Titration protocol reference guide
Titration protocol reference guide

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient types</td>
<td>3</td>
</tr>
<tr>
<td>Titration protocol goals</td>
<td>4</td>
</tr>
<tr>
<td><strong>CPAP</strong></td>
<td></td>
</tr>
<tr>
<td>CPAP protocol</td>
<td>5-6</td>
</tr>
<tr>
<td><strong>auto CPAP</strong></td>
<td></td>
</tr>
<tr>
<td>auto CPAP protocol</td>
<td>7-8</td>
</tr>
<tr>
<td><strong>BiPAP S</strong></td>
<td></td>
</tr>
<tr>
<td>BiPAP S protocol</td>
<td>9-10</td>
</tr>
<tr>
<td><strong>BiPAP Auto</strong></td>
<td></td>
</tr>
<tr>
<td>BiPAP Auto protocol</td>
<td>11-12</td>
</tr>
<tr>
<td><strong>BiPAP autoSV Advanced</strong></td>
<td></td>
</tr>
<tr>
<td>BiPAP autoSV Advanced protocol</td>
<td>13-14</td>
</tr>
<tr>
<td><strong>BiPAP S/T</strong></td>
<td></td>
</tr>
<tr>
<td>BiPAP S/T protocol</td>
<td>15-16</td>
</tr>
<tr>
<td><strong>BiPAP AVAPS</strong></td>
<td></td>
</tr>
<tr>
<td>BiPAP AVAPS protocol</td>
<td>17-18</td>
</tr>
<tr>
<td><strong>Sample prescriptions</strong></td>
<td>19</td>
</tr>
</tbody>
</table>

**IMPORTANT:** The suggested guidelines are intended to serve only as a reference. They should be used only in conjunction with the instructions and/or protocol(s) set forth by the physician and institution in which the assist device is being used. The guidelines are not intended to supersede established medical protocols.

These protocols are recommended for adult patients only.
Patient types

- BiPAP AVAPS
- BiPAP S/T
- BiPAP ASV
- BiPAP Auto
- BiPAP S

Restrictive disorders (e.g., kyphosis or fibrosis)

- Neuromuscular disorders and SDB
- COPD
- Obesity hypoventilation
- Opioid-induced sleep apnea
- Cheyne-Stokes respiration

OSA

CPAP

Auto CPAP

BiPAP Auto

BiPAP S
General Titration Protocol Goals

The goals should be individualized to meet the needs of each patient.

1. Keep the airway open (airway management)
2. Stabilize breathing patterns by monitoring the patient’s response to therapy
3. Adjust user set parameters as needed for optimal therapy efficacy and adherence
4. Ensure proper mask fit to enhance comfort and acceptance and to minimize leaks
5. Have patient lie down and breathe on the designated therapy device at the basic settings described with each protocol
6. Recheck mask fit, assure patient comfort and acceptance
7. Adjust flex features to patient comfort
CPAP

- BiPAP AVAPS
- BiPAP S/T
- Restrictive disorders (e.g., kyphosis or fibrosis)

- BiPAP AVAPS
- BiPAP S/T
- Obesity hypoventilation

- BiPAP AVAPS
- BiPAP S/T
- Neuromuscular disorders and SDB

- BiPAP AVAPS
- BiPAP S/T
- COPD

- BiPAP ASV
  - Advanced
  - Opioid-induced sleep apnea

- BiPAP ASV
  - Advanced
  - Cheyne-Stokes respiration

OSA

CPAP

Auto CPAP

BiPAP Auto

BiPAP S
Suggested titration protocol for CPAP

- Set CPAP at 4 cm H₂O
- Set C-Flex or C-Flex+ to patient comfort

Observe for Obstructive Events

Optimal Pressure Reached

NO

YES

• Increase CPAP by 1 cm H₂O
• Wait 5 minutes
• Repeat as needed

YES

• If the patient cannot tolerate pressure increase, or the pressure threshold of 15 cm H₂O is reached, switch patient to BiPAP S protocol

