervised by a skilled person. The skilled person enables the instructed person to identify hazards, analyse risks, and avoid hazards which electricity, machinery, chemicals, other energies, and supply systems on this equipment can create. Safety Signs



WARNING

Damaged or missing safety signs increase the risk of death or serious injury.

Replace all missing or damaged safety signs immediately.

There are two types of safety sign

- ISO signs are used worldwide
- ANSI signs are used in the United States only

The table shows all safety signs that are located on this equipment.

Note! The position numbers (Pos.) in the table refer to the positions in the illustration(s) in the <u>Locations of Safety Signs</u> section.

Pos.	ISO sign	ANSI sign	
1			Moving parts can crush and cut. Do not operate with guard removed. Follow lockout procedure before maintenance.
	Moving parts can Do not operate with Follow lockout prod	crush and cut. h guard removed. cedure before maintenance.	
2			WARNING Hazardous noise. Risk of impaired hearing. Wear hearing protection.
	Risk of impaired he Wear hearing prote	earing. ection.	
3			Chemical burn hazard. Wear personal protective equipment.
	Chemical burn ha Wear personal pro	zard. tective equipment.	

Pos.	ISO sign ANSI sign
4	Hot surface. Do not touch. Follow lockout procedure before maintenance
5	Follow locked procedure below maintenance. Image: Constraint of the second se

Locations of Safety Signs

Note! Make sure that each safety sign is undamaged and in its correct position after installation and maintenance. Replace all missing or damaged safety signs immediately.

The illustration shows where the safety signs are located. The position numbers refer to the table in the <u>Safety Signs</u> section.



Safety Devices

WARNING Unshielded hazards.

Never inch or run this equipment if any safety device is inoperative.

Change inoperative components of the safety system immediately.

Hazardous Voltage.

Activating a safety device, such as pressing an EMERGENCY STOP push-button or opening a door, does not disconnect the power supply from this equipment.

Emergency Stop

Emergency stop devices are used to stop this equipment immediately in an emergency. Learn the positions of all emergency stop devices and how to use them.

Instructions for a normal production stop are included in the Stop chapter of the Operation Manual.

EMERGENCY STOP Push-Buttons

Push one of the EMERGENCY STOP push-buttons to stop this equipment immediately.

The illustration shows an EMERGENCY STOP push-button. The location of each EMERGENCY STOP push-button is shown by an arrow.





Safeguards

Moving machinery.

Never defeat or bypass the interlocking devices.

All movable guards, such as doors and covers, leading to hazardous areas are fitted with interlocking devices, usually electric safety switches. These devices are part of the safety system and must never be defeated, bypassed, or otherwise made inoperative.



Burn hazard.

Parts of this equipment protected by safeguards may be thermally hot after operation.

After installation and maintenance, and before this equipment is inched or run, check that all safeguards are in place and that they operate correctly.

CAUTION

Equipment damage.

Never stop this equipment by opening a movable guard.

The location of each movable guard is shown by an arrow.





Warning Lamp

A warning lamp is a column of warning lights:

- Red light (1) indicates that the machine is emergency stopped
- Yellow light (2) flashes when an abnormal condition occurs, an impending critical condition calling for action by the operator
- Green light (3) indicates a normal condition, such as production

Note! For a complete list of alarms, see the Operation Manual.

The light stops flashing and remains lit when the alarm is acknowledged. After the fault is corrected or the operator takes the appropriate action, the warning light turns off.



Personal Protection

This section applies to all personnel at all times when this equipment is in operation. For special personal protection required when handling hazardous materials, see the <u>Hazardous Materials</u> section.

Noise Hazard



Hazardous noise.

Risk of impaired hearing. Wear hearing protection whenever this equipment is in operation.



Hazardous noise.

Risk of impaired hearing. Hearing protection is recommended whenever this equipment is in operation.

Entanglement Hazard



Risk of entanglement.

Do not wear jewellery or loose clothing when working on or near this equipment. Long hair may not be loose.







WARNING

Contact with chemicals can cause death, serious injury, and illness.

Always follow the chemical manufacturer's instructions when handling chemicals.

Make sure that

- the showers work
- an eyewash device, movable or wall-mounted, is available and • operational
- additional washing facilities are nearby

Note! Learn the locations of all washing facilities in order to act immediately in case of an accident.







Supply Systems

Electrical Cabinet



Hazardous voltage.

Will shock, burn, or cause death.

The power supply disconnector must be switched off and secured with a lock before maintenance inside the electrical cabinet.

Note! The key to the lock must be removed by the technician and retained in his/her possession until all work is completed.

Make sure that the electrical cabinet doors are closed after working inside the electrical cabinet. Doors with lock must be locked.

The location of each electrical cabinet is shown by an arrow.





Socket Outlet



The illustrations show the socket outlet (1) and the residual current device. Their locations in the electrical cabinet (2) are shown by arrows.



Power Supply



Hazardous voltage and moving machinery.

The power supply disconnector must be switched off and secured with a lock before any maintenance.

Note! The key to the lock must be removed by the technician and retained in his/her possession until all work is completed.

Certain maintenance procedures may require power supply systems to be on. These exceptions are clearly stated in the Maintenance Manual.

The illustration shows the power supply disconnector. The arrow shows its location on this equipment.



NOTE: The lock is not a part of the delivery



Air Supply

Compressed air and moving machinery.

Close the main air valve and secure it with a lock before any maintenance.

Note! The key to the lock must be removed by the technician and retained in his/her possession until all work is completed.

