IF Series

IFH

(Intelligent Flavour System Heated)

SPI Developments Ltd

spi
Fluid Control Experts
a Tembo company

At SPI Developments, we take pride in being the UK's leading manufacturer of Glue and Flavour Systems tailored specifically for the Tobacco Industry.

All of our Intelligent Flavour Systems are expertly designed, assembled, and tested at our state-of-the-art manufacturing facility in Rotherham, United Kingdom.

SPI Developments Ltd
a Tembo company

IFH System Overview:

The IFH Intelligent Heated Flavour Application System is built around a mobile base unit that can be connected to different parent machines and applicators as required.

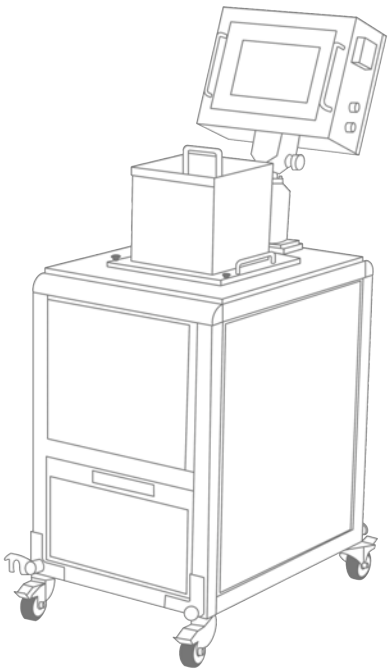
It has the capability of delivering hot or cold liquids into a product, using a high precision micro-gear pump driven by a microprocessor-based control system that ensures consistent and accurate liquid delivery per product at the correct temperature, regardless of host machine speed.

The base unit can be connected to other SPI Intelligent modules to give a flexible platform for applying multiple liquids to products during manufacture.

The module tracks the host machine speed via an SPI supplied high resolution encoder to ensure that the system delivers flavour to the product at a rate proportional to machine speed, within a very high tolerance.

The system delivers liquid via a heated hose to an applicator suitable for the type of product required.

The heating system is designed to prevent menthol from freezing when the host machine stops, ensuring immediate restart.



Key Features:

· Microprocessor control system, with options for open or closed loop control logic
· Micro-gear pump, driven by a servo motor via a magnetic coupling
· Heated Coriolis flow meter to measure liquid flow rate and ensure the system is operating within tolerance.
· Dual tank ingredient hopper system with changeparts to suit customer flavour ingredient requirements, with high menthol melt rate capability for high flavour load product.
· Highly accurate temperature control
·High resolution touch screen
· Filter system to protect the system from foreign matter in the flavour.
· “Plug n play” interface system to allow easy connection to other modules.

