## SV600

## Ventilator

## **Operator's Manual**

# **CE**<sub>0123</sub>

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#### 4.8 Screen Capture

By pressing this key on the main screen **1**, the system will capture and save the screen automatically. The screen capture is saved in "bmp" format. The system can store up to 20 screen captures.

#### 4.9 Lock Screen

Press the [Lock] key on the main screen to enter locked status, and the prompt message [Screen locked. Press the Lock button to unlock screen.] will be displayed. During the

period of screen locked, only  $(O_2\uparrow Suction)$ , and [Lock] keys are enabled. Touch screen, control knob, and other keys are disabled. Press this key a second time to unlock the screen.

## 5.1 Date & Time Settings

- 1. Select the system time field on the main screen to pop up time setup menu.
- 2. Set [Date] and [Time].
- 3. Set [Date Format] to [YYYY-MM-DD], [MM-DD-YYYY] or [DD-MM-YYYY].
- 4. Set [Time Format]: [24 h] or [12 h].

#### 5.2 Export to USB

The ventilator's exportation function provides the ability to export some data or settings to USB device.

#### 5.2.1 Export Screen

Screen exportation involves exporting a saved screen capture for the ventilator. The exported file is saved in "bmp" format. This ventilator could save up to 20 screen captures. To export screen capture,

- 1. Insert the USB device into the USB connector of the ventilator. The key is highlighted on the main screen.
- 2. By selecting the key, the system will open the USB settings interface.
- 3. On the opened interface, select the [Export Screenshot] tab first and then click the [Export Screenshot] key. The system will run a check to verify that there is enough storage space available on the USB device. If there is sufficient space, the system will start to export the screen.
- 4. After exporting is completed, select [Remove USB Device] to remove the USB device.

#### 5.2.2 Export Data

Exporting data means to export data from the ventilator, such as patient demographics, current setting parameters, current alarm limits, trend data and so on. To export data,

- 1. Insert the USB device into the USB connector of the ventilator. The key is highlighted on the main screen.
- 2. By selecting the key, the system will open the USB settings interface.

- 3. On the opened interface, select the [Export Data] tab and then select the [User Export] key. The system will run a check to verify that there is enough storage space available on the USB device. If there is sufficient space, the system will export data including patient information, current parameter settings, current alarm limits, tabular trend, PEEPi measured value, P0.1 measured value, Vtrap measured value, and NIF measured value, etc. The format of the exported data is "html".
- 4. If you need to export calibration data, event logbook and self-check logbook in addition to the above data, select the [Factory Export] tab and enter password. The system will run a check to verify that there is sufficient storage space available on the USD device. If there is sufficient space, the system will start to export data. The exported data is encrypted in the format of "blg".
- 5. After exporting is completed, select [Remove USB Device] to remove the USB device.

#### NOTE

• If you need to check the exported data in format of "blg", please contact the Customer Service Department.

#### 5.2.3 Transfer Settings

You can export or import settings, while unit is in standby.

To export settings,

- 1. Make sure that the machine is in Standby status.
- 2. Insert the USB device into the USB connector of the ventilator. The key is highlighted

on the main screen

- 3. By selecting the key, the system will open the USB settings interface.
- 4. Select [Transfer Settings] → Enter system password → [Export Settings] in the opened interface. The system will run a check to verify that there is sufficient storage space available on the USB device. If there is sufficient space, the system will save the current settings and machine defaults to the USB device.
- 5. After exporting is completed, select [Remove USB Device] to remove the USB device.

## 6.1 Turn on the System

- 1. Insert the power cord into the power receptacle. Ensure the external power indicator light is lit.
- 2. Press the  $\odot/\dot{O}$  hard key.
- 3. The alarm indicator light flashes yellow and red once in turn, and then the system conducts a self check of the speaker and buzzer once respectively.
- 4. A start-up screen and start-up check progress bar appear. Then the System Check screen is displayed.

#### NOTE

• When the ventilator is started, the system detects whether audible alarm tones and alarm lamp function normally. If yes, the alarm lamp flashes yellow and red successively, and the speaker and the buzzer give check tones. If not, do not use the equipment and contact us immediately.

#### 6.2 System Check

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- If the ventilator fails any tests, remove it from clinical use. Do not use the ventilator until necessary repairs are completed and all tests have passed.
- Before running System Check, disconnect the patient from the equipment and ensure that a backup ventilation mode is available for patient ventilation.

