Dräger V500 Ventilator

Overview of Modes and Features for NICU Nurses

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Objectives

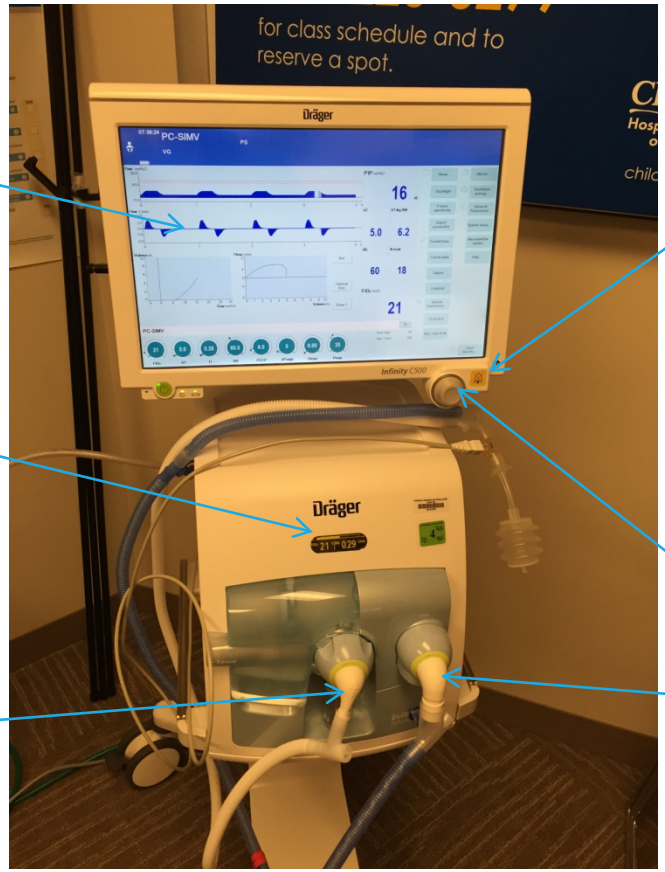
- Discuss the modes of the Dräger V500 that will be used in the NICU
- Display screen shots of each mode
- Display screen shots of different alarms
- Identify differences between the Dräger and the Avea
- Identify differences between pressure ventilation and volume ventilation

Dräger V500

Touch Screen Monitor

FiO_2 Analyzer and Measured Ve

Expiratory Limb



Alarm Silence

Control Knob

Inspiratory Limb

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Dräger V500

Flow Sensor

FiO_2 Analyzer and Measured Ve

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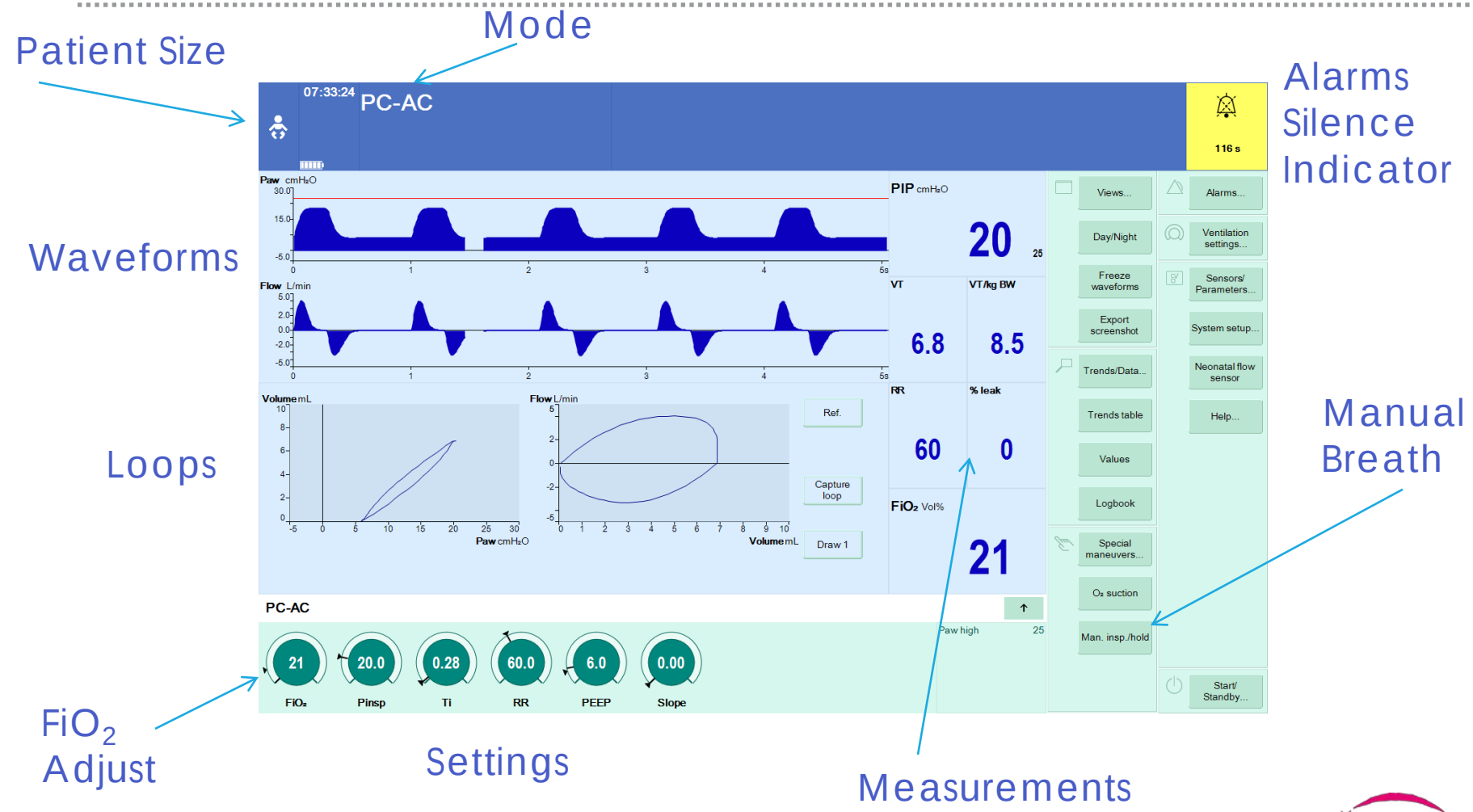
Screen Overview



