

**Mindray**  
**Patient Data Share Protocol**

**Programmer's Guide**

**mindray**



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## Intended Use

This manual describes data transfer, networking mode and network configuration about Mindray patient monitor, anesthesia machine, HYPERVIOSR VI Central Monitoring System and Patient Data Share Gateway, and providing guidelines for third-party developers to connect to the aforementioned products.

Besides, how to install and use Mindray gateway software is described in Chapter 6.

## Intended Audience

This manual is intended for professional software developers. Professional software developers are expected to have a working knowledge of software development and application, network basics and network product development.

## Warranty

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This warranty is exclusive and is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for any particular purpose.

The physiological parameters and alarm information outputted from products designed by Mindray using Patient Data Share Protocol are for doctors' reference only and cannot be directly used as basis for clinical treatment. Before giving intervention treatment to a patient, you must go to the corresponding monitor to confirm the patient's condition.

## Revision History

This document has a revision number. This revision number is subject to change without prior notice whenever this document is updated due to software or technical specification change. Revision 1.0 is the initial release of this document:

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## Conventions

- *Italic* text is used in this document to quote the referenced chapters or sections.
- [ ] is used to enclose screen texts.
- → is used to indicate operational procedures.

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# Safety Information

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## **WARNING**

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- Indicates a potential hazard or unsafe practice that, if not avoided, could result in serious injury or property damage.
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## **CAUTION**

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- Indicates a potential hazard or unsafe practice that, if not avoided, could result in minor personal injury or product/property damage.
- 

## **NOTE**

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- Calls attention to an important point in the text.
-

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# 1 Overview

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## Note

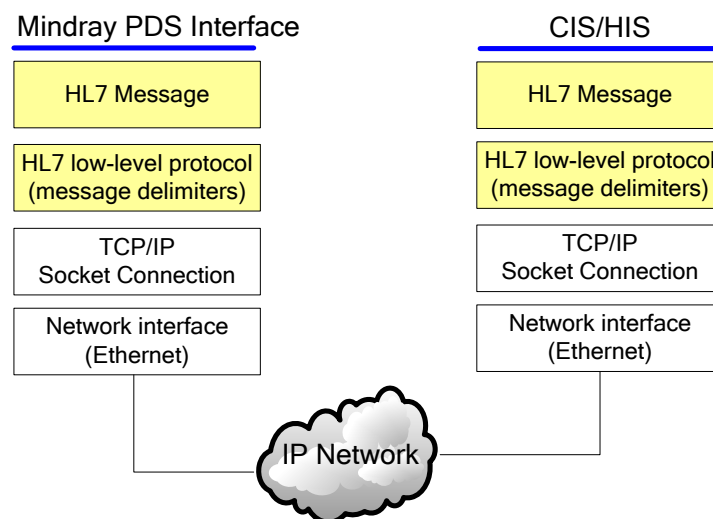
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- Before start work with this document, please read “Mindray Patient Data Share Solution Guide” at first.
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## 1.1 Communication Layers

Mindray Patient Data Share Protocol (hereinafter called PDS Protocol) is defined above TCP/IP layer.

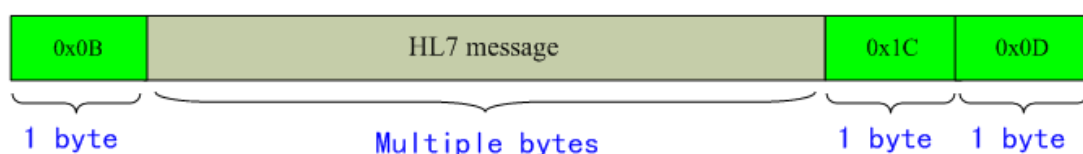
The following diagram shows the communication layers involved in the communication between a Mindray monitor and a client PC. The layers in yellow color are defined in this document.



### 1.1.1 HL7 Low-Level Protocol

TCP/IP is a byte-stream protocol and does not provide messaging boundaries. HL7, which belongs to application layer protocol, defines message format but does not provide a mechanism to detect message start and end. To mark message boundaries, the Minimal Lower Layer Protocol is used (as described in *HL7 Interface Standards Version 2.3.1*).

