

**HTST/UHT Mini Pilot System – FT94X**

The Armfield FT94X HTST/UHT Mini Pilot System extends the range of continuous operation scaled-down units offered by Armfield to 200 l/hr (30-100 l/hr for the standard FT94X). The unit combines full flexibility with comprehensive instrumentation demanded of research and development equipment.

The FT94X is designed for operation as both a stand-alone unit and also for seamless integration into a full processing system with the capability of aseptic packaging of processed product.



**Features / benefits**

- ▶ Compact design and easy installation
- ▶ Low product hold up
- ▶ Suitable for producing large batches of material for extensive product testing
- ▶ Suitable for a wide range of products due to both plate and tubular exchangers
- ▶ From cold start to steady state operation in seconds
- ▶ Rapid switchover from one heat exchanger to another
- ▶ Designed for easy integration into a process line
- ▶ Links directly to sterile filling bench or sealed bag filling systems
- ▶ Touch screen control for ease of use
- ▶ Compact, mobile, easy to install
- ▶ Continuous and batch operation
- ▶ Standard throughputs from 30 to >100 l/hr (dependent on conditions)
- ▶ Units available to 200 l/hr
- ▶ Process temperatures up to 150°C
- ▶ Capable of aseptic operation
- ▶ Fully instrumented
- ▶ Preheating by hot water (indirect)
- ▶ Heating by steam (indirect)
- ▶ Plate and tubular heat exchanger options
- ▶ Controlled product preheat and heating temperatures
- ▶ Simple and rapid switch over between heat exchangers
- ▶ Automatic product divert for low temperature on tubular heat exchanger
- ▶ Built in Clean In Place (CIP) and Sterilisation In Place (SIP) facilities
- ▶ Integral USB data logging
- ▶ Two-stage cooling option
- ▶ Electronic flowmeter option
- ▶ Suction feed with in-line level sensor

## FT94X Service Unit

The FT94X service unit contains the services, controls and instrumentation required to operate the tubular and plate heat exchangers described below. The FT94X may be specified with either or both of the heat exchangers. Switching between the two heat exchangers takes a matter of seconds.

The service unit comprises: an eight inch touch screen control panel with the required controls and displays; a variable speed progressive cavity product feed pump with inlet level sensor and alarm to warn of low product level; a steam-heated hot water system for product preheating; automatic steam control valves for product preheating and final heating; a centrifugal CIP pump and other facilities required for CIP and SIP.

Sensors show product inlet, preheat, final heating and outlet temperatures. Product preheat and final heating temperatures are set by the operator. Inlet and outlet product pressure is also shown. There are various service sensors: pressure, level and temperature – see process flow diagram for details.

A sophisticated data logging package enables the measured data to be recorded onto a standard Windows PC (not supplied). The software records all temperatures, product and steam pressures, feed pump speed and many other sensor values. Data from optional accessories (e.g. the flowmeter) is also recorded. Data may be displayed in tables and graphs (both real time and comparisons across previous runs), and may also be exported to MS Excel.

Interface: USB  
Software requirements: Win 98, ME, 2000, XP, Win 7/8/10

In addition FT94-59 Ethernet PLC update module is available. This accessory gives a direct link from a PC to update the software on the PLC using Dataworx™ Software (not provided).

## Tubular Heat Exchanger

The FT94-20 is a standard tubular heat exchanger design using a series of concentric 316 stainless steel tubes for product preheating, final heating and cooling. In all cases the product passes down the inner tube and the heating/cooling medium passes through the annulus. Two heating tubes of 1.5 m length are used to preheat the product. Four similar tubes are used for product heating and an additional four tubes are used for product cooling.

Product is gently preheated using a hot water system, which is itself heated by steam via a secondary service heat exchanger. In the main heating section the product is indirectly heated using steam itself. Product is cooled normally using water or chilled water. The cooling section can be configured to enable two stages where the first stage is water/chilled water and the second stage is water/glycol.

The FT94-21 is a set of static mixers for two tubes. These significantly improve heat transfer with more viscous products and can be used for improving both heating and cooling efficiency. Multiple sets can be used to optimise both heating and cooling performance.

