Ontario **Ministry of Health and Long-Term Care**

Assistive Devices Branch
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Equipment/Supply Authorization

Please read instructions prior to completion. Press hard, you are completing multiple copies.

Section 1 – Biographical Information *(to be completed by Applicant or Agent)*

Last name of applicant *(please print)* | First name | Initials | Date of birth *(d/m/y)* | Sex ☐ M ☐ F

Apt. no. | Address

City, town or village | Postal code | Area code Telephone no. | Health no. | Version

I am receiving social assistance benefits. ☐ yes ☐ no

If yes, check one only:

☐ Ontario Works (OW) ☐ Ontario Disability Support Program (ODSP) ☐ Assistance to Children with Severe Disabilities (ACSD)

Section 2 – Diagnosis and Equipment Type *(to be completed by Prescriber)*

Primary diagnosis | Insert diag. codes

Secondary diagnosis

Surgical procedure (if applicable) | Date of surgery *(d/m/y)*

Plate Imprint

Please ensure all information is provided

Instructions, special needs

Health insurance billing no.

I certify that the above named person has a long term physical disability and/or illness and medically requires the use of the equipment for other than the exclusive use of sports, school or work.

Prescriber name *(please print)*

Area code Telephone no. | Date *(d/m/y)*

Prescriber's signature

ADP prior authorization no.

Section 3 – Equipment/Supplies Required *(to be completed by ADP Registered Authorizer)*

☐ Check if the client has accessed ADP before for this device category

☐ Change in medical condition *(specify)* _____

☐ Growth/Atrophy

Quantity authorized	Description of item: Brand/Model or product equivalent category	Product equivalent category	ADP catalogue no.	Vendor to complete: Qty. supplied	Vendor to complete: Total cost ($)	ADP use only

I hereby certify that I have seen the above named person and that I have authorized the equipment/supplies described in Section 3 above, based on my assessment of this individual's medical requirements.

Signature of ADP Registered Authorizer | Area code Telephone no.

Date *(d/m/y)* | ADP authorizer registration no. | ADP clinic registration no.

ADP registration no. | Signature of ADP Registered Dispenser or Rehabilitation Assessor | Date *(d/m/y)*

Total cost

Less amount paid by:

☐ Applicant

☐ Agent

Amount billed to ADP

Section 4 – *To be completed by Applicant or Agent*

I hereby certify that I am a resident of Ontario and in need of the equipment prescribed as in Section 3 above. I do not have similar equipment in working order previously funded by ADP and I understand the vendor or ADP may bill me for equipment obtained in contravention of the above.

I understand that I am free to go to any registered vendor in the community and that I may obtain the locations of these vendors from the above ADP registered authorizers, or directly from the Assistive Devices Program.

I certify that the information on this form is true, correct and complete to the best of my knowledge. I understand the rules of eligibility for ADP and I am eligible for the above supplies/equipment. I authorize the release of the above information to the Ministry of Health, its agents the ADP registered vendor I have chosen and my insurance company.

I consent to the "indirect collection" by ADP vendors on behalf of the Ministry of Health of the applicant's name, address, health number and Equipment/Supply Authorization number where such information is required by the Ministry to process this claim.

I consent to the collection and disclosure of medical and non-medical information by the Assistive Devices Branch (ADB) to the Workplace Safety & Insurance Board (WSIB), and by the WSIB to the ADB, to determine my eligibility to receive funding assistance from the ADB.

Signature of applicant or agent | Date *(d/m/y)*

Section 5 – *To be completed by Vendor*

Vendor's name | Vendor's registration no.

Vendor's address

I hereby certify that the information on this form is true, correct and complete to the best of my knowledge and that the equipment /supplies as listed have been provided to the above person by

Vendor's signature | Date *(d/m/y)*

7530–4835

Part 1 – Assistive Devices Program

Pulmonetic Systems®

Innovations For Life

LTV® Series Ventilators

(LTV® 900, 950, and 1000)

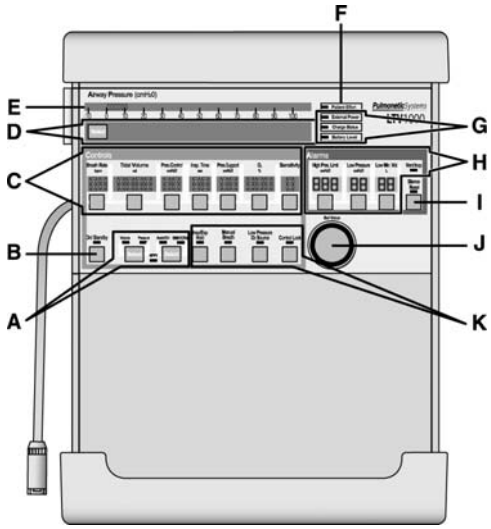
Quick Reference Guide

P/N 10674, Rev. H

TABLE OF CONTENTS

FRONT AND SIDE PANEL REFERENCE

Front Panel Display and Description



A - **Mode and Breath Selection** – Selects ventilation modes. Selects breath types.

B - **Power** – Turns ventilator “On” or to “Standby.”

C - **Variable Control Settings** – Sets ventilation characteristics, such as Tidal Volume and Breath Rate.

D - **Display Window** – Displays Alarm Messages, Monitored Data, Extended Features menu.

E - **Airway Pressure Display** – Displays real-time airway circuit pressure.

F - **Patient Effort Indicator** – LED is lit briefly each time a patient trigger is detected.

G - **Power Source** – Displays power source and charge levels.

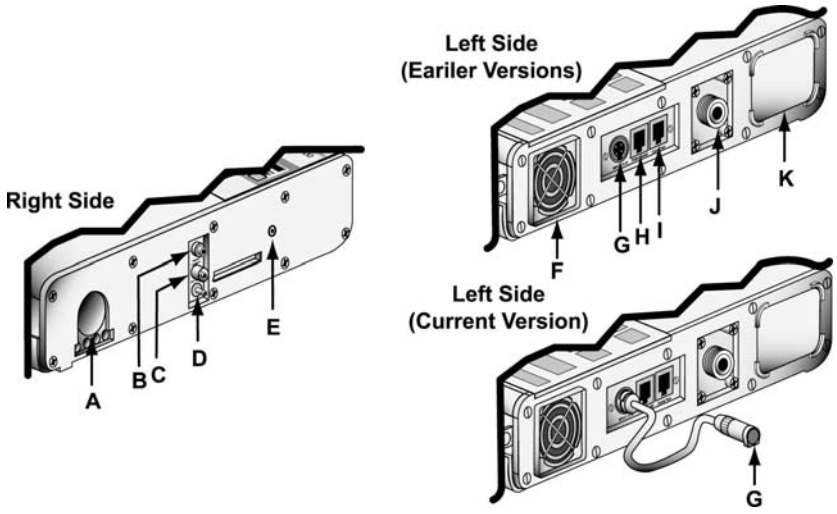
H - **Variable Alarm Settings** – Sets variable alarm levels.

I - **Alarm Silence/Reset** – Silences audible alarms. Clears visual alarms.

J - **Set Value Knob** – Changes variable control settings. Navigates Extended Features menu.

K - **Special Controls** – Activates special controls such as Manual Breath, Low Pressure O_2 Source, Insp/Exp Hold or Control Lock feature.

Side Panel Descriptions



A - **22mm Outlet Port** – Patient Breathing Circuit outlet port.
B - **Flow Xducer** – Flow Transducer high pressure sensing port.
C - **Flow Xducer** – Flow Transducer low pressure sensing port.
D - **Exh Valve** – Exhalation Valve drive line port.
E - **Alarm Sounder Port**
F - **Cooling Fan**
G - **DC Input** – External DC power port (earlier version)
or DC power port pigtail connector (current version).
H - **Patient Assist** – Patient Assist Call jack.
I - **Comm Port** – Communications port.
J - **O_2 Inlet** – Oxygen Inlet fitting.
K - **Filter** – Air Inlet.

TURNING THE VENTILATOR ON AND OFF

Turning the Ventilator On

To turn the LTV® ventilator on:

1) Connect the ventilator to an external power source:
   - The AC power adapter may be used or the ventilator may be connected to an external battery.
   - **If you do not connect the ventilator to an external power source, it will operate from the internal battery.**

2) Press and release the **O**n/**S**tandby button. The ventilator will commence operation:
   - The **O**n/**S**tandby LED is lit and the Power On Self Tests (POST) are run. During POST;
     - The front panel displays are illuminated.
     - Verify the audible alarm is activated for 1 second (only on ventilators with a ♪ symbol on the back panel label).
     - Verify a confirming audible chirp is activated (only on ventilators with a ♪ symbol on the back panel label).
3) Once POST is successfully completed, the ventilator begins operating using the stored control settings.

Turning the Ventilator Off

To turn the LTV® ventilator off:

1) **Disconnect the patient from the ventilator**.
2) Press and hold the **O**n/**S**tandby button for 3 seconds. The ventilator ceases operating, the audible alarm sounds continuously and the **Vent Inop** LED is lit.

3) Press the **S**ilence/**R**eset button to silence the audible alarm.
   - Verify a confirming audible chirp is activated immediately after the alarm is silenced (only on ventilators with a ♪ symbol on the back panel label).

4) The ventilator continues to charge the internal battery as long as it is connected to an external power source.

Note: The **Vent Inop** LED will remain lit for a minimum of 5 minutes and does not affect battery life.

VENTILATOR CHECKOUT TESTS

WARNING - Disconnect the patient from the ventilator prior to running the Ventilator Checkout tests and ventilate the patient using an alternative method. The ventilator does not deliver gas during the Ventilator Checkout tests.

To enable the Ventilator Checkout menu:

1) Begin with the ventilator in Standby mode (off) and connected to a valid AC power source.
   - Verify that the **External Power** and **Charge Status** LEDs are illuminated.
2) Press and hold the Monitor **S**elect button. While holding the **S**elect button, press the **O**n/**S**tandby button.
   - **REMOVE PTNT** alarm message is displayed and an audible alarm is sounded.
3) Clear the alarm by pressing the **S**ilence/**R**eset button.
   - Audible alarm is silenced and **VENT CHECK** is displayed.
4) Press the **S**elect button to move to the first test.
   - The first Ventilator Checkout Test, **ALARM**, is displayed.

Alarm Test

The alarm Test is used to verify that the audible alarm is working correctly.

1) Press the **S**elect button while **ALARM** is displayed.
2) Verify the audible alarm is sounded.
   - If a Patient Assist Call System or Remote Alarm is connected via the ventilator's Patient Assist Port, verify the device also activates (audible/visual), as specified by its manufacturer.
3) When the alarm has sounded for at least 2 seconds, press the **S**elect button again.
   - The audible alarm is silenced and the next menu item is displayed.
4) For ventilators with an audio sound symbol (♪) on the back panel label, verify a confirming audible chirp occurs after the alarm is silenced.

