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Miniature-scale research & development technology

**MODULAR MINIATURE SCALE HTST/UHT  
PROCESS SYSTEM**

FT174X



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ISO 9001:2008  
2YR EXTENDED WARRANTY

**AL**  
ASEPTIC LINE  
COMPONENT

## FEATURES

- Totally modular system
- Direct and/or indirect heating
- Tubular & Plate heat exchangers, Scraped surface
- Full sterile capability options
- Touch screen control panel for ease of use
- Hygienic fittings as standard
- Integral homogeniser option
- Standard throughputs from 12–60 L/hr
- Process temperatures >150°C
- Controllable pre-heat option
- Built-in CIP facility
- USB data logging option
- Electronic flowmeter option

## BENEFITS

- High degree of user configuration
- Rapid start-up
- Switch over between heat exchangers is quick and easy
- Links directly to sterile filling bench
- Small footprint can contain tubular, plate heat exchangers, DSI module & homogeniser
- Low product hold-up

ISSUE - 4



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## Overview

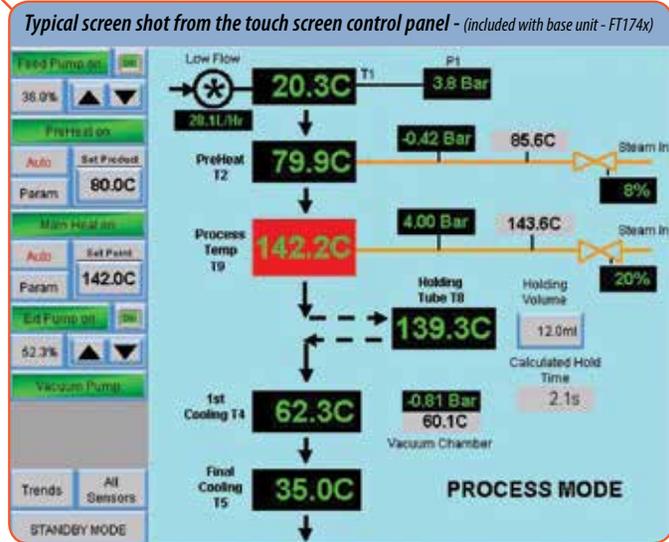
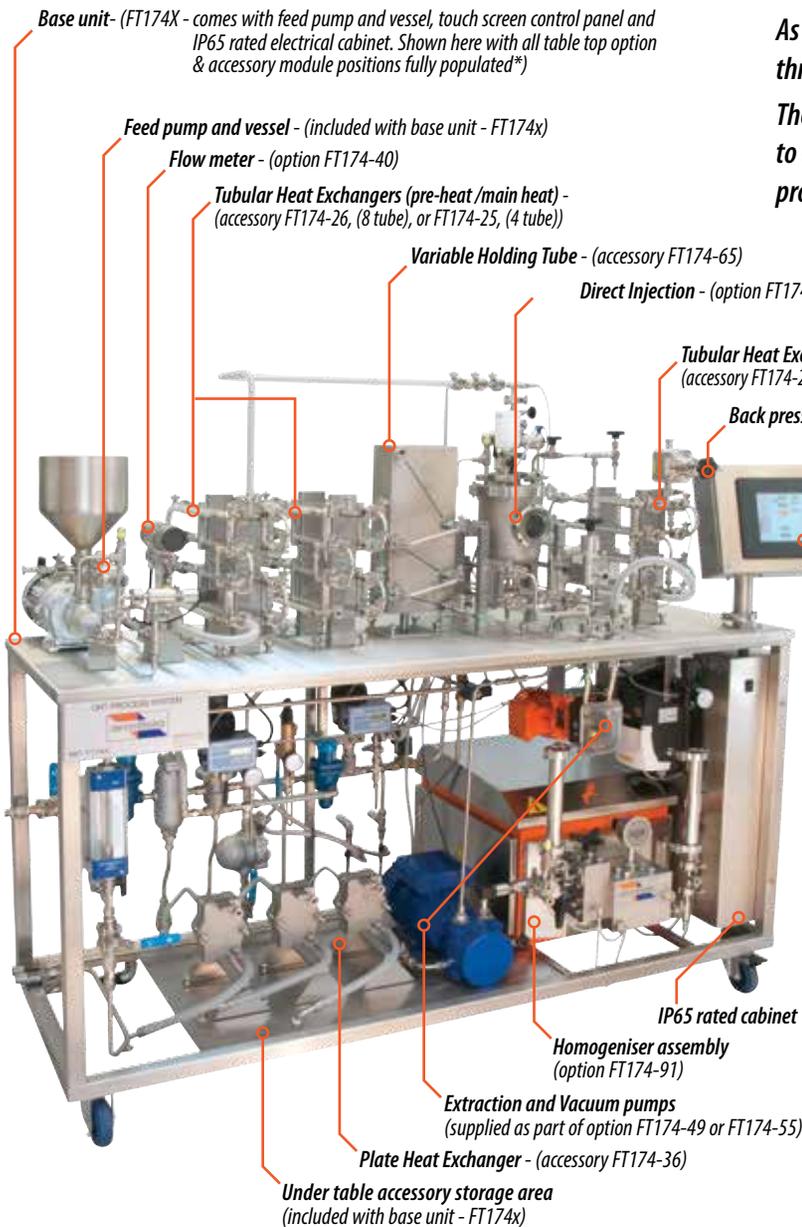
The FT174X is a modular HTST/UHT processing system designed to treat products at flow rates of 12-40 L/hr or up to 60 L/hr for water (or similar low viscosity products).

