

## INNOVATIVE PARTNER FOR COLD CHAIN SOLUTIONS

PHC is the perfect specialist partner to ensure cold chain integrity, efficiency and reliability. We understand cold storage sample security and offer a range of solutions for your cold storage needs.

### Model Ranges:

MIR Cooled Incubators | MPR Pharmaceutical Refrigerators  
Biomedical ECO Freezers | Biomedical ECO Plasma Freezers  
VIP ECO Freezers | VIP ECO SMART Freezers | TwinGuard Freezers  
FrostLess Freezers | Cryogenic Freezers | CBS Isothermal Freezers



All PHC Biomedical refrigerators and freezers are manufactured using world leading technology and specialist engineering to deliver products of the highest quality and durability. Of equal importance is our dedication to delivering exemplary levels of technical support and customer care, helping users to achieve maximum lifespan and the greatest return on investment from their equipment.

**PHC offers our products and support globally to ensure we can meet the needs of our cold chain customers wherever they are.**

# Your innovative partner in **COLD CHAIN** solutions

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# MIR Cooled Incubators

## All-round performance

MIR Cooled Incubators are suitable for a wide range of applications. These incubators offer precise, repeatable control of programmable temperatures and controlled ambient storage conditions.



## High-precision Temperature Control

Precise temperature control with a high precision microprocessor combined with a heater PID and compressor on/off system.

## Wide temperature control range from -10 °C to +60 °C

With a wide temperature range from -10 °C to +60 °C, MIR Cooled Incubators allow a range of storage environments.

	MIR-154-PE	MIR-254-PE	MIR-554-PE
Effective capacity	123L	238L	406L
Temperature Range	-10 °C to +60 °C		

Fan forced air distribution for temperature uniformity throughout the chamber. Microprocessor controller with LCD display, data logging and comprehensive alarms and diagnostics.



# MPR Pharmaceutical Refrigerators

## Uniform storage temperature for the most demanding conditions

MPR Pharmaceutical Refrigerators offer a complete solution for the most demanding requirements for storage of pharmaceuticals, medicines, vaccines, and other temperature-sensitive applications.



## Wide Temperature Range

The temperature of the MPR-722(R) and MPR-1412(R) can be set between 2 °C and 23 °C.

## Excellent Stability

The quiet, 120 mm diameter fan ensures an even temperature distribution throughout the cabinet, creating tight  $\pm 3$  °C uniformity, whilst maintaining excellent recovery characteristics.

## User-friendly Design

The broad, solid frames with effective gaskets ensure excellent temperature stability, whilst double-pane glass windows offer an excellent view of the interior. Optional panels are available to block out light.



	MPR-722-PE	MPR-722R-PE	MPR-1412-PE	MPR-1412R-PE
Effective capacity	684L	671L	1364L	1359L
Temperature Range	+2 °C to +23 °C			

## Microprocessor controlled

An electronic sensor accurately monitors chamber temperature and feeds the information to the microprocessor for precise control at preset temperature. Fans ensure air circulation to provide uniform top to bottom temperature control and recovery after frequent door openings. PHCbi's easily calibrated, reliable and stable controls make validation easier.

## Sensitive Sample Storage

MPR Pharmaceutical Refrigerators are ideally suited for sensitive biological and pharmaceutical storage.

## MPR Sliding Door Pharmaceutical Refrigerators

Sliding glass fronts for minimal installation space and efficient inventory monitoring.



## MPR Sliding Door Pharmaceutical Refrigerators

	MPR-S500H	MPR-S500RH	MPR-1014-PE
Effective capacity	554L	550L	1033L
Temperature Range	+2 °C to +14 °C		

# Biomedical ECO -30 °C Freezers

Biomedical ECO -30 °C Freezers have natural refrigerants and Inverter Compressors to minimise energy consumption, reduce environmental impact, save money on running costs and enhance performance.



## Natural Refrigerants and Inverter Technology

Naturally occurring hydrocarbon [HC] refrigerants have minimal effect on the environment and are compliant with environmental legislation for climate control. Combined with inverter technology, these refrigerants also provide more efficient cooling without compromising cooling performance, ambient tolerance and recovery speeds following door openings.

