



**EDAN**

A world of potential

# iM20

## Transport Monitor

Specially Designed for Emergency & Rescue Purpose



Edan Instruments, Inc.

[www.edan.com.cn](http://www.edan.com.cn)

[info@edan.com.cn](mailto:info@edan.com.cn)

December 10, 2015



## Our Position

- Top 2 patient monitoring exporter
- All products with CE approval



## Our R&D Investments

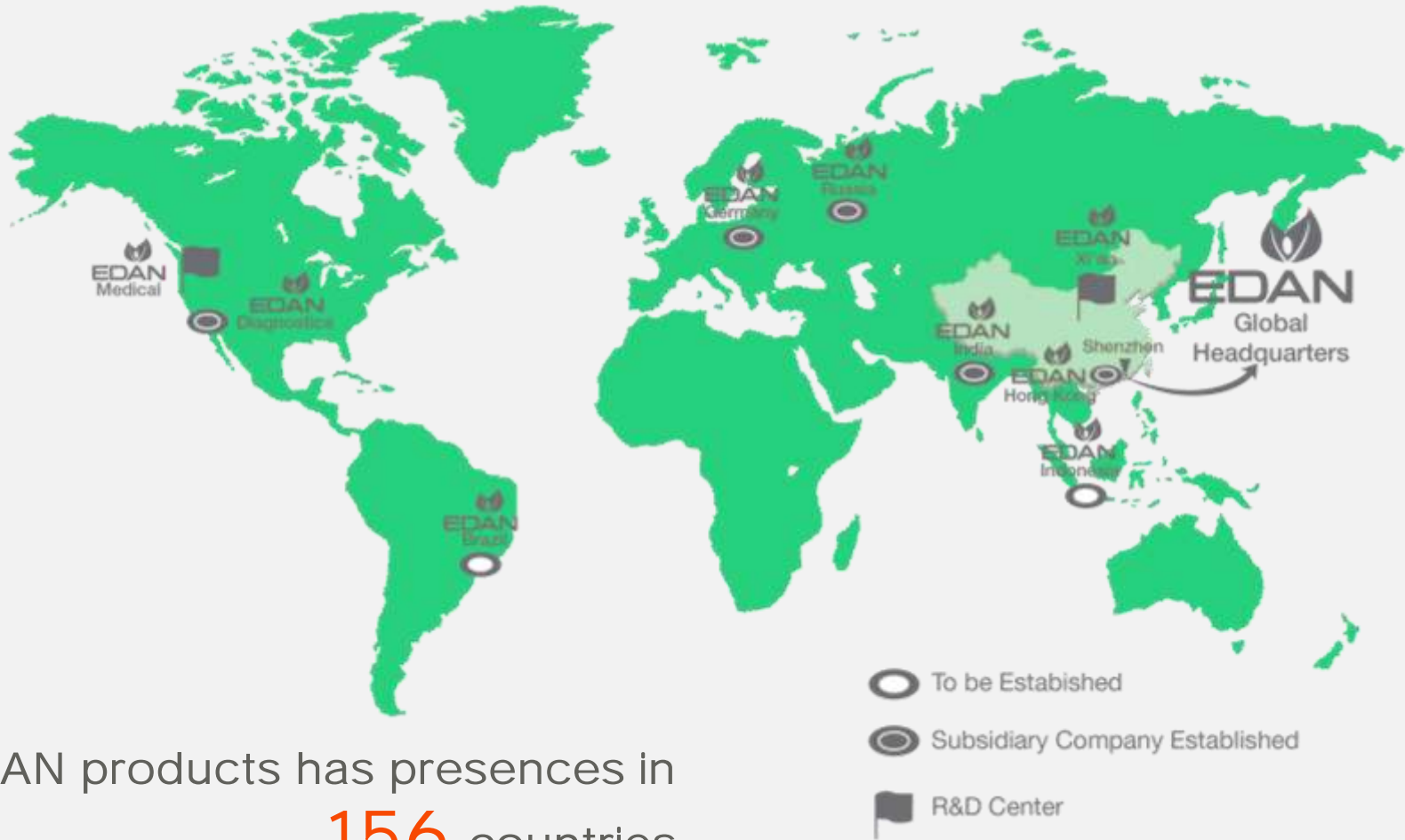
- More than 300 R&D engineers
- 3 R&D centers distributed in China & US
- Industrial design associates in Germany





Our Value Proposition

Bring innovation and value together to  
improve the human condition.

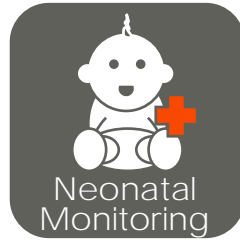


EDAN products has presences in  
**156** countries

# iM20 Transport Monitor



<1.5kg

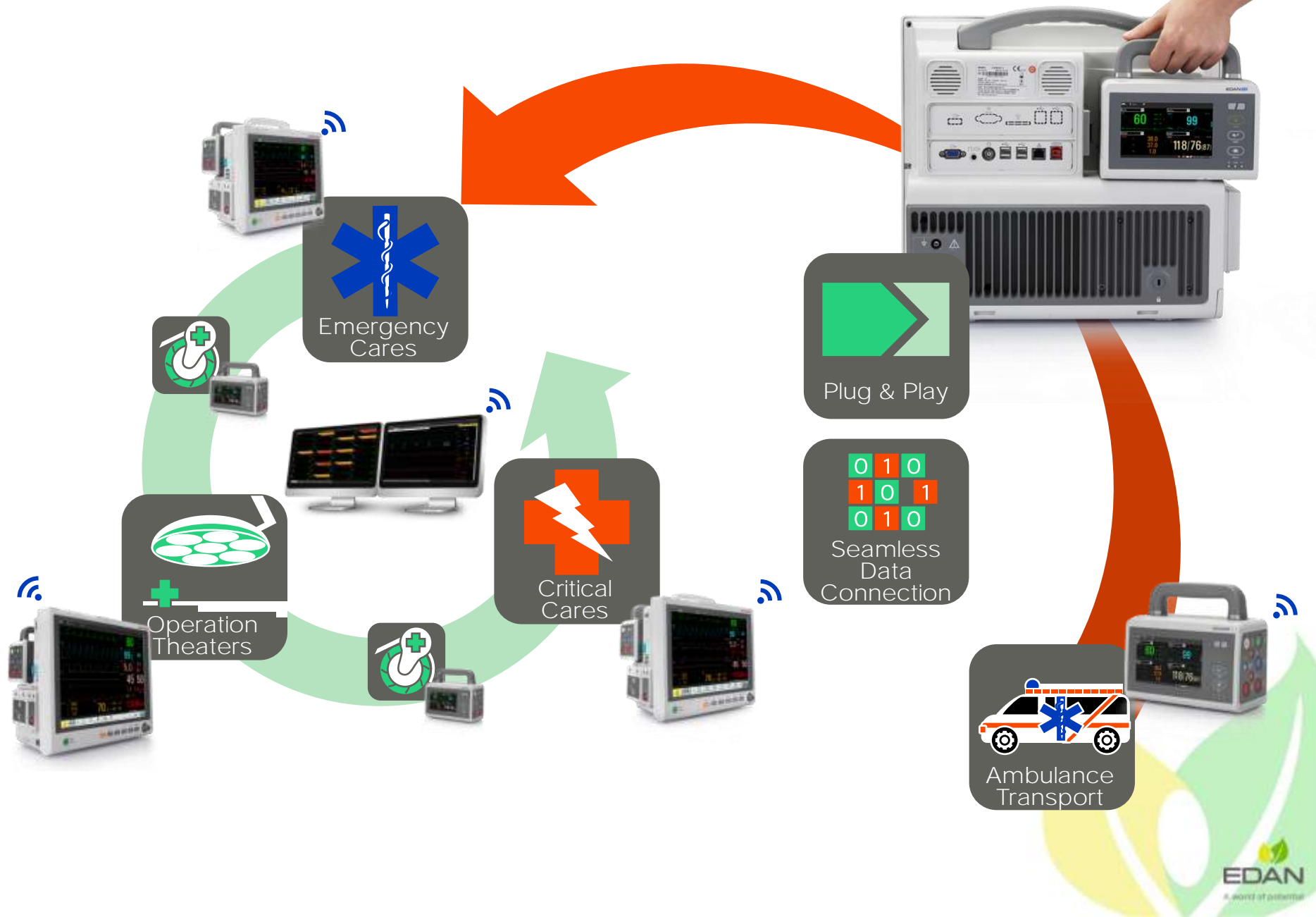


iM20





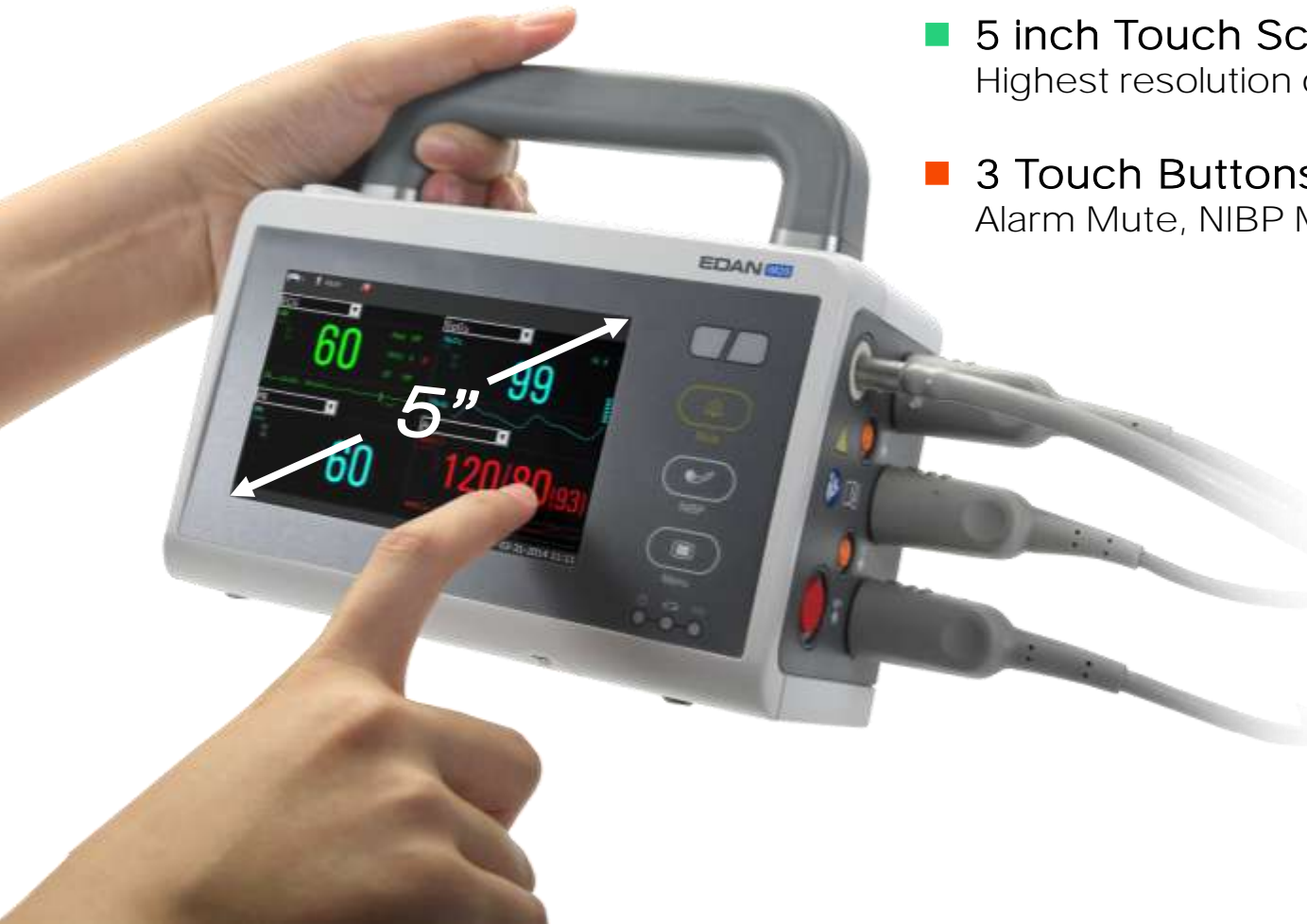
# iM20 + elite Series





# Touch UI

Equipped with a 5 inch touch screen and three touch button on the side, iM20 touch UI design is unique in the industry.



