TekMedika

$$Q \propto \sqrt{\frac{(P_{G1}-P_{G2})}{(P_{G1}+P_{G2})+2*Patmosphere}}$$

An important and necessary simplification is that P_{G1} and P_{G2} encountered in our system are of the order of tens of cmH_2O while *Patmosphere* is of the order of a thousand cmH_2O of pressure. At sea level, *Patmosphere* is approximately 1000 cmH_2O. Even at an altitude of 15,000 feet *Patmosphere* is approximately 600 cmH_2O. On the other hand, the P_{G1} and P_{G2} pressures range from 1 cmH_2O to 60 cmH_2O.

Thus the $(P_{G1} + P_{G2})$ term is negligible compared to (2* *Patmosphere*) even more so since it is preceded by a square root. The flow equation can be simplified to the one below.

$$Q \propto \sqrt{\frac{(P_{G1}-P_{G2})}{Patmosphere}}$$

Recalling *Equation 2* from the theory section above, this equation can be recast as below given that the orifice characteristics and pressure specifications are the same for every system.

$$Q = C * \frac{\sqrt{(P_{G1}-P_{G2})}}{\sqrt{(Patmosphere)}}$$ where $C = f(Re)$ Reynold's number

At a given geographical location, *Patmosphere* is also a constant. So, the above equation further reduces to the below.

$$Q = \left(\frac{C}{\sqrt{Patmoshpere}}\right) * \sqrt{(P_{G1}-P_{G2})}$$

The equation needs further simplification to ease the computation burden of the square root computation for and inexpensive micro-controller. The constraints are as below.

A Simplified Emergency Respiration Assist Device

INSPIRE-100

Salient Features

Emergency Adult Respiratory Support	*Support from Initiation to Weaning*	*No Need for Compressed air*	*Connect to O_2 Cylinder or Concentrator*
Full range of Respiration Parameters	*Breath Synchronization Patient Comfort*	*Elaborate Remote Monitoring*	*Single Limb Breathing Circuit*
Compatible with Standard Accessories	*Easy-to-use Easy-to-train Rugged & Robust*	*Power Consumption 100W*	*Eminently Budget Friendly*

Breathing System Components

Technical Specifications

Commonly used Ventilation Modes

CMV	Continuous Mandatory Ventilation
ACV	Synchronized Assist Control Ventilation
SIMV	Synchronized Intermittent Mandatory Ventilation
PSV	Pressure Support Ventilation

Full Set of Alarm Alerts

Max Pressure	Pressure Leak	Pressure Loss
Airway Blockage	System Temperature	Coughing Hiccupping
Inconsistent Parameters	Extreme Parameter Combination	And many more …

Volume Controlled Breaths

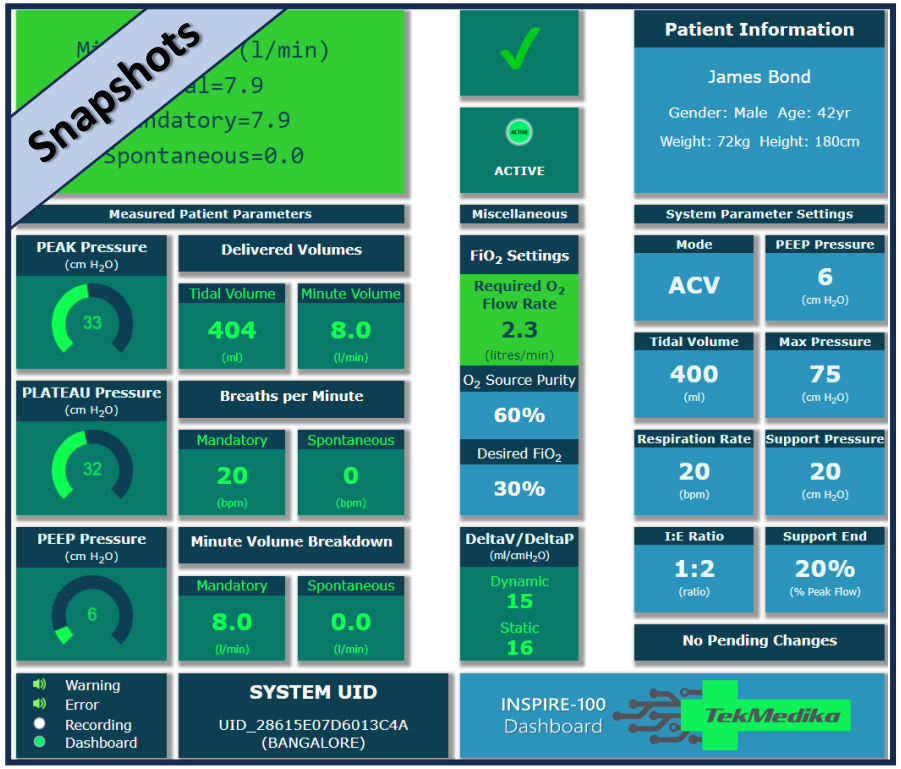
Tidal Volume **200 to 600 ml**	***Respiratory Rate*** **10 to 30 bpm**	***I:E Ratio*** **1:1 1:2 1:3**
PEEP **4 to 15 cmH_2O**	***Max Pressure*** **15 to 60 cmH_2O**	***FiO_2 Support*** **System Managed** **Externally Controlled**