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Pressure Control-Assist Control

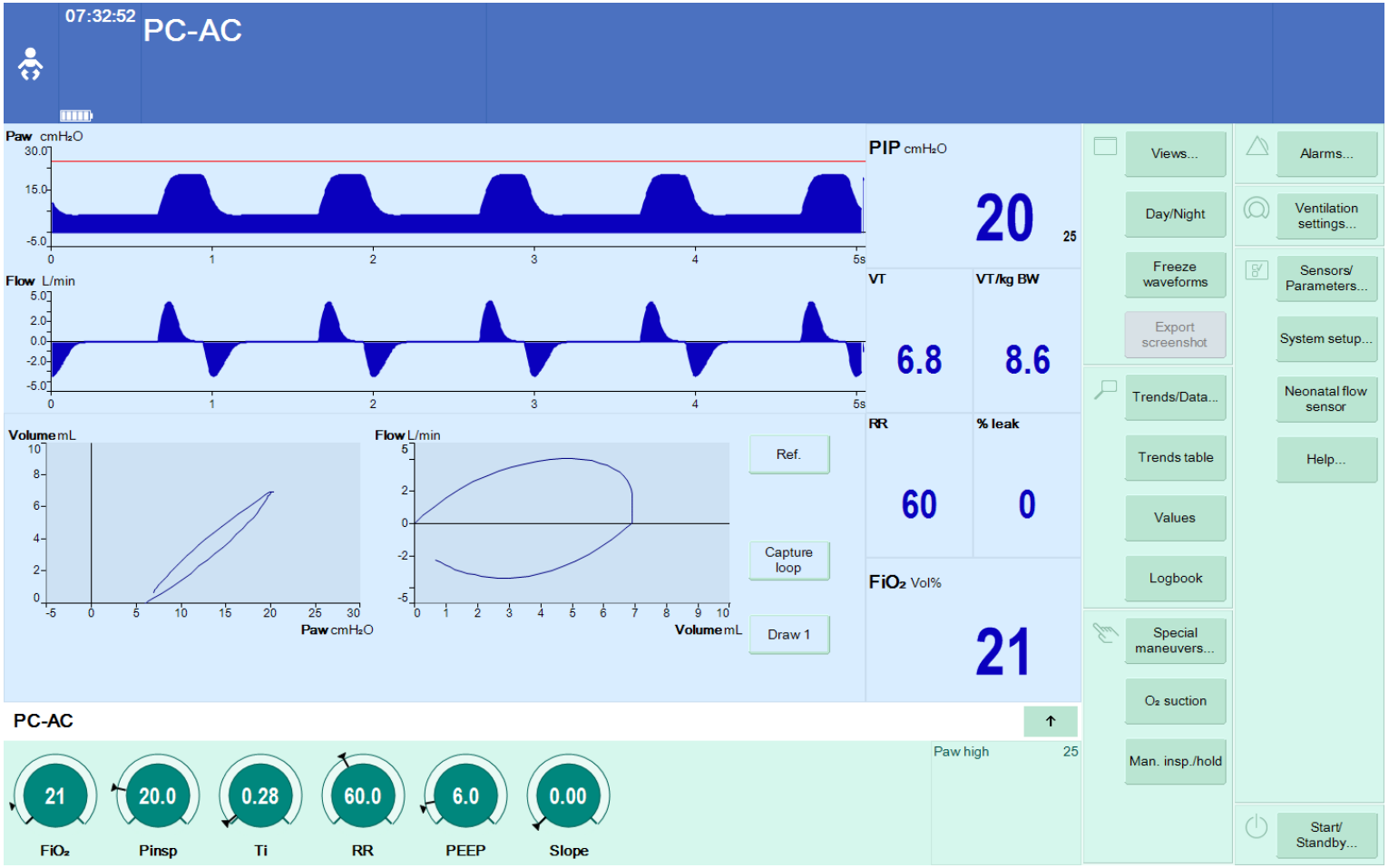
Settings

- **Pinsp (PIP)**
- **PEEP**
- **Rate**
- **Inspiratory Time**
- **Trigger**
  - Baby can trigger the ventilator to get a breath.
  - When baby triggers the ventilator it will give a breath at the **set PIP and set I-Time**
- **Alarms**
- **FiO_2**

Measurements

- **Inhaled Tidal Volume**
- **Exhaled Tidal Volume**
- **mL/kg Tidal Volume**
- **Minute Ventilation**
- **Pmean**
- **% Leak**
- **C20/C**

Pressure Control-Assist Control



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Pressure Control-SIMV

Settings

- **Pinsp(PIP)**
- **PEEP**
- **Rate**
- **Inspiratory Time**
- **Trigger**
- **Pressure Support**
  - When patient triggers a breath above the set rate, the ventilator will deliver the breath at the set pressure support level.
- **FiO_2**

Measurements

- **Inhaled Tidal Volume**
- **Exhaled Tidal Volume**
- **mL/kg Tidal Volume**
- **Minute Ventilation**
- **Pmean**
- **% Leak**
- **C20/C**

