Panasonic

Biomedical journal

2015 3rd edition

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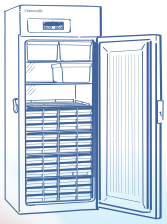

Celebration:

25 YEARS of innovation

Panasonic

Panasonic Biomedical Sales Europe B.V.

Panasonic Biomedical Sales Europe B.V., part of the Panasonic Healthcare Company (PHC), manages sales, marketing, logistics and technical service of Panasonic laboratory products throughout Europe (including Russia and Turkey). Headquartered in the Netherlands with sales and service organizations in the UK, France and the Netherlands.

In the Dutch warehouse, about 1,000 units are waiting to be delivered directly from stock. Within a couple of days, spare parts can be delivered in every part of Europe. That's one of the strengths of Panasonic's Biomedical European sales organization.

Preservation system
- -152ºC/-150ºC/-86ºC Ultra-low temperature freezers (MDF)
- -40ºC/-35ºC/-30ºC Medical freezers (MDF)
- Blood bank refrigerators (MBR)
- Pharmaceutical refrigerators (MPR)

Freezers/refrigerators with dependable internal temperatures.

Culturing system
- CO_2 / Multigas Incubators (MCO)
- Cooled incubators (MIR)
- Heated incubators (MIR)
- Plant growth chamber (MLR)

Incubators for advanced research and testing.

Drying & sterilising system
- Laboratory ovens (MOV)
- Dry heat sterilisers (MOV)
- Autoclaves (MLS)

Equipped with electronic control systems, these models limit temperature fluctuations.

Automated hospital pharmacy system
- Automatic tablet counting and packaging machine (ATC)

Based on microcomputer advances, this unit enables accurate tablet dispensing and reduces operating costs.

25 YEARS of innovation

Celebrating 25 years of realising innovation

This third issue of Panasonic's Biomedical Journal is a special anniversary edition. Panasonic Biomedical turns 25 in 2015! A diverse team from Panasonic have contributed a broad range of articles for this issue – from stories from our dealers to articles outlining the specifications and applications of specific products.

Established initially as SANYO-Gallenkamp in 1990, the company evolved slowly, but solidly, and with a clear vision, into the modern, market-oriented, biomedical company that is now represented in every European country. The world's first lowest temperature freezer, a continuous contamination control concept for safer cell culture and the ultimate sample security VIP Dual Cool freezer are just a few of the many key, ground-breaking introductions that Panasonic has made over the last 25 years. And the articles in this Journal show how these Panasonic developments can help you in your daily challenge to do your work better, easier and more efficiently.

The Pirbright Institute explains their choice for Panasonic's VIP Dual Cool freezers. This organisation is a world leading center in the research and surveillance of animal viruses and diseases. The Institute has already seen improvements in sample security, workflow and resource efficiency since installing the freezers.

In response to customers' requests, Panasonic's engineers designed a state-of-the-art incubator. In this edition of the Journal, we introduce the new MCO-170AIC CO_2 incubator series, which creates a brand new industry-standard by combining exceptional reliability and performance with significant ease-of use across many key features.

Panasonic's customers receive product lifetime support. We offer various types of service contracts. Panasonic has more than 250 qualified Service Engineers across Europe, trained to exceptionally high standards. All products benefit from regular maintenance to ensure a long and trouble-free product life time, Panasonic's Service Manager, Igor Spierenburg, explains why.

With European Union (EU) Medical Device Directive (MDD) certification awarded for several different products, Panasonic demonstrates its commitment to serve scientific professionals. Read more about the reason why Panasonic was one of the first major international companies to be awarded MDD certification in compliance for a wide range of incubation- and refrigeration products in 2011.

The Panasonic Biomedical Journal is a perfect combination of interesting articles, and a complete, but compact, catalogue with all specifications of Panasonic's products. After reading this magazine, you can keep it for reference to the specification pages, display it on the coffee table for everyone to delve into, or pass it on directly to a colleague to read. Enjoy reading!

Panasonic

Biomedical journal

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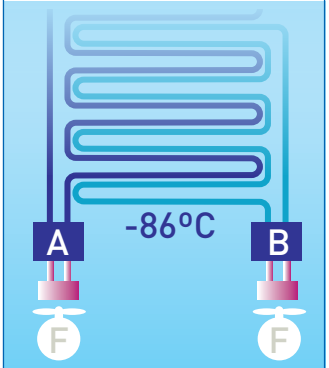


Discovery powered by precision

Panasonic MDF-U700VX VIP Dual Cool -86ºC freezers bring peace of mind at The Pirbright Institute

"Panasonic's flexibility and personal service ensured a smooth operation"

Miriam Windsor,
Research Services Group

VIP dual cool

The Pirbright Institute is a world leading centre of excellence in research and surveillance of animal viruses and zoonotic diseases. First established 100 years ago, as a cattle testing station to combat Tuberculosis, it now plays a vital role in the investigation and control of animal diseases with serious economic and public health implications. As the only specialist animal pathogen facility in the United Kingdom (UK), its work is critical both nationally and internationally. With the importance of its work and specialist expertise growing daily, the Institute is undergoing a major redevelopment of its two main research sites. Having benefitted in the past from a long standing relationship with Panasonic, the Institute turned to us to help equip a new high containment laboratory built at its Main Campus in Surrey. With the purchase of 30 Panasonic MDF-U700VX-PE VIP Dual Cool -86ºC freezers, the Institute has already seen improvements in sample security, workflow and resource efficiency within its new high containment facility.

The Pirbright Institute forms part of the UK Government's Biotechnology and Biological Sciences Research Council (BBSRC). It carries out essential research into infectious diseases that pose a significant threat to agriculture and/or public health. This research helps identify disease control and eradication strategies, new diagnostic tests and treatments. It carries out surveillance activities on general animal health and disease movement in the UK and also provides National and International Reference Laboratories for ten exotic viral diseases of livestock.

With significant financial investment from the BBSRC, a major phased redevelopment of both of its research sites at Pirbright in Surrey and Compton in Berkshire is underway. The transformation will make it the most advanced institute in the world for fundamental and applied research on some of the world's most devastating viruses of farmed animals. A state-of-the-art, high containment (Level 4) laboratory complex at the Pirbright Main Campus in Surrey has just been completed as the first part of the redevelopment. Equipment for the laboratory was sourced by its Research Services Group, led by Miriam Windsor, in consultation with the scientific staff.

"Our new high containment lab enables 150 scientists and support staff to undertake research on highly contagious viruses including Foot-and-Mouth Disease, Swine Fever and highly pathogenic Avian Influenza viruses," said Miriam. "Equipment security and reliability are our top priorities. Dealing with pathogenic biological material means we never compromise on safety. Whilst the decision making process was subject to tender, we chose Panasonic equipment on the basis of the unique capabilities of the Panasonic MDF-U700VX-PE VIP Dual Cool -86ºC freezers and the reliability and longevity of our previous Panasonic equipment."

Deciding on Dual Cooling

Panasonic's MDF-U700VX-PE VIP Dual Cool -86ºC freezers feature a unique Dual Cooling System, designed to store

valuable biological samples securely. Two independent refrigeration systems provide a reliable -86˚C ultra-low temperature storage environment. Should an unexpected failure occur in one cooling circuit, the other maintains the freezer in the -70˚C range until service can be arranged.

"We were particularly impressed with Panasonic's Dual Cooling System and it was the biggest factor in our purchasing decision," added Miriam. "It is imperative that our samples are safely stored. We hold the world reference collections of some biological materials. We would have an extremely limited amount of time to relocate our samples if a freezer failed. That means just hours - even at night. In addition, working within the highest security levels (Levels 4 and 5), means that there is a long, drawn-out process to rectify this kind of situation. With the reassurance provided by Dual Cooling, we know that if one compressor did fail, we would have more time to take appropriate action. Although so far, we've had no problems whatsoever. No other manufacturer offers this kind of advanced system assurance."

Arun Parmar, Panasonic's UK Sales Manager, explained how evolving customer needs have driven development of Panasonic's Dual Cooling System.

"Many of our customers' samples are extremely valuable, either scientifically, commercially or historically, and some are even irreplaceable. For example, they may be from a critical clinical trial, represent many years of scientific research, or they could be pathogenic in nature, as in the case of The Pirbright Institute." he said. "It is essential that we ensure our freezers provide a safe environment for these samples. Reliability is critical. In addition, the processing of these samples has become more expensive. If a freezer goes down, the implications are becoming much more significant. Although Panasonic products are well known for reliability, our Dual Cooling System was developed to make sure extra capacity is available to cover any eventuality."

Long term vision

Long term product reliability was another key factor in The Pirbirght Institute's choice.

"We have a long standing relationship with Panasonic and have used their products with absolutely no problems for many, many years," said Miriam. "By contrast, some of the products made by other manufacturers have failed whilst still under warranty! Even our 'ancient' Sanyo freezers have never broken down. The long term performance of Panasonic's products was another important deciding factor for us."

As well as ensuring that its products deliver long term performance, Panasonic strives to build long term

The state-of-the-art, high containment (Level 4) laboratory complex at the Pirbright Main Campus enables 150 scientists and support staff to undertake research on highly contagious viruses including Foot-and-Mouth Disease, Swine Fever and highly pathogenic Avian Influenza viruses.

business relationships with the aim to grow and develop alongside its customers.

"Our customers evolve and their needs change as science and technology advance. Panasonic prioritises building long-lasting, two-way relationships with its customers. We believe that providing a strong knowledge base and continuity is the only way to provide effective solutions that meet customer needs. And continual dialogue with our customers forms the basis for advancing our technology and product line-up," remarked Arun. "As a company, we have enjoyed a good relationship with various departments of The Pirbirght Institute for many years. We have a clear understanding of their needs."

Delivering performance in a dynamic environment

The Pirbright Institute is a highly dynamic work environment. Samples brought into the Institute can arrive at any time of the day or night and from anywhere in the world. The number and volume of samples requiring freezing can vary widely at any given time. The energy-saving capacity of the Panasonic MDF-U700VX-PE VIP Dual Cool -86ºC freezers is very effective in this instance. The Dual Cooling System's ECO mode is an industry first. The two independent refrigeration systems can run in overlapping cycles to minimise energy consumption, whilst

more about VIP Dual Cool see page 34

The Panasonic Dual Cooling freezers have saved space. They are taller and have a bigger internal capacity that enables us to fit more samples in.

Arun Parmar, Panasonic's UK Sales Manager: "Many of our customers' samples are extremely valuable, or they could be pathogenic in nature, as in the case of The Pirbright Institute."

maintaining the highest levels of performance. The facility is effectively staffed 24-hours a day. In addition, the staff present range in a variety of specialisms and work patterns. Security was a specific issue for the Institute, due to its workflows and the volumes and pathogenic nature of samples.

Smooth installation

One important challenge that the Institute experienced in equipping the new high containment laboratory was connected to the removal of old freezers. This proved less simple than it might sound. Old freezers had to be decommissioned, requiring full decontamination before removal. Only one old freezer could be decommissioned at a time, which meant that the new Panasonic MDF-U700VX-PE VIP Dual Cool -86ºC freezers could only be installed and commissioned gradually. Panasonic arranged and managed the entire process on behalf of the Institute.

"Panasonic's flexibility and personal service ensured a smooth operation," added Miriam.

Significant savings

Now installed and operational, the Institute's 30 MDF-U700VX-PE VIP Dual Cool -86ºC freezers are already bringing significant results.

"The Panasonic Dual Cooling freezers have saved space. They are taller and have a bigger internal capacity that enables us to fit more samples in," said Miriam. "We are also already seeing savings in energy use and we have not had any emergency call-outs. Overall, these benefits save substantial operational costs. Panasonic products really seem to be designed to directly solve problems that our scientists encounter."

MDF-U700VX-PE VIP Dual Cool -86ºC freezers feature Panasonic's patented VIP technology - a revolutionary vacuum insulation cabinet construction that reduces wall thickness by approximately one half and achieves up to 30% more storage capacity than conventionally-insulated freezers, without increasing its footprint.

Strong service and support

Preventative maintenance of Panasonic equipment through a service agreement is an increasingly popular option. The Institute is in the process of setting up a service contract with Panasonic for regular maintenance of its Panasonic Dual Cool freezers and other Panasonic products.

"Alongside a solid knowledge base and continuity, long term customer support through effective service provision is an increasingly important element in our success," said Arun.

Looking ahead

The Institute has now begun its second phase of redevelopment, which will include new containment Level 2 laboratories. Due for completion in 2016, these laboratories will accommodate 90 scientists working on viruses that do not require high containment. A new Biological Resources Facility for in-vivo work at various levels of containment is also planned for completion in 2018. Panasonic looks forward to the opportunity to support The Pirbright Institute with its future developments.

VIP dual cool

Panasonic Dual Cool Freezers
The industry's safest ultra-low

Ultimate security is critical for extremely valuable samples, such as those in the pharmaceutical and biotechnology sector, research institutes or blood and tissue banks. Freezer failure requires swift, effective action to transfer precious samples to a safe, ultra-low temperature environment – often within a matter of hours, even if a failure occurs at night. Any failure, therefore, significantly increases the risk of losing a unique, irreplaceable or potentially life-saving collection of samples. This could halt promising research, delay medical treatments or simply cause substantial financial losses, as well as an administrative nightmare. Panasonic developed Dual Cooling technology specifically to greatly reduce this risk.

for specs see page 34

Our advanced Dual Cool freezers provide an unparalleled level of safety and added peace of mind through the use of two independent refrigeration systems that reliably maintain an ultra-low temperature environment, even if an unexpected failure should occur in one cooling circuit.

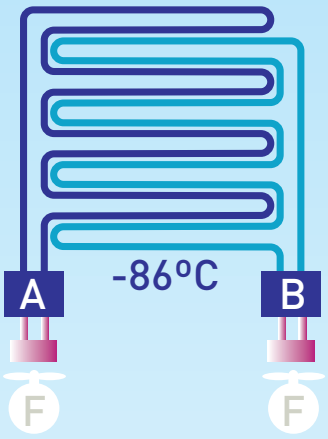
Panasonic developed Dual Cooling technology more than five years ago. The world's first Dual Cool freezer – Panasonic's MDF-U500VX – was launched in 2010. Following its success, the larger volume MDF-U700VX VIP Dual Cool -86°C Freezer was first introduced in 2011. Since then, customers with samples that are valuable, irreplaceable, potentially life-saving or have pathogenic implications, such as those stored at The Pirbright Institute, have benefitted from the added assurance, capacity and advanced features of Dual Cool freezers.

VIP dual cool

MDF-U500VX-PE
519 LITRES

MDF-U700VX-PE
728 LITRES

temperature storage solution



Unparalleled performance
Dual Cooling technology differs significantly from conventional cascade refrigeration technology in fundamental design and operation. In Dual Cool systems, two independent refrigeration systems provide a reliable -86°C ultra-low temperature environment. Should an unexpected failure occur in one cooling circuit, the other can maintain the freezer in the -70°C range until service can be arranged. This level of ultra-low temperature back-up cannot be achieved by conventional cascade systems. The unique functionality of Dual Cooling is achieved through the use of two, completely independent, auto-cascade systems – the compressors, evaporators and cooling fans of the two systems operate separately from each other. Two efficient evaporator circuits surround the interior chamber in a strategically-designed arrangement to ensure the highest levels of temperature uniformity with either one or both of the refrigeration systems functioning.

The accurate ultra-low temperatures within Dual Cool freezers are managed and monitored by an integrated microprocessor controller, complete with a comprehensive alarm system and diagnostic functions. Freezer status and control is accessible via the LCD information centre, which provides a clear overview of freezer conditions and straightforward operation for changing of settings and parameters. In the unlikely event of a problem occurring, clear messages display the issue, so that operators can contact their local Panasonic Service Team and explain precisely what has happened. This enables our Service Technicians to either guide the user through how to proceed, or identify when an engineer might need to visit and indicate which repair components might be required.

Built to last
As with all Panasonic products, Dual Cool freezers are designed to ensure optimal reliability, longevity and efficiency. Panasonic designed Cool Safe® compressors employ innovative refrigerant feedback

Important questions to consider with conventional freezers

What measures do I have in place if my freezer fails?

Do I have all of the necessary alarms and remote monitoring systems in place to alert me if my freezer fails outside of working hours?

How quickly can someone get to the freezer to move samples if the freezer fails overnight, on the weekend or during the holidays?

Do I have a spare freezer with enough capacity to transfer all of my samples into if my freezer fails? Will this spare freezer definitely be empty and ready to use at any time?

What would be the consequences if my samples were lost or no longer viable due to a freezer failure?

Relevant applications

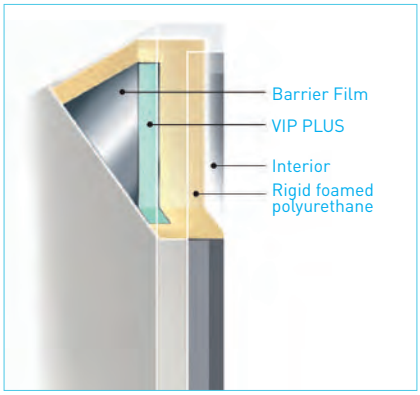
Application	Sample or Laboratory Characteristics	Benefit of Dual Cool freezers
› For laboratories active in culture of: Stem Cells, Cord Blood, T-Cells, Engineered Tissue, Organs, Vaccines, Bone Marrow, Hybridomas, Lymphocytes, Cancer Cells, Clinical Specimens, Fibroblasts, Ova, Sperm.	› For samples that are highly sensitive to temperature fluctuations or uneven temperature distribution within the freezer.	› Dual Cool technology greatly extends the critical time necessary to react in the event of a mechanical failure.
› Storage in BSL-3/4 or Highly Secured Labs.	› Valuable samples.	› Enhanced temperature uniformity, top-to-bottom, front-to-back, assures sample stability at all inventory locations.
	› Irreplaceable samples.	
	› Longitudinal studies and on-going research.	
	› Restricted access laboratories where serviceability is limited.	

Feature	What it does	Why it is important
-86°C Dual Cool Refrigeration Technology	Two independent refrigeration systems operate together or individually, depending on loading and operating conditions.	If one refrigeration system fails, the other can maintain the freezer in the -70°C range.
ECO Mode Performance	Two independent refrigeration systems running in overlapping cycles.	ECO mode optimises run time and minimises energy costs whilst maintaining optimal performance.
Filterless Condenser Design	Transfers energy from the refrigeration system with minimal heat output.	Maintains optimum condenser air flow and eliminates the need for an air filter, as well as the associated cleaning and maintenance.
Patented VIP PLUS Vacuum Insulation Panels	Combines high-efficiency vacuum panels with conventional polyurethane structural foam and barrier film into a high-tech wall assembly.	Increases interior volume within conventional dimensions offering more storage capacity per m² of occupied floor space.
Integrated Graphical LCD Control Centre	Combines all control, alarm, monitoring and data management functions into a single door-mounted system controller.	High visibility LCD display provides a convenient user interface to set points, current and previous temperature status, alarm parameters, internal diagnostics, communications and security.
Enhanced Cabinet Construction	Robust cabinet design with high-strength lockable door latches and doors, insulated inner doors, adjustable shelves and vacuum release port.	Simplifies installation and operation. Exceptional durability under demanding conditions in busy laboratory environments.

processes to reduce compressor temperature, extending compressor life and minimising heat output. The freezers feature a vacuum-release port, which creates smooth door opening in environments where regular access is required ensuring there is no need to put excessive pressure on the door and handle of the freezer.

