bürkert
FLUID CONTROL SYSTEMS

Customer Testimonial – PlasmaJet

"Working in partnership with Burkert enabled us to do what we otherwise couldn't have done," said Professor Nikolay Suslov

The ultra-fine control, accuracy and repeatability provided by Burkert's CMOSens® mass flow controller technology (MFC) has been instrumental in enabling Plasma Surgical to develop PlasmaJet, the first and only true plasma surgery system for surgical cutting and coagulation.

"It is true to say that the ability of Burkert's mass flow controller to control very low gas flows precisely, and with continuous repeatability, has made our unique technology possible," said Professor Nikolay Suslov - Chief Technology Officer for Plama Surgical, and inventor of the PlasmaJet Technology.

PlasmaJet is a virtual scalpel that enables surgeons to achieve more, with less damage to tissue. It comprises a console, a service trolley and a range of single use hand pieces. The console houses the control system with LCD display and touchpad. There is also an integrated cooling circuit, which uses Burkert fluid control valves to cool the tip of the hand-piece.

FDA-approved, the PlasmaJet system cuts & coagulates tissue with a fine beam of electrically neutral, high energy plasma. This is generated by ionizing a low flow of inert argon gas within the insulated body of a single use hand-piece. The gas is excited into a plasma state & emerges from the tip of the hand-piece as a precise pale blue jet stream.

Burkert's involvement in the PlasmaJet development project began as a result of problems with the mass flow controllers that Plasma Surgical was using initially. The problem was lack of consistency in settling times from one MFC to another; and the ramifications this had on the correct operation of the PlasmaJet. For the system to work properly, the MFC first has to provide the high pressure / high flow rate required to ignite the plasma, & then ramp down to tenths of slpm. It is important that there is no over-shoot, otherwise the plasma beam is lost.

Burkert's brief upon joining the project was to provide an MFC that would avoid this problem, controlling the extremely low flow rates with a repeatable accuracy of +/-0.01 slpm. In addition, other elements of the specification required that the MFC should be suitable for use in EMC noisy environments (each unit is sited below a large 3.5kV power supply and has two fans working at low frequency); that each MFC should be stable between 25 & 40 °C; and that manufacturing tolerances should ensure each MFC has the same settling time.

The first prototype of the 8711 MFC was supplied just 9-days after Burkert's initial visit to Plasma Surgical, in August 2008. This unit was then tested in Sweden that same month at Plasma Surgical's R&D facility, in the presence of engineers from Burkert's Gas segment support team. Following successful tests, the Burkert factory created a part number for the variant of the 8711, in October 2008. This was followed by the RoHS statement and request for UR approval, also in November 2008. The culmination of this activity also occurred in the same month, with a pre-production order to Burkert for an initial batch of ten 8711 units. From start to finish, therefore, the development process had taken just three months.

"Working in partnership with Burkert enabled us to do what we otherwise couldn't have done," said Professor Nikolay Suslov, "Burkert were interested enough in the application to take up the considerable challenge, understand it, and configure a solution that worked, shortening our development time considerably. We could have taken much longer, or even failed in our development without their input. We are very happy with them."

Key to the success of PlasmaJet application is the unique CMOSens® technology integrated into 8711 MFC. This operates according to a thermal principle which has the advantage of delivering the mass flow without any corrections for the required pressure or temperature. The actual flow rate is detected by a sensor embedded in the wall of a specifically designed bypass channel, into which a small part of the total gas stream is diverted, ensuring laminar flow conditions.

The sensor element, a CMOS chip, contains a heating resistor and two temperature sensors (thermopiles) which are arranged symmetrically upstream and downstream of the heater. The differential voltage of the thermopiles is a measure of the mass flow rate passing this bypass channel; the calibration procedure employed ensuring a unique assignment of the sensor signal to the total flow rate passing the device.

About Plasma Surgical

Plasma Surgical is a global company committed to advancing surgical techniques that enhance the care and safety of patients during medical procedures. Founded in 2000, Plasma Surgical's corporate headquarters is located in England - where the PlasmaJet console is manufactured – and its research and development facilities in Sweden. The company's sales and operations offices are located in the USA, with additional sales offices in France.

Burkert would like to thank Plasma Surgical for their kind permission to develop and reproduce this customer testimonial.

This is just one example of how we are redefining process systems and equipment. To learn more about Burkert can help with your application, go to ***www.burkert.co.uk*** *or contact your local representative.*

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