# BIYOVENT
# THE FIRST INTENSIVE CARE MECHANICAL VENTILATOR OF TURKEY

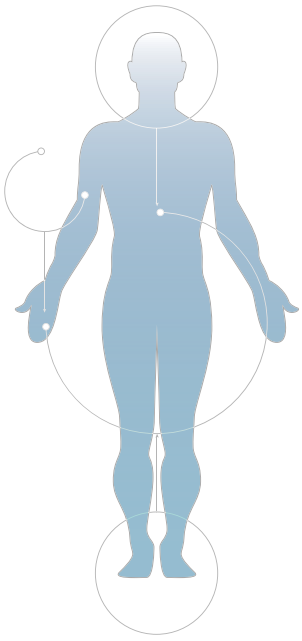
biosys
MİLLİ MEDİKAL SİSTEMLER

Sf. 2

# %100

## Made In Türkiye

Biyovent is produced with the support of the Republic of Turkey Ministry of Industry and Technology,
The Scientific and Technological Research Council of Turkey and Bilkent Cyberpark after a five-year research and development process.
The five-year design is verified and manufactured with the cooperation of engineers of defense industry and doctors who are experts at respiratory physiology.



## BIYOVENT
## THE FIRST HIGH LEVEL INTENSIVE CARE MECHANICAL VENTILATOR OF TURKEY

DESIGNED AND PRODUCED FOR INTENSIVE CARE AND REANIMATION UNITS.

- Modern and ergonomic lines.
- User-friendly interface.
- Perfect performance.
- Traditional and innovative operating modes.
- Compatible with pediatric and adult patients.
- Low cost and maintenance.

# Biyovent
# Respiratory Therapy Equipment

## Ergonomic Design

- Design with smooth and modern lines
- Right/left and up/down angled, 15 inches, high resolution full touch screen monitor
- Touch-operated rapid access keys
- Top section detachable from support legs
- User-friendly expiration valve
- Protective carrying handles
- Shock-absorbing and impact resistant wheels
- External humidification support

## Smart Safety System and User-friendly Interface

- Smart alarm identification and alarm silence (2min)
- Gradual auditory and visual alarm
- Adjustable apnea time and apnea backup mode (5-60 sec.)
- Automatic bilateral apne ventilation mode
- 2 minute supply of oxygen ( O2 suction )
- Stand-by mode
- Leak and trigger compensation
- Automatic tube compensation
- Comparative measurement of sensors and automatic calibration ( when turning on the device and on request )
- Oxygen sensor
- Monitoring the trend of a patient for 1 week
- Logging the system for 6 weeks
- 2 hour internal battery
- 8 hour optional battery
- 5 ms valve response time
- 100 mbar emergency valve
- 50 mbar automatic expiration evacuation
- IP 21 impermeability
- Low air and oxygen pressure detection
- Automatic change of source
- Software update
- Working with a medical compressor
- Display of loss of main power and level of battery
- Display of technical failure, fan failure and connection loss alarm

## Economic Solutions

- 100 % made in Türkiye
- Minimum maintenance cost
- Reusable expiration valve
- 2 years warranty + 3 years optional warranty extension
- Quick and qualitative technical service

## Pediatric and Adult

## One Machine Compatible with All Patients

Biyovent can support all female & male and pediatric & adult patients.

It can deliver up to 150 breaths and go down to 20 cc low Vtidal.

It can calculate the values of patient elastance and compliance fast and precisely.

It can automatically calibrates itself when it is turned on.

Automatic tube compensation.

It provides leak compensation up to 80 % .

Inspiration hold and expiration hold in 1-60 sec. intervals.

## Advanced Adaptive Control

## Biyovent uses advanced adaptive control algorithms. It responds in milliseconds.


Biyovent has Nasal Cpap and High Flow Oxygen Therapy modes.

Biyovent has an integrated nebulizer system.