To enter the System Check screen,

- The System Check screen is accessed automatically after powering on the system.
- On the non-standby screen, select the [Standby] key and enter the Standby status after your confirmation. Select the [System Check] key in the Standby status to enter the System Check screen.

The system check screen displays the last system check time and total system check result. Select the key to query the last system check information of the ventilator system, including system check items and System Check results.

Connect the gas supply and block the Y piece as illustrated. Then select [**Continue**] to start System Check item by item.

System Check items include:

- Backup Air Supply Test: test the speed of backup air supply.
- $O_2$  Flow Sensor Test: test the  $O_2$  Insp. Valve and  $O_2$  Flow Sensor.
- Air Flow Sensor Test: test the Air Insp. Valve and Air Flow Sensor.
- Exp. Flow Sensor Test: test the expiratory flow sensor.
- Pressure Sensor Test: test the pressure sensors at the inspiratory and expiratory ports.
- Exp. Valve Test
- Safety Valve Test
- Leakage (mL/min)
- Compliance  $(mL/cmH_2O)$
- Circuit Resistance ( $cmH_2O/L/S$ )
- O<sub>2</sub> Sensor Test
- Neonatal Flow Sensor Test

System Check result can be:

- Pass: indicates that check of this item is completed and is passed;
- Fail: indicates that check of this item is completed but is failed;
- Cancel: indicates that check of this item is cancelled;
- No Gas Supply: indicates that air or O<sub>2</sub> sources are not connected.
- Monitoring Off: indicates that sensor monitoring function may not be switched on when O<sub>2</sub> sensor test or neonatal flow sensor test is being carried out.
- No Sensor: indicates that the neonatal flow sensor is not connected.
- Sensor Reversed: indicates that the neonatal flow sensor is connected reversed.
- Sensor Failure: indicates that the oxygen sensor may not be working.
- High leakage: indicates that there is high leakage from the test tubing, probably because the tubing is disconnected, not properly installed, the safety valve is not closed, or the expiratory valve membrane is not installed.

Total selftest results are listed as follows after all selftest items have been completed:

- Pass: all selftest items successfully pass the seftest.
- Partially Pass: some selftest items fail, but the mechanical ventilation is allowed.
- Fail. Ventilation Disabled: some important selftest items fail, but the mechanical ventilation is not allowed.
- High Leakage, Ventilation Disabled: Exp. Flow Sensor Test, Pressure Sensor Test, Exp. Valve Test, or Safety Valve Test fails, the mechanical ventilation is not allowed.
- Cancel: some selftest items cancelled and other selftest items have been successfully passed.

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• During the use of the electronic nebulizer, please pay attention to the connection of the nebulizer to prevent the nebulization interruption .

## 10.5 O<sub>2</sub>↑(Oxygen Enrichment)

 $O_2\uparrow$  is also called as  $O_2$  enrichment. It means to deliver oxygen with concentration higher than normal level within the specified time period. The oxygenation magnitude can be set by selecting [**Menu**]  $\rightarrow$  [**Setup**]  $\rightarrow$  [**Ventilation**]. The default oxygen enrichment magnitude is 60% for adult and pediatric patients, and 10% for neonate patients.

Press the  $[O_2\uparrow Suction]$  key and the ventilator starts oxygen enrichment. At that time, the indicator light for  $[O_2\uparrow Suction]$  key will be illuminated, and the remaining oxygen enrichment time will be displayed. Oxygen enrichment is active for maximum two minutes. During oxygen enrichment, the currently set oxygen concentration is displayed in the  $[O_2 \%]$  parameter setup quick key field.

When the 2-minute period of oxygen enrichment is up or the  $[O_2 \uparrow Suction]$  key is pressed again, the ventilator terminates oxygen enrichment.

#### NOTE

- The system cannot start O<sub>2</sub>↑ (oxygen enrichment) in the standby, oxygen therapy, or CPRV modes.
- The system cannot start  $O_2\uparrow$  (oxygen enrichment) in the P-V tool test process.
- When [O<sub>2</sub> Supply Failure] alarm or [No Gas Supply Pressure] alarm is triggered, click [O<sub>2</sub>↑ Suction] key, O<sub>2</sub>↑ is disabled and prompts [O<sub>2</sub> Supply Failure, O<sub>2</sub>↑ disabled].
- If O<sub>2</sub>↑ process triggers [O<sub>2</sub> Supply Failure] alarm or [No Gas Supply Pressure] alarm, O<sub>2</sub>↑ stops.
- Removing the patient tubing during oxygen enrichment will start suction function. Refer to 10.6Suction section.