## Safe & Secure Sample Storage

Biomedical ECO freezers have high and low abnormal temperature alarms, and manual defrosting to prevent samples from being affected by temperature variations. The MDF-MU539HL-PE features two separate outer doors to reduce cold air leakage when taking samples in and out of the freezer. In addition to a standard-feature door lock, a latch that allows a padlock to be attached is also provided.

	MDF-MU339HL-PE	MDF-MU539HL-PE
Effective capacity	369L	504L
Capacity (2" Boxes)	150	224
Cooling Performance	-30 °C	
Temperature Range	-20 °C to -30 °C	

## Height-adjustable shelf trays

Both units feature completely height-adjustable shelves. Optional drawer and racking systems are available upon request.

## Versatile Alarm Functions

Alarms for high/low temperatures and an error code display with self diagnostic functions inform users of any abnormalities, allowing prompt actions to be taken to avoid damaging valuable samples.

## Easy Defrosting

Defrosting can become an easy task with the drain hose which is attached to the main unit

## Inverter Compressors

While conventional freezers use single speed compressors which cycle on and off, Biomedical ECO Freezers utilise inverter compressors that can run at different speeds to maximise cooling performance under different conditions. As the compressor is not cycling on and off as frequently the temperature uniformity of the freezer is significantly improved. Inverter compressors have the added advantage of reducing the energy consumption of the freezer which is not only better for the environment but also helps to reduce running costs.





# Biomedical ECO -40 °C Plasma Freezers

**Cost-saving and environmentally friendly** Biomedical ECO -40 °C Plasma Freezer with two independent chambers for secure storage of valuable research and clinical samples at selectable temperatures.

Natural refrigerants minimise energy consumption, reduce environmental impact and save money.



**Cost-saving and environmentally friendly fresh frozen plasma storage**  
The MDF-MU549DH-PE Biomedical ECO Plasma Freezer, with two independent chambers for sample storage at selectable temperatures, provides an ideal freezing environment for the preservation of blood plasma, vaccines, test samples, and other biological specimens.

A comprehensive alarm system and Class IIa Medical Device Certification ensure this freezer provides unsurpassed reliability and sample security.



#### Lockable door latch

To securely preserve/ manage the valuable samples, in addition to a standard-feature door lock, a hole in the latch allows a padlock to be attached.

	<b>MDF-MU549DH-PE</b>
Effective capacity	479L
Cooling Performance	-40 °C
Temperature Range	-20 °C to -40 °C

#### Two independently controlled temperature chambers

Top and bottom chambers are equipped with two independent refrigeration circuits. This enables separate temperature settings and defrosting for the two chambers.



# VIP ECO Natural Refrigerants -86 °C Freezers

## Cost-saving and environmentally friendly sample storage within an optimal footprint

The VIP ECO Freezers provide maximum sample storage capacity within an optimum footprint combined with natural refrigerants to minimise energy consumption, reduce environmental impact and save money.



### Efficient Refrigeration

Naturally occurring hydrocarbon (HC) refrigerants provide more efficient cooling due to their high latent heat of evaporation. As well as improved performance this leads to reduced power consumption and energy costs.

### Inverter Technology

The VIP ECO ULT Freezers contain Inverter Compressors that maximise cooling performance under different conditions, and contribute to reducing the energy consumption of the freezer.

### Intelligent Interface

The EZlatch makes access to stored samples even easier. A colour LCD touch panel allows full user control, even with gloved hands, while the USB port makes transferring logged data to a PC simple and convenient.

Hybrid water-cooled models are available to facilitate the management of heat removal and energy use.

	MDF-DU502VH-PE	MDF-DU702VH-PE	MDF-DU901VHL-PE
Effective capacity	528L	729L	845L
Capacity (2" Boxes)	384	576	672
Cooling Performance	-86 °C		
Temperature range	-40 °C to -86 °C		-50 °C to -86 °C

### Uniform Sample Storage

Inverter compressors provide optimum stability, while quality of design ensures reliability. Ideal for samples that are sensitive to temperature fluctuations.

### Easy Data Monitoring

Important information such as freezer temperature, door opening times and alarm history is logged for monitoring in GLP applications.