Certain maintenance procedures may require air supply systems to be on. These exceptions are clearly stated in the Maintenance Manual.

Steam Supply



Hot steam can cause scalds.

Pressurized steam can be discharged unexpectedly. Close the steam supply valve and secure it with a lock, depressurize and vent all steam safely before any maintenance on parts with steam, such as pipes and valves.

Note! The key to the lock must be removed by the technician and retained in his/her possession until all work is completed.

Certain maintenance procedures may require steam supply systems to be on. These exceptions are clearly stated in the Maintenance Manual.

Hot parts can cause severe burns.

Pipes, valves, and other parts containing steam can be extremely hot. Do not touch hot parts.

Water Supply

Water under pressure.

Close the water supply valves before any maintenance.

Certain maintenance procedures may require water supply systems to be on. These exceptions are clearly stated in the Maintenance Manual.



3 General Description



Introd	duction	3 - 5
	Applications	3 - 5
	Operator's Working Area	3 - 5
	Risk Area	3 - 5
	Main Components	3 - 6
	Manual Valve Operation Guide	3 - 7



Introduction

This chapter will give a survey of the plant under the following headlines:

- Applications
- Operator's work station
- Risk area
- Main components
- Manual valve operation guide

Applications

Aseptic processing module for indirect UHT treatment in tubular heat exchangers of milk, juice, tea, soy milk.

Operator's Working Area

Mainly in the front of the control panel, see figure below.

Risk Area

One metre around the equipment due to:

- hot pipes and equipment
- jets of hot liquid, steam and cleaning solution



Main Components

Note! All manually operated valves and all gauges are clearly marked with numbers.



Main components

- 1 Feed module with control panel
- 2 Deaerator (option)
- 3 Tetra Alex homogeniser, M6
- 4 Tetra Spiraflo tubular heat exchanger

Manually valves and gauges: Regulating valve V62 Regulating valve V63 Butterfly valve V15:1 Butterfly valve V15:2 Regulating valve V26 Change-over valve V76 Pressure gauge PI04, at holding cell

Pressure gauge PI01, before homogeniser Pressure gauge PI03, after homogeniser Pressure gauge PI07, product pressure to filling machine


Manual Valve Operation Guide



This page intentionally left blank



4 Process Description

This page intentionally left blank



Introduction 4	- 5
Process Cycle	l - 5
Working Principle 4	- 6

This page intentionally left blank



Introduction

This chapter will give an easy to grasp description of the plant.

The way of function is described by means of a flow chart, which is adapted to give a clear picture and may not include all details.

The plant may be designed for direct filling to the packaging machines or filling via an aseptic storage tank. The main difference is that by direct filling, there is always surplus product returning from the packaging machines to the product balance tank, whereas by filling via storage tank all product goes to the tank.

Process Cycle

The process cycle is divided into the following phases:

- Sterilisation loop
- Production
- Aseptic intermediate cleaning
- Stop
- Cleaning





Working Principle

The Tetra Therm Aseptic Flex is sterilised by circulating hot water for 30 minutes. After sterilisation the plant is cooled down step by step to production temperatures. Finally sterile water is circulated through the product circuit.

A production run starts with filling the plant with product via the balance tank. The product displaces the water/product mix to drain or reject tank. When a filling machine is ready, production can start.

If product supply fails or a stop at a filling machine occurs, sterile water replaces the product and the plant goes into circulation.

The product is regeneratively preheated in the Tetra Spiraflo tubular heat exchanger before being homogenised in a Tetra Alex homogeniser.

Final heating takes place in the tubular heat exchanger. The product is then held in a holding tube for the required period of time. Regenerative cooling to packaging temperature. Product regenerative with corrugated tubes.

Final heating is performed by means of an indirect hot water circuit. The regenerative is performed in Tetra Spiraflo MTR tubular heat exchangers with product to product regenerative.

In order to prolong the production period between full CIP (Cleaning In Place), an Aseptic Intermediate Cleaning (AIC) can be performed. The AIC can be performed with either lye or flushing acid detergent.

After each production run the plant is cleaned with both lye and acid.

5 Control Panel

This page intentionally left blank



Denomination 5 - 5
Operator's Panel 5 - 6 Basic Principle 5 - 6 Access code levels 5 - 7
Menu Tree Overview 5 - 8
Buttons and Symbols on the Screen Pictures .5 - 9Navigation Buttons
Menu Screen Pictures
Indication/Push-button
Symbols on the Screen Pictures
Data Indication/Navigation
General Indications on Set Point Buttons 5 - 13
Overview Picture 5 - 14
Indication/Push-button
Operating Menu 5 - 15
Indication/Push-button
Start Check Picture 5 - 16
Indicator/Push-button
Process Value Picture 5 - 17
Indication/Push-button
Process Values
Transmitter Values
Alarm List
Indication/Push-button
Indication/Push-button
Select Pen Picture 5 - 20

Indication/Push-button
Product Selection Menu 5 - 21
Indication/Push-button
Service Menu 1 5 - 22
Indication/Push-button
Service Menu 2
Indication/Push-button
Force I/O Menu 5 - 24
Indication/Push-button
Activation Picture 5 - 25
Indication/Push-button
M2 (Option) 5 - 26
Indication/Push-button
M6 (Option) 5 - 27
Indication/Push-button
Temperature Guard (TSL42) 5 - 28
Indication/Push-button
Temperature Guard (TSL71) 5 - 29
Indication/Push-button
PID Menu 5 - 30
Indication/Push-button
PID Parameter Picture 5 - 31
Indication/Push-button
Keyboards 5 - 32
Integer Numbers 5 - 32
Floating Point Numbers
Alphanumerical Keyboard