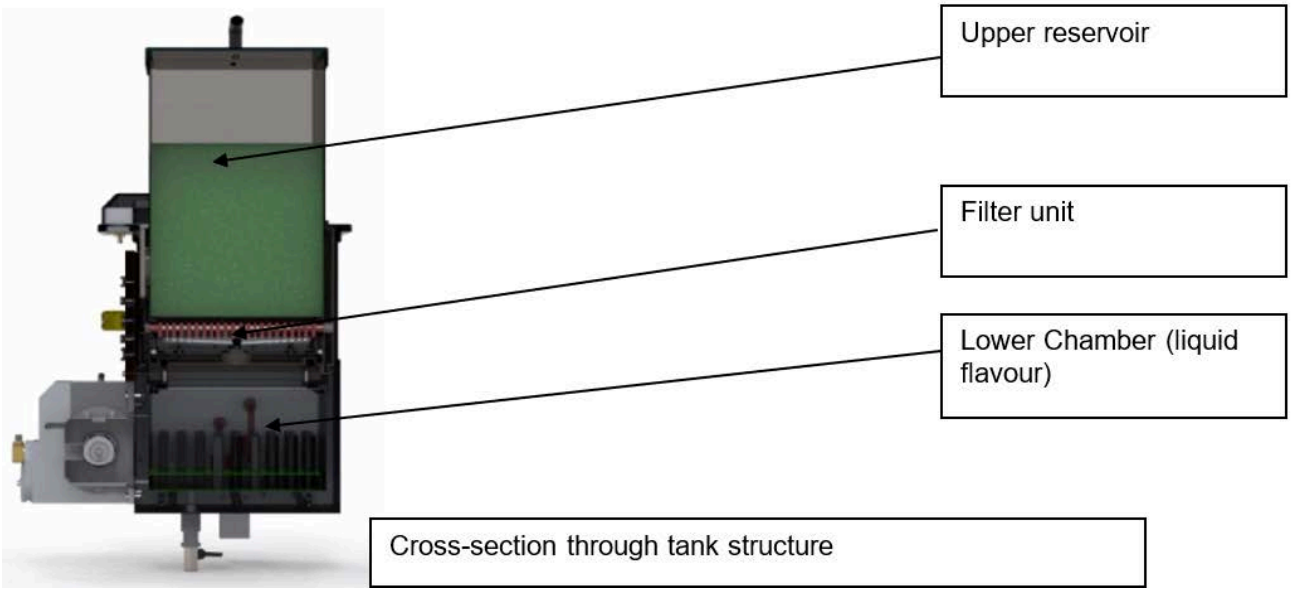
IFH Advantages:

The IFH is a modular system that allows many different system specifications to be created to suit end-user requirements, giving great flexibility to manage end-product and host machine changes.

We believe the IFH system will offer the end-user the following advantages:

- Dispenses liquid with high accuracy and consistency, at a rate proportional to the parent machine speed.
- Includes in-built pre-melt technology and dual menthol tank system to give high menthol melt rate without damaging menthol oils (heated hopper only) and rapid startup from cold.
- Filter system to prevent any foreign material being applied with the flavour
- Provides a clean and safe method of applying flavour to the product, with minimal environmental and machine contamination.
- Includes a Coriolis flowmeter to allow operation with open or closed loop control, automatic calibration and multi stage calibration for more accurate delivery during acceleration and deceleration.
- Easy switch between standard and flavoured product.
- Easy change between cold and heated flavours by using hopper change-parts
- Easy installation onto host machine, with minimal electrical interfacing required.
- Easy to move between different host rod making machines
- Many different types of applicator available depending on product requirements.
- Slim-line heated hose assembly allowing easier positioning of the hose on the parent machine.
- Easily connected to other SPI “Intelligent” modules to create a multiple liquid application system.
- The equipment is compliant with current CE, UKCA and other tobacco industry regulations.

Hopper Arrangement Options:



Specification:

The flavour hopper system has three sections:

· A lower heated tank for maintaining liquid flavour at the correct temperature for application.

· A filter element

· An upper hopper containing either menthol crystals, hot or cold flavour, acting as a feed reservoir for the lower chamber. There are three types of hopper depending on flavour types required.

The lower chamber includes upper and lower level sensors to trigger the delivery of flavour from the upper hopper, together with temperature sensors and heaters to ensure the correct temperature is maintained (normally 50-55 deg C for menthol).

The upper chamber is easily removable to allow access to the filter and for general cleaning purposes. It also contains a level sensor to warn when the level of flavour is at a critically low level. The electrical connection to the lower tank is made by an integral electrical socket that mates with an opposite half on the lower section. The internal areas of the unit are protected by a lining wall.

Hopper Arrangement Options:

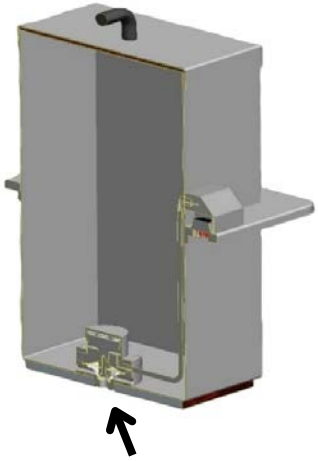
Melt on Demand hopper for Heated Menthol (standard crystals):

Specification:

Menthol crystals (natural or synthetic or a mixture of both) are placed in the upper chamber of the tank system, which has a metal base that is heated only when required. The walls are made of insulating material so that only the bottom layer of crystals is melted.

