
EDAN
A world of potential

X Series Patient Monitor

Be extra smart, be extra refined.

EDAN

A world of potential

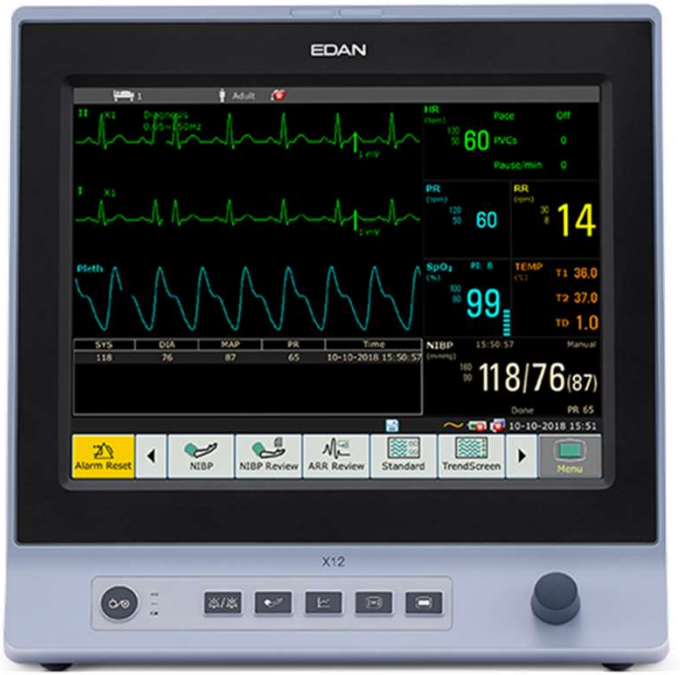
Edan Instruments, Inc.

www.edan.com
piotr@ippolska.pl
tel. 601 130 330

X Series

X10	X12	X8
10.1”	12.1”	8”

X12 Sub-acute Patient Monitor



X12

12.1” Touch Screen

X10 Sub-acute Patient Monitor

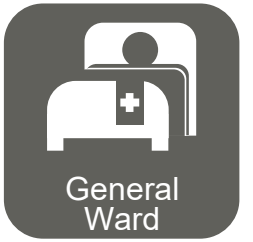
X10

10.1” Touch Screen

X8 Portable Patient Monitor

X8

8” Touch Screen



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Stunning Design

- **Ultra Slim Design**
  X series comes with ultra slim design, the thinnest part is only 41 mm.

- **Light Weight**
  All three models of X series monitors are compact and light weight design, with the comfortable handle, they can easily carried by single hand.

No-fan Design

With low power consumption design, fan is no longer needed.

- **No Noise**
  No-fan design brings no noise to the environment.

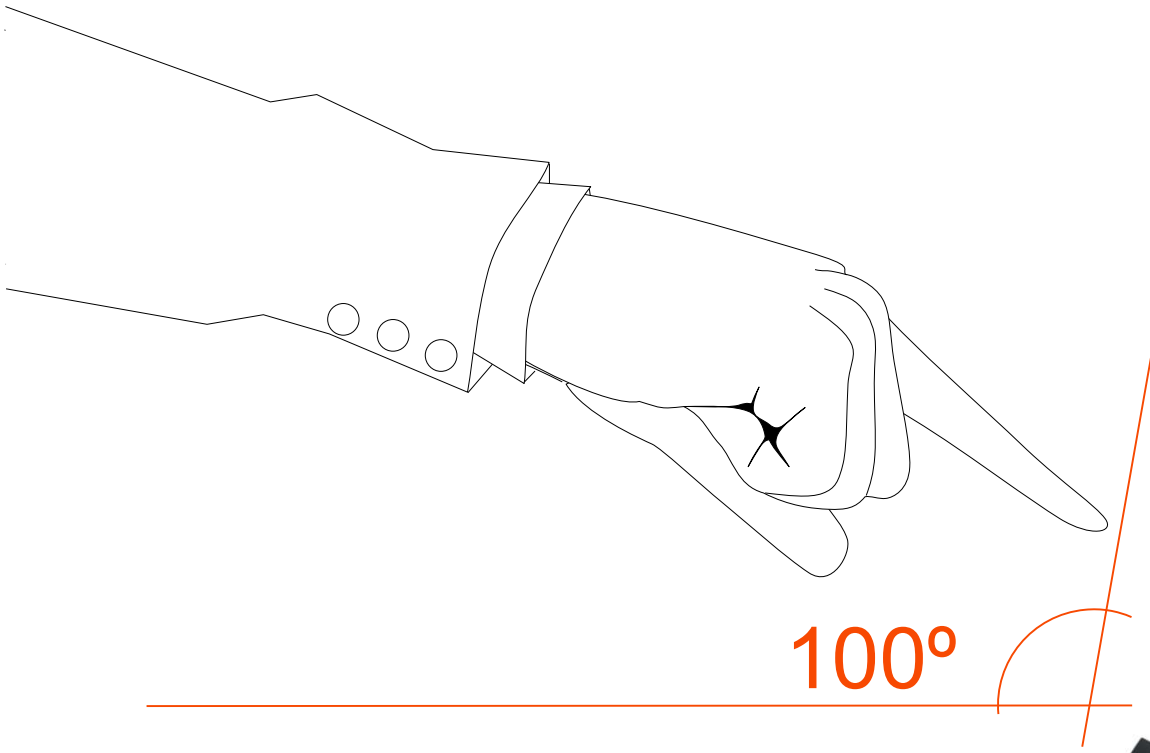
- **No Dust**
  On fan designs, dust accumulation is easily found on the flabellum and grids. With no fan, it brings no dust on these positions, bringing down the faulty rates and adapts well to critical divisions with strict dust control regulations.

Unique Cable-receiving Design

In many primary care applications, there is no proper place for placing cables.

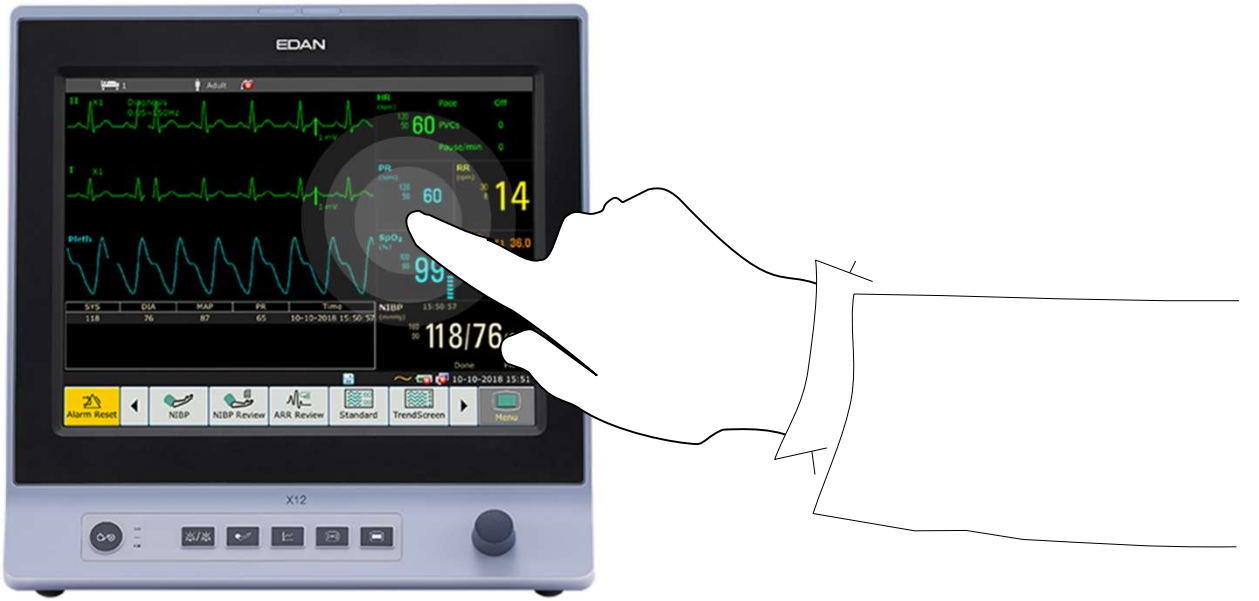
With the unique cable-receiving design on X series, all the cables and sensors may go to the gap next to the handle, which provides an easy cable receiving solution and brings no twist problem.

Humanized design



With the 100 º incline angle design, it's easy to operate & observe the X series monitor on the table or on rolling stand.

A Better Operating Experience



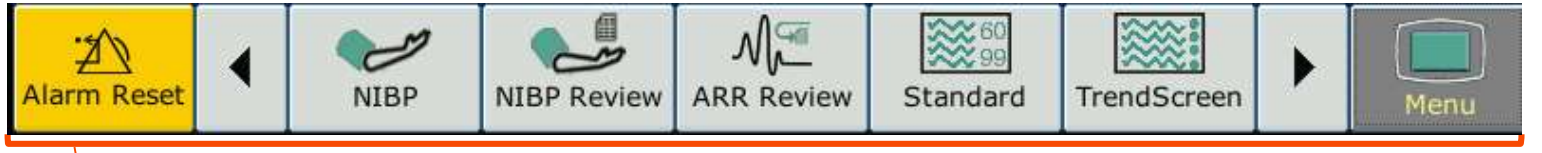
Full-touch screen

Optional full-touch screen is applied in X series patient monitor which brings the visual enjoyment and highly responsive operation experience.

Waterproof silicon button

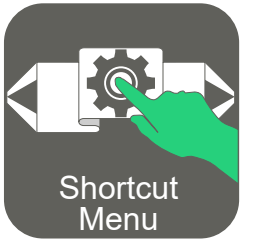
A whole piece of silicon shield designed buttons could be easily cleaned in daily maintenance and it’s water seepage free.

Customizable Shortcut Menu



Most frequent operations are provided as silicon buttons.

The shortcut menu is put on the bottom of the display, providing direct access to daily operations. The options and sequence of Shortcuts are **customizable**.

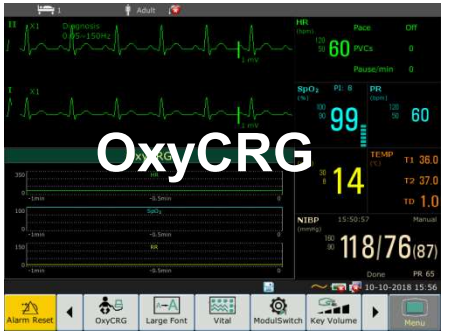


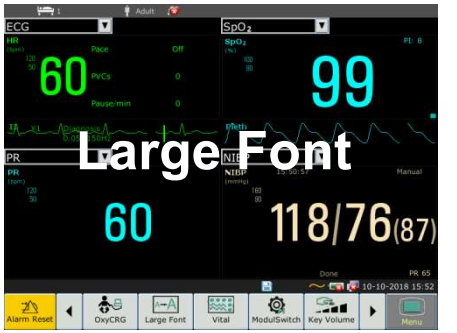
- **Parameters Selection**
  Module Switch
- **Alarm Management**
  Alarm Reset / Alarm Setup
- **History Review**
  Trend Graph / Trend Table / Alarm Review / NIBP Review / ARR Review
- **Display Mode**
  Standard / Trend Screen / OxyCRG / Large Font/ Vital
- **Brightness / Volume Management**
  Brightness / Key Volume / Beat Volume / Night Mode
- **Others**
  Menu / Admission / Privacy / Standby / MEWS / IBP Zero / Ethernet Printer

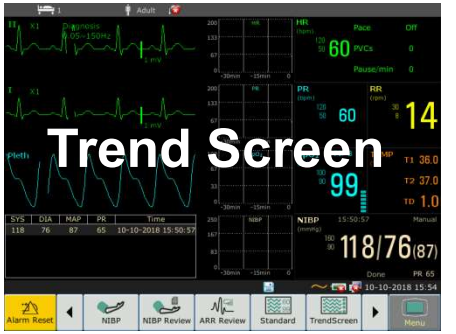
Multiple Display Modes

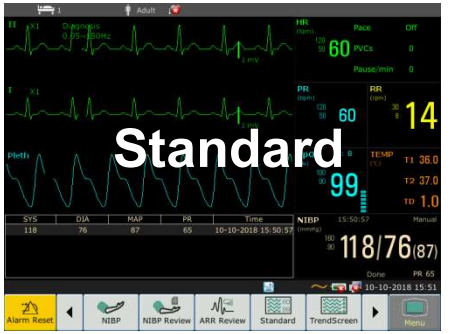
- **X12**
  Maximum **10** channels/**13** waveforms

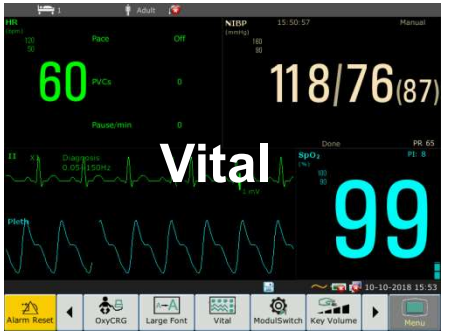
- **X10/X8**
  Maximum **8** channels/**13** waveforms





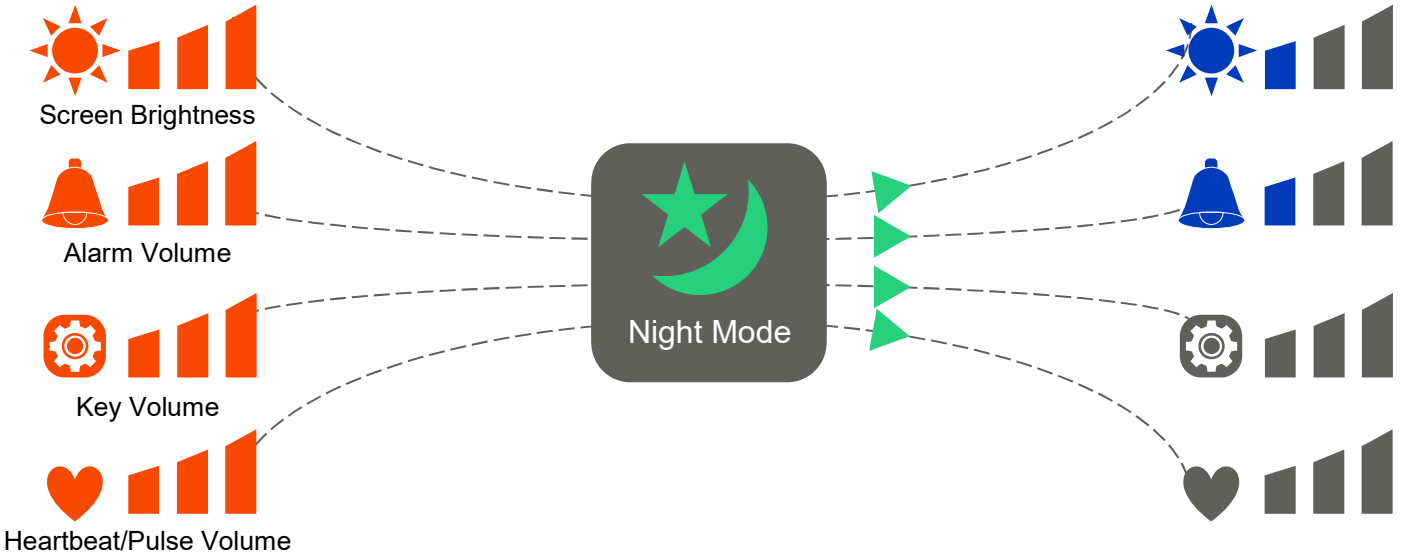






Vital display mode is unique from EDAN.

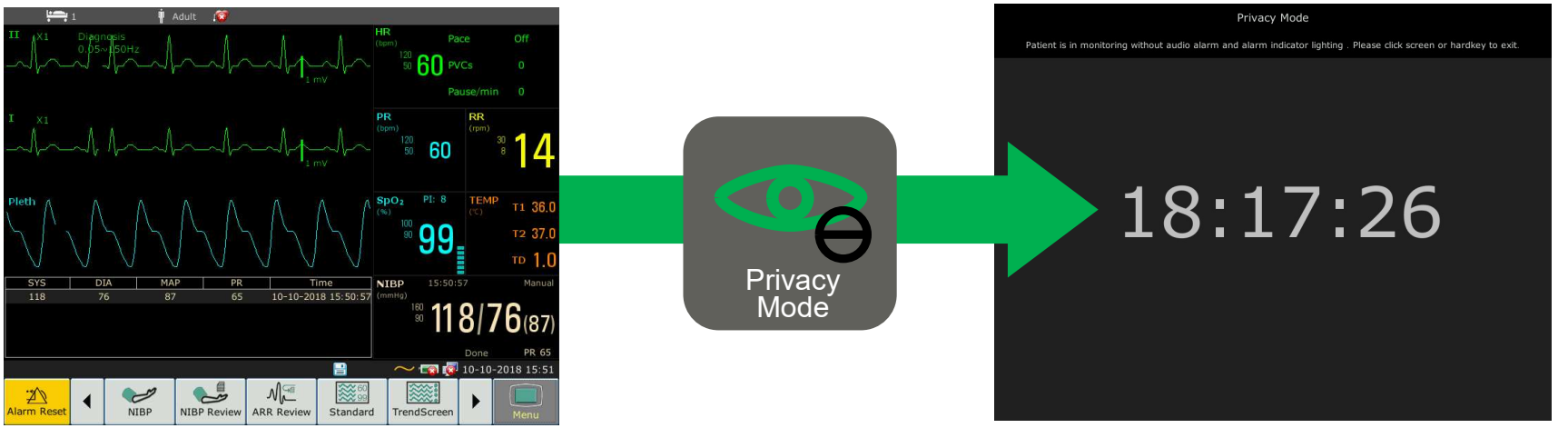
Night Mode



The night mode could provide a more comfortable monitoring experience for patients during night time.