Note:
- Establish initial settings as indicated or as ordered by physician
- Initial CPAP settings may be adjusted to patient condition or severity
- C-Flex or C-Flex+ may be adjusted to patient comfort
- If central apneas are observed consider decreasing pressure for 20 minutes; if still present consider switching to BiPAP autoSV Advanced protocol

Obstructive Event:
- ≥ 2 obstructive apneas, or
- ≥ 3 hypopneas, or
- ≥ 5 RERAs, or
- ≥ 3 min of loud, definite snoring

auto CPAP
Suggested titration protocol for Auto CPAP

Patient on CPAP changed to Auto CPAP

- CPAP at ≤ 10 cm H₂O
  - Set AutoMin at 4 cm H₂O or patient comfort
  - Set AutoMax to 20 cm H₂O
  - Set A-Flex to patient comfort

- CPAP at > 10⁰ cm H₂O
  - Set AutoMin at 6 to 8 cm H₂O or patient comfort
  - Set AutoMax to 20 cm H₂O
  - Set A-Flex to patient comfort

Note:
- Establish initial settings as indicated or as ordered by physician
- Initial Auto CPAP settings may be adjusted to patient condition or severity
- A-Flex may be adjusted to patient comfort
- If central apneas are observed consider switching to BiPAP autoSV Advanced Protocol

*If multiple obstructive events are observed at the beginning of the study use a higher AutoMin.
Suggested titration protocol for BiPAP S

Changing from CPAP therapy to BiPAP S

NO
• Set IPAP at 8 cm H₂O
• Set EPAP at 4 cm H₂O
• Set Bi-Flex to patient comfort

YES
• Set IPAP at CPAP level
• Set EPAP at 4 cm H₂O below the IPAP level
• Set Bi-Flex to patient comfort

Observe for Events*

Obstructive Apneas*
• Increase EPAP by 1 cm H₂O
• Maintain IPAP and EPAP differential
• Wait 5 minutes

Other Events**
• Increase IPAP by 1 cm H₂O
• Wait 5 minutes

NO

Optimal Pressure Reached

Note:
• Establish initial settings as indicated or as ordered by physician
• Initial BiPAP S settings may be adjusted to patient condition or severity
• Bi-Flex may be adjusted to patient comfort
• If central apneas are observed consider decreasing pressure for 20 minutes; if still present consider switching to BiPAP autoSV Advanced protocol

*Obstructive Event:
≥ 2 obstructive apneas,
**Other
≥ 3 hypopneas, or
≥ 5 RERAs, or
≥ 3 min of loud, definite snoring*

BiPAP Auto
Suggested titration protocol for BiPAP Auto

Patient on CPAP changed to BiPAP Auto

- CPAP at ≤ 10 cm H₂O
  - Set MinEPAP at 4 cm H₂O
  - Set PSmin at 4 cm H₂O or patient comfort
  - Set MaxIPAP to 25 cm H₂O
  - Set PSmax to 8 cm H₂O
  - Set Bi-Flex to patient comfort

- CPAP at > 10* cm H₂O
  - Set MinEPAP at 6 to 8 cm H₂O
  - Set PSmin at 4 cm H₂O or patient comfort
  - Set MaxIPAP to 25 cm H₂O
  - Set PSmax to 8 cm H₂O
  - Set Bi-Flex to patient comfort

Note:
- Establish initial settings as indicated or as ordered by physician
- Initial BiPAP Auto settings may be adjusted to patient condition or severity
- Bi-Flex may be adjusted to patient comfort
- If central apneas are observed consider switching to BiPAP autoSV Advanced protocol

*If multiple obstructive events are observed at the beginning of the study use a higher MinEPAP
BiPAP autoSV Advanced
Suggested titration protocol for BiPAP autoSV Advanced

