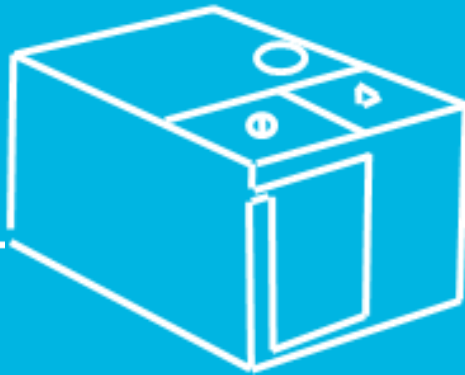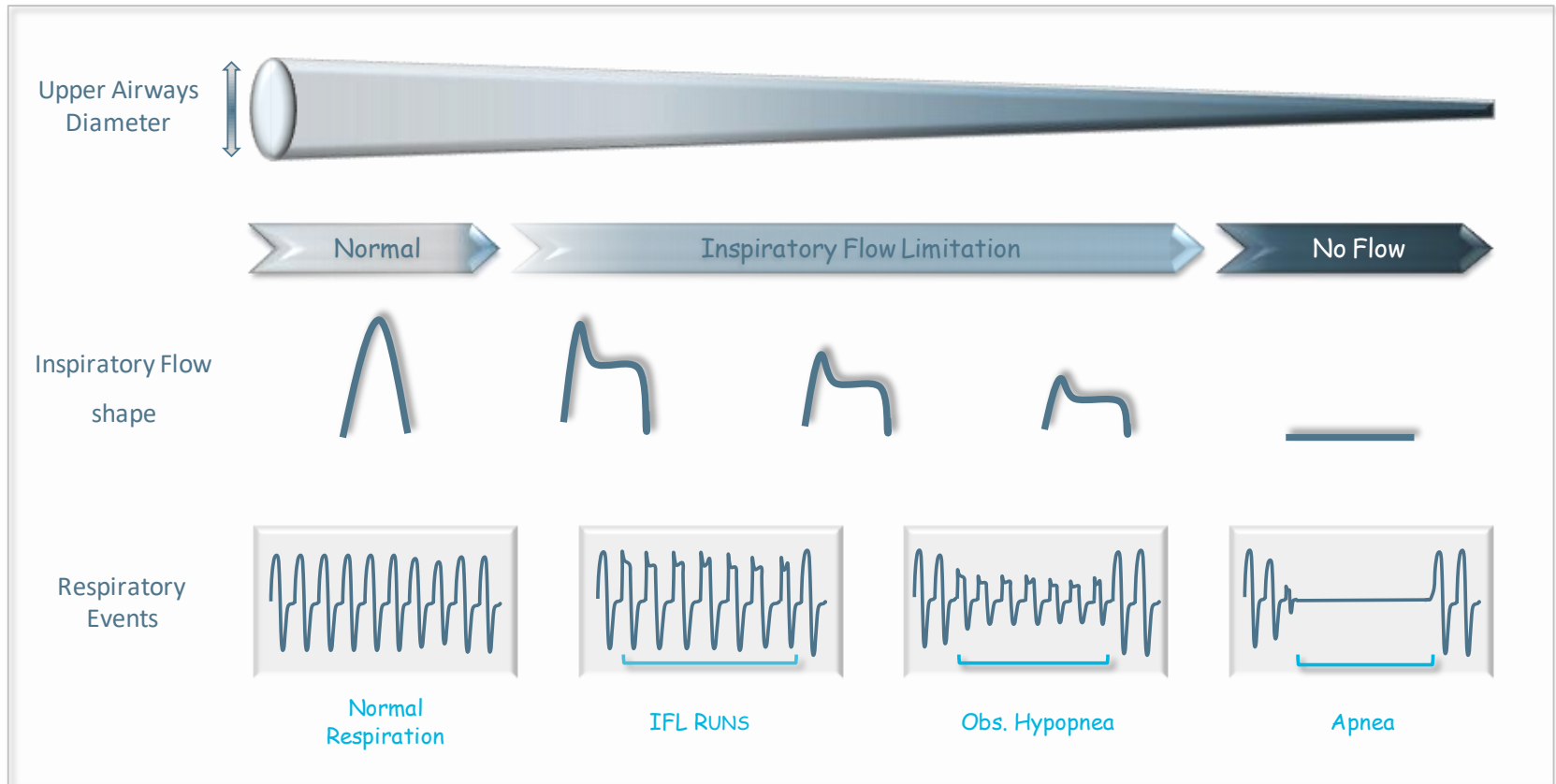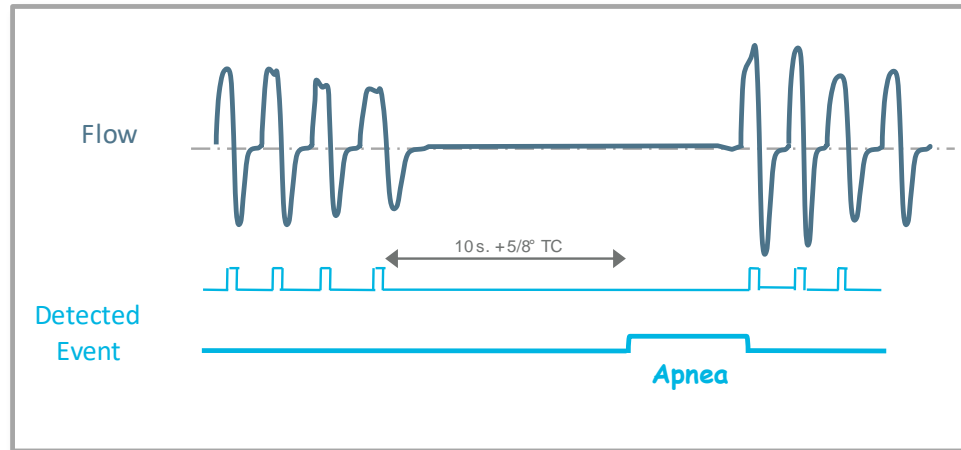# Sefam S.Box