- **Screen Brightness & Alarm Volume**
  Switched to the lowest level
- **Key Volume & Heartbeat/Pulse Volume**
  Switched off
- **Silicone Buttons**
  Lighten up

Privacy Mode*

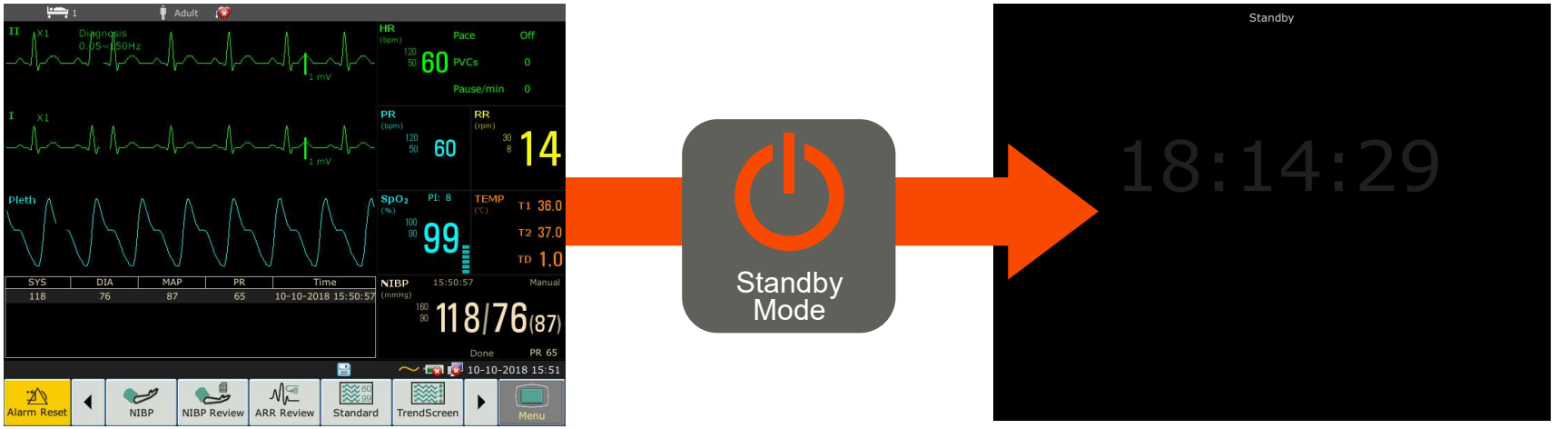


The privacy mode provides patient a comfortable environment and enough privacy with no patient info displayed on screen. However, the background monitoring continues and all the real-time data and alarms will be sent to central monitoring system.

- Only the present time displayed on main screen.
- Background monitoring continuous when using together with central monitoring system.
- No audible alarm can be heard, only the alarm indicator on top will flash.

* *The Privacy mode can be activated only when using with MFM-CMS V2.63 or above*

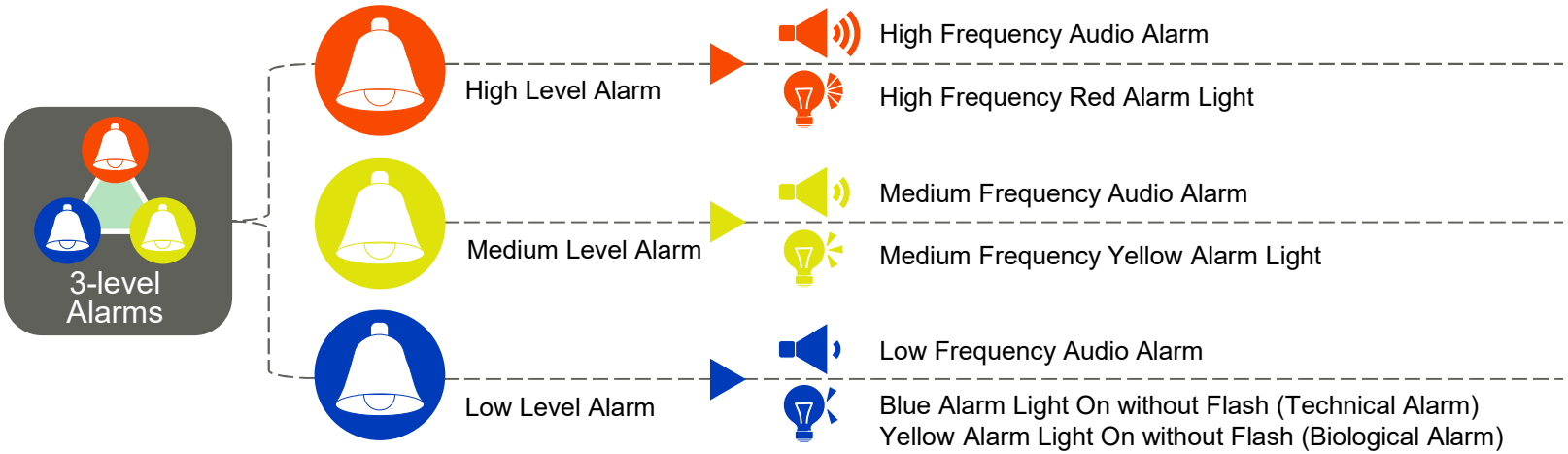
Standby Mode



Under the standby mode, patient monitoring will be temporary stopped and monitor goes into power-saving mode. Only a digital time displays on main screen in large font.

- Background monitoring suspended.
- No physiological parameter or alarms will appear.
- Monitor can quit standby mode directly or through central monitoring system.

3-level Alarm System



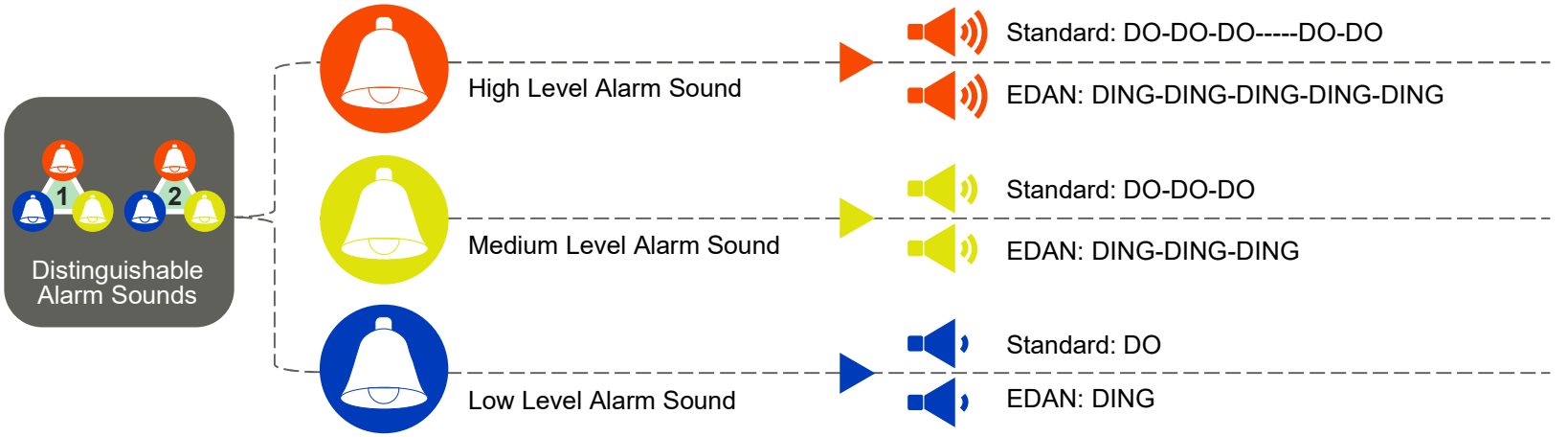
A customizable 3-level alarm management system is built in the monitors, presented with different audio & visual indications.

- **High Level Alarm**
  High priority alarms which requires immediate medical response.

- **Medium Level Alarm**
  Medium priority alarms which requires close attentions.

- **Low Level Alarm**
  Lowest priority alarms which is likely to result in discomfort of the patient.

Distinguishable Alarm System



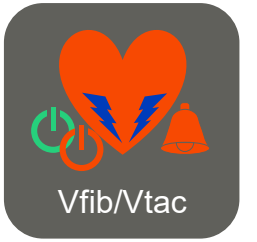
There are two types of alarm sound available in X series patient monitors, including the traditional type that compliance with international standards and the customizable Mode 1.

With totally different sounds and tones, the X series patient monitors could be easily distinguished from other devices nearby.

Essential Alarm Management

On EDAN monitors, alarms can be switched off as per user configuration. However, additional restrictions are put upon some essential alarms to control over possible lethal conditions.

- **Cardiac Arrest**
  Cardiac arrest alarm can never be switched off.
  Cardiac arrest alarm level is fixed as high.



- **Apnea**
  Apnea alarm can never be switched off.
  Apnea alarm level is fixed as high.

- **Ventricular Fibrillation/Tarchycardia**
  Ventricular fibrillation/tarchycardia alarm can be switched off with a reminder on the display.
  Ventricular fibrillation/tarchycardia alarm level is fixed as high.

- **Most Biological Alarms**
  Most biological alarms level can never be switched into low.

Alarm Mute/Reset

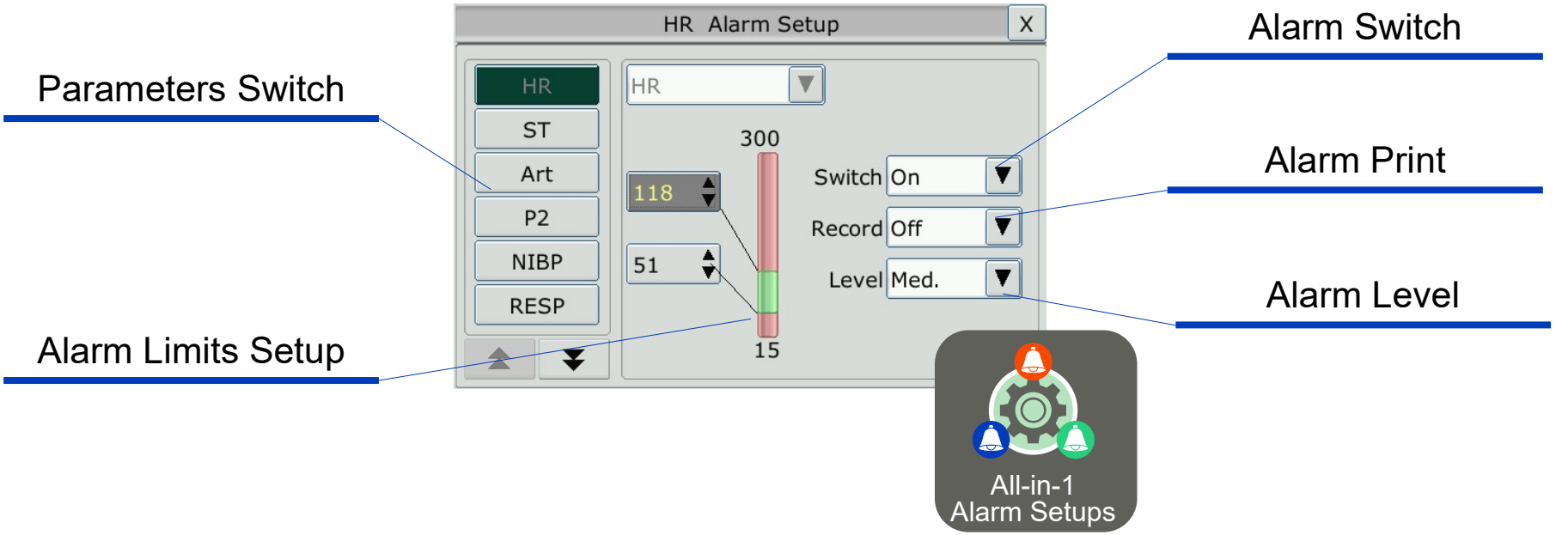
The alarm reset on the shortcut menu serves for the ongoing alarm.

- Ongoing alarm mute
- New alarm will break the mute status

The alarm mute silicone button serves for overall alarms

- Ongoing alarm pause
  1/2/3 minutes mute or permanent mute according to user settings
- Ongoing alarm mute
- New alarm will not break the mute status

All-in-1 Alarm Setup



Biological alarm settings are now integrated into one menu, enabling the users to switch easily between different alarms.

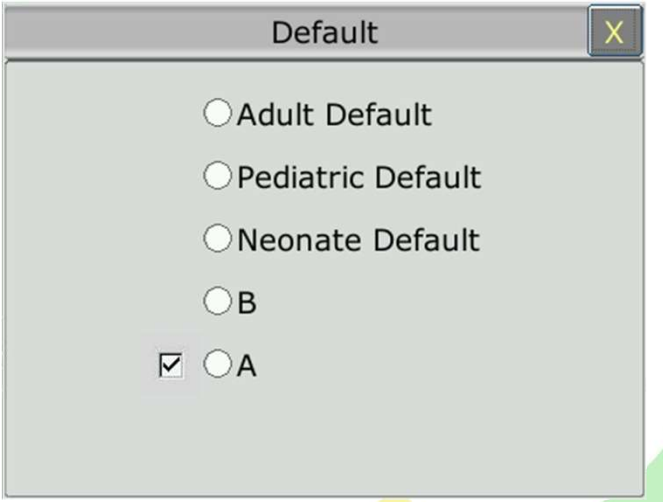
All arrhythmia alarm settings are integrated into another menu.

Personalized Alarm Programs

Preconfigured alarm programs are built inside the machine, divided into adult, pediatric, and neonate.

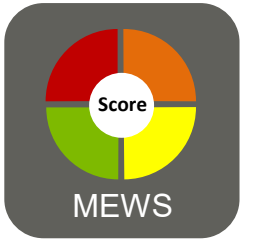
At the same time, users may configure their own alarm settings according to different clinical requirements and save into the monitor. User may also edit the existed programs as new saves.

- **Adult Alarm Program**
  Activated when patient type is “Adult”.
- **Pediatric Alarm Program**
  Activated when patient type is “Pediatric”.
- **Neonatal Alarm Program**
  Activated when patient type is “Neonate”.
- **User Configured Alarm Program**
  Activated when selected.



Modified Early Warning Score System

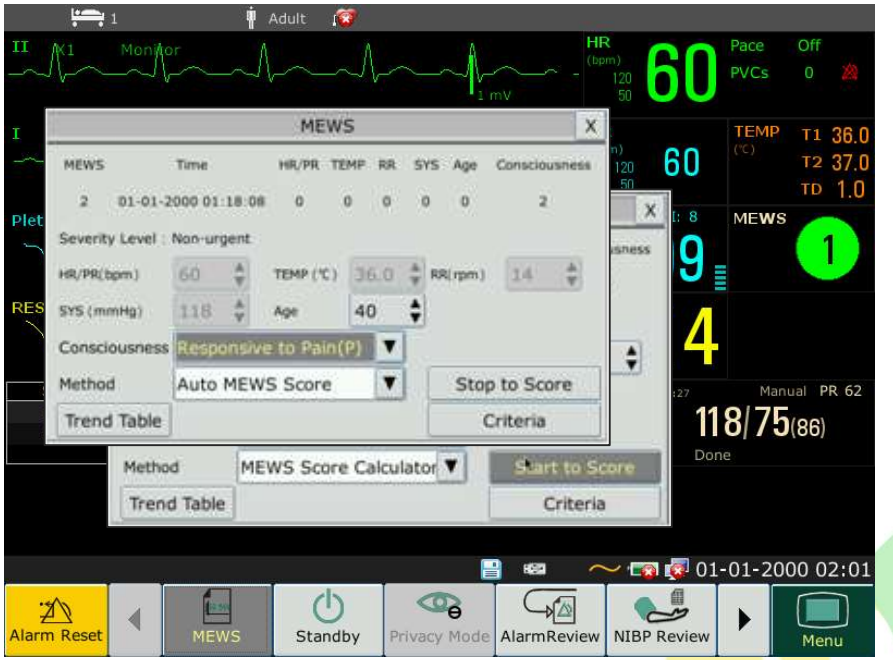
The Modified Early Warning Score (MEWS) is a tool for nurses to help tracking clinical condition of patient and quickly determining their degree of illness.



The score is determined from six aspects including patient's age, systolic blood pressure, heart rate, respiration rate, body temperature and level of consciousness.

■ **Auto MEWS Score**
Auto score display which triggered by SYS monitoring

■ **MEWS Score Calculator**
Input all parameters manually and calculate the score



Non-volatile built-in Memory

The machine is available with non-volatile memory by optional with a built-in SD card in 8 GB capacity. You may easily review the history data through it.

For each piece of file of single patient:

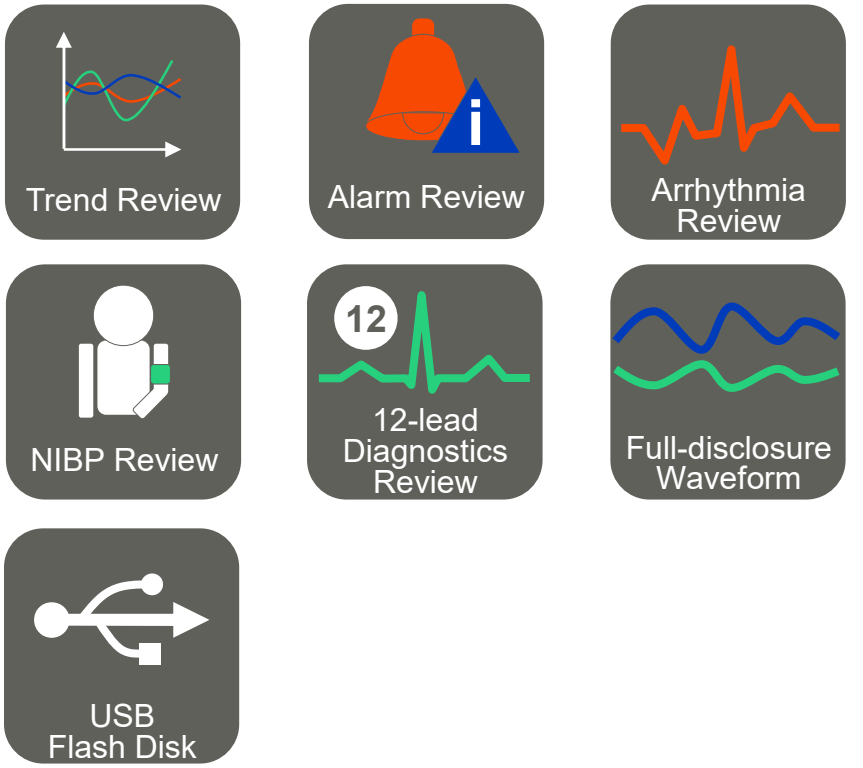
- **Trend Review**
  240 hours of trend graph/trend table
- **Alarm Review**
  200 sets
- **Arrhythmia Review**
  200 sets
- **NIBP Review**
  1200 sets
- **12-lead Diagnostics Review**
  50 sets
- **Full-disclosure Waveform Storage**
  48 hours

External Memory

Installed with an external USB flash disk, monitoring data can also be stored permanently. You may also review these data on any EDAN monitor.

For each patient:

- **Trend Storage**
  240 hours of trend graph/trend table
- **Alarm Storage**
  60 sets
- **Arrhythmia Storage**
  60 sets
- **NIBP Storage**
  1200 sets
- **12-lead Diagnostics Storage**
  50 sets
- **Full-disclosure Waveform Storage**
  48 hours



Screenshot & Raw data storage

Installed with an external USB flash disk and normal keyboard, the monitoring screen and raw data could be stored permanently for clinical study.

- **Screenshot**
  Press the print screen button on keyboard, the screenshot will be automatically saved into USB disk under the folder *pics*.

- **Raw data**
  The raw data for specific parameters could be saved into USB disk if needed, including ECG, SpO_2, BP, RESP and PACE.