Patient on CPAP changed to BiPAP autoSV Advanced

- CPAP at ≤ 10 cm H₂O
  - Set EPAPmin at 4 cm H₂O or patient comfort
  - Set EPAPmax 20 cm H₂O
  - PSmin at 0 cm H₂O or at patient comfort
  - Set PSmax to 20 cm H₂O
  - Set Max pressure to 25 cm H₂O
  - Rate to Auto
  - Set Bi-Flex to patient comfort

- CPAP at > 10 cm H₂O
  - Set EPAPmin at 6 to 8 cm H₂O or patient comfort
  - Set EPAPmax at highest level attainable, PSmin at 0 cm H₂O or at patient comfort
  - Set PSmax at highest level attainable
  - Set Max pressure to 25 cm H₂O
  - Rate to Auto
  - Set Bi-Flex to patient comfort

Note:
- Establish initial settings as indicated or as ordered by physician
- Initial BiPAP autoSV Advanced settings may be adjusted to patient condition or severity
- Bi-Flex may be adjusted to patient comfort
- If numerous hypopneas are noted, maintain PS > 4 cm H₂O

*If multiple obstructive events are observed at the beginning of the study use a higher EPAPmin*
Suggested titration protocol for BiPAP S/T

- Set IPAP at 8 cm H₂O
- Set EPAP at 4 cm H₂O
- Set Rate at 8-10 BPM or 2 BPM below the patient’s spontaneous rate
- Set I-Time at 1.5 seconds or patient comfort
- Set Rise time at 2 or 3 patient comfort

Observe for Events*

NO

Obstructive Apneas*  
- Increase EPAP by 1 cm H₂O  
- Maintain IPAP and EPAP differential  
- Wait 5 minutes

Other Events**  
- Increase IPAP by 1 cm H₂O  
- Wait 5 minutes

NO

Optimal Pressure Reached

Note:
- Establish initial settings as indicated or as ordered by physician
- Initial BiPAP S/T settings may be adjusted to patient condition or severity
- I-Time may be adjusted to patient comfort
- Consider supplemental O₂ if SpO₂ <88% or <90% at optimal PS and RR for 5 min

*Obstructive Event:  
≥ 2 obstructive apneas,  
**Other  
≥ 3 hypopneas, or  
≥ 5 RERAs, or  
≥ 3 min of loud, definite snoring

**Respiratory Event:  
Appearance of or worsening of hypoventilation during sleep

BiPAP AVAPS

Restrictive disorders (e.g., kyphosis or fibrosis)

Neuromuscular disorders and SDB

Obesity hypoventilation

OSA

CPAP
Auto CPAP
BiPAP Auto
BiPAP S

COPD

BiPAP ASV
Advanced

Opoid-induced sleep apnea

Cheyne-Stokes respiration

BiPAP ASV
Advanced

Complex sleep apnea

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T

BiPAP AVAPS
BiPAP S/T
Suggested titration protocol for BiPAP AVAPS

Set Tidal Volume target*
Set IPAPmin at 8 cm H₂O
Set IPAPmax at 25 cm H₂O
Set EPAP at 4 cm H₂O
Set Rate at 8-10 BPM or 2 BPM below the patient’s spontaneous rate
Set I-Time at 1.5 seconds or patient comfort
Set Rise time at 2 or 3 or patient comfort

Observe for Events

YES

Obstructive Events**
- Increase EPAP by 1 cm H₂O

Respiratory Events***
- Inadequate Tidal Volume – Increase the Tidal Volume target
- Inadequate Respiratory Rate – Increase RR by 2 BPM
- Inadequate Oxygenation – Increase EPAP
- Wait 5 minutes

NO

Optimal Pressure Reached

*3 ways to choose a starting tidal volume with AVAPS:
1. MD suggestion
2. Patient comfort
3. Ideal body weight: 8 ml/kg*

AVAPS suggested tidal volume settings based on height and ideal weight.