On the network, a message is transmitted in the following format:



Where,

- Message start mark (1 byte) that corresponds to ASCII <VT>. Its hexadecimal value is <0x0B>.
- HL7 message of multiple bytes.
  1. It includes only ISO 8859-1 characters (hexadecimal values between 0x20 and 0xFF) and <CR>. must not contain other control/non-printable characters.
  2. There is no special treatment for forbidden control characters in the messages received by the server side.
- Message end mark (2 bytes) that respectively corresponds to ASCII <FS> and <CR>. Their respective hexadecimal values are <0x1C> and <0x0D>.

### 1.1.2 HL7 Protocol Layer

HL7 is a communication protocol for data exchange between medical systems. Initially defined in the United States, the HL7 protocol is now used in many countries.

Mindray PDS protocol is based on HL7 protocol version 2.3.1. It uses only part of it, including:

- Chapter 2: ‘Control/Query’
- Chapter 3: ‘Patient Administration’
- Chapter 7: ‘Observation Reporting’

For a detailed description of HL7 V2.3.1, refer to the HL7 standard.

*Appendix A* gives a simple description of the syntax of HL7 V2.3.1.

## 1.2 Character Set

Mindray PDS protocol supports multiple character sets. It does not support Unicode. The default character set is ISO8859\_1. Character sets are defined in segment MSH. For example, MSH|^~&|||||ORU^R01|154155500|P|2.3.1|||||ISO8859\_1|

The ISO8859\_1 character set can be omitted if it is default.

The following character sets are supported: GB2312, from ISO8859\_1 to ISO8859\_16.

## 1.3 Message Separator and Escape character

The following table lists the separators used in HL7 message.

Table A-1 Element & Separator

Element	Separator
Segment	<cr> The hexadecimal value is 0x0D
Field	

Field Repetition	~
Component	^
Sub Component	&

If the HL7 message do uses the above separator characters in field content (i.e. the patient demographics), please use the escape character “\” before them.

For example, string “A & B” should be transfer to “A\&B”.

Special wide char type transfer string:

Special char	Transfer string
WCHAR(916)	{#}
WCHAR(9651)	

## 1.4 Coding System

Mindray PDS protocol uses Mindray HL7 coding system (Mindray HL7 Code, hereinafter called MHC.) Please refer *Appendix B*.

## 1.5 Interface introduction

### 1.5.1 Unsolicited Results Interface

This interface listens to the client side’s connection as the server side of TCP socket. Once the connection is established, this interface will send data unsolicitedly at a configured transmit interval.

The main characteristics of the interface are:

1. The transmit interval can be set through configuration user interface. The minimum interval is 15s.
2. Multiple patients’ data can sent through one TCP connection in each interval.
3. One or more types of following data can be selected for sending: vital sign parameter, physiological alarm, technical alarm, alarm setting and “module settings and device status”.
4. Aperiodic parameters shall also be sent when they are changed.

### 1.5.2 Solicited Results Interface

This interface listens to the client side’s connection as the server side of TCP socket. Once the connection is established, this interface waits for results requests. Upon receiving a request it sends the current results data to the requesting results data consumer. This is all done via the same TCP connection.

The main characteristics of the interface are:

1. The client side can send query message and request the interface to send one or more types

of following data: vital sign parameter, physiological alarm, technical alarm, alarm setting and “module settings and device status”.

2. Multiple patients’ data can be returned through the same TCP connection upon request.
3. This interface will not send any data unsolicitedly unless by requesting.
4. The minimum interval of this interface can accept requesting is 15s. Only the first request will be acknowledged and the others will be dispatched if they come within 15s.

### **1.5.3 ADT Net Query Interface**

This interface as client side connects the hospital’s HIS or EMR system and queries specific patient’s detailed information based on the PID.

The main characteristics of the interface are:

1. Only one patient’s information will be queried at one time from HIS/EMR.
2. The keyword for querying is PID.
3. Does not process any other patient data except for receiving the queried patient.

### **1.5.4 ADT DB interface**

This interface as client side connects the hospital’s HIS or EMR system and stores all the ADT messages received from HIS or EMR.

The main characteristics of the interface are:

1. Receives all the HL7 ADT messages from HIS/EMR and stores them in a local small database. The Central Monitoring System can query patient demographics from this database.
2. Does not send a query message outwards.

### **1.5.5 Realtime Results Interface**

This interface listens to the client side’s connection as the server side of TCP socket. Once the connection is established, the interface will send data every second.

