

## Infusion Pump Technology Platform



### 60601 Development Process:

- **User Interface design**
- **ISO Development Alarm System Compliance**
- **Pump Controller Integration**
- **Fluid and Bubble Sensor Integration**
- **Imbedded Control Software Programming**
- **Integration of OTS sensors and radios**
- **Occlusion Sensor Integration**
- **Process and Pump Control Software Design**
- **Infusion Application Integration**

### Capabilities Overview

Quick and accurate fluid delivery with an intuitive user interface that allows the user to quickly specify the flow, rate and volume by choosing two out of the three options. Depending on the known values the user can deduce the final delivery outcomes. The alarms (promptly and effectively) notify the user if a bubble or occlusion has been detected.

Safety is a priority and the design includes a door that captures the tubing and peristaltic pump. The guide for the tubing reduces the likelihood of occlusions and channels the tubing through the occlusion and bubble detector.

### Accurate fluid delivery

The PICOflo infusion pump delivers fluid treatments with precision. This system is a building block component that highlights Benchmark Electronics ability to integrate occlusion detectors, bubble detectors, peristaltic pump and a display into a cohesive infusion system. The system is intuitive for users that are accustomed to consumer electronics that have large touch displays. Hospital and lab staff would be able to quickly familiarize themselves with the device.

### Building block for infusion technologies

This device can be integrated into customer infusion products or used as a separate component for laboratory infusion procedures.



## Alarms are Compliant with ISO/IEC 60601-1-8

Three separate tones indicate urgency of the alarms:

Low- Two pulses, falling pitch - For: running indication

Medium- Four pulses, rising pitch, repeated at 30s intervals -

For: Occlusion

High- (through faster, louder, at higher pitch and with more rapid onset) with two additional 'attention' pulses appended, repeated at 15 s intervals. For Bubble detection.

An alarm may be triggered due to one or more hazards, including, but not limited to:

- Occlusion (supply side and patient side)
- Air-in-line
- Free flow / Improper flow of fluid
- Low or Empty reservoir
- No reservoir
- ROM / RAM CRC test failure
- Pump mechanism failure
- Watchdog alarm – issued when the watchdog timer expires
- Infusion set not loaded properly

## Future Expansions

Future expansions to this device include a LPSN technologies which restrict access to the device. Medical staff that is wearing a tag that corresponds to the sensor code within the device will be able to unlock the system and make appropriate modifications.