Barcode Scanner

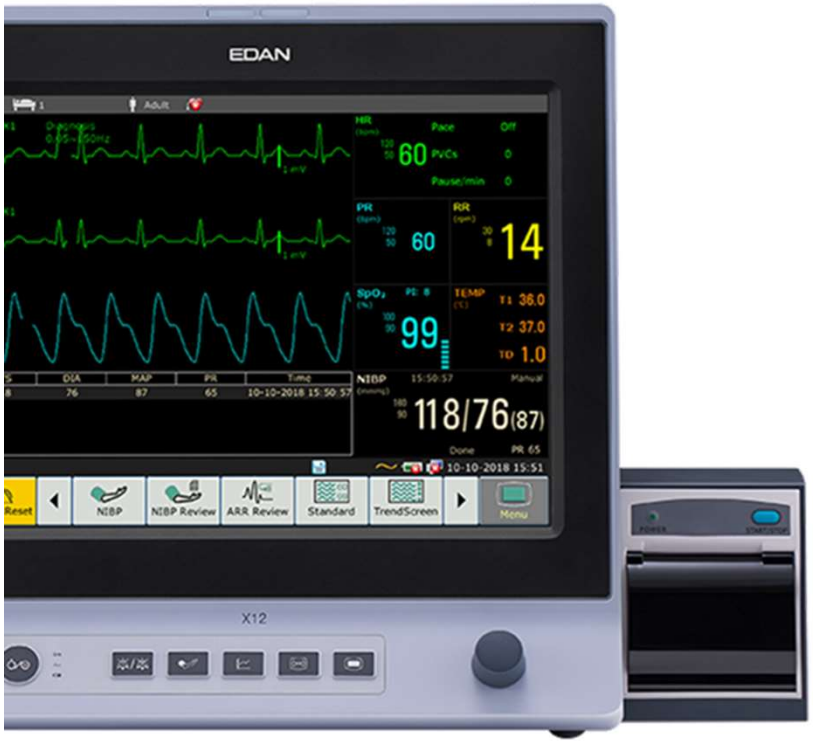
Many hospitals these days utilizes barcode system for patient management.

In these hospitals, you may use a barcode scanner to input patient information rather than inputting manually. Both liner barcode and 2D barcode could be supported by X series patient monitor.

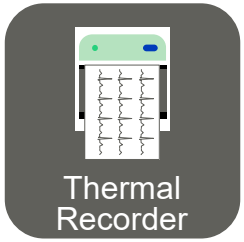
Printing

X series may either printer via built-in thermal recorder on thermal paper or via Ethernet laser printer on plain A4 paper.

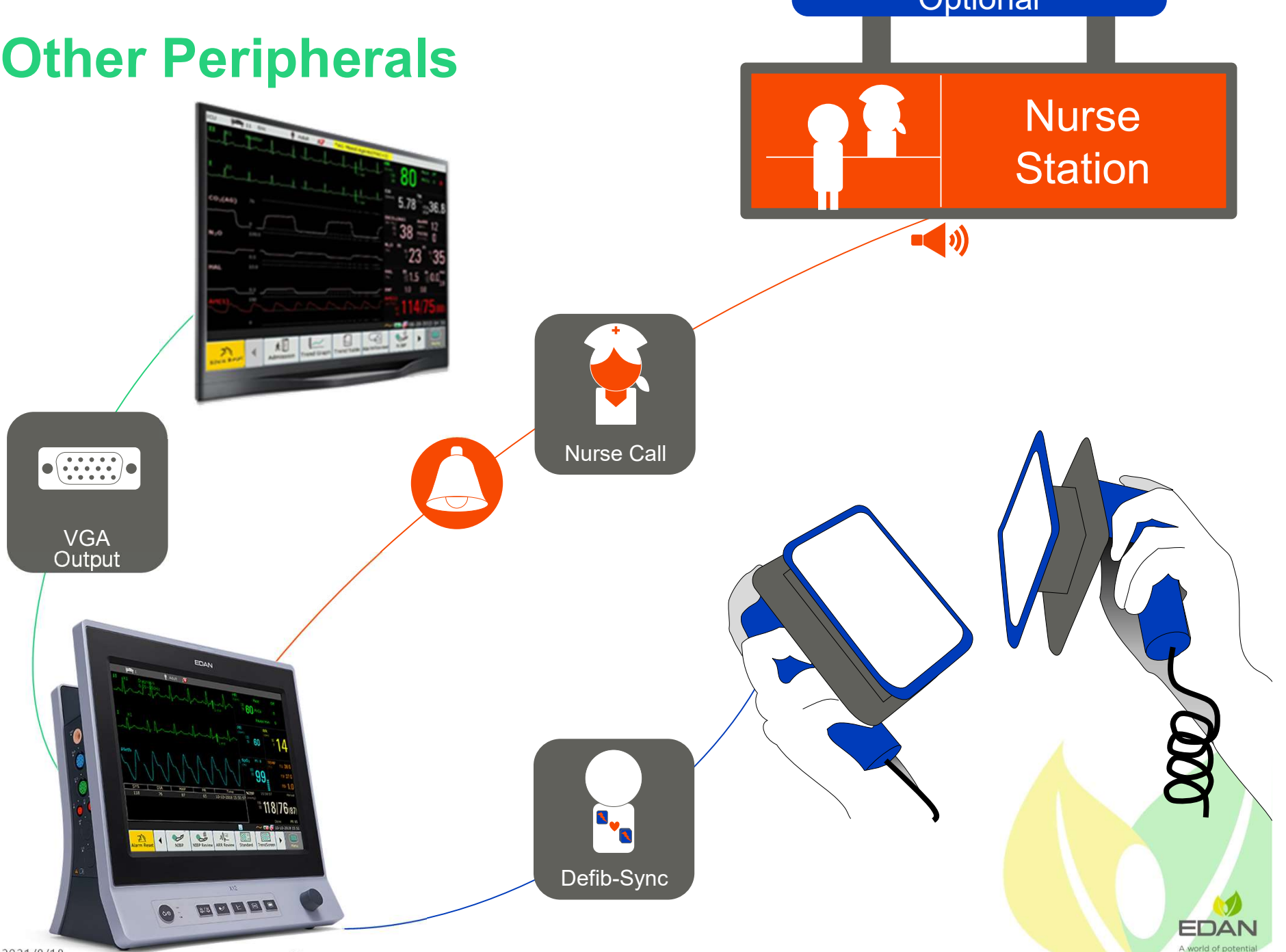
Only compatible with HP Laserjet P2055dn and any other printer with the same driver.



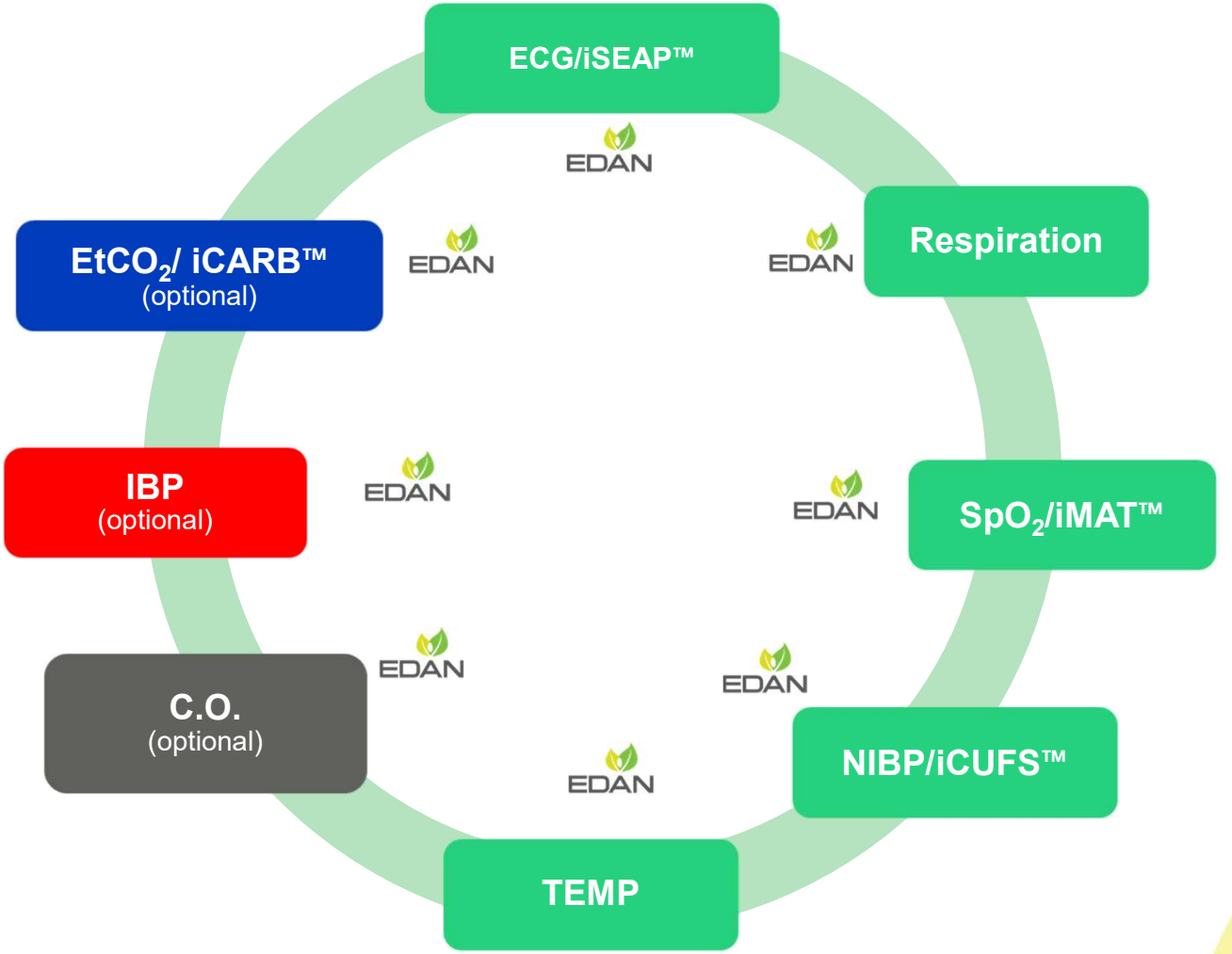
- **Ethernet Printer**
  Plain A4 paper
- **Thermal Recorder**
  3-channel recording



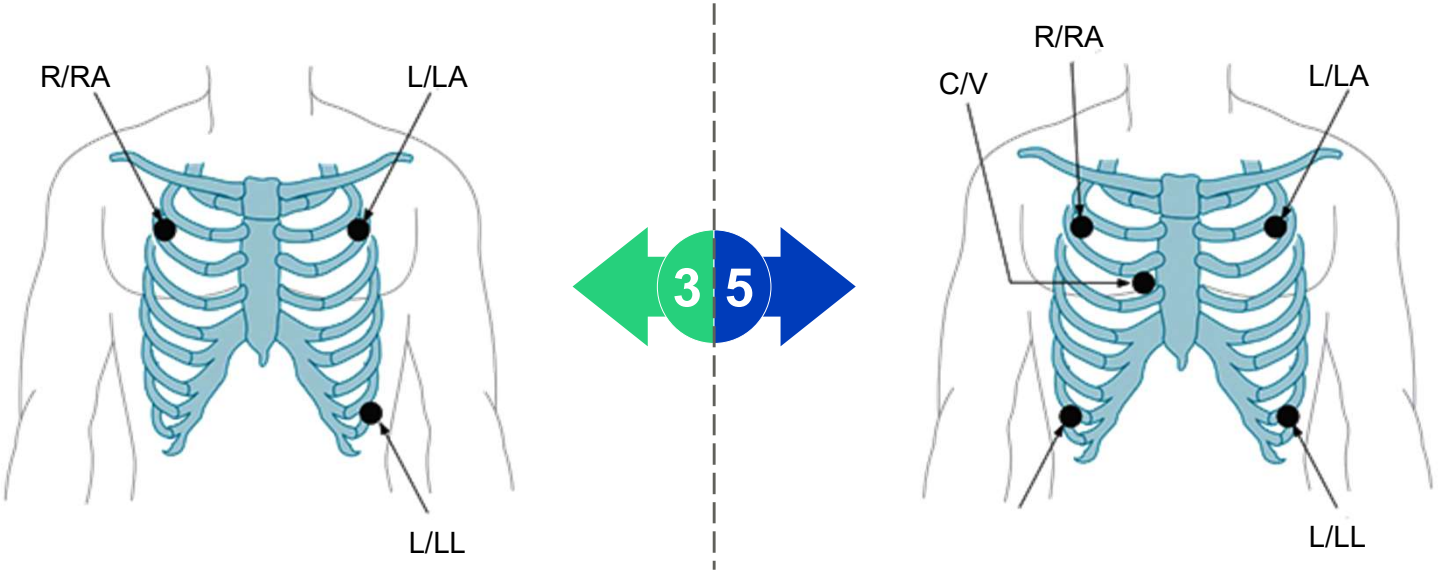
Other Peripherals



Parameters


ECG/iSEAP™
Respiration
SpO2/iMAT™
NIBP/iCUFS™
TEMP
C.O.
(optional)
IBP
(optional)
EtCO2/ iCARB™
(optional)
EDAN

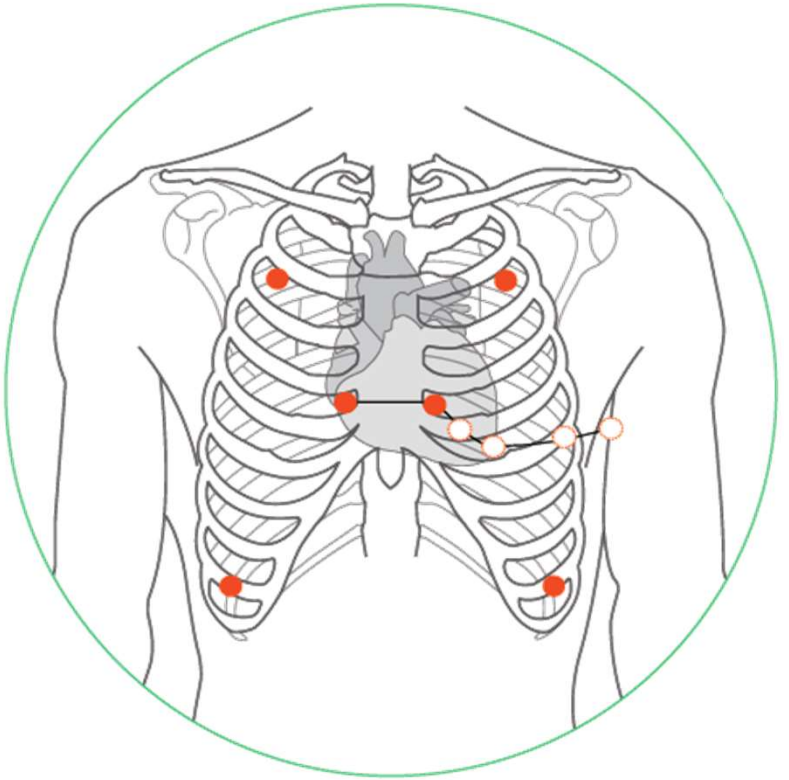
3/5-lead ECG Monitoring



- **EDAN iSEAP™ algorithm optimized for arrhythmia detection, pacemaker detection, ST analysis, and HR measurement.**
- 33 types of arrhythmia events recording and alarms
- Pacemaker detection
- Defibrillator & ESU protection
- 6 types of filter for better performance

6-lead ECG Monitoring

Using a 6-lead placement will allow up to eight ECG leads for a better ST analysis.

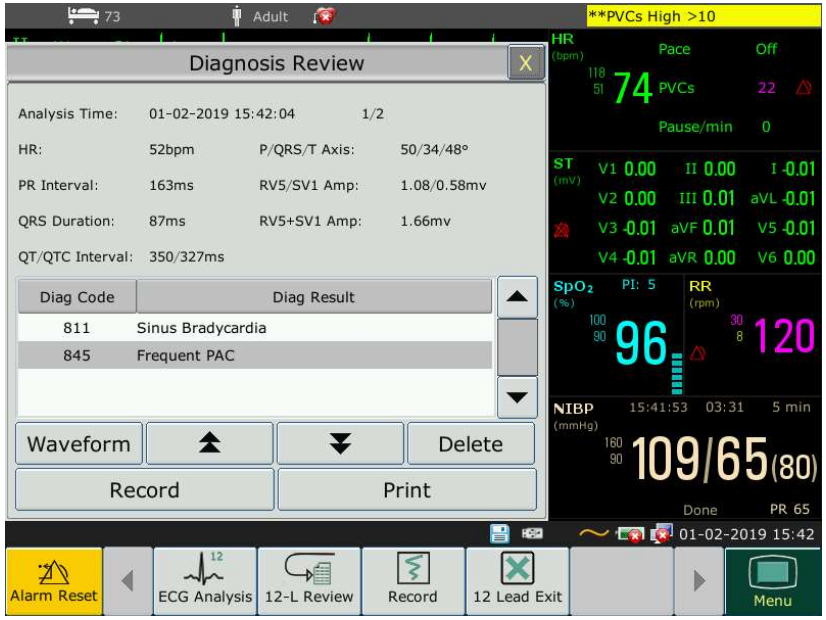


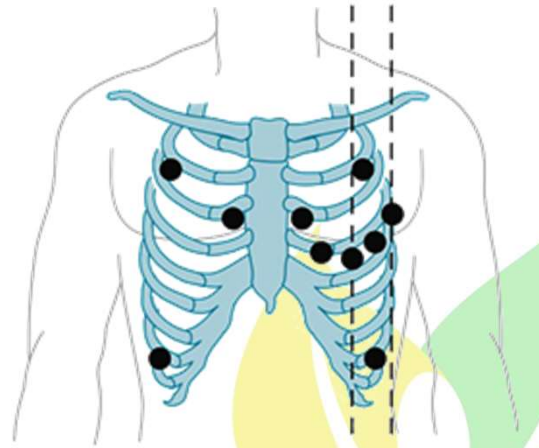
- Four limb leads as standard
- Two thoracic leads Va and Vb can be placed at any two positions from V1 to V6.