Minimal footprint

Panasonic's patented VIP PLUS technology has resulted in a revolutionary vacuum insulation cabinet construction that reduces wall thickness by approximately one half and achieves up to 30% more storage capacity in Dual Cool freezers than in conventionally-insulated freezers of equal size. As well as allowing a smaller installation space in the laboratory, VIP PLUS contributes to the overall energy efficiency of the freezers due to the low thermal conductivity of the insulation.



for specs see page 34

Dual Cool freezers can be set to Normal or ECO mode operation, depending on the requirements of the user. A unique, intelligent ECO mode overlaps refrigeration system cycles to significantly reduce energy consumption, whilst maintaining optimum interior uniformity from top-to-bottom and front-to-back for the protection of high value materials. The microprocessor controller constantly monitors the load status of the freezer to optimise the operation of the two compressors and minimise energy use, whilst protecting valuable samples. ECO mode is recommended for 90-95% of applications, whilst normal mode maintains the most repeatable, cycling wave form for the strictest of GMP applications.

Unsurpassed protection

For complete protection of samples, many customers opt for a combination of Dual Cool freezers with optional Liquid Nitrogen or Liquid CO_2 back-up system, in case of a power failure. This offers complete and unsurpassed protection for samples under any circumstances. Multiple access ports within the Dual Cool freezers permit insertion of independent probes for temperature monitoring, instrumentation or back-up injectors.

Panasonic's MDF-U700VX Dual Cool -86°C Freezer is certified as a Class IIa Medical Device according to the European Union (EU) Medical Device Directives 93/42/EEC & 2007/47/EC.

With performance and reliability that is second to none, Panasonic VIP Dual Cool freezers have been welcomed by a number of prestigious research sites, such as The Pirbright Institute, as well as pharmaceutical and biotech companies, leading universities and across the life science market. When sample security and peace of mind are of paramount importance, put your trust in Panasonic VIP Dual Cool ultra-low temperature freezers.

Panasonic's new MCO-170AIC CO_2 incubator series - The inside story

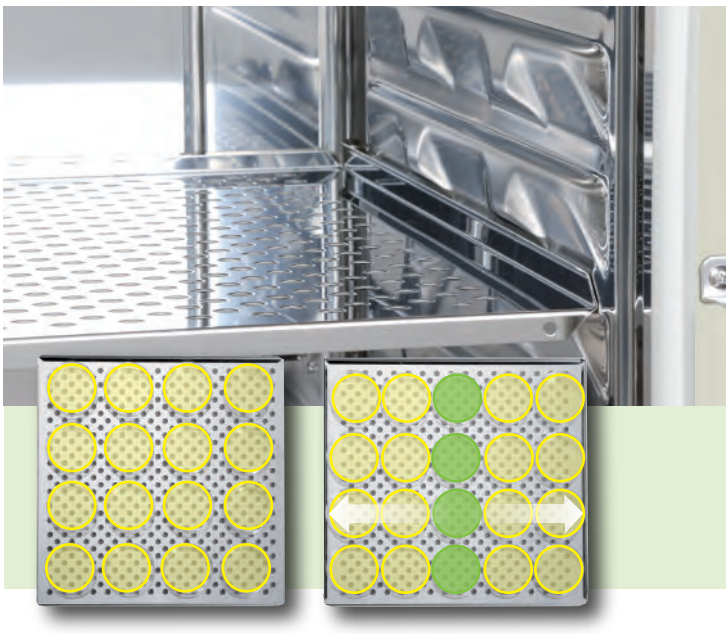
Laboratory scientists face an ever-increasing array of challenges. Alongside the critical need to maintain highly specific optimal incubation conditions and ensure biosecurity, they contend with continual demands to improve efficiency and reach new levels of cell culture productivity. Panasonic's new MCO-170AIC CO_2 incubator series creates a brand new standard by combining exceptional reliability and performance with significant ease-of-use across many key features. Amongst other benefits, the MCO-170AIC CO_2 incubators provide up to 25% more space for tissue cultures[1] and require 80% less cleaning time[2].

Panasonic developed the MCO-170AIC CO_2 incubator series in response to customer requests. The starting point for Panasonic's Design Engineers was to develop an incubator with an interior that was much easier to clean[3], but the resultant product takes ease-of-use to a new dimension. The MCO-170AIC CO_2 incubators, which replace the Panasonic's MCO-19AIC CO_2 incubator series, provide exceptional productivity and performance. First introduced in Europe in May 2014, the MCO-170AIC CO_2 incubators include three models that share core technology and specifications, with various special features as required. A full range of accessories is also already available for the incubator series.

"Panasonic's incubators are well known within the global scientific community for delivering exceptional performance, the highest levels of precision, security and long-term reliability, and the new MCO-170AIC CO_2 incubator series does not deviate from this incredibly high standard," said Jacqueline van der Zijden-Anusic, Panasonic's Product Manager for Europe. "However, laboratory scientists are discovering the significant additional advantages offered by its greatly enhanced ease-of-use and the opportunities it provides to improve their work efficiency."

Extra space

Key to the superiority of the MCO-170AIC CO_2 incubators are their simple design and advanced integrated construction. With just five components in the interior chamber, contamination risks are greatly reduced. The MCO-170AIC CO_2 incubator series has an internal capacity of 165 litres. Additional space for wider shelves has been created by fully-integrated shelf supports that hold the shelves securely in place. Overall, the series provides capacity for up to 25% more culture vessels[2]. The integrated shelf supports have fully-rounded, easy-to-clean corners, which not only reduces the risk of contamination further, but saves significant amounts of time in cleaning.



Additional space-saving capacity is provided by exterior design elements - The MCO-170AIC CO_2 incubators are designed for stacking. With one unit positioned on top of another, interior volume can be doubled without the need for additional floor space. For easier mobility of stacked installations, an optional roller base is available.

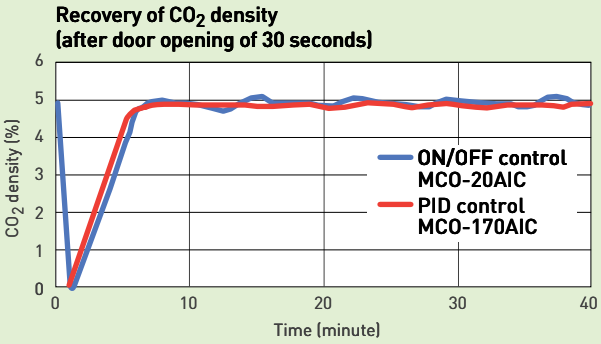
Precise control

Within the incubator, each and every cell is maintained under ideal conditions for optimal growth. The MCO-170AIC CO_2 incubator series supports a reliable, stable cell culture environment across all shelf positions with precise control of CO_2 concentration and temperature. Panasonic's Direct Heat and Air Jacket system provides high precision temperature control for advanced uniformity and rapid recovery after door opening. In this system, a fan gently circulates the incubator air in the interior chamber ensuring that conditions are the same at each shelf, regardless of their position. PID control of CO_2 and temperature guarantees exceptional performance and optimal results. Dual IR CO_2 sensors

Jacqueline van der Zijden-Anusic, Panasonic's Product Manager for Europe

- **MCO-170AIC–PE**
  Panasonic's standard MCO-170AIC CO_2 incubator model;
- **MCO-170AICUV–PE**
  incorporating SafeCell® UV - a special, longer-life, UV lamp that provides continuous background contamination control in combination with the standard inCu saFe® copper-enriched stainless steel interior;
  and
- **MCO-170AICUVH-PE**
  including, as standard, SafeCell® UV and Panasonic's H_2O_2 vapour sterilisation.

PID Dual IR (Infra Red) sensor



The PID control provides a stable cell culture environment and feed forward control with no overshoot and fast recovery times.

*Above graph is for reference only.

minimise the effect of temperature and humidity changes during- and after door-opening, providing outstanding CO_2 control and fast recovery. The pump-less CO_2 sensors have no moving parts, which reduces vibrations and the risk of breakdown. In addition, the series features improved insulation performance, which minimises the impact of ambient temperatures, ensures fast recovery after door opening and reduces running costs[2].

Optimum protection

Inside the MCO-170AIC CO_2 incubators, a number of advanced systems provide continuous background contamination control to ensure protection for cultures. The inCu saFe® copper-enriched stainless steel interior protects cell cultures by eliminating surface contamination sources and mitigating the impact of airborne contaminants. InCu saFe® leverages the benefits of copper (resistance) and stainless steel (resistance to corrosion and durability).

Incorporating a longer-life, ozone-free, SafeCell® UV lamp, continued contamination control of chamber air and water in the water pan is possible with the MCO-170AICUV-PE model. Laboratory scientists have welcomed the significantly extended time between cleaning that can be achieved with the SafeCell® UV lamp. With the MCO-170AICUVH-PE model, rapid sterilisation can be achieved with Panasonic's H_2O_2 vapour sterilisation cycle, which reduces downtime to less than three hours for complete, validatable decontamination. All these features not only prevent loss of valuable or irreplaceable cell cultures, but enhance productivity measurably. In addition, the new, easy-to-clean incubator interior saves valuable time in cleaning and reduces the risk of contamination.

Added security

Alongside optimal culture protection, the MCO-170AIC CO_2 incubator series includes opportunities for added security with an electric door lock (password-controlled), featured as standard in the MCO-170AICUVH-PE model. This provides enhanced security for cell cultures and their environment and ensures that valuable cell lines are only accessed by authorised personnel. The password-controlled electric door lock adds convenience for authorised laboratory scientists, as there is no need for an additional key or security device.

Enhanced data monitoring

Clear information on incubator status is provided by the MCO-170AIC CO_2 incubator's new, user-friendly, full-colour, LCD touch screen. It enables easy access to controller functions for fast convenient set up, even when wearing gloves.

Alongside this, data can be conveniently transferred from the incubator to a PC via a USB memory stick, using the MCO-170AIC CO_2 incubator's built-in USB port. This helps optimise cell culture protocols and supports adherence to standard operating procedures. Logged parameters include chamber temperature, CO_2-level, open door status and alarm activities.

Performance and ease of use that translates into improved productivity

The innovative and unique combination of features of Panasonic's MCO-170AIC CO_2 incubator series delivers exceptional results and enhanced productivity.

for specs see page 50/51

"Through savings in cleaning time, operation and increased shelf space, laboratory scientists can achieve improvements in productivity through enhanced work flows and resource efficiency," added Jacqueline. "In addition, the MCO-170AIC CO_2 incubator series offers wide-ranging suitability for application in research-, diagnostics- and production environments. It elevates the capabilities of CO_2 incubation to a new level."

References:

1. The MCO-170AIC CO_2 incubators can accommodate 25% more 90mm dishes per shelf compared to previous Panasonic 170 litre CO_2 incubators.
2. Compared to previous Panasonic 170 litre CO_2 incubators.
3. See video available at: http://www.biomedical.panasonic.eu/mco170aic

Panasonic's Partners in Europe

Spain

Panasonic delivers its products and services throughout Europe, in some countries, through partnership with distributors. These partnerships not only provide access to our products and services for customers in selected territories, but play an important role in building Panasonic's presence in these countries. They form an important part of our strategy in Northern-, Southern- and Eastern Europe, in particular. Vertex Technics is Panasonic's distributor in Spain. Vicenç Garcia Guasch, Owner, and Celestino Gil, Biotechnology Business Unit Manager at the company, explained what Panasonic brings to the Spanish market and what it's like to work for Panasonic as a European partner.

Founded 21 years ago, Vertex Technics markets, distributes and installs equipment for laboratory research, and is the second largest scientific equipment sales organisation in Spain. Vertex is the face of Panasonic in Spain, and provides a full range of Panasonic products and services to Spanish customers. Sharing Panasonic's core values of dedicated partnership, high quality and innovative solutions and service, Vertex Technics is the perfect ambassador for Panasonic. The company has established an outstanding reputation and is highly regarded by the scientific community across the country. It has also contributed to advancing scientific innovation and technology in Spain through its reliable supply and service.

Vicenç Garcia Guasch founded Vertex Technics together with Josep Salvans in 1993. They established the organisation with a burning ambition to make state-of-the art medical equipment, such as Panasonic's pioneering technology, more widely available to Spanish customers. They built the organisation from scratch, using a focused strategy to ensure solid development. Providing a supportive and professional service alongside Panasonic's high quality products and technology, Vertex Technics now has almost 50 staff and many satisfied customers in Spain.

Vicenç Garcia Guasch, Owner of Vertex Technics

"After I studied engineering and gained a Masters Degree in Business Administration, I worked for many

Headquarters of Vertex Technics

years in international distribution before establishing Vertex. The combination of my experience in international distribution and Josep's experience in finance, gave us a strong competitive edge. Critically, we have an excellent, collaborative relationship and share the goal of becoming an important player in helping to build Spain's growing analytical and biotechnological markets," said Vicenç. "We developed distributorship agreements with strong companies that offered high quality products and excellence services. Spain's scientific community quickly recognised Panasonic as a provider of the ultimate state-of-the-art technology. It was the perfect opportunity to bring these products to the scientific experts who wanted them."

> **"the growing Panasonic product range will continue to create new opportunities for Vertex Technics and also the Spanish scientific community"**

Vertex Technics now serves customers across the whole of Spain with a comprehensive range of technologies, products and supportive services. Its key customers include include Scientific Park, in Barcelona, The Clinical Hospital of the University of Navarra, in Pamplona and The Basque Biobank for Research-OEHUN. Building such a successful business has, however, proved challenging at times, as Vicenç explained:
"It was quite difficult to find solid companies that offered high quality products aligned with our exceptional standards," he said. "In this respect, Panasonic provided a welcome fit. It was also a challenge to find good personnel for our organisation. We introduced a constant training programme to ensure that our sales and service staff are knowledgeable in every aspect of the products we offer. These elements have been key, along with a highly-motivated team, to support our continual operation and growth; even in recent, economically-adverse periods."

Matched to market needs
Panasonic's products provide a good match to the needs of customers in Spain, who are increasingly looking for cleaner, safer, more energy-efficient solutions that utilise faster, safer protocols.

"Advanced products, such as Panasonic's MCO-170AIC CO_2 incubator series, provide enhanced ease-of-use and improved work efficiency for our customers," added Celestino. "And with constant innovation from Panasonic bringing new technological capabilities, we anticipate that the growing Panasonic product range will continue to create new opportunities for Vertex Technics and also the Spanish scientific community.

"In the highly competitive market of ultra low temperature freezers, we are strongly promoting the VIP Eco Line," he added. "Considering the notable technological advantages of our equipment, energy savings and less environmental impact, we anticipate good sales results - even more now since the publication of the new European Normative (UE 517/2014) that controls and limits HFC (Hydro-Fluorocarbon) refrigerant gasses."

Vertex Technics has created its own application laboratory that helps customers find products and protocols to solve application-specific issues.

In addition, Vertex Technics provides a full service offer for Panasonic products. Its dedicated service staff is also continually trained to enable them to stay up-to-date with any product developments.

Perfect partnership
Opportunities for two-way dialogue with Panasonic contribute to better aligned products and services.

"We work together with Panasonic in an open, collaborative way, which enables us and them to focus on staying close to the market," remarked Celestino. "Josep Gómez, Commercial Manager at Vertex, and I first initiated collaboration with Panasonic more than 20 years ago. We can explain any issues or concerns and these are relayed to central Panasonic teams. Before long, a solution is implemented!"

"Our successful strategic alliance is built on shared values, trust, a cross functional vision and continual communication. Right from the start, our partnership has proved highly successful," concluded Vicenç. "Our collaboration capitalises on the particular strengths of each company –Panasonic's world-class, innovative products and technological expertise and Vertex Technics' extensive local- and technical knowledge and its well-established position within Spain's scientific community. We have formed a great relationship with Panasonic built on trust, transparency and clarity. The alliance contributes towards shaping the future of science in Spain."

With ongoing growth, the Headquarters of Vertex Technics has recently moved to a new building with greater capacity and facilities at:
C/Comercio 12
08902 L'Hospitalet de Llobregat
Barcelona, Spain
www.vertex.es

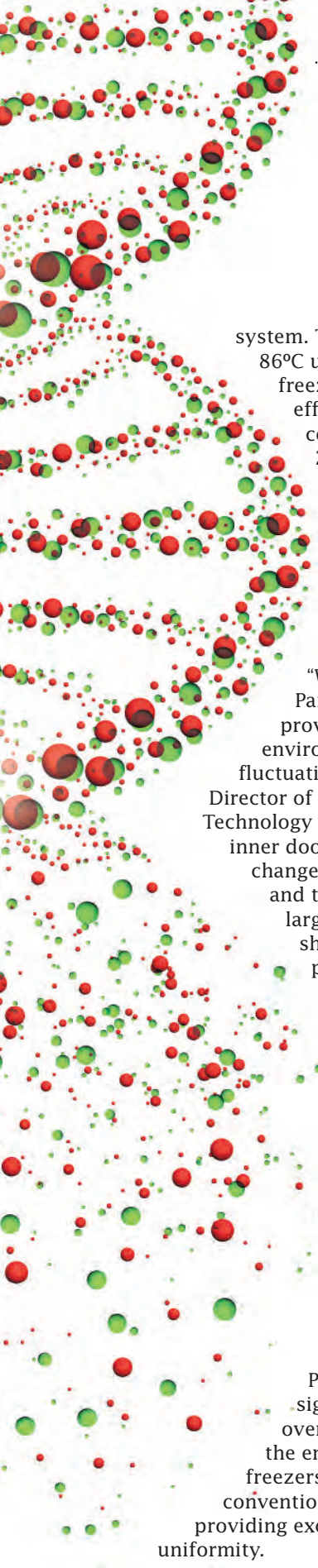
Panasonic water-cooled ultra-low temperature freezers bring significant savings to the Institute of Molecular Biology

The Institute of Molecular Biology (IMB) is a centre of excellence in life sciences located in Mainz, Germany. It carries out academic research into developmental biology, epigenetics and DNA-repair towards deepening our understanding of how we develop, adapt to our environment, age and develop diseases, such as cancer. Its work is acknowledged globally.

Employing 160 people, including some of the world's leading scientific experts in bioinformatics, cytometry, histology, high-end microscopy, micro-array analysis and next generation DNA sequencing, the IMB is housed in a state-of-the-art laboratory complex, equipped with cutting-edge technologies. With top performance, sustainability and reduced operational costs amongst its priorities, the IMB chose to equip its core facilities with Panasonic's ultra-low temperature -86°C and -150°C freezers, both with water-cooled condensers.

The IMB's research involves a wide variety of different types of biological materials, including human cell lines, tissue samples and human protein clones. All these need to be stored at ultra-low temperatures, before nucleic acids and proteins are extracted for further research. With such crucial medical and research applications, the IMB required freezers that offered the highest levels of performance and reliability to securely store these valuable, often irreplaceable samples. The facilities of the IMB were specifically-designed to minimise energy consumption and save resources. With this in mind, wherever possible, equipment such as freezers, centrifuges, laser systems and sterile work benches, are water-cooled, rather than relying on traditional air-cooling, therefore, reducing costs and enhancing efficiency. Equipment use is optimised further by sharing resources amongst multiple users from different research groups.

