

# Summary of NimbleSense Capabilities

## Capability Highlights

- Multiple Selectable Pressure Ranges in One Device – *Multi-Range™*  
*Change pressure ranges 'on the fly' while lowering system inventory cost by up to 8x*
- Advanced Multi-Order Digital Filtering  
*Eliminate noise sources such as fans and blowers*
- Direct Closed Loop Motor Control to a Target Pressure  
*Enhance system performance and simplify design*
- Integrated 50/60Hz Notch Filter  
*Eliminate noise from the power grid and AC devices*
- Proprietary Zero-Noise Suppression  
*Improve zero threshold detection by 10x*
- Zero Error Reduction – *Z-Track™*  
*Significantly reduce zero error in applications such as Spirometry*



## The Architecture

Superior Sensor Technology's NimbleSense™ architecture has enabled a new generation of very high performance, low noise pressure sensing sub-systems. With enhanced internal DSP capabilities, the NimbleSense architecture allows for inclusion of various interchangeable functional blocks. These functional blocks can then be used to create sub-systems which vary from simple traditional sensor modules to advanced multi-sensor closed loop control solutions. An industry first, some examples of these unique technical capabilities include:

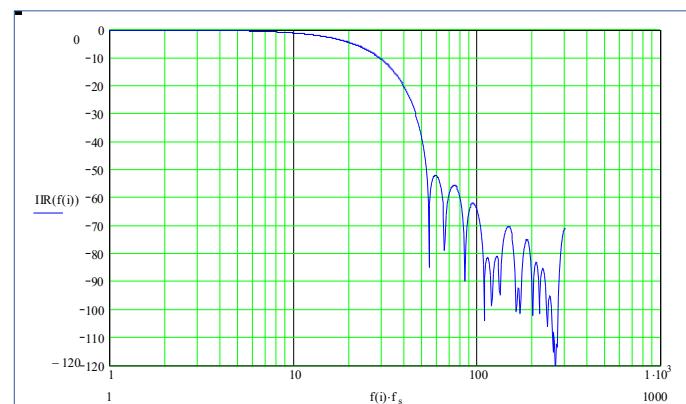
## Multi-Range Technology

Support up to 8 pressure ranges in a single sensor, each performance optimized and calibrated to the selected range. For example, the HV160 supports 8 pressure ranges, from as low as  $\pm 625$  Pa to  $\pm 15$  kPa in the same sensor module while achieving 0.05% accuracy for each selected range and <0.1% TEB FSS. Changing pressure ranges is very simple and can be done 'on the fly' when the device is in use.

This capability is available in all our products and beneficial for nearly all applications.

## Advanced Digital Filtering

Greatly improve system performance by utilizing advanced digital filtering capabilities on the front-end of the sub-system to characterize and eliminate critical noise created by fans, blowers, or other dry air / gas sources prior to reaching the pressure sensing sub-system. The example below is of a 4th order FIR filter used to block 40-100Hz pump noise which has noise of equal magnitude as the signal.

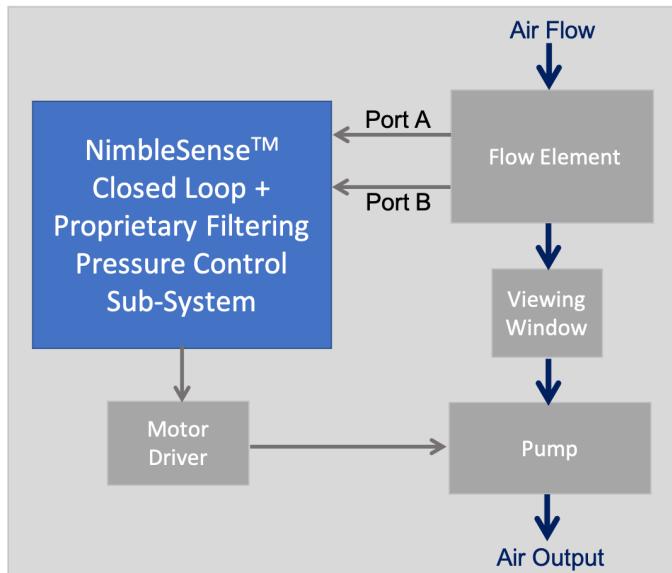


This capability can be beneficial for all electromechanical products including ventilators, sleep apnea machines (CPAP, BiPAP), oxygen concentrators, anesthesia machines, industrial devices and HVAC systems.

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## Closed Loop Control

Use a closed loop, low noise modulated output to directly control fan blowers / motors via dynamically controlling air flow to reach / maintain a user programmable pressure level – Greatly simplifying system design, lowering system complexity and improving loop delays.



This capability can be beneficial for many products including, but not limited to, ventilators, sleep apnea machines (CPAP, BiPAP), oxygen concentrators, anesthesia machines, flow meters and HVAC systems.

## 50/60Hz Notch Filter

Eliminate the noise from the power grid and AC devices before it reaches the sensing element via an integrated solution that simplifies product design and lowers overall system cost.

This capability can be beneficial for products that operate near power lines, a power source or are coupled through a power supply, such as industrial devices and HVAC systems.

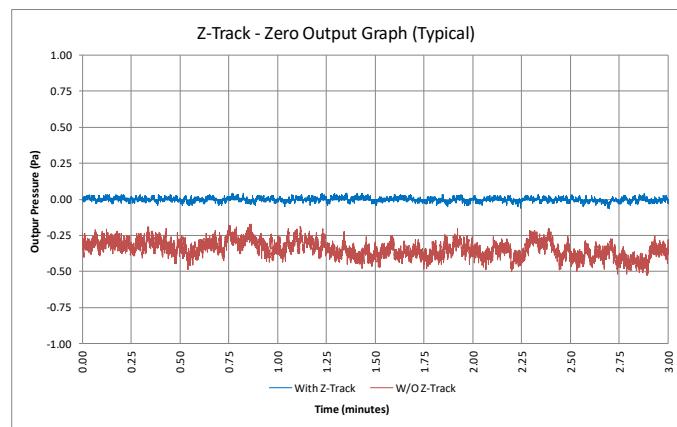
## Advanced Noise Reduction

Add an advanced noise suppression algorithm to further reduce system noise at zero level by up to 10x. Our standard sensor products already have a noise floor up to 100x lower relative to leading competitive solutions. This capability is in all our products.

## Z-Track Technology

Through a proprietary algorithm which detects and automatically tracks zero, Z-Track essentially eliminates zero drift for pressure sensing applications where the pressure level goes to zero on regular intervals. This capability is available in our SP Series for Spirometry applications.

The illustration represents the application of Z-Track and Advanced Zero Noise Reduction (signal in blue) in comparison to that without (red).



Our extremely powerful and flexible architecture is often able to solve the toughest system problems. With early discussions at the architectural planning stage, we then propose unique, highly targeted solutions for a variety of HVAC, industrial and medical systems, where a pressure sensing element is used within the system.

For more information, please contact:

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