Pressure Control-SIMV

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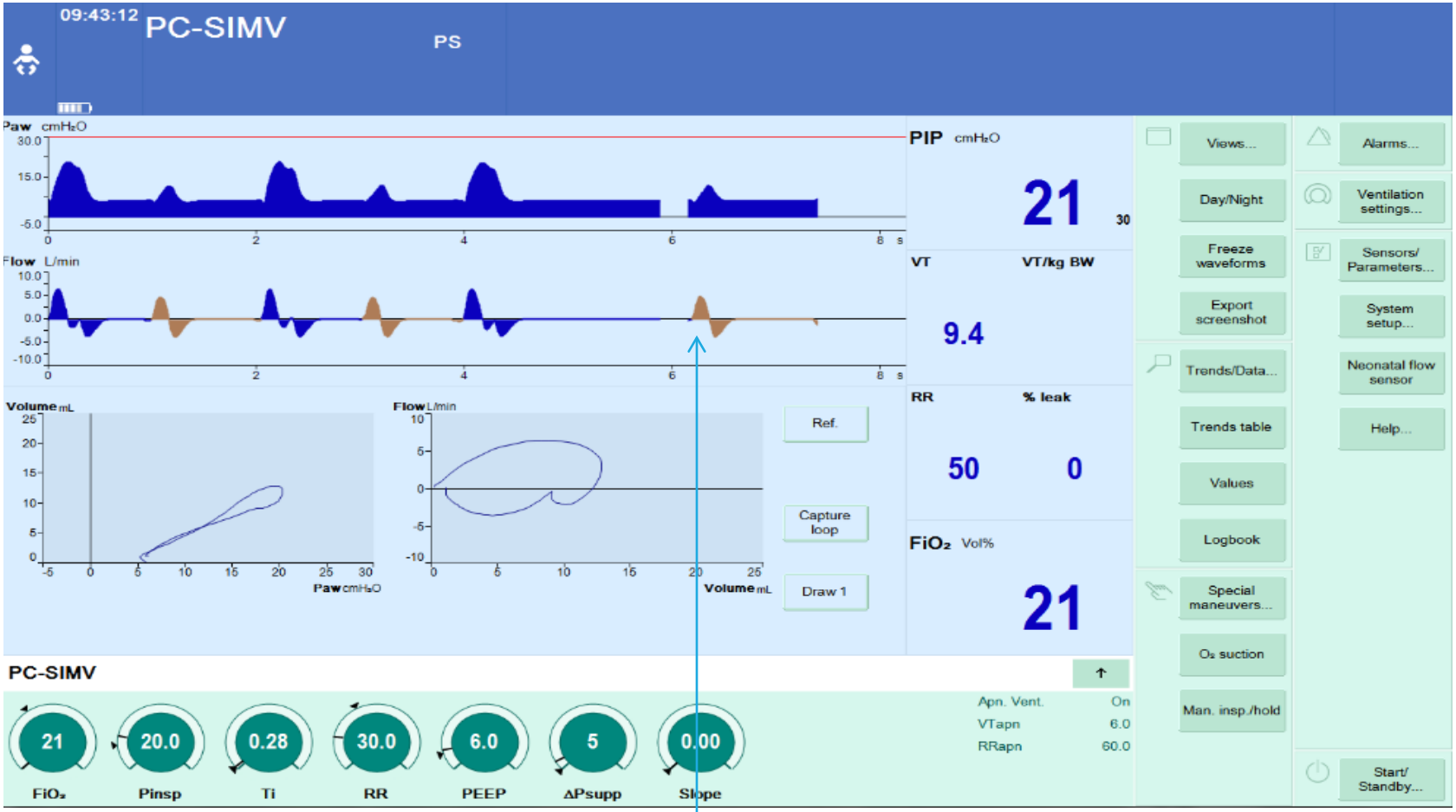
Pressure Control-SIMV



Brown colored waveform indicates a spontaneous breath

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Volume Guarantee-Assist Control

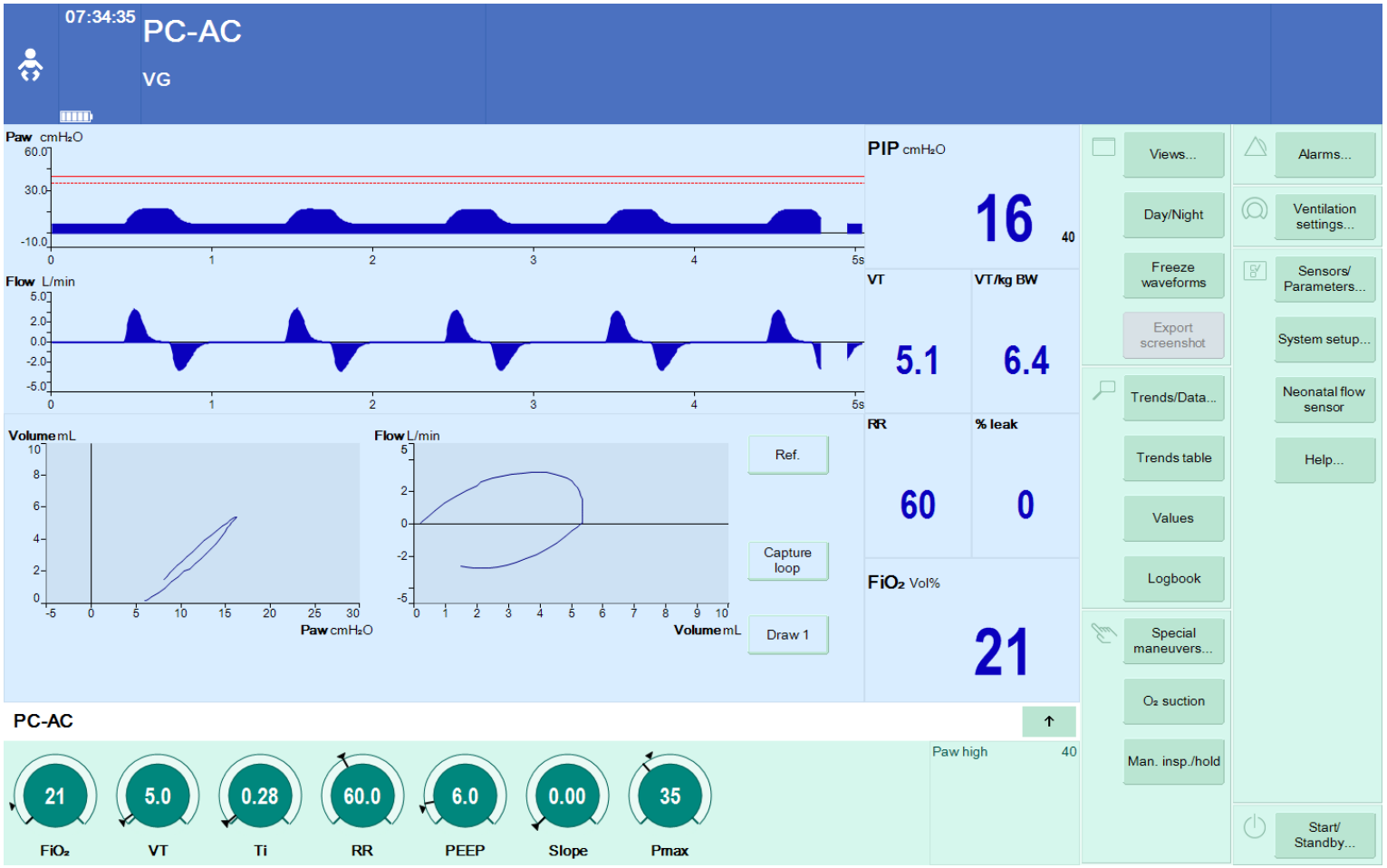
Settings

- **Tidal Volume**
- **PEEP**
- **Rate**
- **Inspiratory Time**
- **Trigger**
- **Pmax**
  - Maximum pressure the ventilator will use to deliver the set volume
- **FiO_2**