BY

## STARCK®

Algorithm

Sefam

# S.Box auto-CPAP Algorithm

Apneas (Central / Obstructive)
Hypopneas (Central / Obstructive)
Runs of Inspiratory Flow Limitation
Snoring

Sefam

# S.Box Algorithm



| Upper Airways Diameter | | | | |
|---|---|---|---|---|
| | Normal | Inspiratory Flow Limitation | | No Flow |
| Inspiratory Flow shape | | | | |
| Respiratory Events | Normal Respiration | IFL RUNS | Obs. Hypopnea | Apnea |

**Sefam**

# S.Box Algorithm : Apnea



Apnea = No breath detection for at least 10 sec plus 5/8 of the average respiratory cycle duration

- Differentiation : Obstructive vs Central
  - 1- By Cardiac Oscillations detection during the apnea
  - 2- By analysis of the respiratory recovery at the end of apnea
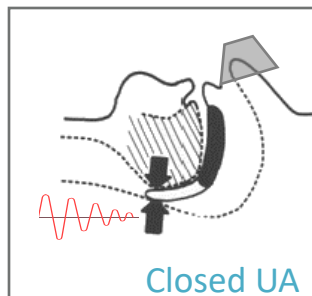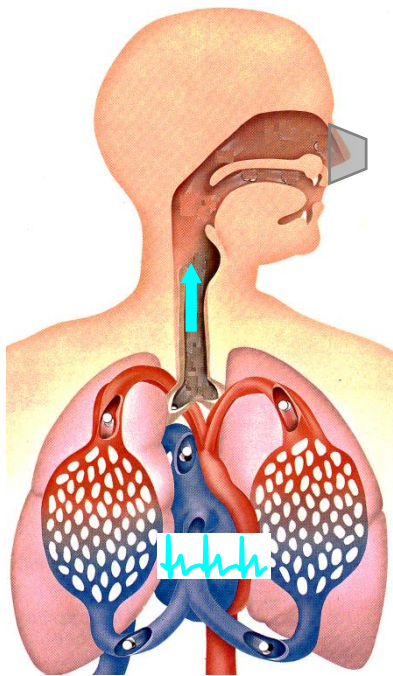
# Apnea classification & Cardiac Oscillations