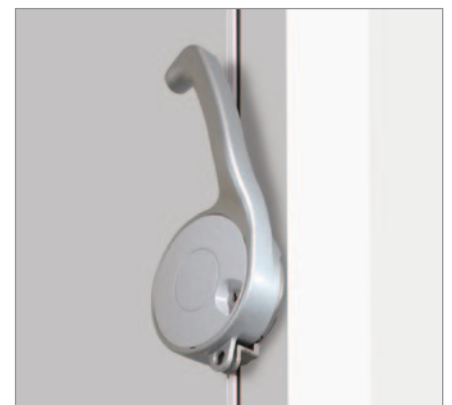
### Efficient & Flexible Sample Storage

The combination of VIP PLUS vacuum insulation and an enhanced cabinet design with insulated outer door, ensures optimum temperature uniformity, while the reduced wall thickness maximizes storage capacity. Multiple shelf configurations allow a variety of storage options.

An extended operating range on MDF-DU502VH / DU-702VH models increases versatility and enables a wider range of storage conditions to be met.

### Innovative Cabinet Design

The enhanced cabinet design with chamfered edges reduces footprint for use in multi freezer laboratories.



### EZlatch

EZlatch door handle newly developed based on human engineering EZlatch is designed for secure door opening/closing with minimum effort.



# VIP ECO <sup>SMART</sup> -86 °C Freezers

Upgraded with additional features for improved usability. The VIP ECO SMART freezers now offers Face Recognition, and NFC Authentication, coupled with an Electric Lock for enhanced access control. Energy-saving is also further improved by using natural refrigerants combined with inverter compressors.



## Performance and Reliability

Naturally occurring hydrocarbon (HC) refrigerants have minimal effect on the environment. Combined with inverter technology, these refrigerants also provide more efficiency without compromising cooling performance, ambient tolerance, and recovery speeds following door openings.

## Natural Refrigerants

Natural refrigerants, compressors and integrated electronics combined to lower operating costs resulting in less energy consumption and less heat output. Freezer operation is managed by effectively balancing temperature performance and energy management.

Upright type	MDF-DU503VH-PE	MDF-DU703VH-PE
Effective capacity	528L	729L
Capacity (2" Boxes)	384	576
Cooling Performance	-86 °C	
Temperature range	-40 °C to -86 °C	

## Smart Performance

Inverter driven compressors with SMART control allow for superior uniformity by running compressors at slower speeds under steady state conditions. Proprietary algorithms give the control that allows extremely tight temperature uniformity.

## Industry's Lowest Energy consumption

Lower energy consumption without compromising performance. The VIP ECO SMART uses 30% less energy compared with existing models.

- 5.4 kWh/day, at -80°C
- 4.4 kWh/day, at -70°C

## Security control and Monitoring

An eye level, door mounted, 10.1 inches high resolution LCD touchscreen allows full user control. A USB port makes transferring logged data to a PC convenient. All performance attributes are displayed and an internal temperature log can be expressed in graphic form over time.



## Controlled Freezer Access

Know who entered the freezer and when. Track how long the door was open.

4 Ways to Lock:

- Facial recognition
- Keypad
- Proximity card (Optional)
- Unique individual key



# TwinGuard -86°C Freezers

## Our most secure ultra-low temperature freezers for the storage of high value samples

TwinGuard Ultra Low Temperature Freezers with Dual Cooling Technology offer the highest level of security for high-value samples. Alongside exceptional ease-of-use and data monitoring, the Dual Cooling System provides the highest level of protection.



### Ultimate Sample Protection

The Dual Cooling System offers high levels of protection through the use of two independent refrigeration systems. In the case of unexpected failure of one of the cooling circuits, the other circuit will maintain the freezer continuously between -70°C and -80°C, dependent on ambient conditions.

### Efficient Sample Storage

The combination of VIP PLUS vacuum insulation and an enhanced cabinet design with insulated outer door, ensures optimum temperature uniformity, while the reduced wall thickness maximizes storage capacity up to 576 2" boxes.

### Intelligent Interface

The EZlatch makes access to stored samples even easier. A colour LCD touch panel allows full user control, even with gloved hands, while the USB port makes transferring logged data to a PC convenient.

Upright type	MDF-DU302VX-PE	MDF-DU502VX-PE	MDF-DU702VX-PE
Effective capacity	360L	528L	729L
Capacity (2" Boxes)	240	384	576
Cooling Performance	-86 °C		
Temperature range	-50 °C to -86 °C		

Chest type	MDF-DC500VX-PE	MDF-DU700VX-PE
Effective capacity	528L	715L
Capacity (2" Boxes)	416	520
Cooling Performance	-86 °C	
Temperature range	-50 °C to -80 °C	

### Flexible Shelf Layout

Multiple shelf configurations allow a variety of storage options. Organize your samples by transferring your current inventory racks.