Measurements

- **PIP**
- **Inhaled Tidal Volume**
- **Exhaled Tidal Volume**
- **mL/kg Tidal Volume**
- **Minute Ventilation**
- **Pmean**
- **% Leak**
- **C20/C**

Volume Guarantee-Assist Control



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Volume Guarantee-SIMV

Settings

- **Tidal Volume**
- **PEEP**
- **Rate**
- **Inspiratory Time**
- **Trigger**
- **Pmax**
  - Maximum pressure the ventilator will use to deliver the set volume
- **Pressure Support (Delta P)**
  - When patient triggers a breath above the set rate, the ventilator will deliver the breath at the set pressure support level.
- **FiO_2**

Measurements

- **PIP**
- **Inhaled Tidal Volume**
- **Exhaled Tidal Volume**
- **mL/kg Tidal Volume**
- **Minute Ventilation**
- **Pmean**
- **% Leak**
- **C20/C**

Volume Guarantee-SIMV

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Nasal CPAP

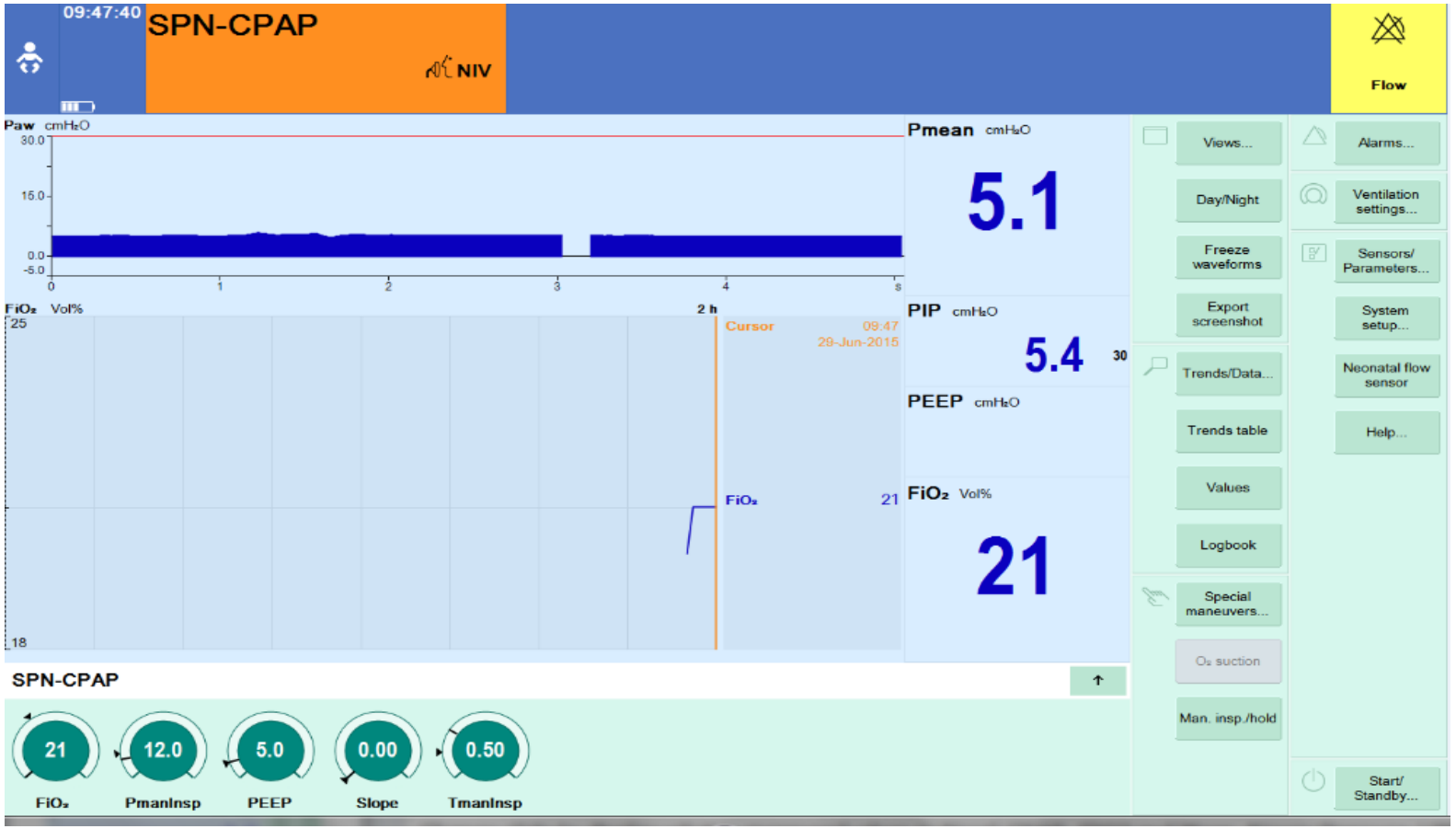
Settings

- **PEEP (CPAP Level)**
- **FiO_2**
- **PmanInsp**
  - Pressure delivered when manual breath is pressed
- **TmanInsp**
  - Inspiratory time to deliver manual breath