Denomination



- 1) Temperature recorder
- 2) Operator panel, type TPOP-E
- 3) Emergency stop button (total stop)
- 4) Steam selector
- 5) Main switch
- 6) Warning lamp (green) continuous light; function in operation, flashing light; operator action required or function stopped (cleaning),
- 7) Alarm lamp (yellow) flashing light; unacknowledged alarm continuous light; acknowledged alarm
- 8) Emergency stop engaged, red light

Operator's Panel

Basic Principle

The Tetra Therm Aseptic Flex is controlled by a Programmable Logical Controller (PLC). This PLC contains several sequences which controls the execution of the necessary programs for running production, cleaning, etc.

The necessary number of controllers (regulators) are also integrated into the PLC to control the analog sub-processes, such as level, pressure and/or temperature controls.

A Human Machine Interface (HMI) is used as the link between PLC, Tetra Therm Aseptic Flex and the operators. By means of the HMI the operator can enter the necessary commands, enter various process and system parameters and obtain information about system status. It is possible to retrieve information about the current step of the system and which sequence is active. Alarms are shown on this unit if abnormal conditions occurs. (Cont'd)

Access code levels



Access levels to operator's panel are divided into two groups:

- Operators have access to level 0 and 1, see table below
- Supervisors have access to level 0, 1 and 2, see table below

Access code status:	Allows to:
0 = No user	-View and choose among all the menus -View and see all values -Alarms, trends -Start and stop sequences -Select Product/Capacity -Take away historic alarms
1 = Operator	All possibilities as for No user (0)
2 = Supervisor	All possibilities as for No user (0) and also: -Change parameters -Run controllers in manual mode -Force I/O -Change set points for PID:s & Guards -Set CIP memory

Menu Tree Overview



5 - 8 (34)



Not selected

Selected

Buttons and Symbols on the Screen Pictures

Buttons are squares with 3D effect.

Buttons can be:

- Navigation buttons.
- Function buttons.
- Process buttons
- Dialogue buttons



Navigation Buttons

Navigation buttons always call up a different screen picture.Example shows navigation button for calling up the Process value picture, see page <u>5-17</u>.

Function Buttons

The operator can select certain machine functions by pushing one of these buttons. Different colour codes on the symbols indicate different status.



Example shows **function button** for Cooler:

- 1) Not selected and not selectable
- 2) Not selected and selectable
- 3) Connected but not selected, selectable
- 4) Selected but not correctly connected, selectable

- 5) Connected but not selected, not selectable (Remote control)
- 6) Selected but not correctly connected, not selectable (Remote control)
- 7) Selected and correctly connected, selectable
- 8) Selected and correctly connected, not selectable

Process Buttons

Push button position

	Not selectable	Selectable	Selectable and pressed
Idle Process phase Not selected			
Que Process phase Selected but not yet active			
Held Process phase Active but paused			
Run Process phase Selected and active			



Dialogue Buttons

These are used to perform different operations in dialogue windows, such as validating or cancelling any commands.

Example shows dialogue button to Start and Stop a function.



Menu Screen Pictures

Note! Following indications and push-button are represented several of the presented screen pictures.



Indication/Push-button

- 1) Date and time
- 2) Screen name
- 3) Current user
- 4) Current recipe
- 5) Any output forced
- 6) Any controller in manual mode
- 7) Local/Remote indication (only Local mode is available)
- 8) Alarm indication. Press to bring up the ALARM LIST, see page 5-18
- 9) Status indication for CIP
- 10) Status indication for AIC (Aseptic Intermediate Cleaning)
- 11) Status indication for Shutdown
- 12) Status indication for Empty to drain
- 13) Status indication for Production
- 14) Status indication for Pre-sterilisation/Sterile water circulation

(*Cont'd*)

(Cont'd)

- 15) Current step
- 16) Remaining time
- 17) Exit/Return to previous screen
- 18) Go to SERVICE MENU, see page <u>5-22</u>
- 19) Go to PRODUCT SELECTION MENU, see page 5-21
- 20) Go to TREND DIAGRAM, see page 5-19
- 21) Go to ALARM LIST, see page <u>5-18</u>
- 22) Go to PROCESS VALUE SCREEN, see page 5-17
- 23) Go to OPERATING MENU, see page 5-15
- 24) Go to OVERVIEW PICTURE, see page 5-14
- 25) Alarm banner

Symbols on the Screen Pictures

The symbols 7-12 on the illustration on the previous page inform about the operating / functioning modes of the machine at any given time.

The illustration below shows the four different modes for the process PRE-STERILISATION.



- 1) Production phase Idle, not selected
- 2) Production phase Running, selected and active
- 3) Production phase Held, active but paused
- 4) Production phase Queued, selected but not yet active **Note!**

Data Indication/Navigation



Data is indicated by a navigation button with data field showing the current value.



General Indications on Set Point Buttons

When the field under the set point value on the set point button is green, this set point is active. When it's grey, the set point is not active. See example below.



Overview Picture



- 1) Steriliser filled with product
- 2) AFM/Alsafe indication Ready/Production, see explanation below.