The FT94-22 product divert option enables product that has not been processed to a sufficiently high temperature to be diverted to drain thus ensuring product quality and heat treatment.

The divert temperature is adjustable. Diversion is achieved using a low hold-up twin diaphragm valve block operated by compressed air and PLC controlled. Diverted product is cooled in a tubular heat exchanger before being led to drain.

The FT94-20 has a one second holding tube (at 50 l/hr) as standard. Contact Armfield for longer holding times.

## Associated equipment

### FT83-94 Sterile Filler

- ▶ The FT83-94 enables sterile product produced by the FT94X to be packaged into pre-sterilised containers in a sterile environment – see separate data sheet.
- ▶ The FT94X contains all the necessary functionality to sterilise the FT83-94.
- ▶ The FT94 can also be interfaced directly to a sterile sealed bag filling system. Contact Armfield for details.
- ▶ Homogeniser subsystems
- ▶ Contact Armfield for details of the in-line Homogenisers for use with the FT94X.

## Plate Heat Exchanger

The FT94-30 uses the sanitary heat exchanger employing the latest plate design for efficient heat transfer. Performance scale-up is straight forward. The standard unit is a three stage system with preheat (hot water) final heating (steam) and cooling (water/chilled water).

The plates have a complex pressed profile to maximise turbulence and minimise dead zones. There is a relatively large gap between plates to enable handling of more viscous products. The plates are fitted with food grade Viton paraclip gaskets for easy replacement as these are simply clipped in place rather than glued.

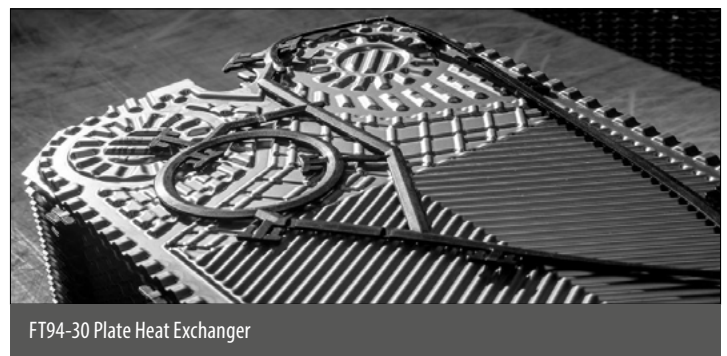
A number of options are available to enhance the performance of the standard plate heat exchanger. These options involve additional plate configurations, which can be supplied and fitted or may be easily retro-fitted by the user.

The FT94-32 homogeniser interconnecting plate enables the homogeniser to be connected downstream of the heating section. The plate is fitted into the cooling section.

The FT94-33 two-stage cooling option provides a complete additional cooling stage, which can be used in conjunction with a chilled water/glycol supply for the best possible product cooling. Output temperatures below 5°C are possible depending on the product and the flow rate.

An interconnecting link is provided so that the two stages can be operated as a single stage when required.

The FT94-30 has a five second holding tube (at 50 l/hr) as standard. Contact Armfield for longer holding times.



FT94-30 Plate Heat Exchanger

## Options

### (FT94-33) Two Stage Cooling option

FT94-33 Two stage cooling option for use with FT94-30 (PHE) to give much increased cooling capacity

### Flow meter option (FT94-40)

Type: Electromagnetic  
 Flow range: 30-100 l/hr  
 Accuracy: <1% error at 50 l/hr

