

Description

The Pressure Support option allows the operator to set a positive pressure that is active during the inspiratory phase of any spontaneous breath. Use of Pressure Support may, in selected cases, reduce the patient's inspiratory work of breathing. Pressure Support is only available in the SIMV and CPAP modes.

The operator may select a support pressure between 1 and 70 cmH₂O. (Earlier versions of Option 10 limit support pressure to 30 cmH₂O.) A zero setting cancels the Pressure Support function.

Theory of Operation

With Pressure Support active (that is, a nonzero support pressure has been selected), the patient initiates the spontaneous breath as usual by reducing PEEP by the <SENSITIVITY> setting. The pneumatic system then delivers gas at a rate sufficient to achieve and maintain an airway pressure level equal to PEEP plus the support pressure. The following example illustrates Pressure Support operation.

EXAMPLE:

If

- PEEP = 5 cmH₂O,
- Sensitivity = 2 cmH₂O, and
- Support pressure = 6 cmH₂O,

Then

- Inspiratory threshold (PEEP - Sensitivity) = 3 cmH₂O, and
- Airway pressure (PEEP + support pressure) = 11 cmH₂O (Until exhalation is declared, as described below).

Figure 1 illustrates initiation and control of a spontaneous breath with Pressure Support. Event "a" indicates the inspiratory threshold.

If the ventilatory mode changes to mandatory breathing, Pressure Support is automatically suspended. Suspension might occur under the following circumstances:

- apnea or disconnect ventilation is invoked
- a mandatory breath (<MANUAL INSPIRATION>, <MANUAL SIGH>, or <AUTOMATIC SIGH>) is delivered
- a respiratory mechanics maneuver is performed (if the Respiratory Mechanics option is installed)
- ventilatory mode is changed to CMV

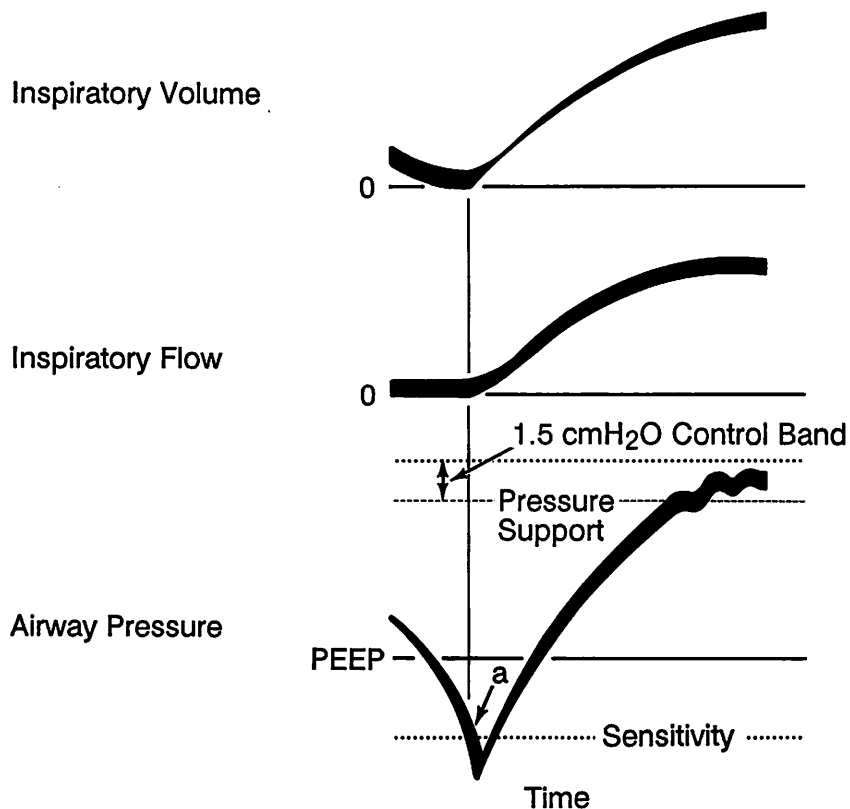


Figure 1. Initiation and Control in the Early Phase of a Pressure-Supported Breath

The <+> key light remains on and the support pressure value is retained in ventilator memory even though Pressure Support is not active. Pressure Support reactivates when spontaneous breathing resumes.