- 1) Sterile water
- 2) Production
- 3) Stop sequence
- 4) Flush to drain
- 5) Product supply pump
- 6) CIP lye + acid
- 7) Lye cleaning
- 8) AIC (Aseptic Intermediate Cleaning) lye
- 9) AIC (Aseptic Intermediate Cleaning) lye + acid
- 10) Include dearator (optional)
- 11) Extra cooler I (optional)
- 12) Holding cell 30s (optional)
- 13) Bring up the START CHECK PICTURE, see page 5-16

3 4 8 7 User: Tetra Pak 1 Start check 04-08-16 18:21:40 X A 1 A 9 B PID 2、 5 6 11 F 📾 | IO | |<u>S</u> Þ G

Start Check Picture

Indicator/Push-button General Start Conditions

- 1) All controllers in Auto
- 2) All EMERGENCY STOP released
- 3) All toggle switches in Auto
- 4) Connection and selection match
- 5) Steam selector ON
- 6) No alarms: low level balance tank (LL BTD), air pressure or temperature fault.

Pre-sterilisation Start Conditions

- 7) CIP memory
- 8) CIP dosing pipes connected outside the balance tank

CIP/AIC Start Conditions

9) CIP dosing pipes connected in to the balance tank

Process Value Picture

		3 /	4
A	/	/	
04-08-16 16:48:46	Proc. value /	User: Tetra Pak 1	E
TI01	PC04 - 4.3 bar	×M2 ← 0.0×	
T102 ← 20.5°C	LC32 - 67.3×		
T103 ← 30.3°C	РТ32А — 1.8 bar	×M6 ← 0.0×	
TC44 <u>+ 123.4 °C</u>	РТ32В 🕂 1.4 bar	%044 → 0.0%	
TSL42 - 140.6 °C			
T106 ← 29.3°C			
TSL71 ← 146.5 °C	TC64 - 150.2 °C	Zul	4
TSL830 + 117.2 °C	1109 ← 89.8°C		ΙΎ
		F166 01/h	
- 			C C
		l	
	2	5	

Indication/Push-button

- 1) Temperature process value
- 2) Temperature Hot water circuit process values
- 3) Process values
- 4) Analogue Out values
- Recommended Hot water flow Green symbol indicates ramp of product flow. Adjust hot water flow slowly with V62 to the recommended flow.

Process Values

-----0 kg/h

Process value indicator: The measured value is indicated.

Transmitter Values

Transmitter values can be viewed only:

LT = Level transmitter

- TT = Temperature transmitter
- PT = Pressure transmitter

Alarm List



This picture shows a complete alarm list which means that the alarm picture will vary depending on the configuration of the Tetra Therm Aseptic Flex module.

- 1) Alarm indication
 - Red colour indicates active alarm, not acknowledged
 - Yellow colour indicates active alarm, acknowledged
 - Green colour indicates history
- 2) Toggle Date and Time on/off indication
- 3) Erase Alarm list
- 4) Acknowledge alarm
- 5) Go one page back (20 rows)
- 6) Go one row back
- 7) Go one row forward
- 8) Go one page forward (20 rows)

Trend Diagram



Indication/Push-button

- 1) Trend curve
- 2) Analogue value for one of the pens
- 3) Select which value to display

The colour of the push-button corresponds to the colour of the pen in the trend diagram. For example, to select a variable for the red pen -push the red push-button. This will bring up the SELECT VARIABLES PICTURE, see page 5-20.

Select Pen Picture

	04-08-16 18:33:36 Select pen User: Tetra Pak 1	١
1	 X	
	TI01 TSL71 FT66	<u>N</u> a
2		
	PT04	B
	T109	.
	TSL42	$\overline{\mathbb{V}}$
	TIC44	$\overline{}$
	TIC64	\geq
		0
		0

- 1) Selected pen colour
- 2) Select analogue value to trend

Product Selection Menu



- 1) Product selection
- 2) The steriliser can be configured for either filling machine selection AFM or capacity selection CAP. Only one of these is visible at a time (in this picture AFM).
- 3) Production to Alsafe selection (option)

Service Menu 1



- 1) Select language
- 2) Set CIP memory
- 3) Log in (enter password)
- 4) Log out
- 5) Change password
- 6) ERASE program on backup memory card
- 7) LOAD program from backup memory card
- 8) SAVE program on backup memory card
- 9) Go to I/O FORCE MENU, see page 5-24
- 10) Go to ACTIVATION PICTURE, see page 5-25
- 11) Go to SERVICE MENU 2, see page 5-23

Service Menu 2

1	_	04-08-16 18:18:17	Service menu	User: Tetra Pak	1
2	_	Register 0			
3		Value 0			În
4		New Value 0	∇		
4					
		$\mathbf{i} = \mathbf{i} \mathbf{i} \mathbf{i} \mathbf{i} \mathbf{i} \mathbf{i} \mathbf{i} \mathbf{i}$			17
		1			
					↓ ↓
					\triangleright
5					
		~			
		न IO 🗠		- & _	
			6		

- 1) Select register to edit/view
- 2) Current register values displayed
- 3) Enter new register value
- 4) Press to transfer the new value to the selected register in PLC
- 5) Go to SERVICE MENU 1, see page <u>5-22</u>
- 6) Go to I/O FORCE MENU, see page <u>5-24</u>

Force I/O Menu



Indication/Push-button

- 1) Selected I/O card
- 2) Selected output number
- 3) Selected object
- 4) Current status
- 5) Select force to low status
- 6) Select force to high status
- 7) Send the force command to the PLC

Note! As soon as you leave the Force I/O Picture all forces will be disabled.