When the sensing system in the lower tank calls for molten menthol, the base of the upper section will heat up and melt the crystals at a high rate, thus filling the lower tank with molten menthol at a rate that ensures the system will keep up with the demand for menthol from the parent machine. Once the lower tank reaches the upper limit, the melt system will turn off until required again. The system will operate this cycle at a frequency that depends on the system overall flow rate.

Cold Flavour Hopper:



Liquid release valve

Specification:

The cold flavour hopper is designed to hold cold flavours and release the liquid in a controlled manner.

When the sensing system in the lower tank calls for more liquid, the valve in the base of the upper section is opened and liquid is allowed to flow, thus filling the lower tank with cold flavour at a rate that ensures the system will keep up with the demand for liquid from the parent machine. Once the lower tank reaches the upper limit, the valve will turn close until required again.
SPI Developments also offer an automatic bulk refill system, to ensure that the hopper fluid level is maintained.

Cold Hopper Stirrer:

To ensure that mixed cold flavour remain constant, and does not separate during non-run time, we can include a cold hopper stirrer to ensure constant agitation of the fluid.

Hopper Arrangement Options:

Universal Hopper:

Specification:

This form of hopper was designed specifically for powered menthol (snowflake) and eliminates the risk of the powder bridging and leaving voids within the hopper.
It can however also be used for natural menthol crystals and liquid flavours (heated or cold).
This solution provides extra flexibility if multiple flavours are to be used.

SPI High Precision Gear Pumps:

Intelligent Pump Module

The IFH includes an “intelligent pump motor” module, with the following features

- Integrated pump motor control microprocessor
- Micro precision gear pump assembly
- Magnetic coupling between pump and motor
- Servo motor drive for the pump
- Diverter valve assembly to allow liquid to be automatically switched between flow to the parent machine and recirculation mode
- Easily removable filter cartridge which protects the filter from dirt ingress
- Heater element to ensure correct temperature maintenance

Different capacity gear pumps can be supplied depending on output requirements (typically but not limited to 5 to 600g/min)

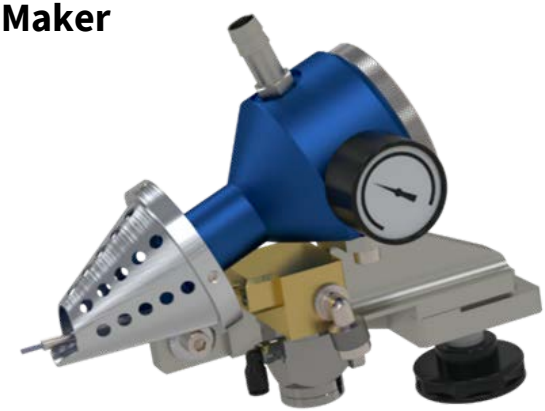
Flavour Application Options:

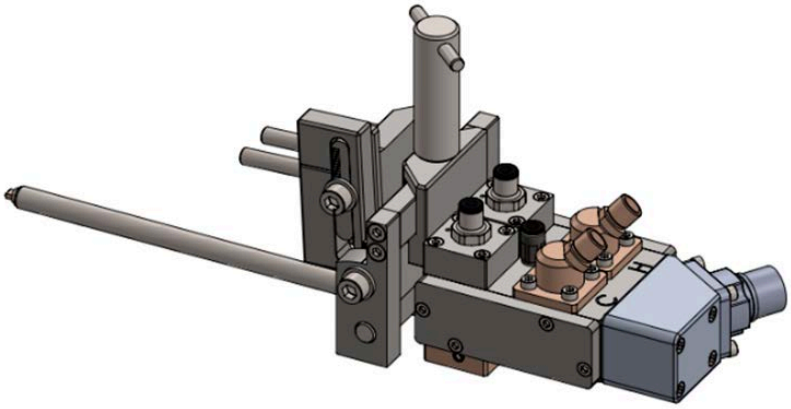
Replacement Stuffer Jet / Applicator for Filter Rod Maker

The application of the flavouring is normally done via an injector nozzle which feeds flavour into the centre of the tow, as it leaves the transport jet.