### Dual Cooling System

The Dual Cooling System offers ultimate sample protection. The two independent refrigeration systems provide a reliable and exceptionally stable -86 °C ultra low temperature environment. In the case of unexpected failure of one of the cooling circuits, the other circuit will maintain the freezer continuously between -70°C and -80°C, dependent on ambient conditions until service can be arranged.

### Filterless Design

The filterless construction of the freezers reduces routine maintenance



time by eliminating the need for regular cleaning of filters.

### Intelligent ECO Mode Operation

When set to ECO mode, the microprocessor controller will establish an overlapping cycle of the two refrigeration systems based on the load status of the freezer, significantly reducing energy consumption.

# FrostLess -86 °C Freezers

## Cost-saving, environmentally friendly sample storage with reduced frost accumulation

The FrostLess Freezers with reduced frost build-up on the inner doors. Provides optimum sample storage capacity within a compact footprint combined with natural refrigerants to minimise energy consumption.



### FrostLess Technology

A new thermal insulation design for the inner doors suppresses frost growth on the inner door surface, resulting in reduced frequently manual labor and time to defrost by 60%.

### Reducing Frost Growth

This new improvement of the packing and insulation materials, and the heated pipe frame of the inner door gasket results in reduced manual labor and time along with less defrosting frequency required. Moreover, suppressing frost growth on areas which may cause damage and deterioration of freezer components.

Upright type	MDF-DU500ZH-PE	MDF-DU700ZH-PE
Effective capacity	525L	725L
Capacity (2" Boxes)	352	528
Cooling Performance	-86 °C	
Temperature range	-40 °C to -86 °C	

### Efficient Refrigeration

Naturally occurring hydrocarbon (HC) refrigerants provide more efficient cooling due to their high latent heat of evaporation. As well as improved performance this leads to reduced power consumption and energy costs. Ideal for laboratories looking to reduce their carbon footprint and environmental impact to comply with sustainability policies.

### Inverter Compressors

While conventional freezers use single speed compressors which

cycle on and off, the MDF-DU500ZH & MDF-DU700ZH FrostLess Freezers contains inverter compressors that can run at different speeds to maximise cooling performance under different conditions. Combined with hydrocarbon refrigerants, these compressors ensure the most efficient energy use and reduced heat output.

### Innovative Cabinet Design

The enhanced cabinet design with chamfered edges reduces footprint for use in multi freezer laboratories.



# Cryogenic -150 °C Chest Freezer

## The most uniform storage temperatures for cryopreservation solutions

The MDF-C2156VAN Cryogenic Freezer offers unparalleled safety, reliability and uniform temperatures well below -135 °C for ideal long-term cryopreservation solutions.



### Optimum Sample Storage

The use of patented space saving VIP PLUS panels within the freezer cabinet provides a reduced wall thickness for maximum interior volume. This results in a capacity of up to 150 2" boxes.

### Reliable Technologies

Compressors that are specifically designed for ultra-low temperature applications are employed in the proven cascade refrigeration system ensuring the highest levels of performance and reliability.

### Ease of Use & Intelligent Security

All alarm functions, self-diagnostic notifications and a graphical display of temperature performance over time are available in the specially designed LCD control panel.



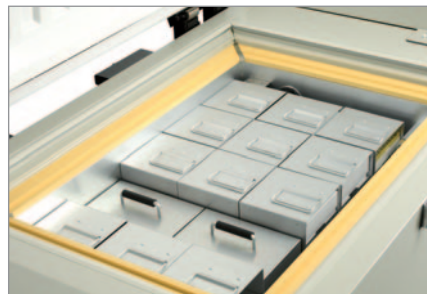
	MDF-C2156VAN-PE
Effective capacity	231L
Cooling Performance	- 150 °C
Temperature range	-130 to -150 °C

### Uniform Sample Storage

The uniform and stable temperatures provided are ideal for storage of cells, tissues and other important biological samples.

### Dry Storage

The highest levels of protection for valuable samples, without the risks of cross contamination and vertical temperature gradients.