Display Test

The display Test is used to verify that the ventilator displays are working correctly.

To run the Display Test:

1) Press the **S**elect button while **DISPLAY** is displayed.

2) All segments of the 7-segment control displays, all dots of the dot-matrix window displays and all LEDs are illuminated.
   - The **External Power** and **Charge Status** LEDs are tested and verified when the AC adapter is connected to the ventilator (see page 7).
   - The **Vent Inop** LED is tested and verified during the Vent Inop Alarm Test (see page 12).

3) To end the display test, press the **S**elect button again and the next menu item is displayed.

Control Test

The Control Test is used to verify that the ventilator buttons and controls are working correctly.

To run the Control Test:

1) Press the **S**elect button while **CONTROL** is displayed.

2) **SELECT** is displayed in the display windows.

3) To test each control, press the button. The name of the button is displayed in the display window. To test the **S**et **V**alue knob, turn it clockwise and counterclockwise. The direction of rotation is displayed in the display window.

4) To exit the control test, press the **S**elect button again and the next menu item is displayed.

Leak Test

The Leak Test is used to test the patient circuit for leaks. The patient circuit should be tested with all accessories, such as humidifiers or water traps, in place.

To run the Leak Test:

1) Cap or otherwise occlude the patient circuit wye.
2) Press the **S**elect button while **LEAK** is displayed.

   - To perform the Leak Test, the ventilator closes the exhalation valve, sets the flow valve to a near-closed state, elevates the turbine motor speed and elevates the circuit pressure.
   - At the conclusion of the test, the display shows **LEAK xx.x pass** or **fail**, where **xx.x** is the measured leak.
3) To exit the Leak Test, press the **S**elect button again and the next menu item is displayed.

Vent Inop Alarm Test

The Vent Inop Alarm Test is used to verify that the Inop Alarm is working correctly.

To run the Vent Inop Alarm Test:

1) To run the Vent Inop Alarm Test, the ventilator must be on (running) for at least 60 seconds and the Ventilator Checkout menu must be enabled.
2) Turn the ventilator off by pressing and holding the **O**n/**S**tandby button for a minimum of 3 seconds. **DO NOT** press the **S**ilence/**R**eset button.

3) Observe the ventilator for 15 seconds.
   - Listen for the alarm tone
   - Watch the Vent Inop LED
4) For all ventilators, verify that both of the following conditions existed;
   - The alarm tone sounded continuously for the full 15-second duration.
   - The Vent Inop LED illuminated continuously for the full 15-second duration.
5) If a Patient Assist Call System or Remote Alarm is connected via the ventilator's Patient Assist Port, verify the device also activates (audible/visual), as specified by its manufacturer.
6) Silence the alarm by pressing the **S**ilence/**R**eset button.

7) For ventilators with an a audio sound symbol (♪) on the back panel label, verify the following condition existed;
   - A confirming audible chirp occurred after the alarm was silenced.

When the Ventilator Checkout Tests have been completed, proceed to ***Exit*** for instructions to exit the vent check mode, or see below concerning the use of the Set Defaults option.

Set Defaults

The Set Defaults option is used to reset user settable Controls and Extended Features settings to their factory-set default values (see the *LTV® 1200 Series Ventilators Operator's Manual* for factory-set default values).

To set the default values:

1) Turn the **S**et **V**alues knob until **EXIT** is displayed and press the **S**elect button.
   - **VENT CHECK** is displayed
2) Turn the **S**et **V**alues knob until **VENT OP** is displayed and press the **S**elect button.
3) Turn the **S**et **V**alues knob until **DEFAULTS** is displayed and press the **S**elect button.
   - **SET DEFAULTS** is displayed.
4) Press the **S**elect button while **SET DEFAULTS** is displayed.
   - Except for the Language selected and the Date/Time settings and format, all user settable Controls and Extended Features options are reset to their factory-set default values.
   - A **DEFAULTS SET** alarm will be generated the next time the ventilator is powered up in normal ventilation mode (see ***Alarms, DEFAULTS SET*** for additional information).

Exit

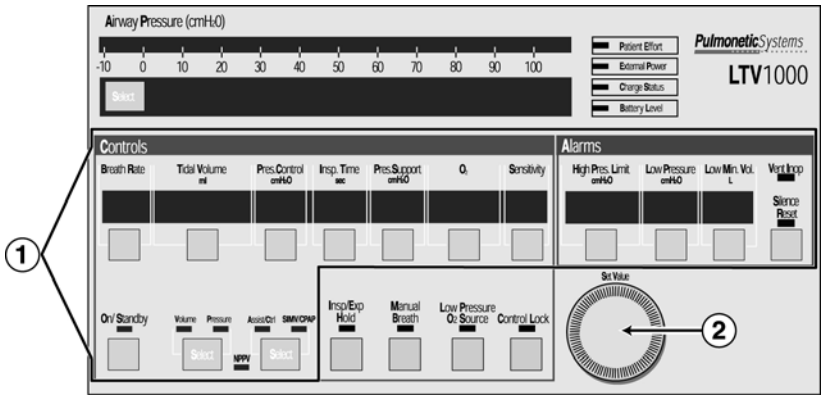
To return to any of the **VENT CHECK** tests, turn the **S**et **V**alue knob until the desired test is displayed.

To Exit:

1) Press the **S**elect button while **EXIT** is displayed, and **VENT CHECK** is displayed.
2) Turn the **S**et **V**alue knob until **EXIT** is displayed again.
3) Press the **S**elect button.

The Ventilator performs a Self Test (POST) and resumes normal operation.

VARIABLE CONTROLS



To set a variable control:

1) Select the control by pressing the associated button. The display for the selected control will be displayed at normal brightness and all other control displays will be dimmed.

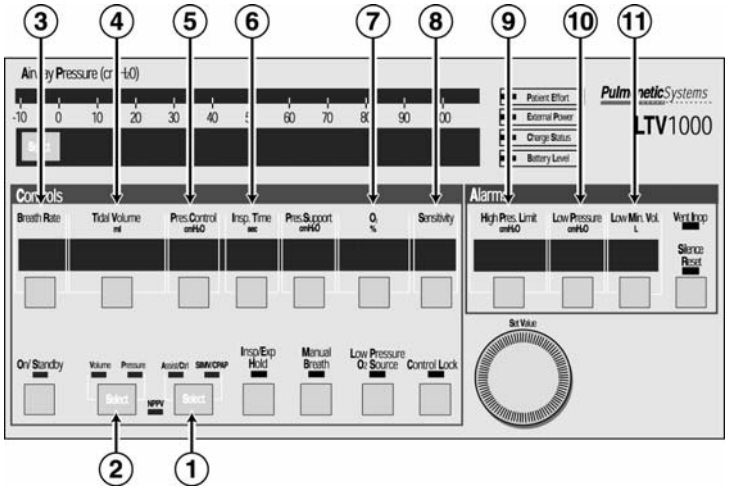
2) Change the control value by rotating the **S**et **V**alue Knob. Rotate clockwise to increase and counter-clockwise to decrease the value.

3) The new control value goes into effect when the operator:
   - Presses the selected button again, or
   - Selects another control, or
   - Presses the **C**ontrol **L**ock button, or
   - Waits 5 seconds

All controls will then return to their normal brightness.

SETTING UP MODES OF VENTILATION

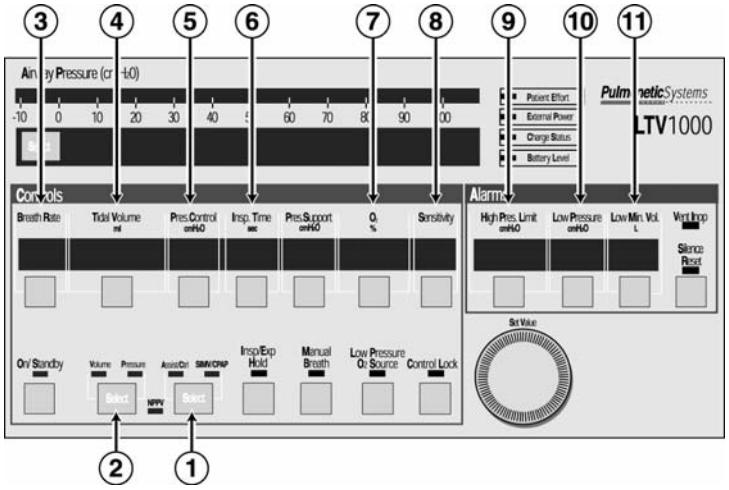
Setting Up Control Mode



To set the ventilator up in Control mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the **A**ssist/**C**ontrol mode.
2) Press the **S**elect button twice to toggle between Volume and Pressure ventilation. Select **V**olume or **P**ressure, as desired. (Not available on the LTV® 900.)
3) Set the Breath Rate.
4) If Volume ventilation is selected, set the Tidal Volume. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control. (Not available on the LTV® 900.)
6) Set the Inspiratory Time. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set O_2% (LTV® 1000 only).
8) Set the Sensitivity to Off (dash "-").
9) Set the High Pressure Limit alarm.
10) Set the Low Pressure alarm.
11) Set the Low Minute Volume alarm.
12) Set the PEEP control on the exhalation valve.

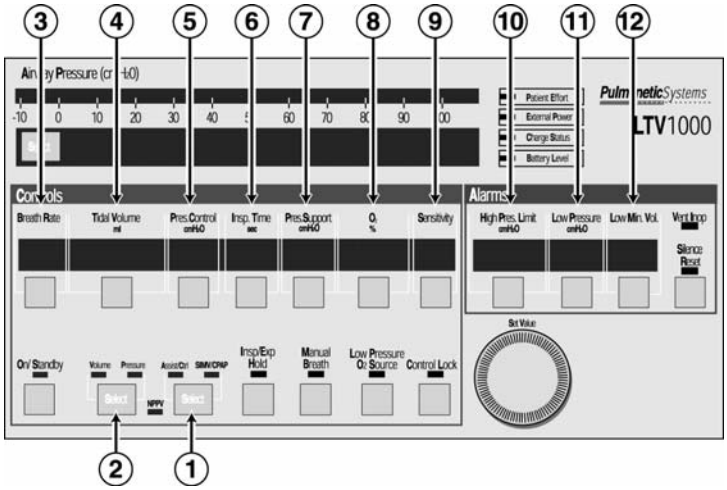
Setting Up Assist/Control Mode



To set the ventilator up in Assist/Control mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the **A**ssist/**C**ontrol mode.
2) Press the **S**elect button twice to toggle between Volume and Pressure ventilation. Select **V**olume or **P**ressure, as desired. (Not available on the LTV® 900).
3) Set the Breath Rate.
4) If Volume ventilation is selected, set the Tidal Volume. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control. (Not available on the LTV® 900.)
6) Set the Inspiratory Time. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set O_2%, (LTV® 1000 only).
8) Set the Sensitivity to a setting from 1 to 9.
9) Set the High Pressure Limit alarm.
10) Set the Low Pressure alarm.
11) Set the Low Minute Volume alarm.
12) Set the PEEP control on the exhalation valve.