The IMB selected 25 Panasonic MDF-U74V -86°C ultra-low temperature freezers and four Panasonic MDF-C2156VAN -150°C Cryogenic freezers. All freezers were equipped with a water-cooled condenser option and utilise the IBM's central water-cooling



system. The 728-litre, space-saving, -86ºC ultra-low temperature freezers with improved energy efficiency are used to hold a collection of more than 25,000 different human protein-coding clones, whilst the large capacity (231 litres) -150ºC Cryogenic freezers store a large number of human cell lines, tumour cell lines and tissue samples.

"What we really love about the Panasonic freezers is that they provide a very stable, constant environment with no temperature fluctuation," said Dr. Korn, former Director of Core Facilities and Technology at the IMB[1]. "The insulated inner doors reduce temperature change when the freezer is opened and there is enough space for large boxes. A wide choice of shelving arrangements provides the flexibility to accommodate the storage needs of our different research groups. The freezers are very easy to operate and we like the fact that the main power switch is on the side. This means there is no danger of a unit being turned off accidentally – a recognised hazard if this switch is placed on the front panel."

Advanced performance and reliability

Panasonic's VIP insulation significantly reduces the overall footprint and maximises the energy efficiency of the freezers compared to freezers with conventional insulation, whilst providing excellent temperature uniformity.

Panasonic's MDF-C2156VAN -150ºC freezers feature a specially-designed cascade refrigeration system with Cool Safe® compressors. These application-specific compressors employ innovative refrigerant feedback processes to rapidly reduce compressor temperature, minimise heat output and extend compressor lifetime, thereby increasing the durability of the freezers. Temperatures within the freezers are extremely uniform.

Seamless integration into an energy-saving system

Many of Panasonic's ultra-low temperature freezers feature an advanced new capillary tube heat exchanger, which significantly increases overall efficiency. By optimising the available heat exchange areas, system reliability is also increased and energy consumption is cut. In addition, some models can be supplied with an optional water-cooled condenser that enables laboratories with a chilled re-circulating water system, like the IMB, to reduce their requirement for air conditioning within the freezer facility, re-use heat energy elsewhere and achieve even greater savings.

> **"With less heat dissipated in the freezer room, only ventilation is needed, rather than air-conditioning, which not only requires energy but wastes heat"**

The process of achieving ultra-low temperatures requires a lot of heat exchange at various stages of refrigeration. The condenser, which is where hot, high pressure, refrigerant gas is cooled to the point that it becomes a liquid, is the most intensive component in the heat exchange equation. In an air-cooled ultra-low temperature freezer, all of the heat is then released into the surrounding air. This heat energy is lost to the environment and in most cases, has to be removed from the building using air conditioning, which requires input of a lot of additional energy. If the air conditioning system fails for any reason, the room could potentially heat up relatively quickly.

Panasonic's water-cooled ultra-low temperature freezers incorporate a double plate heat-exchanger that maximises heat energy transfer from the refrigerant to a closed water circuit. As water is more efficient than air at removing heat, the compressor efficiency is improved, meaning that the power consumption of a water-cooled ultra-low temperature freezer can be reduced by 15-20% compared to an equivalent air-cooled model. As heat is removed through the water, there are much lower demands on the air conditioning system, resulting in additional savings. The energy removed by the water cooling system has the potential for use for other purposes

within the facility, such as heating water for hand-washing, or heating the building, reducing site-wide energy costs. As well as the environmental and financial benefits, a water-cooled system can also improve freezer performance and sample protection. The greater cooling capacity of water leads to a reduction in pull-down time by up to 40%, meaning faster temperature recovery after door-opening and improved sample security. Should the air conditioning system in the freezer room fail, the room will heat up less quickly, as less heat is being released into the room, helping to maintain freezer operation and protect samples.

"With less heat dissipated in the freezer room, only ventilation is needed, rather than air-conditioning, which not only requires energy but wastes heat. Water is circulated at 18°C and leaves the freezers at 23–24°C. However, this heat energy is not wasted, as the warmed water is used to contribute to the central heating for the whole building," explained Dr. Korn[1]. "With more than 100 instruments throughout the IMB connected to the water-cooling system, only a very few laboratories and measurement rooms require active cooling. Therefore, the IMB is able to reduce energy costs and benefit the environment."

The IMB also runs instruments and equipment, such as freezers, at the limit of capacity to optimise efficiency. The Panasonic freezers are located together in a dedicated area to make use of a centralised monitoring and alarm system, which constantly checks the temperature, power supply and cooling water for all units.

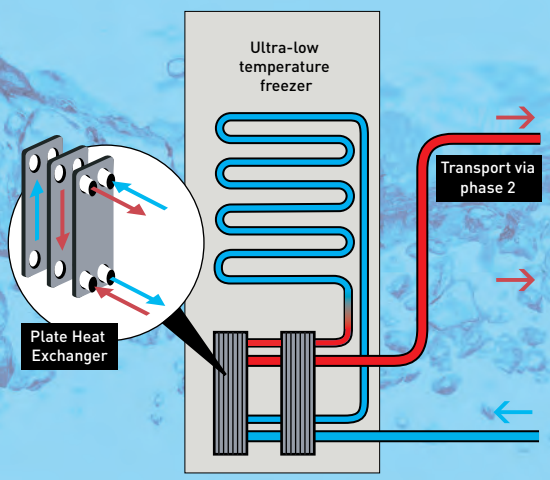
"Although initially more expensive than equivalent air-cooled freezers, choosing the water-cooled condenser option enables the IMB to use less energy and make significant savings in the medium and long term. We believe this is the way to go for the future," remarked Dr. Korn[1].
"Installing the freezers was essentially a 'plug-and-play' experience for us - The freezers arrived, they were hooked up to the cooling water, switched on and they worked! In the longer term, another important factor for us was the high level of service and full guarantee provided by EWALD Innovationstechnik GmbH, Panasonic's German Distributor. Panasonic is well known, not only for the quality and reliability of its laboratory freezers, but also for building good customer relationships and providing excellent technical support."
Panasonic has since introduced a hybrid water-cooling option for its Eco Series freezers (MDF-DU300H, MDF-DU500VH and MDF-DU700VH). This hybrid system offers even greater sample security by allowing the freezer to function via an air-cooled condenser, if for any reason, the water cooling system fails, therefore, ensuring samples are still protected under these exceptional circumstances.

The Institute of Molecular Biology (IMB) in Mainz, Germany

Water-cooling is an ideal solution for any facility with a recirculating, cooled-water circuit, as it not only provides great energy savings and reduced environmental impact, but also offers even better performance and sample security.

1) Dr. Berhard Korn was Director of Core Facilities and Technology at the IMB until 2012, when the position was taken over by Dr. Andreas Vonderheit.

Water Cooled Option
The water-cooled condenser option is available for facilities equipped with chilled recirculating water systems. This option utilises the cascade refrigeration design to reuse energy produced by an ultra-low freezer, whilst delivering additional energy-savings and high performance cooling. Ideal for material storage in repositories, hospitals, clinics and medical research facilities, the water-cooled system provides a range of benefits.
- Energy efficiency
- Cost saving
- Re-use of energy
- Faster recovery time
- Improved sample security



How It Works
Phase 1
Heat generated from the freezer compartment is transferred to a water circuit using a plate heat exchanger.

Phase 2
Transport the absorbed heat/energy from the freezer.

Phase 3
Possibility to re-use heat/energy for other heat/energy demanding systems.

Watch the video:
YouTube
http://tinyurl.com/qyryltd

Panasonic service options

Delivering a lifetime of support

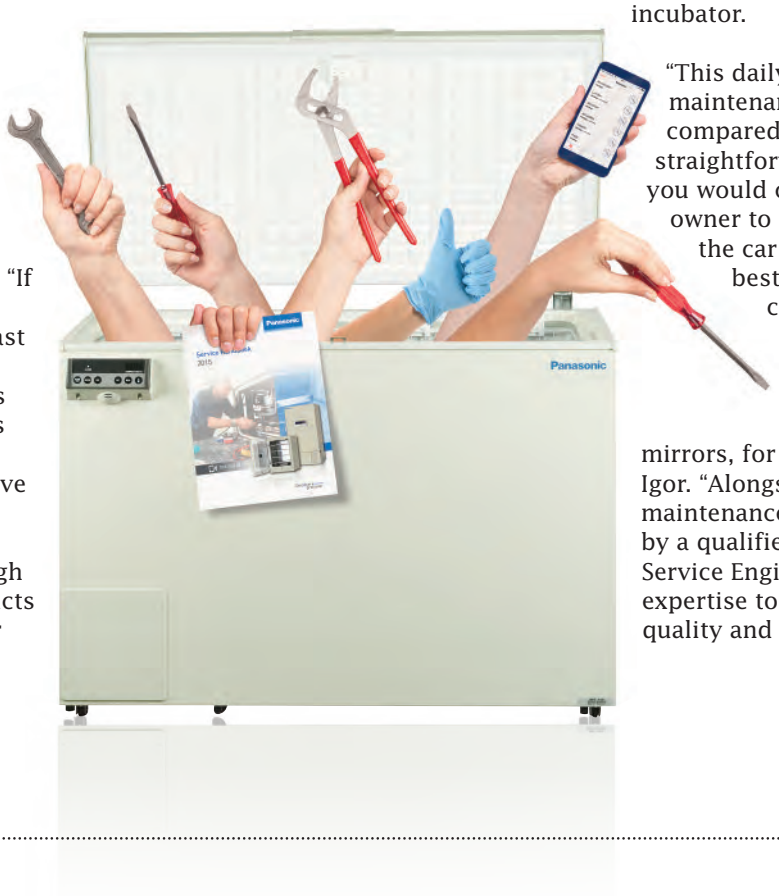
Incorporating sophisticated technology, Panasonic's products are both technically-advanced and built to last. However, even state-of-the-art equipment benefits from regular maintenance to ensure a long and trouble-free product lifetime. To ensure its products operate at peak performance, Panasonic offers a range of preventative maintenance contract options. Igor Spierenburg has led the management and development of Panasonic's service offer in Europe for over ten years. He explains why regular service and maintenance are so important in performance and how proactive technical support is embraced as a top priority at Panasonic.

Just like any other apparatus, laboratory equipment needs regular maintenance to remain in optimal working condition. However, in busy workplaces, this often gets forgotten or overlooked. It can seem relatively unimportant, until samples are put at risk. Panasonic has developed a cost effective solution to ensure that its products receive the attention they deserve, whilst minimising the effort required for customers. An in-warranty maintenance package from Panasonic can lengthen the lifespan of equipment and reduce overall lifetime costs. For Panasonic products covered by extended warranties, a basic essential maintenance schedule is available at a reduced price.

"Our products are produced to exceptionally high standards, which is what makes them so reliable," explained Igor Spierenburg, Panasonic's Service Manager for Europe. "If the unit is not used, its condition would probably last indefinitely. However, customers buy our products for many different purposes and varied demands. Some customer applications involve light 'duties' and others will really utilise them to the maximum. To maintain a high level of performance, products in use require some daily or frequent attention from the user, as well as a more in-depth check on an annual level, carried out by the experts on these products - Panasonic's qualified Service Engineers."

Essential care

Daily maintenance carried out by users of the products might include tasks, such as: scraping ice and cleaning the condenser filter on a medical freezer; checking the CO_2 concentration and cleaning the interior on an incubator; replacing the lamps on an environmental test-chamber; or defrosting a cooled incubator.



"This daily or frequent maintenance can be compared to the straightforward tasks that you would carry out as a car-owner to help ensure that the car operates at its best - checking the car's tyre pressure and adding air if required, or cleaning the car's windows and mirrors, for example," added Igor. "Alongside daily maintenance, annual checks by a qualified Panasonic Service Engineer, who has the expertise to determine the quality and condition of the

equipment at that time and the skills to improve the quality if they see a reason for it, will ensure that customers can use their Panasonic equipment for as long as possible without unexpected failures. This is never a 100% guarantee, of course, but our engineers have the experience and know-how to keep the quality of the unit at a level, as though just installed and powered on from brand new!"

Service beyond screws and software

Panasonic has more than 250 qualified Service Engineers across Europe. These individuals are trained to exceptionally high standards. Through intensive ongoing- and modular training schemes, they achieve qualification in various technical and service aspects, such as First Response and Diagnostics training in Panasonic's ultra-low temperature freezer and incubators, Advanced Cascade Training for Panasonic's ultra-low temperature freezers and Validation Training. Certification in each subject remains valid for two years, after which, each engineer must re-qualify. Panasonic ensures that all its Service Engineers remain up-to-date on the newest techniques through training and testing courses in Europe and with Panasonic's engineers, in Japan. Next year, an e-learning training platform will be introduced to enhance training of the Service Engineers even further. Each qualified engineer carries an identification card that clearly explains who they are and what their specific qualifications are. Panasonic also cultivates a holistic approach to technical support.

"We say that technical support is an attitude, not a department," said Igor. "It means our Service Engineers are not only qualified, but dedicated to ensuring that customers get the optimal benefit from their Panasonic products. Their passion for innovation goes beyond the technical features of our products to cover how they integrate into the laboratory environment."

Flexible service packages

Panasonic has developed a number of service packages to meet any demand of the customer with clear content and fair pricing. Customers can get information on price and arrange their package of choice through local Panasonic Sales Representatives or online. Even in the event that the Service Engineer cannot repair the unit immediately, there are opportunities for back-up equipment to be sent to the customer until the repaired unit is available.

Panasonic's service package options include:

- **Warranty Plus**

Designed for customers who wish to keep their equipment in optimum condition during its warranty period, at an affordable price. Minor problems, which may not be noticed by the user, can be rectified before they become significant. This helps to ensure a long and trouble-free product lifetime.

- **Premium**

Ideal for equipment that is outside its initial warranty period and subject to average use. It offers one Preventative Maintenance visit each year and includes more extensive testing. Whilst the cost of any repair that is necessary is excluded, all parts, labour and travel are at discounted rates.

- **Exclusive**

For customers who like to budget without the worry of unforeseen costs. In addition to the benefits of the Premium option, this contract provides all parts, labour and travel associated with any breakdowns during the year (excluding consumables, misuse or mistreatment).

"We believe that it is our role to educate and support our customers to get the best out of our equipment and with a range of maintenance packages to choose from, we can increase the customers peace of mind," said Igor.

Validation

Because many key component parts used in Panasonic products are designed and built by us, we offer the most precise and in-depth validation resources specific to Panasonic laboratory products. Panasonic provides comprehensive expertise in laboratory equipment to meet your exact compliance needs. Panasonic validation systems employ advanced technology coupled with the latest trends to insure compliance with accurate and time efficient completion.

Prevention is better than cure

What could happen if a customer doesn't take on an annual maintenance on equipment?

"The first years the unit would most likely operate as usual and there would be nothing to worry about, if daily maintenance is still carried out by the end-user,

but deterioration might have already started inside the system," explained Igor. "A lot of the components in the products are moving parts, which have limited life cycle and require replacement or cleaning at some stage. When this is not performed, the system could start to operate less optimally and the power consumption will increase due to more friction in the system. Even electrical components could start to malfunction, because of the current inside of the electrical systems. These are all normal with a mechanical product that has some moving parts. Eventually, the unit could stop working or work incorrectly, and in biomedical applications, this could result in skewed test results or even loss of samples."

"In most cases, the resultant damage to the samples kept within the Panasonic units would be far more expensive than the price of a service inspection or service maintenance visit," Igor emphasized. "We therefore recommend every owner of a Panasonic Biomedical product to consider an annual maintenance on their equipment to make sure that the best care is in place to protect the samples inside, as well as the product itself and not to forget the environment, because it will prevent an unnecessary increase in power required to compensate lack of performance."

Discovery powered by precision

With a precisely-maintained Panasonic product, customers can achieve optimal results. One example is from a large university medical centre in The Netherlands, which currently utilises more than 160 pieces of Panasonic equipment under contract. From the moment of taking on the contract up until now (four years), failure rate of equipment at the medical centre has dropped by 30%, because of the intense involvement of Panasonic's dedicated engineers, who carry out annual maintenance. The Panasonic engineers have optimised the maintenance programme to fit the individual usage of each specific piece of equipment, and are, therefore, able to offer optimal support, as well as learning more about the use of the equipment in such an application.

"Our Service Engineers are not only qualified, but dedicated to ensuring that customers get the optimal benefit from their Panasonic products"

Aligned with customer needs

Preventative Maintenance of Panasonic equipment through a service agreement is becoming increasingly popular. Panasonic strives to continually evolve its service offer alongside customer needs.

"We are currently exploring the possibility to incorporate the use of communication methods that detect problems developing before they actually happen, so that we can warn customers and take action before a problem arises" said Igor. "This is a move towards remote service applications, which is made possible through tuning our diagnostic capabilities in temperature-mapping for example. The future looks bright for even more proactive service from Panasonic."

Safer cryopreservation with Panasonic's –150°C ultra-low Temperature Freezers

Panasonic developed the world's first -152°C ultra-low temperature freezer in 1991 in response to a growing demand for cryopreservation solutions following medical and scientific advances, such as the increased use of cryopreserved oocytes in IVF and stem cells in transplants. Since then, Panasonic has continually invested in the ongoing development of cryogenic freezers, introducing improved insulation, better refrigeration technology and alarm systems, and a bigger capacity. The latest Panasonic MDF-C2156VAN and MDF-1156 ultra-low temperature freezers offer unparalleled safety, reliability and uniform temperatures thanks to the application of over 20 years of specialist expertise.

Reaching the ultra-low temperatures necessary for the cryopreservation of living cells without causing any damage or loss of viability requires special techniques and methods. Cryopreservation was traditionally achieved using liquid phase nitrogen (LN_2). Whilst this achieved the lowest possible storage temperatures, it required the use of large volumes of LN_2, which is a potential hazard. Following the publication of a number of documented cases of major cross contamination by virus pathogens via LN_2, including a well-known case of transmission of Hepatitis B via bone marrow transplants [1], there was a shift towards using vapour phase nitrogen for cryopreservation. However, this can create an uneven temperature distribution throughout the storage chamber, with higher temperatures at the top. Vapour phase storage chambers also tend to have a higher rate of static evaporation than liquid phase tanks, resulting in increased liquid nitrogen use and greater operational costs. Panasonic's -150°C freezers provide effective cryogenic storage without the disadvantages of liquid or vapour phase nitrogen. An increasing number of customers, including blood and tissue banks, hospitals, research institutes, pharmaceutical companies, animal health institutes and biobanks are opting for the added safety and security that they offer. The two Panasonic models, MDF-C2156VAN (231 litres) and MDF-1156/MDF-1156ATN (128 litres), are available with a range of accessories, such as a variety of inventory solutions for even more efficient sample storage and improved usability.

