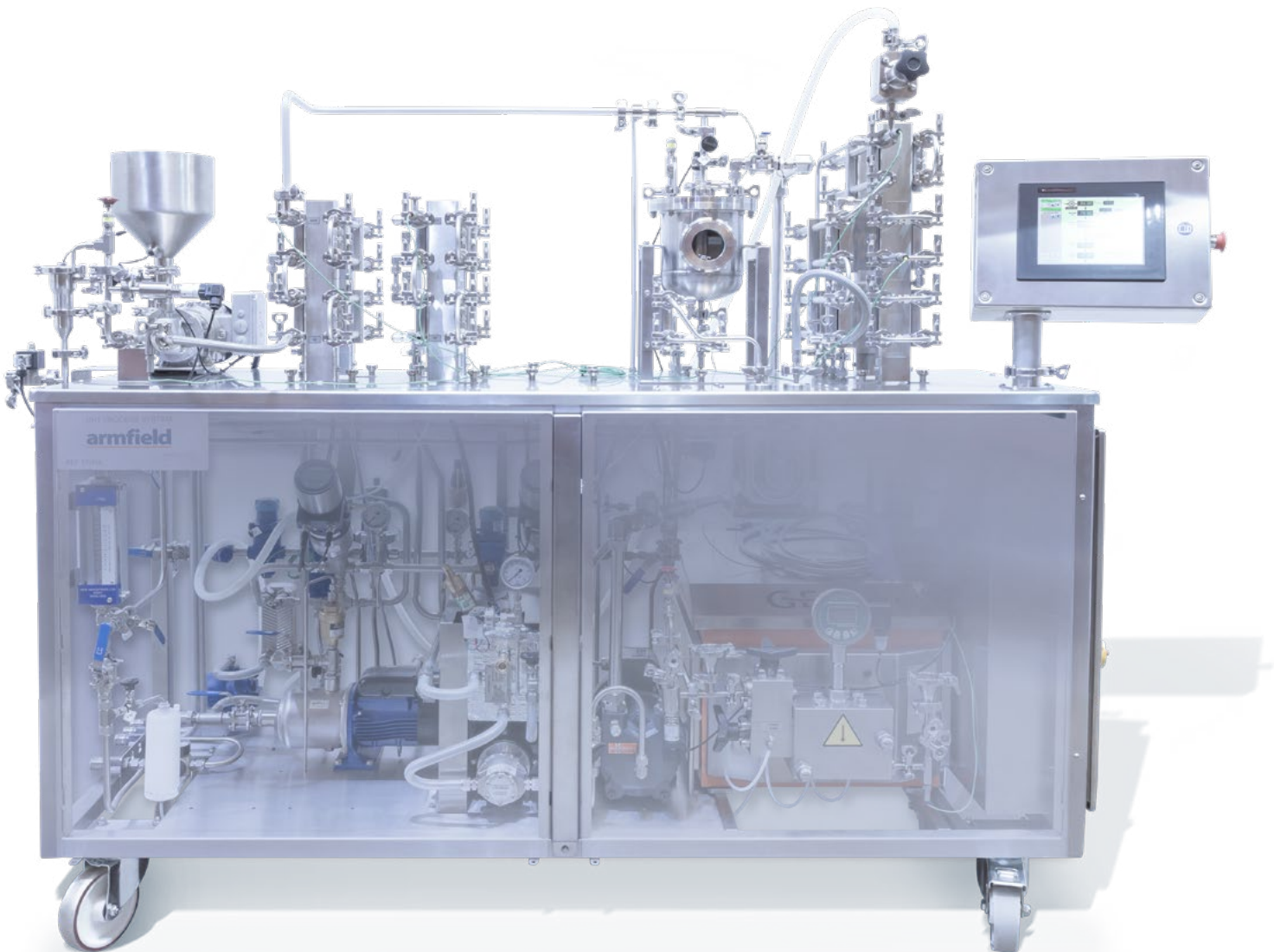


Modular Miniature Scale HTST/UHT Process System – FT174X

The FT174X is a modular HTST/UHT processing system designed to treat products at flow rates of 10-40 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), SSHE, aseptic processing, upstream or downstream homogenisation and additional chilling are available.