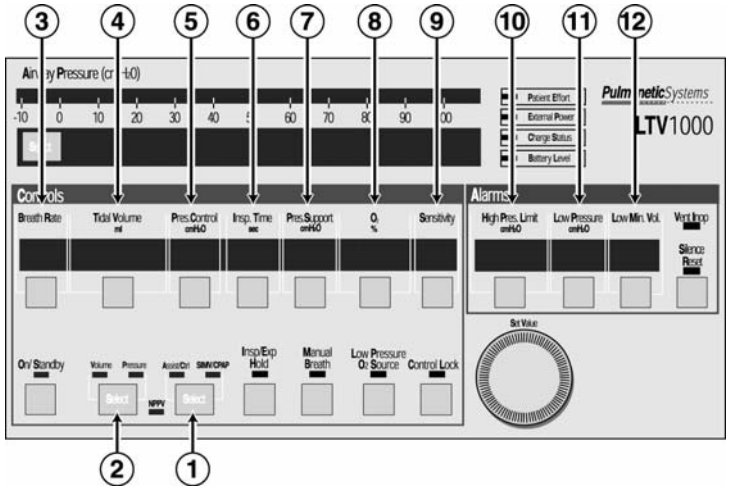
Setting Up SIMV Mode



To set the Ventilator up in SIMV mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the SIMV/CPAP mode.
2) Press the **S**elect button to toggle between Volume and Pressure ventilation. Select **V**olume or **P**ressure, as desired. (Not available on the LTV® 900).
3) Set the Breath Rate.
4) If Volume ventilation is selected, set the Tidal Volume. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control. (Not available on the LTV® 900.)
6) Set the Inspiratory Time. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set the Pressure Support, if desired.
8) Set O_2% (LTV® 1000 only).
9) Set the Sensitivity to a setting from 1 to 9.
10) Set the High Pressure Limit alarm.
11) Set the Low Pressure alarm.
12) Set the Low Minute Volume alarm.
13) Set the PEEP control on the exhalation valve.

Setting Up CPAP Mode

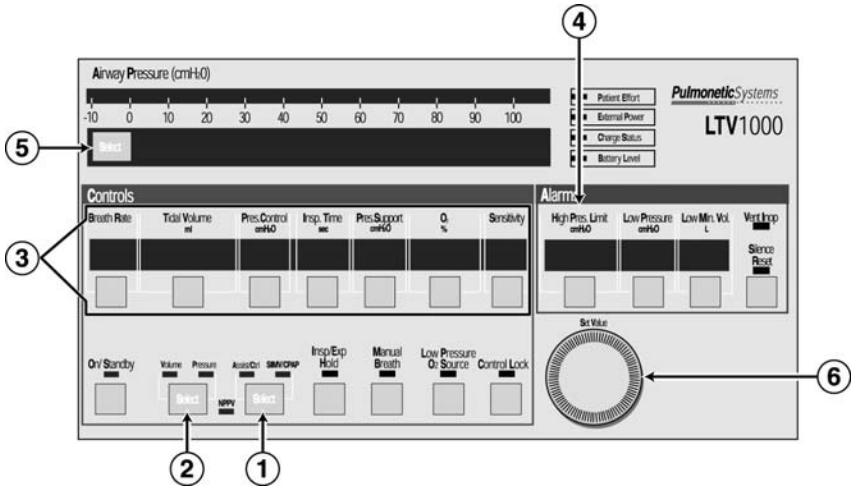


To set the ventilator up in CPAP mode:

1) Press the **S**elect button twice to toggle the modes between **A**ssist/**C**ontrol and SIMV/CPAP. Select the SIMV/CPAP mode.
2) Press the **S**elect button twice to toggle between Volume and Pressure ventilation for Apnea backup. Select **V**olume or **P**ressure for Apnea backup. (Not available on the LTV® 900).
3) Set the Breath Rate to Off (dashes "- -").
4) If Volume ventilation is selected, set the Tidal Volume for Apnea backup. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If Pressure ventilation is selected, set the Pressure Control for Apnea backup. (Not available on the LTV® 900.)
6) Set the Inspiratory Time for Apnea backup. The calculated peak flow Vcalc is displayed in the window while Inspiratory Time is being changed. Vcalc only applies to volume ventilation.
7) Set the Pressure Support, if desired.
8) Set O_2% (LTV® 1000 only).
9) Set the Sensitivity to a setting from 1 to 9.
10) Set the High Pressure Limit alarm.
11) Set the Low Pressure alarm for Apnea backup.
12) Set the Low Minute Volume alarm.
13) Set the PEEP control on the exhalation valve.

NOTE: Although Tidal Volume, Pressure Control and Insp Time are dimmed, they should be set to clinically appropriate levels as the ventilator uses these settings for Apnea back-up ventilation.

Setting Up NPPV Mode



To set the Ventilator up in NPPV mode:

1) Set the ventilator controls for Control, Assist/Control, SIMV, or CPAP mode, as described in the preceding section.
2) Set the ventilator controls for **V**olume or **P**ressure ventilation, as described in the preceding section.
3) Set all other ventilation parameters, as described in the previous section.
4) Set the High Pressure Limit alarm.
5) Enter Extended Features by pressing and holding the Monitor **S**elect button for 3 seconds.
6) Turn the **S**et **V**alue knob until **VENT OP** is displayed.
7) Press the Monitor **S**elect button.
8) Turn the **S**et **V**alue knob until **NPPV Mode** is displayed.
9) Press the Monitor **S**elect button.
10) Turn the **S**et **V**alue knob until **NPPV On** is displayed.
11) Press Monitor **S**elect button.
12) The NPPV LED will be illuminated.
13) Exit the Extended Features menus by turning the **S**et **V**alue knob until **Exit** is displayed, and pressing **S**elect button until monitored data is displayed in the window.

MONITORED DATA

The monitored data displays may be automatically scrolled or manually scrolled. To cycle through the available monitored data automatically from a halted scan, press the Monitor **S**elect button twice. Pressing the **S**elect button once while scan is active shall halt scanning and the currently display monitor shall remain in the display window. Each time you press the button once; the next data item in the list will be displayed. To resume scan, press the scan button twice. The monitored data is displayed in the following order.

Display	Description
PIP	Displays the Peak Inspiratory Pressure measured during the inspiratory phase. PIP is not updated for spontaneous breaths.
MAP	Displays a running average of the airway pressure for the last 60 seconds.
PEEP	Displays the pressure in the airway circuit at the end of exhalation.
f	Displays the breaths per minute and includes all breath types.
Vte	Displays the exhaled tidal volume as measured at the patient wye.

Display	Description
VE	Displays the exhaled tidal volume for the last 60 seconds as calculated from the last 8 breaths.
I:E	Displays the ratio between measured inspiratory time and measured exhalation time. Both normal and inverse I:E Ratios are displayed.
Vcalc	Is based on the Tidal Volume and Inspiratory Time settings. Displayed when selected and whenever Tidal Volume or Inspiratory Time is selected for change.

EXTENDED FEATURES

Navigating the Extended Features Menus:

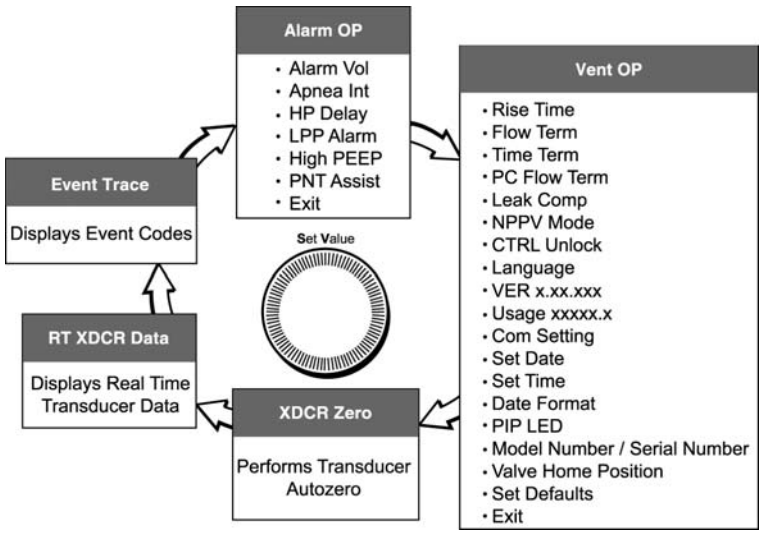
To enter the Extended Features menu (in normal ventilation mode), press and hold the Monitor **S**elect button for three seconds.

To view the next item in a menu, turn the **S**et **V**alue knob clockwise.

To view the previous item, turn the **S**et **V**alue knob counterclockwise.

To enter a menu item or select a setting, press the **S**elect button.

To exit a menu, turn the **S**et **V**alue knob until the **EXIT** option is displayed, then press the **S**elect button or press **C**ontrol **L**ock.



Alarm Operations

Alarm Volume

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed.

1) Press the **S**elect button. 

2) **VOL xx dBA** is displayed, where **xx** is the currently set volume.

3) Turn the **S**et **V**alue knob until the desired setting is displayed. 

4) Press the **S**elect button. 

Alarm Operations

Apnea Interval

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **APNEA INT** is displayed.

1) Press the **S**elect button. 

2) **APNEA xx sec** is displayed, where **xx** is the currently set Apnea interval.

3) Turn the **S**et **V**alue knob until the desired setting is displayed. 

4) Press the **S**elect button. 

Alarm Operations

High Pressure Alarm Delay

This menu item is used to select immediate or delayed audible notification for High Pressure alarms.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **HP DELAY** is displayed.

1) Press the **S**elect button. 

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **NO DELAY, DELAY 1 BRTH,** or **DELAY 2 BRTH**. 

3) Press the **S**elect button. 

Alarm Operations

Low Peak Pressure Alarm

This item is used to select the type of breaths that the Low Pressure Alarm applies to.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **LPP ALARM** is displayed.

1) Press the **S**elect button. 

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **ALL BREATHS, VC/PC ONLY**. 

3) Press the **S**elect button. 

Alarm Operations

High PEEP Alarm[1]

This menu item is used to set a high PEEP alarm value. When the current PEEP value exceeds the set high PEEP alarm value, an audible alarm will be sounded and a flashing **HIGH PEEP** message will be displayed.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **HIGH PEEP** is displayed.

1) Press the **S**elect button. 