Stable, uniform and reliable ultra-low temperatures

For successful cryopreservation, temperatures must be stable and well below the critical temperature of -135°C (the recrystallization point of water). Temperature uniformity throughout the freezer is essential. Transitions above and below this critical temperature can cause damage to cells and loss of viability, due to the change in crystal formation. In vapour phase LN_2 systems, large temperature gradients can develop between the top and bottom of storage containers, which puts samples at risk. In crucial medical and research applications, this can lead to the loss of life-saving, highly valuable or irreplaceable biological materials. Panasonic's -150°C freezers feature a specially-designed cascade refrigeration system with Cool Safe® compressors. These application specific compressors employ innovative refrigerant feedback processes to rapidly reduce compressor temperature, minimise heat output and extend

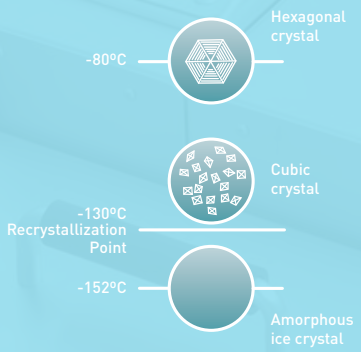
> "Temperatures within the freezers are extremely uniform, adding assurance that all samples can be stored in identical conditions"

Panasonic's -150°C ultra-low temperature freezers are already in use to store:

- Umbilical cord blood as a source of hematopoietic stem and progenitor cells.
- Stem cells for autologous transplants in patients who have undergone high dose chemotherapy.
- Adipose tissue, epithelial cells and bone marrow for stem cell therapy.
- Blood products for immunology analysis.
- Mesenchymal stromal cells for regenerative medicine and tissue engineering.
- Cancerous tissue samples.
- Semen for artificial insemination – used for breeding guide dogs and race horses.
- Oocytes and embryos for IVF.
- Ovarian tissue for preserved reproductive function in women undergoing treatments.
- Plant seeds/shoots for breeding.
- Components for shrink fitting of parts in industrial manufacturing.
- Temperature testing of parts in the automotive and aerospace industry.

Why freeze to -152°C?

Recrystallization mechanism



MDF-C2156VAN-PE
231 Litres

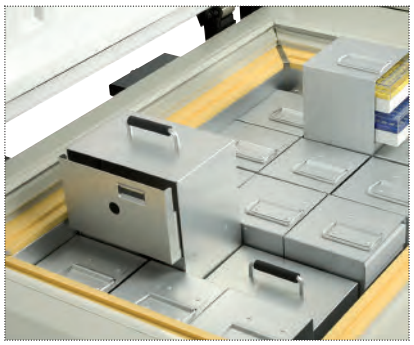
compressor lifetime, thereby increasing the durability of the freezers. Temperatures within the freezers are extremely uniform, adding assurance that all samples can be stored in identical conditions. For complete security, the MDF-C2156VAN and MDF-1156ATN models come complete with LN_2 back-up connections as standard. Both of Panasonic's -150°C freezers incorporate Status Alert continuous condition monitoring. The temperature, filter and cascade sensors monitor operational conditions continuously. Should an abnormality be identified, an alarm, error code and the current temperature are clearly displayed, allowing users to take prompt action.

Removes major health and safety considerations

The use of liquid nitrogen raises numerous major health and safety issues. As LN_2 evaporates, it reduces the oxygen concentration in the air and can act as an asphyxiant, especially in confined spaces such as laboratories. Nitrogen is odourless, colourless, and tasteless and can cause asphyxiation by oxygen depletion without any sensation or prior warning. Consequently liquid nitrogen tanks need to be placed in well-ventilated areas to minimise this risk, such as specialised storage rooms. Users must observe considerable health and safety measures when using LN_2 and may be required to complete multiple forms and emergency action plans. Personal protective equipment must be worn whenever dealing with liquid nitrogen storage containers to prevent contact with skin. Some LN_2 storage containers require manual filling, which puts users at even greater risk of LN_2 contact, cold skin burns and frostbite. Use of Panasonic's -150°C freezers removes these risks, although they must, of course, be closely observed for any LN_2 back-up systems employed in conjunction with the freezers.

No risk of cross-contamination

A number of serious cases of cross-contamination of samples in



traditional LN_2 storage have been published. These cases changed the way scientists stored their vital samples and moved the market away from storage in the liquid phase and towards vapour phase storage. There are some studies that suggest cross-contamination can still occur in vapour phase nitrogen storage [2], however, this is currently unconfirmed. With Panasonic's -150°C freezers there is no risk of cross-contamination.

Eliminates liquid supply issues

LN_2 vaporizes continuously meaning that a constant supply to the container is required. In remote locations and places where roads can be badly affected by weather, issues with replenishing supplies of LN_2 may arise. Sample security can be jeopardised if a constant supply is not possible. Panasonic's -150°C freezers only require a standard European 230V, 50Hz power supply.

Low operational costs

The constant supply of liquid nitrogen required for an LN_2 storage chamber to function properly often leads to high operational costs. Not only is the cost of the liquid nitrogen itself high in many areas, but users must also account for the transport and storage of the liquid nitrogen, which can be significant. Panasonic -150°C freezers use efficient refrigeration systems as well as a host of other features designed to minimise energy consumption, meaning electrical running costs are extremely low.

User-friendly Design

Panasonic's VIP PLUS insulation reduces the wall thickness of the MDF-C2156VAN to save valuable laboratory space, as well as contributing to overall energy efficiency, due to the low thermal conductivity of the insulation. Panasonic's Cool Safe compressors extend compressor lifetime, minimise heat output and are also quiet when running, making the freezers ideal for installation in busy laboratories.
Clear information on freezer status and access for operation is provided by the MDF-C2156VAN's user-friendly, LCD control panel.

With numerous clear advantages over liquid and vapour phase nitrogen cryopreservation, Panasonic's MDF-C2156VAN and MDF-1156 ultra-low temperature freezers are already in wide use to store an extensive range of biological materials.

MDF-1156-PE 128 Litres

References:

1. Tedder RS, Zuckerman MA, Goldstone AH, Hawkins AE, Fielding A, Briggs EM, Irwin D, Blair S, Gorman AM, Patterson KG, Linch DC, Heptonstall J, Brink NS. 1995. Hepatitis B transmission from contaminated cryopreservation tank. Lancet. 346: 137-140.
2. Grout BWW, Morris GJ. 2009. Contaminated liquid nitrogen vapour as a risk factor in pathogen transfer. Theriogenology.71: 1079-1082.

Panasonic MDF-U731M -30ºC Biomedical Pro Upright Freezer

A professional storage solution for valuable samples

Panasonic's MDF-U731M -30ºC Biomedical Pro Upright Freezer provides a stable, uniform -30ºC environment for a wide range of laboratory storage. The MDF-U731M delivers the exceptional performance and high quality that is expected from Panasonic Biomedical freezers, with a larger, 690 litre capacity.

With adjustable shelving and a wide range of storage options available, it offers a flexible solution that can accommodate both the current and future storage needs of growing laboratories. The MDF-U731M also features a digital display, comprehensive alarm system and door lock for the secure storage of valuable samples. Its efficient cooling, durable construction and large capacity make it particularly suitable for use in busy laboratories. The MDF-U731M is an efficient and space-saving professional storage solution for a wide range of applications, including the storage of enzymes, culture media, reagents, vaccines and samples for diagnosis and testing.

The Panasonic MDF-U731M -30ºC Biomedical Pro Upright freezer, and its predecessor the MDF-U730M, were specifically designed to offer a larger capacity freezer with the uniformity, stability and reliability required in the life science market. A wide range of customers including pharmaceutical and biotechnology companies, research institutes,

Biomedical pro

> "The MDF-U731M can accommodate up to 14 plastic storage containers"

universities, hospitals and diagnostics laboratories, are opting for the unrivalled performance and design of this advanced biomedical freezer.

Uniform and stable temperatures

The MDF-U731M -30ºC Biomedical Pro Upright Freezer features direct cooling with a full cold wall design. The evaporator pipes, which remove heat from inside the cabinet, are located in the back, sides, top and bottom walls of the freezer to ensure uniform temperatures throughout. To optimise the temperature uniformity even further, the pipes are strategically placed closer together towards the top of the freezer. This produces natural convection of the air inside the freezer as the colder air falls to the bottom, ensuring an even temperature distribution throughout the large chamber. The absence of 'warm' or 'cold spots', typically found in 'domestic style' freezers, ensures that all samples are stored at the desired temperature. Cold wall technology also ensures maximum sample protection by providing a rapid temperature recovery after door opening.

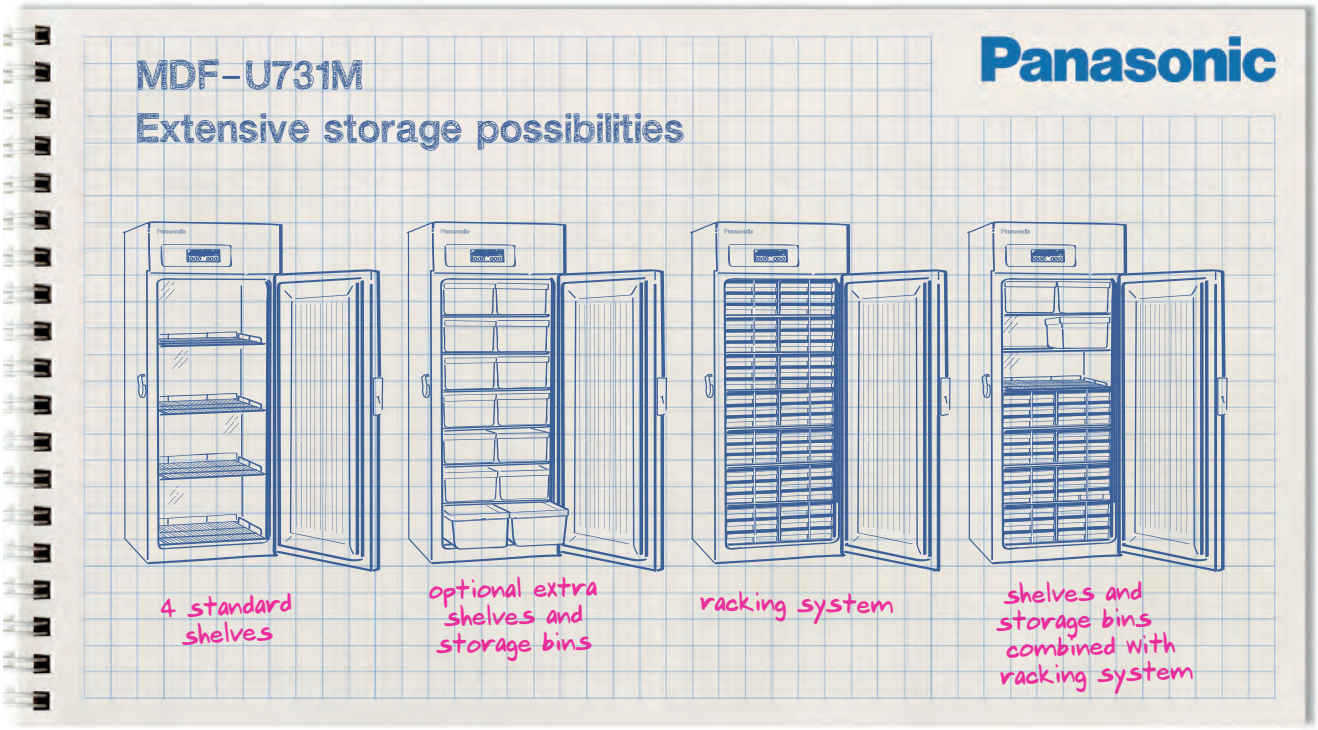
As there is no automatic defrost cycle on the MDF-U731M, the inner chamber offers outstanding temperature stability without any short term temperature increases. Manual defrost is often beneficial for applications in which very constant and stable temperatures are required - for example, in strict GMP applications or for the storage of temperature sensitive samples.

Extensive storage possibilities

Fixed shelf positions and non-changeable compartments within many biomedical freezers can restrict storage options and limit capacity. With adjustable shelving, the MDF-U731M -30ºC Biomedical Pro Upright Freezer can provide significantly more usable capacity and a comprehensive range of storage options for a wider number of applications. With the addition of optional MDF-T07ST extra shelves (available in a set of three) the MDF-U731M can accommodate up to 14 plastic storage containers. These optional MDF-T07SC storage containers are ideal for customers who need to store a variety of different types of samples in different containers, including boxes, bottles and tubes. Individual containers can be allocated to different users or sample types for the most efficient use of space. Panasonic also offers inventory racks for the storage of cryoboxes within the MDF-U731M, giving it the capacity to store up to 384 50mm (2 inch) cryoboxes.

Maximum sample security

The MDF-U731M -30ºC Biomedical Pro Upright Freezer features a fully comprehensive alarm system with diagnostic functions and remote alarm. High and low temperature alarms can be set by the user and easily adjusted to suit specific applications and needs. A door alarm alerts users if the door has been left open accidentally. In the event of a power cut, the power failure alarm alerts users to the situation and the non-volatile memory of the microprocessor controller ensures that the freezer parameters remain as they were previously after power is returned to the unit. In addition, the MDF-U731M has an



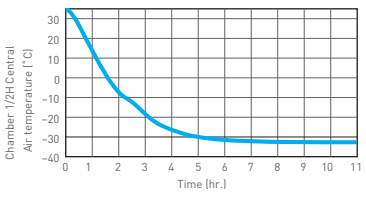
integral door lock for secure storage of valuable samples.

Superior performance by design

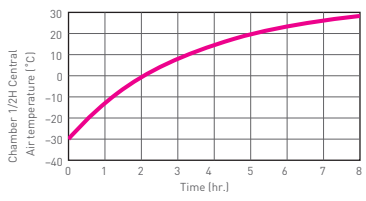
Panasonic's MDF-U731M -30ºC Biomedical Pro Upright Freezer incorporates a refrigeration system that has been specifically designed to provide the best performance for use in demanding laboratory environments, whilst maximising efficiency and ease of use. The reciprocating compressor within the MDF-U731M features an oil cooler pipe. High compressor running temperatures can jeopardise the reliability and durability of a freezer.

In the Panasonic system, cold refrigerant is passed through a pipe in the base of the compressor to cool the oil, optimise lubricant properties and reduce compressor-running temperatures. A skin condenser reduces routine maintenance, noise level and energy use as there is no requirement for a noisy condenser fan motor or filter. A ventilation line at the bottom of the door releases negative pressure that can form on door closing, therefore reducing the waiting time needed to re-open the door, which is ideal for busy laboratories where freezers are accessed regularly. In addition, a hot gas line around the freezer door prevents the build-up of ice and minimises cold air loss, by ensuring that the magnetic door gasket seals effectively against the frame of the freezer.

Pull-down characteristics



Pull-up characteristics



Conditions: AT 35°C, no load, measured at center of chamber

A professional solution for a wide range of applications

Whilst 'domestic style' freezers might appear to offer laboratories an inexpensive storage solution, the added risk to the security of valuable samples is significant. Investing in a professional solution in the form of purpose designed Panasonic freezers, like the MDF-U731M -30ºC Biomedical Pro Upright Freezer, can ensure that samples are properly protected.

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With its large capacity, extensive storage options and advanced energy efficient technology, the MDF-U731M can replace several smaller, 'domestic style' freezers, saving customers space, energy and operational costs, as well as providing a much safer storage environment for precious samples.

Discovery powered by precision

Complying with progress
Medical device certification

Panasonic products are used by a growing number of customers for the preservation or cultivation of human cells, tissues and blood components, and selected products are classified as medical devices in this context, according to the European Union's (EU) Medical Device Directive (MDD). Panasonic was one of the first major international companies to be awarded certification in compliance with the MDD for a wide range of incubation and refrigeration products in 2011. Since then, it has continued with commitment to certification of key products and its quality systems to ensure that Panasonic products meet all current and future regulatory requirements.

Stringent legislation

The EU's MDD was established in the 1990s to ensure that medical devices of all kinds are safe, perform effectively and are designed, manufactured, tested and marketed according to harmonised methods and conditions. The stringent European standards are acknowledged globally, although other regions have their own specific regulations for medical device development and production.

The legislation comprises of three relevant Directives:

- the Active Implantable Medical Device (AIMD) Directive - 90/385/EEC;
- the Medical Device Directive (MDD) - 93/42/EEC; and
- the In Vitro Diagnostic Device Directive (IVD) - 98/79/EC.

The Directives 90/385/EEC (AIMD) and 93/42/EC (MDD) were changed by Directive 2007/47/EC of the European Parliament and the Council of 5th September 2007. These changes applied from 21st March 2010.

In addition, medical devices and accessories are classified into one of four classes: I, IIa, IIb and III. This classification is based on the specific devices' invasiveness; duration of continuous contact with the body; the nature of the tissue contact and whether the device is non-active or active. In general:

- Class I includes devices with low risk, such as external patient support products.
- Class IIa/b covers devices with medium risk, such as electro-medical devices.
- Class III comprises devices with high risk, such as cardiovascular catheters.

Panasonic is certified to manufacture blood bank refrigerators, freezers and incubators as Class IIa medical devices, in line with Directives 93/42/EEC and 2007/47/EC, for the following medical purposes:

- Blood bank refrigerators - *Storage of blood.*
- Freezers - *Storage of cells, organs, DNA or plasma.*
- Incubators - *Culture of cell tissues, organs or embryos.*

Compliance with the Directive and certification for Class IIa devices is assessed and granted by a specific, EU-designated, Notified Body – For Panasonic's products, this authority is the TÜV-Süd, a leading technical service organisation, with headquarters in Munich, Germany.

Unwavering commitment

Every step in the process of design, manufacture and testing is subject to a multitude of complex and specific rules and regulations when applying for medical device status. Declaring a relevant product as a medical device is a significant scientific, engineering and business undertaking. It is very different from developing a 'non-medical' electronic product.

Obtaining MDD certification shows not only that Panasonic products are designed and manufactured to exceptionally high standards, but also that Panasonic is deeply committed to serving scientific professionals in the medical field and ultimately, helping patients.

Achieving certification requires compliance that extends way beyond product function. It demands that Panasonic provides a consistent and effective quality management system, technical documentation, essential product requirements, information about harmonised standards and medical device regulations, risk analysis, post-marketing surveillance, reporting under the vigilance system, and a retention system for certain critical documentation. Certified medical devices must display a CE mark that indicates conformance with the MDD.

Acquiring MDD approval is definitely a lengthy and intricate process. Panasonic had to submit extensive information for certification and assessment, including technical documentation, test results and data on quality systems. A large cross-functional team was involved, including development, engineering, regulatory and quality experts. In applying for EU MDD certification, Panasonic also upgraded compliance of its quality systems to the highest and latest global standards for medical devices according to ISO (the International Organisation for Standardization) - ISO13485.

Matched with market development

The first Panasonic biomedical products to be awarded MDD certification in 2011 were: the MCO-19AIC CO_2 incubator with rapid H_2O_2 vapour decontamination option; the MBR-305GR blood bank refrigerator; and the MDF-U74V ultra-low temperature freezer. Since then, many more Panasonic products have also been certified, including:

- MBR-305GR-PE
- MBR-705GR-PE
- MCO-170AIC-PE series
- MDF-U55V-PE
- MDF-U700VX-PE
- MDF-DU300H-PE
- MDF-DU500VH-PE
- MDF-DU700VH-PE

As medical technology advances, the need for incubators and refrigerators for cultivation or storage of cells and tissues for human use is expected to grow further. Panasonic already provides a wide range of certified products for this sector, but invests continually and significantly to stay ahead of market and customers' needs.

Panasonic's MIR programmable cooled incubators:

Precision and versatility

Many test and experimentation protocols require wide-ranging, high-precision, automatic temperature and lighting control, for example, in analysing the performance of a sample over a range of environmental conditions. In others, distinct and precise temperature and lighting protocols are critical at specific times, as in the culture of biological samples or in plant germination. Precision, repeatability and reliability in laboratory testing are essential to avoid jeopardising samples, results, or entire research projects. Panasonic's MIR programmable cooled incubators offer exceptional accuracy, reliability and flexibility, as well as value for money and enhanced efficiency. Laboratories around the world and from a diverse range of industries are benefiting from outstanding performance of the Panasonic MIR cooled incubators.