Interfaces

- **Flexi-Trunk**
- **RAM Cannula**

Nasal CPAP



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Nasal IMV

Settings

- **Pinsp (PIP)**
- **PEEP**
- **Rate**
- **Inspiratory Time**
- **FiO_2**

***This is a NON-SYNCHRONIZED mode. (Baby Cannot trigger a breath)**

Interfaces

- **Flexi-Trunk**
- **RAM Cannula**

Nasal IMV

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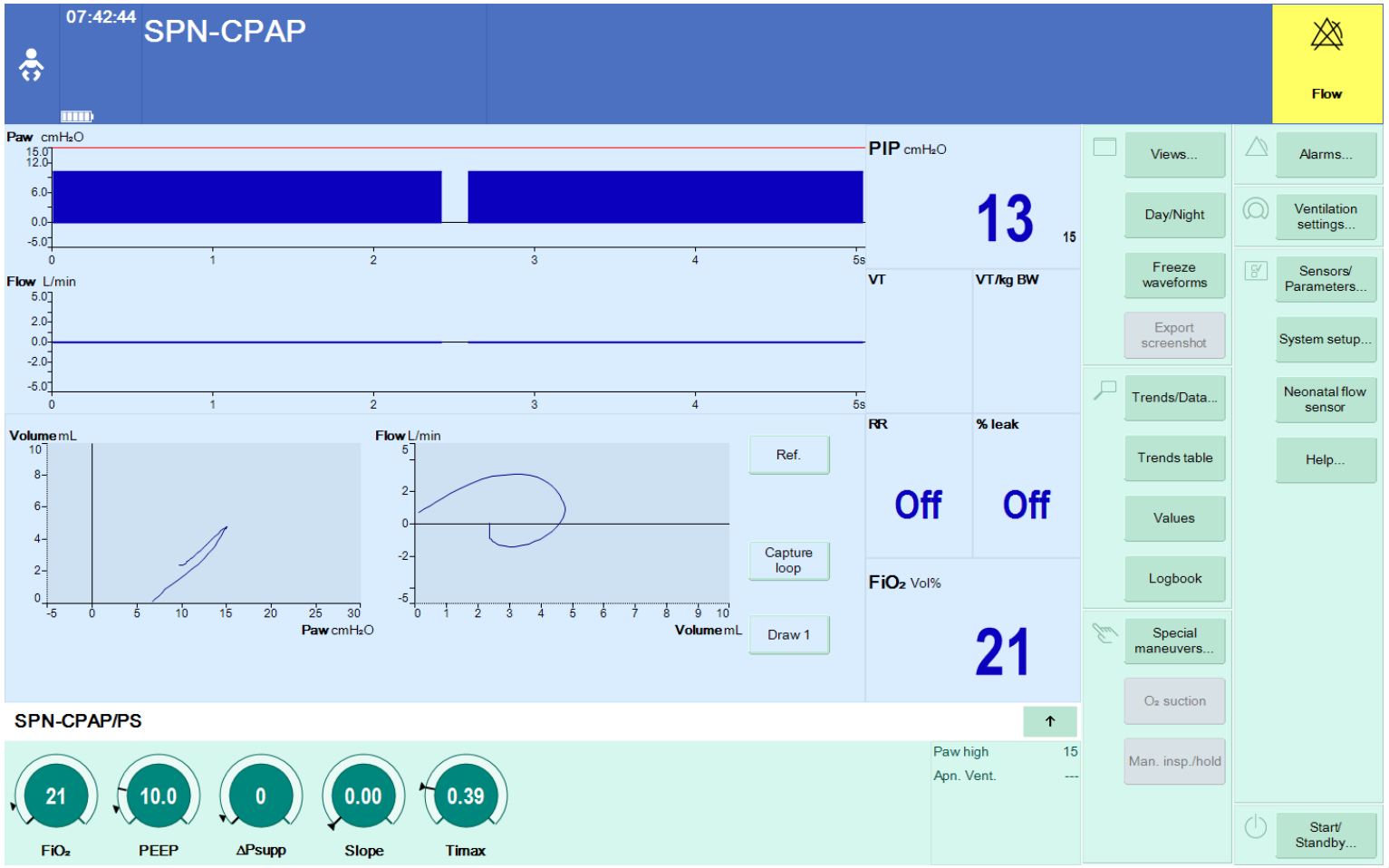
HFJV Screen Shot



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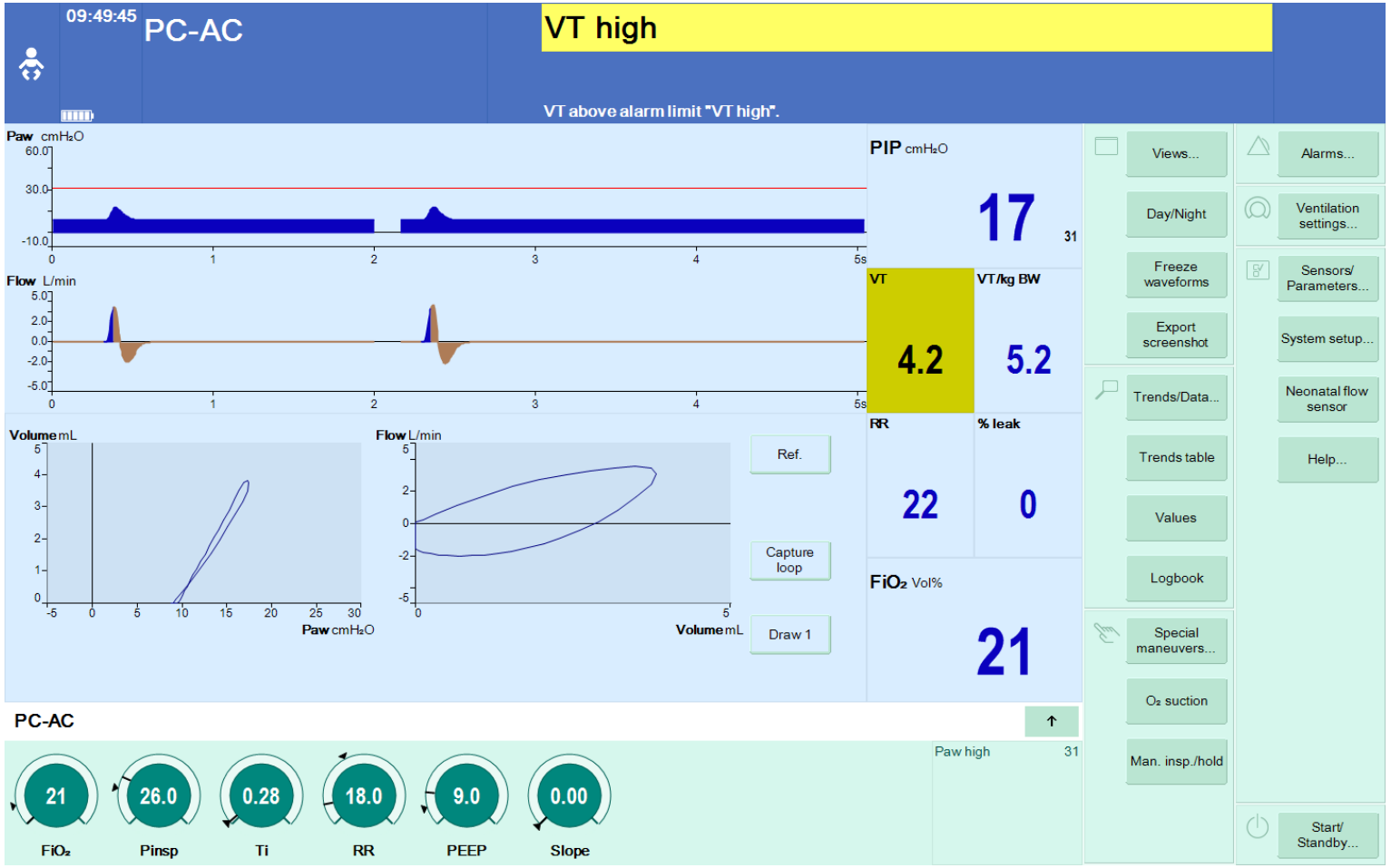
High Tidal Volume
Medium Priority Alarm