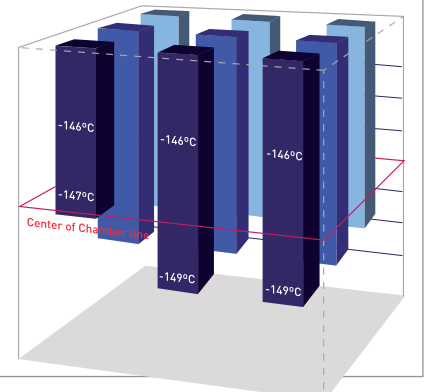
### High Storage Capacity

Cryogenic freezers with VIP PLUS insulation provide up to 30% more storage capacity than a conventionally insulated freezer without increasing the footprint.

### Microprocessor Control

Managed and monitored by an integrated microprocessor controller with a comprehensive alarm system and diagnostic functions.

Comparison of temperature distribution in a liquid nitrogen freezer (vapour phase) and our MDF-C2156VAN mechanically refrigerated Cryogenic Freezer. The graph shows temperatures at different locations within the chamber. This data demonstrates that 100% of the MDF-C2156VAN storage space maintains uniform storage temperatures safely below -130 °C, while temperature in the LN<sub>2</sub> vapour system is dependent on storage location.





# CBS Isothermal Freezers

## Solutions for stable long-term preservation of cells and tissues

Uniform storage temperatures from a range of cryopreservation solutions. The advanced technologies within these liquid nitrogen storage systems offer unparalleled safety and reliability for optimum sample viability.



### The Isothermal concept

CBS Isothermal freezers feature a patented liquid nitrogen jacket to provide uniform storage temperatures in the -190°C range, free from liquid nitrogen contact.

The sample storage area is cooled by a liquid nitrogen jacket surrounding the stainless steel interior, and by nitrogen vapour entering the freezer from the jacket via directional vents. This patented technology provides exceptional temperature uniformity in the -190°C range, allowing the full freezer capacity to be used with confidence. The circulation of vapour within the freezer also results in less cold air loss during lid opening and improved visibility. This allows full-width lids to be used providing quick, unrestricted access to sample racks.

	V-1500AB	V-3000AB	V-3000ABEH	V-5000AB	V-5000ABE
Effective capacity	30L	70L	89L	93L	140L
Capacity (vials)	9100	22100	25500	40300	46500
Capacity (bloodbags)	434	1120	1280	1936	2208
Cooling Performance	-190 °C				

### Automatic operation

Isothermal freezers feature the series 2301 auto-fill and monitor system, which controls the automatic filling of the liquid nitrogen jacket and provides the user with an easy to read overview of the freezer temperature and status.

### Sample security

A comprehensive alarm system with remote alarm contact constantly monitors all aspects of the freezer's operation. Samples are also protected by lid and control panel locks. The freezer can be monitored by a central BMS or monitoring system.

### Sample storage

A wide selection of inventory systems for vials and bags are available to complete the system and optimize sample storage.



# VALIDATION & QUALIFICATION SOLUTIONS

PHC Europe BV is a vertical component manufacturer that can provide turn-key solutions for validation and qualification in accordance with all current GMPs, GLPs, GCPs, 21 CFR Part 11, PAT, ISO and specific customer requirements and applications. Because many of our key component parts are designed and built by PHC Europe BV, we offer the most precise and in-depth validation resources specific to PHCbi laboratory products. Whatever your validation needs are, PHCbi provides comprehensive expertise in laboratory equipment to meet your exact compliance needs. PHCbi validation systems employ advanced technology coupled with the latest trends to insure compliance with accurate and time efficient completion.

## Validation & Qualification Solutions for laboratory equipment

Turn key solutions available for:

- Ultra-Low Freezers
- Cryogenic Freezers
- Medical Freezers
- Bloodbank refrigerators
- Pharmaceutical refrigerators
- Incubators
- Ovens
- Autoclaves
- Environmental test chambers



# Installation and Operational

## Qualification IOQ

PHC Europe BV offer onsite validation of PHCBI supplied equipment via Installation and Operational Qualification Protocol IOQ.

## Installation Qualification (IQ)

Verifies and documents the equipment installation is compliant with the manufacturer's requirements and specifications.