NOTE - Pressure Support and Flow-by (Option 50) cannot be activated simultaneously. If Flow-by is on when the operator enters a nonzero support pressure, the ventilator turns off Flow-by (base flow is set to 0 Lpm). The message [FLOW-BY OFF] appears in the message window. Similarly, if Pressure Support is on when the operator enters a value for base flow, the ventilator turns off Pressure Support (support pressure is set to 0 cmH₂O). [PRESSURE SUPPORT OFF] is displayed in the message window.

Exhalation During Pressure Support

The ventilator monitors gas flow and airway pressure following breath initiation to determine the onset of exhalation for a pressure-supported breath. Exhalation occurs when flow falls to 5 Lpm or less, when airway pressure exceeds the sum of PEEP and pressure support by 1.5 cmH₂O (within specified time frames), or when inspiratory time exceeds 5 seconds.

During the first 300 ms after breath initiation, exhalation occurs if the flow or pressure criterion is achieved and maintained for 100 ms. (See Figure 2 for an example of a flow event "c", in panel A, and a pressure event "e", in panel B.) Once 300 ms have elapsed since breath initiation, the 100-ms duration requirement is disregarded and any occurrence of the flow, pressure, or inspiratory time criterion initiates exhalation. (See Figure 2. For example, flow event "b", in panel