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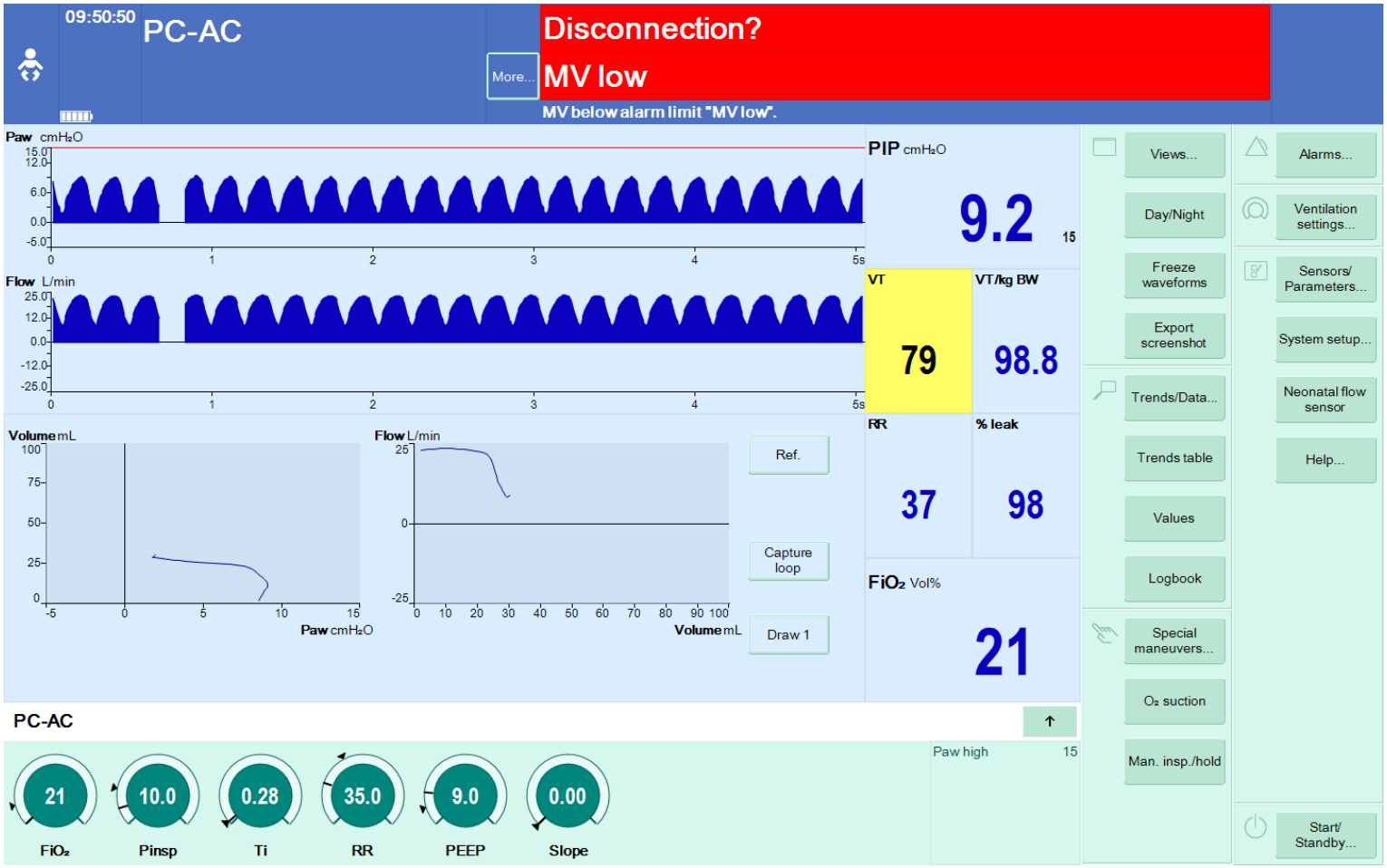
Circuit Disconnect High Priority Alarm