Pressure Supported Breaths

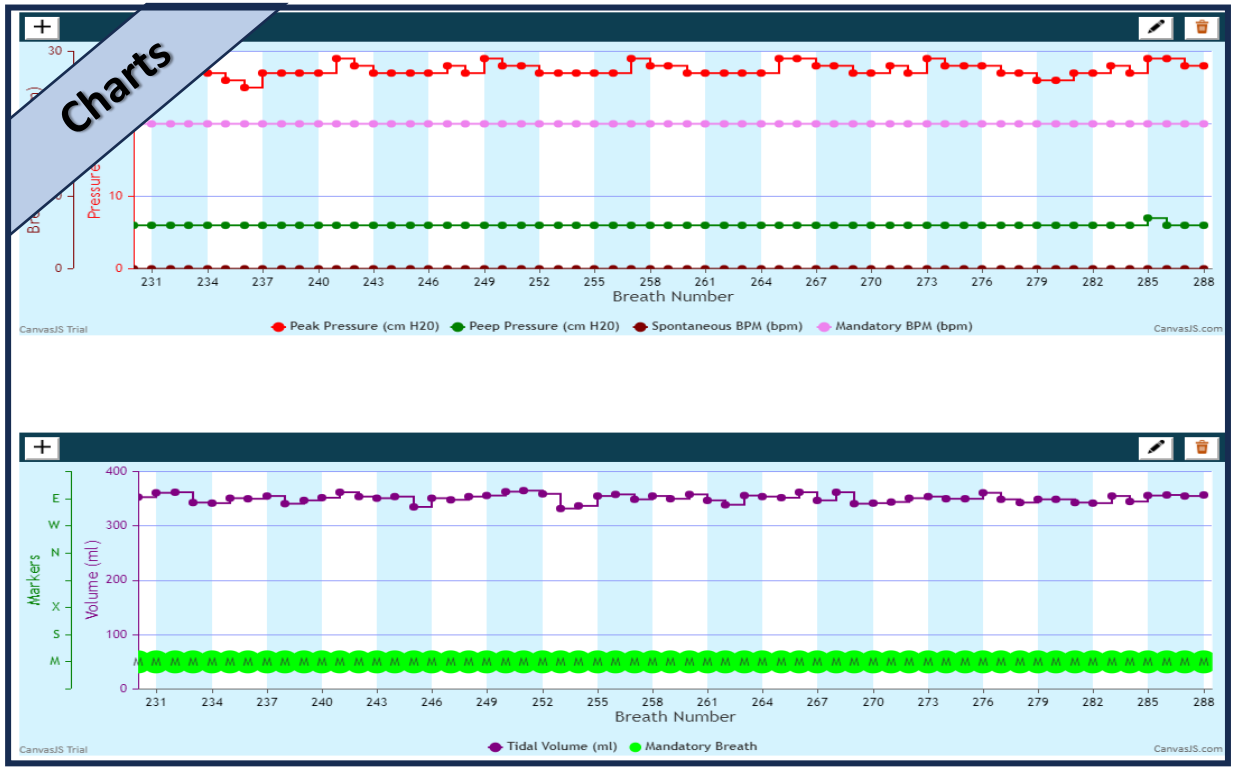
Support Pressure	5 cmH_2O to 35 cmH_2O
Support Pressure Termination	Flow Triggered Time Triggered