Panasonic's MIR series includes three programmable cooled incubator models that provide a range of capacities: the MIR-154-PE (123 litres), MIR-254-PE (238 litres) and the MIR-554-PE (406 litres). A host of accessory options are also available for the MIR series that extend flexibility of the system further.

Precise performance

An extensive temperature range supports the exceptional versatility of the MIR series. Every MIR cooled incubator can be set to any temperature between -10°C and +60°C. Precise temperature control with minimal fluctuation is achieved through the high precision, microprocessor-controlled PID heater. This system minimises temperature fluctuations to only ±0.2°C, using heater control only, and ±1.5°C in combination with compressor-control. This level of accuracy is essential for the success of many environmental tests, experiments with microorganisms and plant germination in particular. In these examples, the MIR series' door window and fluorescent lamp enable clear observation of samples and minimise the need to open the door, which can create temperature fluctuations. Day and night simulation can be achieved with a window blanking plate. This comes as standard with the MIR-554 model and is optionally available for the MIR-154 and MIR-254 models. In addition, fan circulation optimises the temperature uniformity within the incubators. The door switch automatically turns the circulation fan off with door opening to minimise air loss and reduce temperature recovery times. In a dynamic environment, such as a busy microbiological testing laboratory, this can be particularly important.

"Temperature accuracy is essential for the success of many environmental tests, experiments with microorganisms and plant germination in particular."

Buffering against 'extremes'

Working with incubators at the lowest or highest temperatures within this range offers great flexibility and work efficiency. Panasonic's MIR series incorporates innovative features that enable versatile performance. An internal fan offers temperature uniformity in the incubators within a wide temperature range. The MIR-154 and MIR-254 models include a fan that is angled obliquely upward to prevent direct air flow contacting samples. This prevents the medium from desiccation and reduces medium drying. At lower operating temperatures, ice can accumulate on the evaporator, which can be observed through the frost check window. Depending on the experiment and the level and duration of the set temperatures, at which the incubator is being used, a choice can be made either for automatic (daily) defrost or manual defrost. The manual defrost cycle is started manually via the control panel and is completed automatically.

Controlled lighting protocols

For a wide range of environmental testing, and also plant, algae and insect studies, controlled lighting is integral to experimental protocols. Panasonic's MIR series features two levels of illumination with timed 'on/off' control. The incubators are equipped with a fluorescent lamp (15W x 1pc), as standard. However, an optional light addition kit (MIR-L15) is also available, enabling up to three more fluorescent lights to be placed in the chamber ceiling, allowing greater flexibility in light intensity.

Advanced programming options

Advanced programming capabilities are another major feature of the MIR series. Straightforward constant temperatures can be set, as is required in testing waste water for Biological Oxygen Demand (BOD), where a constant temperature of 20°C is required for a period of five days. Or multi-step test protocols, such as those required for plant germination, can be programmed in easily with the

Market sectors and example applications

Electrical and Material testing	Medical, Pharmaceuticals, Foods	Agriculture, Water and Soil qualities
Testing of electrical components (from -10°C to 50°C) Environmental temperature testing of various materials and substances: • Labels and stickers (25°C) • Pastes and organic solvents (23°C and 25°C) • Ink storage (10°C or below) • Electricity measurement device (20°C) Stability testing: • Adhesives (5°C to 30°C) • Powder and liquid samples (40°C) • Soap and detergents (5°C) Curing testing: • Plastics (37°C) • Epoxy resin (20°C to 50°C)	Preliminary tests for drugs and reagents (2°C to 10°C) Stability tests for pharmaceuticals Stability and storage tests for food products (0°C to 40°C programmed operation) Frozen ice-cream quality control (-5°C to 10°C) Stability tests for cosmetic ingredients (-10°C to 50°C, 40°C cycles) Stability tests for hair care products (20°C to 40°C) Fruit fly incubator for research	Waste water BOD (Biological Oxygen Demand) tests (20°C for 5 days) Microbiological testing of drinking water and supply networks (1°C to 44°C) Bacterial testing (e.g. legionella, salmonella) for building water supplies (36°C to 44°C) Fungi culture (25°C) Rice saccharification tests (25°C to 35°C for 3 to 60 days)

Above applications are for reference only. Please note that different tests may be performed according to different (local) standards and regulations.

MIR series. Repeatable programs incorporating up to 12 different steps per program that combine flexible temperature, light on/off and time control are possible. And up to ten programs can be stored for convenient retrieval. Each program can be repeated one to 98 times or continuously repeated. Program input is simple and the incubators accommodate a range of diversified experimentation requirements. They are ideal for experimentation during night time, weekends and holidays, when experimentation settings can be changed automatically, eliminating the need for scientists to return to the laboratory during these times.

Sample protection

Maintaining optimum sample security is a priority in dynamic laboratory environments with many employees accessing incubators during the course of the day or night. It is even more important when working with particularly valuable samples. The MIR series features a comprehensive audio-visual alarm system that alerts the user to temperature deviation and other malfunctions. This helps to reduce the risks to valuable samples and experiments. An alarm ring-back function resets the buzzer to inform the user if the incubator remains in alarm condition after the buzzer mute switch has been pressed. Self-diagnostic messages can reduce service response times and costs, by enabling the user to inform the service department of faults. And a non-volatile memory for program settings and battery back-up of clock function ensure continued operation after recovery from power failure. For added security, the MIR series comes with a user-settable, four-digit keypad lock password and remote alarm output. An optional door padlock bracket is also available.

Easy-to-use

The series is easy-to-use through intuitive operation with the LCD display that has a pop-up menu for fast temperature setting and advanced programming. It has an effective data acquisition system with data acquisition software that enables remote monitoring of cooled incubators. Data can be sent to a PC with the optional communication interface board (MTR-480). The MIR series is designed for comfortable operation and has a reversible door with choice of left- or right-hand door opening (available for the MIR-154 and MIR-254 models).

Flexibility that creates significant savings

Offering outstanding value, the MIR series provides ongoing savings in space, energy, efficiency and labour. To save valuable laboratory space, the MIR-154 can be stacked using the optional Stacking Kit (MIR-S154SB). Optimum energy savings are achieved by the highly efficient, microprocessor-controlled, PID heater that reduces compressor operation at higher temperatures[1].The advanced programming capability of the MIR programmable cooled incubators can also enhance labour-efficiency by increasing the output of busy test laboratories, ensuring that reduced staff availability at nights and weekends does not disrupt protocols. The MIR controller can be programmed so that the temperature is reduced to +4°C after a normal incubation period to refrigerate samples until they can be removed.

for specs see page 53

With exceptional precision and advanced programming capabilities, Panasonic's MIR programmable cooled incubators are suitable for a wide range of applications, from environmental, water, materials electronic and food testing to algae, insect and plant studies.

1. Ambient temperature-dependent

The complete **specifications** of all Panasonic Biomedical products

GROUP		VIP Pro -150°C Chest Freezers	Classic Pro -152°C Chest Freezers	
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm				
MODEL		**MDF-C2156VAN-PE**	**MDF-1156-PE**	**MDF-1156ATN-PE**
Dimensions				
External dimensions (W x D x H)[1]	mm	1730 x 765 x 1010	1400 x 800 x 945	
Internal dimensions (W x D x H)	mm	760 x 495 x 615	500 x 450 x 572	
Volume	litres	231	128	
Capacity	2" boxes	150	81	
Net weight (approx)	kg	318	265	272
Performance				
Cooling performance [2]	°C	-150	-152	
Temperature setting range	°C	-125 ~ -152	-125 ~ -155	
Temperature control range [2]	°C	-125 ~ -150	-130 ~ -152	
Control				
Controller		Microprocessor, non-volatile memory		
Display		LCD	LED	
Temperature sensor		Pt-1000	Pt-100	
Refrigeration				
Refrigeration system		Cascade with auto-cascade low-stage	Cascade	
High-stage compressor	W	1100		
High-stage refrigerant		HFC		
Low-stage compressor	W	1100		
Low-stage refrigerant		HFC mixed		
Insulation material		PUF / VIP PLUS	PUF	
Insulation thickness	mm	135	175	
Construction				
Exterior material		Painted steel		
Interior material		Aluminium		
Outer lid lock		Y	Y	
Inner lid	qty	2	1	
Max. load - total	kg	207	300	
Access port	qty	1	1	
- position		Right	Left	
- diameter	Ø mm	40	40	
Casters	qty	6 (3 levelling feet)	6 (2 levelling feet)	
Alarms				
Power failure		V-B-R	V-B-R	
High temperature		V-B-R	V-B-R	
Low temperature		V-B-R	-	
Filter		V-B	V-B	
Lid open		V-B	-	
Electrical and noise Level				
Power supply		230V 50Hz single phase		
Noise level [3]	dB	51	61	
Options				
Inventory racks		See page 48	See page 48	See page 48
Liquid CO_2 back-up		-	CVK-AT2-PW [4,5]	-
Liquid N_2 back-up		Supplied as standard	CVK-ATN2-PW [4]	Supplied as standard
Temperature recorders				
- Continuous strip type		MTR-155H-PW	MTR-155H-PW	Supplied as standard
- Chart paper		RP-155-PW	RP-155-PW	RP-155-PW
- Ink pen		DF-38FP-PW	DF-38FP-PW	DF-38FP-PW
- Recorder housing (if required)		MDF-S30150-PW	-	-
RS485 interface module		MTR-480-PW	-	-

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +30°C, no load
[3] Nominal value. Background noise 20dB.
[4] Requires recorder MTR-155H-PW
[5] CVK-A-PW may also be used

GROUP		VIP Dual Cool -86°C Upright Freezers		VIP Eco -86°C Upright Freezers	
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		**MDF-U500VX-PE**	**MDF-U700VX-PE**	**MDF-DU500VH-PE**	**MDF-DU700VH-PE**
Dimensions					
External dimensions (WxDxH) [1]	mm	770 x 870 x 1990	1010 x 870 x 2010	770 x 870 x 1990	1010 x 870 x 1990
Internal dimensions (WxDxH)	mm	630 x 600 x 1380	870 x 600 x 1400	630 x 600 x 1400	870 x 600 x 1400
Volume	litres	519	728	526	728
Capacity	2" boxes	352	528	352	528
Net weight (approx)	kg	320	375	291	334
Performance					
Cooling performance [2]	°C	-86		-86	
Temperature setting range	°C	-50 ~ -90		-50 ~ -90	
Temperature control range [2]	°C	-50 ~ -86		-50 ~ -86	
Control					
Controller		Microprocessor non-volatile memory		Microprocessor non-volatile memory	
Display		LCD		LED	
Temperature sensor		Pt-1000		Pt-1000	
Refrigeration					
Refrigeration system		Independent Dual-Cooling		Cascade	
High-stage compressor	W	-		750	
High-stage refrigerant		-		HC	
Low-stage compressor	W	2 x 1100		750	
Low-stage refrigerant		HFC mixed		HC	
Insulation material		PUF / VIP PLUS		PUF / VIP PLUS	
Insulation thickness	mm	70		70	
Construction					
Exterior material		Painted steel		Painted steel	
Interior material		Painted steel		Painted steel	
Outer door lock		Y		Y	
Inner door	qty	2 (insulated)		2 (insulated)	
Shelves	qty	3		3	
Max. load - per shelf	kg	50		50	
Max. load - total	kg	150		150	
Vacuum release port		Y		Y	
Access port	qty	3		2	
- position		Back/bottom x 2		Back / bottom	
- diameter	Ø mm	17		17	
Casters	qty	4 (2 levelling feet)		4 (2 levelling feet)	
Alarms					
Power failure		V-B-R		V-B-R	
High temperature		V-B-R		V-B-R	
Low temperature		V-B-R		V-B-R	
Filter		Filterless design		V-B	
Door open		V-B		V-B	
Electrical and noise level					
Power supply		230V 50Hz single phase		230V 50Hz single phase	
Noise level [3]	dB	53		52	
Options					
Inventory racks		See page 48		See page 48	
Liquid CO_2 back-up		CVK-UB2-PW		CVK-UB2-PW	
Liquid N_2 back-up		CVK-UBN2-PW		CVK-UBN2-PW	
Temperature recorders					
- Circular type		MTR-G85C-PE		MTR-G85C-PE[4]	
- Chart paper		RP-G85-PW		RP-G85-PW	
- Ink pen		PG-R-PW		PG-R-PW	
- Continuous strip type		MTR-85H-PW		MTR-85H-PW[4]	
- Chart paper		RP-85-PW		RP-85-PW	
- Ink pen		DF-38FP-PW		DF-38FP-PW	
- Recorder housing		MDF-S3085-PW		MDF-S3085-PW	
RS485 interface module		MTR-480-PW		MTR-480-PW	
Drawers	qty	MDF-50R-PW (max 1)	-	MDF-50R-PW (max 1)	-
Small inner door kit	set of 2	MDF-5ID-PW (max 2)[5]	MDF-7ID-PW (max 2)[5]	MDF-5ID-PW (max 2)[5]	MDF-7ID-PW (max 2)[5]

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +30°C, no load
[3] Nominal value. Background noise 20dB
[4] Requires Sensor MTR-DU700SF-PW (KM-DUP01SF1W)
[5] Installation of small inner door kit may affect usable storage capacity.

GROUP		VIP Pro -85ºC/-86ºC Upright Freezers			VIP Pro -80ºC Chest Freezers
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		**MDF-U33V-PE**	**MDF-U55V-PE**	**MDF-U76V-PE**	**MDF-C8V1-PE**
Dimensions					
External dimensions (W x D x H)[1]	mm	670 x 867 x 1860	770 x 870 x 1990	1010 x 870 x 1990	550 x 685 x 945
Internal dimensions (W x D x H)	mm	490 x 600 x 1140	630 x 600 x 1380	870 x 600 x 1400	405 x 490 x 425
Volume	litres	333	519	728	84
Capacity	2" boxes	216	352	528	42
Net weight (approx)	kg	255	290	360	67
Performance					
Cooling performance [2]	ºC	-86	-86	-85	-80
Temperature setting range	ºC	-50 ~ -90			-55~-90
Temperature control range [2]	ºC	-50 ~ -86	-50 ~ -86	-50 ~ -85	-60 ~ -80
Control					
Controller		Microprocessor non-volatile memory			Microprocessor non-volatile memory
Display		LED			LED
Temperature sensor		Pt-1000			Pt-1000
Refrigeration					
Refrigeration system		Cascade			Auto-cascade
High-stage compressor	W	450	450	750	-
High-stage refrigerant		HFC			-
Low-stage compressor	W	750			400
Low-stage refrigerant		HFC			HFC mixed
Insulation material		PUF / VIP	PUF / VIP	PUF / VIP PLUS	PUF / VIP PLUS
Insulation thickness	mm	70			70
Construction					
Exterior material		Painted steel			Painted steel
Interior material		Painted steel			Painted steel
Outer door lock		Y			Y
Inner door/lid	qty	2 (insulated)			1
Shelves	qty	3			-
Max. load - per shelf	kg	50			-
Max. load - total	kg	150			100
Access port	qty	3	3	2	2
- position		Back/bottom x 2	Back/bottom x 2	Back/bottom	Back/bottom
- diameter	Ø mm	17			17
Casters	qty	4 (2 levelling feet)			4 (2 levelling feet)
Alarms					
Power failure		V-B-R			V-B-R
High temperature		V-B-R			V-B-R
Low temperature		V-B-R			V-B-R
Filter		V-B			Filterless design
Door / lid open		V-B			-
Electrical and noise level					
Power supply		230V 50Hz single phase			230V 50Hz single phase
Noise level [3]	dB	49	47	49	47
Options					
Inventory racks		See page 48			See page 48
Liquid CO_2 back-up		CVK-UB2-PW			CVK-UB4-PW [4]
Liquid N_2 back-up		CVK-UBN2-PW			CVK-UBN2-PW
Temperature recorders					
- Circular type		MTR-G85C-PE			MTR-G85C-PE [5]
- Chart paper		RP-G85-PW			RP-G85-PW
- Ink pen		PG-R-PW			PG-R-PW
- Continuous strip type		MTR-85H-PW			MTR-85H-PW
- Chart paper		RP-85-PW			RP-85-PW
- Ink pen		DF-38FP-PW			DF-38FP-PW
- Recorder housing		MDF-S3085-PW			MDF-S3085-PW
RS485 interface module		MTR-480-PW			MTR-480-PW
Drawers	qty	MDF-30R-PW (Max 2)	MDF-50R-PW (Max 1)	-	-
Small inner door kit	set of 2	-	MDF-5ID-PW (Max 2)[6]	MDF-7ID-PW (Max 2)[6]	-

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +30ºC, no load
[3] Nominal value - Background noise 20dB
[4] Requires mounting plate MDF-UBK-PW
[5] Requires sensor cover MTR-C8-PW
[6] Installation of small inner door kit may affect usable storage capacity

GROUP		Classic Eco -86ºC Upright Freezers	Classic Pro -86ºC Upright Freezers		
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		MDF-DU300H-PE	MDF-U3386S-PE	MDF-U5386S-PE	MDF-U7386S-PE
Dimensions					
External dimensions (W x D x H)[1]	mm	750 x 870 x 1830	750 x 875 x 1850	890 x 875 x 1990	1130 x 875 x 1990
Internal dimensions (W x D x H)	mm	490 x 600 x 1140	490 x 600 x 1140	630 x 600 x 1280	870 x 600 x 1280
Volume	litres	333	333	483	668
Capacity	2" boxes	216	216	320	480
Net weight (approx)	kg	241	255	305	355
Performance					
Cooling performance [2]	ºC	-86	-86		
Temperature setting range	ºC	-50 ~ -90	-50 ~ -90		
Temperature control range [2]	ºC	-50 ~ -86	-50 ~ -86		
Control					
Controller		Microprocessor non-volatile memory	Microprocessor non-volatile memory		
Display		LED	LED		
Temperature sensor		Pt-1000	Pt-1000		
Refrigeration					
Refrigeration system		Cascade	Cascade		
High-stage compressor	W	450	450	1100	1100
High-stage refrigerant		HC	HFC		
Low-stage compressor	W	450	750	1100	1100
Low-stage refrigerant		HC	HFC		
Insulation material		PUF	PUF		
Insulation thickness	mm	130	130		
Construction					
Exterior material		Painted steel	Painted steel		
Interior material		Painted steel	Painted steel		
Outer door lock		Y	Y		
Inner door	qty	2 (insulated)	2 (insulated)		
Shelves	qty	3	3		
Max. load - per shelf	kg	50	50		
Max. load - total	kg	150	150		
Access port	qty	3	3		
- position		Back/bottom x 2	Back/bottom x 2		
- diameter	Ø mm	17	17		
Casters	qty	4 (2 levelling feet)	4 (2 levelling feet)		
Alarms					
Power failure		V-B-R	V-B-R		
High temperature		V-B-R	V-B-R		
Low temperature		V-B-R	V-B-R		
Filter		V-B	V-B		
Electrical and noise level					
Power supply		230V 50Hz single phase	230V 50Hz single phase		
Noise level [3]	dB	52	49		
Options					
Inventory racks		See page 48	See page 48		
Liquid CO_2 back-up		CVK-UB2-PW	CVK-UB2-PW		
Liquid N_2 back-up		CVK-UBN2-PW	CVK-UBN2-PW		
Temperature recorders					
- Circular type - Chart paper - Ink pen		MTR-G85C-PE RP-G85-PW PG-R-PW	MTR-G85C-PE RP-G85-PW PG-R-PW		
- Continuous strip type - Chart paper - Ink pen - Recorder housing		MTR-85H-PW RP-85-PW DF-38FP-PW MDF-S3085-PW	MTR-85H-PW RP-85-PW DF-38FP-PW MDF-S3085-PW		
RS485 interface module		MTR-480-PW	MTR-480-PW		
Drawers		MDF-30R-PW (max 2)	MDF-30R-PW (max 2)	-	-