## **B** Product Specifications

The ventilator is already integrated with an expiratory volume monitor, pressure measurement device, pressure release device, built-in gas mixer, alarm system, SpO<sub>2</sub> monitor, O<sub>2</sub> monitor, and CO<sub>2</sub> monitor. Among them:

- The expiratory volume monitor, pressure measurement device, and pressure release device comply with ISO 80601-2-12.
- The alarm system complies with IEC 60601-1-8.
- The gas mixer complies with ISO 11195.
- The SpO<sub>2</sub> monitor complies with ISO 80601-2-61;
- The  $O_2$  monitor complies with ISO 80601-2-55.
- The  $CO_2$  monitor complies with ISO 80601-2-55.
- The gas supply hose assembly complies with ISO 5359.

Type of protection against electric shock	Ventilator: Class I device with internal electrical power supply. Air compressor: Class I device.
Degree of protection against electric shock	Ventilator: Mixed BF and CF applied part type, with respiratory circuit, and CO <sub>2</sub> being BF type, and SpO <sub>2</sub> being CF type. Air compressor: No applied part.
Operating mode	Continuous
Degree of protection against	Ordinary equipment, without protection against explosion; not
hazards of explosion	for use with flammable anaesthetics.
Degree of protection against harmful ingress of water	Ventilator: Degrees of protection provided by enclosures(IP Code)—IP21 Air compressor: Degrees of protection provided by enclosures(IP Code)—IPX0 Protection Index according the EN 60529 standard: 2: Protected against solid foreign objects of 12.5 mm diameter and greater 1: Protected against vertically falling water drops 0: no protection
Disinfection and sterilization methods.	Ventilator: The device disinfection and sterilization methods are recommended by manufacturer. Air compressor: The device does not require disinfection and sterilization.
Equipment type	Mobile

## **B.1 Safety Specifications**

This chapter lists physiological and technical alarm messages.

Note that in this chapter:

- Column P stands for the default alarm level: H for high, M for medium and L for low.
- For each alarm message, corresponding actions are given instructing you to troubleshoot problems. If the problem persists, contact your service personnel.

## **D.1 Physiological Alarm Messages**

#### **D.1.1 Ventilator Parameters**

Alarm Messages	Р	Cause and action
		The airway pressure exceeds the set pressure high alarm limit.
		1. Check the patient.
Paw Too High	Н	2. Check the ventilation parameter setup.
		3. Check the alarm limits.
		4. Check the patient tubing for occlusion.
		Airway pressure setting is lower than the low limit of pressure alarm.
		1. Check the patient.
Paw Too Low	Н	2. Check the ventilation parameter setup.
		3. Check the alarm limits.
		4. Check if the patient tubing are leaked or disconnected.
		The inspired $O_2$ concentration is greater than the FiO <sub>2</sub> high alarm limit
		for at least 30s.
EO Tao Uiah	Н	1. Check air supply.
FiO <sub>2</sub> Too High		2. Check the HEPA filter for occlusion.
		3. If the ventilator uses the $O_2$ cell, calibrate the $O_2$ sensor. If the
		ventilator uses the paramagnetic O <sub>2</sub> sensor, perform the System Check.
		The inspired $O_2$ concentration has been lower than the FiO <sub>2</sub> low alarm
		limit for at least 30 s or is less than 18%.
FiO <sub>2</sub> Too Low	н	1. Check air supply.
		2. If the ventilator uses the $O_2$ cell, calibrate the $O_2$ sensor. If the
		ventilator uses the paramagnetic O <sub>2</sub> sensor, perform the System Check.
	М	The TVe monitored value is greater than TVe high alarm limit for
		continuous 3 mechanical ventilation cycles.
TVe Too High		1. Check the ventilation parameter setup.
		2. Check the alarm limits.
TVe Too Low	М	The TVe monitored value is less than TVe low alarm limit for

Apnea       Fet alarm limits.         Apnea       1. Check the patient.         2. Check the ventilation parameter setup.         3. Check the patient tubing for leakage or occlusion.         5. Perform System Check to test the leakage         MVe Too High       H         1. Check the patient number of alarm limit.         MVe Too High       H         1. Check the ventilation parameter setup.         2. Check the ventilation parameter setup.         3. Check the ventilation parameter setup.         4. Check the ventilation parameter setup.         5. Check the patient limits.         6. Check the patient limits.         7. Check the patient limits.         7. Check the patient.         7. Check the patient.         7. Check apnea time setup.         4. Perform System Check to test the leakage         7. The time of failure to detect respiration exceeds Tapnea.         1. Check the patient.         2. Check apnea time setup.         4. Check if the patient setup.         4. Check if the patient setup.         5. Check the ventilation parameter setup.         6. The time of failure to d	I	I	
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process this alarm	-	L	
	Ended		process this alarm.

