FT SERIES

Neutraliser/Washer/Bleacher – FT66

The Armfield FT66 Neutraliser/Washer/Bleacher is a floor-standing batch processing system. The unit is capable of performing all 3 stages on small quantities of crude edible oils and facilitates practical research and development.

Features / benefits

- Small quantities of oil can be processed
- No consumable filter elements required
- Simple Controls
- Surfaces in contact with the process fluid are stainless steel
- Agitation by variable speed flat blade impeller (variable to 1800rpm)
- Working vacuum of 75mm Hg (ABS) with liquid ring vacuum pump
- Pressure leaf filter designed to BS5500 - compliant with PED
- 25 litre vessel designed to BS5500 - compliant with PED
- Compact and self-contained
- Cooling coil
- Extraction pump
- Electrical heating element

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Description

The main reactor vessel, reagent vessels, filter pump and filter are constructed from stainless steel and are mounted within a floor-standing, stainless steel framework. A variable speed agitator, electrical heating element, cooling coil and observation port are incorporated in the reactor, which is a vertical cylindrical vessel designed to process a 25 litre batch of oil.

A liquid ring vacuum pump, also mounted within the framework, is used to create the desired vacuum in the vessel.

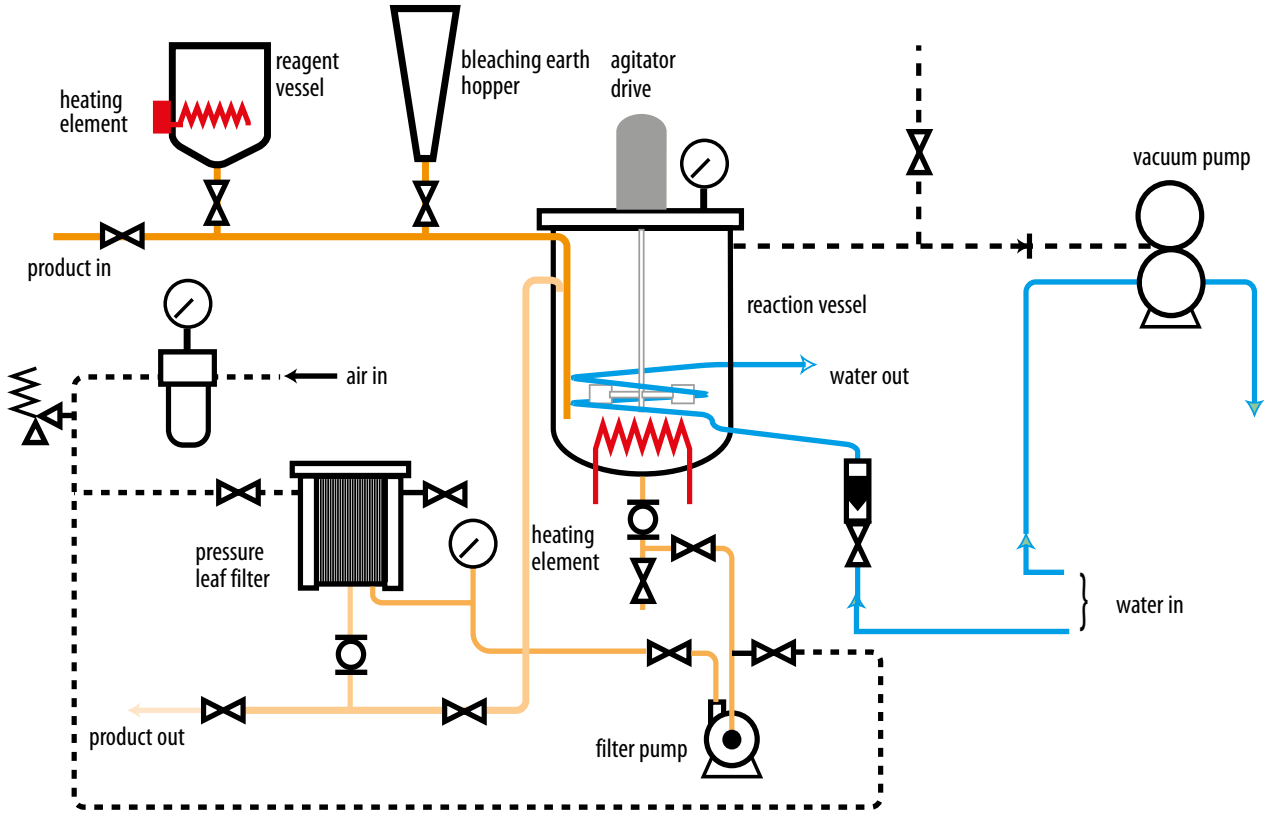
Processing under reduced pressure prevents oxidation of the oil and promotes drying. Vacuum suction is also used to charge the reactor with crude oil and to add reagents and bleaching earth from the appropriate vessels. The reagent tank is used to make up caustic solutions and other additives and to preheat to the desired temperature prior to addition to the reactor. Water for the washing process is also preheated in this vessel. The heating element in the reagent tank is controlled automatically by an electronic controller in the control console. The desired operating temperature of the reactor vessel contents is achieved using an immersed electrical heating element with a maximum power input of 3kW.