Optional

12-lead ECG Diagnostics

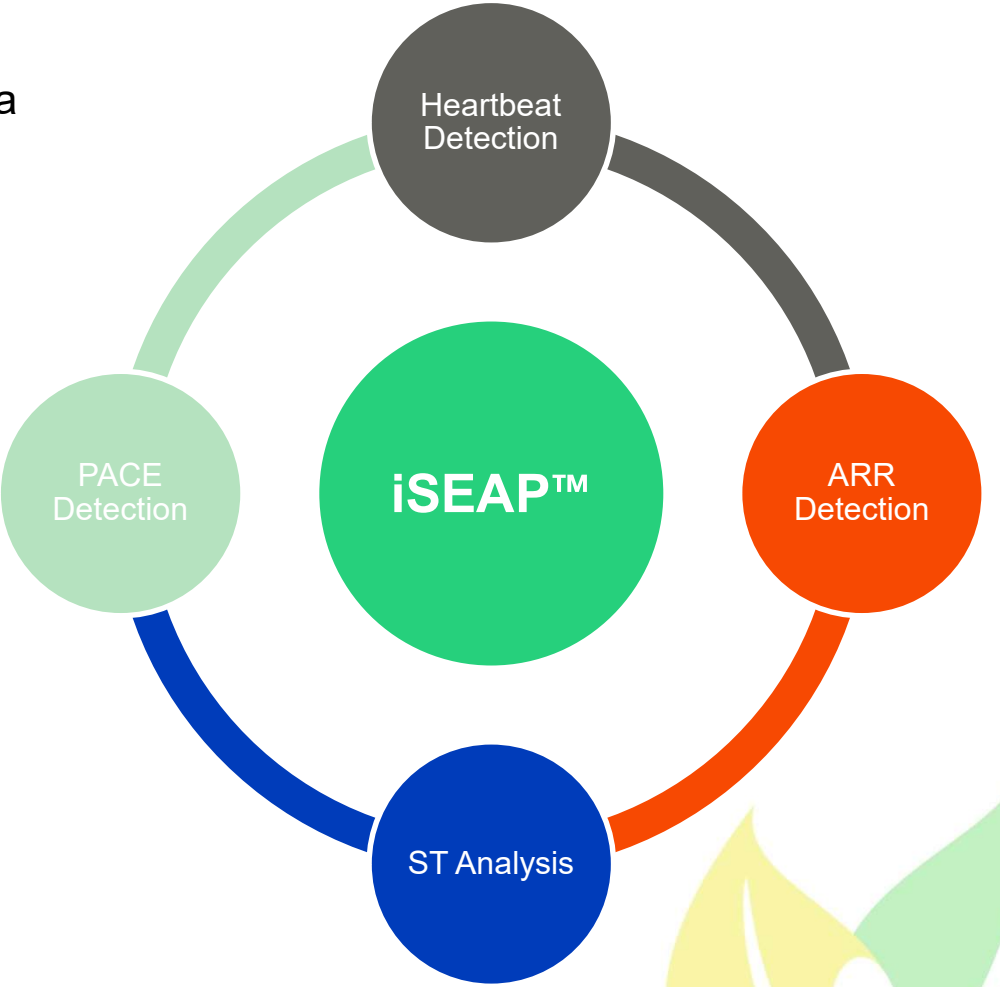
- **EDAN SEMIP® diagnostics algorithm verified by CSE, AHA & MIT-BIH database**
- Pacemaker detection
- Defibrillator/ESU protection
- 12-lead ST analysis
- 208 kinds of diagnosis results
- 10 seconds of 12-lead waveform to review and print out



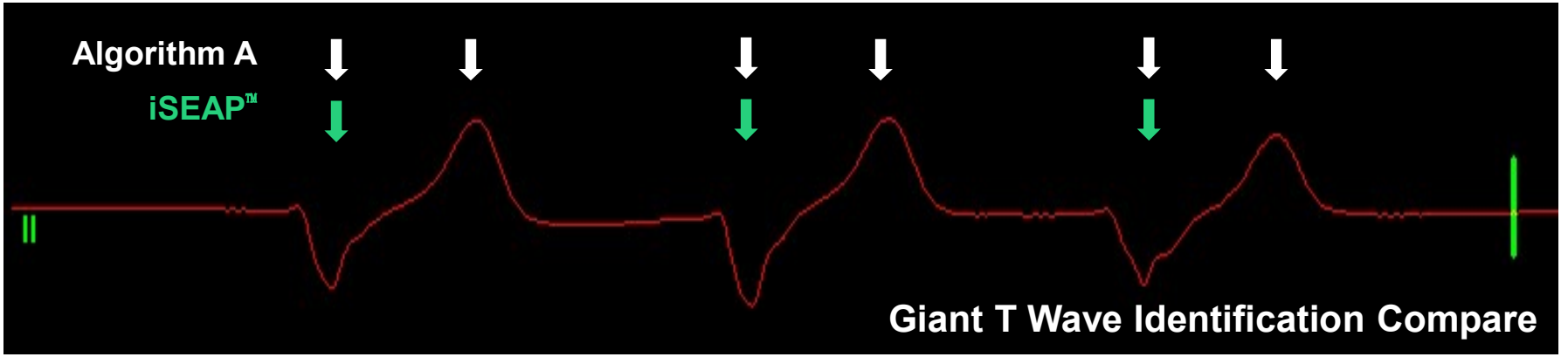


EDAN iSEAP™ Monitoring Algorithm

Based on the experience of EDAN's last generation ECG algorithm, AKA "SEAP", a new generation algorithm iSEAP™ was introduced by April 2012. It shows outstanding performance with great improvement in Arrhythmia Detection, ST Analysis, Giant T Wave Differentiation, Pacemaker Detection, and Interference Resistance.



EDAN iSEAP™ Heartbeat Detection



Algorithm A is another algorithm from market as a compare reference.

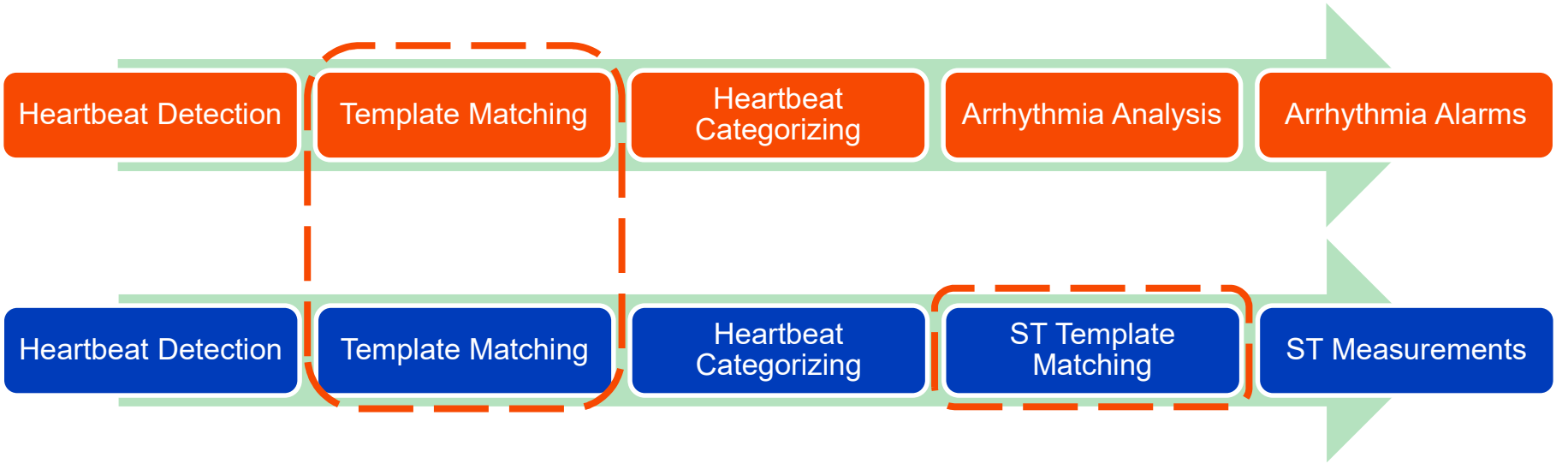
- iSEAP™ identifies giant T waves and avoids false heartbeat, providing accurate HR measurements for patients with ischemic T waves, myocarditis, hyperkaliemia, early repolarization syndrome, and so on.
- For patients with tachycardia, bradycardia, atrial flutter, etc., iSEAP™ makes sure the heart beat sound fits exactly as the real heart beat. You can even tell the heart rate with the heart beat sound alone.
- The heart beat sound detection algorithm is cognate with the heart rate detection algorithm. The two algorithms correct each other to ensure acute heart beat detections

EDAN iSEAP™ Heartbeat Sound Detection

- For patients with tachycardia, bradycardia, atrial flutter, etc., iSEAP™ makes sure the heart beat sound fits exactly as the real heart beat. You can even tell the heart rate with the heart beat sound alone.
- The heart beat sound detection algorithm is cognate with the heart rate detection algorithm. The two algorithms correct each other to ensure acute heart beat detections
- Patients with giant T waves could confuse the ECG monitoring and ends up with false heart beat sound and false HR readings. iSEAP™ differentiates the T waves and ensures the accuracy.

Capture Heartbeat → Cognate with Detected HR → Heartbeat Sound Output

EDAN iSEAP™ Arrhythmia & ST Analysis



iSEAP™ is designed with a special built-in template library, containing piles of ECG templates to help with analysis.

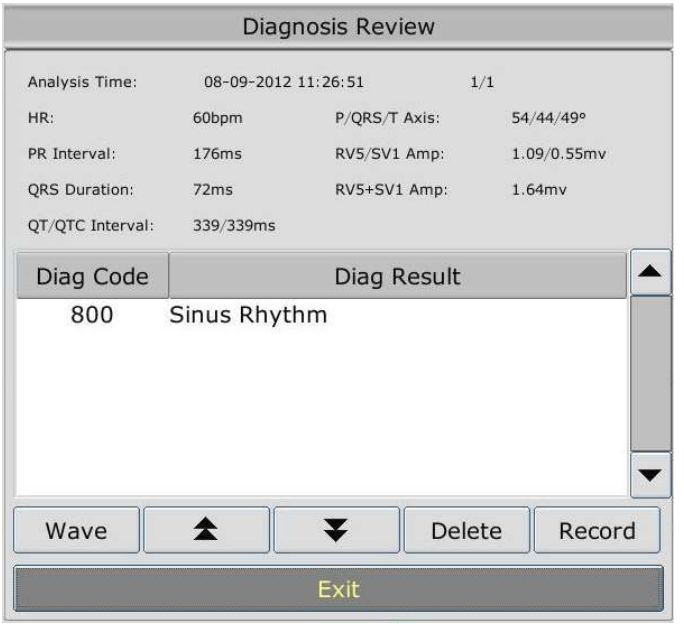
- It compares heartbeats with built-in template library to categorize them before analysis.
- It compares ST segments with built-in template library to assist ST analysis.
- External interference may bring false alarms as ventricular fibrillation, ventricular tachycardia, ventricular premature, cardiac arrest, and so on. iSEAP™ will differentiate the interferences and avoid the false alarms.

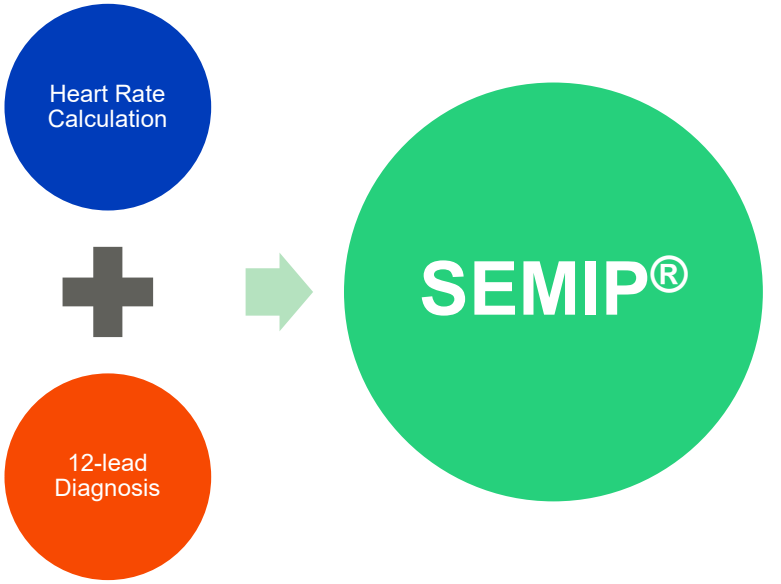
EDAN iSEAP™ Pacemaker Detection

High Frequency Sampling → Locate the Pacemaker Signal → PACE Mark

- It rules out the external inferences and avoid false pacemaker detections.
- It picks accurate pacemaker signal immediately with a high sampling rate

EDAN SEMIP® Diagnostics Algorithm





As a leading Chinese ECG manufacturer, EDAN provides its leading 12-lead ECG interpretation algorithm SEMIP® which gives accurate diagnosis results and offers doctors a reliable reference.

- **Certified by CSE, AHA and MIT-BIH database.**

American Heart Association

Massachusetts Institute of Technology

Age & Gender Specific

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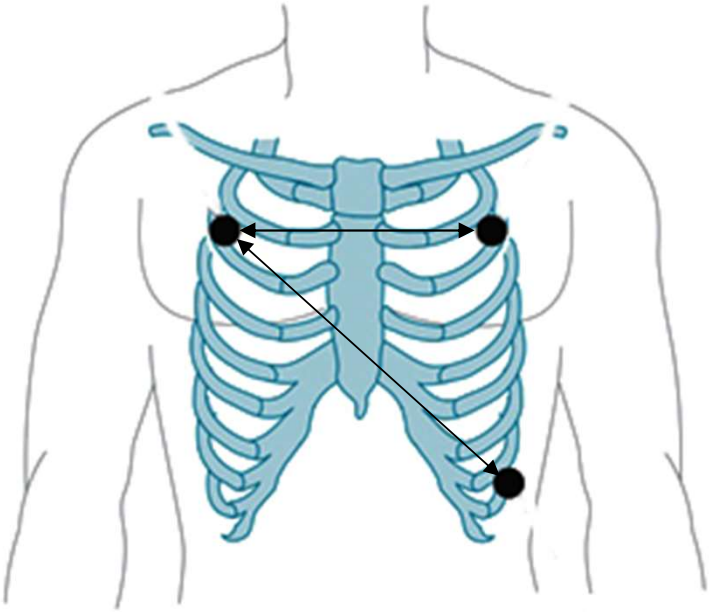
Respiration

EDAN monitors employs impedance method to monitor respiration rate.

- When patient breaths, the movement of chest causes impedance changes with which the machine may calculate the respiration rate.
- Monitored through ECG accessories, no extra accessory required.
- Monitor through lead I or lead II as per user selection.



EDAN SpO_2

- **EDAN iMAT™ algorithm with outstanding motion resistance and low perfusion resistance performance**
  Must work with EDAN SpO2 sensor to ensure accurate readings.

- **Pitch Tone (Pulse-tone modulation)**
  9 types of different tones. Doctors can rely on it to identify SpO_2 changes without checking the readings.

- **PI (Perfusion Index)**
  Reference reading from 0 to 10 according to perfusion changes.

Unique shield design to block outside lights, avoiding light interference.

EDAN Anti-interference Oximetry

There are many factors which limit the performance of pulse oximetry. Two of the most common are high motion (such as occurs with patients' shivering and tremors) and low perfusion at the area of measurement.

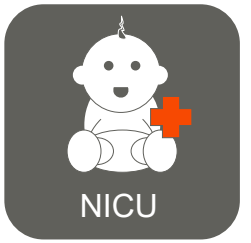
In consideration of this, EDAN developed its anti-interference oximetry, the use of which can largely eliminate the interference even under harsh conditions of high motion and low perfusion. This technique addresses this issue on a combo of hardware and software designs:

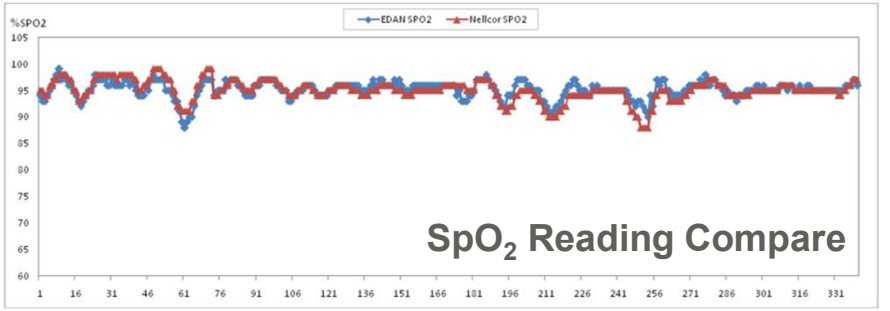
- **Hardware Design**
  A high signal-to-noise ratio circuit with low-noise components is designed for the acquisition of a weak signal under low perfusion.

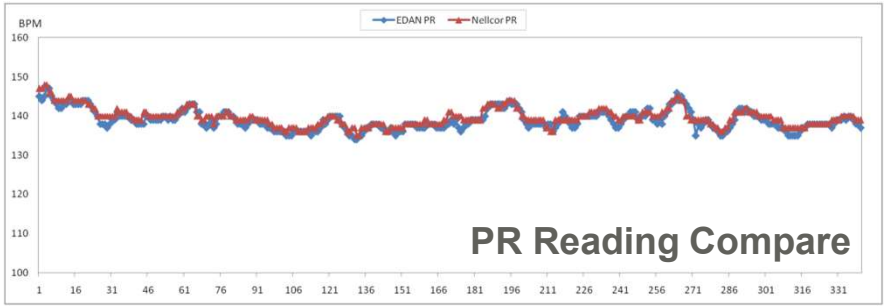
- **iMAT™ Algorithm**
  A unique signal processing algorithm iMAT™ takes advantage of signal characteristics under high motion and low perfusion to improve the accuracy and stability of the measurement. This algorithm employs a special filtering process to reduce the noise caused by motion, as well as from other sources, and amplify the pulse oximetry signal.

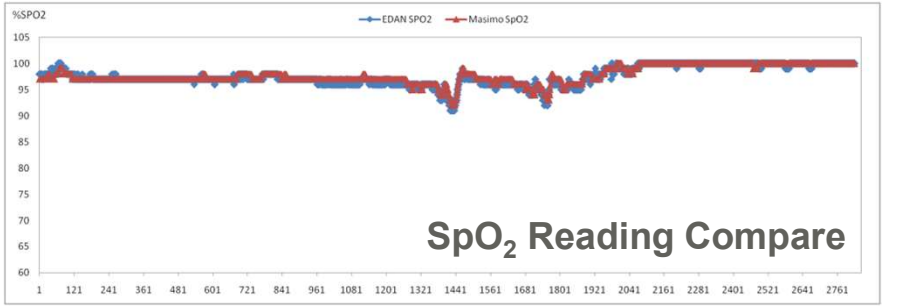
EDAN SpO_2 Compare

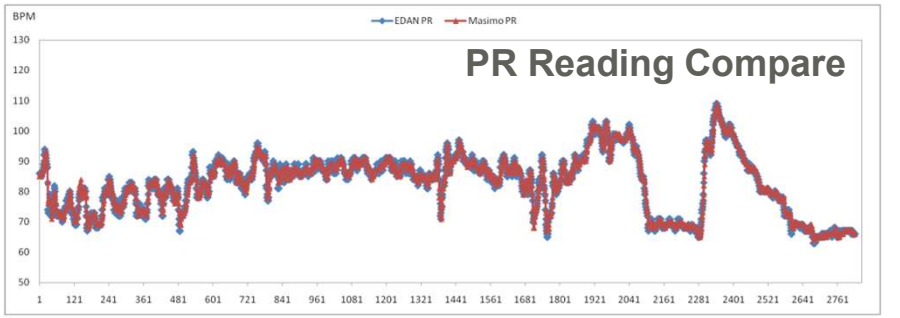
- **EDAN v.s. Nellcor**
  Tested in NICU











- **EDAN v.s. MASIMO**
  Tested in OT

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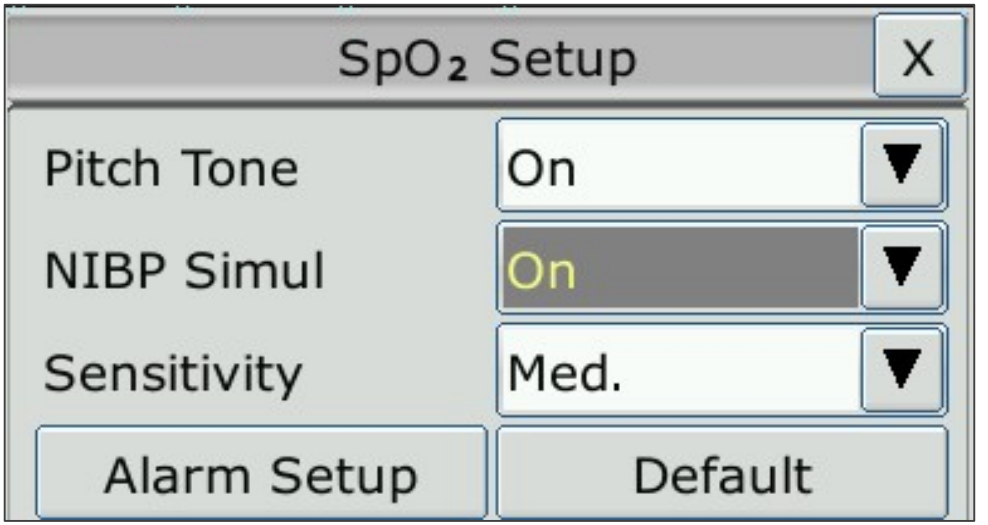
EDAN SpO_2

- **NIBP Simul function in SpO2 monitoring**

  Due to the principles of measurement, the accuracy of SpO2 and NIBP measurements in the same limb may be affected and alarms occur sometimes. However, with the NIBP Simul function, the inflation of NIBP cuff will not affect the real time readings of SpO2 and no insignificant alarms will occur.