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **HI PEEP OFF** or **PEEP xx cmH_2O**.
3) Turn the Set Value knob until the desired setting is displayed. 

4) Press the Select button. 

[1] The HIGH PEEP alarm is only available on ventilators with software version 3.15 or higher installed.

Alarm Operations

PNT Assist[2]

This menu item is used to configure the patient Assist Port output signal to be generated for use with remote alarm systems.

After accessing Extended Features, **ALARM OP** is displayed. Press the **S**elect button and **ALARM VOL** is displayed. Turn the **S**et **V**alue knob until **PNT ASSIST** is displayed.

1) Press the **S**elect button. 

2) Turn the **S**et **V**alue knob until the desired setting is displayed, **NORMAL** or **PULSE**. 

3) Press the **S**elect button. 

[2] The PNT ASSIST option is only available on ventilators with software version 3.15 or higher installed.

Alarm Operations

Exit

To return to the top of the **ALARM OP** menu:

1) Turn the **S**et **V**alue knob until **EXIT** is displayed.

2) Press the **S**elect button while **EXIT** is displayed

Ventilator Operations

Variable Rise Time

The variable Rise Time option is used to select the rise time profile for Pressure Control and Pressure Support breaths. The rise time profiles are numbered 1 through 9, where 1 is the fastest rise time and 9 is the slowest rise time.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button, and **RISE TIME** is displayed.

1) Press the **S**elect button.

2) **PROFILE x** is displayed, where **x** is the currently set value.

3) Turn the **S**et **V**alue knob until the desired Rise Time Profile is displayed.

4) Press the **S**elect button.

Ventilator Operations

Variable Flow Termination

The Variable Flow Termination is used to select the percentage of peak flow used for cycling Pressure Support breaths. Pressure Support breaths are cycled from inspiration to exhalation when the flow reaches the set percentage of the peak flow, or when flow goes below 2 lpm.

When Pressure Control Flow Termination is enabled, the Variable Flow Termination setting is used for flow termination of Pressure Control breaths as well.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **FLOW TERM** is displayed. 

2) Press the **S**elect button. 

3) **% OF PEAK xx** is displayed, where **xx** is the current Flow Termination setting.
4) Turn the **S**et **V**alue knob until the desired Flow Termination percentage is displayed. 

5) Press the **S**elect button. 

Ventilator Operations

Variable Time Termination

The Variable Time Termination is used to select maximum inspiratory time for cycling Pressure Support breaths. Pressure Support breaths are cycled from inspiration to exhalation, if this time is reached before the flow reaches the set percentage of the peak flow. When a breath is cycled based on the time setting, the Pressure Support display is flashed briefly.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **TIME TERM** is displayed. 

2) Press the **S**elect button. 

3) **TERM x.x sec** is displayed, where **xx** is the current Time Termination setting.
4) Turn the **S**et **V**alue knob until the desired Time Termination is displayed. 

5) Press the **S**elect button. 

Ventilator Operations

Pressure Control Flow Termination

The Pressure Control Flow Termination option is used to enable or disable flow termination for Pressure Control breaths.

When this option is on, Pressure Control breaths are cycled at the set percentage of peak flow, if it is reached before the set Inspiratory Time elapses. The percentage of peak flow is set in the Variable Flow Termination option.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **PC FLOW TERM** is displayed.
2) Press the **S**elect button.

3) **PC FLOW ON** or **PC FLOW OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired state is displayed.
5) Press the **S**elect button.

Ventilator Operations

Leak Compensation

Use the Leak Compensation option to enable or disable tracking of the Baseline Flow to improve triggering when a circuit leak is present.

When Leak Compensation is on, the system is gradually adjusted to maintain set sensitivity, if the leak is stable and there is no auto cycling.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **LEAK COMP** is displayed.

2) Press the **S**elect button.

3) **LEAK COMP ON** or **LEAK COMP OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired state is displayed.

5) Press the **S**elect button.

Ventilator Operations

NPPV Mode

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until the **NPPV MODE** is displayed.

2) Press the **S**elect button.

3) **NPPV MODE ON** or **NPPV MODE OFF** is displayed.

4) Turn the **S**et **V**alue knob until the desired state is displayed.

5) Press the **S**elect button.

Ventilator Operations

Control Unlock

When the Easy method is selected, unlock the controls by pressing and releasing the **C**ontrol **L**ock button.

When the Hard method is selected, unlock the controls by pressing and holding the **C**ontrol **L**ock button for 3 seconds.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **CTRL UNLOCK** is displayed.

2) Press the **S**elect button.

3) **UNLOCK EASY** or **UNLOCK HARD** is displayed.

4) Turn the **S**et **V**alue knob until the desired setting is displayed.

5) Press the **S**elect button.

Ventilator Operations

Language Selection

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **LANGUAGE** is displayed.

2) Press the **S**elect button.

3) **ENGLISH** or the currently selected language is displayed.

4) Turn the **S**et **V**alue knob until the desired language is displayed.

5) Press the **S**elect button.

Ventilator Operations

Software Versions

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button. Turn the **S**et **V**alue knob until **VER xx.xx.xx** is displayed, where **xx.xx.xx** is the current software version.

Usage Meter

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button. Turn the **S**et **V**alue knob until **USAGE xxxxx.x** is displayed, where **xxxxx.x** is the current number of hours the ventilator has been in operation.

Ventilator Operations

Communications Setting

The ventilator may be connected to printer, a graphics monitor, or a modem. The Communications Setting option is used to select the communications protocol for data transmission.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **COM SETTING** is displayed.

2) Press the **S**elect button.

3) **MONITOR** or the currently selected protocol is displayed.
4) Turn the **S**et **V**alue knob until the desired protocol is displayed.

5) Press the **S**elect button.

Ventilator Operations

Set Date

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **SET DATE** is displayed.

2) Press the **S**elect button.

3) The current date is displayed in the currently selected date format.
4) Press the **C**ontrol **L**ock button to exit, or continue to modify the Date.

To modify the Date:

1) Press the **S**elect button, **YEAR xxxx** is displayed.

2) Turn the **S**et **V**alue knob until the desired year is displayed.
3) Press the **S**elect button, **MONTH xx** is displayed.
4) Turn the **S**et **V**alue knob until the desired month is displayed.
5) Press the **S**elect button, **DAY xx** is displayed.
6) Turn the **S**et **V**alue knob until the desired day is displayed.
7) Press the **S**elect button to accept the new date.

Ventilator Operations

Set Time

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **SET TIME** is displayed.

2) Press the **S**elect button.

3) The current time is displayed.
4) Press the **C**ontrol **L**ock button to exit, or

To modify the Time:

1) Press the **S**elect button, **HOUR xx** is displayed.

2) Turn the **S**et **V**alue knob until the desired hour is displayed.

3) Press the **S**elect button, **MIN xx** is displayed.
4) Turn the **S**et **V**alue knob until the desired minute is displayed.
5) Press the **S**elect button to accept the new time. The seconds are automatically reset to **00**.

Ventilator Operations

Date Format

The Date Format option is used to select the display format for the current date.

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **DATE FORMAT** is displayed.

2) Press the **S**elect button.

3) **MM/DD/YYYY** or the currently selected date format is displayed.
4) Turn the **S**et **V**alue knob until the desired format is displayed.

5) Press the **S**elect button.

Ventilator Operations

PIP LED

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

1) Turn the **S**et **V**alue knob until **PIP LED** is displayed.

2) Press the **S**elect button.

3) **PIP LED ON** or **PIP LED OFF** is displayed.
4) Turn the **S**et **V**alue knob until the desired setting is displayed.

5) Press the **S**elect button.

Ventilator Operations

Model Number / Serial Number

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

To view the LTV® model number:

Turn the **S**et **V**alue knob until **LTV XXXX** is displayed, where **XXXX** is the model of the ventilator.

To view the LTV® serial number:

1) Press the **S**elect button while **LTV XXXX** is displayed.

   - The serial number is displayed on the left side of the display area as **XXXXXX**, where **XXXXXX** is the serial number of the ventilator.
2) Press the **S**elect button to return to the model number option.

To view LTM™ compatibility:

1) Press the **S**elect button while **LTV XXXX** is displayed.

   - **LTM** will be displayed if software and internal hardware in the LTV® Ventilator are LTM™ compatible.
2) Press the **S**elect button to return to the model number.

Ventilator Operations

Valve Home Position

After accessing Extended Features, **ALARM OP** is displayed. Turn the **S**et **V**alue knob until **VENT OP** is displayed. Press the **S**elect button.

To view the valve home position:

Turn the **S**et **V**alue knob until **Vhome XXX** is displayed, where **XXX** is the home position for the flow valve installed in the ventilator.

Set Defaults

The Set Defaults option is only displayed and accessed through the **VENT CHECK** and **VENT MTNCE** menus and is used to reset user settable Controls and Extended Features settings to their factory-set default values. See *Ventilator Checkout Tests, Set Defaults* for instructions on how to set default values and the *LTV® Series Ventilators Operator's Manual* for factory-set default values.

Ventilator Operations

Exit

To return to the top of the VENT OP menu:

1) Turn the **S**et **V**alue knob until **EXIT** is displayed.

2) Press the **S**elect button.

XDCR ZERO

This item is used to view the Transducer Autozero results and schedule the Transducer Autozero to be run (please refer to the Operator's Manual).

Ventilator Operations

RT XDCR DATA

This menu displays the Real Time Transducer Data (please see the Service Manual for more information).

EVENT TRACE

This menu displays the Events Codes stored by the ventilator (please see the Service Manual for more information).

Ventilator Operations

Exiting Extended Features

To return to Monitored Parameters:

1) Turn the **S**et **V**alue knob until **EXIT** is displayed.

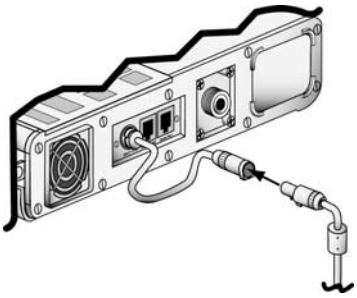
2) Press the **S**elect button.

3) Repeat Steps 1 and 2 until the Monitored Parameters are displayed.

USING AC/DC POWER

Using the AC Adapter

To run the ventilator from an external AC power source.



1) Connect the power jack (straight or 90°) from the AC adapter to the power port (earlier version ventilators) or power port pigtail connector (current version ventilators) on the left side of the ventilator.
2) Connect the proper AC power cable (110 or 220 V plug) to the AC power adapter.
3) Connect the 110 or 220 V power cable to a suitable power source.

While the ventilator is plugged in, the internal battery is continuously charged.

CAUTION: Release Button – To avoid damaging the ventilator or the power connector, press the release button on the connector before removing it from the ventilator power port pigtail connector.

Using an External DC Power Source

To run the ventilator from an external DC power source.