## Advanced Adaptive Control

## Biyovent works both in traditional and innovative modes.

**Pressure Controlled Modes:**
P-ACV
P-SIMV+PS
P-CMV
P-PSV
P-Bilevel
APRV

**Volume Controlled Modes:**
V-ACV
V-ACV(PRVC)
V-CMV
V-SIMV+PS
V-SIMV(PRVC)+PS

**Spontaneous and Smart Modes:**
SPN-PS
SPN-VS

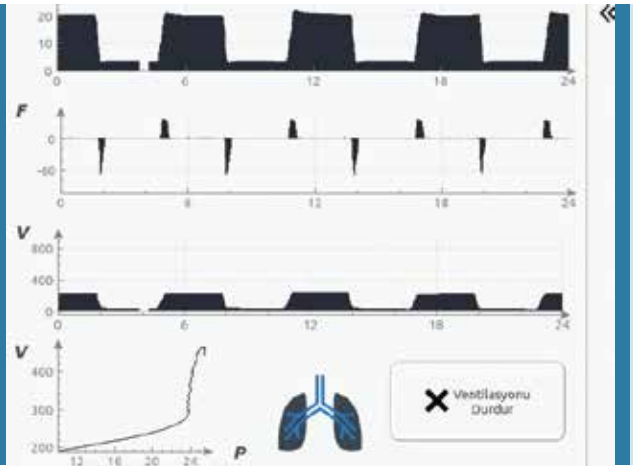
## Full Touch Screen Monitor of 15 inches

Biyovent displays information on a 15-inch high resolution color screen and it provides ease of use with its sensitive touch screen. It also provides rapid access to respiration parameters like FiO2, PEEP and respiratory rate.

It displays instant information about the patient and alarms on its big screen.

It has a user-friendly interface.

Biyovent is easy to use.




## Biyovent Displays 3 Graphics, 3 Cycles (Pressure-Volume, Pressure-Flow, Flow-Volume) and the Dynamic State of Lungs Simultaneously

Biyovent displays instant measurement values on graphics.

Graphics: Pressure-Time, Volume-Time, Flow-Time

Loops: Pressure-Volume, Pressure-Flow, Flow-Volume

It is possible to freeze the graphics and loops to analyze them.


## Just Identify the Patient, let Biyovent do the rest...

Biyovent has trigger compensation feature.

## Gradual Alarm System and Setting Alarm Limits Automatically

Biyovent is equipped with an auditory and visual alarm system, which is gradual and easy to control. It has a mechanical and electronic software system of safety, so the patients who are ventilated are safe. There is an easy access button for silencing the alarm (2min).

## Compatibility with Patient and Performance

| Pediatric | Adult |
|---|---|
| Respiatory rate: 1-150 Per Minute | Respiatory rate: 1-100 Per Minute |
| T inspiration: 0.1-10 Sec | T inspiration: 0.1-10 Sec |
| Tidal Volume: 0.02-0.6 Ltr | Tidal Volume: 0.1-3 Ltr |
| Flow: 1-60 ltr per minute | Flow: 1-120 ltr per minute |
| Trigger Sensitivity:<br>0.1-20 ltr per minute<br>0.1-20 mbar | Trigger Sensitivity:<br>0.1-20 ltr per minute<br>0.1-20 mbar |
| Leak and Tube Compensation | Leak and Tube Compensation |
| Invasive and Non-Invasive Ventilation | Invasive and Non-Invasive Ventilation |