Obstructive (Closed UA) vs Central apnea

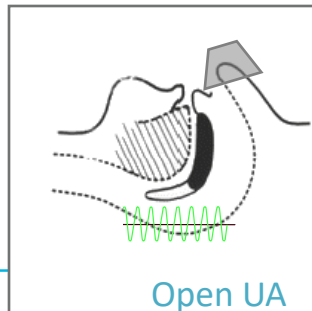- ***Cardiac Oscillations +*** = Open UA , classified as Central Apn.
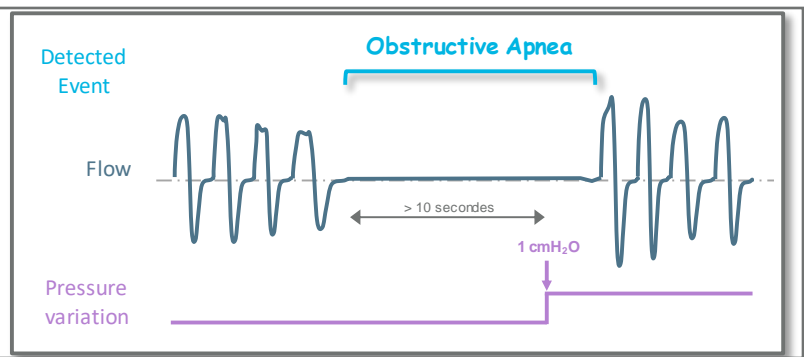
    $\Leftrightarrow$ No pressure increase