- **5 inch Touch Screen**  
Highest resolution of its kind: 800 x 480.
- **3 Touch Buttons**  
Alarm Mute, NIBP Measuring, Menu



Touch UI



EDAN  
a world of animals

# No-fan Design

With low power consumption design, fan is no longer needed on iM20.

- **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.

- **Longer Battery Life**

The low power consumption helps iM20 extend battery life for long-distance transport.



# IP44 Waterproof & Dustproof

Being a transport monitor for both ambulance and in-hospital applications, it's very important to be waterproof and dustproof. iM20, in this case, is designed to be on IP44 protection level.

## ■ IP44 Waterproof

Protected against splashing of water.

Water splashing from any direction shall have no harmful effect.



## ■ IP44 Dustproof

Protected against solid foreign objects with size over 1 mm.

### Emergency & Rescue Applications



# Shockproof

In ambulatory applications, it's very easy for the machine to get bumped around.

- **1.2m Drop Protection**

Dropping from 1.2m high, iM20 can resist the impact from any direction..

- **Algorithms with Motion Resistance Capabilities**

iSEAP™, iMAT™, iCUFST™, iCARB™



## Emergency & Rescue Applications





# Environment Tolerance

iM20 is prepared to transport everywhere, escorting your patients with remarkable environment tolerance performance and constant cares.

- Storage Temperature: -30~70°C
- 20 minutes continuous work at -5°C.
- Working Altitude: -500 ~ 4000 m
- Fast warm up from -30°C storage.

## Emergency & Rescue Applications



# Transport Power Supply

A flexible power solution is provided especially for long transport purpose

- AC/DC Power Supply

AC input: 100~240V (as normal bedside monitor)

DC input: 10~16V (specially for vehicle onboard power supply)

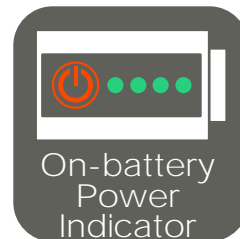
- Built-in Rechargeable Battery

Battery life:  $\geq 4$  hours

On-battery power indicator for fast check of backup batteries



On-battery  
Power  
Indicator



# Customizable Shortcut Menu



A **customizable** shortcut menu is employed for direct access to daily operations.

■ **Parameters Selection**  
ModuleSwitch

■ **Alarm Management**  
Alarm Reset / Alarm Setup

■ **History Review**  
Trend Graph / Trend Table / AlarmReview /  
NIBP Review / ARR Review

■ **Display Mode**  
Standard / TrendScreen / OxyCRG /  
Large Font/ Vital

■ **Brightness / Volume Management**  
Brightness / Key Volume / Beat Volume /  
Night Mode

■ **Others**  
Menu / Admission / Standby / IBP Zero



# Multiple Display Modes

- Maximum 7 channels  
On 12-lead ECG display
- Maximum 13 waveforms  
On 12-lead ECG display

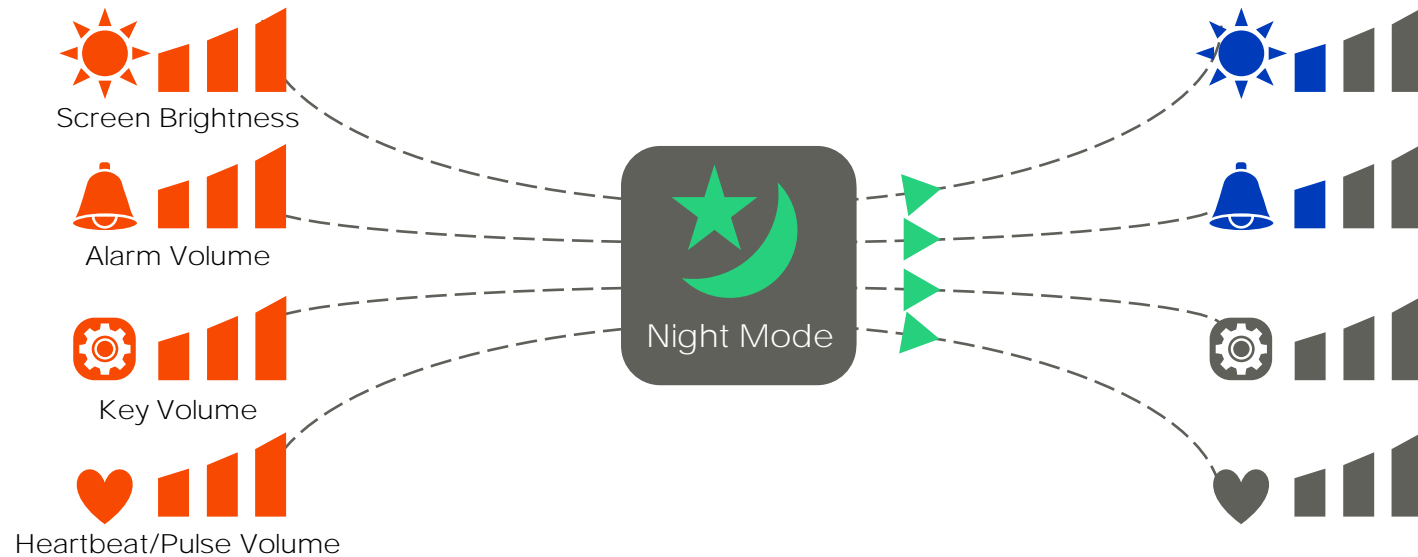


*Vital display mode is unique from EDAN.*





# Night Mode



A special night mode function is provided to provide a more comfortable ward environment for critical patients.

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



# Standby Mode

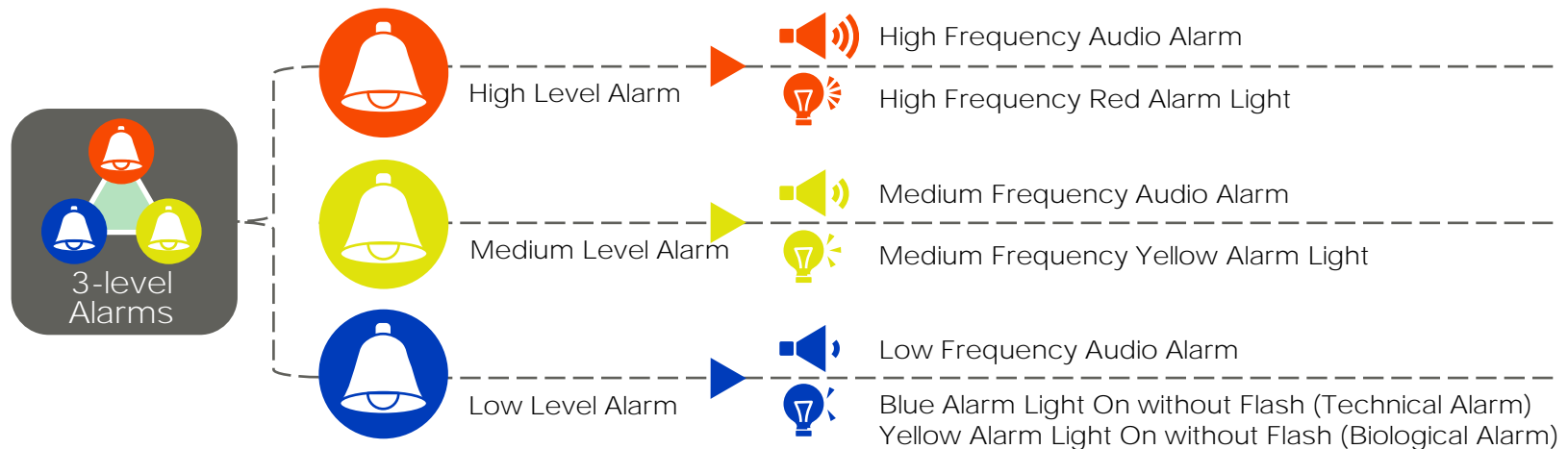


Though named as “Standby”, on this mode, background monitoring still continues while a clock displays, hiding patient’s vital information for privacy protection purpose during family visits.

- Background monitoring continues
- Real-time monitoring data is still sending to central station/other systems.
- No physiological parameter or alarms will appear on the screen but on the central station



# 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.



# Essential Alarm Management

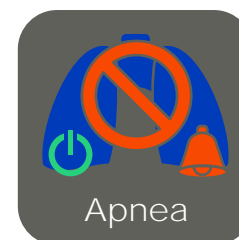
On EDAN monitors, alarms can be switched off as per user configuration. However, additional restrictions are put upon some essential alarms to control over possible lethal conditions.

## ■ 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/Tachycardia

Ventricular fibrillation/tachycardia alarm can be switched off with a reminder on the display.  
Ventricular fibrillation/tachycardia 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

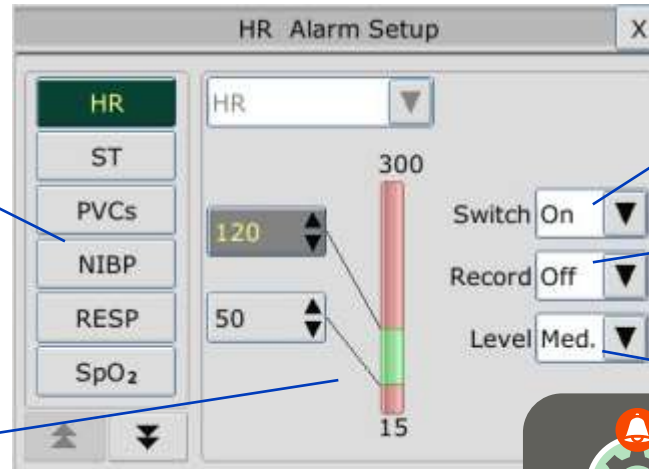
- Overall alarm mute  
1/2/3 minutes mute or permanent mute according to user settings
- New alarm will not break the mute status



# All-in-1 Alarm Setup

Parameters Switch

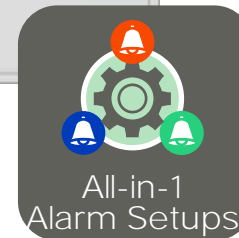
Alarm Limits Setup



Alarm Switch

Alarm Print

Alarm Level



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**

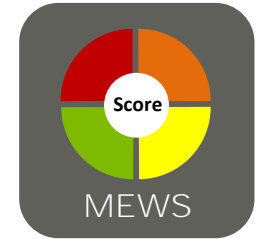
Activated when selected.