### Suction Feed

Suction feed with in-line float switch standard on the FT94X

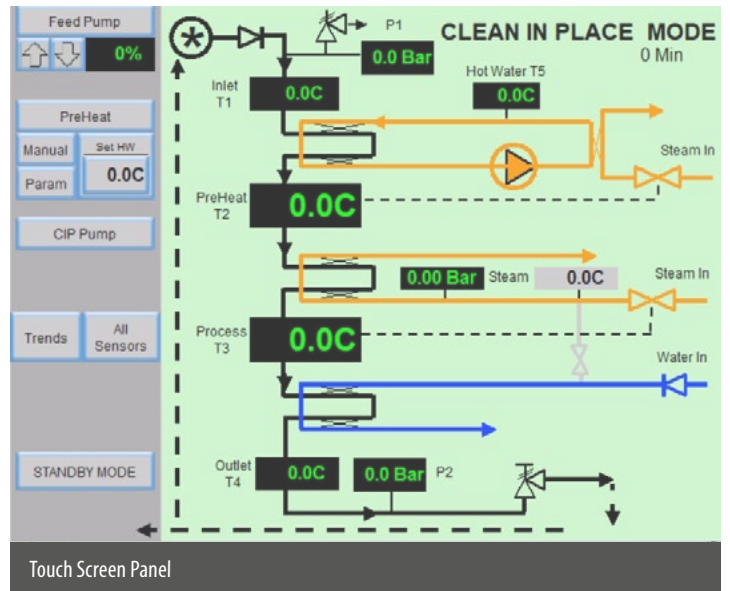
### Feed Vessel (FT94-51)

The FT94-51 Feed Vessel option, is a 50 litre stainless steel vessel with lid, fitted with a product outlet valve and a drain (or recirculation) valve. The assembly is mounted on castors for ease of movement.