- ***Cardiac Oscillations -*** = Closed UA or non detected C.O., Classified as Obs. apnea
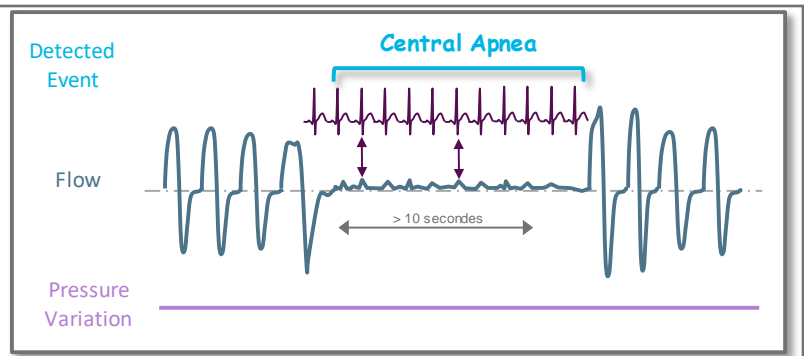
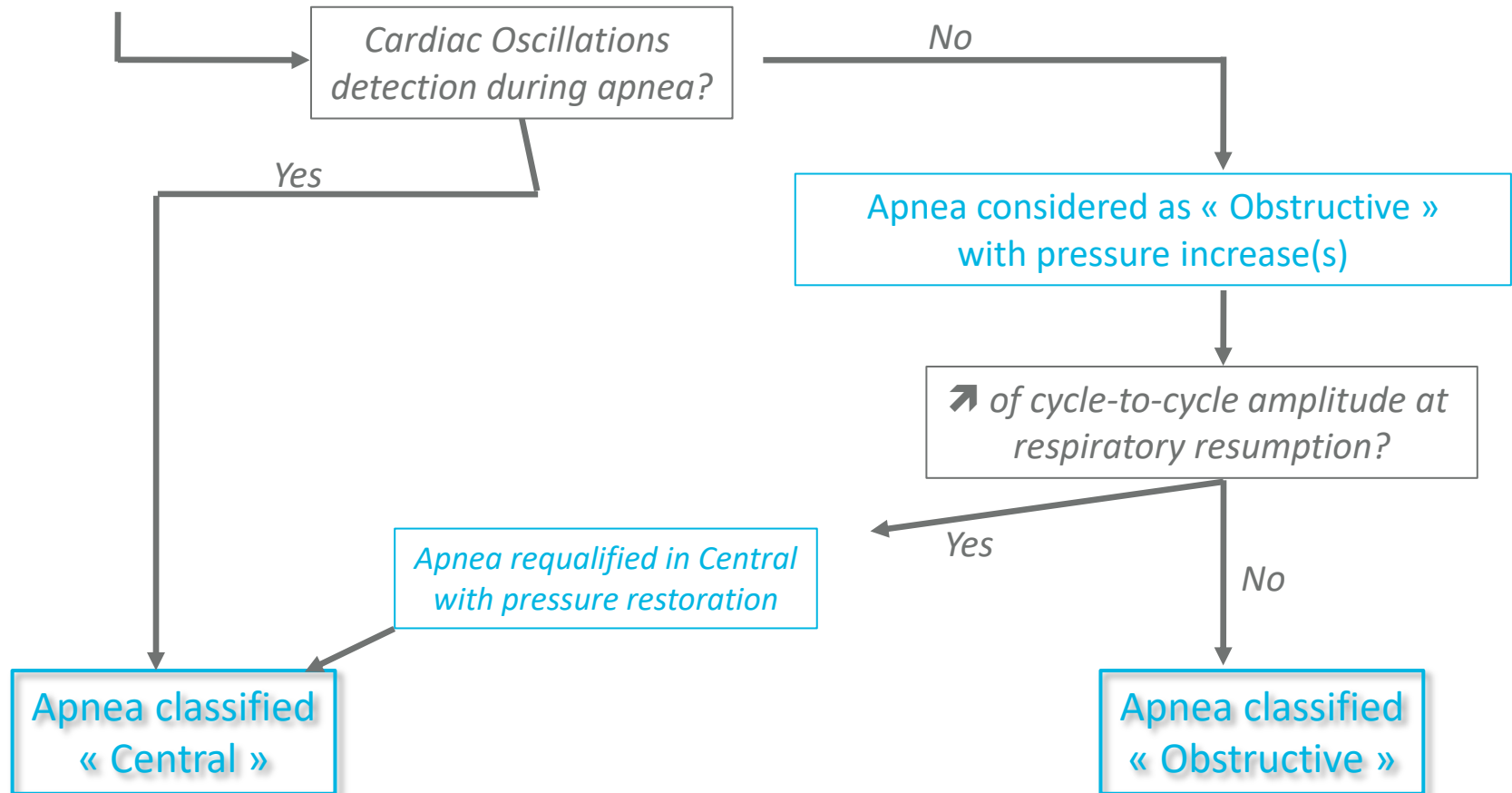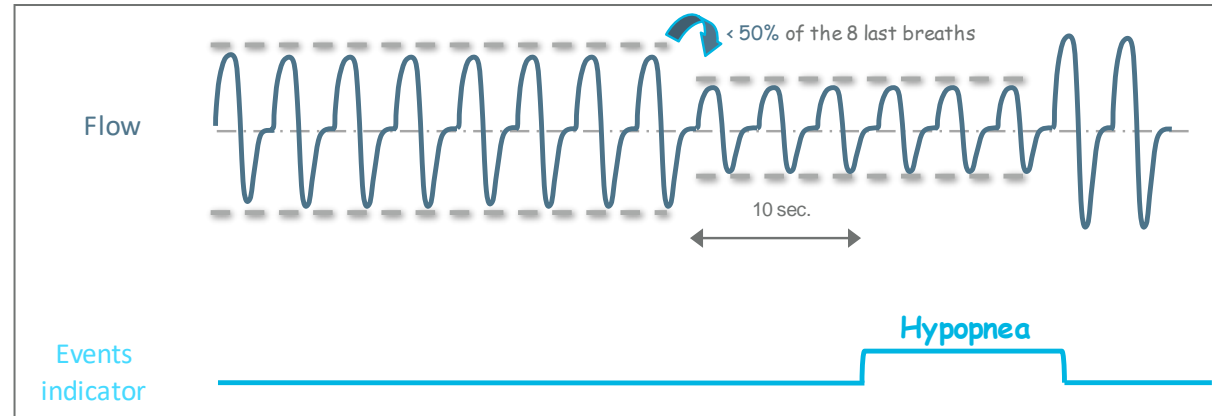    $\Leftrightarrow$ Pressure increases