Activation Picture

	04-08-16 18:37:11	Activations	User:	Tetra Pak	1	e
1	Activations				×	
'	M02 M04 M05 M06 M09 M11	M12 M13 Y82	22 1823			ीत
	V13. U14 U19 U20 U20 U23	U24 U25 U27 U28 U2	9 032 03	i4 V44 V48		
2	U51 U55 U59 U63	5 U64 U66 U74 U75 U7	8	V94		
						↓ ↓ ↓
						\square
	2					
	a 10 E 🗖			& _	₹ _	ۍ ۲ 0

When a motor or valve is activated the corresponding symbol will light up.

Indication/Push-button

- 1) Motor symbol
- 2) Valve symbol

Note! Grey indication - not activated object. Green indication - activated object.



The pump M2 is controlling the product flow.

Indication/Push-button

- 1) Bar graph and numeric display of the current speed for M2
- 2) Increase
- 3) Decrease

Note! As for pump M2, available pictures exists for pump M4 (flow in CIP Option).



- 1) Bar graph and numeric value of the current speed for M6
- 2) Increase
- 3) Decrease

Temperature Guard (TSL42)



Set points and parameter values can be changed. Pressing the corresponding button will bring up the NUMERIC KEY PAD, see page 5-32.

Indication/Push-button

- 1) Bar graph of the current set point of the temperature guard
- 2) Bar graph of the current input signal to the temperature guard
- 3) Numeric value of the current input signal to the temperature guard
- 4) Numeric value of the current set point of the temperature guard
- 5) Indication and setting of set point for product 1
- 6) Indication and setting of set point for product 2
- 7) Indication and setting of set point for product 3
- 8) Indication and setting of set point for product 4
- 9) Indication and setting of set point for product 5
- 10) Indication and setting of sterilising temperature high temp. products
- 11) Indication and setting of sterilising temperature low temp. products
- 12) Indication of current set point value

Note! High temperature product if set point TIC44 \ge 100 °C. Low temperature product if set point TIC 44 < 100 °C.


Temperature Guard (TSL71)

Indication/Push-button

- 1) Bar graph of the current set point of the temperature guard
- 2) Bar graph of the current input signal to the temperature guard
- 3) Numeric value of the current input signal to the temperature guard
- 4) Numeric value of the current set point of the temperature guard
- 5) Indication and setting of sterilising temperature, high temp. products
- 6) Indication and setting of sterilising temperature, low temp. products
- 7) Indication and setting of cooling down step 21, temperature guard production preparation
- 8) Indication and setting of high temperature CIP for high temp. products
- 9) Indication and setting of high temperature CIP for low temp. products
- 10) Indication and setting of low temperature CIP

Note! High temperature product if set point TIC44 \ge 100 °C. Low temperature product if set point TIC 44 < 100 °C.

PID Menu



Indication/Push-button

- 1) Controller name
- 2) Scale for process value (PV) and set point (SP)
- 3) Process value bar graph
- 4) Set point bar graph
- 5) Output bar graph
- 6) Scale for output
- 7) Process value numeric value
- 8) Set point numeric value
- 9) Output numeric value
- 10) The controller is running
- 11) Set the controller into manual mode
- 12) Trend curve. Press on the screen to bring up historic values.
- 13) Go to PID PARAMETER PICTURE, see page 5-31

PID Parameter Picture



Indication/Push-button

- 1) Controller name
- 2) Running set point (SP)
- 3) Set points 1-16
- 4) Running P-value (gain) at selected controller
- 5) Running I-value (integration time) at selected controller
- 6) Running D-value (derivation time) at selected controller
- 7) Indication and setting of PID parameters

Note! All parameter values are possible to change by pressing the corresponding value on the screen.

Keyboards

Different operator commands will bring up different keyboards on the screen.

Integer Numbers

The keyboard in the illustration below will be brought up on the screen if the operator for example wants to choose an integer number.

<u>0</u>			GF508539
7	8	9	ESC
4	5	6	<-
1	2	3	CLR
-	0		DEL
«	»	<	L

Floating Point Numbers

The keyboard in the illustration below will be brought up on the screen if the operator for example wants to change a floating point number.

0				GF508540
7	8	9	Ĥ	ESC
4	5	6	В	<-
1	2	3	С	CLR
-	0		D	DEL
**	»	Е	F	۲۷

Alphanumerical Keyboard

The keyboard in the illustration below will be brought up on the screen if the user for example wants to log in.



By pressing the key "a-z" (2) the operator brings up the keyboard in the illustration below.

_								
a	b	С	d	е	f	g	h	ESC
i	j	k	1	m	n	O	p	<-
q	r	s	t	u	U	ω	x	CLR
y	z	å	ä	ö				DEL
A-Z	0-9	SPC			**	»	<	-

By pressing the key "0-9" (1) the operator brings up the keyboard in the illustration below.

_								
<	>	:	;	#	7	8	9	ESC
()	,	,	0	4	5	6	<-
E]	å	?	•	1	Z	3	CLR
×	=	*	/	+	-	0		DEL
A-Z	a-z	SPC			**	»	<	L



6 Alarm and Troubleshooting



Indications
Alarm Handling
Fault List



Indications

When a fault occurs, the alarm indication lamp on the control panel and the alarm symbol on the displayed menu will start to flash.

A flashing indication lamp/symbol means an active but not acknowledged alarm.

Steady light indicates an active alarm that has been acknowledged.

CAUTION

Always investigate the cause of a fault indication. Otherwise you may endanger the equipment.



Alarm Handling

Press the ALARM MENU button to bring up the ALARM LIST to identify the alarm.