1) Connect the power port of the external DC power adapter cable to the power port on the left side of the ventilator (earlier version ventilators), or the power port pigtail connector (current version ventilators).
2) Connect the DC jack to the DC power source.

POWER DISPLAYS AND INDICATORS

Indicators

Battery Level 

The Battery Level indicator shows the level of available internal battery power while running from the internal battery.

LED Color	Battery Level	Approximate Battery Time @ nominal settings
Green	Internal battery level is acceptable	45 minutes
Amber	Internal battery level is low	10 minutes
Red	Internal battery level is critically low	5 minutes
Off	Ventilator is running on AC or External Battery	

Indicators

Charge Status 

When the ventilator is plugged into an External Power source, it automatically charges the internal battery.

LED Color	Charge Status
Flashing Amber	The ventilator is performing pre-charge qualification testing of the battery prior to starting the charge process. This happens when external power is first applied to the ventilator. The qualification process normally takes a few seconds but may take up to an hour on a deeply discharged battery.
Green	The internal battery is charged to full level.
Amber	The battery has not reached a full charge level and is still charging.
Red	The ventilator has detected a charge fault or internal battery fault. The internal battery cannot be charged. Contact your Pulmonetic Systems Certified Service Technician.

Indicators

External Power 

The External Power indicator shows the level of external power while the ventilator is operating from an external power source. When the ventilator is running from the internal battery, the External Power indicator is off. When running from external power, the indicator shows the following levels.

LED Color	Power Level
Green	External Power level is acceptable
Amber	External Power level is low

External power may be provided by connecting the ventilator to an external battery or to an external AC power source.

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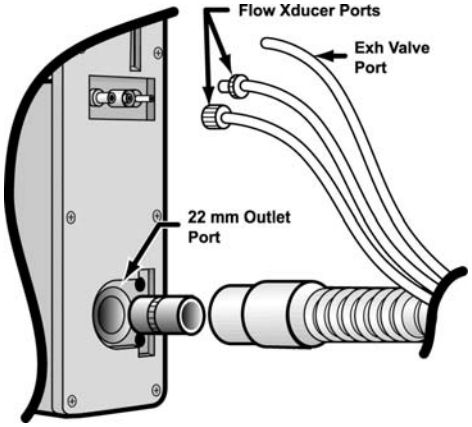
ATTACHING A BREATHING CIRCUIT

How to attach a patient breathing circuit.

1) Connect the main breathing tube to the 22 mm outlet port on the right side of the ventilator.
2) Connect the two exhalation flow transducer sense lines to the ports marked **Flow Xducer** on the right side of the ventilator. These are non-interchangeable Luer fittings.
3) Connect the Exhalation Valve driver line to the port marked **Exh Valve** on the right side of the ventilator.



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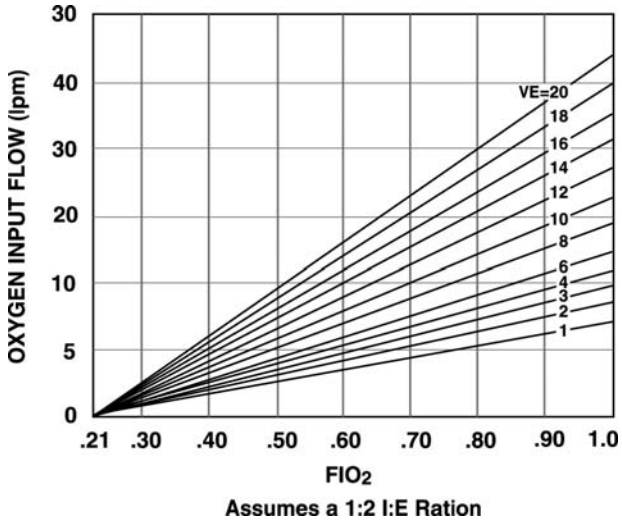
OXYGEN COMPUTER CHART



Oxygen Computer Chart

To determine O2 Input Flow:

1) Find the desired FIO_2 on the horizontal axis.
2) Project up to the minute volume.
3) Project horizontally to the left vertical axis and read the oxygen flow.

To determine O_2 Concentration:

1) Find the O_2 input flow on the vertical axis.
2) Project horizontally right to the minute volume.
3) Project vertically down to the horizontal axis and read the FIO_2.

ALARMS

How to Silence and Reset Alarms

To silence an alarm, press the **S**ilence **R**eset button.
To reset an alarm that has been corrected, press the **S**ilence **R**eset button again.

Alarm	Cause	Solution
APNEA XX bpm	Occurs when the time since the last breath start exceeds the set Apnea Interval. When an Apnea alarm occurs, the ventilator will enter Apnea Back up ventilation mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.
APNEA	An Apnea alarm has occurred and cleared The ventilator is no longer in Apnea Back-up mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.

Alarm	Cause	Solution
BAT EMPTY	Occurs when the ventilator is operating from the internal battery power and the batter charge level is critically low. This alarm can be temporarily silenced but cannot be cleared.	Attach the ventilator to external AC or DC power.
BATTERY LOW	Occurs when the ventilator is operating from internal battery power and the battery charge level is low.	Attach the ventilator to external AC or DC power. Reevaluate power requirements.
DEFAULTS	Occurs during POST when the ventilator detects an invalid setting stored in non-volatile memory.	Push the **S**ilence/**R**eset button twice to reset alarm. Reevaluate ventilator settings.
DEFAULTS SET	Occurs when the ventilator is first powered up after the **SET DEFAULTS** option has been used to reset all controls and extended features settings to their factory-set default values.	Push the **S**ilence/**R**eset button twice to reset alarm. Reevaluate ventilator settings.

Alarm	Cause	Solution
DISC/SENSE	Occurs when the ventilator detects one of the following conditions: • The patient circuit or proximal pressure sense line has become disconnected. • The low side exhalation flow transducer sense line has become disconnected. • The proximal pressure sense line is pinched or occluded.	Check Patient Circuit assembly for disconnects. Check pressure sensing lines for occlusions.
HIGH O_2 PRES	Occurs when the average oxygen inlet pressure exceeds the acceptable limit for the type of oxygen source.	Reduce O_2 inlet pressure.

Alarm	Cause	Solution
HIGH PEEP[3]	Occurs when the ventilator detects one of the following conditions: • The patient circuit positive end expiratory pressure (PEEP) exceeds the High PEEP alarm setting. • Patient Circuit, Exhalation valve and/or PEEP valve occluded.	Reevaluate ventilator settings. Disassemble, clean and reassemble the Patient Circuit, Exhalation Valve and PEEP Valve.
HIGH PRES	Occurs when the circuit pressure exceeds the set High Pressure Limit setting.	Reevaluate ventilator settings. Inspect Patient Circuit for occlusions or kinks. Reevaluate patient.
HW Fault	Occurs when the ventilator detects a problem with the ventilator hardware.	If alarm reoccurs, contact your Service Rep or Pulmonetic Systems.

[3] The **HIGH PEEP** alarm is only available on ventilators with software version 3.15 or higher installed.

Alarm	Cause	Solution
INOP  	A ventilator INOP occurs when: • The ventilator is switched from On to Standby. • The ventilator detects any condition that is deemed to make the ventilator unsafe.	If an INOP alarm occurs during operation, remove ventilator from service and contact your Service Rep.
LOCKED	The **LOCKED** message is displayed when a button is pressed while the controls are locked. No audible alarm is given.	Press the **C**ontrol **L**ock button. If locked alert continues, press and hold the **C**ontrol **L**ock button for three seconds.
LOW MIN VOL	Occurs when the exhaled minute volume is less than the set Low Minute Volume.	Examine Exhalation Valve body for disconnects. Reevaluate patient.

Alarm	Cause	Solution
LOW O_2 PRES	Occurs when the average oxygen inlet pressure is less than the minimum acceptable inlet pressure of 35 PSIG.	Increase O_2 inlet pressure. If using O_2 cylinder, replace used cylinder with a new one.
LOW PRES	Occurs when the peak inspiratory pressure for a machine or assist breath is less than the Low Pressure setting.	Examine Patient Circuit for disconnect. Reevaluate ventilator settings. Reevaluate patient.
NO CAL DATA, NO CAL	Occurs when the ventilator detects invalid or missing calibration records on power up.	Remove ventilator from service, perform Calibration procedure.
POWER LOST	Occurs when the ventilator is operating on external power and the voltage drops below the useable level and switches to internal battery operation.	Evaluate power requirements. Attach ventilator to an external AC or DC power source.

Alarm	Cause	Solution
POWER LOW	Occurs when the ventilator is operating on external power and the voltage drops to the low level.	Evaluate power requirements.
REMOVE PTNT	Occurs when the ventilator is powered up in the Ventilator Checkout or Ventilator Maintenance modes. The ventilator is not delivering gas.	Ensure patient is disconnected from ventilator and is being ventilated by alternative means.
RESET	A **RESET** alarm occurs if the ventilator restarts following a condition other than being shut down by pressing the On/Standby button.	May be caused by Internal Battery depletion during operation[4] or ESD. If the problem reoccurs, remove from service and contact your Service Rep or Pulmonetic Systems

[4] Only available on ventilators with software version 3.13 or higher installed.

Alarm	Cause	Solution
XDCR FAULT	Occurs when a transducer autozero test fails.	Press **S**ilence/**R**eset button twice to reset alarm. If problem occurs frequently, remove from service and contact your Service Rep. or Pulmonetic Systems.

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LTV® 1200/1150 Ventilators

Quick Reference Guide

CardinalHealth

P/N 18409-001 Rev. A

ASSISTANCE

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Pulmonetic Systems
17400 Medina Rd., Suite 100
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Fax: (763) 398-8403
Website: www.cardinalhealth.com/viasys

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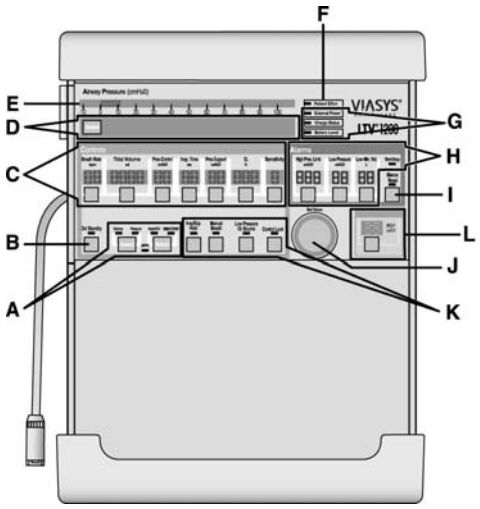
FRONT AND SIDE PANEL REFERENCE

Front Panel Display and Description (LTV® 1200 shown)



A - **Mode and Breath Selection** – Selects ventilation modes, and selects breath types.