Closed UA

**Obstructive Apnea**

Detected Event

Flow

> 10 secondes

1 cmH$_2$O

Pressure variation

Open UA

**Central Apnea**

Detected Event

Flow

> 10 secondes

Pressure Variation

# S.Box Algorithm : Synopsis & apneas

« APNEA »
Event detection

*Cardiac Oscillations detection during apnea?*

No → Apnea considered as « Obstructive » with pressure increase(s)

Yes

$\nearrow$ *of cycle-to-cycle amplitude at respiratory resumption?*

Yes

No

*Apnea requalified in Central with pressure restoration*

Apnea classified « Central »

Apnea classified « Obstructive »

Sefam

# S.Box Algorithm & Hypopnea
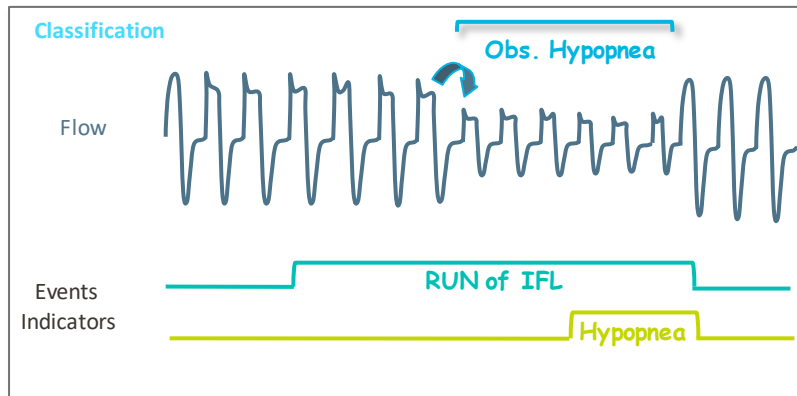
# S.Box Algorithm : Hypopnea



Hypopnea = peak-to-peak flow amplitude reduction by at least 50% from the average of the previous eight respiratory cycles over a period of complete cycles of at least 10 seconds.

- Differenciation : **Central vs obstructive** by the concomitant presence of
  - ➢ Snoring
  - ➢ and/or of Run of IFL
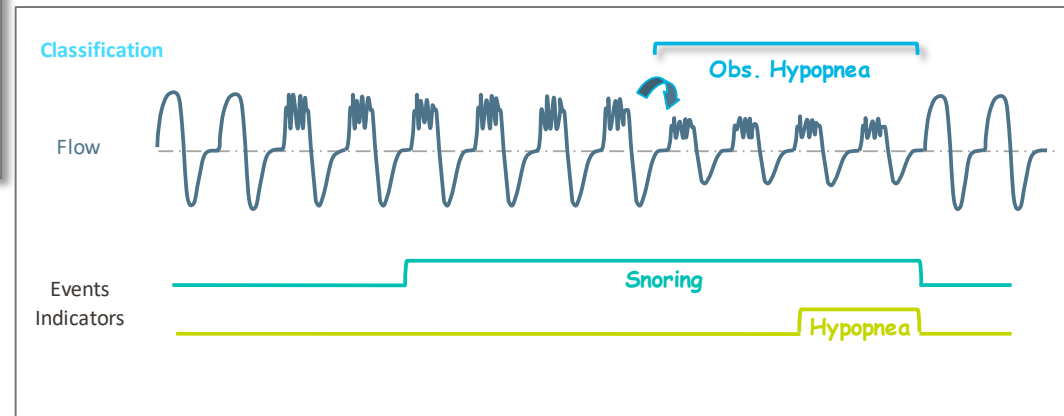
# S.Box Algorithm : Hypopnea

