



## Flexible ECLS Solutions for the I.C.U. and Patient Transport



*The story of Spectrum Medical is now 20 years old and our total commitment to the care of our critically ill patients can be seen in every single one of our revolutionary technologies described within this brochure. Nothing is compromised, no technology is ever considered complete, and minor details matter in the pursuit of ECLS perfection.*

*At Spectrum Medical we have one goal and that is to be your “trusted partner” both clinically and commercially. We understand that our new technologies do push the envelope, they do question current clinical practise and therefore they drive new learning opportunities. Additionally, it is self-evident that for this process to work successfully a traditional vendor mentality by both parties is simply not fit for purpose.*

*In this brochure we present to you three critical technologies as a unified solution. We begin the journey as a trusted partner and together we can change the current status quo and take patient safety, patient outcomes and healthcare efficiency to the next level.*

*At Spectrum Medical we are proud of where we started all those years ago with the development of non-invasive SO<sub>2</sub> technology to being a full solutions provider today. We have proven that ECLS is an exciting place to integrate ground-breaking technology and Spectrum Medical is dedicated to its future.*

*Yours Sincerely,  
Steve Turner  
C.E.O & Founder*

# Quantum Perfusion Technologies

The ultimate representation of Performance,  
Functionality and Ease of use.



# Quantum Perfusion Systems

Spectrum Medical proudly presents a modular range of Quantum Perfusion Modules and Patient Safety Systems for a wide range of ECLS procedures used in the I.C.U. and Patient Transport.

## The Toronto Perfusion System

The Toronto Perfusion System with its integrated docking station provides a “high-stability” platform for the Quantum Transportation system whilst retaining totally flexible for all ECLS therapies in the I.C.U.



The Toronto Perfusion System



## The Charlotte Perfusion System

The Charlotte Perfusion System is Spectrum Medical's most compact Perfusion ECLS System. Designed to maximize mobility within the I.C.U. and yet offering the ultimate in patient safety technologies for all ECLS therapies in the I.C.U.

In its standard configuration the Quantum ECLS system includes the Quantum Workstation Elite, an integrated stainless-steel Space Frame, and a secondary Power Pack which optimizes patient safety with extended battery life and system redundancy. System flexibility is further enhanced with the optional Quantum Ventilation Lite, a range of therapy based disposable mounting solutions and the capability to operate both centrifugal and roller pump technologies.



The Charlotte Perfusion System

# The Quantum Transport System

Combining future technologies with proven Quantum performance to maximise safety and simplify patient care during transport.

Modular, flexible, and extremely light weight; Spectrum Medical's advanced Quantum Carbon Fibre technology defines the future of ECLS transport solutions.

The Quantum Carbon Fibre transport solution is a completely integrated platform within the Quantum range of ECLS technologies combining proven Quantum flexibility and system functionality with

Spectrum Medical's unique and proven Quantum Informatics Patient Safety system.

The Quantum Transport System is supplied with the Quantum Workstation Elite, the Quantum Mini Ventilation module and a range of therapy based disposable mounting solutions that can support different patient populations with either one or two Quantum Centrifugal Pump drive systems.



The Quantum Transport System

All modules except for the Quantum Mini Ventilation module are detachable from the Quantum Transportation System and can be used with alternative framing solutions to maximise equipment utilization and to minimise training requirements. Additionally, the Quantum Transport frame has been designed to integrate with the Toronto ECLS System.

The integrated Quantum Mini Ventilation module

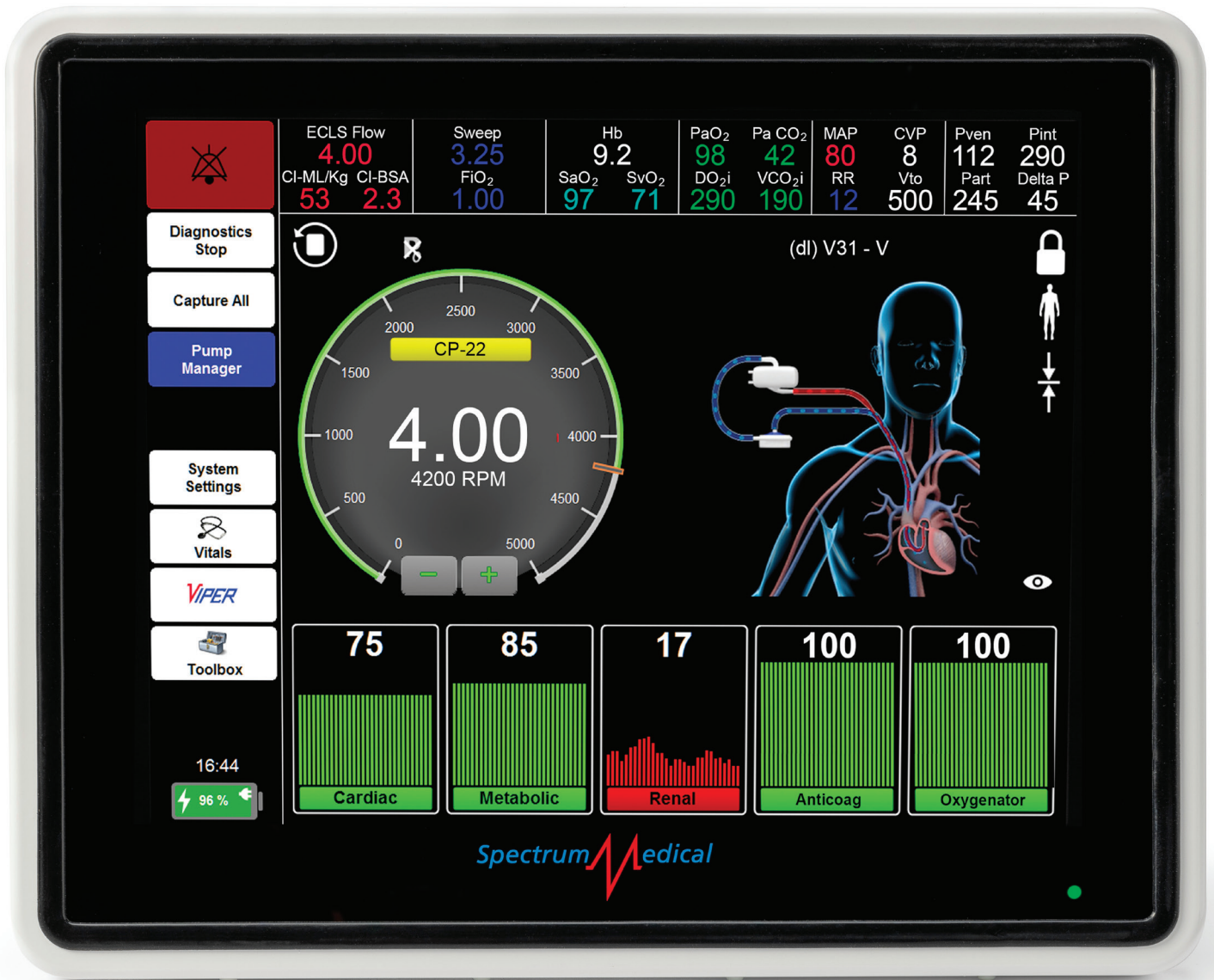
is a world first ventilation technology, designed by Spectrum Medical to be used for ECLS transport. Being both compact and lightweight the Quantum Mini Ventilation module provides precision hypobaric ventilation using Spectrum Medical's revolutionary dual-chamber oxygenator technology during the critical transport phase of care.





# The Quantum Workstation Elite

Your gateway into the management of the World's most advanced Perfusion Patient Safety System supporting complex ECLS procedures in the I.C.U. and during patient transport.



Quantum Workstation Elite



## The Quantum Workstation Elite

The new and revolutionary 12" Quantum Workstation Elite has been designed to offer the ultimate in clinical flexibility when supporting complex ECLS procedures in the I.C.U. and during patient transport. A single solution not only reduces training requirements it offers maximum investment utilization.

The Quantum Workstation integrates two channels of flow measurement, four channels of pressure and temperature measurement, and Spectrum Medicals proven non-invasive measurement of O<sub>2</sub> Saturations and Hb/Hct.

As a standalone technology the Quantum Workstation Elite can modulate two CP22 Quantum Centrifuge Pumps or two Quantum 4" Roller Pumps (or any combination). When connected to an ECLS system with a Quantum Power Pack the Quantum Workstation can modulate both 6" and 8" roller pumps. Furthermore, The Quantum Workstation Elite supports connectivity to a

wide range of Quantum modules including the Quantum Ventilation Lite and Quantum Smart Occulders.