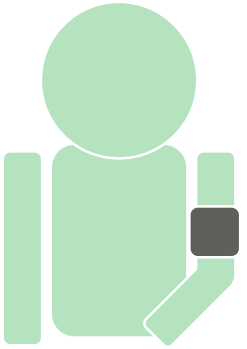
EDAN NIBP

- **EDAN iCUFS™ NIBP algorithm optimized for cardiac patients, hypertensive patients, and neonatal patients**
  Must work with EDAN NIBP cuff to ensure accurate readings.

- **Measuring Mode**
  Auto, Manual, Continual (STAT mode as known in many other brands)

- **Low Noise**
  Environment friendly. Makes patient more comfortable.

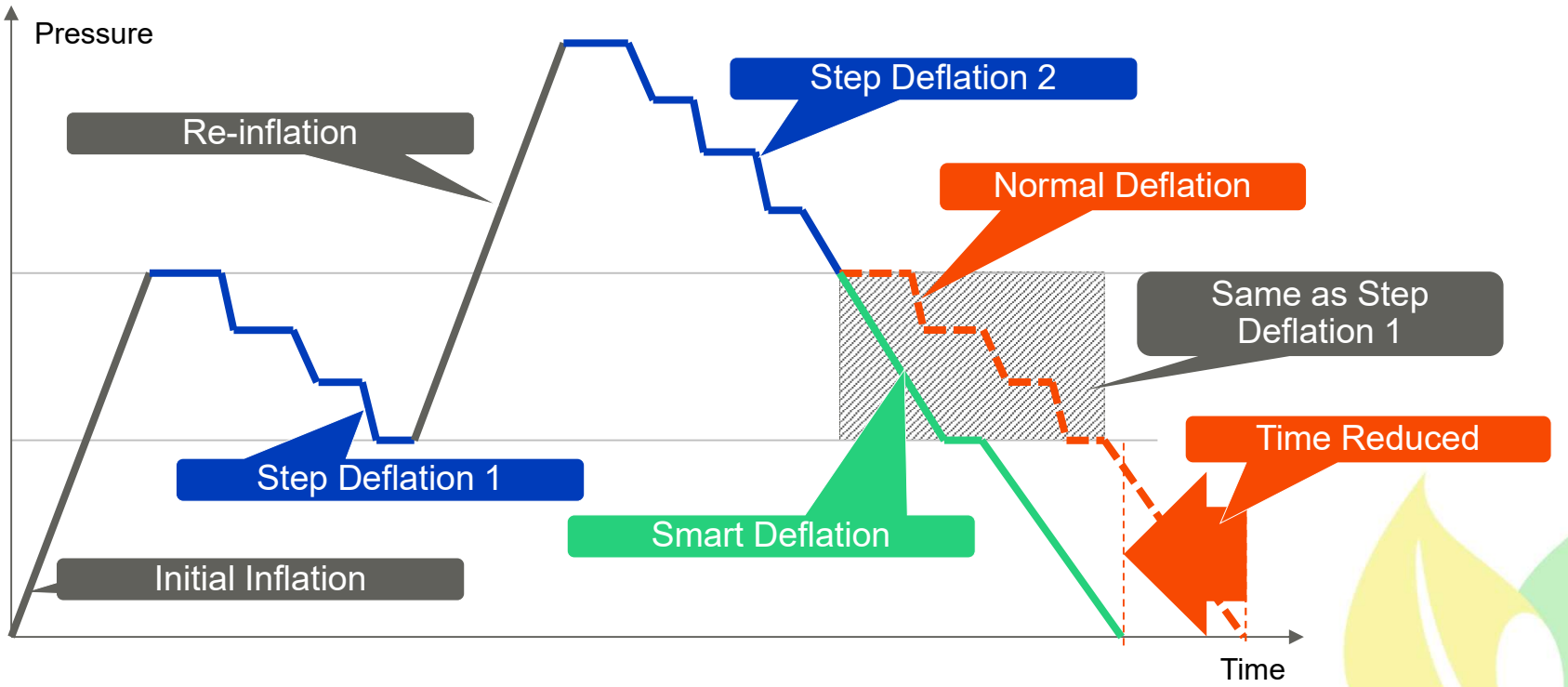
- **Full Range of Optimized Cuff Sizes**
  9 different sizes of cuffs covering from neonates to large adults, from arm to thigh.
  Cuff sizes are optimized according to clinical researches.



EDAN iCUFS™ Smart Deflation

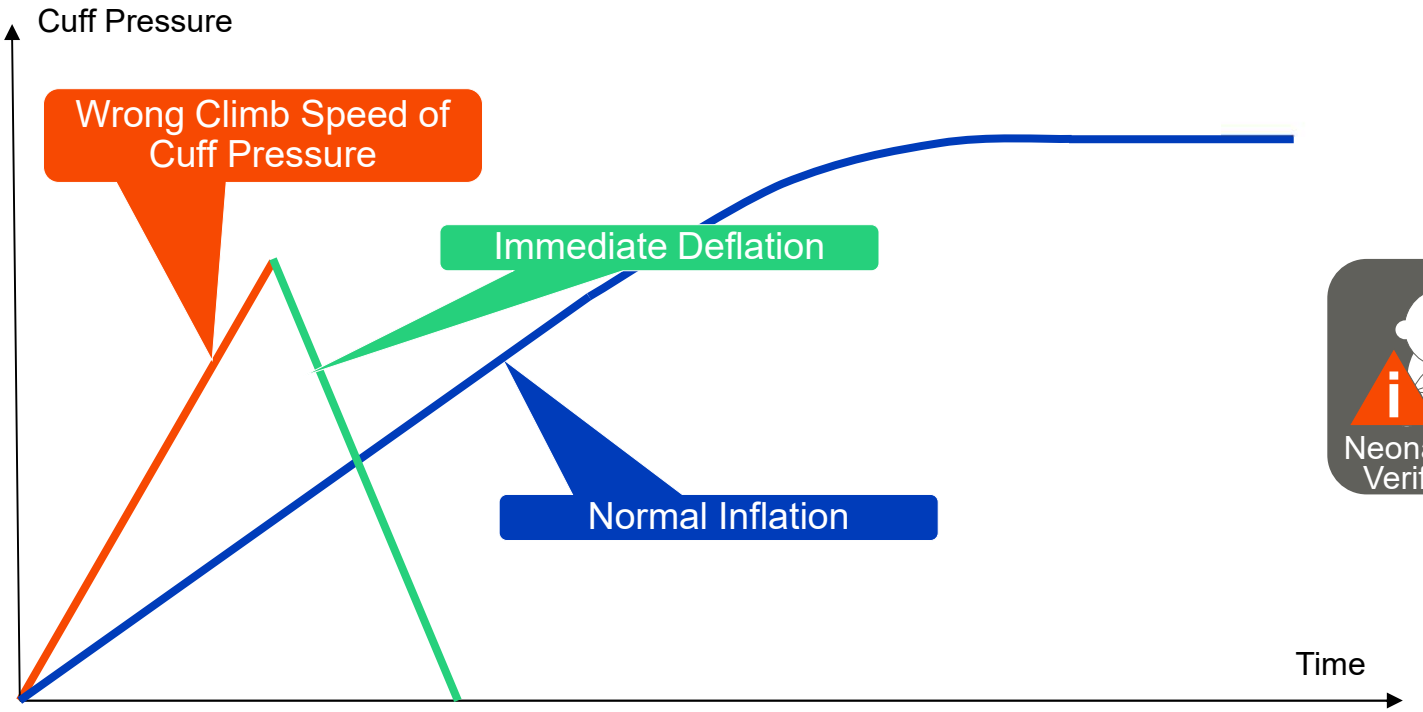
With the smart deflation technology used in EDAN iCUFS™, normal BP measuring time will be decreased by avoiding unnecessary deflation steps, ensuring BP measuring efficiency especially in emergency cares.

- **Time Reduced:**
  Around 5 seconds when there's re-inflation
  Around 2~3 seconds when there's no re-inflation



EDAN iCUFS™ Neonatal Cuff Verification

Sometimes during neonatal monitoring, patient type could be set as adult by mistake. In this case, iCUFS™ shall locate the mistake immediately by measuring the climb speed of cuff pressure and deflate right away. This will prevent unintentional harm brought to the neonatal patients.



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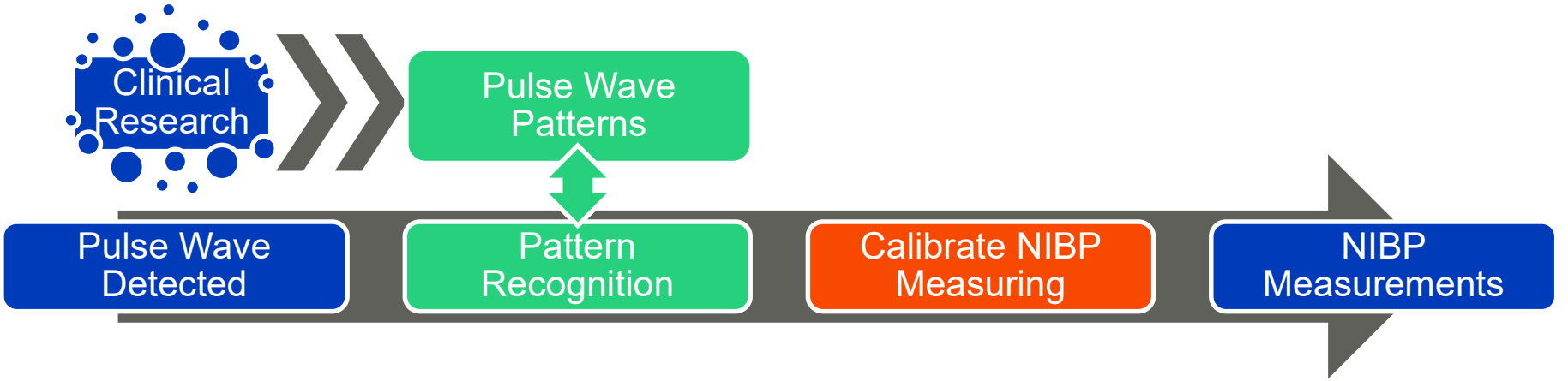
A world of potential

EDAN iCUFS™ Pulse Wave Calibration

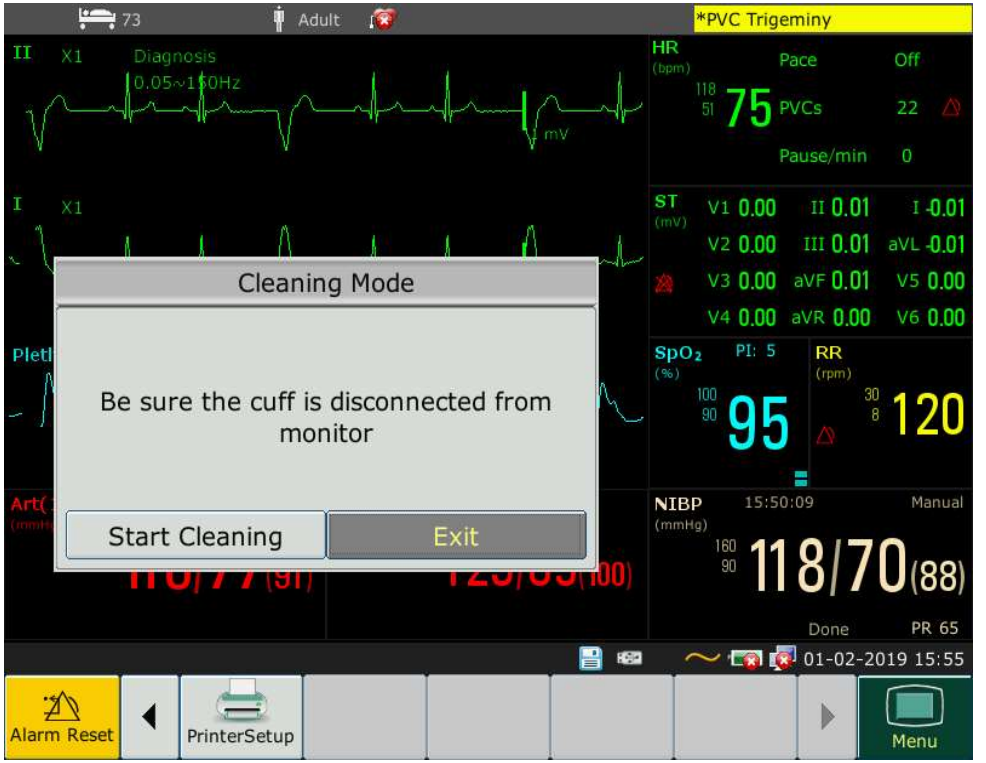


With thousands of clinical research data, iCUFS™ is equipped with pulse wave patterns got from different types of subjects, such as arrhythmia patients, restless patients, transport patients, etc. These patterns help iCUFS™ to generate correct NIBP measurements out of various interferences, especially in cardiac cares and emergency cares.

Road Type	Percentage of Measuring with Readings Come Out	Variation Compared to Resting BP in Non-Transport Status
Paving Road with Bends;Flat Unpaved/Gravel Road	100% with Readings	90% with less than 15 mmHg Variation
Rough Unpaved/Gravel Road; Road with 10 degree Slope; Road with Water/Ice/Snow	90% with Readings	80% with less than 15 mmHg Variation

EDAN NIBP Cleaning Mode

The unique cleaning mode can help to remove the dust inside of machine especially for the NIBP tubing. With less dust inside, the NIBP pump can do a better job and provide a more accurate reading.



Temperature

- **X8: 1-channel, X10/X12: 2-channel**

- **Probes**
  Probes for adult, pediatric and neonate patients
  Compatible with CY and YSI probes
  Compatible with 2.252 K/25ºC & 10K/25ºC probes

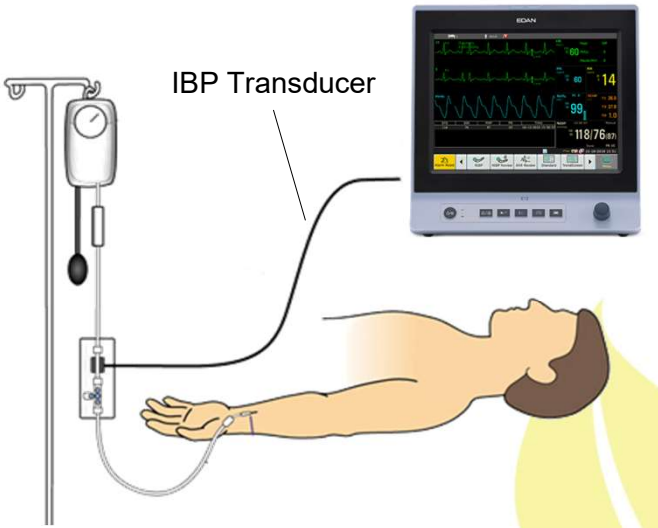
- **Measuring Positions**
  Skin, Oral & Rectal temperature measurements

IBP

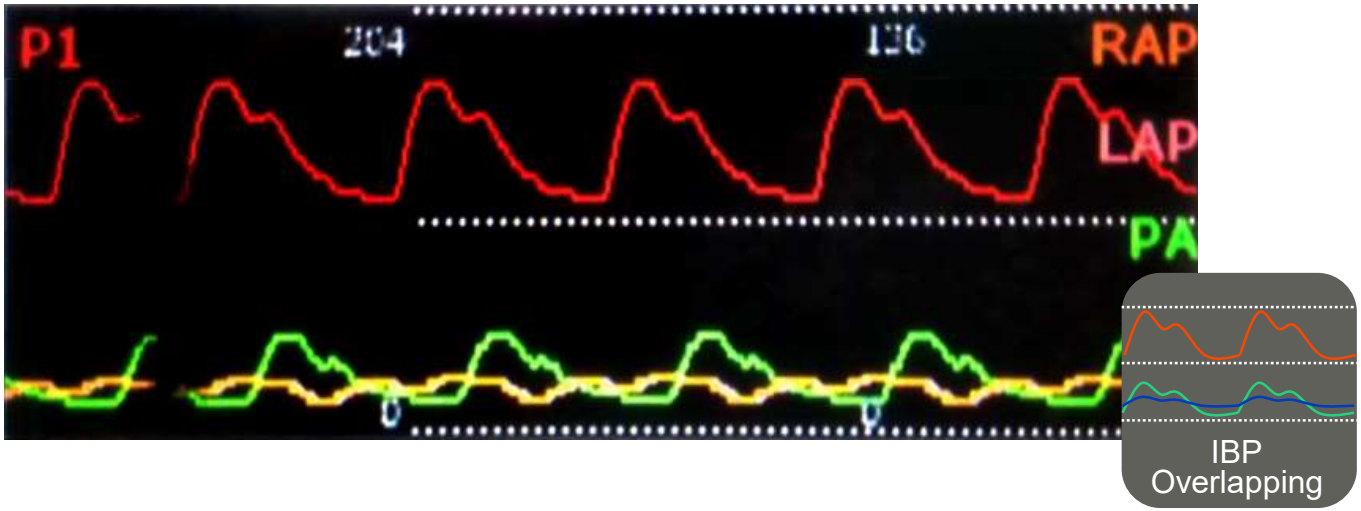
Compatible Transducers

- **2-channel IBP Monitoring**
  X10/X12: 2-channel IBP monitoring with Y shape cable
- **Pressure Labels**
  ART, PA, CVP, RAP, LAP, ICP, P1 (User-defined), P2(User-defined)
- **Pressure Units**
  mmHg/kPa/cmH_20
  (**cmH_20 is designed specially for venous pressure monitoring**)

Y shape interface cable



IBP Overlapping



In multi-channel IBP monitoring applications, which is applied often on critical cardiovascular patients, it's very common that the doctors need to compare different BP waveforms captured from different positions. Thus, an IBP overlapping function is added, to put different IBP waveforms on one display channel, making it much easier to compare each of them.