## D.1.2 CO<sub>2</sub> Module

Alarm Messages	Р	Cause and action
		The monitored parameter value exceeds the alarm limit.
EtCO <sub>2</sub> Too High	M	1. Check the patient type.
		2. Check the alarm limits.
		The monitored parameter value exceeds the alarm limit.
EtCO <sub>2</sub> Too Low	Μ	1. Check the patient type.
		2. Check the alarm limits.

2. Check apnea time setup.	Apnea CO <sub>2</sub>	M	The time of failure to detect respiration by the $CO_2$ module exceeds Apnea Tinsp. Whenever the $CO_2$ apnea alarm is on, block the [EtCO <sub>2</sub> Too High] alarm and [EtCO <sub>2</sub> Too Low] alarm until the alarm is cleared.
		c	<ol> <li>Check the patient.</li> <li>Check apnea time setup.</li> <li>Check the connections of CO<sub>2</sub> module sampling device.</li> </ol>

#### D.1.3 SpO<sub>2</sub> Module

Alarm Messages	Р	Cause and action
		SpO <sub>2</sub> value is greater than the high alarm limit.
SpO <sub>2</sub> Too High	м	1. Check the patient's condition and ventilator settings.
5p02 100 mgn		2. Check the patient's inspiratory $O_2\%$ .
		3. Check the alarm limits.
		SpO <sub>2</sub> value is lower than the low alarm limit.
SpO <sub>2</sub> Too LOW	м	1. Check the patient's condition and ventilator settings.
5p02 100 LOW	111	2. Check the patient's inspiratory $O_2\%$ .
		3. Check the alarm limits.
		SpO <sub>2</sub> value is lower than the desaturation alarm limit.
SpO <sub>2</sub> Desat	н	1. Check the patient's condition and ventilator settings
Spo <sub>2</sub> Desar		2. Check the patient's inspiratory $O_2\%$ .
		3. Check the alarm limits.
		PR value exceeds the high alarm limit.
PR Too High	М	1. Check the patient's condition.
I K 100 Ingh	IVI	2. Check ventilator settings.
		3. Check the alarm limits.
	М	PR value is lower than the low alarm limit.
PR Too LOW		1. Check the patient's condition.
No pulse		2. Check ventilator settings.
		3. Check the alarm limits.
	Н	The patient's pulse signal is too weak, and the system cannot perform
		analysis.
	11	1. Check the patient's condition.
		2. Check SpO <sub>2</sub> sensor and measurement site connection

## D.2 Technical Alarm Messages

#### D.2.1 Power Board

Alarm Messages	P	Cause and action
Battery 1 Failure	11	Battery 1 Charge Failure
02	H	Contact your service personnel.
Battery 1 Failure		Battery 1 Aging
03	H	Contact your service personnel.
Battery 1 Failure		Battery 1 Comm Error
04	Н	Contact your service personnel.
Battery 1 Failure	11	Battery 1 Failure
05	Н	Contact your service personnel.
Battery 2 Failure	Н	Battery 2 Charge Failure
02	П	Contact your service personnel.
Battery 2 Failure	Н	Battery 2 Aging
03	П	Contact your service personnel.
Battery 2 Failure	II	Battery 2 Comm Error
04	Н	Contact your service personnel.
Battery 2 Failure		Battery 2 Failure
05	H	Contact your service personnel.
Blower Battery		Backup air supply battery failed.
Failure 02	Н	Contact your service personnel.
Blower Battery	Н	Backup air supply battery failed.
Failure 03	П	Contact your service personnel.
Blower Battery	11	Backup air supply battery failed.
Failure 04	Н	Contact your service personnel.
Blower Battery		Backup air supply battery failed.
Failure 05	H	Contact your service personnel.
Battery Temp.		Battery temperature is a bit high during discharge.
High. Connect	M	
Ext.Pwr.		Connect to the external power supply.
Battery Temp		Battery temperature is too high during discharge. The system may be
High. Syst maybe	H	down.
Down		Connect to the external power supply.
Dettems in Lies		The current system is powered by battery.
Battery in Use	L	Connect to the external power supply.
Low Battery.		The remaining battery power is lower than a threshold.
Connect Ext. Power.	M	Connect to the external power supply.
System DOWN.	Н	Battery power is depleted. The system will shut down in a few
Connect Ext.	11	minutes.
Connect LAt.		minutes.