Systems interoperability and patient safety are fundamental to Spectrum Medical and its commitment to partnering with customers to improve patient outcomes. The new Quantum Workstation Elite has an integrated third-party device connectivity solution that enables the central display and transfer of critical real-time continuous clinical information.

The system also includes a range of safety and best practice systems. Compliance is supported by the Best Practice App and patient safety through our Checklist and Complications Apps. Spectrum Medical's Live Vue technology and Critical Care Scoring systems functionality are available when the Quantum Workstation Elite is network connected to a Quantum Informatics server installation.

# The Quantum Ventilation Lite

Finally, a fully integrated “single solution” Ventilator technology designed to provide the safe delivery of patient ventilation for specialized ECLS applications in the I.C.U.



## Quantum Ventilation Lite

The Quantum Ventilation Lite is a world first solution designed to manage ECLS patient (Membrane) ventilation, including the blending of gases, integrated patient safety systems and perfusion diagnostics.

The ultra-compact Quantum Ventilation Lite employs the very latest gas blending technologies to provide the user with an Atmospheric or Hypobaric patient ventilation capability.

In Atmospheric mode the Quantum Ventilation Lite delivers precision regulated  $\text{FiO}_2$ ,  $\text{CO}_2$  with a sweep flow range from 0.025 to 10 L/m when flowing a single gas e.g.  $\text{O}_2$  and up to a maximum flow rate of 20 L/m when modulating the delivery of two gases e.g. 60%  $\text{FiO}_2$ .

In Hypobaric mode the Quantum Ventilation Lite regulates the delivery of two channels of  $\text{O}_2$  to Spectrum Medical's new dual-chamber oxygenator technology with a sweep flow range of 0.025 to 10L/m per channel.

To ensure system performance and safety the ventilation system has a fully integrated secondary monitoring system that continuously compares actual measured values with user defined set-points

and activates an alarm when the discrepancy between the two systems is greater than 10%.

In 'Patient Ventilation Mode' the Quantum Ventilation Lite, combined with its patented  $\text{PaO}_2$  and  $\text{PaCO}_2$  measurement technologies, provides a decision support capability and an auto regulation function for the modulation of gas flows and gas concentrations when setting  $\text{PaO}_2$  and  $\text{PaCO}_2$  target values.

To further improve patient safety the Quantum Ventilation Lite provides real-time monitoring of the following gas-ventilation parameters:

- Incoming Supply Pressures of Air,  $\text{O}_2$  &  $\text{CO}_2$
- $\text{O}_2$  and  $\text{CO}_2$  Gas Concentrations & Pressures to the Oxygenator
- Overall Gas Flow to the oxygenator (SWEEP)
- $\text{FeCO}_2$  concentrations

Integrated within the Quantum Ventilation Lite is Spectrum Medical's full range of Non-Invasive Diagnostic and Calculated Physiologic Measurements. To further improve usability the system includes the measurement of Flow (including bubble detection), Pressure and Temperature.

# The Quantum Flexible ECLS Mounting Solutions

Two therapies, one system.





# The Quantum Centrifugal Pump Drive System

Dedicated centrifuge pump technology for ECLS application in the I.C.U. and during transport.

The CP22 Quantum Centrifugal Drive System is both compact and powerful and can be used to support ECLS circuits utilizing either the Quantum CP22 or CP20 Centrifugal Pump. Central to the Quantum philosophy is system flexibility and equipment utilization. The CP22 Motor Drive

System can be integrated with either the Charlotte and Toronto Perfusion Systems or directly connected to the new Quantum Workstation Elite during transport. The availability of a hand-crank further improves patient safety.



Quantum CP22 Hand-Crank



Quantum CP22 Motor Drive

# Perfusion Roller Pump

A Quantum leap in usability and perfusion systems' functionality.



The compact range of Quantum direct drive peristaltic roller pumps are provided with 4", 6" and 8" raceway diameters which maximizes both flexibility and compactness when optimizing ECLS System design. In particular, the introduction of the mid-range 6" option eliminates the current compromise that compels users to use 8" pumps in medium flow applications.

The Quantum Universal Clamping System supports the mounting of pumps into multiple locations and pump change times of less than 60 seconds. Importantly, Quantum's pump detection software eliminates user intervention when adding or exchanging pumps.

Smart LEDs enable visual identification of pump function and color coordination with both the Quantum Workstation and the Quantum Pump Control Module.

Spectrum Medical's universal tube clamping system is designed to eliminate the frustration of using current tube clamping solutions and colour coded plastic inserts. A single 'bobbin' solution allows for the clamping of all tubing diameters associated within the selected size of race-way.

# Sterile Technologies

A “Quantum leap” in Perfusion best practise



# The Quantum ECLS SuperPAC

The Quantum ECLS SuperPAC represents Spectrum Medical's total commitment to patient safety, patient outcomes and the ultimate in Perfusion clinical best practice.

The Quantum SuperPAC is an uncompromising combination of innovative sterile technologies and a key system within Spectrum Medical's "Quantum Perfusion" strategy. What makes the SuperPAC different to currently available "tubing circuits" is the revolutionary approach to world first innovation and their integration with Spectrum Medical's Quantum ECLS & Informatics Technologies.

- The elimination of Gaseous Microemboli
- Improved Gross Air Management
- Minimal Time to Prime
- Anti-Thrombotic Strategies
- No Blood Re-Circulation
- Low Haemolysis & Low Heat Generation
- Lowest Pressure Drop
- Minimal Blood Contacting Surface Area
- Integrated Pressure and Temperature Measurement
- Durable Biocompatible Coating

## SuperPAC Configuration

The Quantum SuperPAC is available in a range of sizes to support Adult, Paediatric and Neonate patient populations. SuperPACs are supplied coated with Spectrum Medical's cross linked biocompatible PC1036. Superior adhesion qualities, elasticity and surface smoothness maximise antithrombotic performance throughout the life of the product.

The SuperPAC is supplied with its own priming kit that is easy to use and duplicates current clinical practise.

For Reference: The Quantum Dual Chamber Oxygenator and the Quantum range of centrifugal pumps are not included within the SuperPAC and will need to be purchased separately.



# The Quantum Dual Chamber Oxygenator

Spectrum Medical's Extracorporeal Membrane Ventilation Technology is another world first technology combining a revolutionary fluid path design with a dual chamber gas transfer technology.

## Sizes available:

Large Adult  
Paediatric

Small Adult  
Neonate (availability Q3-2023)

Spectrum Medical's revolutionary Dual Chamber Oxygenator technology takes patient ventilation to the next level. Working in conjunction with the Quantum Ventilation Lite clinicians are offered the opportunity to continue current practice with the blending of  $\text{FiO}_2$  or transition to a Hypobaric Ventilation strategy.

For Reference: The Quantum Mini-Ventilation Module used in the Quantum Transportation System, provides Hypobaric Ventilation only.



## What is Hypobaric ventilation?

When all the gases combined equal less than one atmosphere it is called hypobaric. The Quantum Dual Chamber Oxygenator creates a hypobaric condition by only using oxygen and controlling Patient  $\text{PaO}_2$  through a V/Q mismatch within the independent laminated fibre chambers. The V/Q mismatch supports the management of partial pressure significantly below atmospheric pressure, without the use of Nitrogen. This unique technology creates a large gas diffusion gradient and space within the patient's blood volume to absorb significant volumes of gaseous micro emboli.

# The Quantum Dual Chamber Oxygenator

Changing the world in the safe ventilation of Patients undergoing ECLS Support.

## Total Surface Area (Ventilation Efficiency)

Spectrum Medical's revolutionary laminated membrane construction significantly increases gas exchange efficiency, minimises pressure drop and priming volume. The unique construction eliminates the current compromise between fibre bundle compression and low priming volume. Individually all fibre layers within the fibre bundle are separated by ten microns, leading to a significant advantage in that the individual fibres within the laminated bundle construction, are in contact with flowing patient blood and providing gas exchange. This significant increase in gas transfer efficiency leads to a reduction in blood contact surface area and by default a lower priming volume and pressure drop.

## Superior Air Handling

Spectrum Medical continues its commitment to patient safety with the integration of its patented Quantum Vortex Flow technology. This innovation in fluid dynamics ensures that blood flow passing through the laminated bundle construction is centrifugal in nature which generates a fluid vortex to support the separation of gross air from flowing patient blood. This separation of gross air from patient blood ensures almost instantaneous priming in addition to minimising or eliminating venous air being passed through to the arterial circuit.