**Features / benefits**

- ▶ High degree of user configuration
- ▶ Rapid start-up and shut down
- ▶ Switch-over between heat exchangers is quick and easy
- ▶ Links directly to sterile filling bench
- ▶ Direct and/or indirect heating
- ▶ Small footprint can contain tubular & plate heat exchangers, scraped surface heat exchangers (SSHE), DSI module & homogeniser
- ▶ Low product hold-up
- ▶ Totally modular system
- ▶ Full sterile capability options
- ▶ Touchscreen control panel for ease of use with 32 presets
- ▶ Hygienic fittings as standard
- ▶ Integral homogeniser option
- ▶ Standard throughputs from 10-60 l/hr
- ▶ Maximum product temperature setting of 160°C
- ▶ Controllable preheat and cooling
- ▶ Built-in CIP facility
- ▶ USB data logging option
- ▶ Electronic flow meter option

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Issue: 2

URL: <http://www.armfield.co.uk/ft174x>

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Description

Base unit (FT174X)

The base unit comprises a stainless steel table for mounting the process equipment, a feed pump and vessel, the touchscreen 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 tabletop 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 and CIP Pump.

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

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 sterile 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.

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

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:

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.

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.

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 10 L/hr to as much as 150 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.



FT174X Option Overview

Base unit - (FT174X - comes with feed pump and vessel, touch-screen control panel and IP65-rated electrical cabinet. Shown here with all tabletop options & accessory module positions fully populated*)

Feed pump and vessel - (included with base unit - FT174X)

Flow meter - (option FT174-40)

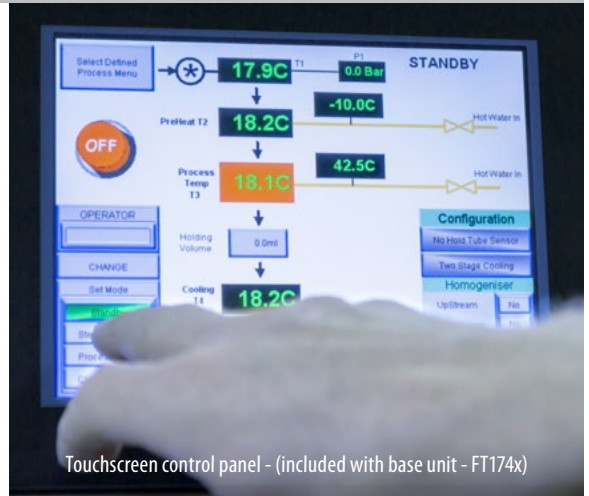
Tubular heat exchangers (preheat /main heat)
(accessory FT174-26, (8 tube), or FT174-25, (4 tube))

Variable holding tube - (accessory FT174-65)