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +30ºC, no load
[3] Nominal value - Background noise 20dB

GROUP		Classic Pro -86ºC Chest Freezers			
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		**MDF-193-PE**	**MDF-394-PE**	**MDF-594-PE**	**MDF-794-PE**
Dimensions					
External dimensions (W x D x H)[1]	mm	750 x 700 x 945	1860 x 800 x 945	2010 x 770 x 1070	2570 x 770 x 1070
Internal dimensions (W x D x H)	mm	480 x 430 x 420	1120 x 520 x 530	1280 x 500 x 762	1840 x 500 x 762
Volume	litres	86	309	487	701
Capacity	2" boxes	42	189	312	468
Net weight (approx)	kg	103	219	291	335
Performance					
Cooling performance [2]	ºC	-86			
Temperature setting range	ºC	-50 ~ -95	-50 ~ -90	-20 ~ -95	-20 ~ -95
Temperature control range [2]	ºC	-50 ~ -86	-50 ~ -86	-20 ~ -86	-20 ~ -86
Control					
Controller		Microprocessor non-volatile memory			
Display		LED			
Temperature sensor		Pt-100	Pt-1000	Pt-100	Pt-100
Refrigeration					
Refrigeration system		Auto-cascade	Cascade	Cascade	Cascade
High-stage compressor	W	-	450	1100	1100
High-stage refrigerant		-	HFC	HFC	HFC
Low-stage compressor	W	450	750	1100	1100
Low-stage refrigerant		HFC mixed	HFC	HFC	HFC
Insulation material		PUF			
Insulation thickness	mm	135	140	135	135
Construction					
Exterior material		Painted steel			
Interior material		Stainless steel			
Outer lid lock		Y			
Inner lid	qty	1	3	3	4
Max. load - total	kg	200	81	234	190
Access port	qty	1			
- position		Left			
- diameter	Ø mm	40			
Casters	qty	4 (2 levelling feet)	4 (3 levelling feet)	4 (3 levelling feet)	4 (3 levelling feet)
Alarms					
Power failure		V-B-R			
High temperature		V-B-R			
Low temperature		V-B-R	V-B-R	-	-
Filter		Filterless design	V-B	V-B	V-B
Electrical and noise level					
Power supply		230V 50Hz single phase			
Noise level [3]	dB	46	49	50	50
Options					
Inventory racks		See page 48			
Liquid CO_2 back-up		CVK-A-PW	CVK-UB2-PW [4]	CVK-UB2-PW [4]	CVK-UB2-PW [4]
Liquid N_2 back-up		-	CVK-UBN2-PW	CVK-UBN2-PW	CVK-UBN2-PW
Temperature recorders					
- Continuous strip type		MTR-85H-PW			
- Chart paper		-			
- Ink pen		RP-85-PW			
- Recorder housing		DF-38FP-PW			

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +30ºC, no load
[3] Nominal value - Background noise 20dB
[4] CVK-A-PW may also be used - Transformer is required

GROUP		Biomedical Pro -40°C Upright Freezers		Biomedical Eco -30°C Upright Freezers	
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		**MDF-U443-PE**	**MDF-U5412-PE**	**MDF-MU300H-PE**	**MDF-MU500H-PE**
Dimensions					
External dimensions (W x D x H)[1]	mm	800 x 832 x 1810	804 x 772 x 1802	610 x 598 x 1620	800 x 772 x 1802
Internal dimensions (W x D x H)	mm	640 x 615 x 1090	658 x 607 x 1272	490 x 486 x 1290	658 x 607 x 1272
Volume	litres	426 300 FFP packs (300ml)	482 280 FFP packs (300ml)	274	482
Capacity	2" boxes	256	224	150	224
Net weight (approx)	kg	213	134	76	124
Performance				-30 [2]	
Cooling performance	°C	-40 [3]	-40 [2]	-18 ~ -35	
Temperature setting range	°C	-15 ~ -44	-18 ~ -45	-20 ~ -30 [2]	
Temperature control range	°C	-15 ~ -40 [3]	-20 ~ -40 [2]		
Control					
Controller		Microprocessor, non-volatile memory		Microprocessor, non-volatile memory	
Display		LED		LED	
Temperature sensor		Thermistor		Thermistor	
Refrigeration					
Cooling method		Cascade + forced air circulation	Direct	Direct	
Compressor	W	H:400/L:750	400	250 (inverter control)	
Refrigerant		HFC		HC	
Insulation material		PUF		PUF	
Insulation thickness	mm	80	70	60	70
Construction					
Exterior material		Painted steel		Painted steel	
Interior material		Styrol resin	Stainless steel	ABS resin	Styrol resin
Outer door	qty	1	2	1	2
Outer door lock		Y		Y	
Shelves	qty	5	4 (fixed)	4 (fixed)	
Containers / baskets	qty	-	4/6/0	4/0/1	4/6/0
Max. load per shelf / container / basket	kg	50	30	30	U:30/L:20
Max. load - total	kg	200	100	80	100
Access port	qty	1	1	1	1
- position		Left	Back	Left	Back
- diameter	Ø mm	40	30	30	
Interior fluorecent lamp		Y	-	-	
Casters	qty	4 (2 levelling feet)		4 (2 levelling feet)	
Alarms					
Power failure		V-B-R		V-B-R (Optional)	
High temperature		V-B-R		V-B-(R[4])	
Low temperature		V-B-R		V-B-(R[4])	
Filter		V-B	-	-	
Door open		V-B	-	-	
Electrical and noise level					
Power supply		230V 50Hz single phase		230V 50Hz single phase	
Noise level [5]	dB	51	42	40	
Options					
Storage systems		-		-	
Temperature recorders					
- Circular type		MTR-85H-PW	MTR-G85C-PE	MTR-G85C-PE	MTR-G85C-PE
- Chart paper		RP-G85-PW	RP-G85-PW	RP-G85-PW	RP-G85-PW
- Ink pen		DF-38FP-PW	PG-R-PW	PG-R-PW	PG-R-PW
- Recorder housing		-	MPR-S7-PW	MPR-S470T-PW	MPR-S7-PW
- Continuous strip type		MTR-4015LH-PE	MTR-4015LH-PE	MTR-4015LH-PE	MTR-4015LH-PE
- Chart paper		RP-40-PW	RP-40-PW	RP-40-PW	RP-40-PW
- Recorder housing		MPR-S30-PW	MPR-S30-PW	-	MPR-S30-PW
RS485 interface module		MTR-480-PW	MTR-480-PW	MTR-480-PW[6]	
External mounting power failure alarm		-	-	MPR-48B1-PW[6]	

Appearance and specification are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +30°C, no load
[3] Air temperature measured at freezer centre, ambient temperature +35°C, no load
[4] Remote alarm comes with optional power failure alarm MPR-48B1-PW
[5] Nominal value - Background noise 20dB
[6] Requires MPR-48B1-PW

GROUP		Biomedical Pro -30°C Upright Freezers		
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm				
MODEL		**MDF-U334-PE**	**MDF-U5312-PE**	**MDF-U731M-PE**
Dimensions				
External dimensions (W x D x H)[1]	mm	614 x 709 x 1620	804 x 772 x 1802	770 x 830 x 1955
Internal dimensions (W x D x H)	mm	490 x 486 x 1290	658 x 607 x 1272	650 x 700 x 1520
Volume	litres	274	482	690
Capacity	2" boxes	150	224	384
Net weight (approx)	kg	81	134	152
Performance				
Cooling performance	°C	-30 [2]		
Temperature setting range	°C	-18 ~ -35		
Temperature control range	°C	-20~ -30 [2]		
Control				
Controller		Microprocessor, non-volatile memory		
Display		LED		
Temperature sensor		Thermistor		
Refrigeration				
Cooling method		Direct		
Compressor	W	200	400	400
Refrigerant		HFC		
Insulation material		PUF		
Insulation thickness	mm	60	70	60
Construction				
Exterior material		Painted steel		
Interior material		Styrol resin		Painted steel
Outer door	qty	1	2	1
Outer door lock		Y		
Shelves	qty	4 (fixed)		
Containers / baskets	qty	4/0/1	4/6/0	Optional
Max. load per shelf/container/basket	kg	30		50
Max. load - total	kg	80	100	200
Access port	qty	1		
- position		Left	Back	Left
- diameter	Ø mm	30		
Casters	qty	4 (2 levelling feet)		
Alarms				
Power failure		V-B-R		
High temperature		V-B-R		
Low temperature		V-B-R		
Door open		-		V-B
Electrical and noise level				
Power supply		230V 50Hz single phase		
Noise level [3]	dB	37	40	42
Options				
Storage systems		-	-	MDF-T07SC-SW, Set of 2 containers MDF-T07ST-SW, Set of 3 shelves
Temperature recorders				
- Circular type - Chart paper - Ink pen - Recorder housing		MTR-G85C-PE RP-G85-PW PG-R-PW MDF-S740T-PW	MTR-G85C-PE RP-G85-PW PG-R-PW MPR-S7-PW	MTR-G85C-SE RP-G85-SW PG-R-SW MPR-S7-SW
- Continuous strip type - Chart paper - Recorder housing		MTR-4015LH-PE RP-40-PW -	MTR-4015LH-PE RP-40-PW MPR-S30-PW	MTR-4015LH-PE RP-40-SW MPR-S30-SW
RS485 interface module			MTR-480-PW	

Appearance and specification are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +35°C, no load
[3] Nominal value - Background noise 20dB

GROUP		Biomedical Pro -30ºC Chest Freezers		
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm				
MODEL		**MDF-137-PE**	**MDF-237-PE**	**MDF-437-PE**
Dimensions				
External dimensions (W x D x H)[1]	mm	640 x 687 x 881	905 x 687 x 881	1265 x 807 x 902
Internal dimensions (W x D x H)	mm	525 x 440 x 715	790 x 440 x 715	1140 x 550 x 733
Volume	litres	138	221	425
Capacity	2" boxes	51	111	201
Net weight (approx)	kg	52	60	81
Performance				
Cooling performance [2]	ºC	-30		
Temperature setting range	ºC	-18 ~ -35		
Temperature control range [2]	ºC	-20 ~ -30		
Control				
Controller		Microprocessor		
Display		LED		
Temperature sensor		Thermistor		
Refrigeration				
Cooling method		Direct		
Compressor	W	150	200	250
Refrigerant		HFC		
Insulation material		PUF		
Insulation thickness	mm	55	55	60
Construction				
Exterior material		Painted steel		
Interior material		Coloured aluminium		
Outer lid	qty	1		
Outer lid lock		Y		
Containers / baskets	qty	2	3	4
Max. load per container / basket	kg	10		
Max. load - total	kg	50	80	110
Access port	qty	2		
- position		Right / bottom left		
- diameter	Ø mm	17		
Casters	qty	4 (2 levelling feet)		
Alarms				
Power failure		V-B-R		
High temperature		V-B-R		
Low temperature		V-B-R		
Electrical and noise level				
Power supply		230V 50Hz single phase		
Noise level [3]	dB	35	41	42
Options				
Storage systems		MDF-13B2-PW, set of two baskets MDF-13B3-PW, set of three baskets		MDF-43B2-PW, set of two baskets MDF-43B3-PW, set of three baske
Temperature recorders				
- Circular type - Chart paper - Ink pen - Recorder housing		MTR-G85C-PE RP-G85-PW PG-R -PW MDF-S740-PW		
- Continuous strip type - Chart paper - Recorder housing		MTR-4015LH-PE RP-40-PW MDF-S3040-PW		
RS485 interface module		MTR-480-PW		

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +35ºC, no load
[3] Nominal value - Background noise 20dB

GROUP		Refrigerator with Freezer		Refrigerator Series	
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		**MPR-215F-PE**	**MPR-414F-PE**	**MPR-S163-PE**	**MPR-S313-PE**
Dimensions					
External dimensions (WxDxH) [1]	mm	540 x 557 x 1794	800 x 600 x 1805	800 x 465 x 1090	800 x 465 x 1800
Internal dimensions (WxDxH)	mm	455 x 466 x 917 (Ref) 420 x 342 x 267 (Frz)	720 x 495 x 1425 (Ref) 317 x 440 x 576 (Frz)	720 x 300 x 725	720 x 350 x 1435
Volume	litres	176/39 (Ref/Frz)	340/82 (Ref/Frz)	158	340
Net weight (approx)	kg	86	126	71	100
Performance					
Temperature control range [2]	°C	2 ~ 14 (Ref) / -20 ~ -30 (Frz)[2]	2 ~ 14 (Ref) / -20 ~ -30 (Frz)[2]	2 ~ 14	
Control					
Controller		Microprocessor		Microprocessor	
Display		LED		LED	
Temperature sensor		Thermistor		Thermistor	
Refrigeration					
Cooling method		Fan forced air circulation (Ref) / Direct cooling (Frz)		Forced air circulation	
Defrost method		Cyclical defrost (Ref) / Manual (Frz)		NEW cyclical defrost (plus forced defrost)	
Refrigerant		HFC		HFC	
Insulation		PUF		PUF	
Construction					
Exterior material		Painted steel		Painted steel	
Interior material		Styrol resin (Ref) / Painted aluminium (Frz)	Stainless steel (Ref) / Painted aluminium (Frz)	Stainless steel	
Outer doors	qty	2, glass window (1)	4, glass window (2)	2 sliding doors, double pane glass window with heat reflecting film	4 sliding doors, double pane glass window with heat reflecting film
Outer door lock		Y		Y	
Shelves	qty	3/1 (Ref/Frz)	2 & 3/1 (Ref/Frz) [4]	2 wire shelves, clear coated	5 wire shelves, clear coated
Max. load - per shelf	kg	20/10 (Ref/Frz)	25 & 15 /15 (Ref/Frz)	20	20
Max. load - total	kg	70	110	40	100
Access port	qty	2		1	
- position		Left		Back	
- diameter	Ø mm	30		30	
Casters	qty	4		2	
Interior light		Fluorescent (Ref)		LED	
Alarms					
Power failure		R		V-B-R (Optional)	
High temperature		V-B-R		V-B-(R[3])	
Low temperature		V-B-R		V-B	
Door open		V-B		V-B	
Electrical and noise level					
Power supply		230V 50Hz single phase		230V 50Hz single phase	
noise level [5]	dB	35	39	35	40
Options					
Temperature recorders					
- Temperature chart recorder - Chart paper - Recorder housing		MTR-0621LH-PE (Ref) RP-06-PW MPR-S30-PW		MTR-0621LH-PE RP-06-PW MPR-S30-PW	
- Circular type - Chart paper - Ink pen - Recorder housing		MTR-G3504C-PE (Ref/Frz) RP-G3504-PW PG-RB-PW MPR-S7-PW		MTR-G04C-PE RP-G04-PW PG-R-PW MPR-S7-PW	
- Continuous strip type - Chart paper - Recorder housing		MTR-4015LH-PE (Frz) RP-40-PW MPR-S30-PW			
RS485 interface module		MTR-480-PW		MTR-480-PW [6]	
External mounting power failure alarm		-		MPR-48B1-PW (V-B-R)	
Drawers for bottom left compartment		-	MPR-41R-PW	-	

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at refrigerator centre, ambient temperature +30°C, no load.
[3] Remote alarm comes with optional power failure alarm MPR-48B1-PW
[4] Refrigration compartment contains 2 large and 3 small shelves
[5] Nominal value - Background noise 20dB
[6] Requires MPR-48B-PW or MPR-48B1-PW

GROUP		Refrigerator Series			
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		MPR-721-PE	MPR-721R-PE	MPR-1411-PE	MPR-1411R-PE
Dimensions					
External dimensions (W x D x H)[1]	mm	770 x 830 x 1955		1440 x 830 x 1950	
Internal dimensions (W x D x H)	mm	650 x 710 x 1500		1320 x 710 x 1500	
Volume	litres	684	671	1364	1359
Net weight (approx)	kg	174	193	248	287
Performance					
Temperature control range[2]	°C	2 ~ 23		2 ~ 23	
Control					
Controller		Microprocessor		Microprocessor	
Display		LED		LED	
Temperature sensor		Thermistor		Thermistor	
Refrigeration					
Cooling method		Forced cool air circulation		Forced cool air circulation	
Defrost method		Forced type (cycle defrost), fully automatic		Forced type (cycle defrost), fully automatic	
Refrigerant		HFC		HFC	
Insulation		PUF		PUF	
Construction					
Exterior material		Painted steel		Painted steel	
Interior material		Painted steel		Painted steel	
Outer door	qty	1 door, double pane glass, self closing		2 doors, double pane glass, self closing	
Outer door lock		Y		Y	
Shelves	qty	4 wire shelves, polyethylene-coated	-	8 wire shelves, polyethylene-coated	-
Max. load - per shelf	kg	50	-	40	
Drawers	qty	-	5 coated steel drawers	-	10 coated steel drawers
Max. load - per drawer	kg	-	40	-	40
Max. load - total	kg	200	200	320	400
Access port	qty	3		3	
- position		Left/right/top		Left/right/top	
- diameter	Ø mm	30		30	
Casters	qty	4		4	
Interior light		Fluorescent		Fluorescent	
Alarms					
Power failure		V-B-R (Optional)		V-B-R (Optional)	
High temperature		V-B-R		V-B-R	
Low temperature		V-B-R		V-B-R	
Door open		V-B		V-B	
Electrical and noise level					
Power supply		230V 50Hz single phase		230V 50Hz single phase	
Noise level [3]	dB	41		42	
Options					
Temperature recorders					
- Temperature chart recorder - Chart paper - Recorder housing		MTR-0621LH-PE RP-06-PW MPR-S30-PW		MTR-0621LH-PE RP-06-PW MPR-S30-PW	
- Circular type - Chart paper - Ink pen - Recorder housing		MTR-G04C-PE RP-G04-PW PG-R-PW MPR-S7-PW		MTR-G04C-PE RP-G04-PW PG-R-PW MPR-S7-PW	
RS485 interface module		MTR-480-PW [4]		MTR-480-PW [4]	
External mounting power failure alarm		MPR-48B-PW (V-B) [5]		MPR-48B-PW (V-B) [5]	

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at refrigerator centre, ambient temperature +30°C, no load.
[3] Nominal value - Background noise 20dB
[4] Requires MPR-48B-PW or MPR-48B1-PW
[5] MPR-48B1-PW can also be used

Refrigerator Series




MPR-514-PE	MPR-514R-PE	MPR-1014-PE	MPR-1014R-PE
900 x 600 x 1790		1800 x 600 x 1790	
800 x 465 x 1300		1700 x 465 x 1300	
489	486	1033	1029
141	147	246	258
2 ~ 14		2 ~ 14	
Microprocessor		Microprocessor	
LED		LED	
Thermistor		Thermistor	
Forced cool air circulation		Forced cool air circulation	
Forced type, fully automatic		Forced type, fully automatic	
HFC		HFC	
PUF		PUF	
Painted steel		Painted steel	
Stainless steel		Stainless steel	
2 sliding doors, double pane glass window with heat reflecting film		2 sliding doors, double pane glass window with heat reflecting film	
Y		Y	
5 wire shelves, polyester-coated	5 wire shelves, polyester-coated	10 wire shelves, polyester-coated	5 wire shelves, polyester-coated
50	50	50	50
-	5 sliding racks, polyester-coated	-	10 sliding racks, polyester-coated
-	20	-	20
250	350	500	450
1		1	
Left		Left	
30		30	
4		4	
Fluorescent		Fluorescent	
V-B-R (Optional)		V-B-R (Optional)	
V-B-R		V-B-R	
V-B-R		V-B-R	
V-B		V-B	
230V 50Hz single phase		230V 50Hz single phase	
42		42	
MTR-0621LH-PE RP-06-PW MPR-S30-PW		MTR-0621LH-PE RP-06-PW MPR-S30-PW	
MTR-G04C-PE RP-G04-PW PG-R-PW MPR-S7-PW		MTR-G04C-PE RP-G04-PW PG-R-PW MPR-S7-PW	
MTR-480-PW [4]		MTR-480-PW [4]	
MPR-48B-PW (V-B) [5]		MPR-48B-PW (V-B) [5]	

Appearance and specifications are subject to change without notice.

