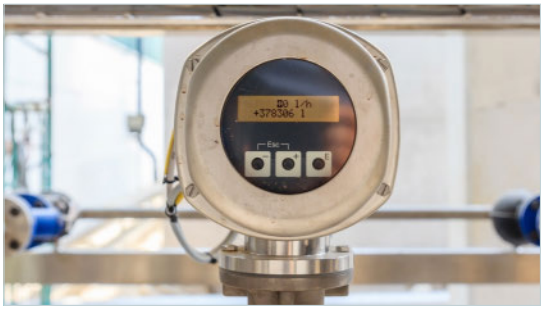
Small Size, Low Profile | Low Weight | Redundancy/ Power Sharing | Low EMI

Industrial Flow Meter

Power Components Simplify Source Redundancy

The Customer's Challenge



One manufacturer was looking to adapt one of their flow meter designs to expand the flow ranges across which it can operate and improve the accuracy over the whole flow range. Being fundamental to safety, the system needed to provide precise and fast measurements reliably under all operating conditions, including during an AC line failure. This required the addition of a 48V battery input within the existing constrained flow meter case.

At the same time as adding a back-up supply to the case the design team was challenged to reduce the system's overall weight to give customers the flexibility necessary for use in challenging installation circumstances.

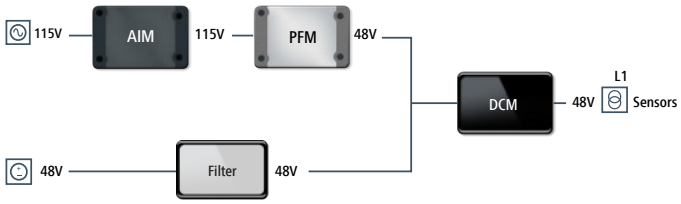
The design of the flow meter system power supply had to meet low levels of conducted and radiated EMI to prevent any interference from affecting flow sensor accuracy.

The Solution

Vicor's Power Component Design Methodology is a scalable and modular building block approach to power system designs, integrating powerful online design tools and an extensive portfolio of small footprint, proven power components, all the way from the power source to the point of load. Each power component is optimized to work together to deliver outstanding performance.

The wide input voltage range (36 – 75V) DCM DC-DC converter provided the regulation of either the 48V battery input or of the internal 48V AC-derived bus. The AC input was handled by a PFM Isolated AC-DC converter.

Link to Whiteboard »



The Results

The use of high power density components enabled the new power solution – AC-DC and the 48V battery input – to be developed with a footprint of just 64cm^2, easily fitting into the existing flow meter case. The components' low weight (PFM 148g; DCM 24g) also enabled the design team to meet their weight targets.

The DCM's wide input voltage range (36 – 75V) allowed operation from a discharged battery. With its high frequency zero-voltage switching (ZVS) topology high efficiency is delivered across the input line range, improving operation time under fault conditions.

The DCMs' zero-voltage switching reduced the radiated and conducted EMI, simplifying the filtering required to avoid interference affecting the sensor, further reducing the power system size and weight.

Product Family Key Specifications	
PFM Isolated AC-DC Converters with PFC	
Input Voltages	Universal rectified: 85 – 264V_{RMS}
Output Voltage	24 and 48V isolated, regulated outputs
Output Power	400W
Efficiency	Up to 92%
Power Density	≥ 127W/in^3
Dimensions	PFM 4414: 111 x 36 x 9.4mm PFM 4914: 125 x 36 x 9.4mm
DCM DC-DC Converter Module	
Input Voltages	9 – 50V_{DC}; 16 – 50V_{DC} 18 – 36V_{DC}; 36 – 75V_{DC} 120 – 420V_{DC}; 160 – 420V_{DC} 200 – 420V_{DC}
Output Voltage (SELV)	3.3, 5, 12, 13.8, 15, 24, 28, 36, 48V
Output Power	4623 ChiP: Up to 600W 3623 ChiP: Up to 320W
Efficiency	Up to 93%
Dimensions	4623 ChiP: 47.91 x 22.8 x 7.21mm 3623 ChiP: 38.72 x 22.8 x 7.21mm

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