Standard Modules for direct heating (steam injection) or indirect heating (using tubular and/or plate heat exchangers), aseptic processing, upstream or downstream homogenisation and additional chilling are available.

These, along with many other options, enable multiple modules to be included in the same system, giving high process adaptability by reconfiguration of flexible product hoses, using quick release connections. The sterilisation options enable it to be linked to an Armfield sterile filling bench to produce aseptic product, even when using long holding tubes and/or downstream homogenisation.

As with all Armfield systems, it comes with hygienic fittings throughout as standard, it is easy to clean and very flexible in use.

The Touch screen control panel makes it extremely user friendly to configure and monitor processing parameters. The operator is prompted at every stage whenever intervention is required.



Note: \*The above configuration shows a selection of the options<sup>1</sup> & accessories<sup>2</sup> available for the FT174X and represents one of the many configurations made possible by the flexibility of this versatile modular system.

<sup>1</sup> options to be defined at time of order

<sup>2</sup> accessories can be added at any time

## Description

### Base Unit (FT174X)

The base unit comprises a stainless steel table for mounting the process equipment, a feed pump and vessel, the touch screen control panel and all associated electrical controls housed in an IP65 cabinet.

On top of the table are four mounting positions for the selected heat exchangers. There is also space for a variable holding tube.

Under the table top are storage positions for unused heat exchangers, plus space for the optional vacuum and extraction pumps used for direct heating. There is also space for the optional integrated homogeniser.

The system is PLC controlled, with a high resolution TFT 8" colour touch screen panel. All operation functions are controlled from this panel, including configuration, mode of operation (sterilisation, process or Clean In Place).

Different sets of processing parameters can be edited stored and quickly recalled using the menu capability of the system.

Similarly the ancillary items such as the homogeniser and sterile filler are also controlled from this panel. The system can be quickly and easily interfaced to other free-standing Armfield process items such as a mixing vessel, a chiller (FT63 or FT64) or a sterile filling system (FT83).



The base unit provides the services to the heat exchangers.

**Four sets of services are provided:**

- **Main Heat**

Steam is applied to the service side of the heating section of the product heat exchanger using an electro-pneumatic steam control valve. The product temperature is measured at the end of the heat exchanger (or holding tube) and this value is used by a PID control algorithm, implemented in the PLC, to control the steam regulating valve ensuring the user defined set point is maintained. The same steam output and control valve is used to provide the steam injection for the optional Direct Steam Injection module

- **Preheat**

A gentle preheat action is achieved by using steam at sub-atmospheric pressure (and hence low temperature). In this way, steam temperatures at or significantly below 100°C can be produced and low differentials between steam temperature and product temperature are achieved. Stable temperatures of 60°C or less are feasible. Control of the steam pressure/temperature is achieved by a manual steam control valve Automatic PID control is an available option.