# 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

MEWS	Time	HR/PR	TEMP	RR	SYS	Age	Consciousness
2	01-01-2000 01:18:08	0	0	0	0	0	2

Severity Level : Non-urgent

HR/PR(bpm) 60    TEMP (°C) 36.0    RR(rpm) 14

SYS (mmHg) 118    Age 40

Consciousness Responsive to Pain(P)

Method Auto MEWS Score

Trend Table    Stop to Score    Criteria

MEWS Score Calculator    Start to Score    Criteria



# Non-volatile built-in Memory

The machine comes with built-in memory with which you may easily review the monitoring history data.

- **Trend Review**  
150 hours of trend graph/trend table
- **Alarm Review**  
200 sets
- **Arrhythmia Review**  
200 sets
- **NIBP Review**  
1200 sets
- **12-lead Diagnostics Review**  
50 sets



Trend Review



Alarm Review



Arrhythmia Review



NIBP Review

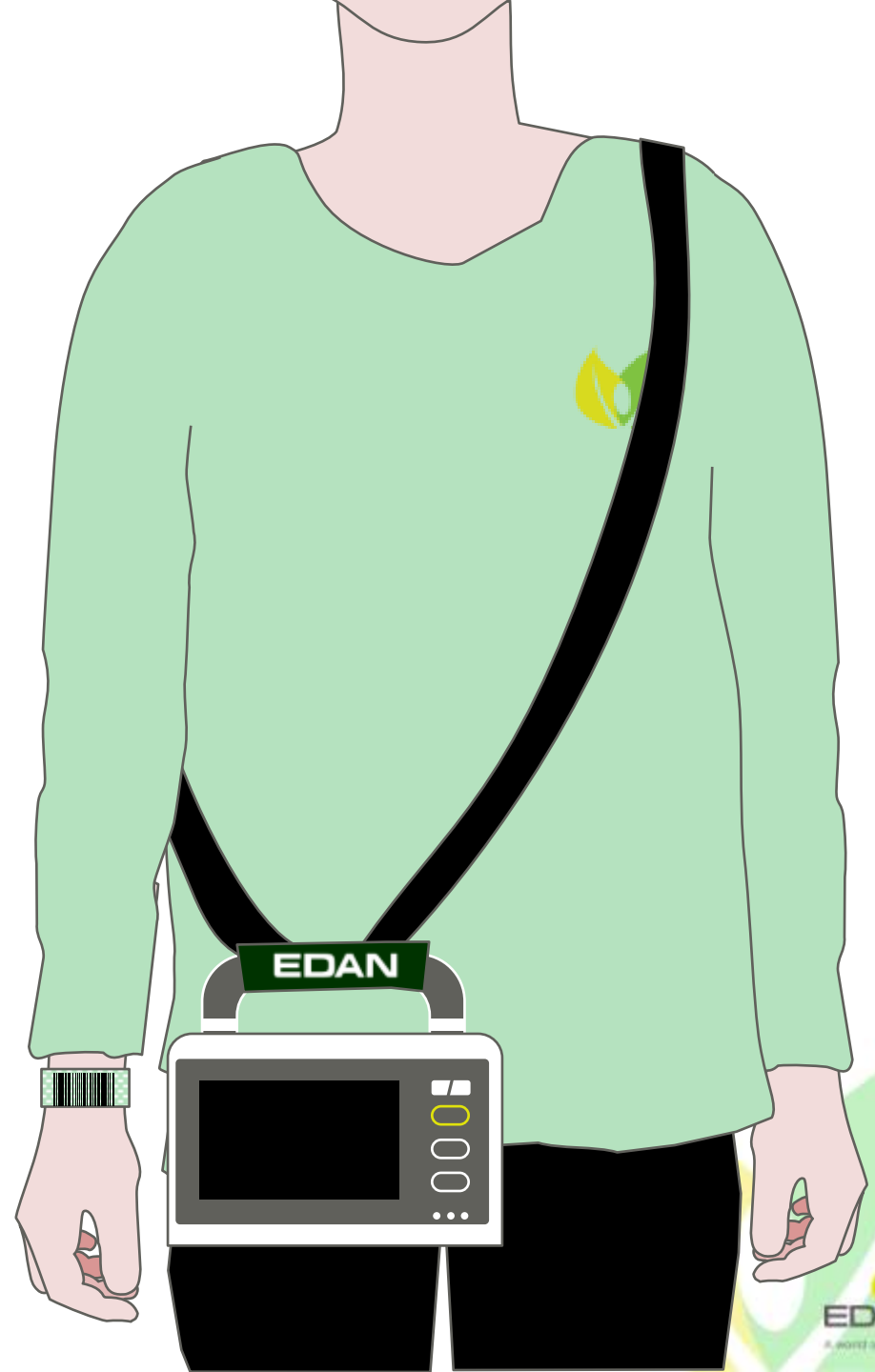
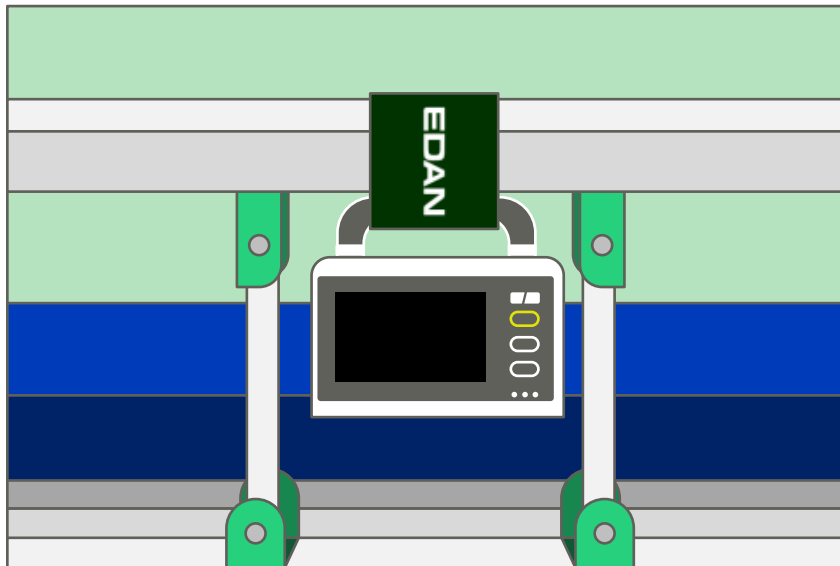