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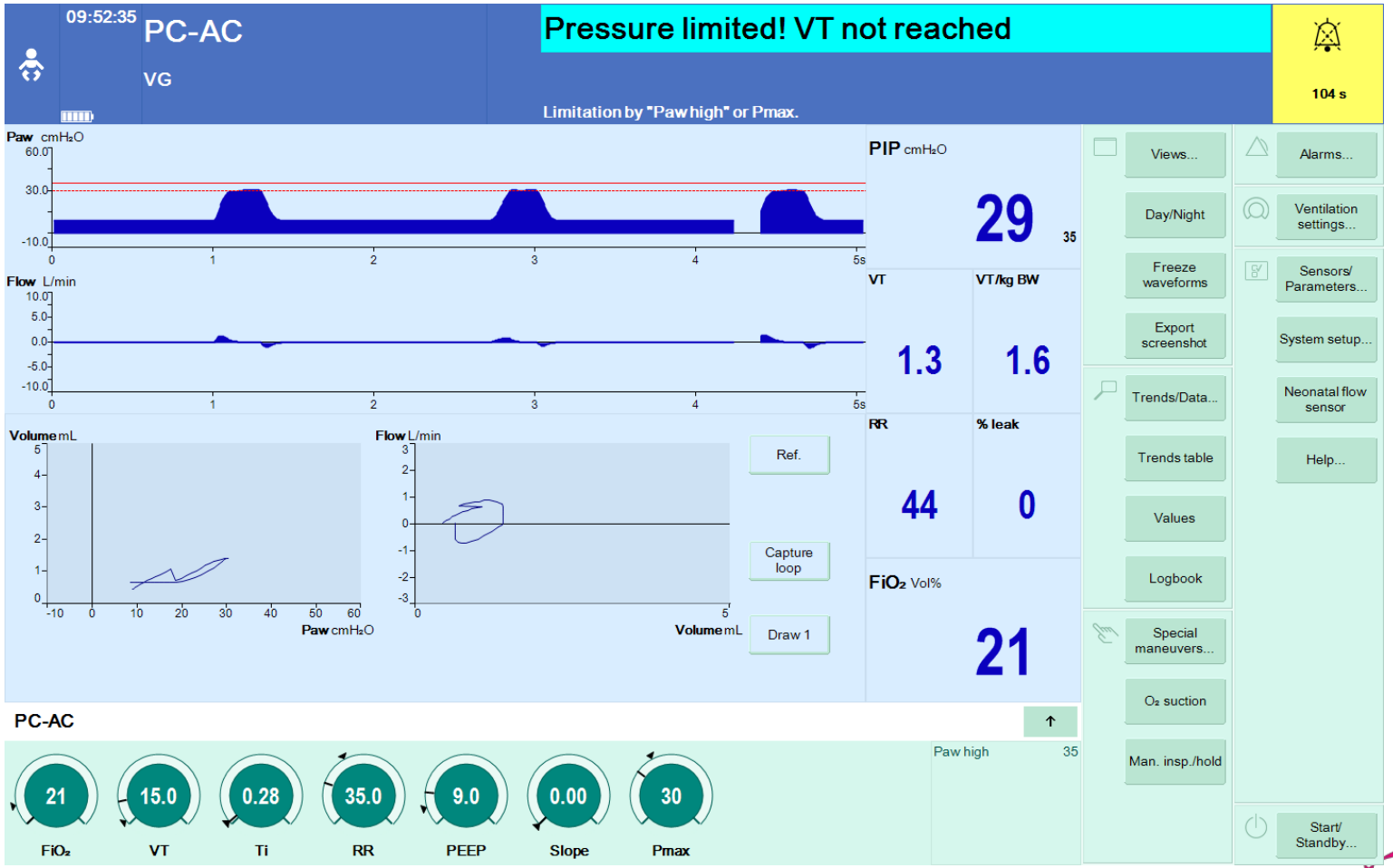
Pressure Limit Alarm while in Volume Guarantee



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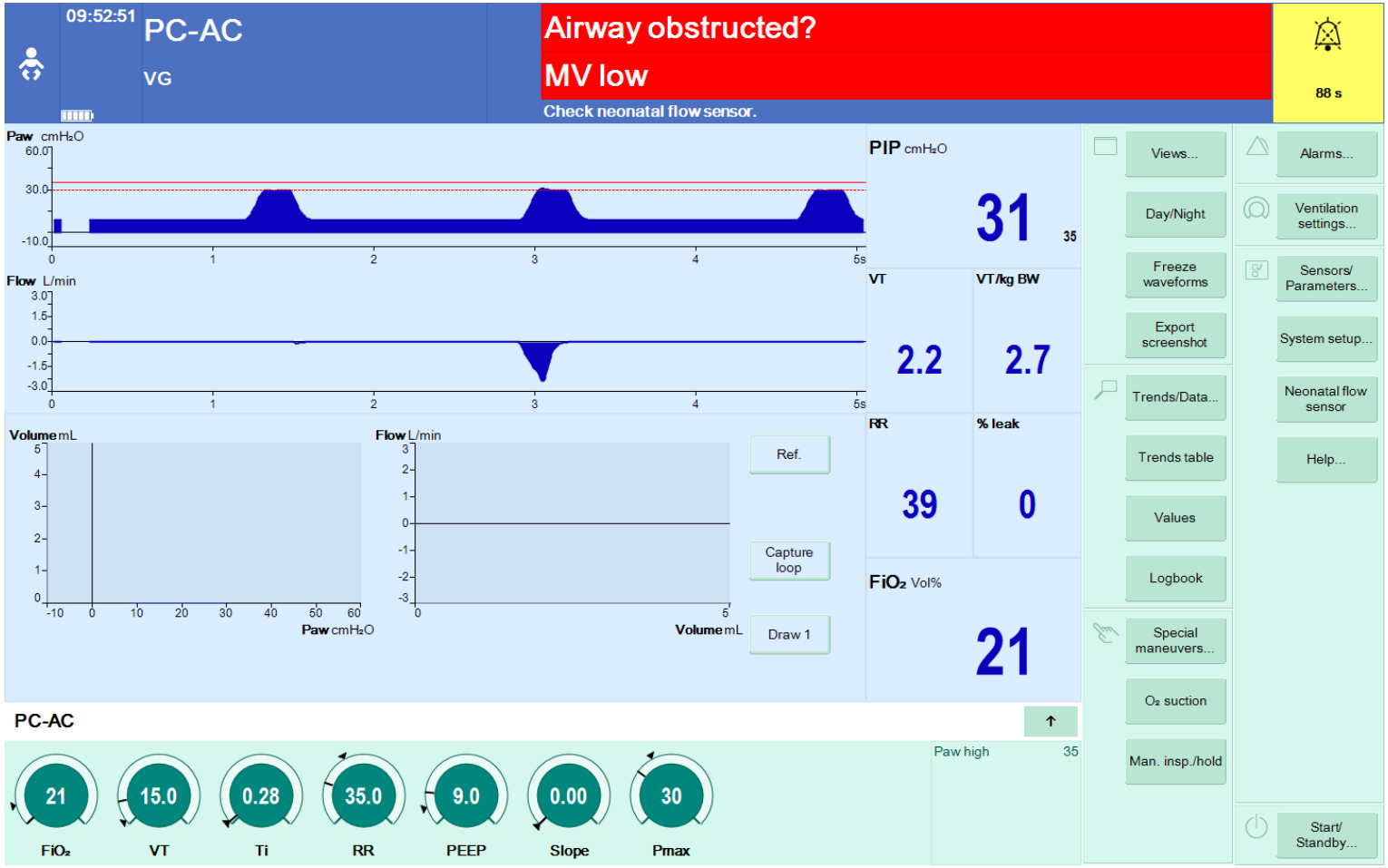
Airway Obstruction Alarm