## Maximum Fluid Dynamic Performance

The elimination of low velocity sections and dead space within the fluid path has been at the forefront of Spectrum Medical's "anti-thrombotic" strategy. This unique design concept in conjunction with the Quantum Vortex Flow and Fibre Separation technologies guarantees that the total surface area of the laminated bundle construction is subjected to a circulating blood flow with a guaranteed full volume wash out of approximately 4 seconds when flowing blood at 5 lpm.

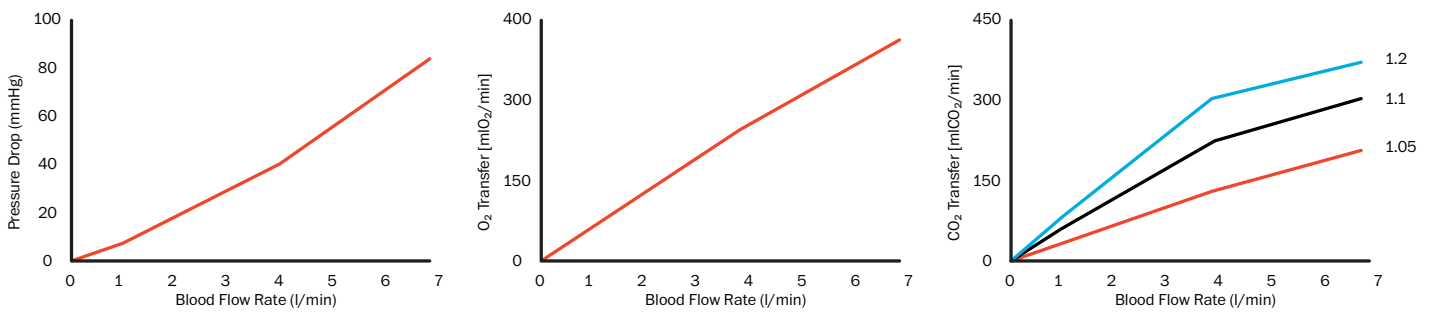
## Biocompatible

Resulting from significant process research, a world first in the application of PC1036 cross-linked biocompatible coating to a fibre membrane construction. Superior adhesion qualities, elasticity and surface smoothness maximises antithrombotic performance throughout the life of the product.

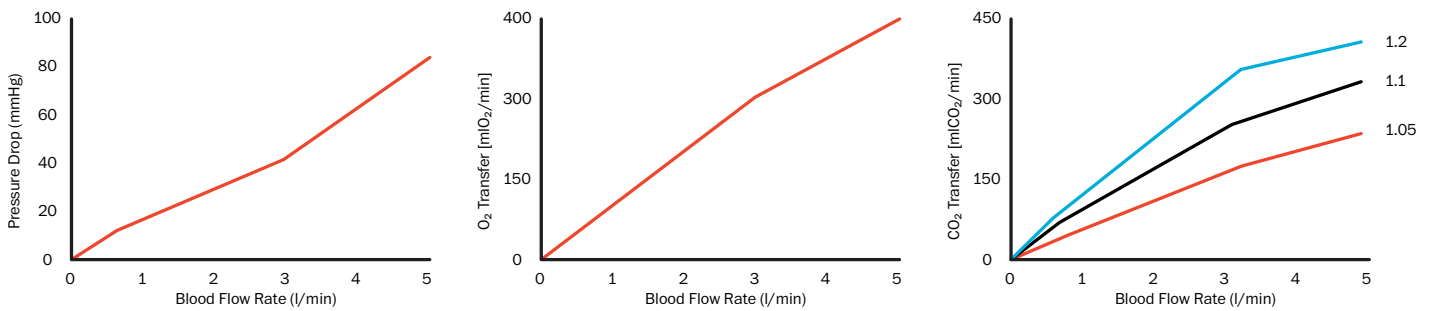
## Materials free from DEHP

Commitment is again emphasised with all internal blood contacting surfaces being made from materials free from plasticizers.

## Quantum Perfusion Blood Oxygenator ECC VT200



## Quantum Perfusion Blood Oxygenator ECC VT160



Performance of the device were obtained in agreement with ISO 7199 Standard (37 °C)

Paediatric and Neonate Oxygenators coming soon. Keep Checking our website for updates.

# The Quantum ECMO SuperPAC - Centrifugal Pump

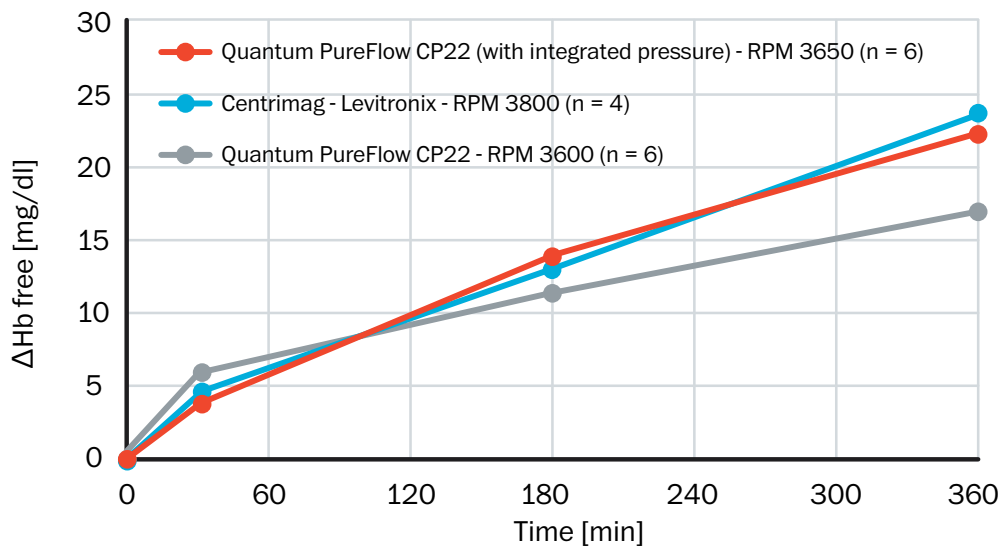
Dedicated centrifuge pump technology for ECLS applications in the I.C.U. an during patient transport.

Spectrum Medical's next generation range of Quantum Centrifugal Pumps provide exceptional levels of performance along with significant reductions in prime volume. The integration of a single sapphire bearing, and patented hydro-dynamic balancing technology ensures levitation at low RPMs leading to significantly reduced heat generation and haemolysis.

Another world first is the integration of Spectrum Medical's advance pressure and temperature measurement technology. In-line pressure and temperature measurement of both the arterial and venous lines can now be accomplished without compromising the safety of the ECLS circuit.



CP22





# The Quantum ECMO SuperPAC – Integrated Centrifugal Pump and Heat Exchanger

Leading the world with integrated patient safety technologies.

To support the introduction of Spectrum Medical's new ECLS heater solution and to minimise circuit complexity Spectrum Medical has integrated a stainless-steel venous heat exchanger and the Quantum centrifugal pump into a single disposable assembly.



PH33

## Product Range

Description	Code	Ports	Performance
Centrifugal Pump	CP22	3/8	7 L/min – 5000 rpm – 550 mmHg
Centrifugal Pump	CP20	1/4	3 L/min - 5000 rpm - 550 mmHg
Centrifugal Pump with integrated Heat Exchanger	PH33	3/8	7 L/min – 5000 rpm – 550 mmHg
Centrifugal Pump with integrated Heat Exchanger	PH30	1/4	3 L/min - 5000 rpm - 550 mmHg

All solutions are coated with Spectrum Medical's cross linked bio compatibility PC1036. Superior adhesion qualities, elasticity and surface smoothness maximises antithrombotic performance throughout the life of the product.

# The Quantum SuperPAC – Dual Lumen Technology

Spectrum Medicals revolutionary range of Dual Lumen Cannulas minimizes venous/arterial recirculation during extracorporeal life support.