12-lead Diagnostics Review

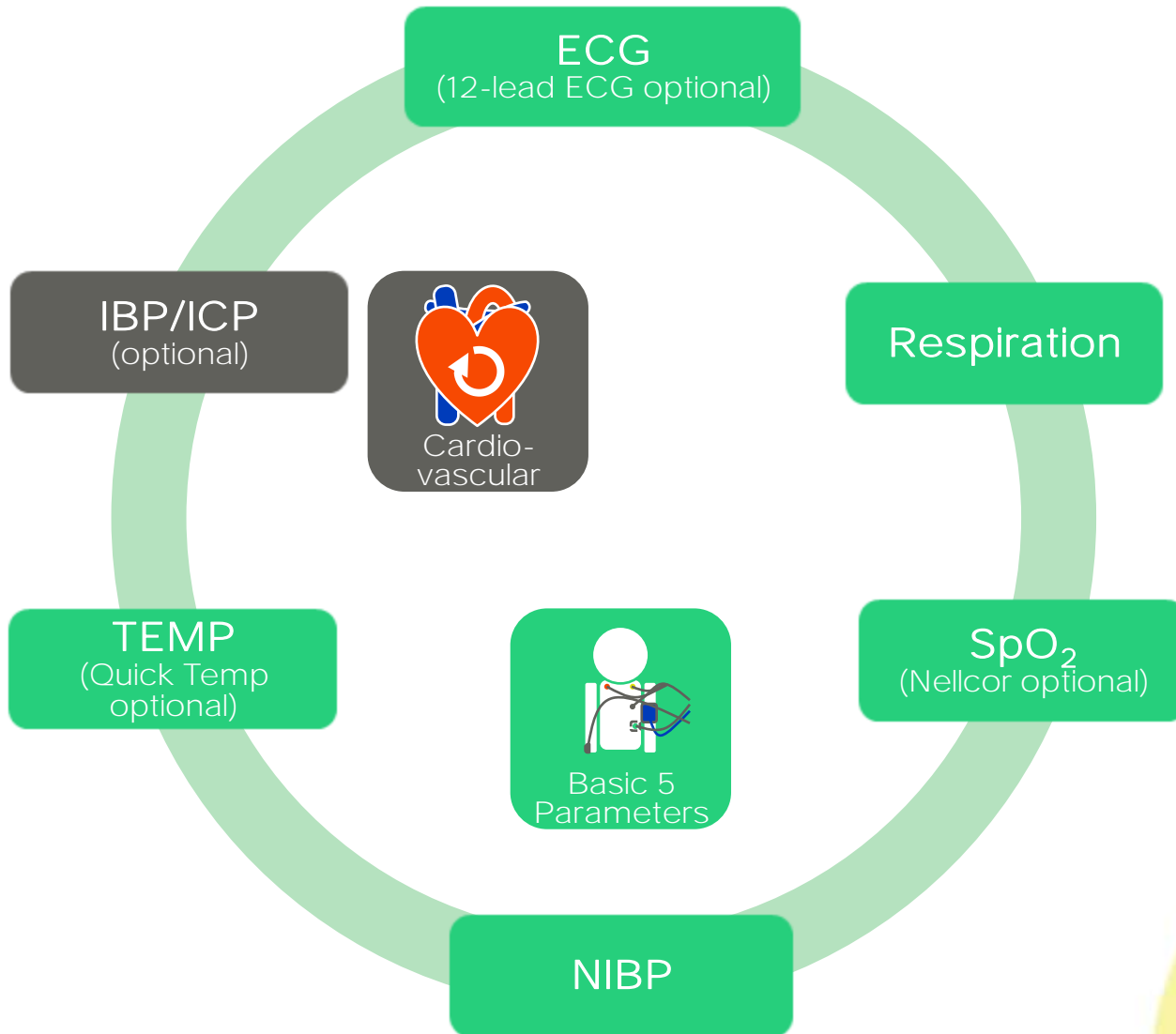


# Mounting Solution

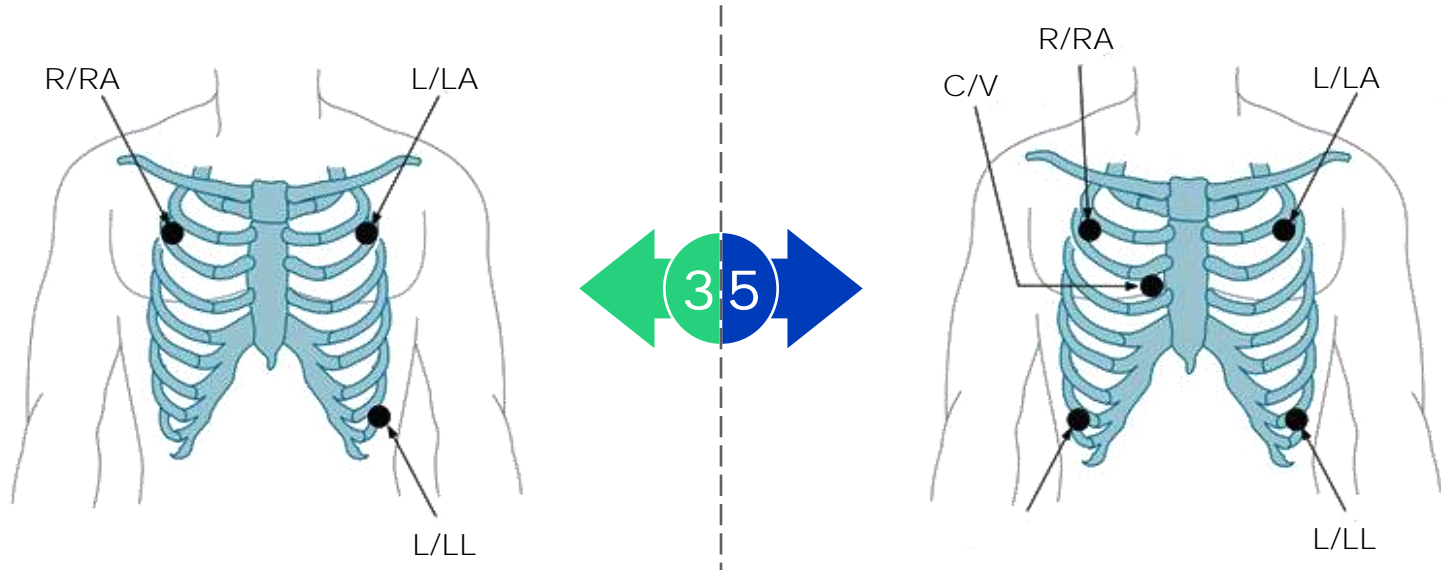
- Carry Belt  
For carrying around by the patient
- Bedrail Belt  
For mounting on bedrails



# Parameters



# 3/5-lead ECG Monitoring



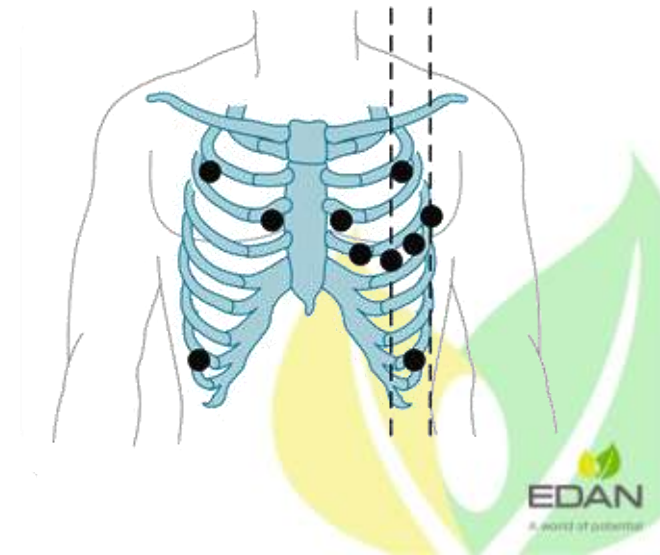
- EDAN iSEAP™ algorithm optimized for arrhythmia detection, pacemaker detection, ST analysis, and HR measurement.
- 16 types of arrhythmia events recording and alarms
- Pacemaker detection
- Defibrillator protection
- ESU protection



# 12-lead ECG Diagnostics

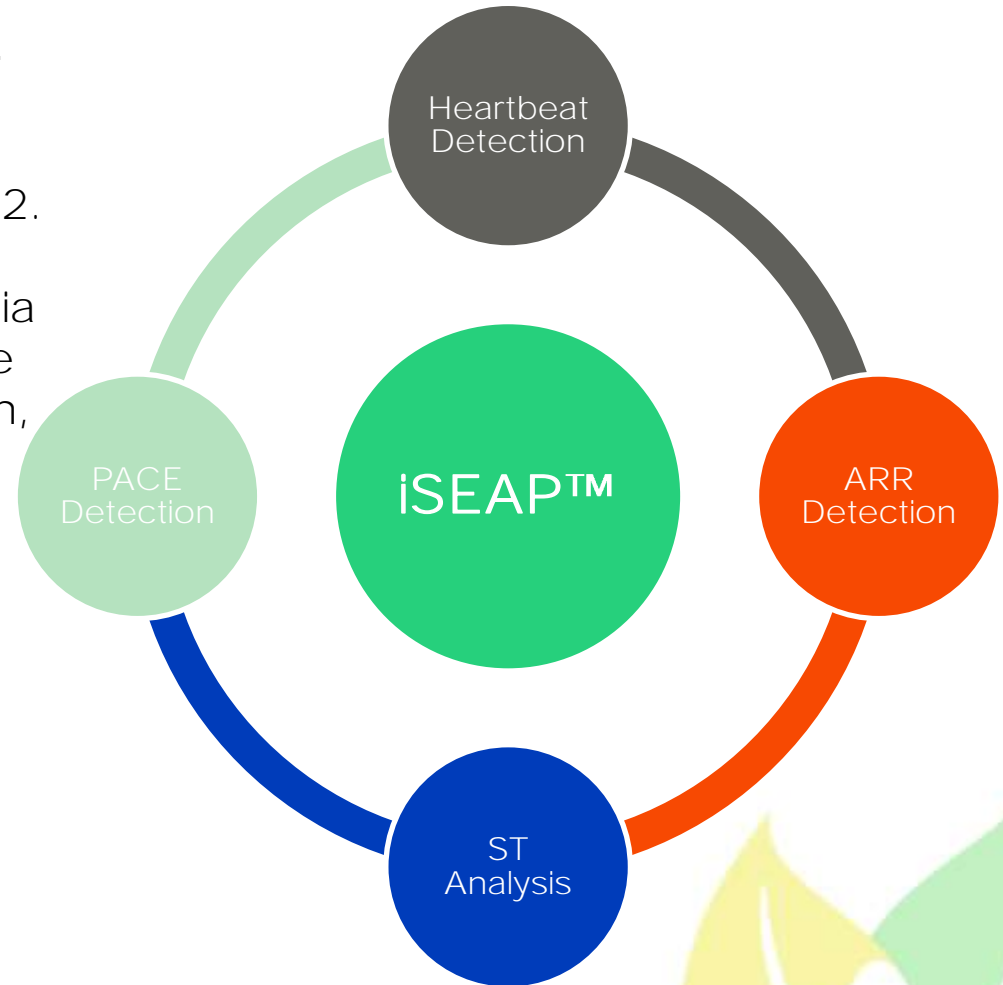
- EDAN SEMIP® diagnostics algorithm verified by CSE, AHA & MIT-BIH database
- Pacemaker detection
- Defibrillator/ESU protection
- 12-lead ST analysis
- 208 kinds of diagnosis results
- 10 seconds of 12-lead waveform to review and print out
- 12-lead ST analysis

Diagnosis Review			
Analysis Time:	08-09-2012 11:26:51	1/1	
HR:	60bpm	P/QRS/T Axis:	54/44/49°
PR Interval:	176ms	RVS/SV1 Amp:	1.09/0.55mv
QRS Duration:	72ms	RVS+SV1 Amp:	1.64mv
QT/QTc Interval:	339/339ms		
Diag Code	Diag Result		
800	Sinus Rhythm		
Wave    ▲    ▼    Delete    Record			
Exit			



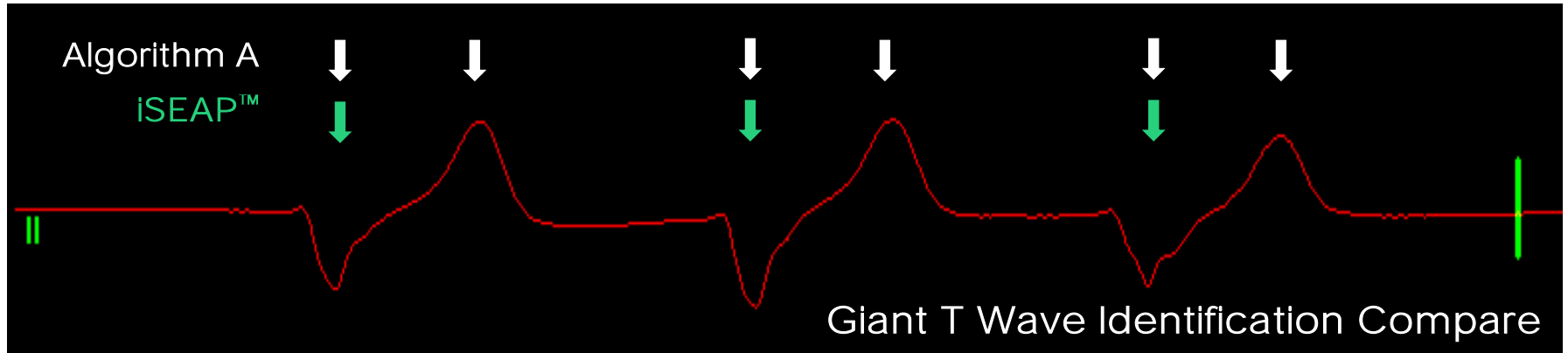
# EDAN iSEAP™ Monitoring Algorithm

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, hyperkalemia, 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

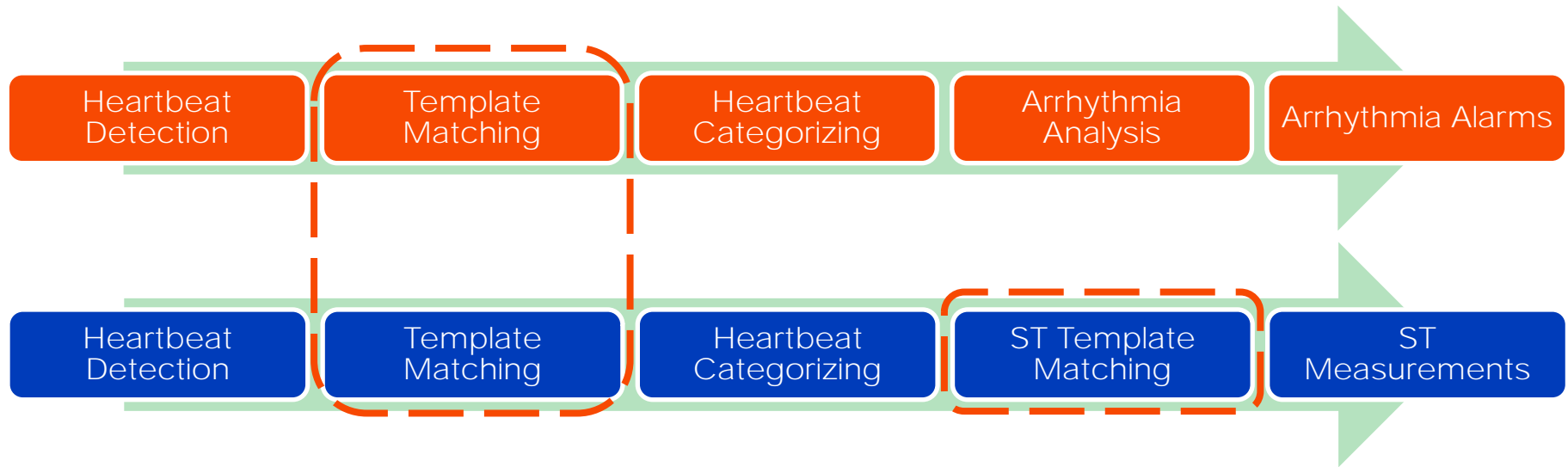
- For patients with tachycardia, bradycardia, atrial flutter, etc., iSEAP™ makes sure the heart beat sound fits exactly as the real heart beat. You can even tell the heart rate with the heart beat sound alone.
- The heart beat sound detection algorithm is cognate with the heart rate detection algorithm. The two algorithms correct each other to ensure accurate 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