Explanation of the alarm list, see chapter control panel.



When the fault has been identified and taken care of press the ACKNOWLEDGE ALARM button.

Fault List

Alarms are divided into two categories as follows:

- A Faults that will cause an alarm only. The faults are not critical but the alarm will make the operator aware of an incident.
- B Faults that will cause action from the PLC, rectify the fault.

Fault list

Pos	Alarm	Cause	Machine action	Instruction to operator
A	Aseptic tank (option)	No "ready" signal from Alsafe is present or if "high level" signal from Alsafe is detected.		
A	Communication fault PLC	Fault in the serial- communication to another process- module		
A	Outlet temp TE6 fault (option)	Wrong adjustment V26		Adjust V26
A	Caustic	Feedback from motor M12 or M13 is missing.		Check pump Check wiring
A	Acid	Feedback from motor M12 or M13 is missing.		Check pump Check wiring
A	Water pressure	Pressure in water circuit to low.		Check incoming water pressure Check PS66 Check that V66 is open?
A	Air pressure in panel	Inlet air pressure to low.		Check incoming air pressure (6 bar)
A	Battery fault in PLC	Voltage over the internal CPU battery is low		Change battery
A	Filling machine	No ready or production signal from filling machine during production		
A	Disc < 10% Logo screen	Disc full or missing in recorder		Insert/change disc
A	Level fault Deaertor vessel	To low or to high level in the Deaerator vessel		
A	Air cooler in cabinet	Fault in air cooler		
A	Steam barrier homogeniser (optional)	To low temperature		Check steam pressure to homogeniser
A	V62 adjust	The plant enters a step where V62 has to be adjusted		Adjust V62
A	V63 open	The plant enters a step where V63 has to be opened		Open V63

6 Alarm and Troubleshooting

Pos	Alarm	Cause	Machine action	Instruction to operator
A	V63 close	The plant enters a step where V63 can be closed		Close V63
В	Temperature transmitter broken	No signal from Temperature transmitter	Not possible to start plant or if running see Temp faults	Check sensor and convertor
В	Sterilizing temperature	TT71 indicates a temperature drop during Plant sterilisation.	The program steps down to heating.	Check sensor and converter
В	Production temperature	TT42 indicates a temperature drop during sterilisation or Production	If in sterilisation the program steps down to heating. If in production the plant will stop immediately, the product goes to reject.	Check steam supply Check sensor and converter
В	CIP temperature	TSL71 indicates a temperature drop during circulation steps in Cleaning	The CIP timer stops and continues from where it was stopped when the alarm is off.	Check steam supply Check sensor and converter Check position of V75 (should be in position circulate over BTD)
В	Level fault in balance tank	IS65 indicates low level	If low level during Production the program steps to Emptying. If more than 30 sec. the machine will go to total stop.	Check incoming water Check pressure (min. 3 bar) Check auto switches in panel (in auto mode) Check level switch in BTD
В	Motor fault	Feedback from a motor is missing.	If the fault is caused from M2 or M5 (option), the plant stops immediately. If the fault is caused by M9, the steam valve V44 closes.	



7 Preparations



Introduction
General Checkpoints7 - 6
Checkpoints Holding Tube (Option)
Checkpoints Deaerator (Option)



Introduction

This chapter contains a list of necessary check points prior to starting the plant. Most points are always to be done, but others are valid only if the corresponding equipment is included in the plant and is going to be used for a certain product. E.g. not all plants include a vacuum chamber and even if so, it might be used only for certain products.

CAUTION

If product other than specified in Technical Data is processed the sterilisation effect might be insufficient. Other products may need other temperature program.

1

Turn the MAIN SWITCH to position ON.

2

Turn on the:

- COMPRESSED AIR
- STEAM
- WATER

General Checkpoints

- CHECK that the cover is properly fitted on the balance tank.
- CHECK that the steam switch is in position ON.
- CHECK that all emergency stop buttons are released.

Checkpoints Holding Tube (Option)

Make sure that the right holding tube according to the product you are going to run is connected.

A = 4 seconds holding tube

B = 4+26 seconds holding tube (option)



Checkpoints Deaerator (Option)

Check the pipe connections

A = Deaerator not connected

B = Deaerator connected





CHECK that the FUNCTION SYMBOL for cleaning indicates that the Therm Aseptic Flex is cleaned, if not start with a cleaning sequence according to chapter OPERATION.



8 Operation



Introduction
Start Sterilising Sequence
Selection/Settings prior to Start
Start Conditions
Start Sequence
Check during Sequence
Start Production Sequence
Selection/Settings prior to Start
Checks prior to Start8 - 12
Start Conditions8 - 15
Start Sequence
Checks during Sequence8 - 17
Checks during Sequence8 - 18
Stop Production Sequence
Revert to Sterile Water
Max Time for Sterile Water8 - 20
Start Stop Sequence8 - 21
Selection/Settings prior to Start
Start conditions8 - 21
Start Sequence
Emergency Stop
After Emergency Stop8 - 22
Start after Emergency Stop8 - 22
Cleaning

Aseptic Intermediate Cleaning -AIC
Selection/Settings prior to Start
Start Conditions
Start Sequence
Checks during Sequence8 - 26
Final Cleaning- CIP 8 - 27
Selection/Settings prior to Start
Start Conditions
Start Sequence
Checks during Sequence
Flush
Start Conditions
Start Sequence
Cleaning of Supply Line

Introduction

This chapter describes how to operate the Therm Aseptic Flex in local mode.