- 2 channels of IBP can be put on one display channel.
- Each IBP channel is differentiated with an user-defined color.

PPV

Pulse Pressure Variation (PPV) is calculated from the specific arterial pressure values, which reflects the variation between the maximal pulse pressure and the minimum pulse pressure in 30 seconds. It is as useful to predict the deleterious hemodynamic effects of fluid depletion as it is to predict the beneficial effects of fluid loading.

- Assessment of Preload.
- Useful for intubated patients.

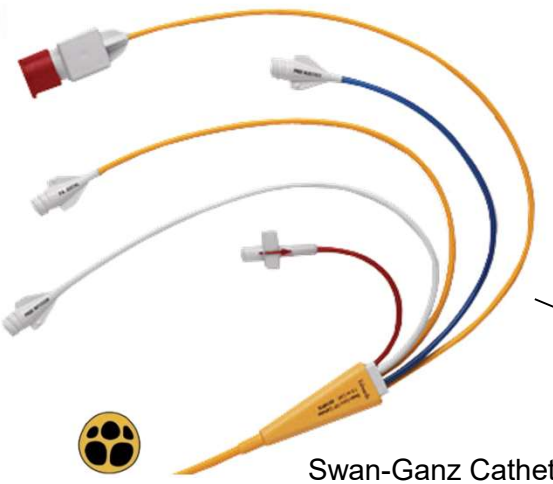
Thermodilution C.O.

The thermodilution technique is based upon the principle that a known volume of saline at zero degrees Celsius is added to an unknown volume of blood, the volume of blood will be determined by measuring the temperature of the mixture. And then the cardiac output can be calculated by the monitor.

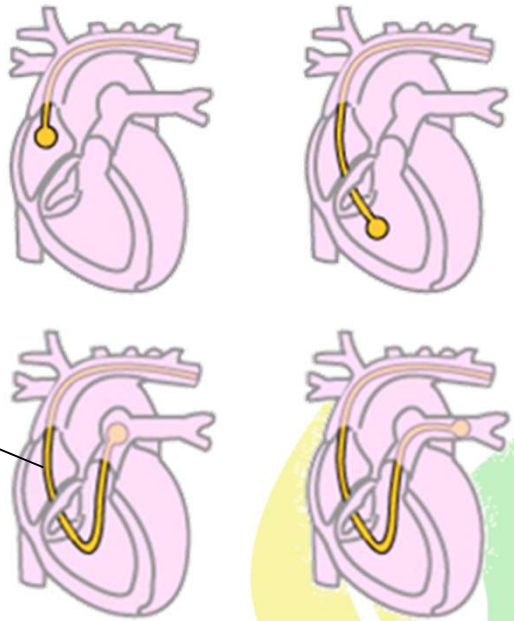
- Built-in C.O. Module
- Swan-Ganz Catheter required
- Invasive non-continuous measurement

Compatible Catheter

Edwards Lifesciences



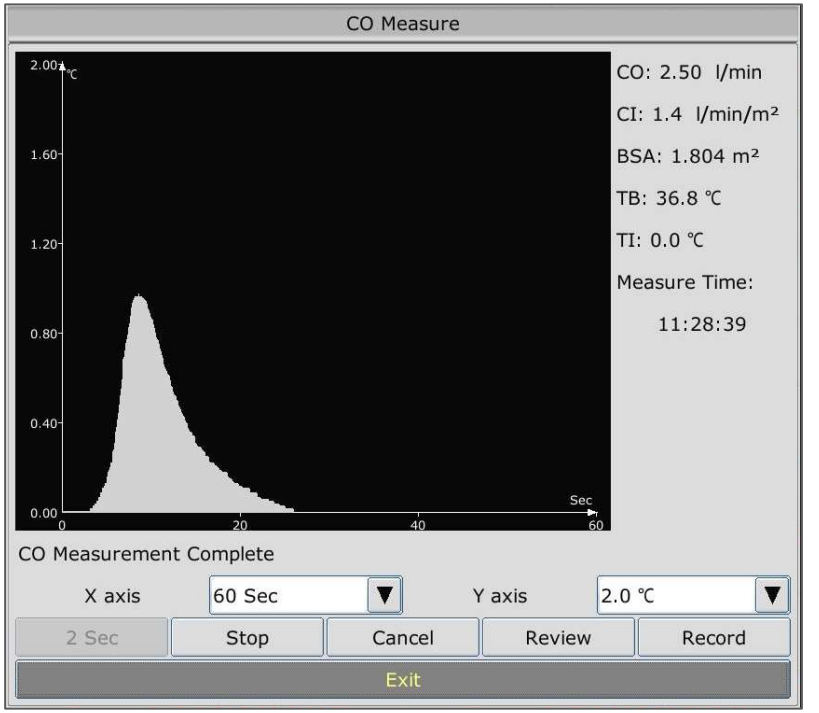
Swan-Ganz Catheter

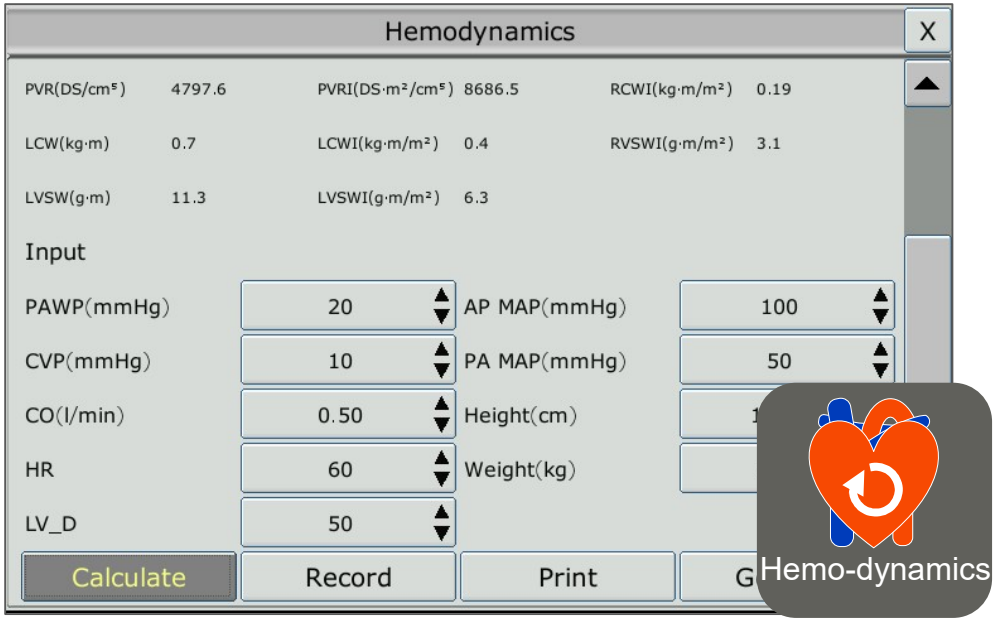


Thermodilution Measurements

Based on patient information and the temperature changes, thermodilution method calculates BSA (Body Surface Area) and offers two essential readings:

- **CO (Cardiac Output)**
- **CI (Cardiac Index)**
  CI=CO/BSA





Related values from patient info, thermodilution readings, and IBP readings could be obtained as inputs in hemodynamics calculation.

EDAN G2 Sidestream CO_2

EDAN G2 CO_2 is designed as a sidestream CO_2 with dehumidification cup. Such design is most widely accepted and utilized in Capnography monitoring.

- **Built-in G2 CO_2 Module**
  Needs to work with G2 water trap
- **Superior Water Trap Design**
  Airway pressure fluctuation filter design to prevent possible CO2 pseudo wave.
- **iCARB™ CO_2 Algorithm**
  Unique algorithm with intelligent CO2 pseudo wave identification.
- **Instant Warm-up**
  Warm-up time < 4 seconds
- **Automatic Zeroing**
  No need for manual zeroing
- **Automatic Real-time Air Compensation**
  No need for manual compensation
- **Low Flow Rate**
  50/70/100 ml/min optional

EDAN G2 Water Trap

Water cup design nowadays still faces two frequent technical problems. One is drainage failure of the water, which leads to air chamber damage; the other is false readings on lower sampling rate. To solve such problems, a few advanced technologies are developed in EDAN's G2 water trap.

Dual-channel Pumping

With one channel connecting the air chamber, the second channel serves only for water drainage into the reservoir. Such design eliminates drainage failure and protects the module from water droplets.

Arc Dehumidification Channel

A thin arc style dehumidification channel is introduced to G2 water trap. Such design effectively reduced the dead spaces and improves the drainage capability.

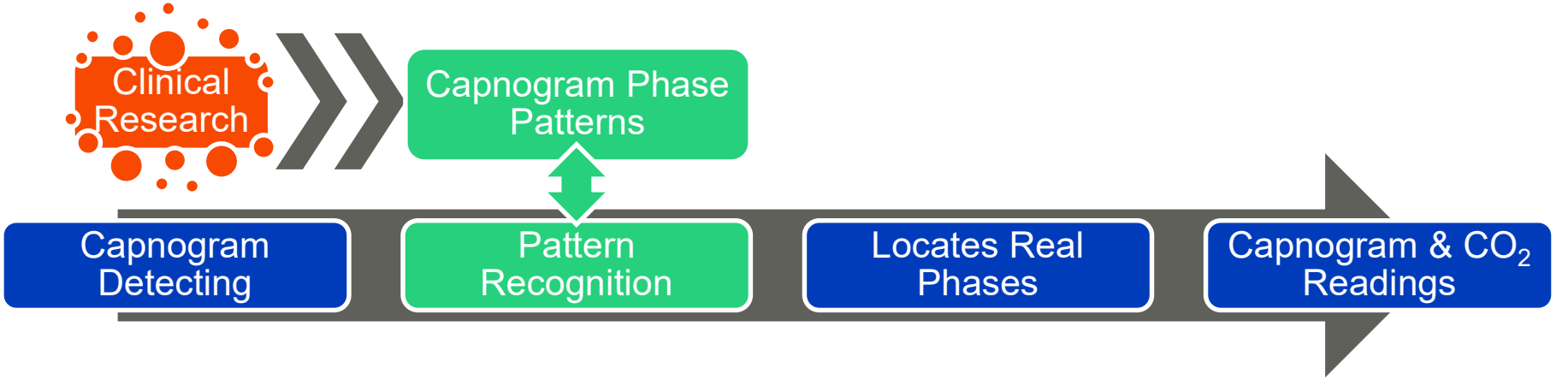
Smart Channel Technology

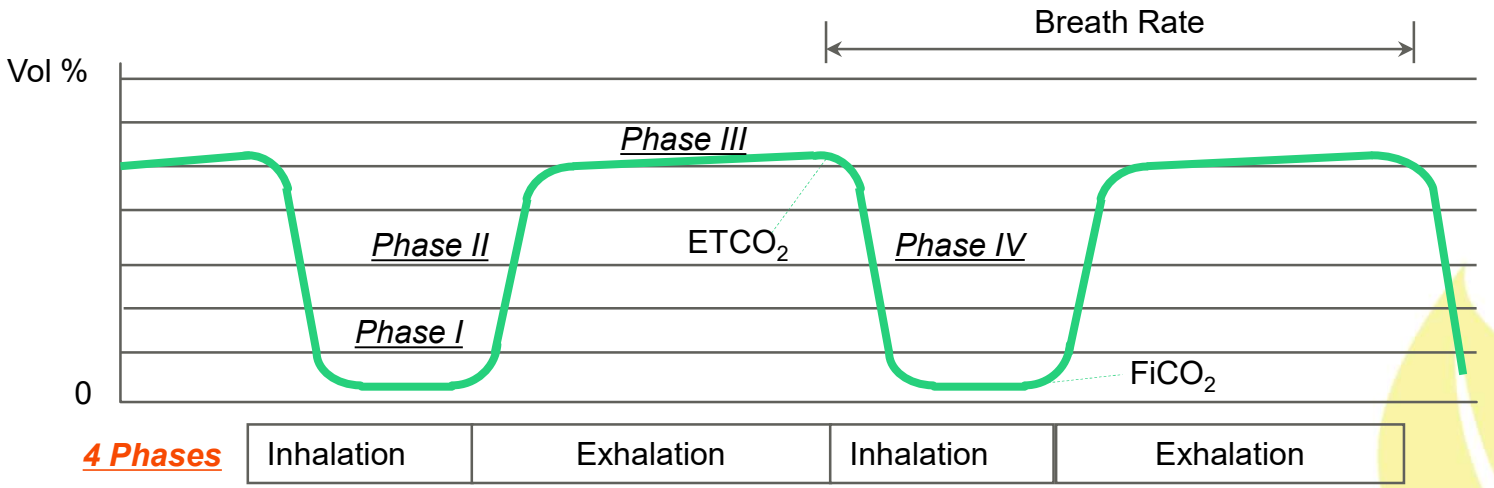
A kind of hydrophilic material is also been introduced in the end of air channel inside, once the water trap is fully filled, the material will help to block the channel and let no water flow into the patient monitor.

The air channel blocks can be also detected immediately by the G2 sensor, to prevent possible high flow rate injuries especially for weak patients and neonates.

EDAN iCARB™ Pattern Recognition

Based on massive clinical data and analysis, pattern recognition is developed and applied in iCARB™ as a core technology. Even in the most complex clinical cases with a lot of psuedo signals, EDAN iCARB™ still locates the real phases and the real CO2 values through comparing the Capnogram with the known patterns.

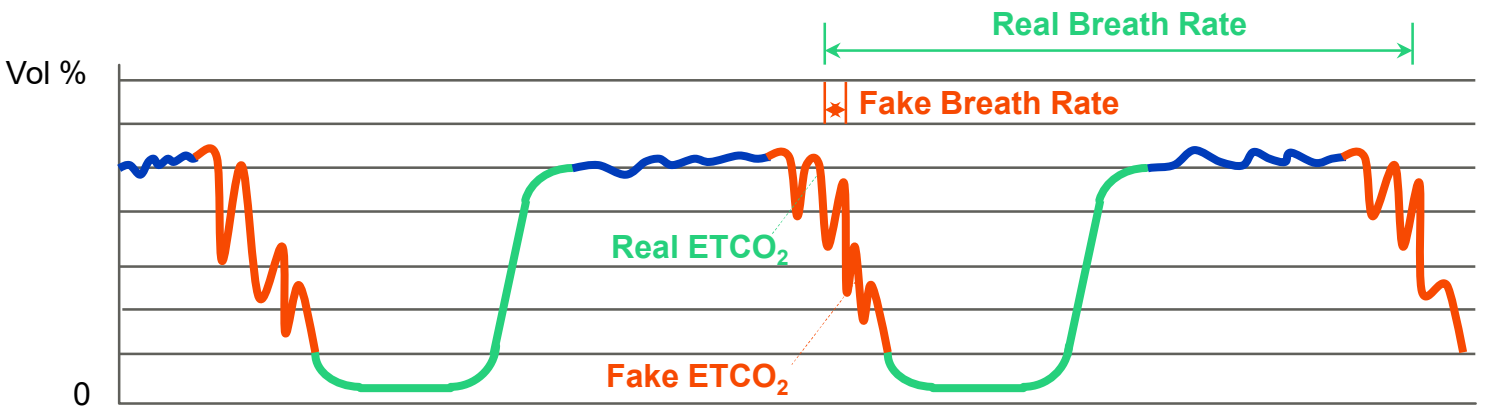




EDAN iCARB™ Cardiogenic Oscillation

Cardiogenic Oscillations are caused by the heart beating against lungs, which generally happens on pediatric patients. Under this circumstance, the Capnogram presents periodic multimodal structure on the inspiratory downstroke, which normal Capnography misleads to lower EtCO2 and critically high Respiration Rate.

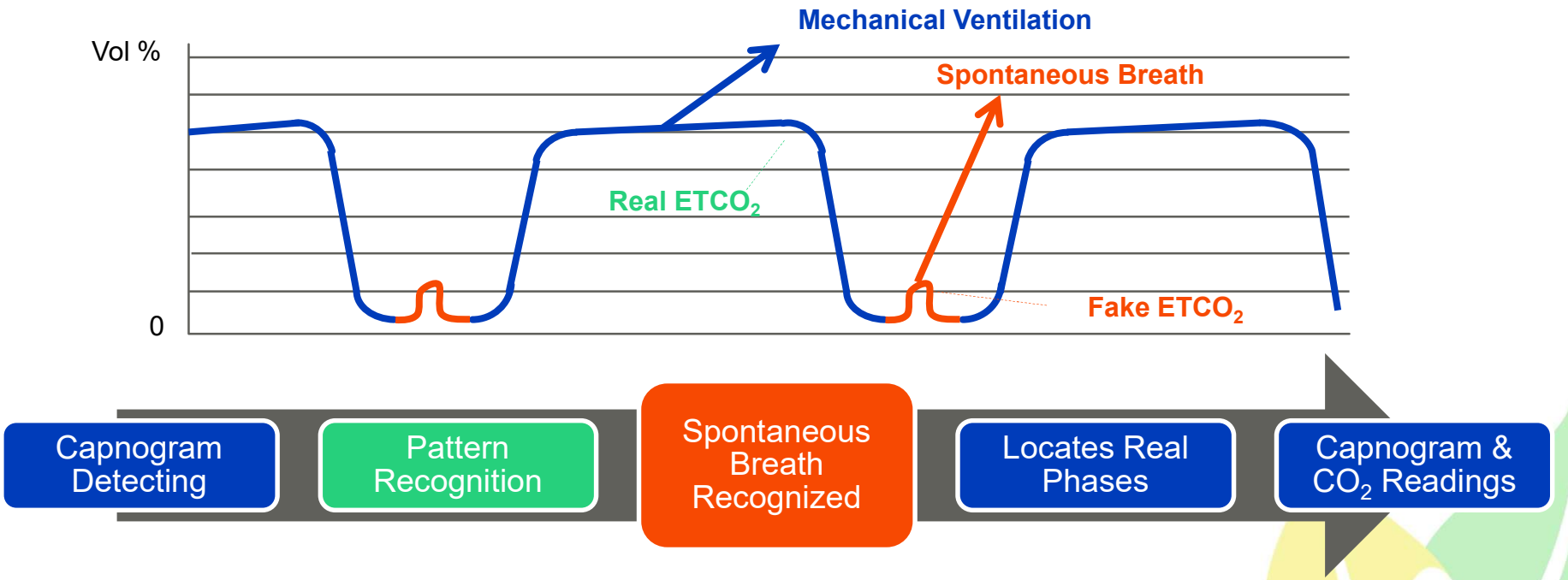
With pattern recognition technology, iCARB™ recognizes cardiogenic oscillation, and generates accurate readings.