<table>
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<tr>
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<th>5’9”</th>
<th>6’1”</th>
<th>6’3”</th>
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<th>6’7”</th>
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<th>7’3”</th>
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<tr>
<td>ideal weight</td>
<td>52.0 kg</td>
<td>55.5 kg</td>
<td>59.0 kg</td>
<td>62.5 kg</td>
<td>66.5 kg</td>
<td>70.5 kg</td>
<td>74.5 kg</td>
<td>78.5 kg</td>
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<tr>
<td>8 ml/kg V₁</td>
<td>420 ml</td>
<td>440 ml</td>
<td>470 ml</td>
<td>500 ml</td>
<td>530 ml</td>
<td>560 ml</td>
<td>600 ml</td>
<td>630 ml</td>
<td>660 ml</td>
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Note:
- Establish initial settings as indicated or as ordered by physician
- Initial BiPAP AVAPS settings may be adjusted to patient condition or severity
- I-Time may be adjusted to patient comfort
- Consider supplemental O₂ if SpO₂ <88% or <90% at optimal PS and RR for 5 min.

**Obstructive Event:
- > 2 obstructive apneas,
- > 3 hypopneas, or
- > 5 RERAs, or
- > 3 min of loud, definite snoring

***Respiratory Event:
Appearance or worsening of hypoventilation during sleep

Titration protocol reference guide
Sample prescriptions

System One CPAP

____ cm H₂O with Encore Anywhere/SleepMapper
□ Heated Humidifier □ Heated Tube
DISPENSE AS WRITTEN/DO NOT SUBSTITUTE

System One CPAP

REMstar Pro / REMstar Auto
C-Flex C-Flex+ A-Flex: 1 2 3
Auto Pressure: Min: _____ cm H₂O Max: _____ cm H₂O
□ Encore Anywhere/SleepMapper
□ Heated Humidifier □ Heated Tube
DISPENSE AS WRITTEN/DO NOT SUBSTITUTE

System One CPAP

____ cm H₂O with Flex
□ EncoreAnywhere/SleepMapper
□ Heated Humidifier □ Heated Tube
Convert to System One BiPAP Auto after 60 days if non-compliant
DISPENSE AS WRITTEN/DO NOT SUBSTITUTE

BiPAP Auto SV Advanced

EPAPmin: _____ cm H₂O (4 cm – 25 cm)
EPAPmax: _____ cm H₂O (4 cm – 25 cm)
PSmax: _____ cm H₂O (0 cm – 21 cm)
PSmin: _____ cm H₂O (0 cm – 21 cm)
Max Pressure: _____ cm H₂O (25 cm)
Rate: _____ BPM (auto, 4 - 30, off)
Bi-flex setting: _____ (1,2,3)
□ Encore Anywhere/SleepMapper
□ Heated Humidifier □ Heated Tube
DISPENSE AS WRITTEN/DO NOT SUBSTITUTE

BiPAP S/T AVAPS

EPAP: _____ cm H₂O (4 cm – 25 cm)
IPAP max: _____ cm H₂O
IPAP min: _____ cm H₂O
Max Pressure: _____ cm H₂O (30 cm)
Rate: _____ BPM (4 -30)
Tidal Volume ______ ml (200-1500 ml)
□ Heated Humidifier □ Heated Tube
DISPENSE AS WRITTEN/DO NOT SUBSTITUTE

System One CPAP

____ cm H₂O with Encore Anywhere/SleepMapper
□ Heated Humidifier □ Heated Tube
DISPENSE AS WRITTEN/DO NOT SUBSTITUTE
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<td>1010 Murry Ridge Lane</td>
<td>+49 8152 93 06 0</td>
</tr>
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<td></td>
<td>Murrysville, PA 15668</td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td>Philips Respironics Asia Pacific</td>
<td>+65 6882 5282</td>
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