Power.		Connect to the external power supply immediately.
Battery		No battery in main unit or backup air supply at present
Undetected	Н	Contact your service personnel.
		Power board fan speed abnormal. If it can't be solved, please restart
Fan Failure	М	the machine.
		Contact your service personnel.
Device Failure 03	Н	Power Board Selftest Error.
Device Failule 05		Contact your service personnel.

#### D.2.2 Main Control Board

Alarm Messages	P	Cause and action
Please Reset Date	L	Button cell is available in the system. But the clock is powered down and reset.
and Time		Re-set the date and time.
Key Error	L	Hardkey or rotary encoder is depressed continuously for more than 35s.
		Contact your service personnel.
Device Failure 04	Н	Ctrl Module Init Error.
Device Failure 04	П	Contact your service personnel.
Device Failure 05	Н	Ctrl Module Comm Stop.
Device Failule 03		Contact your service personnel.
Device Failure 19	Н	Power Board Comm Stop.
Device Failule 19		Contact your service personnel.
Device Failure 20	Н	SpO <sub>2</sub> Module Comm Stop.
Device Failure 20		Restart the ventilator or contact your service personnel.
Device Failure 22	Н	Protecting Module Comm Stop.
	п	Contact your service personnel.

#### **D.2.3 Monitor Board**

Alarm Messages	Р	Cause and action
Technical Error	L	Buzzer Failure.
04		Contact your service personnel.
Technical Error	М	Atmospheric Pressure Sensor Failure.
05	IVI	Contact your service personnel.
Technical Error	М	3-way Valve Failure.
07	IVI	Contact your service personnel.
Technical Error	м	Nebulizer Valve Failure.
08	IVI	Contact your service personnel.
Technical Error	М	Insp. Temp Sensor Failure.
09	IVI	Contact your service personnel.