EDAN iCARB™ Mechanical Ventilation

During mechanical ventilations, spontaneous breathing also happens from time to time. It always results in some small and narrow waveforms on the respiratory baseline. Normal Capnography may be confused and gives wrong readings of extreme low $EtCO_2$.

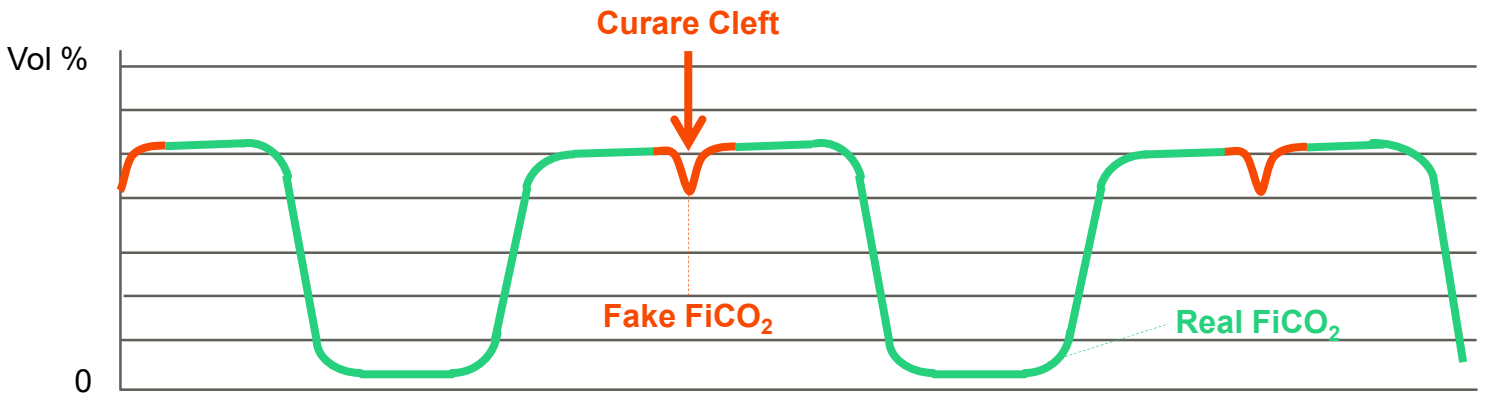
With pattern recognition technology, iCARB™ recognizes spontaneous breaths, and generates accurate readings.



EDAN iCARB™ Curare Cleft

While the anesthesia patients are regaining spontaneous breathings, curare clefts in the alveolar plateau will appear. Normal Capnography may give wrong readings of extreme FiCO2.

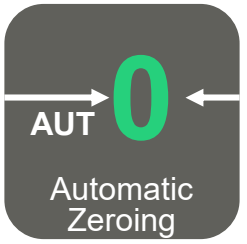
With pattern recognition technology, iCARB™ recognizes curare clefts, and generates accurate readings.

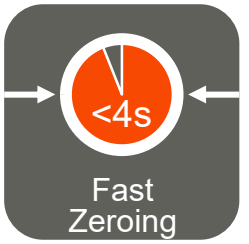


EDAN G2 Compare

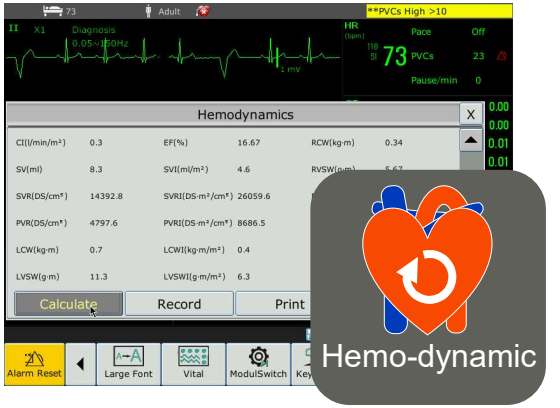
	EDAN G2 CO_2	Company A
CO_2 Range	0~150 mmHg 0~20 Vol% **(Wider range for critical pulmonary patients, such as chronic obstructive emphysema patients)**	0~99 mmHg
Respiration Frequency Range	2~150 bpm	0~120 bpm
Automatic Zeroing	Yes **(No need for manual operations)**	No
Zeroing Time Cost	< 4s **(Faster response to start measurement)**	10~20s
Barometric Compensation	Auto	Manual

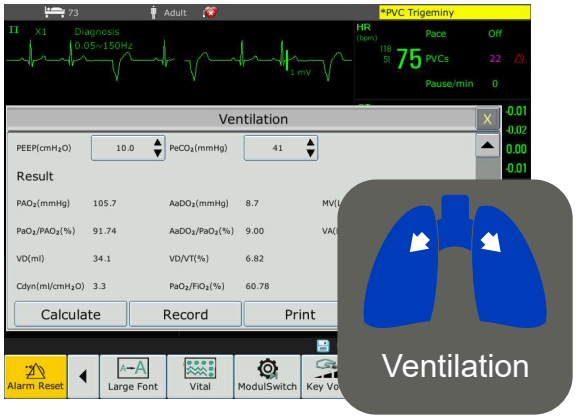
Company A is another brand as a compare reference.

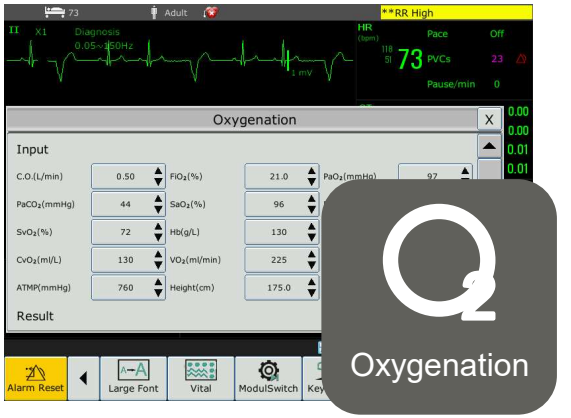


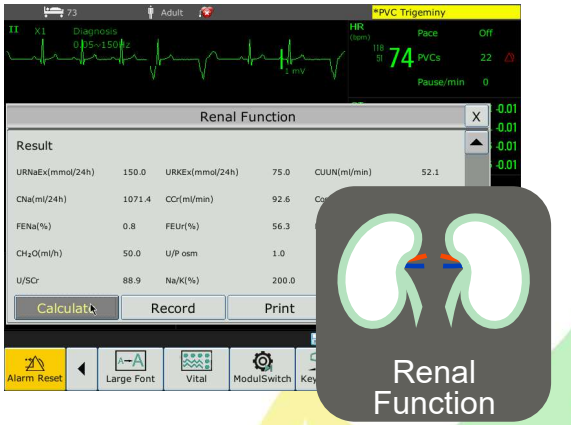


Clinical Calculations



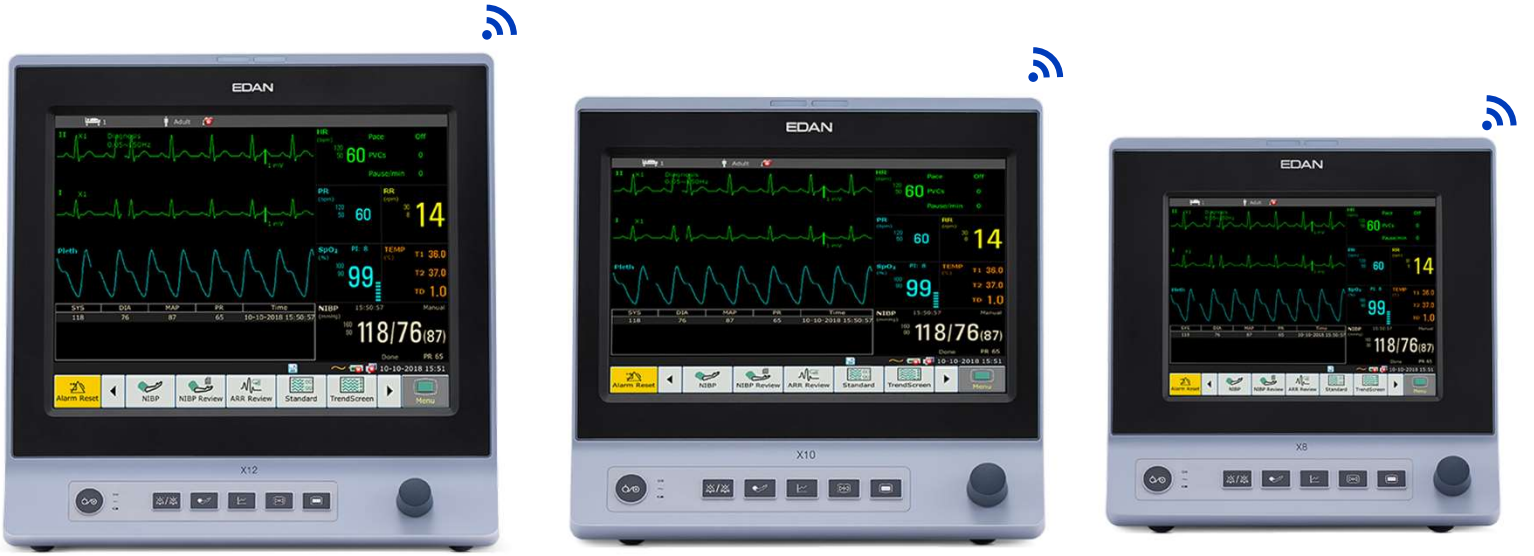






Five kinds of calculations are introduced to provide an overall clinical guide.

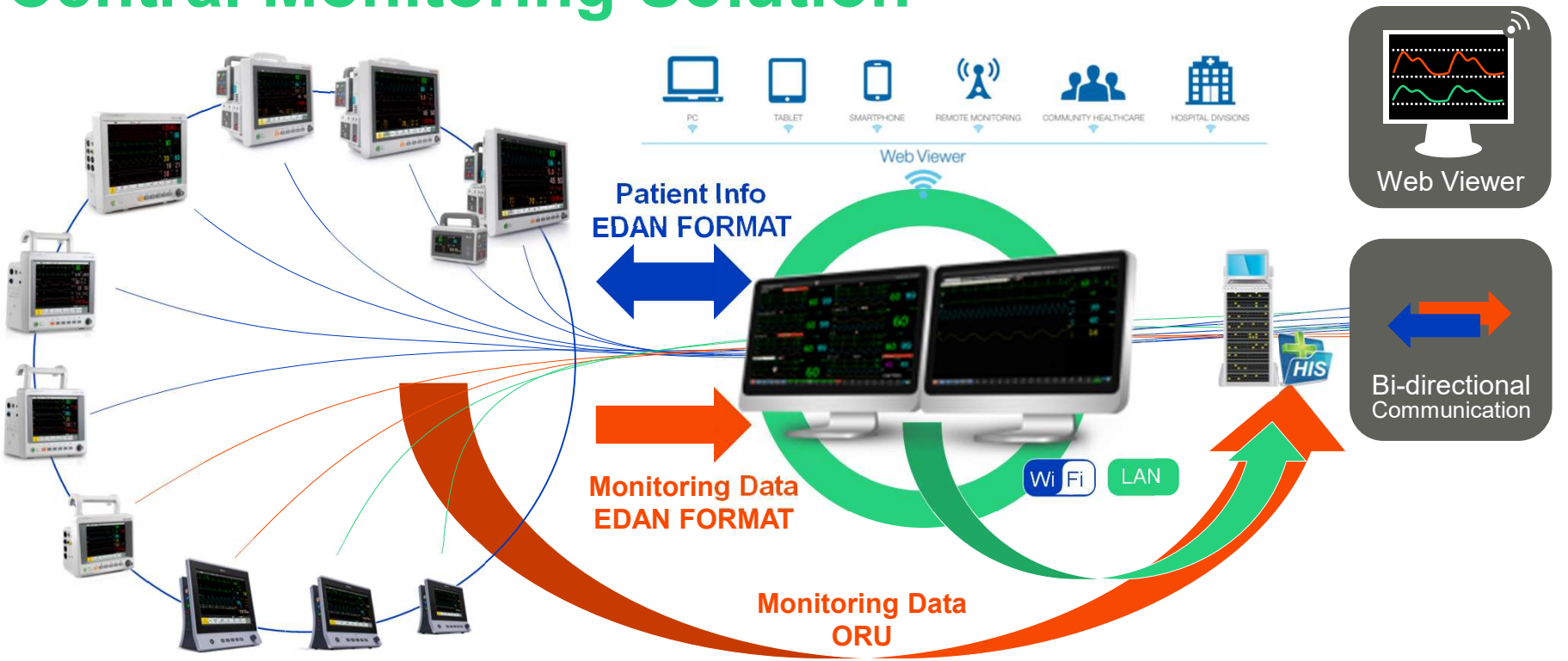
Built-in Wi-Fi



Built-in Wi-Fi

x series is embedded with built-in Wi-Fi facility as well as Ethernet port for network connections.

Central Monitoring Solution

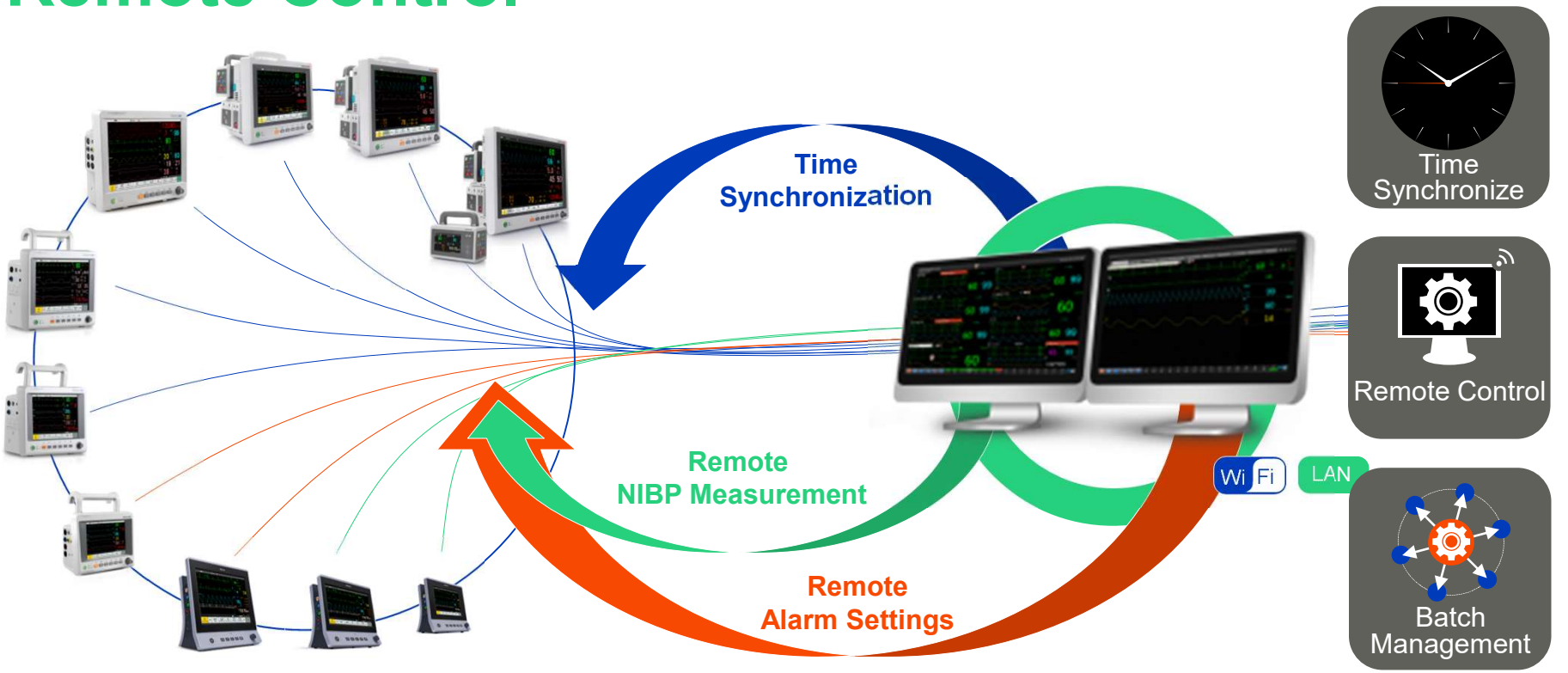


- **Central Monitoring Station**
  EDAN MFM-CMS central monitoring station may communicate with EDAN monitors on a bi-directional basis.

- **Web Viewer**
  You may log in from any device, anywhere.

- **HL7 Communication**
  Monitoring data could be transmitted to HIS via HL7 from either monitors or MFM-CMS.

Remote Control



- **Time Synchronization**
  Time setup of each monitor synchronizes with MFM-CMS either automatically or manually.

- **Remote NIBP Measurement**
  NIBP measurement can be activated remotely from MFM-CMS.

- **Remote Alarm Settings & Batch Management**
  Alarm settings can be adjusted remotely from MFM-CMS.
  Alarm configuration for single monitor can be obtained by the central monitoring system and applied into other patient monitors in same network.

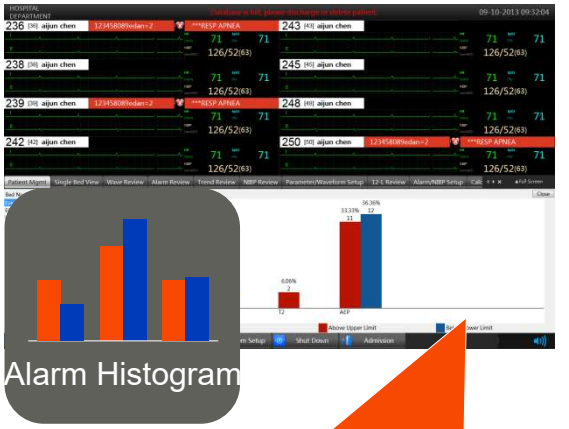
Central Statistics & Analysis

A regular central monitoring system could provide a large amount of physiological data gathered from long term monitoring of a large number of patients. And in most conditions, such data is not properly organized but only listed in trends. If doctors want to extract any valuable information from this ocean of data, they have to look up manually term by term.

In order to help with the diagnosis, an innovative central analysis technology is now introduced into the central monitoring system. As found in MFM-CMS, the central monitoring system developed by EDAN, central analysis function provides intuitive, easy-to-understand diagrams which focus on alarms, arrhythmias, trends and physiological measurements.

Data Statistics

Total data amount and event amount during the whole monitoring period.