The main characteristics of the interface are:

1. The time interval of data sending is fixed to 1 second, causing a great network throughput.
2. Only one patients’ data can sent through one TCP connection in each interval.
3. Specific vital sign parameter can be sent every second only after receiving query message from client side.
4. Physiological alarms and technical alarms are sent every second unsolicitedly without query.
5. Detailed device configuration and status information are sent unsolicitedly upon connection is established or they are changed.
6. Aperiodic data, device configuration and status information shall also be sent when they are changed.
7. For this interface on bedside device, dynamically, the client side can request this interface to change to send different vital sign parameters at runtime by resent different query

messages.

8. For this interface on Central Monitoring System and PDS Gateway, dynamically, the client side can request this interface to change to send different vital sign parameters from different bedside monitors at runtime by resent different query messages.

This interface also provides two functions using UDP connection or other TCP connection:

1. Broadcast online message using UDP connection.
2. Bedside monitors list can be queried from Central Monitoring System or PDS Gateway.

## Note

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- **Mindray will no longer update and maintain Realtime Results Interface. Please make cautious decision for using it.**
- 

## 1.6 Application scope

Please refer to “Mindray patient data sharing solution” for finding out which bedside devices or products support the above interfaces.

## 1.7 Patient unique identification

CIS can receive different patient’s results data in one TCP connection, so unique patient identification should be used.

Mindray bedside devices and Central Monitoring System are not able to insure the patient identification (i.e. Medical Record Number/MRN or name or bed number) is unique. After the patient is discharged, all his demographics are clear, and there is no mechanism to make different patient’s MRN, name or bed number are unique.

Hospital and services personal should carry out some means to make the patient identification is unique. At least, the bed number should be unique.

Notes, the patient Medical Record Number is present in the OBX segment on “Realtime Results Interface” (refer to *Appendix B.4*), while it is present in the field PID-3 on other interfaces (refer to section 2.2.4).

## 1.8 Valid value of results data

The valid range of normal vital sign parameters is positive, except these:  
The valid range of ST is from -2 to 2; The valid range of IBP is from -50.  
-100 or -10 are used to indicate a invalid value normally.

# 2 Unsolicited Results Interface

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## 2.1 Communication Process

### 2.1.1 Network Connection

The unsolicited results interface acts as TCP server socket and always listens for connections on the client socket. Once the number of connected client sockets reaches the maximum, new client socket connection will be rejected. The client socket listened to can be set via the configuration screen.

The unsolicited results interface doesn't break TCP connection spontaneously. In case of unexpected network interruption, connection needs to be reestablished between the server socket and the client socket. But the unsolicited results interface will not resend data occurred during the network disconnection period.

Two methods are optional to break or close the connection. One is that the client socket turns off Socket spontaneously to break the connection. The other is that the client socket sends HL7 message containing a network disconnection command to the unsolicited results interface which then turns off Socket.

If interruption of network physical connection occurs, TCP Socket of Windows operating system may be unable to notify the unsolicited results interface or the client socket of network disconnection in time, which results in Socket being considered to have normal connection by both the unsolicited results interface and the client socket. However, the network physical connection has been disconnected, which finally makes data unable to be sent and received properly. Therefore, it is suggested that the client socket reestablish the connection spontaneously if it doesn't receive any data sent from the unsolicited results interface at the set time interval. If connection can't be established, measures should be taken to solve network faults.

### 2.1.2 Data Communication

#### 2.1.2.1 Unsolicited Sending

The unsolicited results interface sends data (ORU^R01 message) to the client socket when TCP connection has been established (within 1 second after TCP connection is established) and the set time interval has reached.

The sending interval is configurable in the configuration screen.

This interface doesn't handle any data sent from the client socket except for the network disconnection message (See Section 2.3).

The data of all the bedside monitors is sent at each set time interval when connection is established. With network data traffic and computer performance considered, the interface

will send data of one bed after another about every 200 milliseconds after starting to send data. Therefore, based on the number of bedside monitors, the lasting time of data transmission at each set time interval may amount to several seconds.

The sent data of each bedside monitor is the most recent data points at current time.

Upon receiving data sent by this interface, the client socket can respond by sending either ACK or NACK, but they will be ignored by the unsolicited results interface.