# Technical Features of Biyovent

## Types of Patients:

Padiatric and Adult

## Modes of Ventilation

| | |
|---|---|
| P-ACV | Pressure Controlled, Assisted Ventilation |
| P-SIMV+PS | Pressure Controlled, Synchronized Mandatory Ventilation With Pressure Support |
| P-PSV | Pressure Controlled, Ventilation With Pressure Support |
| P-BILEVEL | Pressure Controlled, Two-Level Ventilation |
| P-CMV | Pressure Controlled, Continuous Mandatory Ventilation |
| APRV | Airway Pressure Release Ventilation |
| V-ACV | Volume Controlled, Assisted Ventilation |
| V-ACV(PRVC) | Volume targeted, Pressure Controlled, Assisted Ventilation |
| V-CMV | Volume controlled, Continuous Mandatory Ventilation |
| V-SIMV+PS | Volume controlled, Synchronized Mandatory Ventilation With Pressure Support |
| V-SIMV(PRVC)+PS | Volume Targeted, Pressure Controlled, Synchronized Mandatory Ventilation With Pressure Support |
| SPN-PS | Spontaneous Ventilation With Pressure Support |
| SPN-VS | Spontaneous Ventilation With Volume Support |
| nCPAP | Nasal CPAP Mode |

High Flow Oxygen Therapy Mode, 2-120 ltr/min

Spontaneous Breath Indicator

## Working Features

| | |
|---|---|
| Inspiration pressure | 2-100 mBar |
| Inspiration Time | 0.1-10 sec |
| Peep Pressure | 1-50 mBar |
| Respiatory rate | (p): 1-150/min<br>(a): 1-100/min |
| Tidal Volume | (p): 20-600 mL<br>(a): 100-3000 mL |
| Flow Rate | (p): 1-60 lt/min<br>(a): 1-120 lt/min |
| O2 Mixture | 21-100% |
| Spontaneous Pressure Support | 0-100 mBar |
| I/E rate | 1:10(x60*)-10:1 |

(p): pediatric (a): adult

## Detailed Features

| | |
|---|---|
| Apnea Time | 5-60 sec, Bilateral Apnea Ventilation |
| Apnea Mode | P-CMV, V-CMV |
| Flow Trigger | 0.1-20 lt/min |
| Pressure Trigger Termination | 0.1-20 mBar |
| Termination Of Inspiration | 0-80% |
| Tramp | 0.1-5 sec |
| Automatic Tube Compensation | 0-80% |
| Automatic Leak Compensation | 0-80% |
| Trigger Compensation | On-Off |
| Inspiration Pause | 1-60 sec |
| Expiration Pause | 1-60 sec |
| Internal (Integrated) Nebulizer | 1-20 Lt/min |
| O2 Support | 2 min |

# Displayed Data on screen

| | |
|---|---|
| P Peak | Measurement of Peak Pressure Inspiration |
| P Peep | Measurement of PEEP |
| P Plateau | Masurement of Plateau Pressure Inspiration |
| P Average | Masurement of Average pressure |
| F Inspiration | Inspiration Flow |
| F Expiration | Expiration Flow |
| MVe | Volume Measurement |
| SpnMVe | Spontaneous Minute Volume Measurement |
| SpnMVe/MVe | Spontaneous Volume Per Minute / Volume Raito Per Minute |
| V Tidal | Tidal Volume |
| FiO2 | Oxygen Ratio |
| Respiratory rate | Number of Breaths Per Minute |
| Spontaneous respiratory rate | Spontaneous Number of Breaths Per Minute |
| T Inspiration | Inspiration Time |
| T Exspiration | Exspiration Time |
| I/E | Inspiration and Expiration Time Ratio |
| R Airway | Airway Resistance Measurement |
| C Static | Static Compilance Measurement |
| C Dynamic | Dynamic Compilance Measurement |
| Elastance | Elastance Measurement |
| RC Constant | Rc Time Constant Measurement |
| WOB | Energy Spent During Inspiration |
| WOB/Lt | Energy Spent During Inspiration / Volume |
| V Resudial | Resudial volume at the end of breathing |
| V Expiration | Exspiration Tidal Volume |
| V Ads | Anatomic Dead Space Measurement |
| AutoPeep | Trapped Air Pressure After Respiration Occlusion |
| P0.1 | Pressure Measurement Per 100 milli Seconds |
| RSBI | Rapid Shallow Breathing İndex |
| PTP | Negative Pressure x Negative Pressure Time |
| FTP | Negative Flow x Negative Flow Time |
| P NIF | Negative Inspiration Pressure Force |
| MVsp% | Spontaneous Ratio to Mandatory Minute Volume |
| Leak Rate | Leak Volume Rate |
| Leak Volume | Leak Volume After Respiration Cycle |