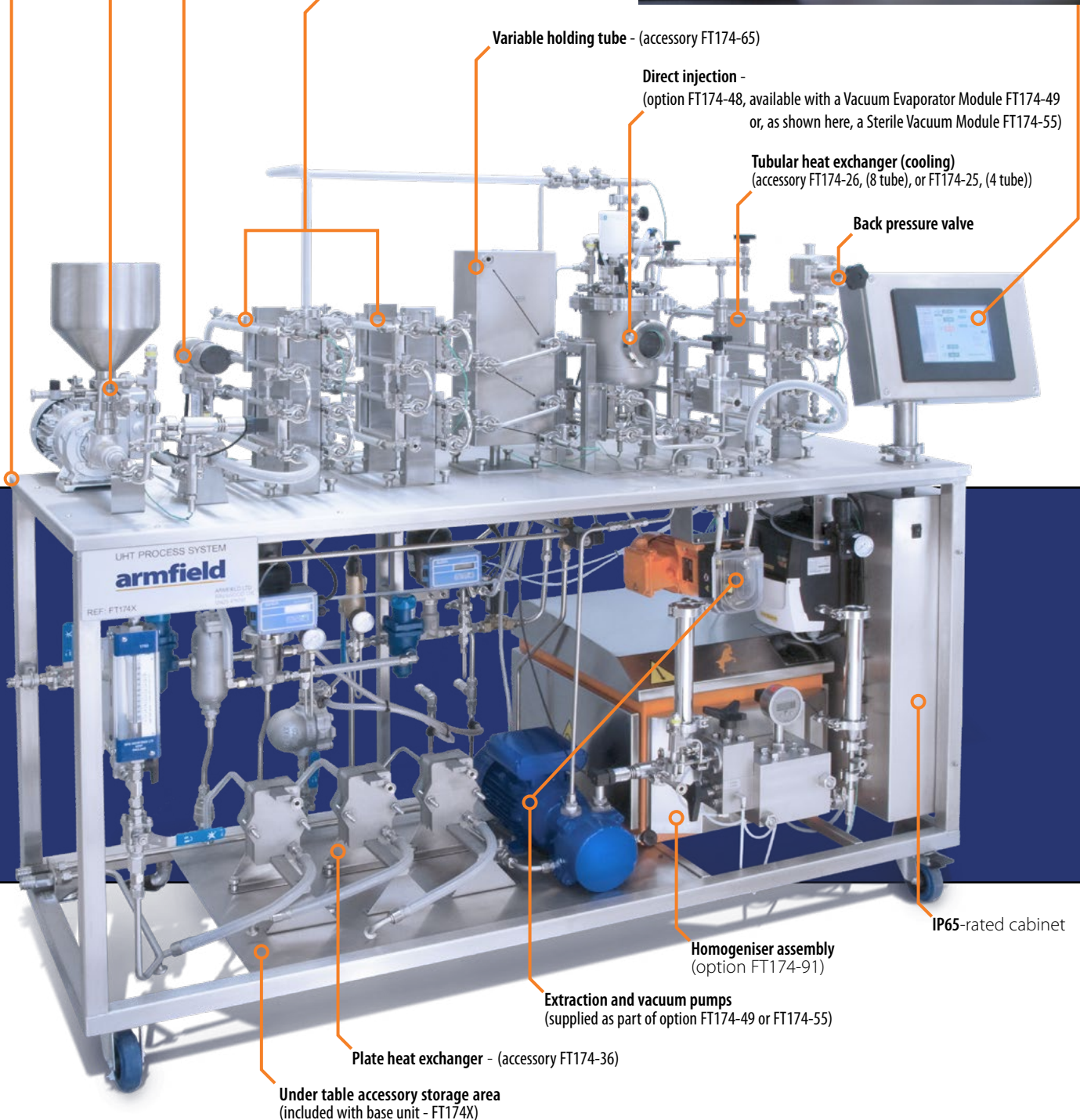
Direct injection -
(option FT174-48, available with a Vacuum Evaporator Module FT174-49 or, as shown here, a Sterile Vacuum Module FT174-55)

Tubular heat exchanger (cooling)
(accessory FT174-26, (8 tube), or FT174-25, (4 tube))

Back pressure valve



Touchscreen control panel - (included with base unit - FT174x)



Homogeniser assembly
(option FT174-91)

Extraction and vacuum pumps
(supplied as part of option FT174-49 or FT174-55)

Plate heat exchanger - (accessory FT174-36)

Under table accessory storage area
(included with base unit - FT174X)

IP65-rated cabinet

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.

Suction Feed Assembly (FT174-41)

The FT174-41 blanks off the hopper feed port and allows product to be drawn from an upstream tank or vessel.

When no more product is available, the float switch detects this and sends a 10 second warning to the operator before engaging a safety cut out to protect the system.

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. Pressure control in the system can be more finely regulated.

Additional Cooling Stage (FT174-43)

Adds the location points and plumbing for a fourth heat exchanger (second-stage cooling). Necessary accessory when using FT174-26 DUAL.

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. The FT174-45 is only needed when using indirect heat exchangers for the main cooling (i.e. not using the [D.S.I. and] 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 preheat 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 exchangers are used in position one for preheat and four for final cooling.

Controlled Cooling (FT174-51)

This option, used in conjunction with secondary cooling, allows the user to define an outlet product temperature. Flow rate of the secondary coolant is automatically adjusted to attain the defined temperature.

Vacuum Evaporator Module Option (FT174-49 or FT174-55) FT174-49

This module is used in conjunction with a direct system injection to evaporate away the injected steam and prevent dilution of the product.