GROUP		Bloodbanks	
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm			
MODEL		**MBR-107DH-PE**	**MBR-506DH-PE**
Dimensions			
External dimensions (WxDxH) [1]	mm	400 x 495 x 1515	800 x 832 x 1810
Internal dimensions (WxDxH)	mm	320 x 350 x 710	640 x 550 x 1240
Volume	litres	79	425
Capacity	450ml bags	32	120
Net weight (approx)	kg	70	185
Performance			
Cooling performance [2]	°C	4 +/- 1 [2]	
Control			
Controller		Microprocessor	
Display		LED	
Temperature recorder		MTR-0620LH (included)	
Temperature sensor		Thermistor	
Refrigeration			
Cooling method		Forced air	
Defrost method		Fully automatic	
Insulation		PUF	
Refigerant		HFC	
Construction			
Exterior material		Painted steel	
Interior material		Stainless steel	
Outer door	qty	1, Triple layer glass window	
Outer door lock		Y	
Inner door	qty	2, Acrylic	5, Acrylic
Shelves	qty	3, Zinc plated steel wire & 1, stainless steel	5, Coated hard steel wire
Max. load - per shelf	kg	20	50
Max. load - total	kg	80	250
Access port	qty	1	1
- position		Left	Left
- diameter	Ø mm	30	40
Casters	qty	-	4
Interior light		Fluorescent	
Alarms			
Power failure		V-B-R	
High temperature		V-B-R	
Low temperature		V-B-R	
Door open		V	
Electrical and noise level			
Power supply		230V 50Hz single phase	
Noise level [3]	dB	44	50
Options			
Temperature recorder			
- Temperature chart recorder		Included	
- Chart paper		RP-06-PW	
- Ink pen			
Storage system		Baskets; MBR-15B-PW, max. 8/unit 7 x 220ml bags/basket MBR-16B-PW, max. 8/unit 4 x 450ml bags/unit	Baskets; MBR-55B-PW, max. 20/unit 10 x 220ml bags/basket MBR-56B-PW, max. 20/unit 6 x 450ml bags/unit

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections
- See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +35ºC, no load
[3] Nominal value - Background noise 20dB

GROUP		Bloodbanks		
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm				
MODEL		**MBR-305GR-PE**	**MBR-705GR-PE**	**MBR-1405GR-PE**
Dimensions				
External dimensions (WxDxH) [1]	mm	600 x 680 x 1835	770 x 830 x 1955	1440 x 830 x 1950
Internal dimensions (WxDxH)	mm	520 x 490 x 1150	650 x 697 x 1500	1320 x 697 x 1500
Volume	litres	302	622	1301
Capacity	450ml bags	120	360	720
Net weight (approx)	kg	147	213	315
Performance				
Cooling performance [2]	°C	4 +/- 1.5 [2]	4 +/- 1.5 [2]	4 +/- 1.5 [2]
Control				
Temperature controller		Microprocessor		
Display		LED		
Temperature recorder		MTR-G04 (included)		
Temperature sensor		2 bottles with thermistor sensor		
Refrigeration				
Cooling method		Forced air		
Defrost method		Fully automatic		
Insulation		PUF		
Refigerant		HFC		
Construction				
Exterior material		Painted steel		
Interior material		Painted steel		
Outer door	qty	1, Double layer glass window	1, Double layer glass window	2, Double layer glass windows
Outer door lock		Y		
Inner door	qty	2, Acrylic	3, Acrylic	6, Acrylic
Drawers	qty	5, Stainless steel	6, Stainless steel	12, Stainless steel
Max. load - per drawer	kg	20	40	40
Max. load - total	qty	100	240	480
Access port	qty	1	3	2
- position		Left	Left / right / top	Left / right
- diameter	Ø mm	30	30	30
Casters	qty	4	4	4
Interior light		Fluorescent		
Alarms				
Power failure		V-B-R		
High temperature		V-B-R		
Low temperature		V-B-R		
Door open		V-B		
Electrical and noise level				
Power supply		230V 50Hz single phase		
Noise level [3]	dB	41	45	48
Options				
Temperature recorder				
- Temperature chart recorder		Included		
- Chart paper		RP-G04-PW		
- Ink pen		PG-R-PW		
RS485 interface module		MTR-480-PW		

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Air temperature measured at freezer centre, ambient temperature +35°C, no load
[3] Nominal value - Background noise 20dB

GROUP		Isothermal -190ºC Dry Storage Freezers				
						
MODEL		V-1500AB	V-3000AB	V-3000ABEH	V-5000AB	V-5000ABEH
Liquid nitrogen capacity	litres	30	70	89	93	140
Dimensions						
External dimensions (W x D x H)	mm	660 x 939 x 1143	939 x 1219 x 1206	939 x 1219 x 1473	1219 x 1371x 1320	1219 x 1371 x 1473
Usable interior height	mm	736	736	940	736	864
Usable interior diameter	mm	534	787	787	1016	1016
Weight empty	kg	148	272	295	425	453
Weight full	kg	174	327	367	500	566
Maximum capacity						
Max. vial capacity (2ml)**		9100	22100	25500	40300	46500
Max. blood bag capacity (50ml)**		434	1120	1280	1936	2208

** Capacity is subject to rack type

GROUP		Standard LN_2 Freezers				
						
MODEL		S-90AB	S-1500AB	S-3000AB	S-5000AB	S-5000ABEH
Liquid nitrogen capacity	litres	90	145	345	615	720
Dimensions						
External dimensions (W x D x H)	mm	457x 457x 965	558x 787x 1041	863x 1092x 1066	1117x 1320x 1219	1117x 1320x 1397
Usable interior height	mm	711	736	736	736	863
Usable interior diameter	mm	406	508	787	1016	1016
Weight empty	kg	36	70	159	227	245
Weight full	kg	109	188	438	724	827
Maximum capacity						
Max. vial capacity (2ml)**		5832	9100	22100	40300	46500
Max. blood bag capacity (50ml)**		266	434	1120	1932	2208

** Capacity is subject to rack type

GROUP		Classic			Value added			XC series		
										
MODEL		Classic 2002	Classic 4002	Classic 6002	Value added 2001	Value added 4001	Value added 6001	20/20	34/18	47/11
Liquid nitrogen capacity	litres	61	121	175	61	121	175	20.5	34.8	47.4
Static evaporation rate	ltr/day	0.85	0.99	0.99	0.85	0.99	0.99	0.09	0.18	0.39
Static holding time	days	38	70	104	38	70	104	140	123	76
Working volume	litres	51	111	165	51	111	165			
Weight empty	kg	26.3	36.7	46.7	26.3	36.7	46.7	11.8	15.4	16.4
Weight full	kg	82.5	136	193	82.5	136	193	28.3	43.5	54.6
Dimensions										
Neck opening	mm	216	216	216	216	216	216	55.4	89	127
Overall height	mm	723	1003	1003	723	1003	1003	652	675	673
Outside diameter	mm	559	559	665	559	559	665	368	464	508
Canister dimensions										
Canister height	mm	-	-	-	-	-	-	279	279	279
Canister diameter	mm	-	-	-	-	-	-	41.9	71	102
Maximum capacity										
Maximum number of racks	qty	4	4	6	4	4	6	-	-	6
Maximum vial capacity		2000	4000	6000	2000	4000	6000	-	-	750
Maximum number of canisters		-	-	-	-	-	-	6	6	6
Maximum boxes per rack	qty	5	10	10	5	10	10	-	-	-
Maximum number of 1/2cc straws (10/cane)		-	-	-	-	-	-	780	2100	4500
Maximum number of 1/2cc straws (1 level bulk)		-	-	-	-	-	-	1122	3000	6216
Maximum number of 1.2 & 2.0 ml vials (5/cane)		-	-	-	-	-	-	210	630	1320
Alarm										
Low-level alarm		standard	standard	standard	standard	standard	standard	standard	standard	standard

Appearance and specifications are subject to change without notice.

GROUP		Isothermal Carousel			
					
MODEL		V-3000AB/C	V-3000ABEH/C	V-5000AB/C	V-5000ABEH/C
Liquid nitrogen capacity	litres	70	89	93	140
Dimensions					
External dimensions (WxDxH)	mm	939 x 1219 x 1130	939 x 1219 x 1384	1194 x 1372 x 1257	1194 x 1372 x 1384
Usable interior height	mm	686	889	737	813
Usable interior diameter	mm	736	736	978	978
Weight empty	kg	272	288	425	452
Weight full	kg	327	361	499	566
Maximum capacity					
Max. vial capacity (2ml)**		16800	21000	36400	42000
Max. blood bag capacity (50ml)**		852	1136	1722	1968

** Capacity is subject to rack type

GROUP	Controlled Rate Freezer	
		
MODEL		2101
Dimensions		
Exterior (W x D x H)	mm	484 x 648 x 743
Interior (W x D x H)	mm	356 x 243 x 349
Effective capacity	litres	28
Weight	kg	34.7
Power		
Voltage		230V
Frequency		50 Hz
Current		10A
Maximum capacity		
2ml vials		650
4ml / 5ml vials		390
Bag canisters		20
Canes		130

GROUP		Lab tanks					
							
MODEL		Lab4	Lab5	Lab10	Lab20	Lab30	Lab50
Liquid nitrogen capacity	litres	4	5	10	21	32	50
Static evaporation rate	ltr/day	0.2	0.15	0.18	0.18	0.25	0.45
Static holding time	days	18	33.3	55.6	116.7	128	111
Weight empty	kg	2.7	4	6	9	12	15
Weight full	kg	6	8	14	26	38	56
Exterior dimensions							
Neck opening	mm	35.5	56	56	51	64	64
Overall height	mm	426	462	546	627	611	779
Outside diameter	mm	185	222	260	368	432	432
Interior dimensions							
Interior diameter	mm	139	165	210	289	356	356
Usable height	mm	198	266	343	348	378	559

GROUP		Vapor shippers				Shipper
						
MODEL		SC 2/1 V	SC 4/2 V	SC 4/3 V	DS-3	CF-9511
Liquid nitrogen capacity	litres	1.5	3.6	4.3	10	10.5
Static evaporation rate	ltr/day	0.19	0.26	0.20	0.7	3.3
Static holding time	days	8	13	21	14	3
Weight empty	kg	2.7	5.9	13.9	13.6	5.9
Weight full	kg	4	8.1	9.3	21.3	14.5
Number of canisters		1	1	1	-	-
Max vial capacity (2ml)		9	106	48	500	-
Unit dimensions						
Neck opening	mm	35	70	51	216	228.6
Overall height	mm	343	468	492	584	431.8
Outside diameter	mm	184	222	222	381	254
Usable interior dimensions						
Interior height	mm	-	-	-	317.5	228.6
Interior diameter	mm	-	-	-	216	228.6
Canister height	mm	127	278	278	-	-
Canister diameter	mm	31	67	46	-	-

Appearance and specifications are subject to change without notice.

Inventory racks

All boxes are available:
in Polypropylene (P)
or carton (A)
as 2 inch (1)
or 3 inch (2)


NIR-210C


NIR-213C


NIR-224U


NIR-312U


HCS-519


HCS-5584

Chest freezer model	Vertical rack type	Box type	Rack/quantity Wesbart (aluminium)	Total boxes	Storage Cases/quantity
MDF-C2156VAN-PE	side openings	(P) A1	15 x NIR-210C	150	9 x MDF-49SC (4 drawers)
	side openings	(P) A2	15 x NIR-307C	105	
MDF-1156-PE	side openings	(P) A1	9 x NIR-209C	81	6 x MDF-49SC (4 drawers)
	side openings	(P) A2	9 x NIR-306C	54	
MDF-C8V1-PE	side openings	(P) A1	6 x NIR-207C	42	4 x MDF-19SC (3 drawers)
	side openings	(P) A2	6 x NIR-305C	30	
MDF-794-PE	side openings	(P) A1	36 x NIR-213C	468	24 x MDF-59SC (5 drawers)
	side openings	(P) A2	36 x NIR-309C	324	
MDF-594-PE	side openings	(P) A1	24 x NIR-213C	312	18 x MDF-59SC (5 drawers)
	side openings	(P) A2	24 x NIR-309C	216	
MDF-394-PE	side openings	(P) A1	21 x NIR-209C	189	20 x MDF-39SC (4 drawers)
	side openings	(P) A2	21 x NIR-306C	126	
MDF-193-PE	side openings	(P) A1	6 x NIR-207C	42	6 x MDF-19SC (3 drawers)
	side openings	(P) A2	6 x NIR-305C	30	

Upright freezer model	Vertical rack type	Box type	Rack/quantity Wesbart (aluminium)	Total boxes	Storage Cases/quantity
MDF-U3386S-PE/ MDF-DU300H-PE/ MDF-U33V-PE	with trays	(P) A1	6 x HCS-32-4584/143 + 6 x HCS-32-5584/143	216	4 x MDF-30SC (6 drawers)
	side opening	(P) A1	6 x NIR-216U + 6 x NIR-220U	216	
	with trays	(P) A2	12 x HCS-32-3804/143	144	
	side opening	(P) A2	12 x NIR-312U	144	
MDF-U5386S-PE	with trays	(P) A1	16 x HCS-5584	320	-
	side opening	(P) A1	16 x NIR-220U	320	
	with trays	(P) A2	16 x HCS-3804	192	
	side opening	(P) A2	16 x NIR-312U	192	
MDF-U55V-PE/	with trays	(P) A1	4 x HCS-519	352	
MDF-U500VX-PE/	with trays	(P) A1	8 x HCS-5584 + 8 x HCS-6564	352	8 x MDF-70SC (4 drawers)
MDF-DU500VH-PE	side opening	(P) A1	8 x NIR-220U + 8 x NIR-224U	352	
	with trays	(P) A2	8 x HCS-4804 + 8 x HCS-3804	224	
	side opening	(P) A2	8 x NIR-316U + 8 x NIR-312U	224	
MDF-U7386S-PE	with trays	(P) A1	24 x HCS-5574	480	
	side opening	(P) A1	24 x NIR-220U	480	-
	with trays	(P) A2	12 x HCS-3804 + 12 x HCS-4804	336	
	side opening	(P) A2	24 x NIR-312U	336	
MDF-U76V-PE/	with trays	(P) A1	6 x HCS-519	528	
MDF-U700VX-PE/	with trays	(P) A1	12 x HCS-5584 + 12 x HCS-6564	528	12 x MDF-70SC (4 drawers)
MDF-DU700VH-PE	side opening	(P) A1	12 x NIR-220U + 12 x NIR-224U	528	
	with trays	(P) A2	12 x HCS-4804 + 12 x HCS-3804	336	
	side opening	(P) A2	12 x NIR-316U + 12 x NIR-312U	336	

Appearance and specifications are subject to change without notice.


HCS-6564


HDR-216


HDR-222

Rack/quantity Tenak (stainless steel)	Total boxes
15 x TE-NIR-211COM	165
15 x TE-NIR-307COM	105
9 x TE-NIR-210COM	90
9 x TE-NIR-307COM	63
6 x TE-NIR-207COM	42
6 x TE-NIR-305COM	30
39 x TE-NIR-213COM	507
39 x TE-NIR-309COM	351
27 x TE-NIR-213COM	351
27 x TE-NIR-309COM	243
21 x TE-NIR-209COM	189
21 x TE-NIR-306COM	126
9 x TE-NIR-207COM	63
9 x TE-NIR-305COM	45

Rack/quantity Tenak (stainless steel)	Total boxes
6 x TE-HCS-244COM + 6 x TE-HCS-254COM	216
6 x TE-NIR-244CLA + 6 x TE-NIR-254CLA	216
12 x TE-HCS-334COM	144
12 x TE-NIR-334CLA	144
16 x TE-HCS-254COM	320
16 x TE-NIR-254CLA	320
16 x TE-HCS-334COM	192
16 x TE-NIR-334CLA	192
8 x TE-HCS-254COM + 8 x TE-HCS-264COM	352
8 x TE-NIR-254CLA + 8 x TE-NIR-264CLA	352
8 x TE-HCS-334COM + 8 x TE-HCS-344COM	224
8 x TE-NIR-334CLA + 8 x TE-NIR-344CLA	224
24 x TE-HCS-254COM	480
24 x TE-NIR-254CLA	480
24 x TE-HCS-334COM	288
24 x TE-NIR-334CLA	288
12 x TE-HCS-254COM + 12 x TE-HCS-264COM	528
12 x TE-NIR-254CLA + 12 x TE-NIR-264CLA	528
24 x TE-HCS-344COM	384
24 x TE-NIR-344CLA	384

Discovery powered by precision

GROUP		CO_2 incubators			
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		**MCO-5AC-PE**	**MCO-18AC-PE**	**MCO-170AIC-PE**	**MCO-170AICUV-PE**
Dimensions					
External dimensions (WxDxH)[1]	mm	480 x 548 x 575	620 x 710 x 900		620 x 710 x 900
Internal dimensions (WxDxH)	mm	350 x 378 x 375	490 x 523 x 665		490 x 523 x 665
Volume	litres	49	170		165
Net weight (approx)	kg	49	92		80
Performance					
Temperature control range and fluctuation	°C	AT+5 ~ +50, ±0.1	AT+5 ~ +50, ±0.1		AT +5 ~ +50, ±0.1
Temperature uniformity[2]	°C	±0.25	±0.25		±0.25
CO_2 control range and fluctuation	%	0 ~ 20, ±0.15	0 ~ 20, ±0.15		0 ~ 20, ±0.15
O_2 control range and fluctuation	%	-	-		-
Humidity level and fluctuation	%RH	95, ±5	95, ±5		95, ±5
Control					
Temperature sensor		Thermistor	Thermistor		Thermistor
CO_2 sensor		TC	TC		Dual IR
O_2 sensor		-	-		-
Display		LED	LED		LCD touch screen
Construction					
Exterior material		Painted steel	Painted steel		Painted steel (rear cover not painted)
Interior material		SS copper alloyed	SS copper alloyed		SS copper alloyed
Insulation material		PUF	PUF		Extruded polystyrene
DHA heating system		Y	Y		Y
Outer door	qty	1	1		1
Outer door lock		N	N	option	option
Reversible door		Y	Y		Y
Inner door	qty	1	1		1
Shelves	qty	3	3		4
Max. load per shelf	kg	4	7		7
Max. total load	kg	12	28		20
Max. shelf capacity	qty	6	15		10
Access port	qty	1	1		1
- position		Rear	Rear		Rear
- diameter	Ø mm	30	30		30
Alarms					
Power failure		-	R		R
Out of temperature setting		V-B-R	V-B-R		V-B-R
High temperature		V-B-R	V-B-R		V-B-R
Out of CO_2 setting		V-B-R	V-B-R		V-B-R
Water level		V	V		-
Door open		V	V		V-B
Electrical and noise level					
Power supply	V	230	230		230
Frequency	Hz	50	50		50
Noise level[3]	dB	24	24		29
Options					
SafeCell UV® system		MCO-19UVS-PE	MCO-18UVS3-PE [4]	MCO-170UVS-PE[5]	standard
H_2O_2 decontamination board		-	-	MCO-170HB-PE[5]	MCO-170HB-PE[5]
Electric door lock with password		-	-	MCO-170EL-PW[5]	MCO-170EL-PW[5]
H_2O_2 decontamination kit		-	-	-	-
H_2O_2 vapour generator		-	-		MCO-HP-PW[5]
H_2O_2 reagent, pack of 6 bottles		-	-		MCO-H2O2-PE
Multiple inner doors		-	MCO-18ID-PW		MCO-170ID-PW
CO_2 gas pressure regulator		MCO-100L-PW	MCO-100L-PW		MCO-100L-PW
Automatic CO_2 cylinder changeover system		MCO-5GC-PW	MCO-21GC-PW		MCO-21GC-PW
Semi-automatic one point gas calibration kit		-	-		MCO-SG-PW
InCu saFe® shelf (and brackets if required)		MCO-30ST-PW	MCO-47ST-PW		MCO-170ST-PW
InCu saFe® half tray system		-	MCO-25ST-PW		MCO-25ST-PW
Double stacking bracket *		-	-		MCO-170PS-PW*
Stacking plate *		-	-		MCO-170SB-PW*
Stacking kit		Standard	Standard		-
Roller base		MCO-5RB-PW	MCO-18RB-PW		MCO-170RB-PW
Roller bottle rack mounting kit		-	-		-
Automatic water supply system kit		-	-		-
Optional communication systems[8]					
Ethernet interface (LAN)		-	MTR-L03-PW		MTR-L03-PW
Digital interface (RS232C/RS485)		MTR-480-PW	MTR-480-PW		MTR-480-PW
Analogue interface (4-20mA)		MCO-420MA-PW	MCO-420MA-PW		MCO-420MA-PW

* Stacking of MCO-170AIC series

If stacking two incubators, please refer to the double stacking table for advise on the required stacking options.