Elaborate Remote Monitoring

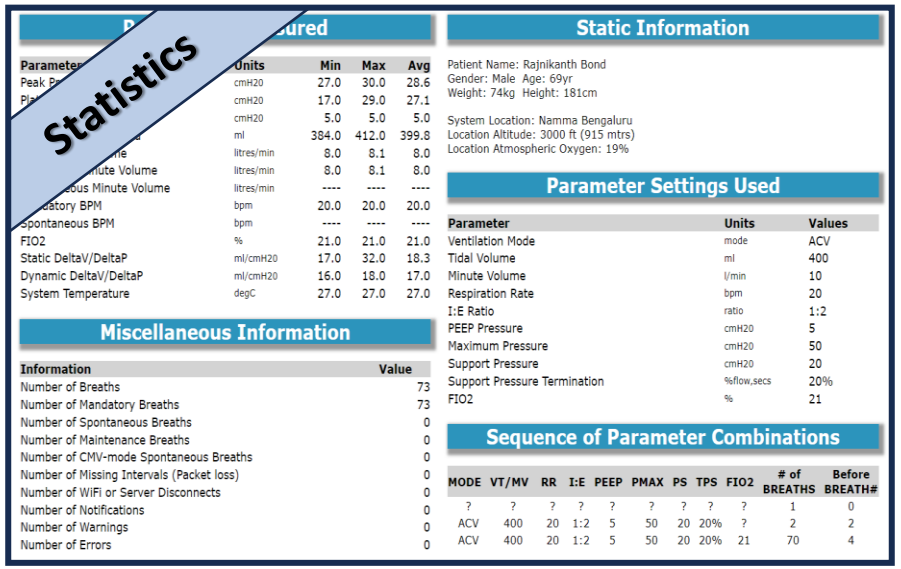
Snapshots



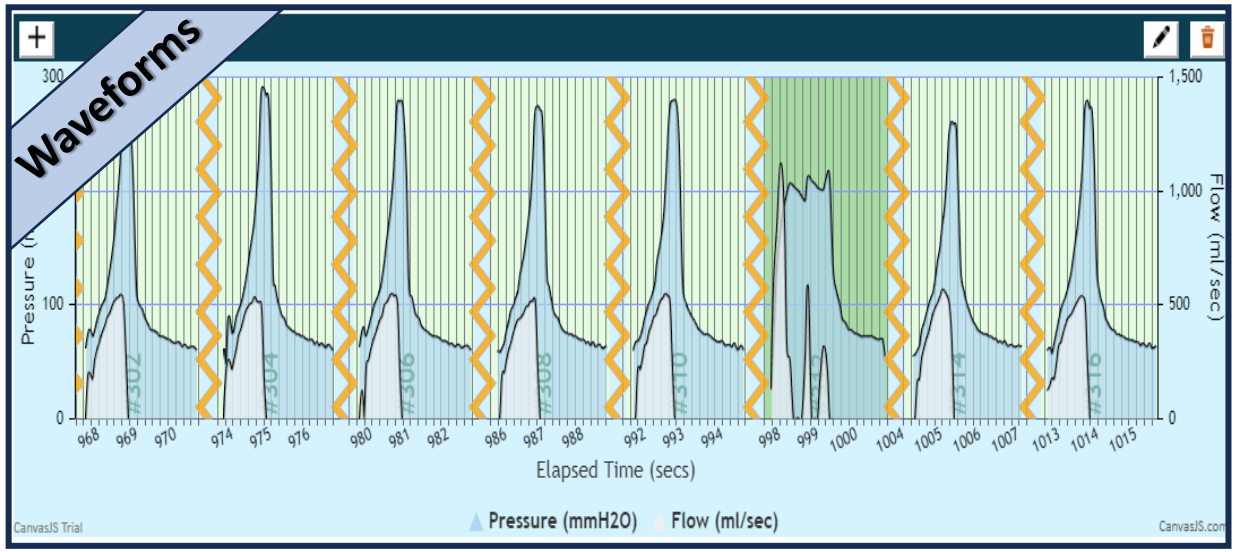
Charts



Statistics

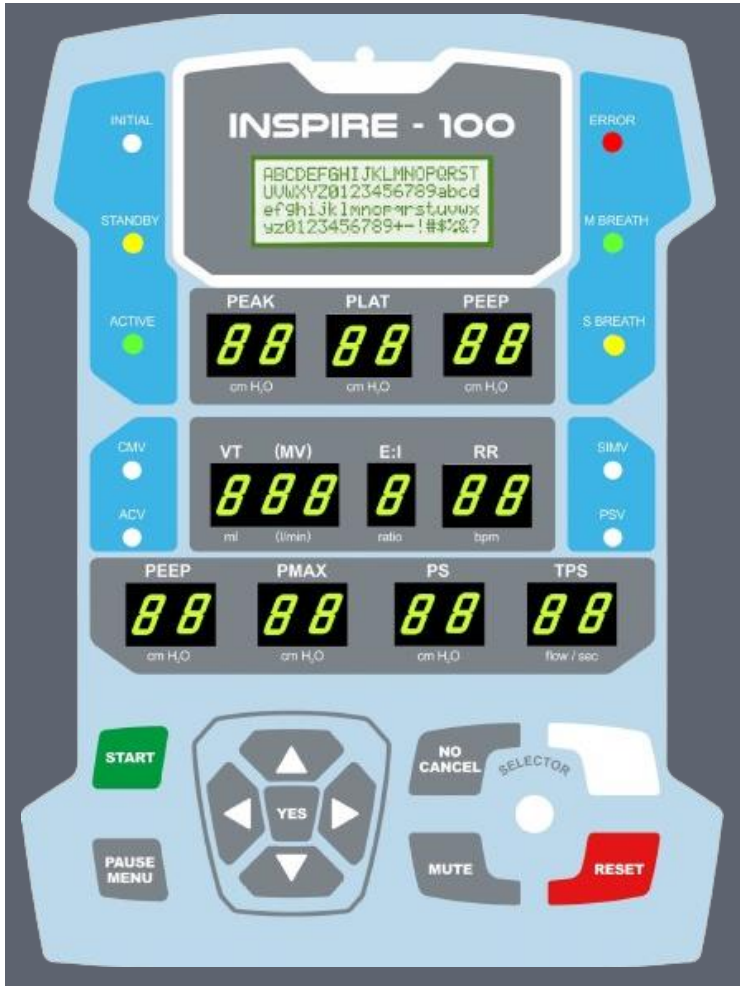


Waveforms

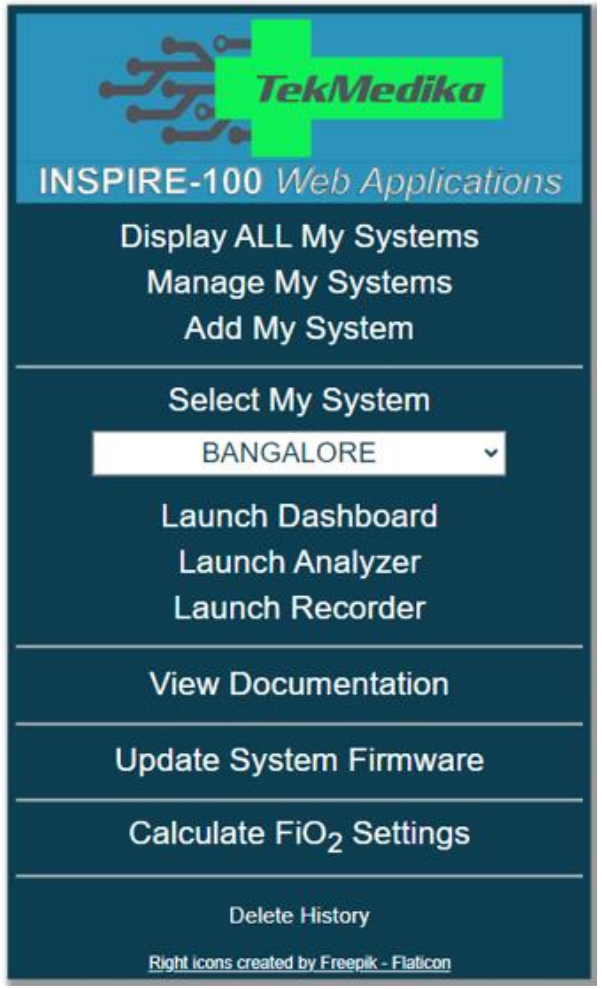


Elegance in Simplicity

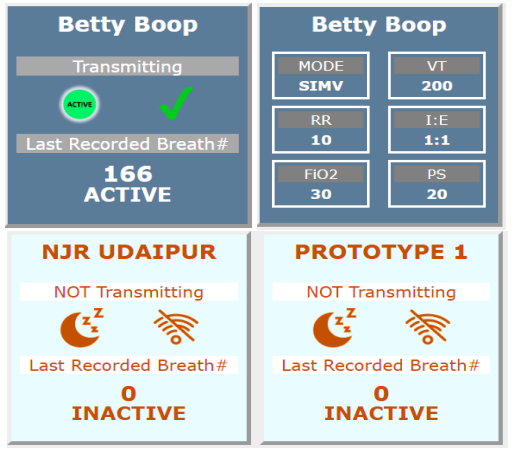
Menu-driven, Tactile, Intuitive, Easy-to-read Control Panel



Live Dashboard Recording, Analyzer



Live Dashboard for Nurses' Station



Field Upgradeable