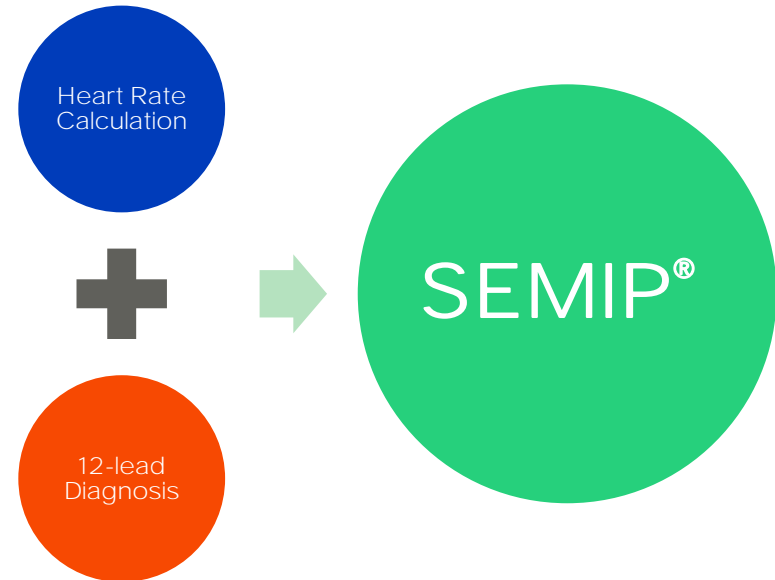


- It rules out the external inferences and avoid false pacemaker detections.
- It picks accurate pacemaker signal immediately with a high sampling rate



# EDAN SEMIP<sup>®</sup> Diagnostics Algorithm

Diagnosis Review			
Analysis Time:	08-09-2012 11:36:51	1/1	
HR:	60bpm	P/QRS/T Axis:	54/-44/-49°
PR Interval:	176ms	RVS/SVI Amp:	1.09/0.55mv
QRS Duration:	72ms	RVS+SVI Amp:	1.64mv
QT/QTc Interval:	339/339ms		
Diag Code	Diag Result		
800	Sinus Rhythm		
Wave   ↑   ↓   Delete   Record			
Exit			



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.

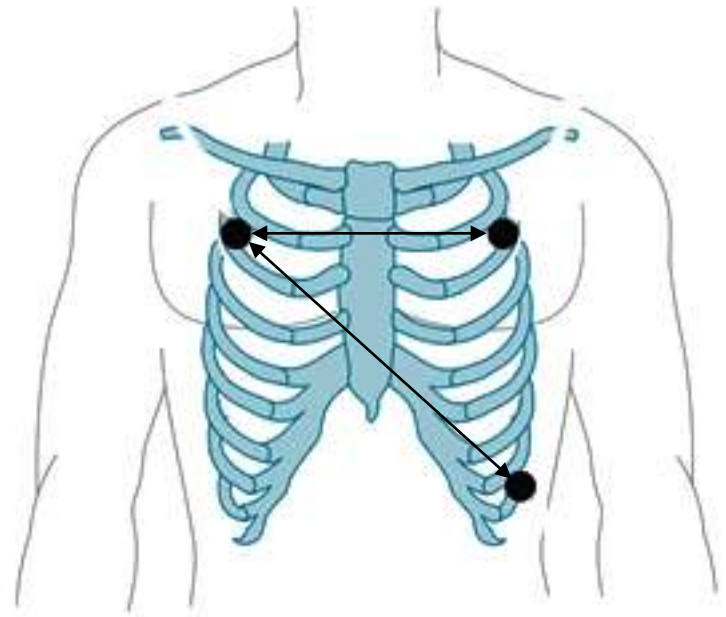
- Certified by CSE, AHA and MIT-BIH database.



# 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<sub>2</sub>

- EDAN iMAT™ algorithm with outstanding motion resistance and low perfusion resistance performance

Must work with EDAN SpO<sub>2</sub> sensor to ensure accurate readings.

- Pitch Tone (Pulse-tone modulation)

9 types of different tones. Doctors can rely on it to identify SpO<sub>2</sub> 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:

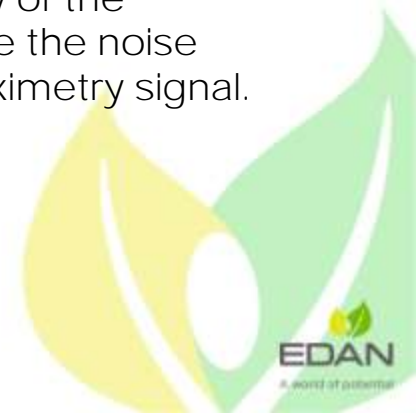
## ■ Hardware Design

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



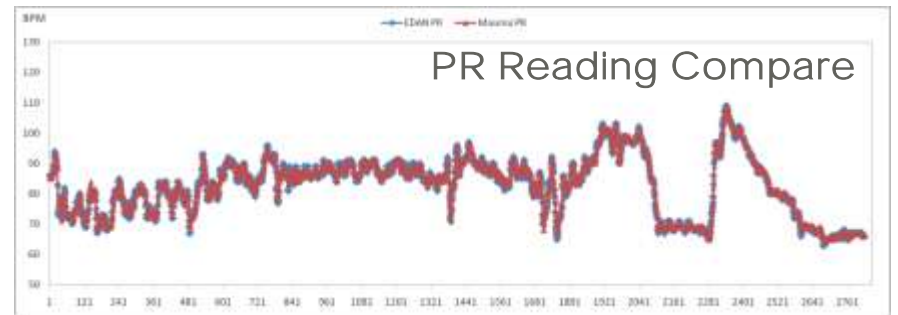
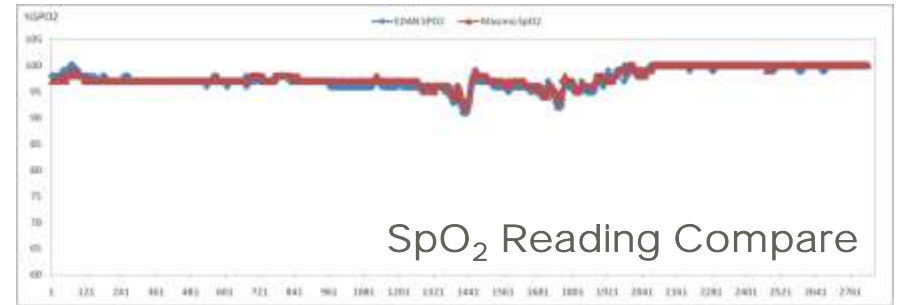
## ■ iMAT™ Algorithm

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<sub>2</sub> Compare

■ EDAN v.s. Nellcor  
Tested in NICU



■ EDAN v.s. MASIMO  
Tested in OT



# Nellcor™ Oximax™ SpO<sub>2</sub>

- Built-in Nellcor™ Oximax™ Module  
Must work with Nellcor™ SpO<sub>2</sub> sensor to ensure accurate readings.
- Pitch Tone (Pulse-tone modulation)
- Reputable motion resistance & low perfusion resistance performance
- Nellcor™ SatSeconds Technology

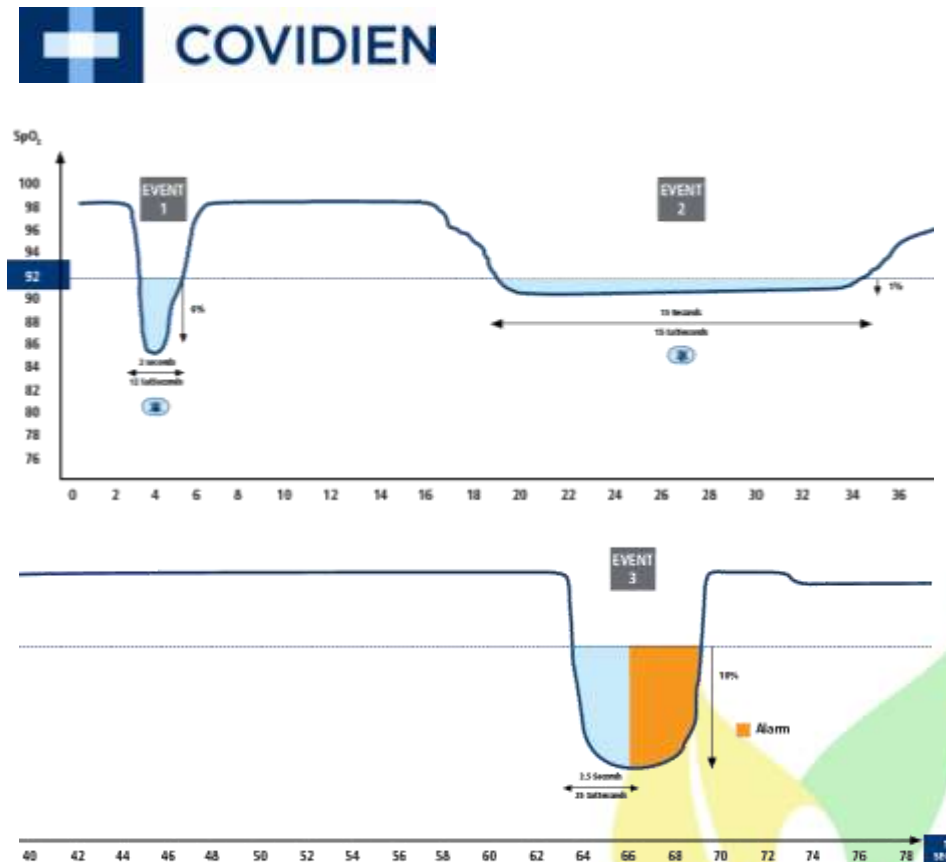


# Nellcor™ SatSeconds Technology

The Nellcor™ SatSeconds alarm management system calculates the duration of the event multiplied by the number of percentage points that SpO<sub>2</sub> falls outside of the saturation alarm threshold. Based on which, the machine will give alarms accordingly



- Nuisance alarms are a common concern with pulse oximetry monitoring. They are often triggered by minor or brief desaturations which are clinically insignificant. High levels of these irrelevant alarms may lead users to deactivate the alarm system or widen the alarm limits.
- Traditionally with SpO<sub>2</sub> alarm management, the monitor will alarm when the saturation falls outside of the alarm threshold—no matter how minor or short the duration. Most users do not want alarm notification to occur for very brief or small changes in saturation.