Start Sterilising Sequence 1

Selection/Settings prior to Start

This selection must fit with the equipment connected. according to chapter preparations.

SELECT desired equipment from the OPERATING MENU:

- If a DEAERATOR is used press **a**
- If a 30 SECONDS HOLDING CELL is used press b





SELECT Product.

(Capacity can be selected/changed at anytime during Sterile Water and Production) (option)

3

- a) CHECK that valve V76 is in position DRAIN
- b) CHECK that the caustic/acid dosing pipes are connected to the CIP solution drain pipes









Start Conditions

Press START CONDITION in the OPERATING MENU.



5

All the general and pre-ster. start conditions are fulfilled when the symbols background in the START CHECK MENU are indicated green.

Except from this following conditions must also be fulfilled:

- The PLC in step 0.
- No low level (LSL65) in balance tank
- Air pressure in panel OK

The sterilising sequence can now be started.

Note! The start conditions in the start check menu are described in the chapter CONTROL PANEL.

Start Sequence

Press STERILISATION followed by START in the OPERATION MENU.

- When the sterilising temperature has been reached, the plant will be sterilised for 30 minutes.
- The plant cools down by performing program steps Cooling 1-3 and Stabilising.
- When the plant is cooled down, Sterile water is indicated on the display.





7 Check during Sequence



7b

Option Deaerator

CHECK the water supply for the seals on the vacuum pump M11 and the pump M5 on the deaerator.

ADJUST the vacuum and the cooling water by means of valves V30/V33 until a temperature difference of 4 °C is achieved.



8

Continue with desired sequence: PRODUCTION: See "Start Production Sequence" on page 8-11. AIC: See "Aseptic Intermediate Cleaning -AIC" on page 8-23. CIP: See "Final Cleaning- CIP" on page 8-27. STOP: See "Start Stop Sequence" on page 8-21.





Start Production Sequence

Selection/Settings prior to Start

- 1
- a) Press desired push button 1 4 in the AFM/CAPACITY MENU to select the aseptic filling machine or capacity for production.

Note! Can be selected at any time during Sterile Water and Production. The change over sequence will take approx. 2 -5 min.

Option:

b) Press TANK SYMBOL for production to Tetra Alsafe tank.

2 Checks prior to Start



2a

Check that the flow at FI66 is enough to match the chosen capacity, adjust if necessary with the valve V62.




Press PRODUCT SUPPLY PUMP followed by START in the OPERATION MENU.





Stop the product supply pump by pressing PROD SUPPLY followed by STOP.



- a) CHECK that the valve V76 is in correct position, towards the reject tank (or drain) to continue pushing out the product to reclaim tank (or drain)
- b) CHECK that the caustic/acid dosing pipes are connected to the cip solution drain pipes



7 Start Conditions

- 1 Ready indication AFM/Alsafe
- 2 No alarms

8

Start Sequence

Press PRODUCTION followed by START in the OPERATION MENU.

The first filling step is the prepare production step, which means that cold water enters the plant to bring down the filling temperature.

When the filling temperature (TT71) has dropped to a preset temperature or a timer has elapsed, Filling is indicated on the display.

The plant will now automatically drain the water from the balance tank, activate V13. and start the product supply pump.

A timer controls when the product line contains product only, valve V75 reroutes the flow to the balance tank for recirculation.

The plant is ready for production. Signal is given to the filling machines.

Note! If a disturbance occurs during Production, the Therm Aseptic Flex will automatically proceed to Emptying and end up in Sterile water or Parking position.

If a permanent or longer stop at a filling machine occurs, it is possible to revert

to Sterile water. See "Revert to Sterile Water" on page 8-20.

Reverting to this phase, sterile water displaces the product.

9 Checks during Sequence

9a

Regular check on the process values such as flow, temperature and pressure.

Recommended max time for production

During operation deposits may build up on the heat exchanger surfaces and in the product holding cell.

- Check the pressure drop over the heat exchanger
 - if the pressure drop is too big, production must be stopped and cleaning has to be done
 - max pressure after the homogeniser/booster pump is stated on the machine sign.
- Check the temperature difference between the heating medium and the product.
 - max temperature is stated on the machine sign.



9b Option extra cooler

CHECK that the correct filling temperature TT6 in maintained, adjust with valve V26.



9c

Checks during Sequence Option Deaertor

ADJUST the vacuum and the cooling water by means of valves V30/V33 until a temperature difference of 4 °C is achieved.

Stop Production Sequence

Select one of the following to stop the production.

- STERILE WATER: See "Revert to Sterile Water" on page 8-20.
- AIC: See "Aseptic Intermediate Cleaning -AIC" on page 8-23.
- CIP: See "Final Cleaning- CIP" on page 8-27.
- STOP: See "Start Stop Sequence" on page 8-21.

Note! Select CIP directly after finished production.



Revert to Sterile Water

Instead of continuing to circulate the product during any kind of disturbance, the plant can be reverted to Sterile water.

Press STERILISING followed by START in the OPERATION MENU.

The plant will now automatically:

- drain the product from the balance tank to reject or drain (V75 deactivated).
- deactivate V13.
- stop AFM before product/water mix reaches AFM (timer controlled).

Max Time for Sterile Water

There is a limit for how long time the Therm Aseptic Flex may run in Sterile Water before cleaning is required.

It depends on the milk temperature in the supply pipe to the balance tank. At a temperature of 15 °C the milk can stand about 6 hours before it is destroyed and the Therm Aseptic Flex unit has to be cleaned and resterilised.