10LContact your service personnel.Device Failure 01HPower Supply Voltage Error. Contact your service personnel.Device Failure 02HMemory Error. Contact your service personnel.Device Failure 03HCtrl Module Comm Stop. Contact your service personnel.Device Failure 06HCtrl Module Selftest Error. Contact your service personnel.Device Failure 07HPressure Sensor Failure. Contact your service personnel.Device Failure 08HPressure Sensor Failure. Contact your service personnel.Device Failure 09HSafety Valve Failure. Contact your service personnel.Device Failure 10HSafety Valve Failure. Contact your service personnel.Device Failure 12HSafety Valve Failure. Contact your service personnel.Device Failure 13HO_2 Limb Failure. Contact your service personnel.Device Failure 21HPressure Sensor Zero Point Error. Contact your service personnel.Device Failure 22HProtecting Module Comm Stop. Contact your service personnel.Device Failure 23HProtecting Module Comm Stop. Contact your service personnel.PEEP Too High PEEP Too LowMNentition parameter setup. 2. Check the patient tubing for occlusion.PEEP Too LowMNAirway Obstructed?NNetwork the patient tubing for leakage. 2. Check and clean the patient tubing. 2. Check and clean the expiration valve.Insp. LimbHTop Liew of Colded.	Technical Error		Heating function of the expiration valve is faulty.
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Device Failure 01       H       Contact your service personnel.         Device Failure 02       H       Memory Error. Contact your service personnel.         Device Failure 05       H       Ctrl Module Comm Stop. Contact your service personnel.         Device Failure 06       H       Ctrl Module Selftest Error. Contact your service personnel.         Device Failure 09       H       Pressure Sensor Failure. Contact your service personnel.         Device Failure 10       H       Safety Valve Failure. Contact your service personnel.         Device Failure 11       H       Safety Valve Failure. Contact your service personnel.         Device Failure 12       H       Air Insp. Limb Failure. Contact your service personnel.         Device Failure 13       H       O2 Limb Failure. Contact your service personnel.         Device Failure 21       H       Pressure Sensor Zero Point Error. Contact your service personnel.         Device Failure 21       H       Protecting Module Comm Stop. Contact your service personnel.         Device Failure 22       H       Protectino Module Self Check Error. Contact your service personnel.         PEEP Too High       H       Aintored PEEP exceeds PEEP + 5 cmH_20 (PEEP + 10 cmH_20 for APRV mode) within any fully mechanical ventilation cycle.         PEEP Too Low       M       I. Check the patient tubing for occlusion.         PEEP Too Low       M	10		
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PEEP Too Low       M       1. Check the patient tubing for leakage.         2. Perform System Check to test the leakage         Airway       Tube is occluded.         0bstructed?       1. Check and clean the patient tubing.         2. Check and clean the expiration valve.         Insp. Limb       The patient tubing is bent or occluded in case of O <sub>2</sub> therapy.			2. Check the patient tubing for occlusion.
Airway       Dostructed?         Insp. Limb       The patient tubing is bent or occluded in case of O <sub>2</sub> therapy.			Patient's PEEP is less than the setting value to a certain extent.
Airway       Tube is occluded.         Obstructed?       1. Check and clean the patient tubing.         2. Check and clean the expiration valve.         Insp. Limb       The patient tubing is bent or occluded in case of O <sub>2</sub> therapy.	PEEP Too Low	M	1. Check the patient tubing for leakage.
Airway       H       1. Check and clean the patient tubing.         Obstructed?       2. Check and clean the expiration valve.         Insp. Limb       The patient tubing is bent or occluded in case of O <sub>2</sub> therapy.			2. Perform System Check to test the leakage
Obstructed?       H       1. Check and clean the patient tubing.         2. Check and clean the expiration valve.         Insp. Limb       The patient tubing is bent or occluded in case of O <sub>2</sub> therapy.	A		Tube is occluded.
Insp. Limb       2. Check and clean the expiration valve.         The patient tubing is bent or occluded in case of O2 therapy.	-	H	1. Check and clean the patient tubing.
The puttern tubing is bent of beefuded in cuse of $O_2$ therapy.			2. Check and clean the expiration valve.
	Insp. Limb		The patient tubing is bent or occluded in case of $O_2$ therapy
Airway M	Airway	M	
Obstructed? Check if the patient tubing is occluded or bent. If yes, clear it.	Obstructed?		Check if the patient tubing is occluded or bent. If yes, clear it.
The airway pressure measured by any pressure sensor is greater than	Sustained Airway Pressure	Н	The airway pressure measured by any pressure sensor is greater than
the setting PEEP + 15 cmH <sub>2</sub> O for 15 s consecutively.			the setting PEEP + 15 cmH <sub>2</sub> O for 15 s consecutively.
H   ] Check the patient			1. Check the patient.
Pressure   2. Check the ventilation parameter setup.			-
3. Check the patient tubing for occlusion.			3. Check the patient tubing for occlusion.
Airway Leak? L Tube is leaky.	Airway Leak?	L	

	I	
		1. Check the patient tubing for leakage.
		2. Perform System Check to test the leakage
Tube	Н	Tube is disconnected.
Disconnected?	11	Re-connect the patient tubing.
		In volume mode or pressure mode when ATRC function is enabled,
		the pressure reaches Paw high alarm limit-5.
Pressure Limited	L	1. Check the patient.
		2. Check the ventilation parameter setup.
		3. Check pressure high alarm limit.
		In pressure mode, delivered gas volume exceeds the set TV high limit.
Valence Limited	T	1. Check the patient.
Volume Limited	L	2. Check the ventilation parameter setup.
		3. Check the alarm limits.
		Pinsp is lower than the pressure setting value by 3 cmH <sub>2</sub> O or 2/3 of
		the pressure setting value, whichever is less.
<b>D' M</b>		1. Check the patient.
Pinsp Not	L	2. Check TV alarm limits.
Achieved		3. Check the $O_2$ supply.
		4. Check the patient tubing for leakage.
		5. Check the HEPA filter for occlusion.
		TVi is less than the TV setting value by more than $10 \text{ mL} + 10 \%$ of
	T	the setting value.
		1. Check the patient.
		2. Check pressure high alarm limit.
TV Not Achieved	L	3. Check the high-pressure gas supply or the HEPA filter for
		occlusion.
		4. Check the $O_2$ supply.
		5. Check the patient tubing for leakage or occlusion.
		The pressure reaches Paw high alarm limit-5 in sigh cycle.
D I''' 1		1. Check the patient.
Pressure Limited	L	2. Check pressure high alarm limit.
in Sigh cycle		3. Check the patient tubing for occlusion.
		4. Consider to turn off sigh.
		Oxygen supply is not sufficient to support normal ventilator operation.
O <sub>2</sub> Supply Failure	Н	1. Check connection with $O_2$ supply.
		2. Check $O_2$ supply pressure.
Air Supply Failure	Н	Air supply is not sufficient to support normal ventilator operation.
		1. Check connection with Air supply.
		2. Check air supply pressure
No Gas Supply Pressure		Both oxygen and air supply are not sufficient to support normal
		ventilator operation.
	Н	1. Check connection with air and $O_2$ supply.
		2. Check air and $O_2$ supply pressure.
		3. For machines with backup air supply configuration, check whether
	L	