This interface will not send data of the bedside monitor, when any of the three conditions occurs:

Network disconnection occurs between a bedside monitor and CMS or between a bedside monitor and PDS gateway;

The bedside monitor is turned off;

A patient is discharged from the bedside monitor.

Aperiodic parameters like NIBP, C.O., and CCO will also be sent at the set time interval. The value sent is the most recent manual measurement value at next transfer interval.

### 2.1.2.2 Sent Data Contents

Once configured in the configuration screen, the following data can be sent.

1. Vital sign parameters
2. Physiological alarms
3. Technical alarms
4. Alarm setups including the upper and lower limits of each parameter, alarm on/off, and alarm priority
5. Module configuration and device status that include:
  - (1) ECG lead type
  - (2) HR alarm source
  - (3) PR source
  - (4) Whether the equipment is in standby state
  - (5) Currently highest alarm priority of the equipment
  - (6) Type of currently highest alarm priority of the equipment: physiological alarm or technical alarm
  - (7) Whether alarms of the equipment are in one of these statuses: alarm off, alarm pause, audio alarm off, alarm silence, or none of above statuses (i.e. in normal alarming status).

### NOTE

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- **If the patient monitor uses the ‘CMS protocol’ to connect Central Monitor System or PDS Gateway, the point 7 above is invalid and the receiver should ignore this content. About ‘CMS protocol’, please refer to the document Mindray patient data**
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**sharing solution .**

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(8) If the equipment is telemetry equipment, is **Nurse Call** or **Event** available?

The data sent is the most recent data at the time of data sending. Data measurement time is indicated by the OBR segment of HL7 message.

### **2.1.2.3 Data Sent when Triggered**

Once triggered, the following contents will be sent by the interface.

1. Aperiodic parameters like NIBP, C.O., and CCO measurement completion. When network connection between bedside monitors and gateway is established and only when the option of **Physiological Parameter** in the configuration screen is selected, aperiodic parameters are sent to CIS client socket.
2. State of a monitor entering or exiting standby. Even though the data contents to be sent are not selected from the configuration screen, when a monitor enters or exits standby state, this event (a monitor entering/exiting standby state) is also sent.
3. Event of network disconnection between a bedside monitor and this interface or a monitor turned off . Even though the data contents to be sent are not selected from the configuration screen, when a monitor enters or exits standby state, this event is also sent via HL7 message. When a monitor is not networked to this interface, it will no longer receive any data from this interface.
4. The message ADT^A03 is sent only when a patient is discharged from a bedside monitor and the option **Device Configuration and Status Information** is selected.