A new SPI transport jet and mounting is included with the IFH, so that the applicator module can be correctly mounted. The mounting allows the transport jet to be retracted away from the tongue and swung out to allow for easy system calibration and cleaning.

Injection nozzle:
1.0mm and 1.5mm diameter nozzle tubes are supplied as standard to allow the tube to be matched to the required flavour flow, thus ensuring a consistent application rate. The applicator tube is also heated when the host machine stops to ensure the flavour does not freeze on restarting the host machine.





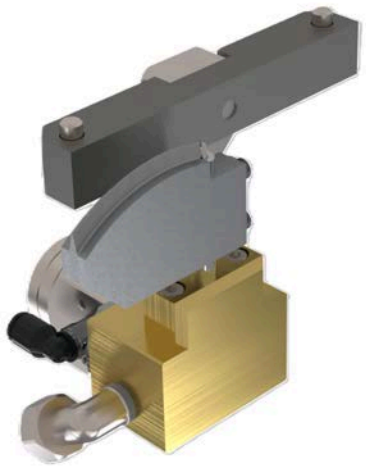
Dual Flavour into Filter Rod Tow

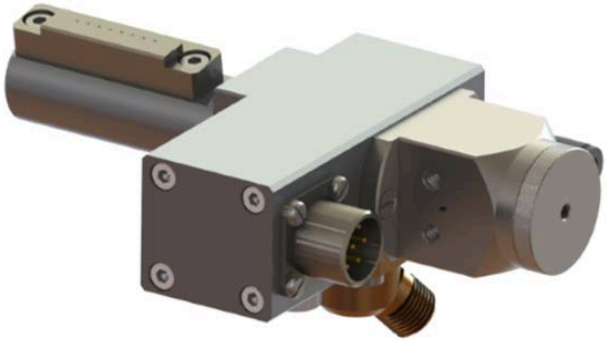
SPI also offer a dual flavour applicator (heated or cold) allowing for two different flavours to be simultaneously injected into the filter rod.

Flavour application to Tobacco - Post Ecreteur discs

The applicator is mounted below the rail and the nozzle protrudes up into the gap between the inner and outer rails. The angle of the applicator nozzle can be adjusted as required (limited by space available).

The tip of the nozzle is protected from wear by a “shoe” which prevents tobacco choking and ensures that the flavour is applied as close to the centre of the tobacco as possible, thus reducing flavour contamination on the host machine.



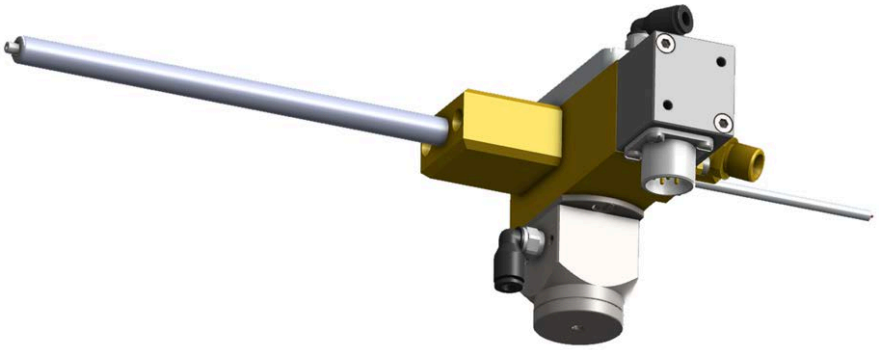


Cigarette / Filter Paper

SPI also offer the option for applying flavour to the cigarette or filter paper
A multi-line applicator is fitted to the paper run on the front of the host machine, designed to ensure no gaps in the flavour lines. The applicator has X-Y position micro-adjustment to ensure the correct line positions.