B - **On/Standby Button** – Turns the ventilator “On” or to “Standby”.

C - **Variable Control Settings** – Sets and displays each ventilation characteristic.

D - **Display Window** – Displays Alarm Messages, Monitored Data, and Extended Features menus.

E - **Airway Pressure Display** – Displays real-time airway circuit pressure.

F - **Patient Effort Indicator** – LED is lit briefly each time a patient trigger is detected.

G - **Power Source** – Displays power source and charge levels.

H - **Variable Alarm Settings** – Sets and displays variable alarm levels.

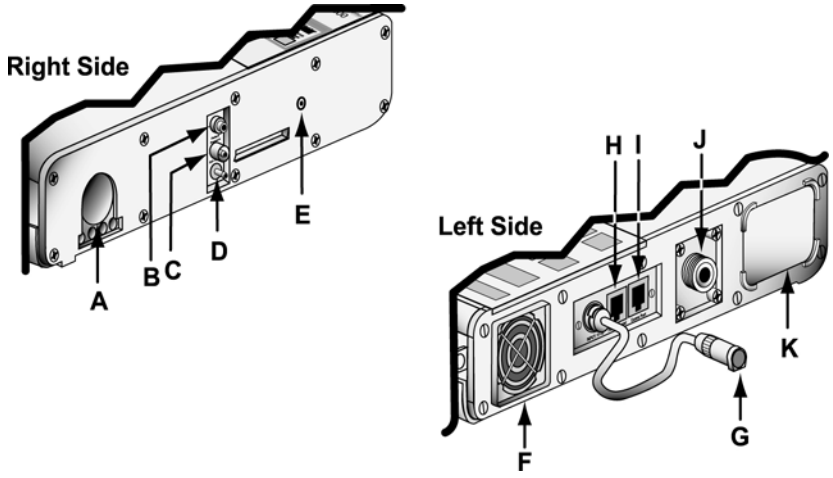
I - **Alarm Silence/Reset** – Silences audible alarms. Clears visual alarms.

J - **Set Value Knob** – Changes variable control settings. Navigates Extended Features.

K - **Special Controls** – Activates special controls such as Manual Breath, Low Pressure O_2 Source (LTV® 1200 only), Insp/Exp Hold and Control Lock feature.

L - **PEEP** – PEEP control setting and display.

Side Panel Descriptions



A - **22mm Outlet Port** – Patient Breathing Circuit outlet port.
B - **Flow Xducer** – Flow Transducer high pressure sensing port.
C - **Flow Xducer** – Flow Transducer low pressure sensing port.
D - **Exh Valve** – Exhalation Valve drive line port.
E - **Alarm Sounder Port**
F - **Cooling Fan**
G - **DC Input** – DC power port pigtail connector.
H - **Patient Assist** – Patient Assist Call jack.
I - **Comm Port** – Communications port.
J - **O_2 Inlet** – Oxygen Inlet fitting.
K - **Filter** – Air Inlet.

TURNING THE VENTILATOR ON AND OFF

Turning the Ventilator On

1) Push the **On/Standby** button.

If the Patient Query feature is enabled/on when the ventilator is powered up, ventilation and alarm activation are suspended and the message **SAME PATIENT** is displayed.

- To enable the suspended alarms and begin ventilation with the settings in use during the last power cycle, press the **Select** button while **SAME PATIENT** is displayed.
- To enable the suspended alarms and begin ventilation with Preset values appropriate for a new patient, turn the **Set Value** knob until **NEW PATIENT** is displayed and press the **Select** button. Then turn the **Set Value** knob until the desired patient type is displayed (**INFANT, PEDIATRIC** or **ADULT**) and press the **Select** button (see the *LTV® 1200 or LTV® 1150 Operator's Manual,* Chapter 10, for detailed settings and information).

If the Patient Query feature is disabled/off when the ventilator is powered up and passes POST, it will begin ventilation (appropriate alarms enabled) using the settings in use during the last power cycle.

Turning the Ventilator Off

To turn the ventilator off:

1) **Disconnect the patient from the ventilator**.

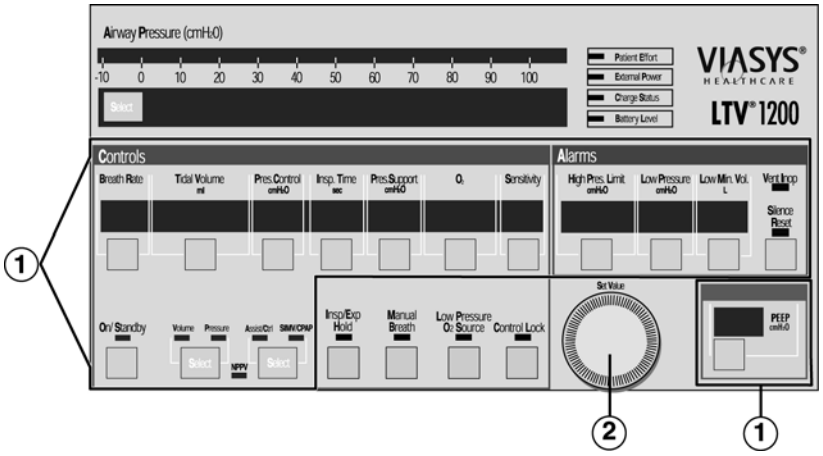
2) Press and hold the **On/Standby** button for 3 seconds. The ventilator ceases operating, the audible alarm sounds continuously and the **Vent Inop** LED is lit.

3) Press the **Silence/Reset** button to silence the audible alarm.
   - Verify a confirming audible chirp is activated immediately after the alarm is silenced.

4) The ventilator continues to charge the internal battery as long as it is connected to an external power source.

   Note: The **Vent Inop** LED will remain lit for a minimum of 5 minutes and does not impact battery life.

VARIABLE CONTROLS



To set a variable control:

1) Select the control by pressing the associated button. The display for the selected control will be displayed at normal brightness and all other control displays will be dimmed.

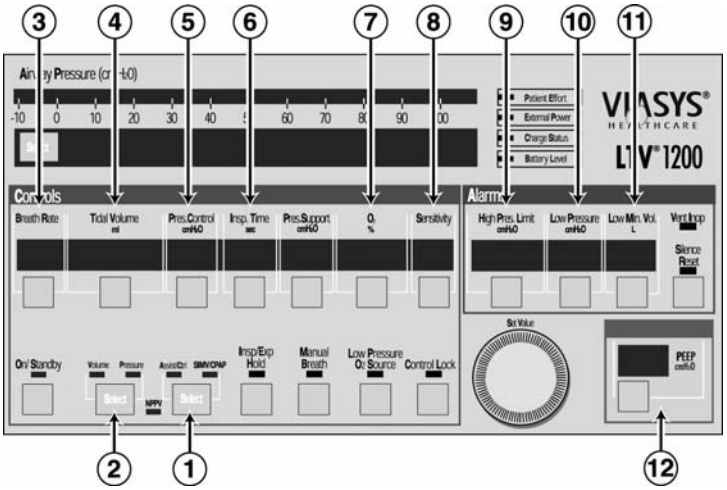
2) Change the control value by rotating the **Set Value** Knob. Rotate clockwise to increase and counter-clockwise to decrease the value.

3) The new control value goes into effect when the operator:
   - Presses the selected button again, or
   - Selects another control, or
   - Presses the **Control Lock** button, or
   - Waits 5 seconds

All controls will then return to their normal brightness.

SETTING UP MODES OF VENTILATION

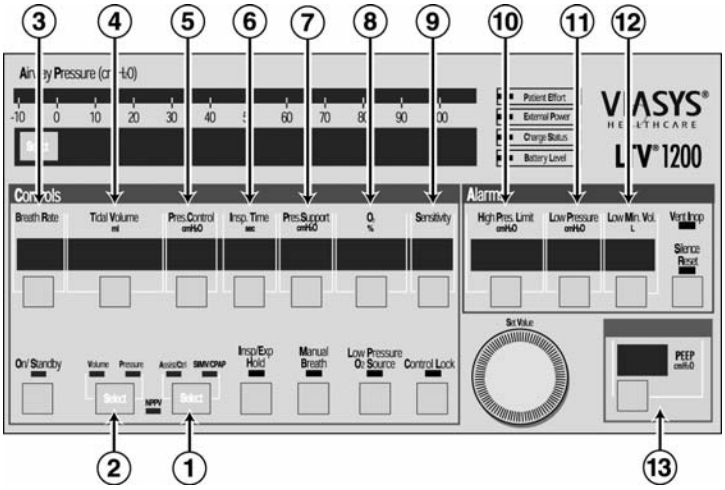
Setting Up Assist/Control Mode



Setting Up the Ventilator in Assist/Control Mode:

1) Press the **Select** button twice to toggle the modes between **Assist/Control** and **SIMV/CPAP**. Select the **Assist/Control** mode.
2) Press the **Select** button twice to toggle between **Volume** and **Pressure** ventilation. Select **Volume** or **Pressure**, as desired.
3) Set the **Breath Rate**.
4) If **Volume** ventilation is selected, set the **Tidal Volume**. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If **Pressure** ventilation is selected, set the **Pressure Control**.
6) Set the **Inspiratory Time**. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set **O_2%** (LTV® 1200 only).
8) Set the **Sensitivity** to a setting from 1 to 9.
9) Set the **High Pres. Limit** alarm.
10) Set the **Low Pressure** alarm.
11) Set the **Low Min. Vol.** alarm.
12) Adjust the **PEEP** control.

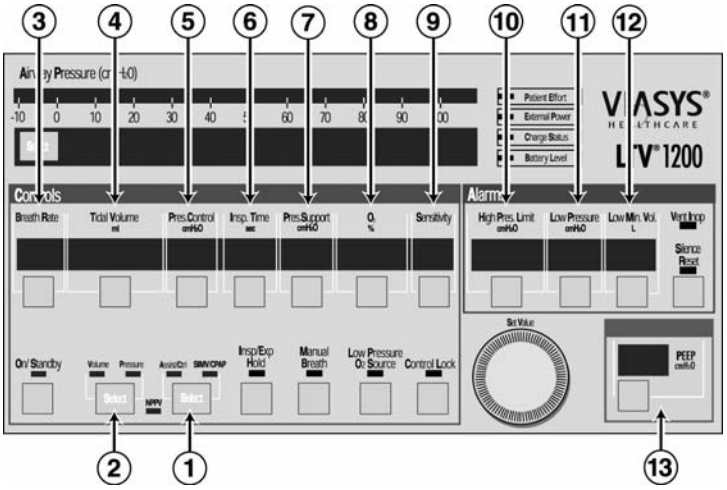
Setting Up SIMV Mode



To set the Ventilator up in SIMV mode:

1) Press the **Select** button twice to toggle the modes between **Assist/Control** and **SIMV/CPAP**. Select the **SIMV/CPAP** mode.
2) Press the **Select** button to toggle between **Volume** and **Pressure** ventilation. Select **Volume** or **Pressure**, as desired.
3) Set the **Breath Rate**.
4) If **Volume** ventilation is selected, set the **Tidal Volume**. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If **Pressure** ventilation is selected, set the **Pressure Control**.
6) Set the **Inspiratory Time**. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set the **Pressure Support**, if desired.
8) Set **O_2%** (LTV® 1200 only).
9) Set the **Sensitivity** to a setting from 1 to 9.
10) Set the **High Pres. Limit** alarm.
11) Set the **Low Pressure** alarm.
12) Set the **Low Min. Vol.** alarm.
13) Adjust the **PEEP** control.