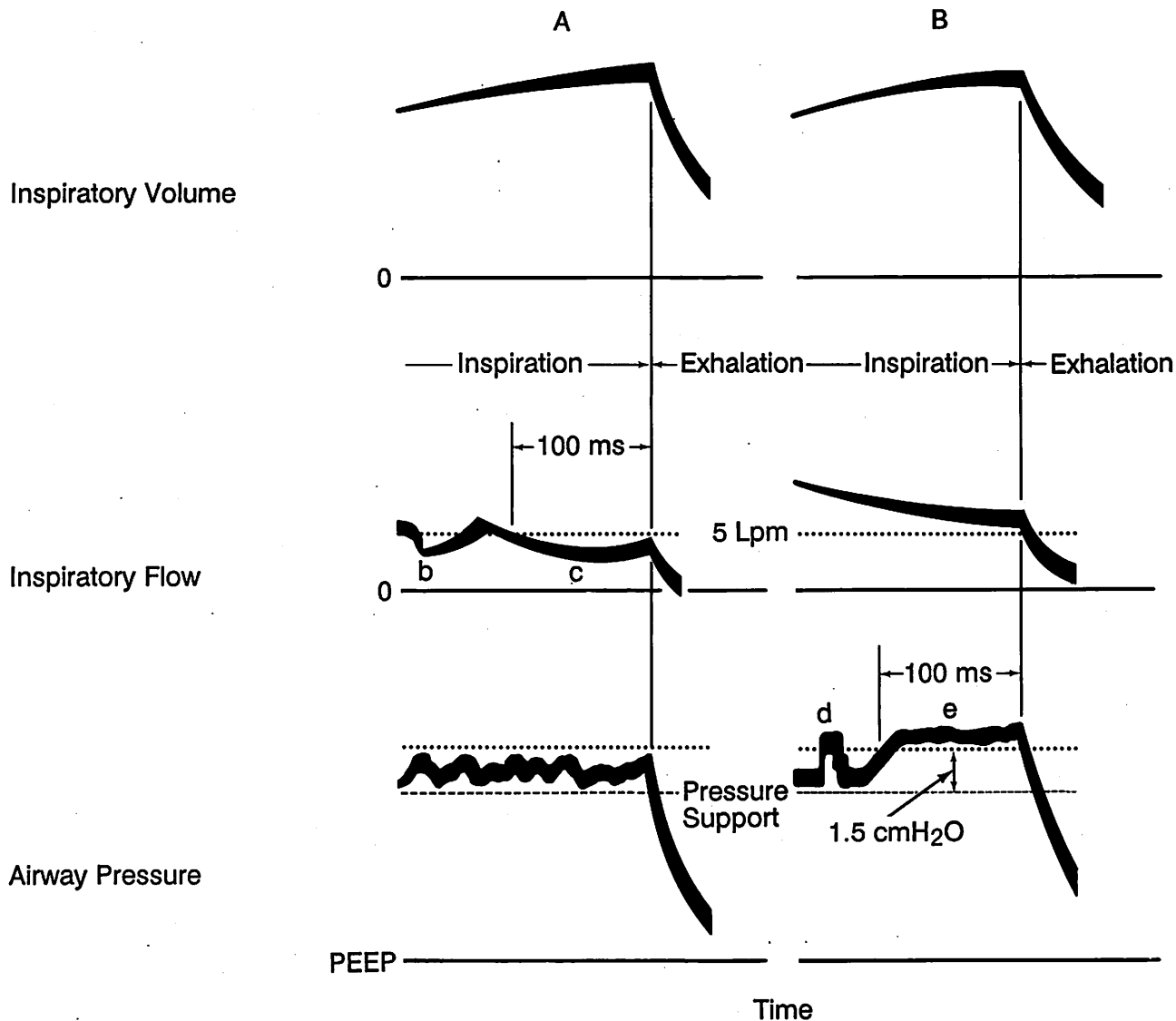


Figure 2. Conditions for Initiation of Exhalation during a Pressure-Supported Breath

A, and pressure event "d", in panel B, would have initiated exhalation.) When exhalation is declared, Pressure Support is terminated and the exhalation valve opens.

Operating Instructions

Pressure Support, like other software options, is accessed via the <+> key. Detailed information on the use of this key is provided in Chapter 3 of the 7200 Series Microprocessor Ventilator Operator's Manual. Please review those instructions before proceeding with operation of Pressure Support.

Refer to Table 1 for the option initiation sequence, and Figure 3 for an abbreviated version of the <+> key sequence.

NOTE - Where nondefault settings are selected for options, pressing the <ENTER> key brings up the option number and name, followed by [ON].

Table 1. Initiating Pressure Support

Operator Action	Message Window Response	Comments
Select Option 10.	[10 PRESS SUPPORT]	Pressure Support has been accessed; support pressure is set to zero (inactive). [10 PRESS SUPPORT ON] appears if a non-zero value is set and the option is active.
Press <ENTER> to access the support pressure value prompt.	[SUP PRESS XX CMH2O]	XX represents the last-entered value. If this is the desired setting, press <ENTER> to proceed to the next prompt.
Key in the desired value.	[SUP PRESS YY CMH2O]	XX represents the new value.
Press <ENTER>.	[UPDATE PARAMS-ENTER]	The ventilator has accepted the new support pressure (provided the value is between 1 and 70* cmH ₂ O) and prompts the operator to complete the Pressure Support entry sequence. (If the new value exceeds 70* cmH ₂ O, the ventilator emits four beeps and displays the message [INVALID ENTRY] instead of [UPDATE PARAMS-ENTER]. Press <CLEAR> to erase the unacceptable value; key in an appropriate value.
Press <ENTER>.	[10 PRESS SUPPORT ON]	This message indicates that the Pressure Support function is active with a nonzero value. [10 PRESS SUPPORT] appears if support pressure is set to zero (option inactive).

*Early versions only provide 1 to 30 cmH₂O support pressure.

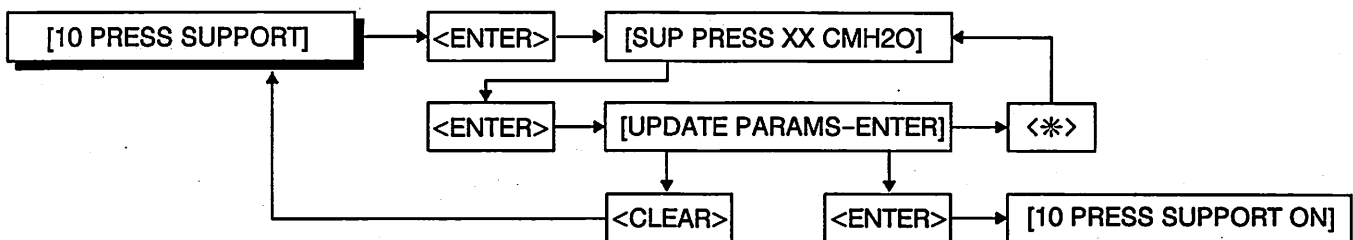


Figure 3. Sequence of Pressure Support <+> Key Function