1	· · · · · · · · · · · · · · · · · · ·
	the Blower Disabled switch for user maintenance is on.
	4. Check backup air supply for failure.
	In PSV mode, Tinsp exceeds 4s for adult, 1.5s for pediatric, and the
L	maximum inspiration time set by the user for neonates for continuous
	3 cycles.
	1. Check the patient.
	2. Check the ventilation parameter setup.
	3. Check the patient tubing for leakage.
TT	Installing the expiratory flow sensor fails.
Н	Contact your service personnel.
	The gas temperature exceeds 55°C.
Н	1. Disconnect the patient.
	2.Restart the machine. Contact the specified service personnel if the
	issue persists.
	Installation error with air flow sensor or $O_2$ flow sensor.
H	Contact your service personnel.
	Backup air supply fan speed error. If it can't be solved, restart the
	machine.
M	Please contact your service personnel (turning off backup air supply
	could also resolve the alarm).
	Backup air supply temperature exceeds the threshold.
	1. Check if the operating ambient temperature of the machine exceeds
	the maximum operating temperature specified by the vendor.
П	2. Check if the fan inlet and outlet are occluded. If yes, clear the
	foreign substance and dust.
	3. Check the rotation of the fan. If it runs abnormally (such as
	abnormal sound or rotation speed), replace the fan.
	Cannot meet established MV%
L	1. Check the ventilation parameter setup.
	2. Check the alarm limits setting.
	Three-way valve failure, only blower gas supply available.
H	
	Contact your service personnel.
	Three-way valve failure, blower module disabled.
H	
	Contact the specified service personnel.
L	HEPA filter occluded, resistance increased.
	Contact the specified service personnel.
M	Backup air supply Temp Sensor Failure.
	Contact your service personnel.
	HEPA Pressure Sensor Failure.
	Contact your service personnel.
М	Backup air supply three-way valve microswitch failure.
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Error 03		Contact your service personnel.
Blower Failure 01		Insp. Limb valve or flow sensor fails.
		1. Use another device for ventilation.
	H	2.Restart the machine.
		3. Contact the specified service personnel if the issue persists.
Blower Failure 02	Н	Insp. Valve Disconnected.
Blower Failure 02		Contact your service personnel.
Blower Failure 03	Н	Backup air supply Temp Too High.
Blower Failule 05	11	Contact your service personnel.
Blower Failure 04	Н	Backup air supply Failure.
Blower Failule 04	11	Contact your service personnel.
O <sub>2</sub> Sensor	L	The $O_2$ sensor is not connected.
Unconnected	L	Connect the $O_2$ sensor.
Please Replace O <sub>2</sub>	M	The chemical $O_2$ sensor is expired.
Sensor.	IVI	Please replace the $O_2$ sensor.
Please calibrate	L	Please calibrate the $O_2$ sensor.
O <sub>2</sub> sensor	L	Please calibrate O <sub>2</sub> concentration.
Please reset O <sub>2</sub>	М	The oxygen concentration measured by the paramagnetic oxygen
sensor		sensor has a large error.
501301		Contact your service personnel.
Please perform		Calibrate the pressure sensor.
pressure	H	
calibration.		Contact your service personnel.
Please perform	Н	Calibrate the flow sensor.
flow calibration.		Please perform flow calibration.

#### D.2.4 CO<sub>2</sub> Module

Alarm Messages	Р	Cause and action
CO <sub>2</sub> Module Failure 01	М	Sidestream $CO_2$ module zeroing fails. The gain input signal offset is too large, exceeding the adjustable range.
		Contact your service personnel.
CO <sub>2</sub> Module Failure 02	М	CO <sub>2</sub> Init Error. An error occurs to the CO <sub>2</sub> module during initialization. Contact your service personnel.
CO <sub>2</sub> Module Failure 03	М	CO <sub>2</sub> self check error. An error occured in the CO <sub>2</sub> module during self check. Contact your service personnel.
CO <sub>2</sub> Module Failure 04	М	CO2 Hardware Error.       Contact your service personnel.
CO <sub>2</sub> Module Failure 05	М	CO <sub>2</sub> Comm Stop, CO <sub>2</sub> Module Failure, CO <sub>2</sub> Comm Error or communication failure reaches 10s. Contact your service personnel.