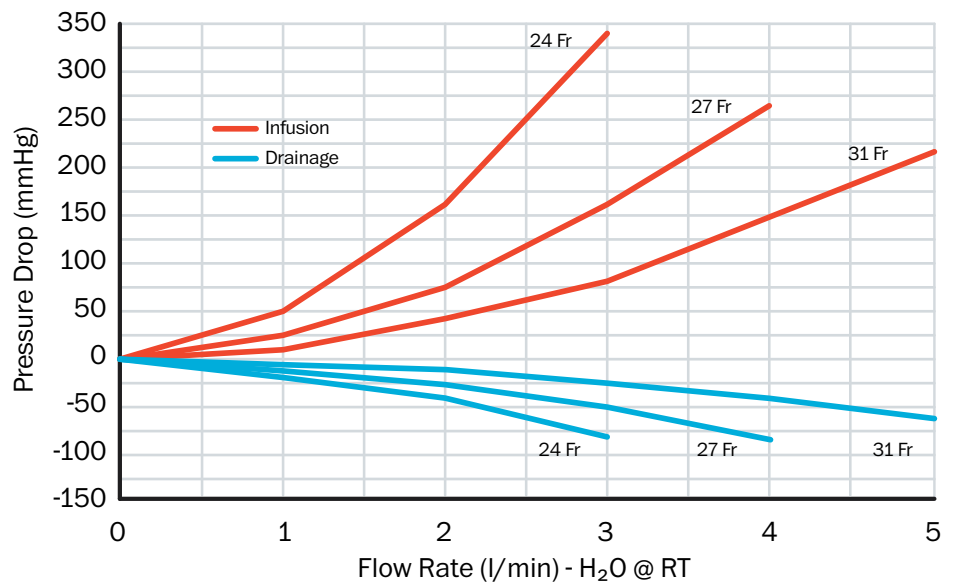


Spectrum Medical's new Dual Lumen Cannula allows for venous drainage and reinfusion of blood via the internal jugular vein during extracorporeal life support procedures lasting up to 6 hours.

The device exploits a single site insertion which reduces the invasiveness of extracorporeal procedures. It is inserted via the right internal jugular vein. Blood is drained through the lumen of the outer catheter and returned through the lumen of the inner catheter. The device features multiple inflow openings in the outer catheter limiting the circulation of unoxygenated blood.

The Cannula is supplied as a 31Fr, 27Fr or 24Fr and is coated with Spectrum Medical's cross linked bio compatibility PC1036.

## Dual Lumen Cannula Performances



# The Quantum SuperPAC with Side Port Technology

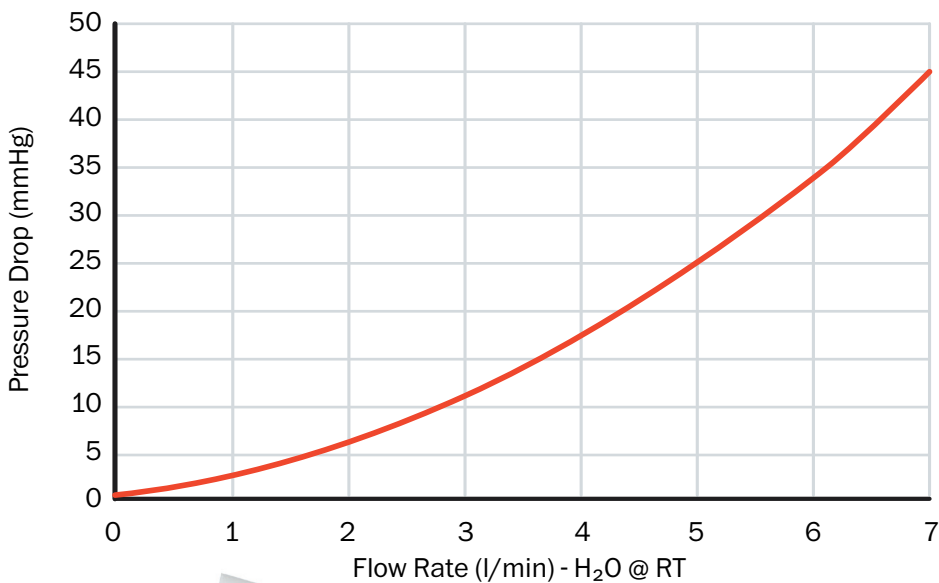
The world's first Axillary Artery Graft with a built-in access side port for VA extracorporeal life support.

The world's first Axillary Artery Graft with a built-in access side port for VA extracorporeal life support.

Spectrum Medical's revolutionary 8mm Graft provides up to 7lpm of blood flow with the addition of a side port that can accept up to 9 French. This side port can be used for LV Venting, endo-clamping, cardioplegia delivery devices, PCI, IABP and other imaging or procedures that need easy access. The system has an access site designed purposefully to allow safe entry and removal of appropriately sized catheters into the high-pressure blood lines.



Arterial Cannula Graft Performances



Something New for 2023



New technology will be introduced in 2023. Watch for any updates on [spectrummedical.com](https://spectrummedical.com).

# Quantum Informatics - 21

Revolutionizing real-time patient safety and the development of clinical best practise.





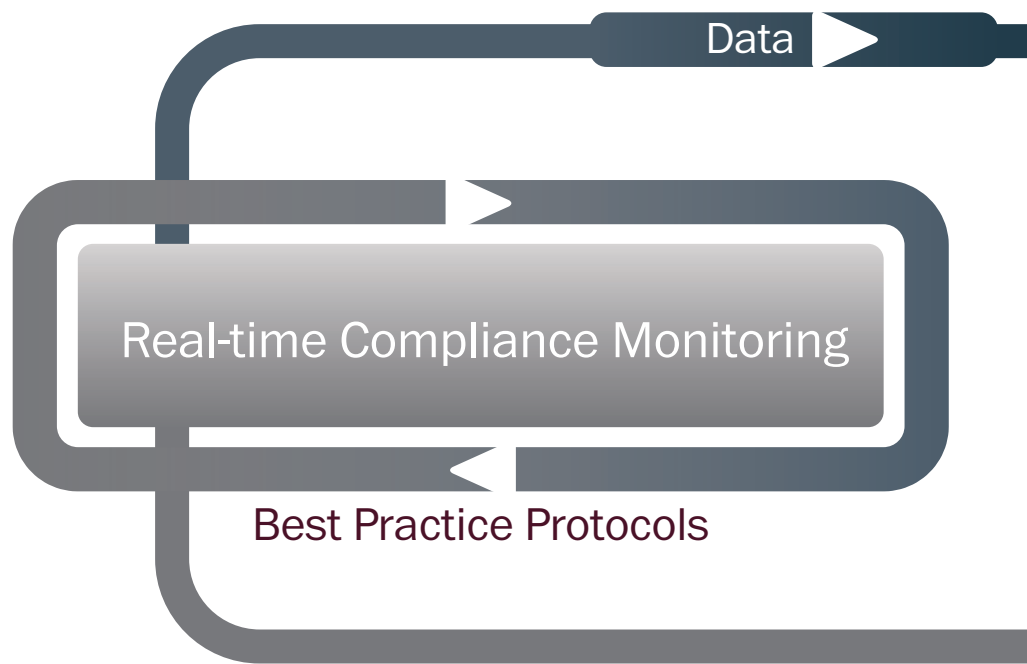
# Active Patient Safety Strategies, QA and QI

Quantum Informatics - 21 is Spectrum Medical's latest generation software solution that revolutionizes real-time patient safety and the future development of clinical best practice for the high-risk patient population within the O.R and the I.C.U.

The seamless integration of “multiple information feeds” supports the real-time distribution of critical patient information and the deployment of advanced “active Patient Safety Systems” and Clinical Best Practice. Integrated compliance, complication and critical care scoring systems combined with sophisticated alerting systems improves support for the avoidance of adverse events.

## Stage 1

At the heart of the Quantum Informatics is seamless connectivity to data, and to ensure seamless connectivity, Quantum Informatics integrates with Quantum Workstations, 3<sup>rd</sup> Party Gateway Servers, Hospital Information Systems and a wide range of Patient Physiologic Monitors in the O.R. and I.C.U. setting.