Filter Thread Feed

A version of the filter stuffer jet/flavour applicator module with thread feed can also be supplied, allowing the flavour and thread to be inserted into the filter together. This ensures that the correct amount of flavour is always applied, regardless of flavour carrying capacity of the thread. System options include thread break detection with host machine shut down, bobbin holders and other variations.

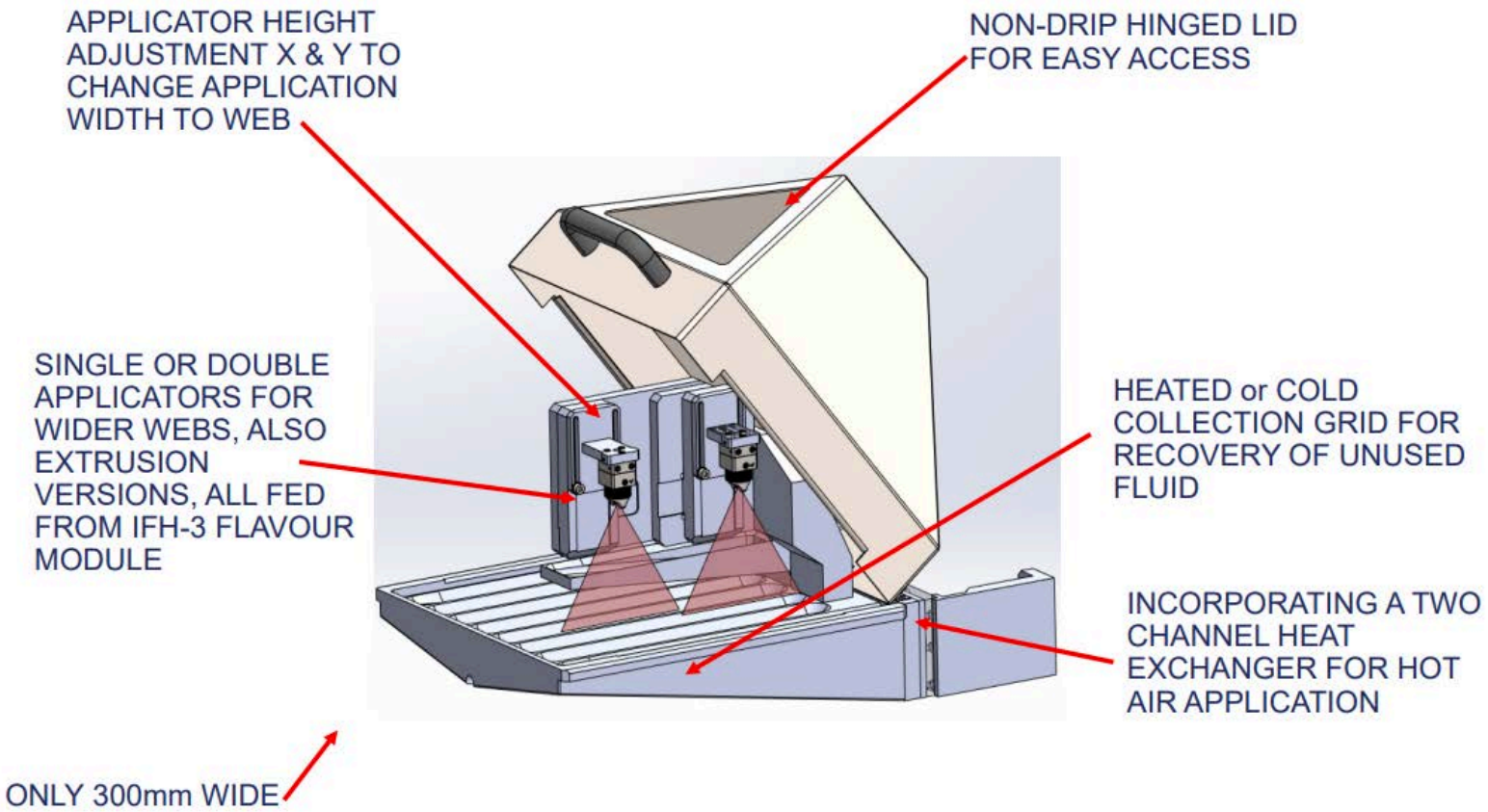


Heated Flavour Application Chamber - HFAC

The application of cold or heated fluids proportionally to moving wide webs of substrate