CO <sub>2</sub> Module	M	Mainstream CO <sub>2</sub> module zeroing fails.
Failure 06		Contact your service personnel.
CO <sub>2</sub> Sensor High	L	The sensor temperature is too high (above 63 °C).
Temp		Contact your service personnel.
	L	Sampling line is faulty or occluded.
CO <sub>2</sub> Sampleline		1. Check the sampling line for occlusion.
Occluded		2. Replace the sampling line.
		3. Replace the water trap.
	L	The water trap is disconnected or not connected properly. Check the
CO <sub>2</sub> No Watertrap		water trap.
		Re-install the water trap.
	L	Parameter measured values exceed the measurement range (error
Et CO Overrenge		range is included).
Et CO <sub>2</sub> Overrange		1. Perform CO <sub>2</sub> module zeroing.
		2. Contact your service personnel.
Please Replace	м	The mainstream CO <sub>2</sub> module sensor is faulty.
CO <sub>2</sub> Sensor		Contact your service personnel.
CO No Songor	L	The mainstream CO <sub>2</sub> module sensor is not connected.
CO <sub>2</sub> No Sensor		Connect the $CO_2$ sensor.

#### D.2.5 SpO<sub>2</sub> Module

Alarm Messages	Р	Cause and action
SpO <sub>2</sub> Sensor Off		Connected SpO <sub>2</sub> sensor became disconnected from patient tubing (e.g.
	L	wire disconnection or short circuit).
		Check SpO <sub>2</sub> sensor and measurement site connection.
Diago Domigoo		SpO <sub>2</sub> sensor failed (e.g. wire disconnection or short circuit).
Please Replace	M	1. Replace $SpO_2$ sensor.
SpO <sub>2</sub> Sensor		2. Contact your service personnel.
		Main cable has disconnected from module. Connection between
SpO <sub>2</sub> No Sensor	L	sensor and main cable has disconnected.
		Check that SpO <sub>2</sub> cable is connected to the module.
		The light to which the sensor is exposed is so bright that the sensor's
SpO <sub>2</sub> Too Much	L	photodetector is absorbing the surrounding light.
Light		Put SpO <sub>2</sub> sensor in a place with lower ambient light levels.
	L	SpO <sub>2</sub> sensor cannot obtain pulse signal (or incomplete signal).
GrO No Dolos		1. Check the patient's condition.
SpO <sub>2</sub> No Pulse		2. Check SpO <sub>2</sub> sensor and measurement site connection
		3. Replace $SpO_2$ sensor.
Sao Madala	M	SpO <sub>2</sub> module error\SpO <sub>2</sub> initialization error
SpO <sub>2</sub> Module Error		1. Replace SpO <sub>2</sub> sensor.
		2. Contact your service personnel.
SpO <sub>2</sub> Overrange	L	Measured values of parameter $SpO_2$ exceed the measurement range.

		<ol> <li>Replace SpO<sub>2</sub> sensor.</li> <li>Contact your service personnel.</li> </ol>
		Measured values of parameter PR exceed the measurement range.
PR Overrange	L	1. Replace $SpO_2$ sensor.
		2. Contact your service personnel.

#### D.2.6 Neo. Module

Alarm Messages	P	Cause and action
Reverse the	М	Neonatal flow sensor connected reversed.
neonatal flow		
sensor.		Please reverse the neonatal flow sensor.
Neo. Flow Sensor		Range of neonatal flow sensor exceeds 32 L/min.
	M	1. Check the patient's condition and ventilator settings
Overrange		2. Change patient type if necessary.
Neo, Flow Sensor	L	Neonatal flow sensor failure.
Failure		1. Replace neonatal flow sensor
Failure		2. Contact your service personnel.
		Serial cable of neonatal flow sensor is not connected. Sampling line of
No Neo. Flow	<b>N</b>	neonatal flow sensor is not connected.
Sensor	M	Check the connection of the neonatal flow sensor cable and sampling
		line.
Wrong Neo. Flow	т	Adult proximal flow sensor is used.
Sensor Type	L	Use neonatal flow sensor.
Neo. Flow Sensor Monitoring Off	М	Neonatal flow sensor monitor off in the volume mode.
		Neonatal flow sensor monitor on.