# 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

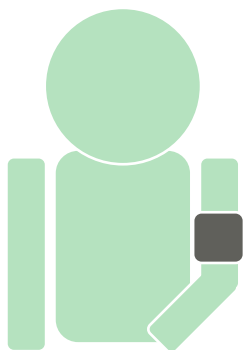
Automatic, Manual, Continual (STAT mode as known in many other brands)

- 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.





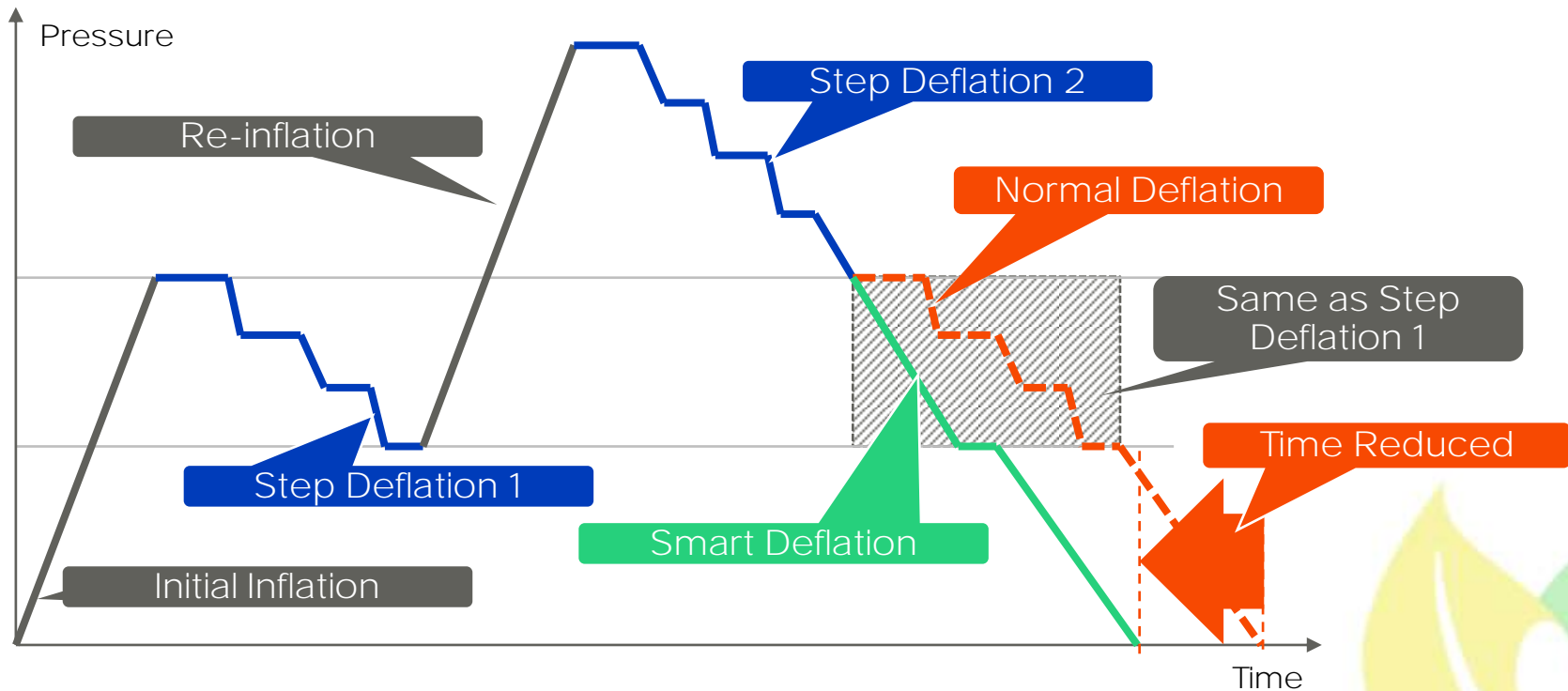
# EDAN iCUFS™ Smart Deflation

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:

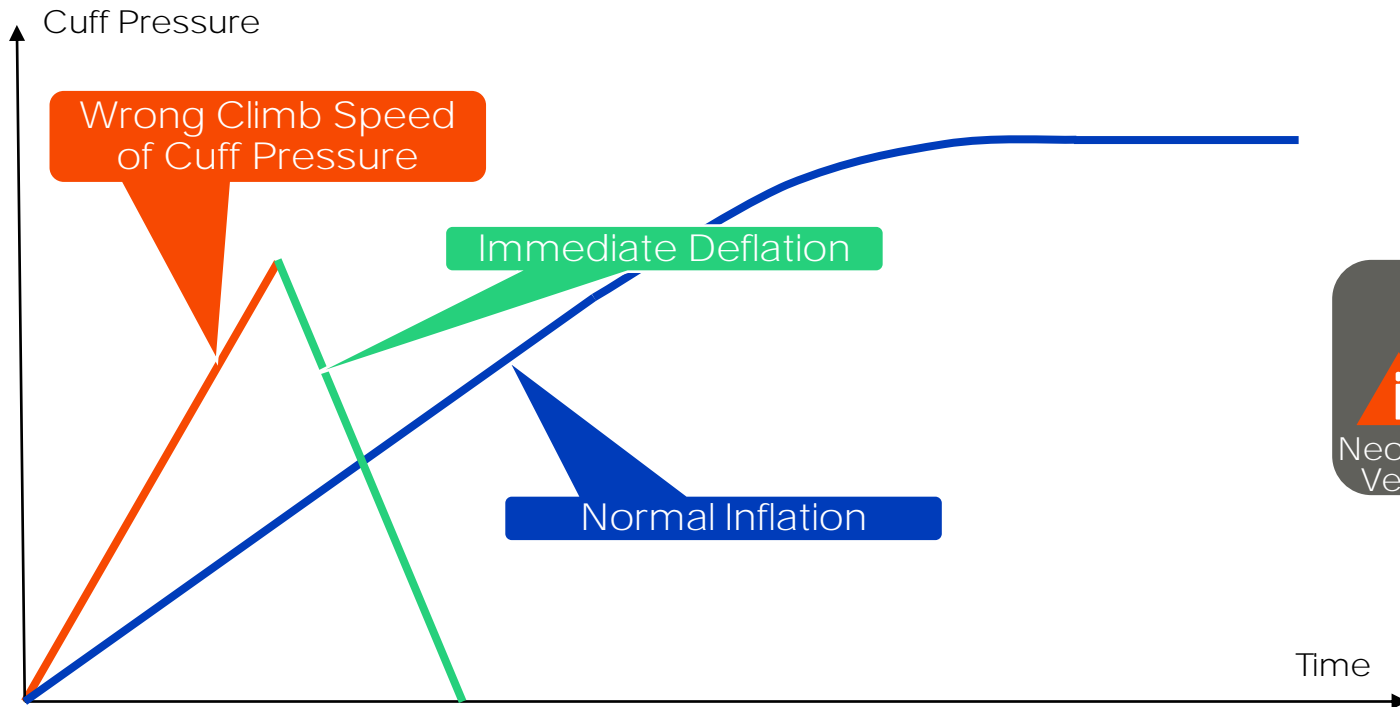
Around 5 seconds when there's re-inflation

Around 2~3 seconds when there's no re-inflation

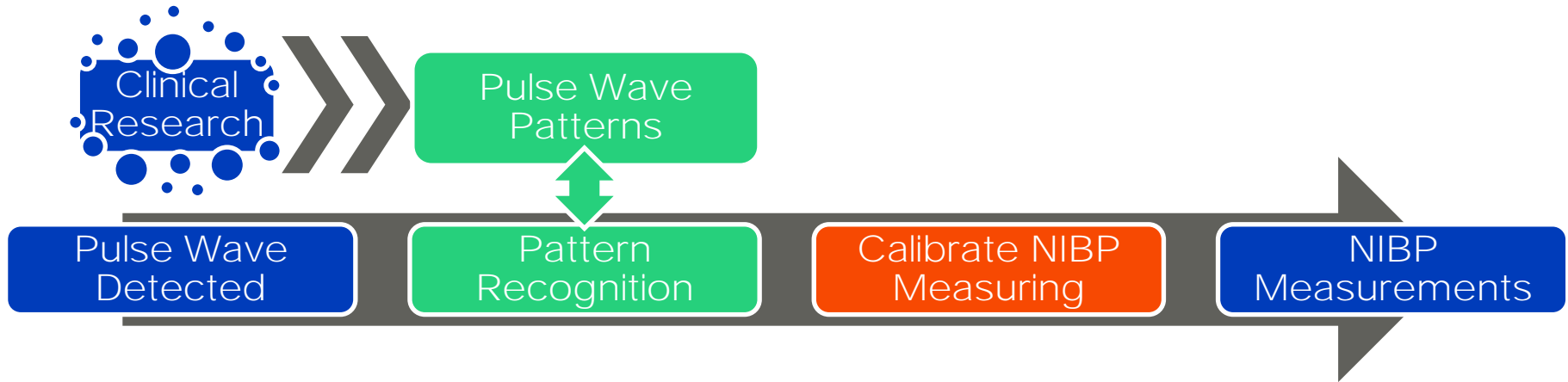


# EDAN iCUFS™ Neonatal Cuff Verification

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.

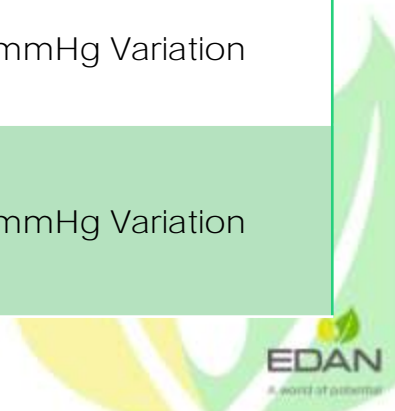


# EDAN iCUFS™ Pulse Wave Calibration



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



# Suntech NIBP

- **Optional on iM20**  
Must work with Suntech NIBP cuff to ensure accurate readings.
- **Measuring Mode**  
Automatic, Manual, Continuous (STAT mode as known in many other brands)
- **Meets ANSI/AAMI SP10, EN 1060-4, ISO 81060-2**
- **Reputed Motion Resistance Performance**



**SunTech**<sup>®</sup>



# Temperature

- 2-channel Temperature monitoring
- Probes
  - Compatible with CY and YSI probes
  - Compatible with 2.252 K/25°C & 10K/25°C probes
- Measuring Positions
  - Skin, Oral & Rectal temperature measurements