- **Cooling**

Cooling water is applied to the cooling section of the product heat exchanger via a rotameter in order to measure flow rate.

- **Chilling**

(Optional), using an external recirculating chiller such as the Armfield FT63, FT64 or other chilled water supply.

### Feed Pump System

A progressing cavity feed pump is used as this gives consistent volumetric flow rate for a wide range of liquid viscosities. It consists of a stainless steel rotor within a food-grade rubber stator. All metal parts of the pump, which come into contact with product are made from 316L stainless steel. A mechanical seal isolates the product from the drive system.

This pump provides a very wide range of flow capability, from as low as 12 L/hr to as much as 120 L/hr (used for CIP). The pump is fitted with a feed tank and level sensor, a pressure relief valve and temperature and pressure sensors.

## Modules, Options and Accessories

### Options (to be defined at time of order)

#### Flowmeter Option (FT174-40)

The standard unit displays an estimated flow rate calculated from the feed pump speed. This is accurate enough for many applications, but where more accuracy is required a flowmeter is available for measuring the product flow rate.

#### Additional Cooling Stage (FT174-43)

Adds the location points and plumbing for a fourth heat exchanger.

#### Sterilisation Option (indirect heating) (FT174-45)

Sterilisation is achieved by applying steam onto the outside of the cooling tubes instead of cold water. This sterilises the cooling tubes and gives the power to sterilise a downstream homogeniser. The FT174-45 option provides the switching valves necessary to perform this. Note; sterile operation is limited to single stage cooling.

The FT174-45 is only needed when using indirect heat exchangers for the main cooling (i.e. not using the vacuum cooling vessel). However FT174-45 components need not be removed when a vacuum module is fitted.

#### Controllable Preheat Option (FT174-46)

This option is required when it is necessary to achieve an accurate pre-heat temperature (e.g. when it is important to homogenise at a particular temperature) or when using the preheat facility by itself for pasteurising at lower temperatures. It is also beneficial when using direct steam injection.

It replaces the standard manual preheat control valve with an automatically controlled electro-pneumatic valve. A PID loop is used to control the temperature to the operators desired set point by actuation of the valve. The option also includes an electronic pressure sensor to measure the steam pressure. This pressure and its equivalent temperature (determined in the PLC) are displayed on the control panel.

#### Direct Injection Option (FT174-48)

The same steam valve used to provide the main heating on an indirect heat exchanger can be used to provide the steam control for a direct injection heat exchanger. The heat exchangers themselves therefore become interchangeable.

#### The option comprises:

- steam conditioning unit, built into the service unit frame (including a culinary grade steam filter to clean any impurities from the steam prior to injection)
- steam injection port.

When using direct steam injection, conventional tubular (or plate) heat exchanger's are used in position one for preheat and four for final cooling.

#### Vacuum Evaporator Module (FT174-49)

This module is used in conjunction with a DI heat exchanger to evaporate away the injected steam and prevent dilution of the product.

#### It comprises:

- A module assembly located in position three, inc:
  - Vacuum vessel with sight glass
  - Back pressure valve on inlet
  - Tubular HE (two tubes) for cooling prior to the extraction pump
  - Pressure (vacuum) sensor and temperature sensor
  - Mounting position for the steam injector, FT174-48
- Vacuum pump assembly mounted below the table with isolator valve and bleed valve.
- Extraction pump to pump out the contents of the vessel against the vacuum

#### Sterile Vacuum Module (FT174-55 (used instead of FT174-49))

This module is an alternative to the vacuum module, which is modified to make sterilisation possible.

The module adds a hygienic divert valve prior to the vacuum chamber, a cooling heat exchanger, a sterile breather and a second valve and steam trap at the filler (FT83). Steam is used to sterilise the system, injected through the direct injection port.

The divert valve enables product to be diverted away from the vessel until it is fully up to temperature keeping the vessel sterile during processing.