This unique unit is designed to apply & distribute liquids cold or heated proportionally onto wide (> 40mm) moving webs of substrates. Typical application where this unit is intended to be used:

- Conventional filter making where flavours are added to the Tow
- Applying liquids to crimped paper for making mono paper filters
- Applying Glycol or glycerol / flavours to crimped reconstituted tobacco web for HnB segment
- Applying Glycol or glycerol / flavours to strip cut reconstituted paper – HnB segment
- Applying Glycol or glycerol / Flavours to crimped paper HnB segment.



Other Key Elements of the IFH:

Recirculation Mode:

When the system is an automatic mode and the host machine is not running, the pump will continue to run but the liquid will be diverted back into the tank. This ensures that the liquid remains fully mixed and of consistent quality.

Coriolis Flowmeter:

The IFH is fitted with a Coriolis flowmeter to suit either high flow rates (30-600g/min) or low flow rates (5-30g/min).
The Coriolis flow meter provides the following advantages over a geared flowmeter:

· Automatic pump calibration instead of manual pump calibration
· Allows pump capacity and performance to be monitored and warning provided when maintenance is required
· Allows multistage calibration routine which ensures that the flavour pump is calibrated automatically for all possible flow rates and host machine speeds, improving application accuracy during acceleration and deceleration.
· Allows for either open or closed loop control of the flavour pump to ensure increased accuracy of flow during production
· Increased reliability for flowmeter, as it is not affected by foreign particles in the menthol

Filtration:

The system has two levels of filtration to protect the equipment and also prevent any foreign matter entering the end product:
· The flavour is filtered immediately below the upper chamber to ensure that no foreign material enters the lower chamber
· Each pump has a filter to protect it

HMI Control Screen

The IFH includes a high-resolution HMI touch screen module, mounted on the top of the main unit, which allows the operator to set up and control the system, changing such factors as flow rates, temperature and other machine settings. It uses Embedded Windows software as an operating system

It also provides the following:

- Datalogging capability for live machine run data and also events, such as alarms, calibration etc
- Live monitoring and display of flow rates, machine speeds and other parameters
- Remote access capability to allow remote support and troubleshooting by SPI

Data Analysis:

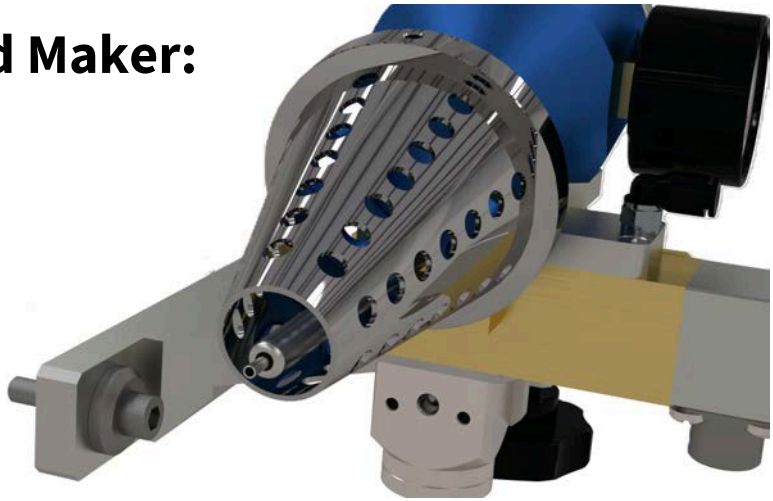
The system collects running data at user specified intervals (typically every few seconds) and also records all events, such as alarm stoppages, calibrations and specification changes.