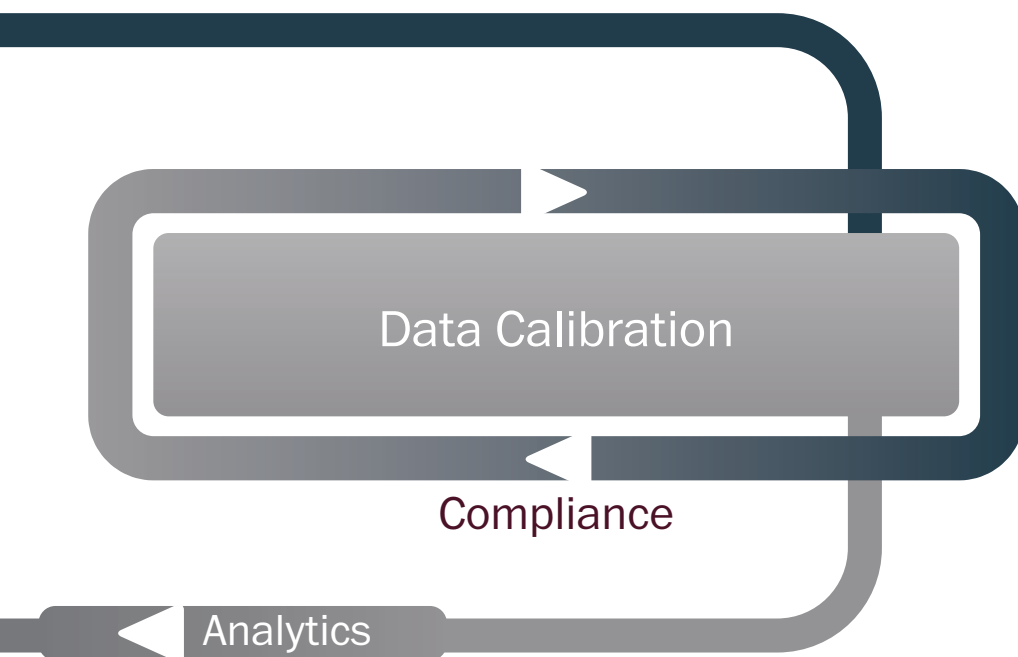


## Stage 4

An active Patient Safety Strategy is a significant new development within the Quantum Informatics Technology. Within this system the patient is continuously monitored against several deployed best practice and evidence-based protocols that can communicate non-compliance via a central display system and physician alert systems. This system allows active QA/QI goals to become real-time clinical practice.

## Stage 2

Unique to the Quantum Informatics technology is its ability to report QA indexes for compliance to hospital objectives encapsulated within the active Patient Safety System. Compliance is considered a function of time within Quality Objectives compared to total time care is provided. QA indexes can be broad based departmental index's or more granular segments of time and team.



## Stage 3

The use of analytics is an essential element in the QA/QI improvement process and wholly dependent on having access to clinical data for both large patient populations and discreet data for individual patients. To support the QA/QI process the Quantum Informatics technology facilitates the transfer of clinical interventions and diagnostic data to the VISON server SQL database, where a wide range of reporting tools can be used for “post-op” investigation and the continuous improvement of the active Patient Safety System.

# Active Patient Safety System

The Compliance, Complications, and Checklists applications combine clinical best practice and evidence-based protocols into an active Patient Safety System that supports the consistent delivery of quality and enhanced patient safety.

Best Practices

Measurement	Level	Critical Low	Critical High	Sustained Low	Sustained High	Decrease Rate	Increase Rate	Latest Value
Art Flow (L/min)	L1		7.5	2L/min / 2.0min				
CVP (mmHg)	L1							
FEMMean (mmHg)	L1	50	110					
LRADMean (mmHg)	L1	50	110					
MAP (mmHg)	L1	50	110	50mmHg / 2.0min				
SaO <sub>2</sub> (%)	L1	70						
SvO <sub>2</sub> (%)	L1	50	80	59% / 00s				
Art Flow (L/min)	L2	0.5	4.5					
CVP (mmHg)	L2	-25	25					
FEMMean (mmHg)	L2	50	85					
LRADMean (mmHg)	L2	50	85					
MAP (mmHg)	L2	50	85					
SaO <sub>2</sub> (%)	L2	70						
SvO <sub>2</sub> (%)	L2	50	100					

Adult Pediatric

Stop Record Case Info Procedures Intra-Op Event Chart Checklist Record Closing Toolbox

## Compliance

The Best Practice app is an integral part of Quantum's active Patient Safety System which supports the real-time deployment of a bedside patient specific surveillance profile. Multiple surveillance profiles can be created within a hospital and stored within the Quantum Informatics System. Furthermore, clinicians with system privileges can make changes to a surveillance profile in real-time to further enhance individual care strategies and reduce alarm fatigue.

Creating surveillance profiles is a simple process in which real-time physiological data and discreet blood gas data is combined with a specific alerting strategy to create an individual surveillance profile. Alerting parameters can be configured individually or in combination using high/low limits, sustained limits or percentage rates of change limits.

LIVE VUE Spectrum Medical

Departments ICU Anesthesia Perfusion Test

Perfusion Location C - QD1000027 Location A - VV2

Location A - VV4 Location: PH1000013

Measurement	Critical Low	Critical High	Sustained Low	Sustained High	Sustained High Seconds	Decrease Rate (%)	Decrease Rate Seconds	Increase Rate (%)	Increase Rate Seconds
Art Flow (L/min)		8							
Bld Temp (°C)	33	37.5		35	50				
Card. Press (mmHg)	80	3							
FiO <sub>2</sub> (%)	40	100	50	30					
Line Press (mmHg)	1	300		300	30		5	60	
PCO <sub>2</sub> (mmHg)	30	55			50				
PO <sub>2</sub> (mmHg)	130	400				10	60	60	
Pump Flow (l/min)		7.5							
Swapp (L/min)	1	6							

Update

ECG HR 79 FEM 11 FEMSys FEMDia ABP PIP PEEP Iso Sevo  
RR 12 SpO2 94 FEM 7  
Cardiac 100

ECG HR 80 FEM 11 FEMSys FEMDia ABP PIP PEEP Iso Sevo  
RR 9 SpO2 99 FEM 7  
Cardiac 100

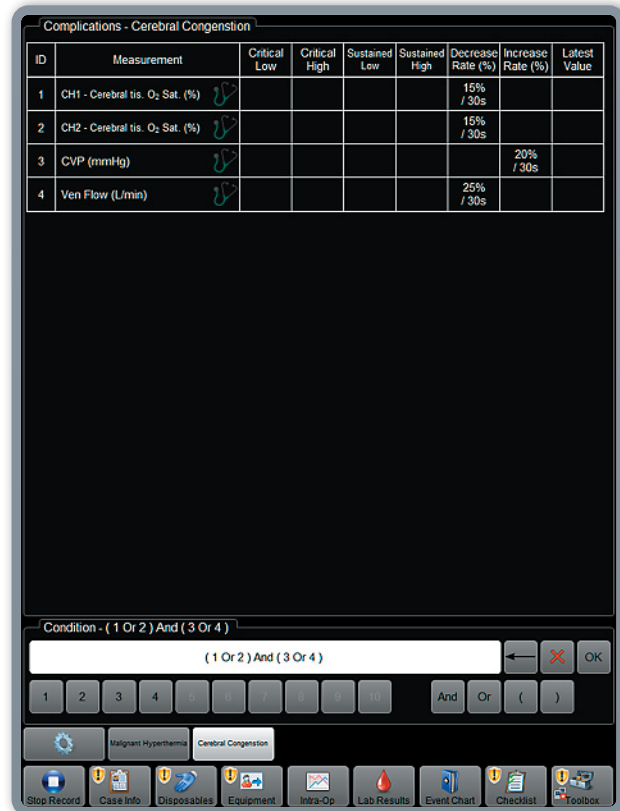
ECG HR 81 FEM 11 FEMSys FEMDia ABP PIP PEEP Iso Sevo  
RR 12 SpO2 100 FEM 8  
Cardiac 100

ECG HR 80 FEM 11 FEMSys FEMDia ABP PIP PEEP Iso Sevo  
RR 11 SpO2 91 FEM 8  
Cardiac 100 Renal 91 Metabolic 100 Hematological 100 Pulmonary 63  
Cardiac 100 Renal 81 Metabolic 94 Hematological 100 Pulmonary 63

## Complications

The Complications application provides a real-time capability that combines the surveillance of multiple information feeds with a range of complication algorithms. When activated the complication algorithm generates a Complication Alert which is supported by a pre-agreed Complication Response.

Complication Specific Algorithms and a Complication Response are easily configured using a “decision tree” format or a check list. Complication alerts can be triggered both automatically via the active Patient Safety System and manually by the clinician. In both cases the clinician gains access to the pre-configured Complication Response. Furthermore, the alert is communicated to all active participants within the Clinician Alert System.



## Checklists

A Checklist application within Quantum’s active Patient Safety System supports the creation of multiple checklist formats and their real-time deployment to the bedside. Checklists can be configured to be triggered by any number of specific event types such as a complication alert, patient hand-off etc. Furthermore, Checklist functionality can be time-synchronised with a change of shift or current rounding practice.