*Note: Products with certain particulates can be processed on the Direct Steam Injection option. Please consult with Armfield regarding your particular application.*

#### Data Logging Option (FT174-44)

This option enables the various operating parameters to be recorded on a standard Windows PC (not provided) via a USB interface. It also displays calculated values such as steam equivalent temperatures and f0 values. Graphs and tables can be displayed and updated in real time. Data can be saved to Excel file format

#### Homogeniser Assembly (FT174-91)

Twin-piston two-stage variable flow rate homogeniser with pulsation damping devices, bleed valve to control input pressure, plus temperature, product line pressure and homogenisation pressure sensors all integrated within the FT174X frame, enabling upstream or downstream processing.

The homogeniser is controlled from the FT174X touch screen. The pump speed can be controlled to automatically match the product flow rate.

Homogenisation pressure: 400bar max

Maximum flow rate: 55 L/hr

**Accessories (may be added at any time)**

Various heat exchanger and holding tube options can be easily added to the service unit.

**Scraped Surface Heat Exchanger options. (FT174-75)**

Scraped surface heat exchangers can be fitted at any position (heat, preheat, cool) for use with viscous products. Product flow rates would be typically 10-20 L/hr.



Please contact Armfield with your specific requirements.

**Tubular Heat Exchanger (FT174-25)**

A single bank of four tubes, with temperature sensor. The product flows through the centre while the service fluid (heating or cooling fluid) flows through the outer tube.

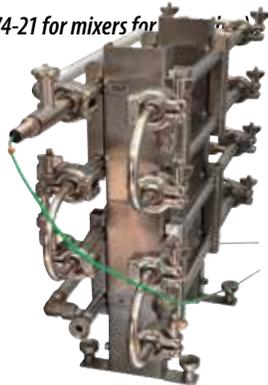
The FT174-25 is normally used for lower flow rates, (typically 10-20 L/hr).

**Can be used for :**

- Preheat    Main heat (indirect)
- Cooling    Chilling

i.e. more than one FT174-25 can be used at the same time.

Static mixers are available to promote turbulence in the tubes and improve heat transfer. (Order code FT174-21 for mixers for tubes).



**Tubular Heat Exchanger (FT174-26) ▶**

A single bank of eight tubes, with temperature sensor. The product flows through the centre while the service fluid (heating or cooling fluid) flows through the outer tube.

The FT174-26 can achieve higher flow rates than the FT174-25, (typically up to 60 L/hr).

**Can be used for :**

- Preheat    Main Heat (indirect)
- Cooling    Chilling

i.e. more than one FT174-26 can be used at the same time, and FT174-26's can be mixed and matched with FT174-25's.

Static mixers are available to promote turbulence in the tubes and improve heat transfer. (Order code FT174-21 for mixers for tubes).



**Extended Plate Heat Exchanger (FT174-36) ▶**

Single stage plate heat exchanger comprising 18 plates.

**Can be used for :**

- Preheat
- Main Heat (indirect)
- Cooling
- Chilling

i.e. more than one FT174-36 can be used at the same time, and FT174-36's can be mixed and matched with tubular heat exchangers if required.

**Pneumatic Back Pressure Valve Accessory (FT174-42)**

The FT174-42 is a pneumatic pinch valve, which provides much better performance than the standard sprung back pressure valve when used with products containing particulates.



**Variable Holding Tube (FT174-65) ▶**

Provides nominal holding times of 15, 30, 45, 60, 75, 90, 105, and 120s for a flow rate of 20 L/hr.

Note: FT174X display shows the actual hold time based on the measured or estimated flow rate used during processing.

**Other Holding Tubes**

Other Holding tubes can be provided to suit your holding time and flow rate requirements.

Please contact us with your specific requirements.

**Further Accessories**



**◀ Sterile Filler (FT83-174)**

When used with one of the sterile configurations (FT174-45 or FT174-55) the FT83 can be used to fill presterilised containers in a sterile environment. The FT83-174 version is completely compatible with the FT174X and is controlled from the FT174X's touch screen.