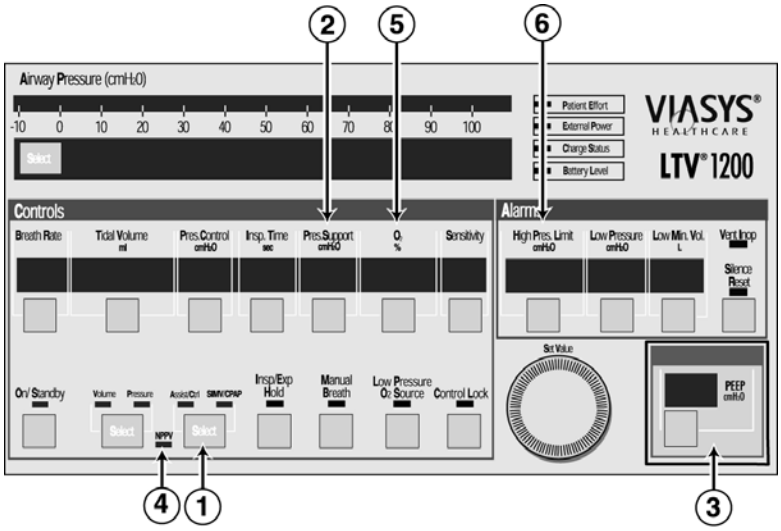
Setting Up CPAP Mode



To set the ventilator up in CPAP mode:

1) Press the **Select** button twice to toggle the modes between **Assist/Control** and **SIMV/CPAP**. Select the **SIMV/CPAP** mode.
2) Press the **Select** button twice to toggle between **Volume** and **Pressure** ventilation for Apnea backup. Select **Volume** or **Pressure** for Apnea backup.
3) Set the **Breath Rate** to Off (dashes "**- -**").
4) If **Volume** ventilation is selected, set the **Tidal Volume** for Apnea backup. The calculated peak flow **Vcalc** is displayed in the window while Tidal Volume is being changed.
5) If **Pressure** ventilation is selected, set the **Pressure Control** for Apnea backup.
6) Set the **Inspiratory Time** for Apnea backup. The calculated peak flow **Vcalc** is displayed in the window while Inspiratory Time is being changed. **Vcalc** only applies to volume ventilation.
7) Set the **Pressure Support**, if desired.
8) Set **O_2%** (LTV® 1200 only).
9) Set the **Sensitivity** to a setting from 1 to 9.
10) Set the **High Pres. Limit** alarm.
11) Set the **Low Pressure** alarm for Apnea backup.
12) Set the **Low Min. Vol.** alarm.
13) Adjust the **PEEP** control.

Setting Up NPPV Mode



To set the Ventilator up in NPPV mode:

Set any desired Extended Features options and:

1) Push the **Assist/Control**, **SIMV/CPAP** mode button until the **NPPV** LED flashes. Press the button once more to confirm. The **NPPV** LED continues to flash and **SET IPAP** displays. The **Pres. Support** control display is bright and all other controls dim.
2) Turn the **Set Value** knob to adjust the IPAP value (shown in **Pres. Support** LED window). Press the **Pres. Support** button to confirm, **SET EPAP** will display. The **PEEP** control display is bright and all other controls are dim.
3) Turn the **Set Value** knob to adjust the EPAP value (shown in the **PEEP** LED window). Press the **PEEP** button to confirm.
4) The **PEEP** button push confirms **NPPV** operation and LED then turns solid.
5) Set **O_2%** (LTV® 1200 only).
6) Set the **High Pres. Limit** alarm.

MONITORED DATA

The monitored data displays may be automatically scrolled or manually scrolled. To cycle through the available monitored data automatically from a halted scan, press the Monitor **Select** button (left of display window) twice. Pressing the **Select** button once while scan is active shall halt scanning and the currently display monitor shall remain in the display window. Each time you press the button once; the next data item in the list will be displayed. To resume scan, press the **Select** button twice within 0.3 seconds. The monitored data is displayed in the following order:

Display	Description
PIP	Displays the Peak Inspiratory Pressure measured during the inspiratory phase. PIP is not updated for spontaneous breaths.
MAP	Displays a running average of the airway pressure for the last 60 seconds.
PEEP	Displays the pressure in the airway circuit at the end of exhalation.
f	Displays the breaths per minute and includes all breath types.
Vte	Displays the exhaled tidal volume as measured at the patient wye.
VE	Displays the exhaled tidal volume for the last 60 seconds as calculated from the last 8 breaths.

Display	Description
I:E	Displays the ratio between measured inspiratory time and measured exhalation time. Both normal and inverse I:E Ratios are displayed.
I:Ecalc	Displays the ratio between the set Breath Rate and Inspiratory Time. The display is updated in real-time while the Breath Rate setting is being changed.
Vcalc	Is based on the Tidal Volume and Inspiratory Time settings. Displayed when selected and whenever Tidal Volume or Inspiratory Time is selected for change.
SBT min	Displays the time remaining until the number of minutes preset in the SBT OP, MINUTES menu have elapsed. (Only displayed in the SBT mode of ventilation.)
f/Vt f	f/Vt is computed every time the Total Breath Rate (f) or Total Minute Volume (VE) is calculated. (Only displayed when SBT mode is selected.)

EXTENDED FEATURES

Navigating the Extended Features Menus:

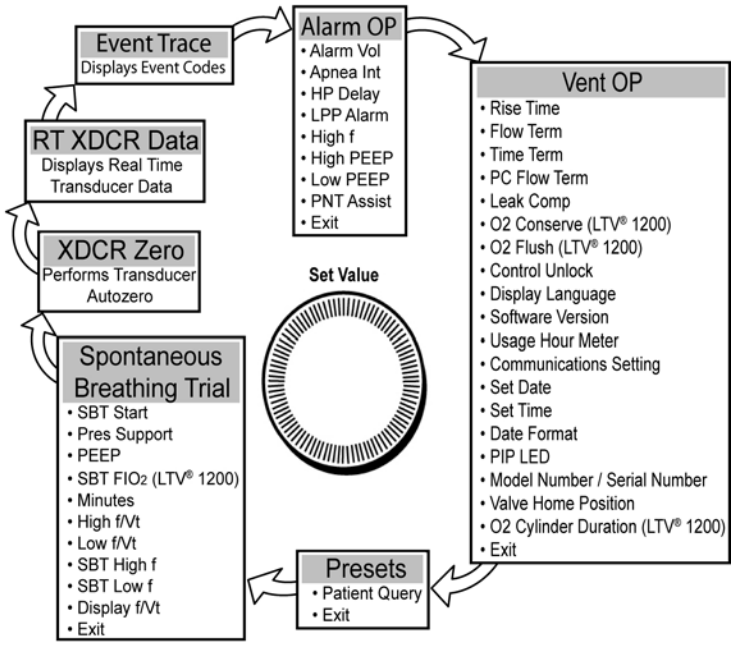
To enter the Extended Features menu (in normal ventilation mode), press and hold the Monitor **Select** button for three seconds.

To view the next item in a menu, turn the **Set Value** knob clockwise.

To view the previous item, turn the **Set Value** knob counterclockwise.

To enter a menu item or select a setting, press the **Select button**.

To exit a menu, turn the **Set Value** knob until the **EXIT** option is displayed, then press the Select button or press **Control Lock**.



SBT (Spontaneous Breathing Trial)

Using the Spontaneous Breathing Trial option you can temporarily minimize ventilatory support and perform clinical assessments of a patient's dependence on, or ability to be removed from positive pressure ventilation. SBT mode should be used only while attended by a Respiratory Therapist or other properly trained and qualified personnel (please refer to the *LTV® 1200 or LTV® 1150 Operator's Manual*, Chapter 10, for more information).

When the Spontaneous Breathing Trial mode is turned on (**SBT ON** selected);

- The ventilator switches to CPAP mode.
- Pressure Support and F_{iO_2} control settings on the front panel are overridden with the values preset in the SBT OP menus.
- The High Breath Rate alarm (**HIGH f**) in the **ALARM OP** menu is disabled (as long as the SBT mode is on).

SBT (Spontaneous Breathing Trial)

To modify the Spontaneous Breathing Trial settings:

1) Turn the **Set Value** knob until **SBT START** is displayed, push the **Select** button, and **SBT OFF** or **SBT ON** is displayed.
   Turn the **Set Value** knob until the desired setting is displayed, and push the **Select** button.

- When **SBT ON** is selected, the Spontaneous Breathing Trial ventilation mode is turned on using the current SBT menu settings. If the SBT menu settings were not previously reset, the factory set default settings will be used. **<u>All</u> SBT menu settings are to be reviewed for applicability and/or set as necessary, <u>prior</u> to selecting the SBT ON menu option.**
- When the Spontaneous Breathing Trial ventilation mode is active and **SBT OFF** is selected, the Spontaneous Breathing Trial ventilation mode is terminated and ventilation returns to the previously set modes/settings.

SBT (Spontaneous Breathing Trial)

2) **SBT Menu Options**

SBT OP
- **SBT START**
- **PRES SUPPORT**
- **PEEP**
- **SBT FIO2** (LTV® 1200 only)
- **MINUTES**
- **HIGH f/Vt**
- **LOW f/Vt**
- **SBT HIGH f**
- **SBT LOW f**
- **DISPLAY f/Vt**
- **EXIT**

Turn the **Set Value** knob until desired SBT menu option is displayed, push the **Select** button and the value setting is displayed.

Turn the **Set Value** knob until the desired setting is displayed, push the **Select** button, and the desired value is set.

EXTENDED FEATURES

Exiting Extended Features

To return to Monitored Parameters:

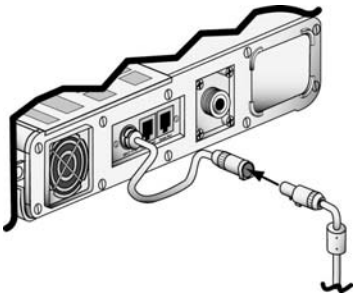
1) Turn the **Set Value** knob until **EXIT** is displayed.