### **2.1.2.4 Data Sent when a Bedside Monitor Is in Standby state**

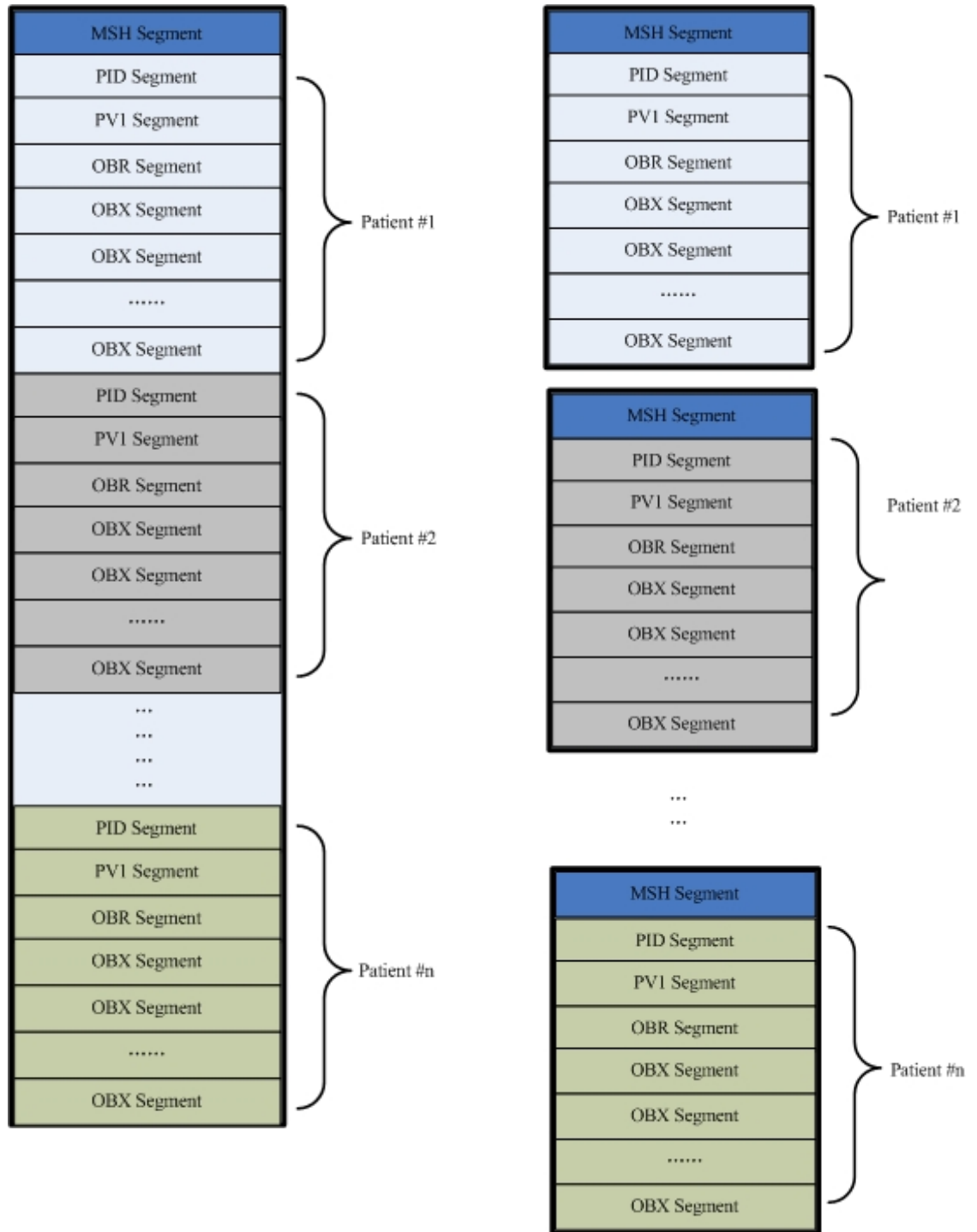
1. Standby state change: whatever data contents to be sent is selected from the configuration screen, when a bedside monitor accesses or exits standby state, this interface will send standby state change via HL7 message.
2. Unsolicited sending: If a bedside monitor is in standby state currently, this interface only sends patient information and standby state at each interval. Even if other data contents are selected from the configuration screen, these contents will not be sent at all. If the bedside monitor is in normal monitoring mode and the option of **Module Configuration and Device Status** is selected from the configuration screen, this interface will send the status information of “Being Monitored” to the client socket.

For the format and contents of HL7 message when a bedside monitor is in standby state, see *Appendix B.4*.

## 2.2 ORU^R01 Message

### 2.2.1 Format

There are two methods to send results data. First is to send out all patient data in one HL7 message. Second is to send out one patient data per one HL7 message. One of them can be selected from the user configuration dialog.