# Critical Care Scoring

Patient Safety Technologies, revolutionizing real-time clinician patient connectivity in the I.C.U. and O.R.



The Quantum Informatics Critical Care Scoring technology has been designed to support instant access to a highly visual representation of patient status and then to alert the clinical team via the Quantum Informatics' system when a patient status becomes critical.

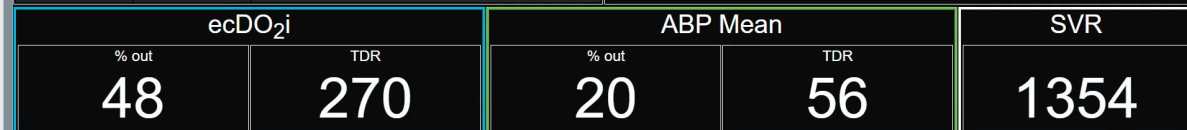
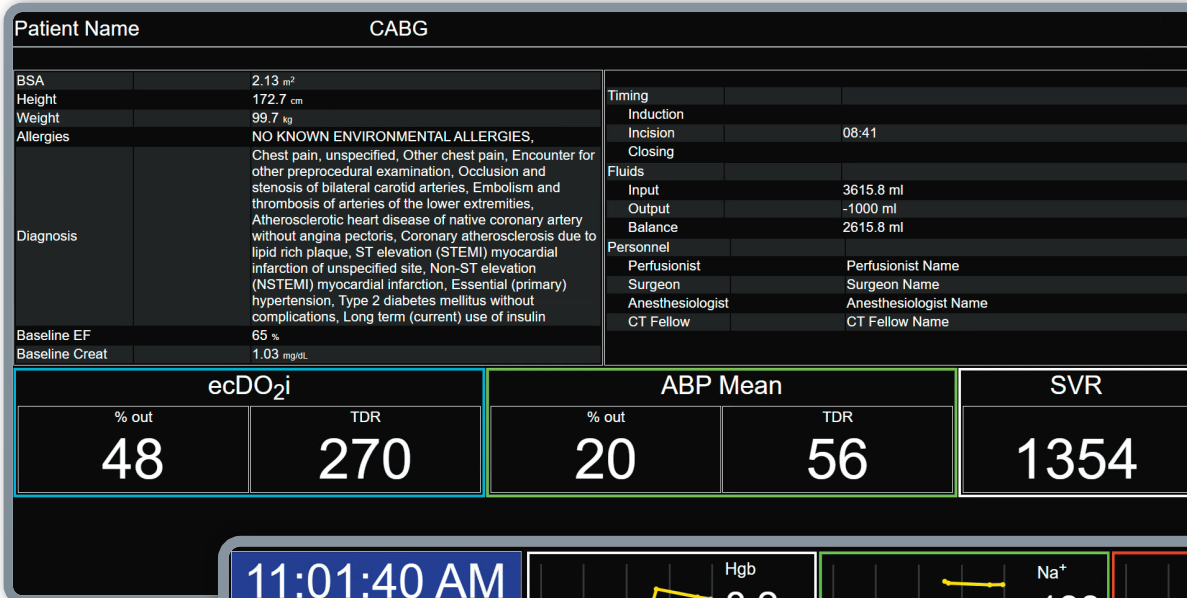
At the heart of the Critical Care Scoring functionality is the development of a hospital configured scoring system that's specific to a physiologic system such as Renal, Respiratory, Cardiac etc. Analysing data at the system level allows the

instant summary of multiple data points to both speed response and patient triage.

Initial system configuration and subsequent modification is both easy and only possible with Admin level access. Real-time data combined with ADT feeds from the Hospital Management System facilitates the active calculation of a patient system status. Additionally, ADT feeds allow the introduction of pre-specified patient weighting factors into the system scoring calculation.



# Custom Dashboards for the I.C.U. and O.R.



Custom dashboards are used by the clinical team to visualize data that is critical to clinical practice and patient safety. Dashboards have been used in the operating room to create real-time custom views and clinical decision trees relevant to the surgical procedure. Dashboards have also been

used in the I.C.U. to allow clinical teams to monitor patients and share data to multiple clinicians to support real-time response to real-time adverse events. These dashboards can consist of live streaming data from 1<sup>st</sup> and 3<sup>rd</sup> party devices, ADT, Labs and information from the HIS.

# Centralized & Remote Tele-Health and Integrated Alerting

With the seamless integration of “multiple information feeds” and the intuitive input of ADT data, Spectrum Medical is committed to maximizing patient safety with real-time responses to real-time adverse events.

With the integration of Spectrum Medical’s revolutionary Quantum Elite and its app based Patient Safety System with our next generation server based Quantum Informatics technology, you take clinical safety and real-time physician response to the next level.

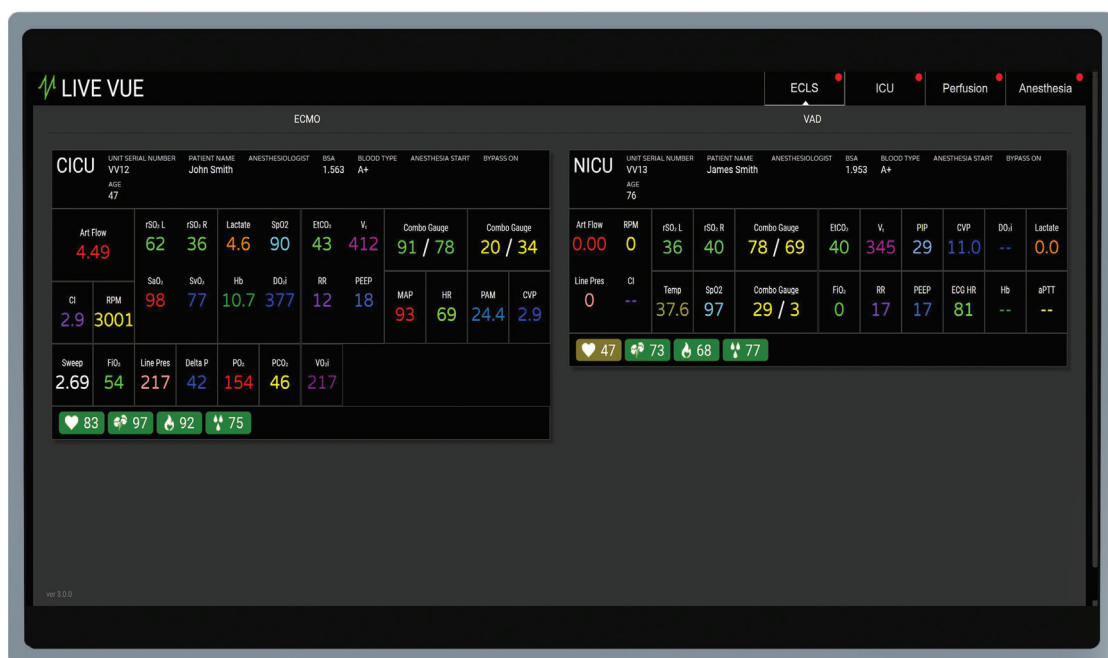
Quantum Informatics LIVE VUE is the name given to the software system designed to visualize real-time clinical information in both graphical and textual formats to clinicians within the clinical setting or from a remote location. LIVE VUE will provide the clinical team with a “wide area, real-time perspective” of all patients within the care setting. This presentation of data is further enhanced with the integration of system alerts associated with the deployed active Patient Safety System.