Hypopnea classification in Obstructive if Run of IFL or or snoring during the hypopnea
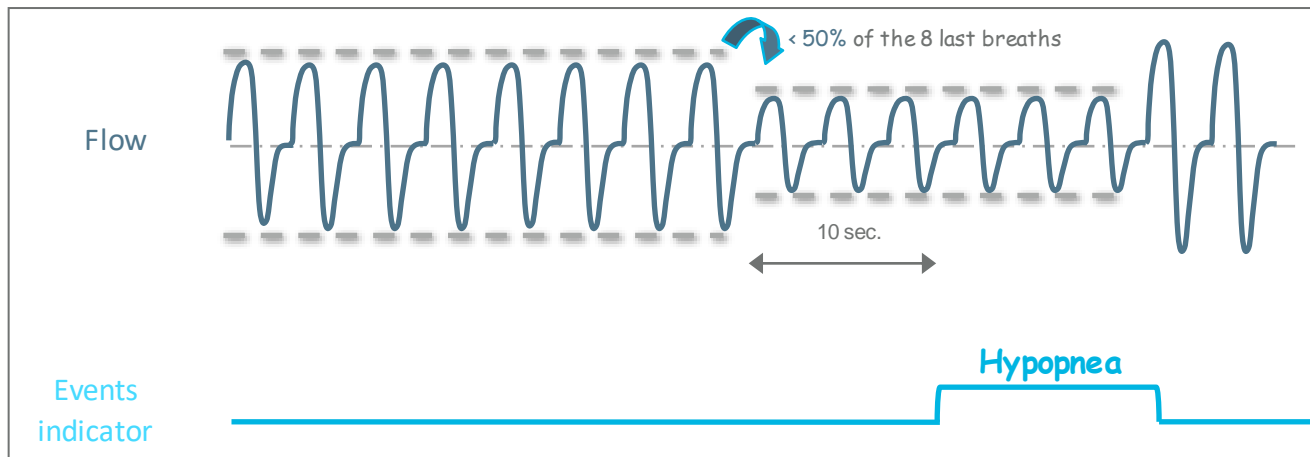
Occurrence of IFL

And/or



Occurrence of Snoring

# S.Box Algorithm : Hypopnea

## Central Hypopnea Classification

If NO run of IFL or Snoring during the hypopnea



2018 - CONFIDENTIEL

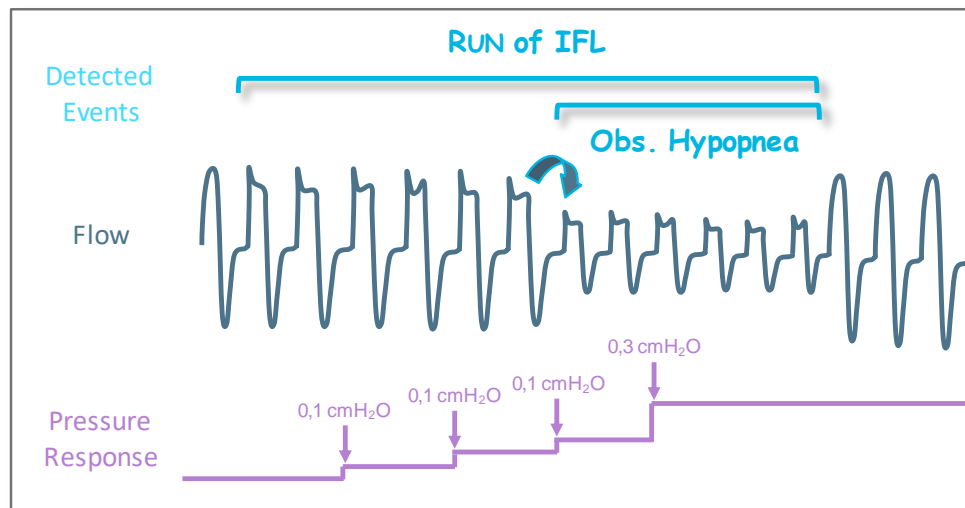# S.Box Algorithm & Inspiratory Flow Limitation