This data collected by the system can be downloaded via USB or Ethernet connections for later analysis.

Alternatively, a data analysis and presentation package is available from SPI as an extra cost option.

Interface Between IFH and Rod Maker:

The SPI flavour equipment and the rod maker will have the following connections:



Applicator and mountings-

Flavour applicator and mounting are mounted on the rod maker.

Speed measurement-

The IFH system uses a high precision SPI paper encoder fitted to the host machine's backplate.

Intelligent Machine Interface (IMI)-

SPI will supply an IMI interface module as part of the system. This allows the following electrical connections between the rod maker and the IFH:

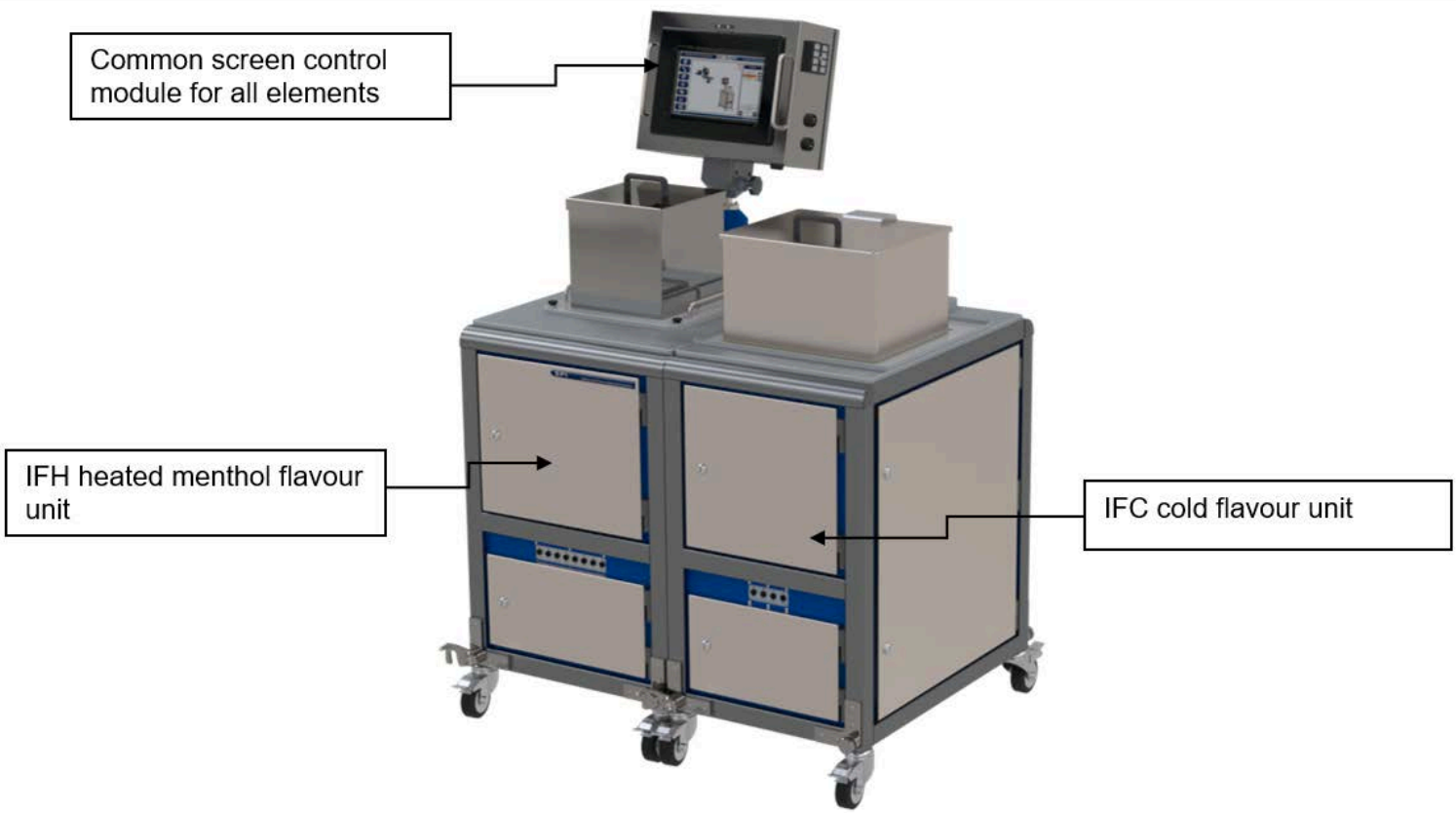
A. 3 phase power supply - from Host Machine to IFH
B. Start signal - from Host Machine to IFH
C. Stop signal - from IFH to Host Machine
(IFH will stop rod maker under fault conditions)
D. Eject signal - from IFH to Host Machine