System alerts for Complications, Compliance, Critical Care Scoring and Checklist, if active, will

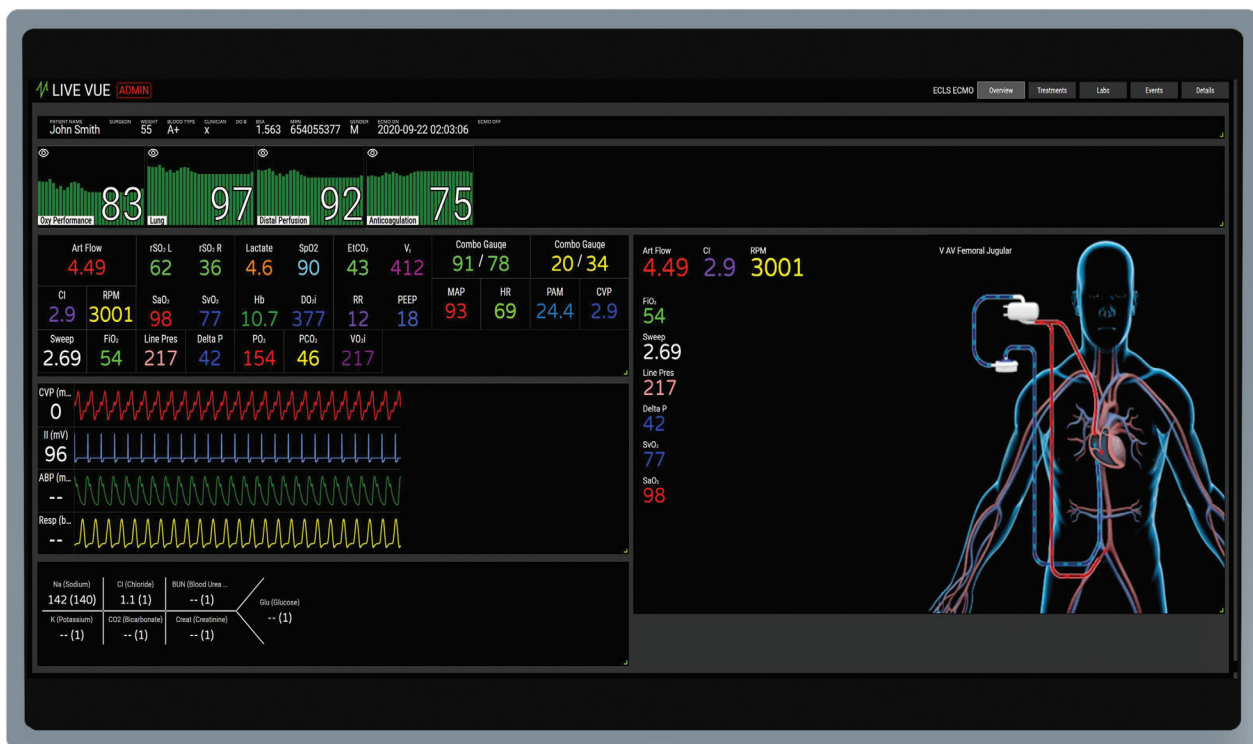
be communicated to the summary information screen and to the clinician personnel comms device in real-time.

Access to patient specific granular trending information is made possible by selecting a patient displayed in the LIVE VUE dashboard. This data can include wave forms, trending physiologic data, intermittent blood gas data etc. In fact, the presentation of discreet patient data can be further enhanced by extending the exchange of information to include relevant data within the Hospital Information System.

The LIVE VUE interface is also used for the selection and deployment of both surveillance profiles and check lists. The LIVE VUE interface is also used for the individual setting of alerts within an active patient surveillance profile.

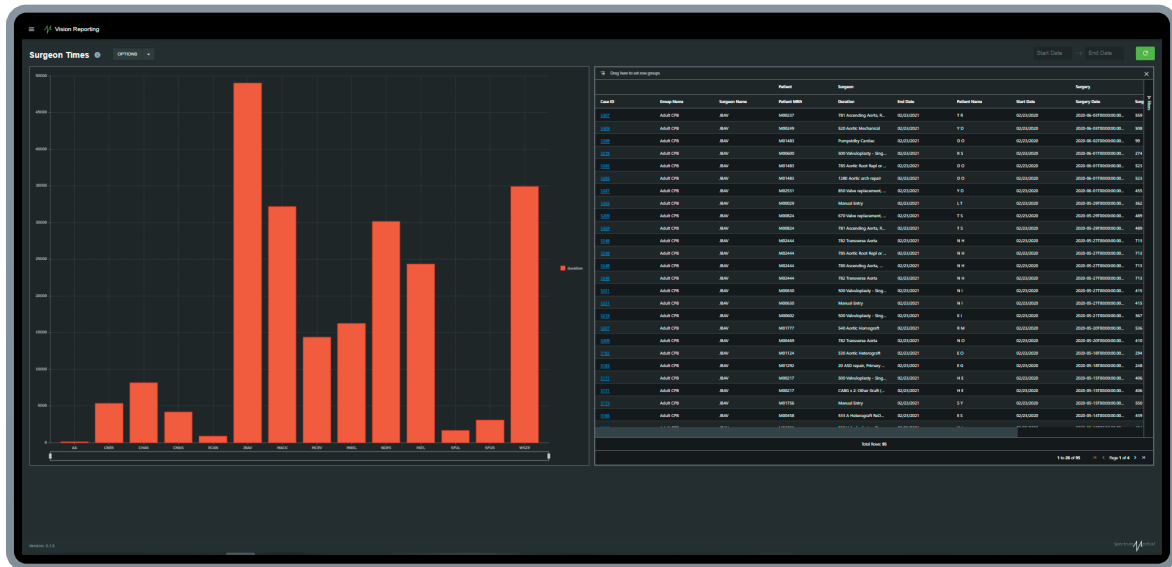


# Systems



# System Architecture and H.I.S. Integration (VISION)

The Powerhouse behind Spectrum Medical's Quantum Informatics technology.



## About VISION

VISION is a sophisticated server application that is the gateway into Spectrum Medical's Quantum Informatics Technology. VISION automates the system-wide distribution of software upgrades, windows and security updates, a web-based remote access capability plus the management of user passwords and system privileges. VISION will also support integration with Active Directory.

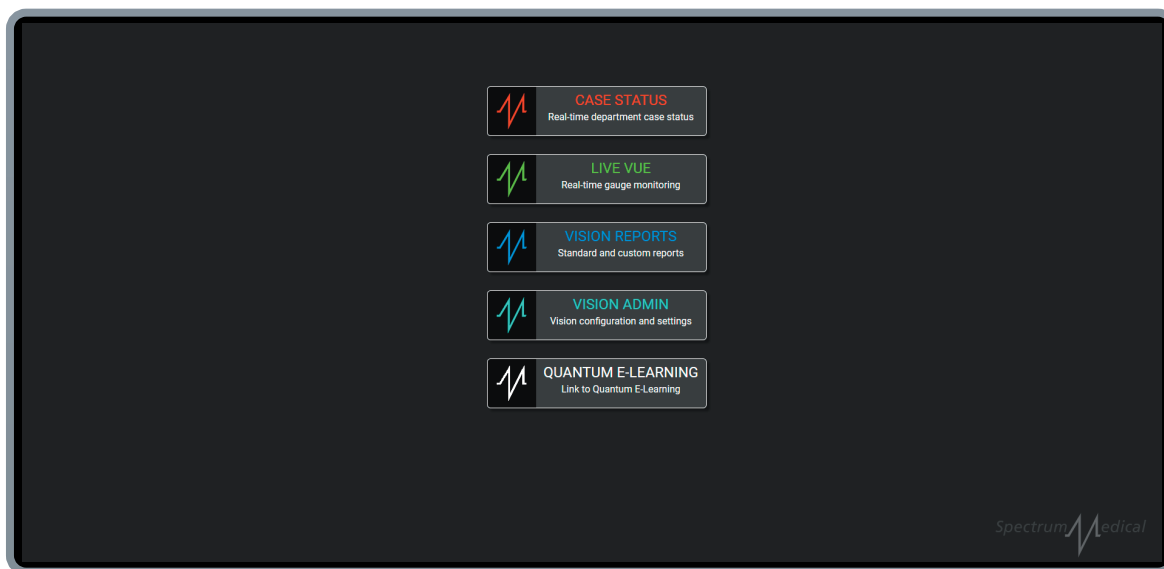
The VISION server application operates on a hospital supplied server and supports two way communication with Hospital Information systems and 3<sup>rd</sup> party gateway servers using an integrated communications interface engine supplied by MIRTH Inc. In addition to its system management functionality the VISION server application includes a SQL database for the long term storage of data and for the real-time distribution of active

patient data to both LIVE VUE and the clinician deployed active Patient Safety Systems.

## Medical Device Connectivity

To ensure the seamless integration of clinical information the Quantum Informatics VISION Server application includes a world leading Medical Device Connectivity solution that can eliminate the need for a 3<sup>rd</sup> party middle ware solution. The VISION server application can support connectivity to the following systems:

- 3<sup>rd</sup> Party Gateway Servers (e.g. Philips & GE)
- Direct device connectivity to a range of Physiologic Monitors Ventilators etc.
- Connectivity to middle ware solutions
- Hospital Information Systems (via Mirth)
- The Quantum Workstation Platform



## System Analytics & Case Playback

Initially developed to support the training environment as well as Morbidity and Mortality meetings, the Case Playback technology provides the capability to retrospectively replay stored patient data from the VISION SQL database in real-time. Continuous information includes waveforms, trending physiological and blood gas data. Additionally and dependent on H.I.S integration case playback can include case related events such as medication delivery, best practice alerts, personnel activity etc.