# S.Box Algorithm : reaction on Run of IFL

## Isolated Run without Flow amplitude decrease

- 0.1 cm/H2O pressure increase every 2 FL breath in RUN
- Up to 4 increases per RUN

## Run with at least 50% of Flow amplitude decrease : **Obstructive Hypopnea**

- 0.3 cm/H2O pressure increase every 2 FL breath in RUN
- Up to 4 increases per RUN
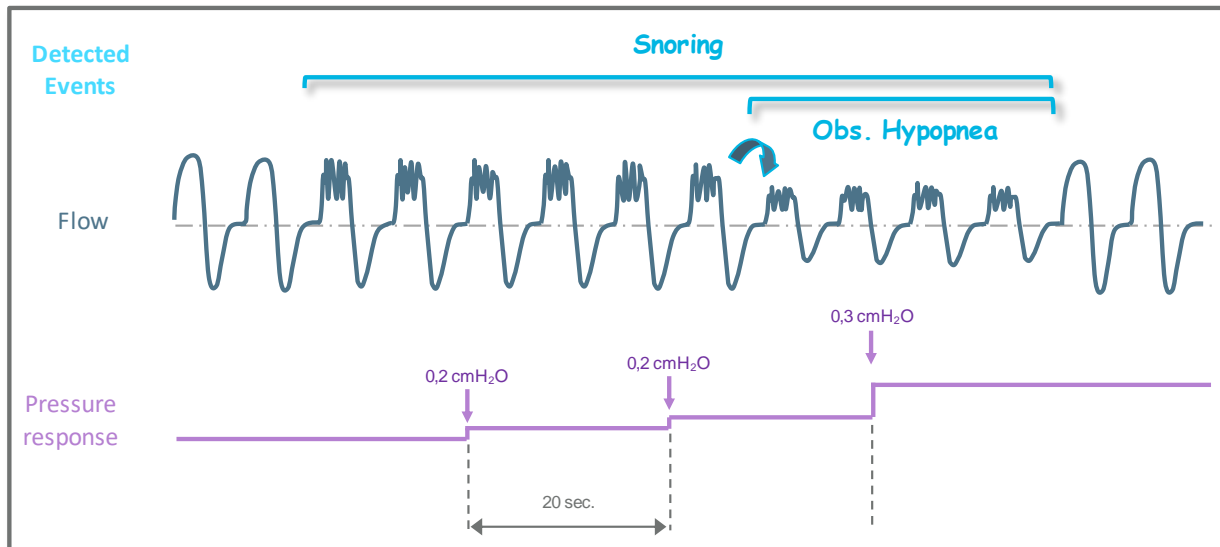
# S.Box Algorithm & Snoring

# S.Box Algorithm : pressure reactions on Snoring

## Snoring

- 0.2 cm/H2O increases every les 20 secondes
- Maximum of +3 cmH2O if only snring is detected

## Snoring with hypopnea (= classified as obstructive)

- 0.3 cm/H2O increases every les 20 secondes up  to the end of the hypopnea

# S.Box Algorithm : Pressure decreases

2 steps for pressure decreases:

- Once there is no detection of an apnea or a snoring event or no command IFL, for a **5 minutes** period pressure will decrease

- If the airway remains stable after this first decrease, the pressure is further decreased each **1 minute** until the minimum level is reached or a respiratory event is detected

Pressure decrease control: decrease of 0.2 cmH2O

Sefam