## Alarm Feautures

Auditory and Visual Alarm and Recording
Two-Minute Alarm Silence

| | |
|---|---|
| Inspiration Pressure | Lower Limit / Upper Limit |
| Tidal Volume | Lower Limit / Upper Limit |
| Speed of Respiration | Lower Limit / Upper Limit |
| Volume Per Minute | Lower Limit / Upper Limit |
| I/E Ratio | Lower Limit / Upper Limit |
| FiO2 | Lower Limit / Upper Limit |
| Apnea Time | Upper Limit |
| Leak | Upper Limit |

## Graphic Features

Pressure Time Graphic
Flow Time Graphic
Volume Time Graphic
Pressure-Volume, Pressure-Flow, Volume-Flow Cycles

## Patient Records and Logging

Last 3 Days Record of Ventilation Value Trend and Graphical Representation.
Information Storage With The Capauty of 2000 Record Alarm and Ventilation Alarm.

## Electrical Features

| | |
|---|---|
| Battery Time | 2 Hours + 8 Hours Optional |
| Mains Voltage Power | 180 - 264 VAC |
| Consumption | 47-63 Hz 100W |

## Features of The Source of Pressure

| | |
|---|---|
| O2 Pressure | 2.5 - 7 Bar Central System / Tube |
| Air Pressure | 2.5 - 7 Bar Central System / Tube |

Automatic Change and Alarm Display When The Source İs Consumed
Working With a Medical Compressor or Regulator

## Size and Weight

| | |
|---|---|
| Lenght | 150cm |
| Depth | 44cm |
| Width | 42cm |
| Weight | 55kg |
| Monitor Movement | Left and Right 150° |

Up and Down 15°
15 inch Full Touch Screen Monitor
Pendant and Column Mounting

## Digital Interfaces

4 USB, 2 COM, 2 Ethernet

# Comparison of Modes

| Biosys | Puritan Bennett | Dräger | GE | Hamilton | Maquet | Mindray |
|---|---|---|---|---|---|---|
| **P-ACV** | A/C: PC | PC-AC | PCV | PCV | PC | P-AC |
| **P-SIMV+PS** | SIMV: PC | PC-SIMV | SIMV-PC | PSIMV+ | SIMV-PC+PS | P-SIMV |
| **P-PSV** | PS | SPN-CPAP/PS | CPAP/PSV | Spont | PS | PSV |
| **P-Bilevel** | BiLevel | PC-BIPAP | BiLevel | DuoPAP | Bi Vent | DuoLevel |
| **APRV** | APRV | PC-APRV | APRV | APRV | Bivent-APRV | APRV |
| **V-ACV** | A/C: VC | VC-AC | VCV | (S)CMV | VC | V-AC |
| **V-ACV(PRVC)** | VC+ | Autoflow | PCV-VG | APV/SIMV+ | PRVC | PRVC |
| **V-CMV** | A/C: VC | VC-CMV | VCV | CMV | VC | V-AC |
| **V-SIMV+PS** | SIMV: VC | VC-SIMV | SIMV-VC | SIMV | SIMV-VC+PS | V-SIMV |
| **V-SIMV(PRVC)+PS** | VC+ | VC-SIMV+ Autoflow | SIMV-PCVG | APV/SIMV+ | SIMV-PRVC+PS | PRVC |
| **SPN-PS** | PS | SPN-CPAP/PS | CPAP | Spont. | PS/CPAP | - |
| **SPN-VS** | VS | SPN-CPAP/VS | - | - | VS | - |

- +PS(Pressure Support) feature supports the breathing efforts with pressure.
- PRVC(Pressure Regulated Volume Control) feature provides pressure control for volume target.

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