## 2.2.2 Example

1. At each time interval

```

MSH|^~\&|Mindray|Gateway||||ORU^R01|2|P|2.3.1| <CR>
PID||M1015_00010||John^||20091112|M||^| <CR>
PV1||I|^|ICU&Bed5&3232241659&0&0|||||A|||||20091201111211 <CR>
OBR|||Mindray Monitor||20091203121631| <CR>
OBX||NM|52^Height|169.0||||F <CR>
OBX||NM|51^Weight|59.0||||F <CR>
OBX||CE|2302^BloodType|1^A||||F <CR>
OBX||CE|2303^PACE_Switch|0^Off||||F <CR>
OBX||NM|101^HR|2101|60||||F <CR>
OBX||NM|151^RR|2102|20||||F <CR>
OBX||NM|200^T1|2104|37.00||||F <CR>
OBX||NM|201^T2|2104|37.20||||F <CR>
OBX||NM|202^Td|2104|0.20000||||F <CR>
OBX||NM|160^SpO2|2103|98||||F <CR>
OBX||NM|213^TB|2108|37.20||||F <CR>
OBX||NM|500^ART-Sys|2116|120||||F <CR>
OBX||NM|501^ART-Mean|2116|93||||F <CR>
OBX||NM|502^ART-Dia|2116|80||||F <CR>
OBX||NM|503^PA-Sys|2117|20||||F <CR>
OBX||NM|504^PA-Mean|2117|12||||F <CR>
OBX||NM|505^PA-Dia|2117|8||||F <CR>
OBX||NM|506^Ao-Sys|2130|120||||F <CR>
OBX||NM|507^Ao-Mean|2130|93||||F <CR>
OBX||NM|508^Ao-Dia|2130|80||||F <CR>
OBX||NM|515^FAP-Sys|2133|120||||F <CR>
OBX||NM|516^FAP-Mean|2133|93||| <CR>
OBX||NM|171^Dia|2105|80||||F||APERIODIC|20091203120508 <CR>
OBX||NM|172^Mean|2105|93||||F||APERIODIC|20091203120508 <CR>
OBX||NM|170^Sys|2105|120||||F||APERIODIC|20091203120508 <CR>
OBX||CE|2|1|10033^**SpO2 Too High||||F||PHY_ALM|20091203120540| <CR>
OBX||CE|2|1|10043^**RR Too High||||F||PHY_ALM|20091203120540| <CR>
OBX||CE|3|457^NIBP Communication Error||||F||TECH_ALM| <CR>
OBX||CE|2404^Lead_Type|2^Lead_5||||F <CR>
OBX||CE|2415^HR_PR_Alm_Src|1^HR||||F <CR>
OBX||CE|3902^PR_Source|1^SPO2||||F <CR>
OBX||CE|2306^HighestAlmLevel|3^LowLevel||||F <CR>
OBX||CE|2307^HighestAlmType|2^Tech||||F <CR>
OBX||CE|2032^AlarmSetting|0^AlmNormal||||F <CR>
OBX||CE|2305^WorkState|0^Monitoring||||F <CR>

```

2. After the bedside device enters "Standby" status

MSH|^~\&|Mindray|Gateway||||ORU^R01|19|P|2.3.1| <CR>  
PID||M1015\_00010|Jhon^|20091112|M||^| <CR>  
PV1||I|^ICU&Bed5&3232241659&0&0|||||A|||||20091201111211 <CR>  
OBR||Mindray Monitor||20091203121631| <CR>  
OBX||NM|52^Height|169.0||||F <CR>  
OBX||NM|51^Weight|59.0||||F <CR>  
OBX||CE|2302^BloodType|1^A||||F <CR>  
OBX||CE|2303^PACE\_Switch|0^Off||||F <CR>  
OBX||CE|2305^WorkState|1^Standby||||F <CR>

3. After the NIBP measurement is finished

MSH|^~\&|Mindray||||ORU^R01|3|P|2.3.1| <CR>  
PID||M1015\_00010|John^|20091112|M||^| <CR>  
PV1||I|^ICU&Bed5&3232241659&0&0|||||A|||||20091201111211 <CR>  
OBR||Mindray Monitor||20091203121631| <CR>  
OBX||NM|52^Height|169.0||||F <CR>  
OBX||NM|51^Weight|59.0||||F <CR>  
OBX||CE|2302^BloodType|1^A||||F <CR>  
OBX||CE|2303^PACE\_Switch|0^Off||||F <CR>  
OBX||NM|171^Dia|2105|89||||F||APERIODIC|20091203115457 <CR>  
OBX||NM|172^Mean|2105|99||||F||APERIODIC|20091203115457 <CR>  
OBX||NM|170^Sys|2105|129||||F||APERIODIC|20091203115457 <CR>

4. After the C.O. measurement is finished.

MSH|^~\&|Mindray||||ORU^R01|3|P|2.3.1| <CR>  
PID||M1015\_00010|John^|20091112|M||^| <CR>  
PV1||I|^ICU&Bed5&3232241659&0&0|||||A|||||20091201111211 <CR>  
OBR||Mindray Monitor||20091203121631| <CR>  
OBX||NM|52^Height|169.0||||F <CR>  
OBX||NM|51^Weight|59.0||||F <CR>  
OBX||CE|2302^BloodType|1^A||||F <CR>  
OBX||CE|2303^PACE\_Switch|0^Off||||F <CR>  
OBX||NM|210^C.O.|2108|5.400||||F||APERIODIC|20091203114943 <CR>  
OBX||NM|212^C.I.|2108|2.0000||||F||APERIODIC|20091203114943 <CR>