MCO-170AIC series double stacking table

Double stacking options		**Upper unit** MCO-170AIC
Lower unit	MCO-170AIC	MCO-170PS-PW
	MCO-19AIC(M) MCO-18AC	MCO-170SB-PW
	MCO-20AIC	MCO-170SB-PW

		Multigas incubators		CO_2 reach-in incubator
				
MCO-170AICUVH-PE	MCO-20AIC-PE	MCO-5M-PE	MCO-19M-PE	MCO-80IC-PE
	770 x 708 x 900	480 x 548 x 575	620 x 710 x 900	986 x 853 x 2040
	620 x 523 x 665	350 x 378 x 375	490 x 523 x 665	806 x 693 x 1524
	215	49	162	851
	106	50	94	275
	AT+5 ~ +50, ±0.1	AT+5 ~ +50, ±0.1	AT+5 ~ +50, ±0.1	AT +5 to 50 (AT; 20°C to 35°C)
	±0.25	±0.25	±0.25	±0.5
	0 ~ 20, ±0.15	0 ~ 20, ±0.15	0 ~ 20, ±0.15	0 ~ 20, ±0.15
	-	1 ~ 18, 22 ~ 80 ±0.2	1 ~ 18, 22 ~ 80 ±0.2	-
	95, ±5	95, ±5	95, ±5	Normal mode; >80% R.H., High mode; > 90% R.H.
	Thermistor	Thermistor	Thermistor	Thermistor
	IR	TC	Dual IR	IR
	-	Zirconia	Zirconia	-
	LED	LED	LCD	LED
	Painted steel	Painted steel	Painted steel	Painted steel
	SS copper alloyed	SS copper alloyed	SS copper alloyed	SS copper alloyed
	PUF	PUF	PUF	PUF
	Y	Y	Y	N (laminar airflow)
	1	1	1	1 double paned glass
standard	N	N	N	N
	Y	Y	Y	Y
	1	1	1	Option
	5	3	3	5
	5	4	7	30
	35	12	28	150
	15	6	15	5
	1	1	1	2
	Rear	Rear	Rear	Left and right hand side
	30	30	30	40
	-	-	R	R
	V-B-R	V-B-R	V-B-R	V-B-R
	V-B-R	V-B-R	V-B-R	V-B-R
	V-B-R	V-B-R	V-B-R	V-B-R
	V	V	V	V
	V	V	V-B	V
	230	230	230	230
	50	50	50	50
	30	24	30	33
standard	standard	MCO-19UVS-PE	MCO-19UVS-PE[6]	MCO-80UVS-PE
standard	-	-	-	-
standard	-	-	-	-
-	-	-	MCO-HL-PE[6]	-
	-	-	MCO-HP-PW[6]	-
	-	-	MCO-H2O2-PE	-
	MCO-20ID-PW	-	standard	MCO-80ID-PW (5 small doors)
	MCO-100L-PW	MCO-100L-PW	MCO-100L-PW	MCO-100L-PW
	MCO-21GC-PW	MCO-5GC-PW	MCO-21GC-PW	MCO-80GC-PW
	-	-	MCO-SG-PW	-
	MCO-58ST-PW	MCO-30ST-PW	MCO-47ST-PW	MCO-80ST-PW
	MCO-35ST-PW	-	MCO-25ST-PW	-
	-	-	-	-
	-	-	-	-
	Standard[7]	Standard	Standard	-
	MCO-20RB-PW	MCO-5RB-PW	MCO-18RB-PW	-
	-	-	-	MCO-80RBS-PW
	-	-	-	MCO-80AS-PW
	-	-	MTR-L03-PW	-
	MTR-480-PW	MTR-480-PW	MTR-480-PW	MTR-480-PW
	MCO-420MA-PW	MCO-420MA-PW	MCO-420MA-PW	MCO-420MA-PW

Notes:
1) Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
2) ±0.25°C; ambient temp 23°C - 25°C, setting 37°C, CO_2 5%, O_2 5% (Multigas), no load
3) Nominal value
4) Includes humidifying pan cover and water level sensor
5) MCO-170AIC series requires MCO-170HB-PE, MCO-170EL-PW, MCO-HP-PW and SafeCell UV option for H_2O_2 decontamination
6) MCO-19M requires MCO-HL-PE, MCO-HP-PW and SafeCell UV option for H_2O_2 decontamination
7) MCO-21SB-PW is required for stacking with the MCO-19M-PE or MCO-18AC-PE
8) MCO-18AC, -19M, -170AIC series, -20AIC and 5 series can only be fitted with one communications interface.

Appearance and specifications are subject to change without notice.

GROUP		Plant growth chambers		Heated incubators	
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm					
MODEL		MLR-352-PE	MLR-352H-PE	MIR-162-PE	MIR-262-PE
Dimensions					
External dimensions (WxDxH)[1]	mm	760 x 700 x 1835		580 x 595 x 820	730 x 645 x 870
Internal dimensions (WxDxH)	mm	520 x 490 x 1135		450 x 460 x 450	600 x 510 x 500
Volume	litres	294		93	153
Net weight (approx)	kg	226	235	44	61
Performance					
Temperature control range and fluctuation	°C	0 ~ +50 (lamp off) ±0.3, +10 ~ +50 (lamp on) ±0.3		Ambient temp +5 ~ +80 ±0.2 (≤60) ~ ± 0.5 (60 ~ 80)	
Temperature uniformity	°C	±1 (lamp off), ±2.5 (lamp on)		±1	
Humidity level and fluctuation	%RH	-	60~90 / LS:0 (15~45°C) 55~85 / Lamp On (15~45°C)	-	
Light control range	Lx	Programmable 0 ~ 20000		-	
Control					
Temperature sensor		Thermistor		Thermistor	
Display		LED		LED	
Construction					
Exterior material		Painted steel		Painted steel	
Interior material		SS SUS-304		SS SUS-304	
Insulation material		PUF		Glass fiber	
Outer door	qty	3		1	
Inner door	qty	1		1	
Shelves	qty	5		2	3
Max. load per shelf	kg	25		15	15
Max. total load	kg	100		30	30
Access port	qty	1		0	0
- position		Ceiling		-	-
- diameter	Ø mm	40		-	-
Alarms					
Power failure		R	R	-	
Out of temperature setting		B-R	B-R	V-B	
High temperature		B-R	B-R	V-B	
Out of humidity setting		-	V	-	
Door open		V-B	V-B	-	
Electrical and noise level					
Power supply	V	230		230	
Frequency	Hz	50		50	
Noise level [2]	dB	45		NA [3]	
Optional communication systems					
Analogue interface (4-20mA)		MTR-480-PW		-	

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Nominal value
[3] Not applicable

GROUP		Programmable cooled incubators		
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm				
MODEL		**MIR-154-PE**	**MIR-254-PE**	**MIR-554-PE**
Dimensions				
External dimensions (WxDxH)[1]	mm	700 x 580 x 1018	700 x 580 x 1618	800 x 832 x 1810
Internal dimensions (WxDxH)	mm	620 x 368 x 555	620 x 368 x 1088	640 x 550 x 1160
Volume	litres	123	238	406
Net weight (approx)	kg	78	108	195
Performance				
Temp control range and fluctuation	°C	-10 ~ +60 (AT; +5 ~ +35, no load), ±0.2 with Heater PID control (SV 50), ±1.5 with Compressor control (SV 5) PID control: 7°C above AT for MIR-154/254; 10°C above AT for MIR-554		
Temperature uniformity	°C	±0.5 SV (35)		
Performance ambient temperature	°C	20, no load		
Control				
Temperature sensor		Thermistor		
Refrigeration				
Insulation material		PUF		
Insulation thickness	mm	40	40	80
Compressor	W	150	250	250
Refrigerant		R-134a	R-404a	R-404A
Cooling method		Forced air circulation		
Construction				
Exterior material		Painted steel		
Interior material		SS SUS-304		
Outer door	qty	1		
Outer door lock		MIR-LP option	MIR-LP option	Y
Reversible door		Y	Y	N
Inner door	qty	N	N	2 small inner doors (MIR-55ID option) MIR-LP option
Shelves	qty	3	5	5
Max. load per shelf	kg	20	20	50
Max. total load	kg	61	100	250
Access port	qty	1	1	2
- position		left side	left side	left and right side
- diameter	Ø mm	40	40	40
Interior fluorescent lamp	qty, W	1, 15, with MIR-L15-PE[2] option		
Alarms				
Power failure		-	-	R
High temperature		V-B-R		
Low temperature		V-B-R		
Door open		V-B		
Electrical and noise level				
Power supply	V	230	230	230
Frequency	Hz	50	50	50
Noise level[3]	dB	41	44	45
Options				
Stacking kit		MIR-S154SB-PW	-	-
Door padlock bracket		MIR-LP-PW	MIR-LP-PW	-
Additional illumination kit		MIR-L15-PE	MIR-L15-PE	MIR-L15-PE
Inner doors		-	-	MIR-55ID-PW
Door window blanking plate		MIR-154BP-PW	MIR-254BP-PW	-
Optional communication systems				
Ethernet interface (LAN)		MTR-L03-PW		
Digital interface (RS232C/RS485)		MTR-480-PW		

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] MIR-L15-PE operates between +2°C and +50°C
[3] Nominal value

GROUP		Dry heat sterilizers		Laboratory ovens	
Characteristics					
MODEL		MOV-112S-PE	MOV-212S-PE	MOV-112F-PE	MOV-212F-PE
Dimensions					
External dimensions (WxDxH)[1]	mm	580 x 595 x 820	730 x 645 x 870	580 x 595 x 820	730 x 645 x 870
Internal dimensions (WxDxH)	mm	450 x 450 x 450	600 x 500 x 500	450 x 450 x 450	600 x 500 x 500
Volume	litres	90	150	90	150
Net weight (approx)	kg	50	66	50	66
Performance					
Temperature control range	°C	40 ~ 200		40 ~ 200	
Temperature fluctuation	°C	+/- 1 deg	-	+/- 1 deg	+/- 1 deg
Temperature uniformity	°C	+/- 4 (AT 200°C)		+/- 4 (AT 200°C)	
Control					
Temperature sensor		Thermo couple		Thermo couple	
Temperature setting		Digital setting (adjustable range +/- 1°C)		Digital setting (adjustable range +/- 1°C)	
Display		Digital LED display		Digital LED display	
Construction					
Exterior material		Baked acrylic finish on galavanized steel		Baked acrylic finish on galavanized steel	
Interior material		Stainless-steel plate (SUS-304)		Stainless-steel plate (SUS-304)	
Insulation material		Glass wool		Glass wool	
Heating system		Forced air circulation system		Forced air circulation system	
Reversible door		Y		Y	
Observation window		Reinforced triple glass window (t=5 mm)		Reinforced triple glass window (t=5 mm)	
Air exhaust vent		Two on top plate (32mm inside Ø)		Two on top plate (32mm inside Ø)	
Interior fan		Sirocco fan, Ø 149 mm		Sirocco fan, Ø 149 mm	
Exterior fan		Propeller fan, Ø 107 mm		Propeller fan, Ø 107 mm	
Shelves	qty	2	3	2	3
Max. load per shelf	kg	15	15	15	15
Alarms & Safety functions		automatic set temperature (set point 10°C), independent overheating protection circuit, overtemperature			
Electrical					
Power supply		230V 50Hz single phase		230V 50Hz single phase	

GROUP		Autoclaves		Laboratory autoclaves	
Characteristics					
MODEL		MLS-3751L-PE	MLS-3781L-PE	MLS-2420U-PE	MLS-3020U-PE
Dimensions					
External dimensions (WxDxH)[1]	mm	478 x 632 x 748	478 x 632 x 965	380 x 490 x 840	440 x 550 x 1050
Internal dimensions (diameter x depth)	Ø mm	370 x 415	370 x 630	240 x 450	300 x 670
Effective chamber height incl. recess in lid	mm	463	688	-	-
Volume	litres	50	75	20	48
Net weight (approx)	kg	61	71	45	67
Performance					
Max. pressure	Mpa	0,240		-	
Sterilisation temperature	°C	115 ~ 135		105 ~ 126	
Temperature gauge range	°C	-		Digital display 80 ~ 141	
Culture media melting temperature	°C	60 ~ 114		-	
Safety valve release pressure		-		177 kPa (25 psig)	
Pressure gauge range		-		0 - 0.3 Mpa / 0 -45 psi	
Timer setting range	min.	-		1 - 180	
Keep warm temperature	°C	45 ~ 60		-	
Control					
Sterilisation timer	min.	1 to 300		-	
Melting timer	min.	1 to 300		-	
Keep warm timer	hrs.	72 hours fixed		-	
Exhaust control		Exhaust valve open temperature setting		-	
Construction					
Exterior material		Stainless steel (SUS 304)		Stainless steel (SUS 304)	
Interior material		Stainless steel plate		-	
Stainless steel baskets	qty	1 large & 1 small	2 large & 1 small	2	3
Exhaust tank		2 ltr polyethylene tank		3 ltr polyethylene tank	
Pressure vessel		Small-scale pressure vessel		-	
Safety devices		Pressure safety valve • Over-temperature limiter • Over-pressure limiter • Anti-scorch limiter • Door interlock • Current fuse		Pressure safety valve • Anti dry scorch thermo limiter • Door switch • Handle switch • Current fuse	

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Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details

Laboratory ovens	
	
MOV-112-PE	MOV-212-PE
580 x 595 x 820	730 x 645 x 870
450 x 450 x 450	600 x 500 x 500
97	157
47	63
40 ~ 250	
+/- 1 deg	+/- 1 deg
+/- 10 (AT 200°C)	
Digital setting (adjustable range +/- 1°C)	
Thermo couple	
Digital LED display	
Baked acrylic finish on galavanized steel	
Stainless-steel plate (SUS-304)	
Glass wool	
Natural convection system	
Y	
Reinforced triple glass window (t=5 mm)	
Two on top plate (32mm inside Ø)	
-	
-	
2	3
15	15
safety system for control section, self diagnosis	
230V 50Hz single phase	

Appearance and specifications are subject to change without notice.

GROUP		Orbital shaker	Orbital shaker for CO_2 incubators
Characteristics PUF = Rigid polyurethane foamed insulation V = Visual alarm B = Buzzer alarm R = Remote alarm			
MODEL		MIR-S100-PE	MIR-S100C-PE
Dimensions			
External dimensions (WxDxH)[1]	mm	410 x 305 x 120	Shaker 409 x 275 x 118 Controller 365 x 275 x 93
Internal dimensions (WxDxH)	mm	Platform 380 x 250	
Net weight (approx)	kg	15	Shaker -12, controller - 4
Performance			
Amplitude of orbiting motion	mm	20	
Revolution	rpm	50 ~ 500	40 ~ 200
Operating temperature range	°C	0 ~ 60	Shaker 0 ~ 50 in CO_2 ; Controller 0 ~ 40
Operating CO_2 range	%	Ambient	0 ~20
Operating relative humidity range	%	≤80	Shaker ≤95, controller ≤80
Control			
Timer	hrs	0-99.9	
Construction			
Exterior material		Body painted steel platform SS copper alloyed	Controller painted steel, shaker SS copper alloyed
Shaking motion		Circular orbit	
Motor		Brushless DC	
Soft start		Y	
Flask capacity	qty	e.g. 11 x 100ml, 6 x 500ml	
Maximum load	kg	5	
Alarms			
Power failure		-	
Revolution abnormality		V-B-R	
Motor overload		V-B-R	
Abnormal vibration		V-B-R	
Temperature abnormality		V-B-R	
Electrical and noise level			
Power supply	V	230	
Frequency	Hz	50	
Noise level [2]	dB	38 [3]	38.9
Options			
InCu saFe® Shaking Platform Threaded hole diameter: 10 – 32UNF Threaded hole pitch (longitudinal): 34.85 mm Threaded hole pitch (lateral): 20.65 mm		MIR-38PFN-PW	
Flask clamps			
50 ml		MIR-51FC-PW	
100ml		MIR-101FC-PW	
200ml		MIR-201FC-PW	
300ml		MIR-301FC-PW	
500ml		MIR-501FC-PW	
1000ml		MIR-1001FC-PW	
2000ml		MIR-2001FC-PW	
Test tube rack		MIR-204SC-PW	
Mounting kit for use with MIR-154-PE/ 254-PE/ 554-PE and MLR-352-PE		MIR-15FP-PW	
Optional communication systems			
Ethernet interface (LAN)		MTR-L03-PW	
Digital interface (RS485)		MTR-480-PW	

Appearance and specifications are subject to change without notice.

Notes:
[1] Exterior dimensions of main cabinet only, excluding handle and other external projections - See dimensions drawings on website for full details
[2] Nominal value
[3] Nominal value in a 13dB background, no load

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