It comprises:

- ▶ A module assembly located in position three, including:
 - 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

FT174-55

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.

CIP System for FT174 (FT174-52)

The FT174X has an efficient CIP facility built-in as standard. Should the unit be used for especially fouling products where very high cleaning velocities are required then this option may be specified. It includes a dedicated centrifugal pump which augments the cleaning provided by the feed pump.

Pressurised Hot Water Heating (FT174-58/FT174-59)

Secondary hot water heating circuits between the steam & product streams. This gives precise control over the temperature of the process temperatures between ambient and 150°C. When processing sensitive viscous products at lower temperatures, the accessory gives more stability in the temperature control.

Scraped Surface Heat Exchanger options (FT174-75)

The scraped surface heat exchanger can be used for both heating and cooling of your products and can be fitted at any position (preheat, main heat, cooling).

They are especially effective when viscous products are being processed of if they are non-newtonian fluids.

Product flow rates would be typically 10-20 l/hr.

Homogeniser Assembly (FT174-91)

Twin-piston two-stage variable flow rate homogeniser. Comes with with pressures up to 400 bar. 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 touchscreen. The pump speed can be automatically controlled to match the product flow rate.

Accessories (may be added at any time) Various heat exchanger and holding tube options can be easily added to the service unit.

Static Mixers (FT174-21)

Static mixers are available to promote turbulence in the tubes and improve heat transfer. One set provides mixers for two tubes.

Tubular Heat Exchanger (FT174-25)

A single bank of four tubes, with a 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.

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 FT174-26s can be mixed and matched with FT174-25s.

Dual Cooling (FT174-26-Dual)

When the direct steam injection option has been specified then the position normally taken for the primary cooling heat exchanger is unavailable. If low product outlet temperatures are still required, then a dual cool heat exchanger can be specified for the final position. This is a 16-tube heat exchanger, eight tubes for primary cooling and a further eight tubes for secondary cooling.

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 FT174-36s can be mixed and matched with tubular heat exchangers if required.

Suction Feed Assembly with automatic changeover (FT174-53)

This option adds an automatic water feed to the suction feed assembly (FT174-41) so that should a low feed level situation occur, the unit can switch to a pressurised water feed automatically.

This means the operation of the HTST system is not interrupted and sterility is not broken.

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 pre-sterilised containers in a sterile environment. The FT83-174 version is completely compatible with the FT174X and is controlled from the FT174X's touchscreen.



Mixing tanks (FT140X)

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.



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.



Feed and holding tanks

Armfield also offer a range of feed and holding tanks.

Please contact us with your specific requirements.



Requirements

Scale



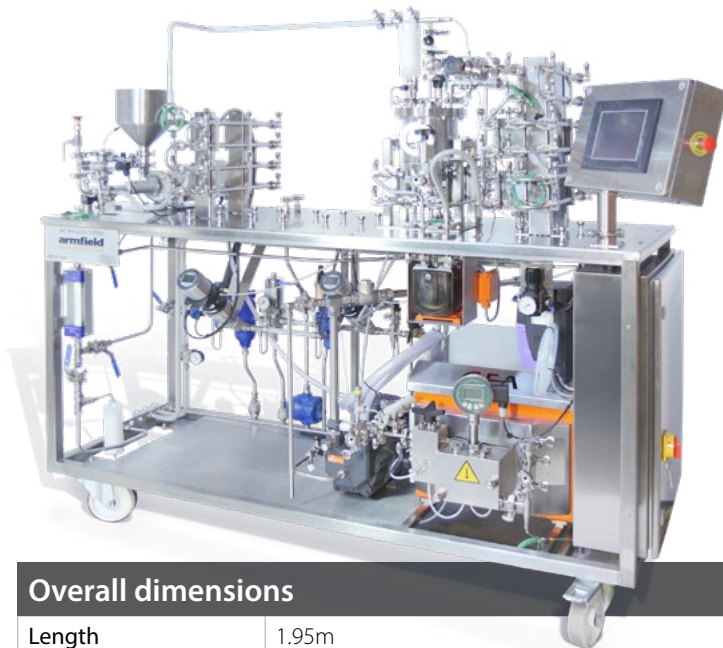
- ▶ **Mains water :** 5 l/min @ 2 bar
(10 l/min if FT174-49 or FT174-55 are fitted)
- ▶ **Electricity:** 230V / 1ph / 3ph / 50-60Hz @ 6 amp
(16 amp if FT174-49 or FT174-55 are fitted, if the FT174-91 Homogeniser option is fitted, total power requirement is 30A, 230V, single phase or 16A, 400V, three phase)
Consult Armfield for other options
- ▶ **Compressed air:** 6 bar
- ▶ **Steam:** 6 bar, estimated consumption 15 kg/hr
- ▶ **Note:** Armfield can supply a steam boiler if required, order code UOP10.