**Recirculating Chiller (FT63 or FT64) ▶**

A recirculating chiller, used in conjunction with the additional cooling stage option (FT174-43) enables product to be output at reduced temperatures. The FT63 is suitable for lower flow rates, but the FT64 is recommended for higher flows.



**◀ Mixing Tanks**

Armfield can offer a range of mixing tanks with low speed agitators, optional heated jackets and optional high shear mixing.

Standard sizes are 50L and 100L.

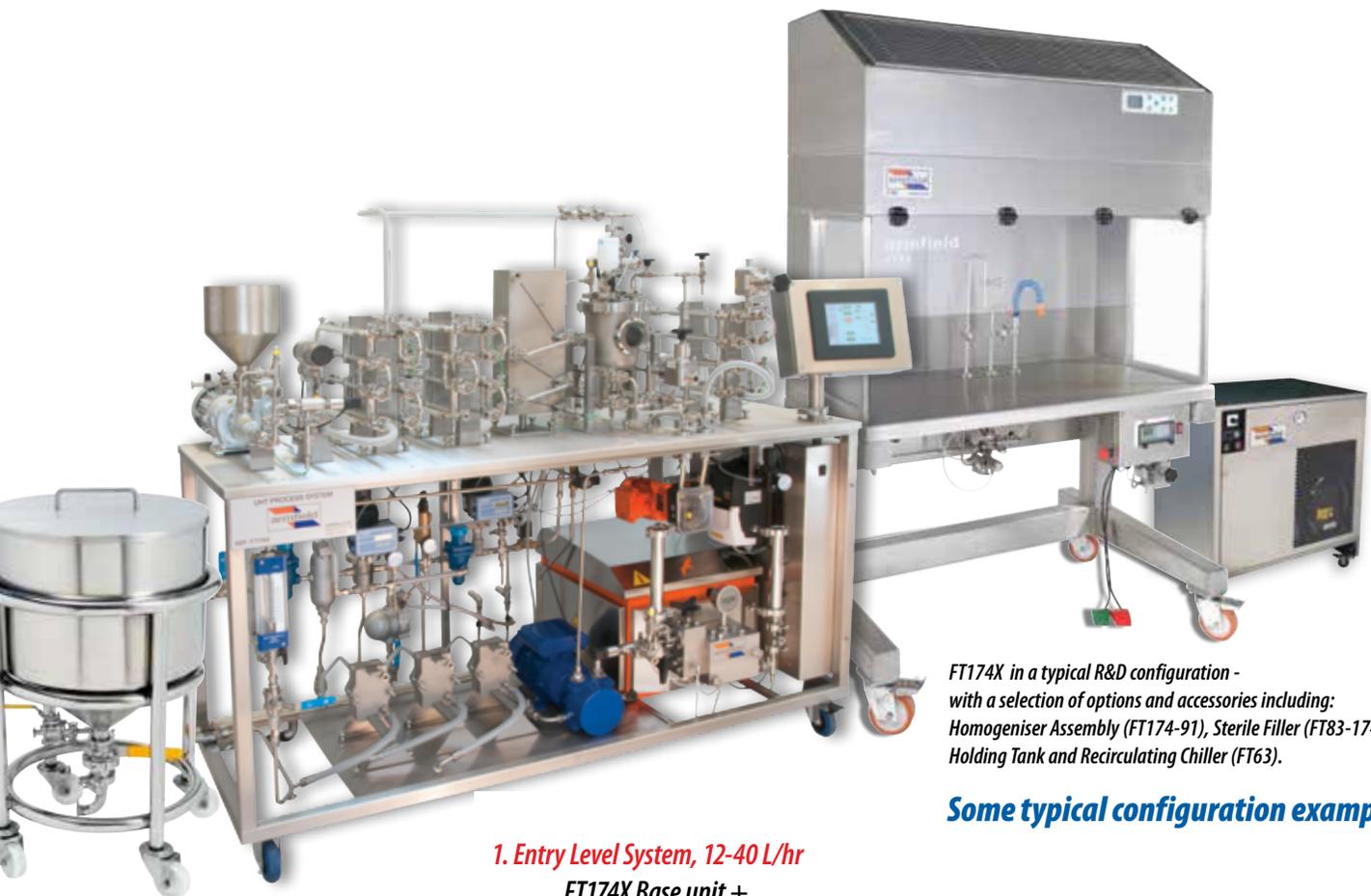
Please contact us with your specific requirements.