## System Administration

Spectrum Medical has long recognised that the success of any deployed QA / QI platform is dependent on the maintenance of Physician engagement, which in itself is largely dependent

on utility and the ability to introduce system-wide changes quickly.

The day-to-day management of Quantum Informatics is at the physician level. VISION's web interface supports the real-time management of the active Patient Safety System, including, profile creation, profile modification and profile deployment.

## Dashboards / Management Reporting

Spectrum Medical recognizes that dashboards and active reporting systems are core to delivering information and clinical analytics across the continuum of healthcare. To deliver this, Spectrum Medical has partnered with LOGI Analytics, a recognized leader in the field of data visualization and data analytics. The LOGI "tool-set" is now a standard module within Quantum Informatics.



# Sentinel Total Care

Absolute dedication to customer support  
and a total solutions approach to a “trusted  
partner status”



# In-service Customer Support

Sentinel Total Care defines Spectrum Medical's approach to a total solutions support program that maximises equipment availability with the very latest systems functionality.

## Software Updates:

Spectrum Medical is committed to the continuous improvement of both systems functionality and the enhancement of capital value. We continually review, enhance, and add software functionality driven by evidence-based clinical usage and trends. Our 3rd party device driver software is regularly updated to ensure compatibility with both established and new systems. All software updates are included at no additional cost to the customer. Any software deployment is subject to prior customer approval and training via Spectrum Medical's web-based electronic Learning Management System (Quantum eLearning).

## On Site Customer Support:

A Spectrum Medical Product Specialist will perform all required routine servicing to ensure optimum performance of your Quantum Perfusion System. Visiting Product Specialists will also provide additional user training and support changes to systems configuration to enhance clinical practice. Using dedicated Product Specialists as opposed to

traditional service personnel is a unique strategy within the ECLS space, with Sentinel Total Care covering all associated service visit costs (travel, labour, and spare parts).

## Extended Warranty:

Sentinel Total Care includes comprehensive protection in the event of any breakdown of your Quantum System. Coverage includes modules, sub-assemblies, and any associated accessories (sensors, cables, clamp assemblies, batteries, etc.). Quantum products beyond economical repair will be replaced with the latest 'new build' technologies at no additional cost.

## Accidental Damage:

No questions asked, unintentional damage protection, including all Quantum accessories. Quantum products beyond economical repair will be replaced with the latest 'new build' technologies at no additional cost. Sentinel Total Care allows you to effectively manage your budget with no sudden large Purchase Order requirements.

# In-service Customer Support

Real Time Customer support 24 hours, seven days a week.

## Remote Real-Time Support (QuantumChat):

Integrated, as part of Sentinel Total Care, users have access to Spectrum Medical's comprehensive 24/7 remote real-time support application, QuantumChat.

QuantumChat puts customers in direct contact with our product, clinical and technical specialists located globally. Ask a question anytime, anywhere and get an immediate response back straight away. Share pictures, videos or even start a live video chat with a product expert using your mobile device. Each user is given a dedicated login and grouped within your clinical team. Follow or respond to questions asked by fellow team members. Get device information about your Quantum System by simply scanning the QR barcode found on any Quantum module/sensor. Accessed via the app, our knowledge-based libraries such as documents, manuals, software release notes and various troubleshooting help tips. QuantumChat makes troubleshooting and resolving issues easy and fast. QuantumChat supports multiple languages and is compatible with either Apple or Android mobile devices.

Additionally, with the inclusion of our VISION Server System and with VPN access, Spectrum Medical can provide remote monitoring and fault diagnosis of all Quantum system networks connected to the local VISION server intraoperatively.



## QuantumChat



## Emergency Loan Equipment:

Spectrum Medical will dispatch complimentary loan equipment if your defective equipment cannot be rectified within 24 hours of being returned to a Spectrum Medical Service Centre. To maximise equipment uptime our loan equipment stays with you until you receive a repaired or new replacement module from Spectrum Medical.

## Quantum Sterile Products Support:

Partnering with hospitals in the provisioning of care is at the core of the Sentinel relationship and providing dedicated customer support for sterile disposable technologies is another exciting world first for Spectrum Medical.

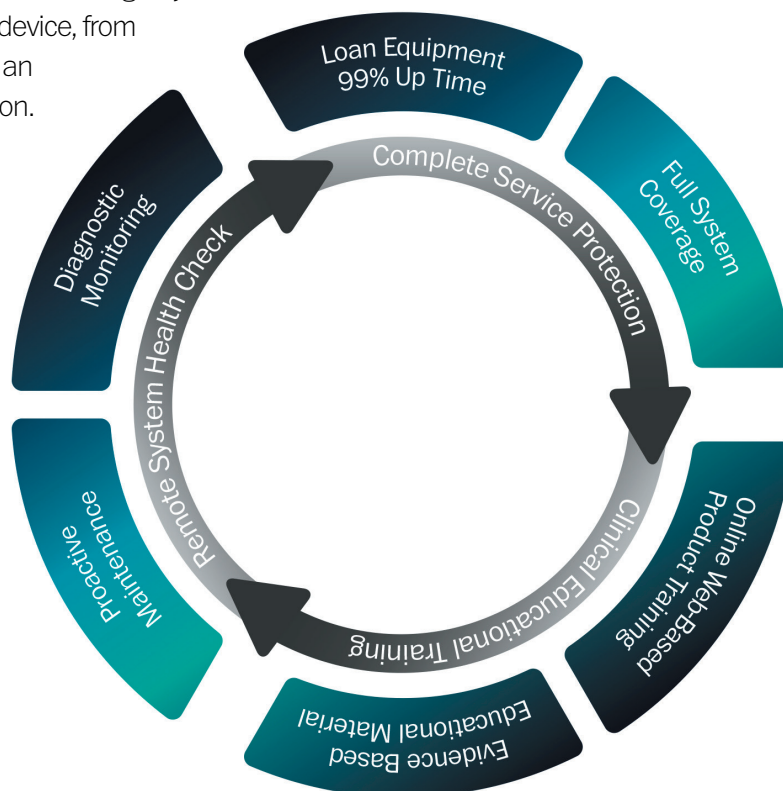
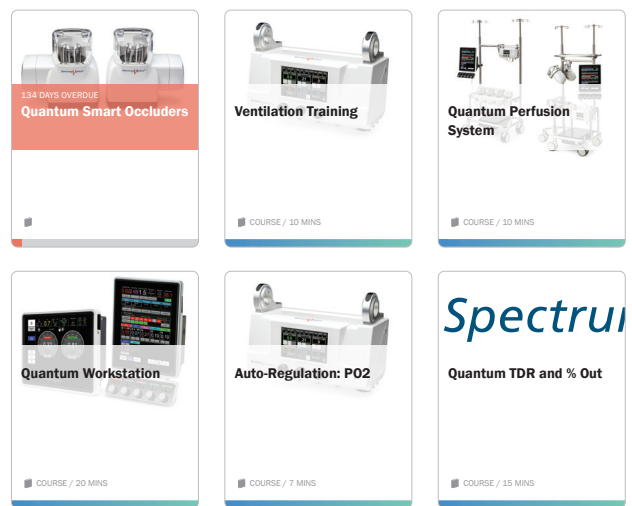
Spectrum Medical can now offer its exclusive users of the Quantum SuperPAC technology an optional fixed cost per patient pricing model. To minimise disruption and associated administration costs this option is only available to hospitals using Quantum Informatics.

Quantum sterile products supplied by Spectrum Medical that have exceeded their expiration date can be returned to Spectrum Medical for full credit against future purchases.

Sentinel provides access to a wide range of structured Training, Educational and Re-Certification resources.

### On-Line Learning Support (Quantum eLearning):

All users have access to Spectrum Medical's web-based eLearning management platform, Quantum eLearning. Quantum eLearning will complement any existing training or re-certification program. Each Spectrum Medical module, product or technology, has its own dedicated course. Each course content is available in multiple languages and designed to ensure that the user's product and clinical knowledge is both relevant and up-to-date. Topics covered include clinical benefits of hypobaric oxygenation, safety features for Mini-Bypass mode, and auto-regulation of PO<sub>2</sub> and PCO<sub>2</sub>. Quantum eLearning is an easily accessible resource library. Access Quantum eLearning day or night, on any device, from any location with an internet connection.





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