## Operational Qualification (OQ)

Verifies and documents the full functional operation of the installed equipment (as specified by PHCBI or other OEM supplied equipment). Temperature performance will be mapped over a continuous 24hr period; also, a short open-door test included toward the end of this period. Data produced will be compared with manufacturers published equipment specification. Product specific parameters such as CO<sub>2</sub>/O<sub>2</sub>, %RH etc. are included within the relevant equipment IOQ protocol.

PHCbi validation services by model						
	Temp.	CO <sub>2</sub>	O <sub>2</sub>	%RH	Lighting (Lux/Par)	Pressure
Validation by Model	✓					
MDF-150 °C Freezers	✓					
MDF-86 °C Freezers	✓					
MDF-30 °C Freezers	✓					
MBR Blood Bank Refrigerators	✓					
MPR Pharmaceutical Refrigerators	✓					
MIR Incubator Series	✓					
MCO CO <sub>2</sub> & O <sub>2</sub> /CO <sub>2</sub> Incubators	✓	✓	✓	✓		
MLS Top Loading Autoclaves	✓					✓
MLR Environmental Test Chamber	✓			✓	✓	
CBS Standard LN <sub>2</sub> Freezers	✓					

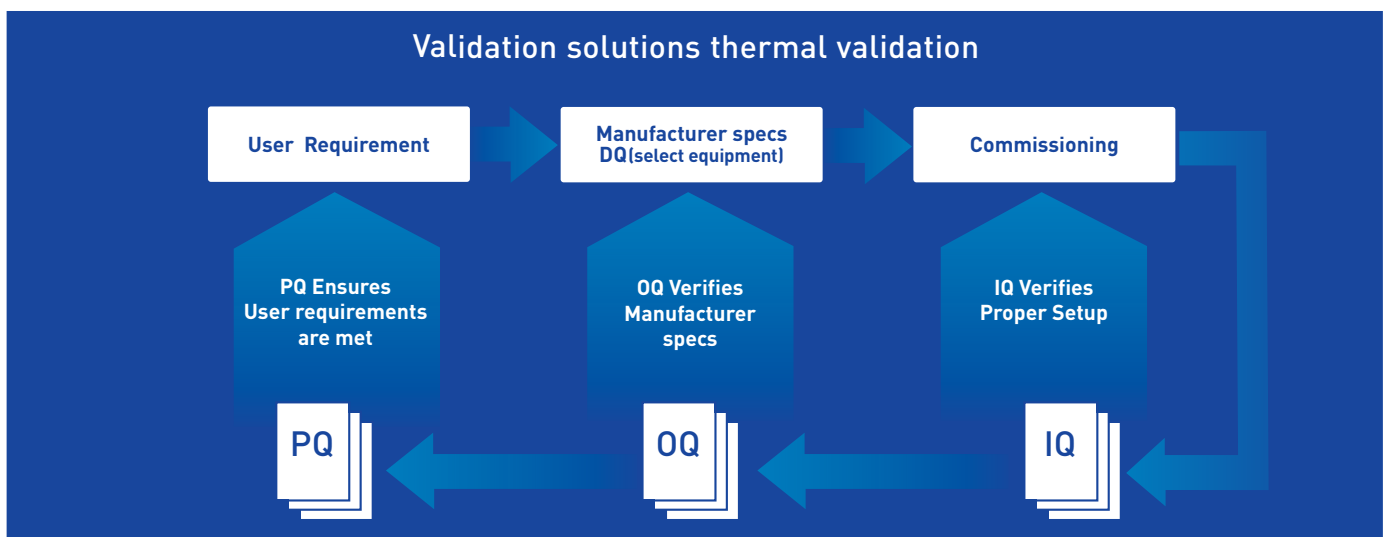
## Additional options:

Additional temperature sensor positions, Extended logging period 48/72hrs, Simulated customer loaded mapping, Powerfail/ Recovery performance tests.

**Process Qualification (PQ)** is usually conducted and performed by customer/end-user as the equipment will be in an environment where specific user conditions and actual product is loaded, stored and accessed e.g. the customers actual production or product processing area. The PQ will probably refer to customer specific Standard Operating Procedures documents (SOPs).

Example: product identification and specific storage requirements; loading patterns etc. therefore making the PQ a unique and customer specific document. PHC Europe however will provide assistance to customers where required in either the preparation or assisted execution of the Process Qualification.

PHC Europe BV is also able to offer a "Temperature Mapping Service" for customers wishing to verify actual equipment performance as installed, this service is also available for all NON PHCBI equipment.





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