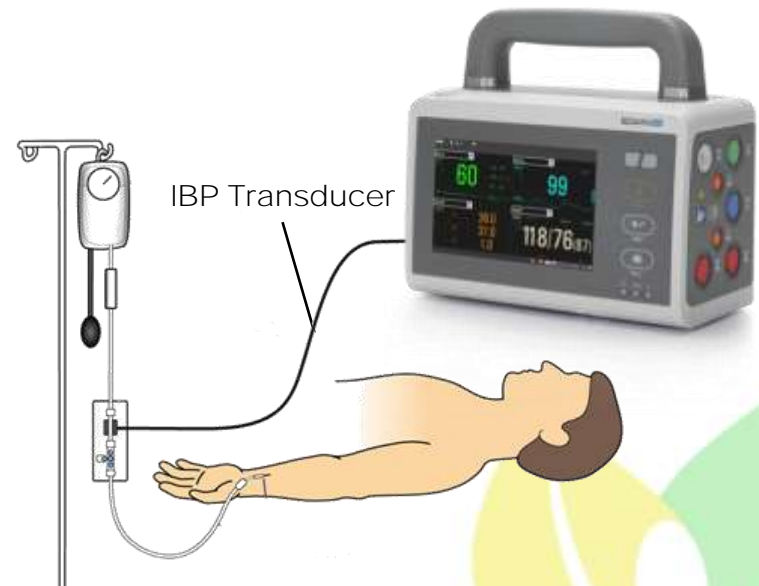
# IBP

- 2-channel IBP monitoring
- Pressure Labels  
ART, PA, CVP, RAP, LAP, ICP, PI(User-defined), P2(User-defined)
- Pressure Units  
mmHg/kPa/cmH<sub>2</sub>O  
(cmH<sub>2</sub>O is designed specially for venous pressure monitoring)

## Compatible Transducers

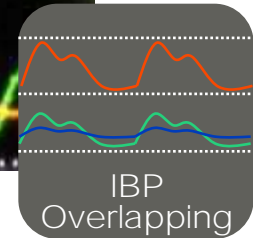
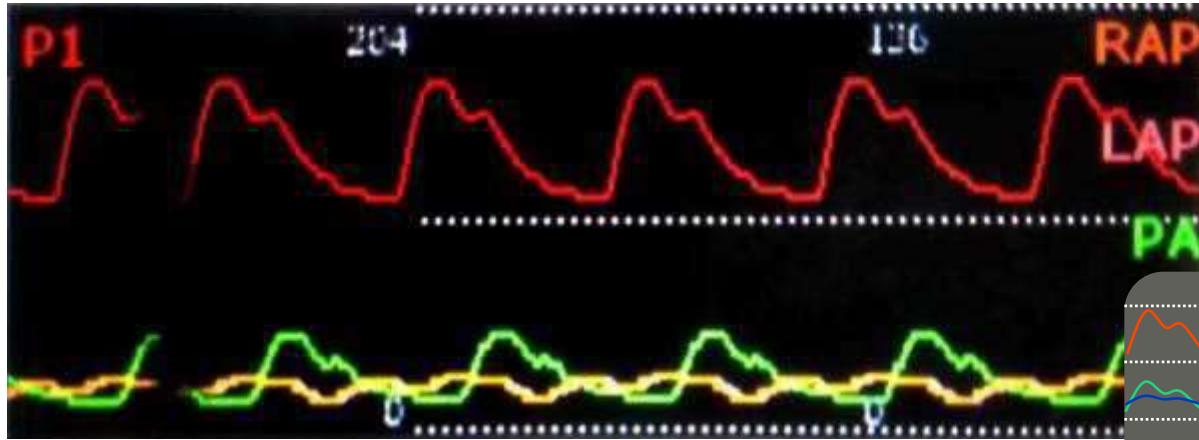


Edwards Lifesciences





# 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.

- Maximum 4 channels of IBP can be put on one display channel.
- Each IBP channel is differentiated with an user-defined color.



# ICP/ CPP

## ■ ICP

ICP monitoring uses a transducer, placed inside the head, which senses the pressure inside the skull and sends its measurements to patient monitor.

ICP monitoring can prevent the brain damage caused by increased intracranial pressure, and help to decrease the mortality.

## ■ CPP

Cerebral Perfusion Pressure is the pressure gradient between the systemic blood pressure and the pressure in the cranial compartment.

Cerebral Perfusion Pressure is calculated as the mean arterial blood pressure minus mean intracranial pressure . The CPP number will be displayed together with ICP in the same window.



*Compatible Transducer*

**Gaeltec**

ICT/B Transducer



# Respironics LoFlo™ Sidestream CO<sub>2</sub>

- **Plug and play Module Design**

EFM module with Respironics LoFlo™ sidestream CO<sub>2</sub> technology inside

- **Short Warm-up Time**

10~20 seconds

- **Water Trap**

Dehumidification Tubing Design

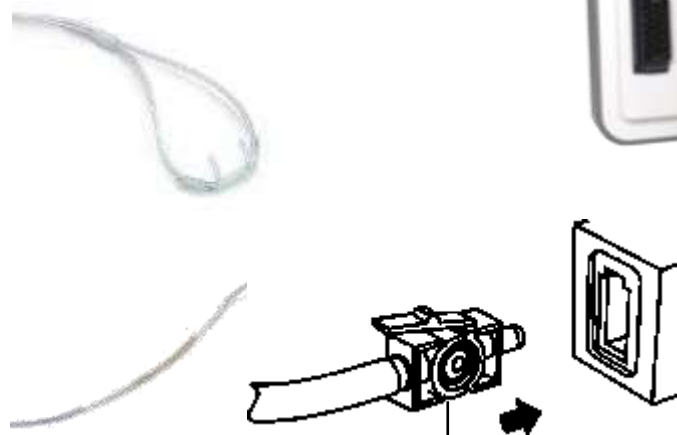
- **Unique Sampling Chamber Design**

Prevent contamination of the module

**PHILIPS**  
**RESPIRONICS**



Dehumidification Tube

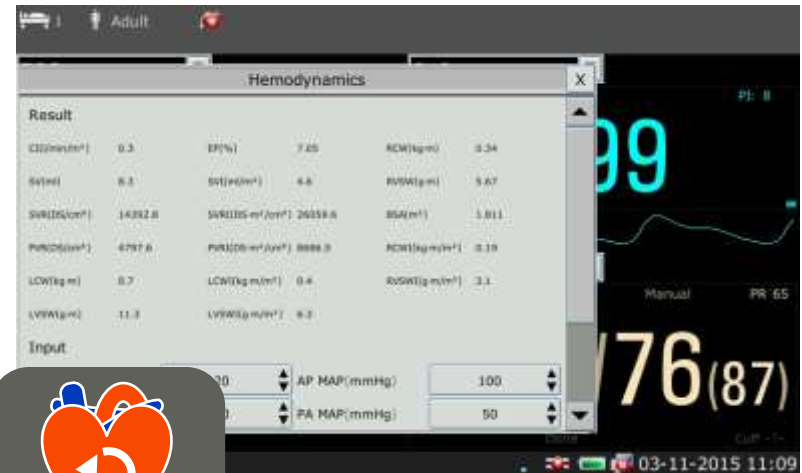


Sampling Chamber



# Clinical Calculations

Drug dose calculation and hemodynamic calculation are introduced to provide related clinical guides.



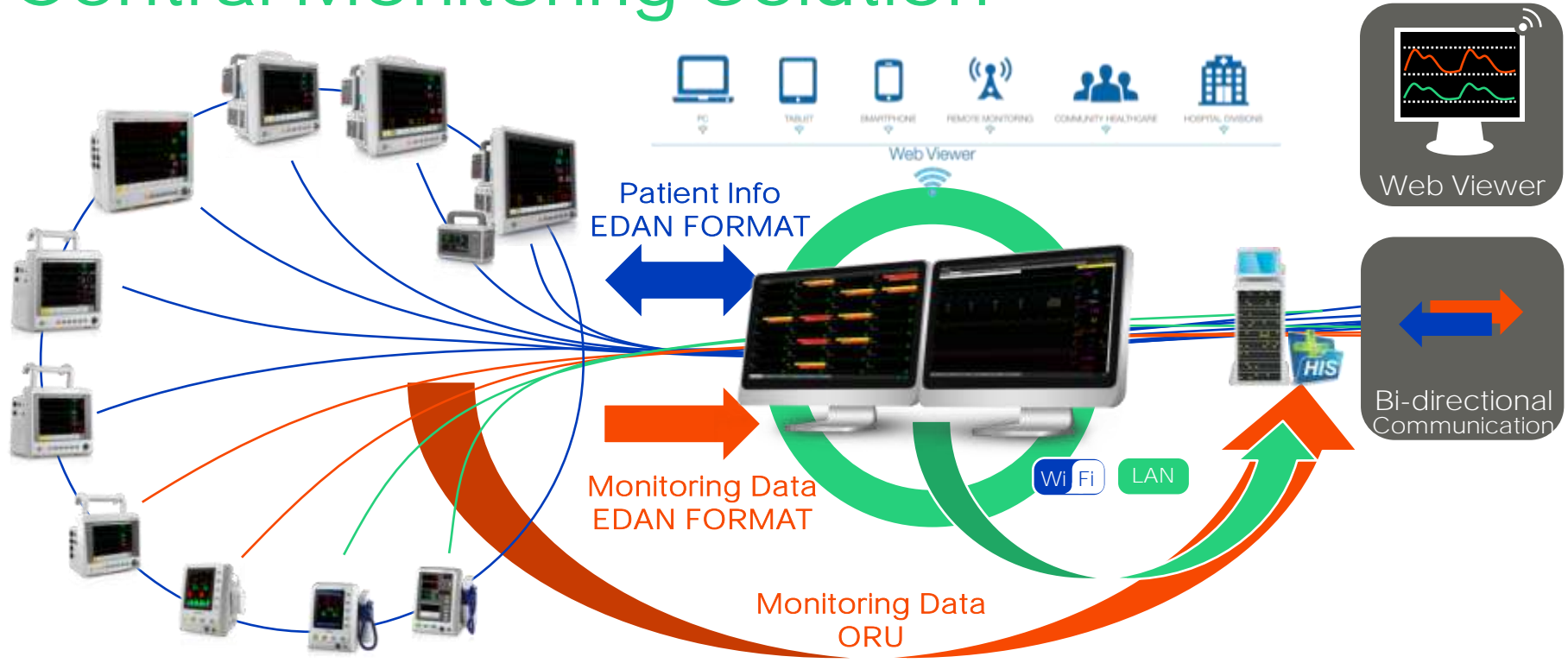
# Built-in Wi-Fi



iM20 is embedded with built-in Wi-Fi facility 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.