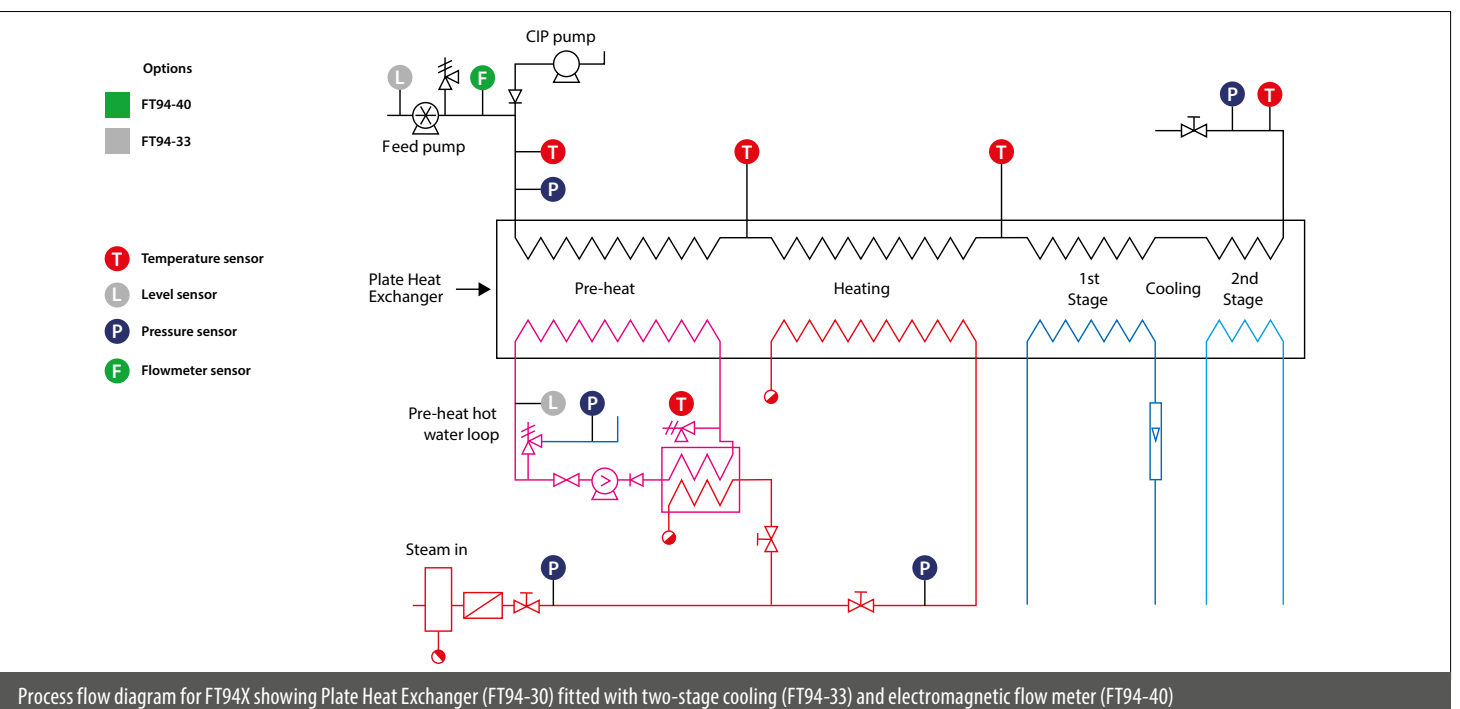


### (FT94-59) Ethernet PLC Update Module

Comprising of a single port (RJ45) 10/100 ethernet connection module directly connected to the PLC. This module enables remote connection to the PLC for maintaining the most up to date software.



FT94X with homogenisation and true aseptic bag in box packing miniature process line



Process flow diagram for FT94X showing Plate Heat Exchanger (FT94-30) fitted with two-stage cooling (FT94-33) and electromagnetic flow meter (FT94-40)

## Technical specifications

### FT94X Service Unit Technical specifications

#### Feed pump

Progressive cavity variable speed pump

Solids handling	Soft 10 mm
	Hard 4 mm

Flow rate 30-100 l/hr

Discharge pressure 24 bar (max)

#### Pre-heat water system

Water capacity ~2-3 litres

Maximum temp 110°C

Safety cut-outs Low level

	Temperature
	Product pump
	Pressure relief valve

#### Heating system

External steam supply

Maximum temp 165°C

Relief valve (7 barg)

Product pump off

steam valve closes

Max product heating duty 17 kW

(preheat + heating)

### Tubular Heat Exchanger (FT94-20)

Number of tubes 10 (2 preheat, 4 heating, 4 cooling)

#### Tube diameter

(product side) 8.1 mm

Overall diameter 22.0 mm

Length (heated) 1.46 m

Product volume 1.0 l

Material 316 stainless steel

Assembled test pressure 30 bar

Working pressure 24 bar (maximum)

### Plate Heat Exchanger (FT94-30)

Plate overall dimensions 150 x 480mm

Effective area per plate 0.04m<sup>2</sup>

Plate thickness 0.6mm

Product volume 2.5litres

Materials,Plates 316 stainless steel

Gaskets Food grade Viton

Max differential test pressure 11.5bar

Max balanced test pressure 12.5bar

Max working pressure 9.6bar

Working temperature Max: 170°C

Min: -4°C

#### Number of plates

FT94-30 Preheating 13, Heating 6, Cooling 13

FT94-33 Secondary cooling 7

## Requirements

## Scale



- ▶ Electricity supply: Single phase (see ordering codes)
- ▶ Steam supply: Heat output of 30kW (min 6.0 bar) – heating medium
- ▶ Compressed air: 7 l/s (min 7.0 bar, max 10.0 bar) – valve operation
- ▶ Cooling water: 10 l/min at 2 bar – product cooling
- ▶ Chilled water: Required if two-stage cooling option is specified

## Applications

- ▶ Baby foods
- ▶ Beer
- ▶ Condiments
- ▶ Confectionery
- ▶ Culture media
- ▶ Desserts and puddings
- ▶ Fruit and vegetable purees
- ▶ Health and nutritional products
- ▶ Fruit juices and cordials
- ▶ Gelatine products
- ▶ Gravies
- ▶ Cream
- ▶ Ice cream
- ▶ Sauces and soups
- ▶ Yoghurts
- ▶ Meat pie fillings
- ▶ Milk
- ▶ Pet food
- ▶ Pharmaceuticals
- ▶ Ready meals

## Overall dimensions

Length	2.02m
Width	0.70m
Height	1.55m (Fitted with FT94-20)

### Packed and crated shipping specifications

Volume	5.0m <sup>3</sup>
Gross weight	708Kg

## Ordering codes

- ▶ FT94-A: 220-240V/1ph/50Hz (10 A)
- ▶ FT94-G: 220V/1ph/60Hz (10 A)

## Knowledge base

- > 28 years' expertise in research & development technology
- > 50 years' providing engaging engineering teaching equipment

Benefit from our experience, just call or email to discuss your laboratory needs, latest project or application.

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