Software

The armBUS software enables the operator to select the appropriate stage of the process and a mimic diagram with measured variables is displayed. The speed of the pump can be varied to meet the required flow rate.

Results are saved in a log, which can be viewed and manipulated with the armBUS results viewer. Results can be printed or exported in a spreadsheet format, which can be opened in a wide range of packages for further analysis.

View details at: www.armfield.co.uk/armsoft



Overall dimensions

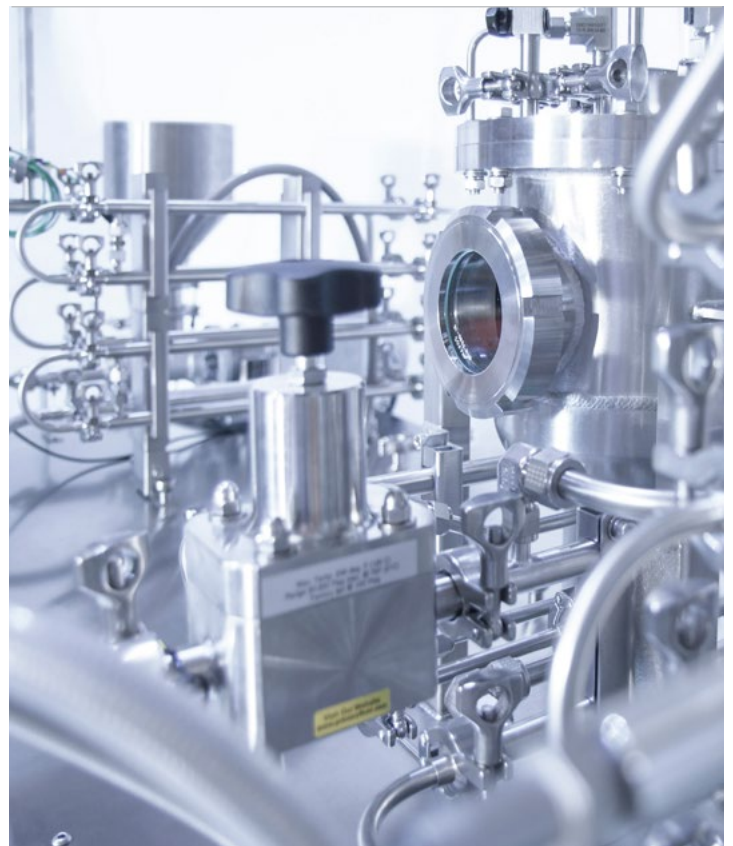
Length	1.95m
Width	0.80m
Height	1.50m

Packed and crated shipping specifications

Volume	4m ³
Gross weight	567Kg

Applications

- ▶ Baby foods
- ▶ Beer
- ▶ Beverages
- ▶ Condiments
- ▶ Confectionery
- ▶ Milk
- ▶ Cream
- ▶ Ice-cream
- ▶ Yogurts
- ▶ Desserts and puddings
- ▶ Fruit and vegetable purées
- ▶ Fruit juices and cordials
- ▶ Sauces and soups
- ▶ Gravies
- ▶ Gelatine products
- ▶ Pet food
- ▶ Health and nutritional products
- ▶ Culture media
- ▶ Proteins
- ▶ Pharmaceuticals



Please note:*The FT174X shown in this data sheet is configured with a selection of the options¹ & accessories² available and represents one of many configurations made possible by the flexibility of this versatile modular system.

¹ options to be defined at time of order

² accessories can be added at any time

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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