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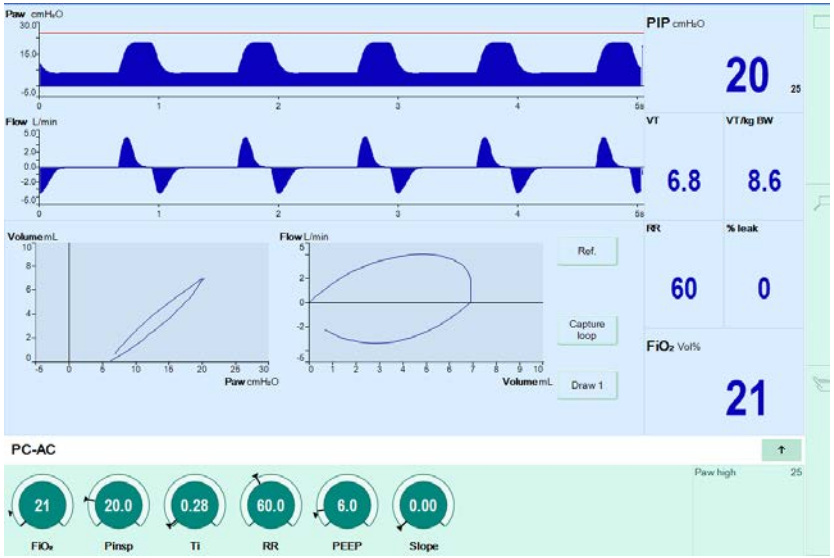
Differences in Increase O_2 or O_2 Suction

- **Increase O_2 Function**
  - Avea: FiO_2 increases by 10%
    - Increase FiO_2 Button
  - Dräger: FiO_2 increases by 1.3 times the set FiO_2
    - Example 1: Set FiO_2 is 25%. O_2 Suction is activated, FiO_2 will increase to 33%
    - Example 2: Set FiO_2 is 60%. O_2 Suction is activated, FiO_2 will increase to 78%.
    - O_2 Suction Button
      - Push O_2 Suction on screen
      - Confirm by pushing control knob
    - 180 seconds of oxygen increase

Differences in Set PIP

- **Avea:**
  - Total PIP = Insp pressure + PEEP
- **Dräger:**
  - Total PIP = Pinsp



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Differences in Manual Breath Function

- **Avea:**
  - Manual breath function delivers set pressure/volume and I time
- **Dräger:**
  - Man Insp/hold function
    - Pressing and releasing will deliver set pressure and set I time.
    - Pressing and holding will deliver sustained inflation

Differences in Manual Breath Function

- **Avea:**
  - Manual breath function delivers set pressure/volume and I time
- **Dräger:**
  - Man Insp/hold function
    - In PC will deliver set pressure and set I time.
      - Function can deliver prolonged I time if desired
    - In VG will deliver breath at the set Pmax level
      - This could result in a larger tidal volume than what is currently set.

What is Pressure Ventilation?

- **Pressure ventilation or PC is a mode in which the ventilator will deliver a set pressure**
  - Tidal volume will vary depending on the patient's compliance and resistance
- **Tidal volume will increase:**
  - Improved lung compliance
  - Decreased resistance
- **Tidal volume will decrease:**
  - Decreased lung compliance
  - Increased resistance
  - Air leak
  - Pneumothorax

What is Volume Guarantee?

- **Volume ventilation is a mode in which the ventilator will deliver a set volume**
  - Peak inspiratory pressures will vary depending on patient's compliance and resistance
  - Peak inspiratory pressures can be limited for safety
- **Peak inspiratory pressure will increase:**
  - Decreased compliance
    - Surfactant deficiency
    - Inflammation/immaturity
  - Increased resistance
    - Secretions
    - Kinked ET tube
    - Pneumothorax
- **Peak inspiratory pressure will decrease:**
  - Increased compliance
    - Surfactant administration
  - Decreased resistance
    - ET tube suctioned and secretions removed
    - Bronchodilator given

Compliance

Increased

- **Causes**
  - Surfactant administration
  - Decreased inflammation
  - Increased lung maturity
- **Pressure Control**
  - Increased Tidal Volume
- **Volume Guarantee**
  - Decreased PIP

Decreased

- **Causes**
  - Surfactant deficiency
  - Inflammation
  - Structural immaturity
  - Infection
- **Pressure Control**
  - Decreased Tidal Volume
- **Volume Guarantee**
  - Increased PIP

Resistance

Increased

- **Causes**
  - Bronchospasm
  - Secretions
  - Kinked ETT
- **Pressure Control**
  - Decreased Tidal Volume
- **Volume Guarantee**
  - Increased PIP

Decreased

- **Causes**
  - Bronchodilator administration
  - Suctioning
  - Air leak
- **Pressure Control**
  - Increased Tidal Volume
- **Volume Guarantee**
  - Decreased PIP

Why is Volume Ventilation Preferred?

- **In Pressure Control ventilation, the patient's tidal volumes change depending on compliance and resistance.**
  - Because of this, the patient does not receive a consistent minute ventilation
    - Ve = Vt x Respiratory Rate
  - Excessive tidal volume (volutrauma) is a primary cause of lung injury
- **In Volume Guarantee, the volume is set and PIP will change depending on compliance and resistance.**
  - In this mode the patient receives a consistent minute ventilation, while being protected from harmful airway pressures and potential for excessive tidal volumes.

Why is consistent minute ventilation important?

- **Alveolar minute ventilation affects carbon dioxide removal and PaCO2.**
  - PaCO2=CO2 Production/Alveolar minute ventilation
- **Consistent minute ventilation can aid in keeping a normal acid/base balance.**
- **Severe hypocarbia or severe hypercarbia can cause rapid changes in cerebral blood flow**
- **Rapid changes in cerebral blood flow can cause:**
  - IVH
  - PVL

Questions?

- **Please contact Ryan Sura or Alicia Rummel with any questions or concerns that you may have.**

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