5. After the bedside device is offline or power off.

MSH|^~\&|Mindray|||||ORU^R01|7|P|2.3.1| <CR>

PID||M1015\_00010|John^||20091112|M||^|^|^| <CR>

PV1||I|^ICU&Bed5&3232241659&0&0|||||||||A|||||||||||||||||20091201111211 <CR>

OBR|||Mindray Monitor||20091203121631| <CR>

OBX||NM|52^Height||169.0|||||F <CR>

OBX||NM|51^Weight||59.0|||||F <CR>

OBX||CE|2302^BloodType||1^A|||||F <CR>

OBX||CE|2303^PACE\_Switch||0^Off|||||F <CR>

OBX||CE|2394^Connect\_State||1^Disconnected|||||F <CR>

### 2.2.3 MSH Segment

MSH segment is first segment of HL7 message, it defines the message type.

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	1	ST	R	Yes	Field Separator	Always ' '
2	4	ST	R	Yes	Encoding Characters	Always '^~\&'
3	30	HD	O	Yes	Sending Application	Mindray
4	30	HD	O	Yes	Sending Facility	
9	7	CM	R	Yes	Message Type	ORU^R01
10	20	ST	R	Yes	Message Control ID	This field contains a number or other identifier that uniquely identifies the message. The receiving system echoes this ID back to the sending system in the Message acknowledgment segment (MSA).
11	3	PT	R	Yes	Processing ID	Always 'P'
12	60	VID	R	Yes	Version ID	Always '2.3.1'

## 2.2.4 PID Segment

SEQ	LEN	DT	OPT	Used	Field NAME	Description
3	20	CX	R	Yes	Patient Identifier List	Patient Medical Record Number as populated in the HY-VI CMS or bedside monitor.
5	24	XPN	R	Yes	Patient Name	<First Name>^<Last Name>
7	24	TS	O	Yes	Date/Time of Birth	Format: YYYYMMDD
8	1	IS	O	Yes	Sex	Contains the sex of the patient as entered at the Information Center. The format is: Male: M Female: F Unknown: U
11	128	XAD	O	Yes	Patient Address	<Address>^^^<Zip Code>
13	16	XTN	O	Yes	Phone Number - Home	

## 2.2.5 PV1 Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	1	IS	R	Yes	Patient Class	'I' for Inpatient. 'O' for Outpatient.
3	60	PL	O	Yes	Assigned Patient Location	Only the third component (bed) is used. The firsttwo components are empty.. Format: <point of care>^<room>^<bed>. The <bed> component divides into the following subcomponents: <Office Name>&<bed id>&<IP>&<IPSeq>&0  The <IP> is the bedside device IP Address and the <IPSeq> is the telemetry transmitter's sequence number.
7	30	XCN	O	Yes	Attending Doctor	
18	2	IS	O	Yes	Patient Type	"N": Neonate "A": Adult "P": Pediatric "U": Unknown
44	24	DTM	O	Yes	Admit Date/Time	Format: YYYYMMDDHHmmss

## 2.2.6 OBR Segment

The OBR Segment is used to carry the measurement time of real-time vital sign parameter.

SEQ	LEN	DT	OPT	Used	Field Name	Description
4	200	CE	R	Yes	Universal Service ID	Always "Mindray Monitor"
7	26	TS	C	Yes	Observation Date/Time	YYYYMMDDhhmmss

## 2.2.7 OBX Segment

### 2.2.7.1 Patient demographics

Some patient demographics are carried in PID segment and PV1 segment. The others are carried through OBX segment, including patient height, patient weight, blood type and pace switch.