**Feed and holding tanks ▶**

Armfield also offer a range of feed and holding tanks.

Please contact us with your specific requirements.



*FT174X in a typical R&D configuration - with a selection of options and accessories including: Homogeniser Assembly (FT174-91), Sterile Filler (FT83-174), Feed/Holding Tank and Recirculating Chiller (FT63).*

### **Some typical configuration examples**

#### **1. Entry Level System, 12-40 L/hr**

**FT174X Base unit +**

**FT174-25 (1 off) Tubular heat exchanger (preheat)**  
**FT174-26 (2 off) Tubular heat exchanger (main heat and cooling)**

#### **2. Aseptic indirect system with controlled preheat and homogenisation, 20-55 L/hr**

**FT174X Base unit +**

**FT174-91 Homogeniser**  
**FT174-25 (1 off) Tubular heat exchanger**  
**FT174-26 (2 off) Tubular heat exchanger**  
**FT174-45 Sterilisation subsystem (indirect heating)**  
**FT174-46 Controllable preheat**  
**FT83-174 Filler**

#### **3. Aseptic direct injection system with controlled preheat, 20-60 L/hr**

**FT174X Base unit +**

**FT174-26 (2 off) Tubular heat exchanger (preheat and cooling)**  
**FT174-48 Direct injection heat exchanger**  
**FT174-43 Additional cooling stage**  
**FT174-55 Sterile vacuum system**  
**FT174-46 Controllable preheat (optional)**  
**FT83-174 Filler**

#### **4. Combined Direct and Indirect R&D Research System**

**FT174X Base unit +**

**FT174-25 Tubular heat exchanger (preheat)**  
**FT174-26 Tubular heat exchanger (main heat)**  
**FT174-48 Direct injection heat exchanger**  
**FT174-26 Tubular heat exchanger (cooling)**  
**FT174-43 Additional cooling stage**  
**FT174-49 Vacuum evaporator**  
**FT174-65 Variable holding tube**  
**FT174-46 Controlled preheat**

### **Other Configurations**

*The above configurations are just a few examples of the many configurations available with the modular FT174X system.*

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Armfield R&D products include:

- Hygienic connections as standard ✓
- 316 Stainless steel ✓
- Advanced CIP ✓
- CE certification ✓
- Extended warranty as standard ✓



An ISO 9001 Company

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### Requirements

**Mains Water:** 5L/minute at 2 bar  
(10L/min if FT174-49 or  
FT174-55 are fitted)

**Electricity:** 6A 230V 50/60Hz Hz single phase  
(16A if FT174-49 or FT174-55 are fitted,  
if the FT174-91 Homogeniser option is  
fitted, total power requirement is  
30A, 230v, single phase or  
16A, 400v, three phase)  
Consult Armfield for other options

**Compressed Air:** 7 bar

**Steam:** 6 bar, estimated consumption 15 Kg/hr

Note: Armfield can supply a steam boiler if required, order code UOP10.

### Shipping specification

**Volume:** 4m<sup>3</sup>  
**Gross weight:** 567kg

### Overall dimensions

**Height:** 1.50m  
**Width:** 1.95m  
**Depth:** 0.80m

Note: \*The FT174X shown in this data sheet is configured with a selection of the options<sup>1</sup> & accessories<sup>2</sup> available and represents one of many configurations made possible by the flexibility of this versatile modular system.

<sup>1</sup> options to be defined at time of order

<sup>2</sup> accessories can be added at any time

The Armfield range includes HTST/UHT/aseptic systems, carbonator/filler/cappers, spray dryers/chillers, multifunction batch processors, ice cream freezers, margarine crystallisers, extractors, edible oils processors and more. For further information about our products and services, or to book a trial at one of our trials facilities, please contact us.