2) Press the **Select** button.

3) Repeat Steps 1 and 2 until the Monitored Parameters are displayed.

USING AC/DC POWER

Using the AC Adapter



To run the ventilator from an external AC power source.

1) Connect the power jack (straight or 90°) from the AC adapter to the power port pigtail connector on the left side of the ventilator.
2) Connect the proper AC power cable (110 or 220 V plug) to the AC power adapter.
3) Connect the 110 or 220 V power cable to a suitable power source.

While the ventilator is plugged in, the internal battery is continuously charged.

CAUTION: Release Button – To avoid damaging the ventilator or the power connector, press the release button on the connector before removing it from the ventilator power port pigtail connector.

Using an External DC Power Source

To run the ventilator from an external DC power source.

1) Connect the power port of the external DC power adapter cable to the power port pigtail connector on the left side of the ventilator.
2) If applicable, connect the DC jack to the DC power source.

POWER DISPLAYS AND INDICATORS

Indicators

Battery Level 

The Battery Level indicator shows the level of available internal battery power while running from the internal battery.

LED Color	Battery Level	Approximate Battery Time @ nominal settings
Green	Internal battery level is acceptable	45 minutes
Amber	Internal battery level is low	10 minutes
Red	Internal battery level is critically low	5 minutes
Off	Ventilator is running on AC or External Battery	

Indicators

Charge Status 

When the ventilator is plugged into an External Power source, it automatically charges the internal battery.

LED Color	Charge Status
Flashing Amber	The ventilator is performing pre-charge qualification testing of the battery prior to starting the charge process. This happens when external power is first applied to the ventilator. The qualification process normally takes a few seconds but may take up to an hour on a deeply discharged battery.
Green	The internal battery is charged to full level.
Amber	The battery has not reached a full charge level and is still charging.
Red	The ventilator has detected a charge fault or internal battery fault. The internal battery cannot be charged. Contact a Pulmonetic Systems Certified Service Technician.

POWER DISPLAYS AND INDICATORS

Indicators

External Power 

The External Power indicator shows the level of external power while the ventilator is operating from an external power source. When the ventilator is running from the internal battery, the External Power indicator is off. When running from external power, the indicator shows the following levels.

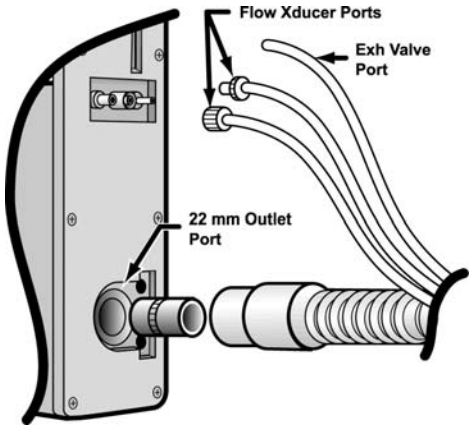
LED Color	Power Level
Green	External Power level is acceptable
Amber	External Power level is low

External power may be provided by connecting the ventilator to an external battery or to an external AC power source.

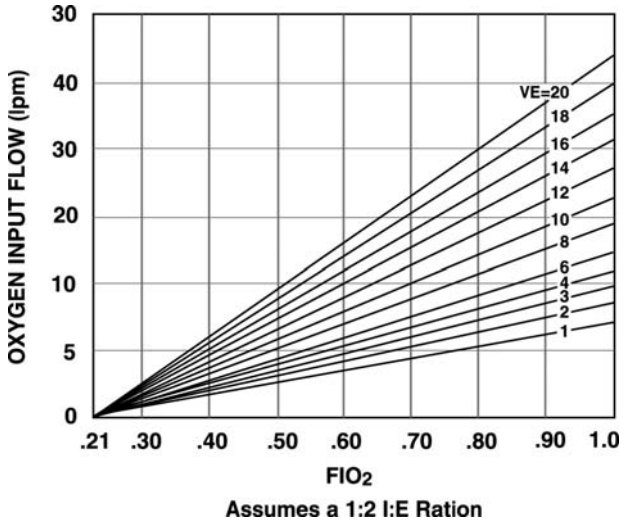
ATTACHING A BREATHING CIRCUIT

How to attach a Patient Breathing Circuit.

1) Connect the main breathing tube to the 22 mm outlet port on the right side of the ventilator.
2) Connect the two exhalation flow transducer sense lines to the ports marked **Flow Xducer** on the right side of the ventilator. These are non-interchangeable Luer fittings.
3) Connect the Exhalation Valve driver line to the port marked **Exh Valve** on the right side of the ventilator.



OXYGEN COMPUTER CHART



Oxygen Computer Chart

To determine O_2 Input Flow:

1) Find the desired F_{iO_2} on the horizontal axis.
2) Project up to the minute volume.
3) Project horizontally to the left vertical axis and read the oxygen flow.

To determine O_2 Concentration:

1) Find the O_2 input flow on the vertical axis.
2) Project horizontally right to the minute volume.
3) Project vertically down to the horizontal axis and read the F_{iO_2}.

How to Silence and Reset Alarms

To silence an alarm, press the **Silence Reset** button.
To reset an alarm that has been corrected, press the **Silence Reset** button again.

Alarm	Cause	Solution
APNEA XX bpm	Occurs when the time since the last breath start exceeds the set Apnea Interval. When an Apnea alarm occurs, the ventilator will enter Apnea Back up ventilation mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.
APNEA	An Apnea alarm has occurred and cleared The ventilator is no longer in Apnea Back-up mode.	Reevaluate the patient's condition. Reevaluate ventilator settings.

Alarm	Cause	Solution
BAT EMPTY	Occurs when the ventilator is operating from the internal battery power and the batter charge level is critically low. This alarm can be temporarily silenced but cannot be cleared.	Attach the ventilator to external AC or DC power.
BAT LOW	Occurs when the ventilator is operating from internal battery power and the battery charge level is low.	Attach the ventilator to external AC or DC power. Reevaluate power requirements.
DEFAULTS	Occurs during POST when the ventilator detects an invalid setting stored in non-volatile memory.	Push the **Silence/Reset** button twice to reset alarm. Reevaluate ventilator settings.
DEFAULTS SET	Occurs when the ventilator is first powered up after the **SET DEFAULTS** option has been used to reset all controls and extended features settings to their factory-set default values.	Push the **Silence/Reset** button twice to reset alarm. Reevaluate ventilator settings.

Alarm	Cause	Solution
DISC/SENSE	Occurs when the ventilator detects one of the following conditions: • The patient circuit or proximal pressure sense line has become disconnected. • The low side exhalation flow transducer sense line has become disconnected. • The proximal pressure sense line is pinched or occluded.	Check Patient Circuit assembly for disconnects. Check pressure sensing lines for occlusions.
HIGH f	Occurs when the Total Breath Rate (**f**) exceeds the high breath rate and time period alarm values.	Check Patient Circuit assembly for leaks. Check **HIGH f** alarm values.
HIGH O_2 PRES (LTV® 1200 only)	Occurs when the average oxygen inlet pressure exceeds the acceptable limit for the type of oxygen source.	Reduce O_2 inlet pressure.

Alarm	Cause	Solution
HIGH PEEP	Occurs when the ventilator detects one of the following conditions: • The patient circuit positive end expiratory pressure (PEEP) exceeds the High PEEP alarm setting. • Patient Circuit, Exhalation valve and/or PEEP valve occluded.	Reevaluate ventilator settings. Disassemble, clean and reassemble the Patient Circuit, Exhalation Valve and PEEP Valve.
HIGH PRES	Occurs when the circuit pressure exceeds the set High Pressure Limit setting.	Reevaluate ventilator settings. Inspect Patient Circuit for occlusions or kinks. Reevaluate patient.
HW Fault	Occurs when the ventilator detects a problem with the ventilator hardware.	If alarm reoccurs, contact your Service Rep or Pulmonetic Systems.

Alarm	Cause	Solution
INOP 	A ventilator INOP occurs when: • The ventilator is switched from On to Standby. • The ventilator detects any condition that is deemed to make the ventilator unsafe.	If an **INOP** alarm occurs during operation, remove ventilator from service and contact your Service Rep.
LOCKED	The **LOCKED** message is displayed when a button is pressed while the controls are locked. No audible alarm is given.	Press the **Control Lock** button. If locked alert continues, press and hold the **Control Lock** button for three seconds.
LOW MIN VOL	Occurs when the exhaled minute volume is less than the set Low Minute Volume.	Examine Exhalation Valve body for disconnects. Reevaluate patient.

Alarm	Cause	Solution
LOW O_2 PRES (LTV® 1200 only)	Occurs when the average oxygen inlet pressure is less than the minimum acceptable inlet pressure of 35 PSIG.	Increase O_2 inlet pressure. If using O_2 cylinder, replace used cylinder with a new one.
LOW PEEP	Occurs when the patient circuit Positive End Expiratory Pressure (PEEP) is less than the Low PEEP alarm setting.	Reevaluate ventilator settings. Disassemble, clean and reassemble the Patient Circuit, Exhalation Valve and PEEP Valve.
LOW PRES	Occurs when the peak inspiratory pressure for a machine or assist breath is less than the Low Pressure setting.	Examine Patient Circuit for disconnect. Reevaluate ventilator settings. Reevaluate patient.
NO CAL DATA, NO CAL	Occurs when the ventilator detects invalid or missing calibration records on power up.	Remove ventilator from service, perform Calibration procedure.

Alarm	Cause	Solution
POWER LOST	Occurs when the ventilator is operating on external power and the voltage drops below the useable level and switches to internal battery operation.	Evaluate power requirements. Attach ventilator to an external AC or DC power source.
POWER LOW	Occurs when the ventilator is operating on external power and the voltage drops to the low level.	Evaluate power requirements.
REMOVE PTNT	Occurs when the ventilator is powered up in the Ventilator Checkout or Ventilator Maintenance modes. The ventilator is not delivering gas.	Ensure patient is disconnected from ventilator and is being ventilated by alternative means.

Alarm	Cause	Solution
RESET	A **RESET** alarm occurs if the ventilator restarts following a condition other than being shut down by pressing the On/Standby button.	May be caused by Internal Battery depletion or ESD. If the problem reoccurs, remove from service and contact your Service Rep or Pulmonetic Systems
SBT < f **SBT > f** **SBT < f/Vt** **SBT > f/Vt** **SBT OFF**	These alarms are only active in the Spontaneous Breathing Trial (SBT) mode of ventilation (see the *LTV® 1200 or LTV® 1150 Operator's Manual,* Chapter 9, for more information on each alarm setting).	
XDCR FAULT	Occurs when a transducer autozero test fails.	Press **Silence/Reset** button twice to reset alarm. If problem occurs frequently, remove from service and contact your Service Rep. or Pulmonetic Systems.

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