The heating operation is controlled using a digital display electronic controller, which automatically maintains the temperature.

Cooling of the hot oil is achieved by circulating cold water through a submerged coil. A flat blade agitator in the reactor is driven by a geared electric motor and the speed of the motor can be adjusted up to a maximum of 1800rpm using a potentiometer on the console. Agitation of the oil charge promotes mixing of reagents and adsorbents with the oil as well as increasing heat transfer efficiency of the heating and the cooling cycles.

The bleaching earth hopper is a steep sided conical vessel designed to enable dosing of the required amount of bleaching earth into the reactor. It is also used for the addition of other adsorbents such as activated carbon. Diatomaceous earth can be charged from this hopper as an aid for the filtering process.

A stainless steel centrifugal pump is used to transfer the oil to the filter in order to filter out any solids previously added. The filter is a pressure leaf type, which is designed for repeated use with no consumable filter elements required. By recirculating the oil/adsorbent mixture through the filter, a layer of solids is built up on the filter mesh screen upon which the remaining solids are deposited. When the oil is clear, it is discharged from the reactor through the filter after which the 'filter cake' is dried using compressed air so that it can be removed easily from the filter screen.



Schematic diagram of the FT66

Modes of operation

Crude oil, freshly extracted from seed contains undesirable impurities, which must be removed. These include free fatty acids, phosphatides, colour pigments and fine particles.

Using the FT66, the crude oil can be refined by operation in the following modes:-

Neutralisation/Washing:

Free fatty acids are removed by neutralising them with a strong base such as caustic soda, which forms a water- soluble soap.

The soap is then removed by a combination of thorough washing, gravity settling and draining.

Phosphatides are also removed by washing, settling and draining after the addition of phosphoric acid to form water-soluble gums. Any water remaining in the oil is dried by heating the oil under vacuum.

Bleaching:

Colour pigments are removed or reduced by the addition of an adsorbent such as Fullers Earth.

The desired colour of the oil can be obtained by adjusting the amount and type of earth used and the physical conditions under which the bleaching operation is carried out.

Filtration:

After bleaching, an efficient filtering process ensures that the earth and other particulates are removed leaving a clean, refined oil ready for further processing such as hardening and deodorising.

The filter used for this is a pressure leaf type, which is commonly used in the edible oil industry for the removal of adsorbent.

Example product, palm oil, essential oils, vegetable oil

Technical specifications

Reactor vessel	
Material	stainless steel
Total volume	45 litres
Working volume	25 litres
Diameter	0.30m
Height	0.65m
Heating element	3.0kW
Cooling coil area	0.12m^2
Agitator speed	250-1800rpm
Reagent vessel	
Material	stainless steel
Working volume	3 litres
Diameter	0.165m
Height	0.20m
Heating element	1kW
Earth hopper	
Material	stainless steel
Volume	0.3 litre
Pressure leaf filter	
Material	stainless steel
Filter volume	3.8 litres
Filter cake capacity	1 litre
Filtering area	0.09m^2
Filter screen	110 mesh (0.3mm wire)
Maximum pressure	3.0 bar
Vacuum pump	
Type	liquid-ring
Sealant	water
Working vacuum	75mm Hg (ABS)
Sealant flow rate	8 l/m

Requirements

Scale

- Electricity supply: Three phase (see ordering codes)
- Water supply: 30l/m @ 3.0 bar min/5.0 bar max
- Compressed air: 20l/s @ 3.0 bar min/10.0 bar max

Overall dimensions

Length	1.28m
Width	1.90m
Height	1.90m
Packed and created shipping specifications	
Volume	2.0m^3
Gross weight	500Kg

Performance

Independent tests carried out by Manchester Metropolitan University, Hollings Faculty using crude Rapeseed oil gave the following analytical results

	Crude Oil	Neutralised	Bleached
Iodine value	117	117	117
Free fatty acid	1.5%	0.12%	0.1%
Colour	70 Yellow	50 Yellow	20 Yellow
	7 Red	3.3 Red	0.5 Red
	3.2 Blue		
Soap in oil	—	<100ppm	nil
Peroxide	0.4 meguiv/kg	nil	nil

Capabilities

- Effect of variation of operating parameters such as temperature, vacuum and degree of agitation
- Selection of the correct amount and strength of caustic solution for the particular oil
- Selection of the type and quantity of adsorbent for the bleaching operation
- Optimization of operation of a pressure leaf filters

Ordering codes

- FT66-C: 415V/3ph/50Hz, (14kW)
- FT66-D: 208V/3ph/60Hz, (10kW)
- FT66-E: 380V/3ph/50Hz, (13kW)
- FT66-F: 220V/3ph/60Hz, (10kW)

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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CE

Products CE certified

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