Modular Systems:

SPI's range of flavour and adhesive systems, including the IFH, have been designed in such a way that they are fully modular.

The result of this unique design is that multiple systems can be interconnected using bespoke link cables and they can be operated from a single HMI screen.

Systems can be connected to each other as illustrated in the image below or can be physically removed from each other but connected via a link cable. This second method is ideal for scenarios where the flavour system is a mobile device but, for example, an adhesive system is installed upon a rod making machine.



On powering the devices, the HMI will automatically scan for connected systems and will perform an autoconfiguration routine to ensure that the HMI displays the relevant live data and permits setting changes to be made for each system.

In the above image, an IFH has been connected to an IFC unit and this allows heated and cold flavours to be dispensed to any form of flavour applicator or multiple applicators.

Technical Specifiation:

Unit Size	760mm long x 500mm wide x 1260mm high
Flavour Types	Natural/Synthetic Menthol Crystals or Cold Flavours
Operating Temperature Range	0-70 degrees C
Tank Capacity	Upper tank - approximately 10kg menthol crystals*
Max Flow Rate	Approximately 600g/min. Higher flow rates are achievable upon request.
Flowmeter	Coriolis flow meter to suit normal operating flow rate
Application Accuracy	< +/- 1%
Parent Machine Rod Speed	Up to 600m/min
Flavour Application Method	SPI Replacement Stuffer Jet / Flavour Applciator into Tobacco Stream / onto Plug Wrap Paper
Product Ejection	The unit can provide a signal to the host maker control module, to allow product to be ejected by the maker under the correct conditions.
Control System	The unit uses a dedicated microprocessor control module to give high pump and application accuracy. The control panel is accessed via an easily removable side panel on the unit.
Electrical Supply	3 phase supply required, with the customer responsible for providing this voltage. 3 Phases, Earth and Neutral are required.
Air Supply	5 bar supply required, with minimal consumption
Safety/Guarding	The guarding of the equipment systems is designed to meet the latested Machinery Safety Standards and conform to current machinery requirements.
Noise	Levels are minimal and significantly below 70dB
Documentation	The equipment will be delivered with a full set of documentation in electronic form. The documentation will be in English, with other languages available if required.
CE Compliance	The equipment will be fully compliant with all the relevant European Directives and Standards and will be supplied with CE Certificates of Conformity. If local regulations apply different standards, the stricter ones will be applied. In particular the following standards.directives will be respected: - Machinery Directive: 98/37/CE Electromagnetic Compatibility Directive: 89/336/CEE Low Voltage Directive: 73/23/CEE Safety of Machinery: EN12100 1&2 Emergency Stop: EN418 Electircal Equipment of Machines: EN60204-1 EMC Emission Standard: EN61000-6-4 EMC Immunity Standard: EN61000-6-2 Risk Assesment: EN1050

SPI Developments Ltd
1, Eden Close
Hellaby Industrial Estate,
Rotherham
South Yorkshire
S66 8RW, United Kingdom

Tel: +44 (0) 1709 541143
Web: www.spidevelopments.com
Email: enquiries@spidevelopments.com
Registered in England: Number 453 2216
VAT Registered Number: GB 727836012

spi
Fluid Control Experts

a Tembo company