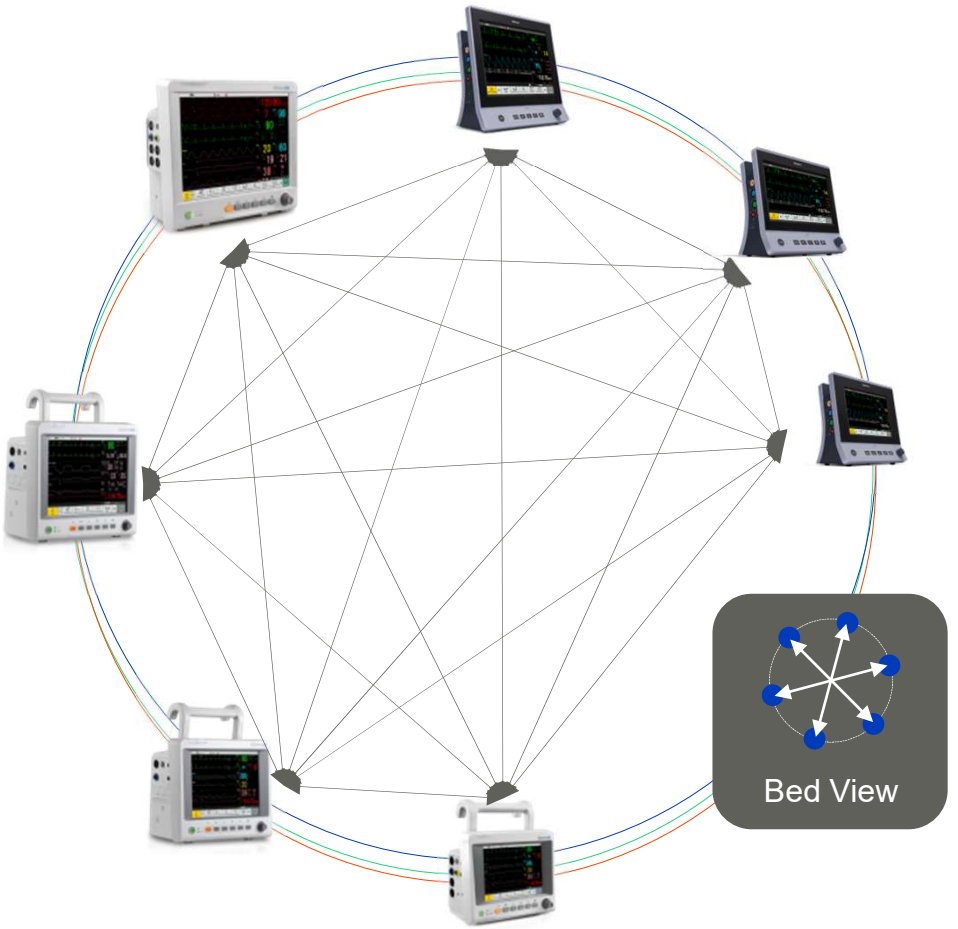
Alarm Histogram

General view of the abnormal events with the amount & percentage of each event.

History Histogram

Measurement distribution diagram of each parameter.

Bed View

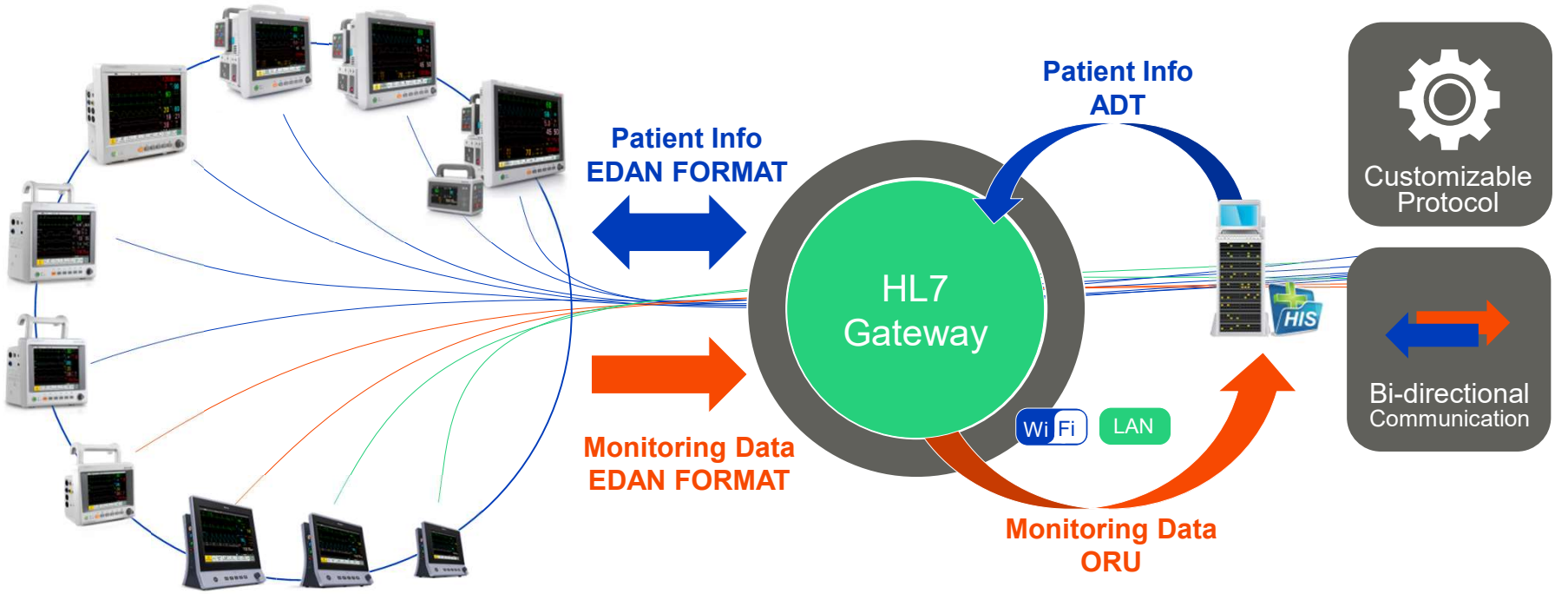


Each bedside monitor will be able to check the monitoring data and alarms of any other monitor in the same network.

This bed view function makes it possible for the nurses to check another patient while attending to the patient right beside. It's quite useful for huge critical divisions with dozens of monitors installed.

This function does not require MFM-CMS installed.

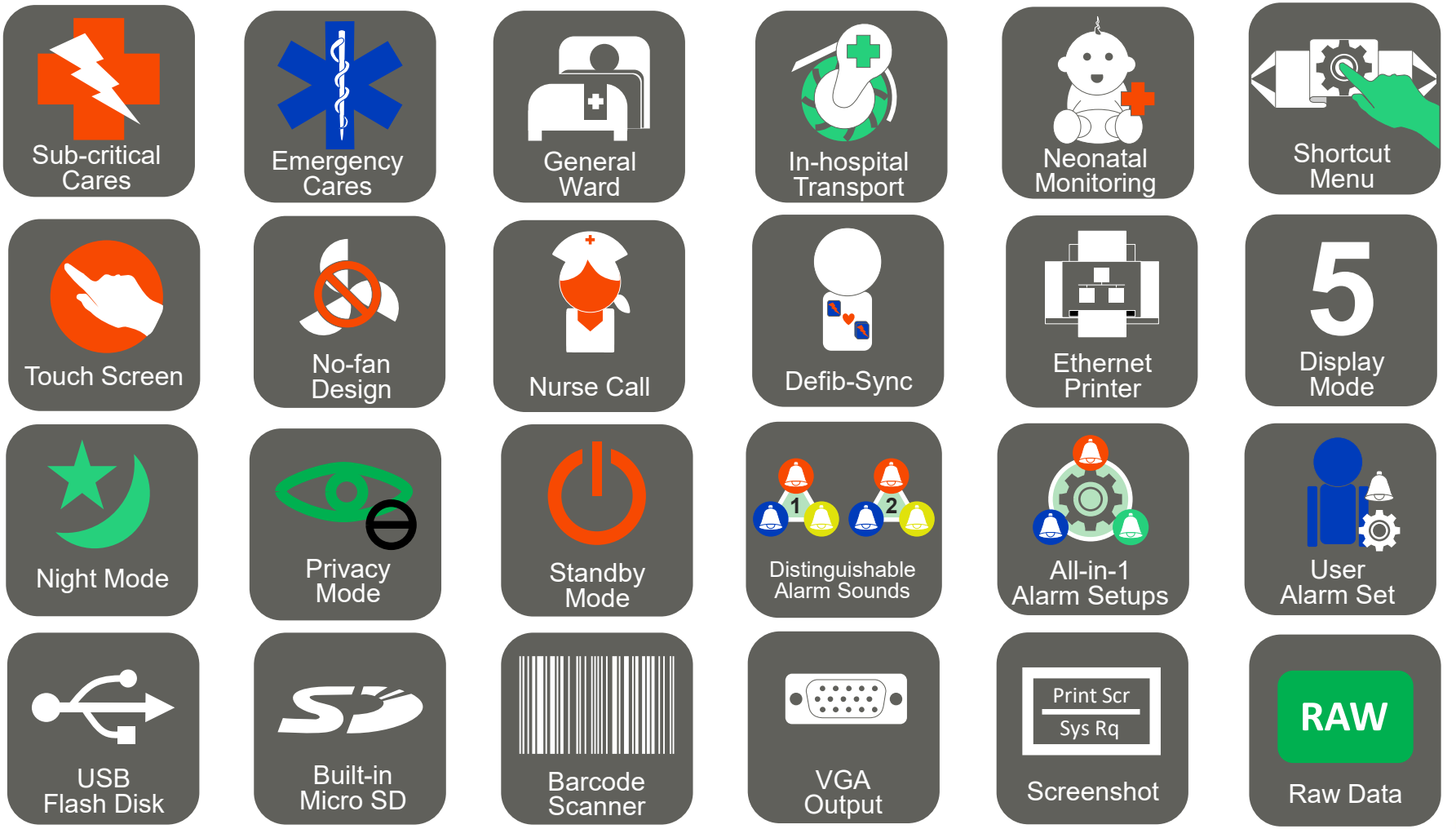
HL7 Gateway Solution



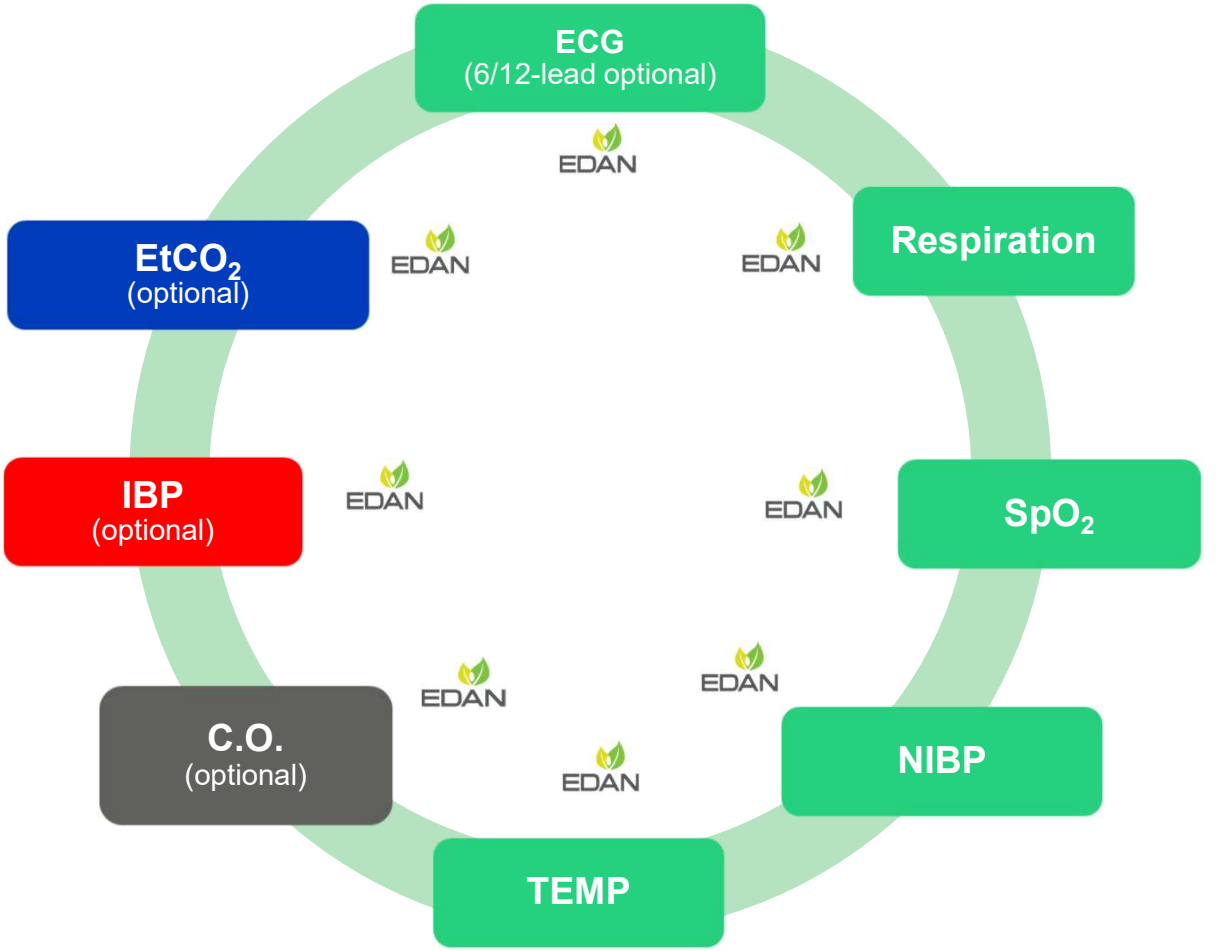
Installed on any device in the network, EDAN Gateway Software brings machines and HIS together:

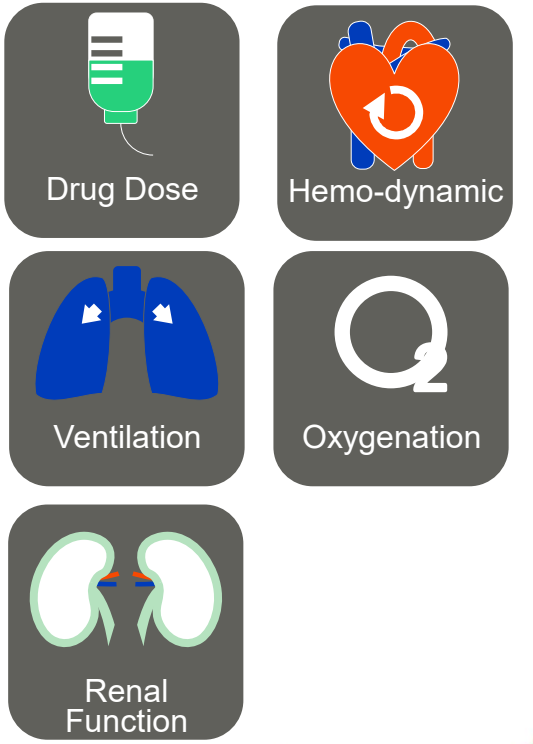
- **Bi-directional Communication**
  Barrier free transmission of patient info and monitoring data.

- **Customizable Protocol**
  You may customize the protocol according to actual needs without turning to 3-party software developers.

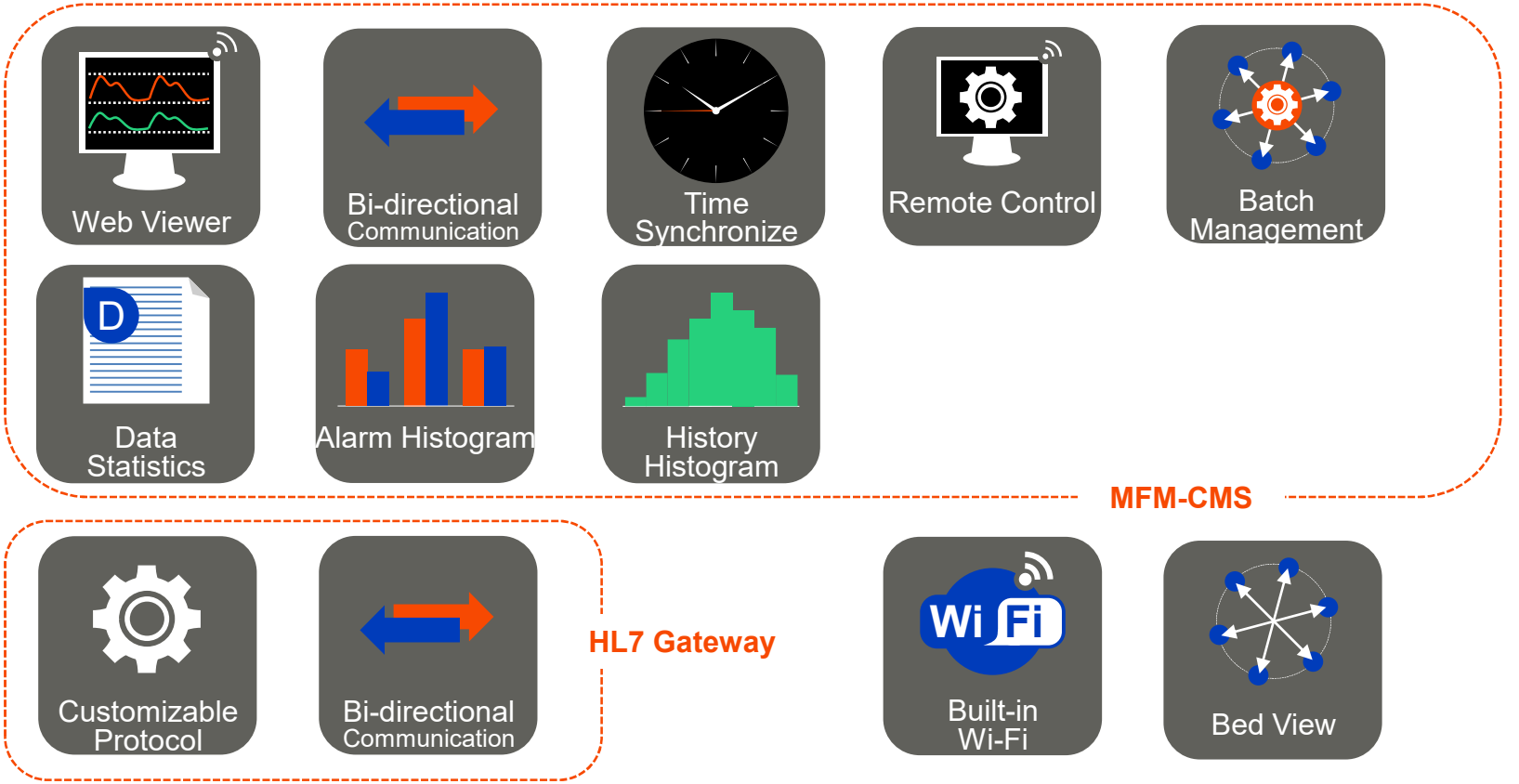


Design Highlights





Parameter Highlights



Network Highlights

Configurations

	X8	X10	X12
3/5-lead ECG	●	●	●
6/12-lead ECG	○	○	○
EDAN NIBP	●	●	●
EDAN SpO_2	●	●	●
TEMP	1-TEMP	2-TEMP	2-TEMP
IBP	x	○ 2-IBP function	○ 2-IBP function
C.O.	x	x	○
EDAN G2 CO_2	○	○	○

● **Standard** ○ **Optional** **X Not available**

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THANK YOU

Edan Instruments, Inc.

www.edan.com
piotr@ippolska.pl
tel. 601 130 330