Start Stop Sequence 1

Can be ordered from all programme steps except for CIP/AIC.

If ordered from Production, an emptying and a rinse sequence take place automatically before the Stop-sequence starts.

The plant will end in Parking position.

Selection/Settings prior to Start

• Nothing stated





Start Sequence

Press STOP followed by START in the OPERATION MENU.

The balance tank is drained and a cold water rinse sequence is started. The cooling down and the Therm Aseptic Flex is ended up in Parking position.



Emergency Stop

Press the emergency stop button on the control panel to stop the plant immediately. All pumps will stop and all valves will be deactivated.

WARNING Emergency stopped

The machine may contain hot liquid or

cleaning solution. Handle wit outmost care to avoid exposure.

After Emergency Stop

After emergency stop has been activated, the sterile temperature (TT42) will drop below set point.

Start after Emergency Stop

- Release all emergency stops.
- Reset the homogeniser on the Tetra Alex control panel.

The Therm Aseptic Flex must be emptied by means of the **FLUSH.** See "Flush" on page 8-32.

Note! CIP must be ordered if product has entered the plant.



Cleaning

Cleaning is carried out in the following sequences:

- Aseptic Intermediate Cleaning AIC
- Final Cleaning CIP
- Flush
- Cleaning of Supply Line

CAUTION

The cleaning program is designed for the products specified in the Technical Data. If any other product is processed, the cleaning result might be insufficient. Other products may need new CIP program setup.

WARNING Chemical hazard

Cleaning solution contains Caustic soda (NaOH) or Nitric acid (HNO₃).

These chemicals may cause severe burning to skin and eyes. Use protective clothes, goggles and gloves during handling.

If exposed - wash with water for at least 15 minutes. Seek medical assistance.

Follow the instructions given by the supplier.

Aseptic Intermediate Cleaning -AIC

AIC can be ordered to extend the production period before a full cleaning, CIP, is required.

The AIC takes approximately 40 minutes. The plant remains sterile in its aseptic part.



Selection/Settings prior to Start

- a) CONNECT the caustic/acid dosing pipes to the balance tank
- b) CHECK that valve V76 is in position drain

2 **Start Conditions**





2a

Press START CONDITION in the OPERATING MENU.





2b

 From STERILE WATER: CIP dosing pipes connected to balance tank and No alarms

3

Start Sequence

a) Select appropriate AIC followed by START within 15 seconds.

If AIC is ordered from programme step Production, an emptying and a rinse sequence take place automatically before the intermediate cleaning starts.

When the cleaning is completed, the indication for AIC goes out and STERILE WATER is indicated with green.







Checks during Sequence

CHECK that the flow at FI66 is enough to match the chosen capacity, adjust if necessary with the valve v62.



Cleaning solution contains Caustic soda (NaOH) or Nitric acid (HNO₃).

These chemicals may cause severe burning to skin and eyes. Use protective clothes, goggles and gloves during handling.

If exposed - wash with water for at least 15 minutes. Seek medical assistance.

Follow the instructions given by the supplier.

Final Cleaning- CIP

Select CIP directly after finished production.

The CIP takes approximately 120 minutes. The plant remains sterile in its aseptic part.

1 Selection/Settings prior to Start



1 a

- a) CONNECT the caustic/acid dosing pipes to the balance tank
- b) CHECK that valve V76 is in position drain



1b

a) OPEN the valve v62 fully.

2 Start Conditions





2a

Press START CONDITION in the OPERATING MENU.



2b

- From Parking position: all general and CIP start conditions fulfilled.
- From Sterile water: CIP dosing pipes connected to balance tank





4 Checks during Sequence

a) During STEP 114 OPEN the valve v63 to avoid boiling in the BTD.

Flush

The FLUSH FUNCTION is only selectabled from Parking position.

Use the Flush function to:

- flush out the product.

– emptying after an emergency stop.

to cool down the equipment.

1 Start Conditions





1 a

Press START CONDITION in the OPERATING MENU



1b

In Parking position: all general start conditions fulfilled.





Start Sequence

Press FLUSH followed by START in the OPERATION MENU.



Cleaning of Supply Line

The cleaning is controlled by an external CIP-system.

- a) OPEN the valve V15:1 towards cip return
- b) OPEN (Flip) the valve V15:2 for a short while towards drain during circulation

Note! The pipes connected to the Valve V15:2 can easily be removed for manually cleaning.

9 Care and Cleaning

This page intentionally left blank



Verify Cleaning	5
Daily Check	5
Cleaning Complete	5
Lye/Acid Concentration	5
Homogenizer damper	5
Recommended Check 9 -	5
Holding cell9 -	5

This page intentionally left blank



Verify Cleaning

Daily Check

Cleaning Complete

Check on the recorder that the cleaning has run the appropriate time with the appropriate temperatures.

Lye/Acid Concentration

Check that the lye and acid concentrations during cleaning are appropriate.

Homogenizer damper

Disassemble the homogenizer damper to ensure an air cushion inside and:

- check that it is free from any product residues after cleaning.
- clean the damper manually if necessary.

Recommended Check

It is recommended to regularly weekly/monthly verify the cleaning result at critical points such as the holding cell.

Holding cell

Disassemble the holding cell or holding cells (if applicable) and:

- visually check that it is free from any product residues after cleaning
- make a swab test to check that the cleaning result is appropriate
- if necessary, adjust cleaning circulation time and detergent concentration

This page intentionally left blank



♪: Tetra Pak