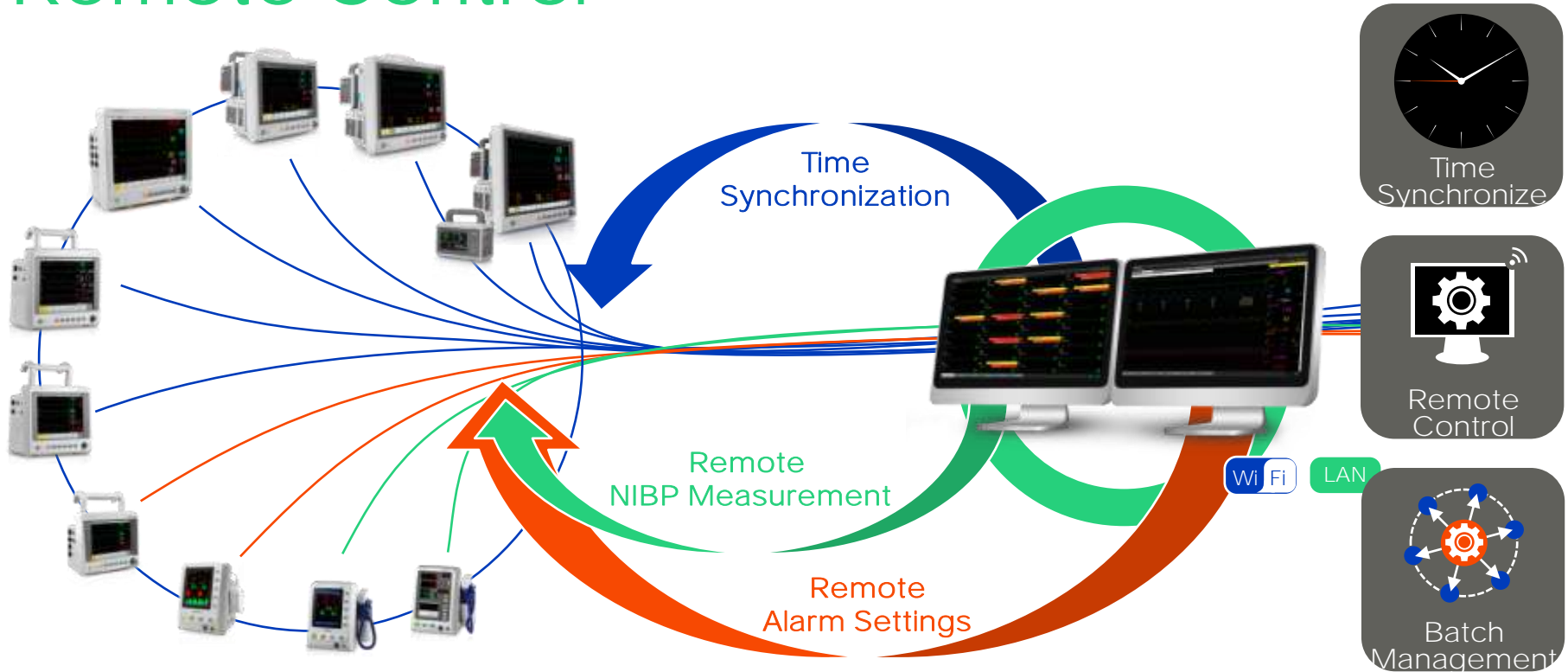
## ■ HL7 Communication

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

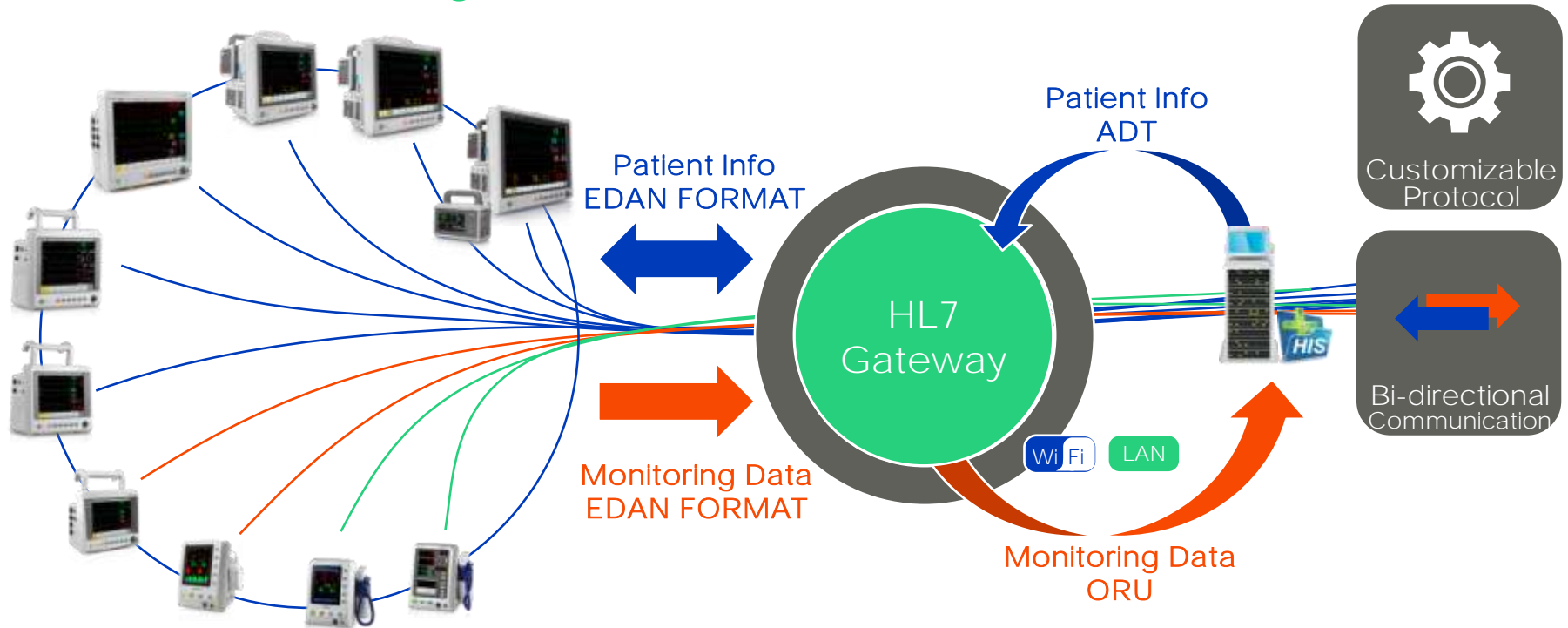
General view of the abnormal events with the amount & percentage of each event.



History Histogram

Measurement distribution diagram of each parameter.

# HL7 Gateway Solution



Installed on any device in the network, EDAN HL7 gateway 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.





# Emergency & Rescue Highlights

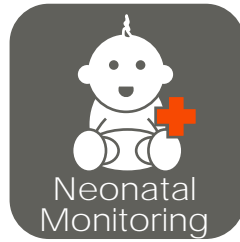




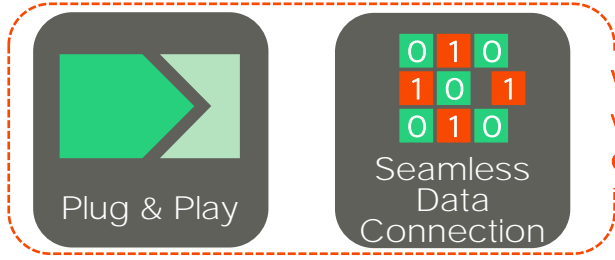
In-hospital  
Transport



Ambulance  
Transport



Neonatal  
Monitoring



Plug & Play



Seamless  
Data  
Connection

Working  
with  
elite Series



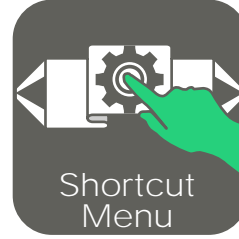
Portable  
Design



Touch UI



No-fan  
Design



Shortcut  
Menu



Display  
Mode



Night Mode



Standby  
Mode



3-level  
Alarms



All-in-1  
Alarm Setups



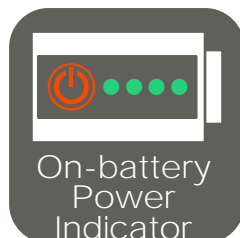
User  
Alarm Set



Vehicle DC  
Supply



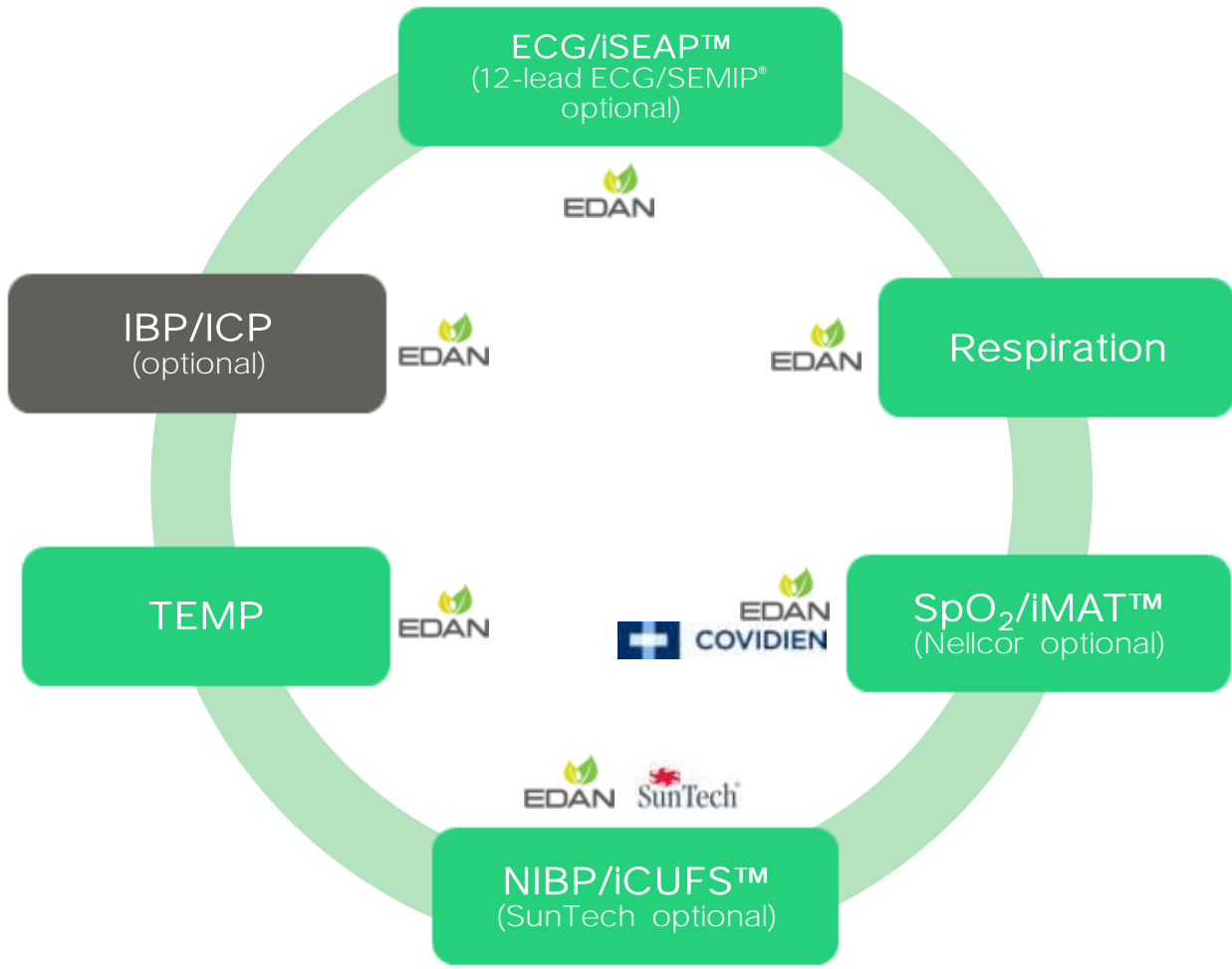
Rechargeable  
Battery



On-battery  
Power  
Indicator

# Other Design Highlights





# Parameter Highlights





MFM-CMS



HL7 Gateway



# Network Highlights





A world of potential

# THANK YOU

Edan Instruments, Inc.

[www.edan.com.cn](http://www.edan.com.cn)

[Info@edan.com.cn](mailto:Info@edan.com.cn)

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