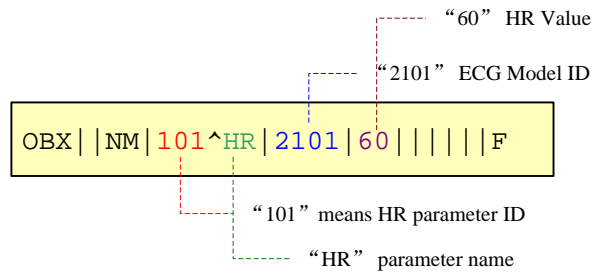
Patient height and weight are defined in section



### 2.2.7.2 Periodic Parameter

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"NM"
3	80	CE	R	Yes	Observation Identifier	The format is:<ID>^<text>. <ID>: Parameter ID. It cannot be empty. Refer to Appendix B.1 <text>: Parameter name. It cannot be empty. The parameter name is defined by the server side.
4	20	ST	O	Yes	Observation Sub-ID	ID of the module to which the parameter belongs. Refer to Appendix B.3.
5	65K		R	Yes	Observation Results	Parameter value.
6	60	CE	O	Yes	Units	Omitted. The default unit is used. Refer to Appendix B.1.
7	60	ST	O	Yes	Reference Range	Omitted.
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

The HR parameter is shown below:



Example:

- OBX||NM|101^HR|2101|60|||||F
- OBX||NM|102^PVCs|2101|0|||||F
- OBX||NM|151^RR|2102|20|||||F
- OBX||NM|200^T1|2104|37.0|||||F
- OBX||NM|201^T2|2104|37.2|||||F
- OBX||NM|202^TD|2104|0.2|||||F

### 2.2.7.3 Aperiodic parameter

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"NM"
3	80	CE	R	Yes	Observation Identifier	The format is: <ID>^<text>. <ID>: Parameter ID. It cannot be empty. Refer to Appendix B.1 . <text>: Parameter name. It cannot be empty. The parameter name is defined by the server side.
4	20	ST	O	Yes	Observation Sub-ID	ID of the module to which the parameter belongs. Refer to Appendix B.3.
5	65K		R	Yes	Observation Results	Parameter value.
6	60	CE	O	Yes	Units	Omitted. The default unit is used. Refer to Appendix B.1.
7	60	ST	O	Yes	Reference Range	Omitted.
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".
13	20	ST	O	Yes	User Defined Access Checks	Parameter type: "APERIODIC": aperiodic parameter.
14	26	TS	O	Yes	Date/Time of the Observation	Omitted by default. The format is: YYYYMMDDHHMMSS. Only used for aperiodic parameters, indicating measurement time.

Example:

1. NIBP module

OBX||NM|171^Dia|2105|80|||||F||APERIODIC|20070106191915

OBX||NM|172^Mean|2105|93|||||F||APERIODIC|20070106191915

OBX||NM|170^Sys|2105|120|||||F||APERIODIC|20070106191915

2. C.O. module

OBX||NM|210^C.O.|2108|5.400|||||F||APERIODIC|20091203114943

OBX||NM|212^C.I.|2108|2.0000|||||F||APERIODIC|20091203114943

3. CCO module

OBX||NM|652^C.O.|2108|5.400|||||F||APERIODIC|20091203162913

OBX||NM|653^C.I.|2108|2.0000|||||F||APERIODIC|20091203162913

Notes: In continuous measurement mode of CCO module, the parameters CCO and CCI are belong to 'Periodic Parameter'.

### 2.2.7.4 Physiological Alarm

If the message has no OBX segment about physiological alarm, it indicates that there is no physiological alarm currently.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	“CE”
3	80	CE	R	Yes	Observation Identifier	“1”: high-level alarm “2”: medium-level alarm “3”: low-level alarm “4”: message
4	20	ST	O	Yes	Observation Sub-ID	Not defined.
5	65K		R	Yes	Observation Results	The format is:<ID>^<text>. <ID>: alarm ID <text>: alarm text. It cannot be empty. Multiple languages are displayed based on different character sets.
6	60	CE	O	Yes	Units	Omitted.
7	60	ST	O	Yes	Reference Range	Omitted.
11	1	ID	R	Yes	Observation Results Status	“F”, representing “Final”.
13	20	ST	O	Yes	User Defined Access Checks	“PHY_ALM”
14	26	TS	O	Yes	Date/Time of the Observation	The format is: YYYYMMDDHHMMSS , indicating the time when the alarm occurs.

Example:

OBX||CE|2|1|10033^\*\*SpO2 Too High|||||F||20070106193145|

OBX||CE|2|1|10002^\*\*HR Too low|||||F||20070106193145|

### 2.2.7.5 Technical Alarm

If the message has no OBX segment, it indicates that there is no physiological alarm currently.

The format and definition is similar with physiological alarm, except these:

1. OBX-13: the value is “TECH\_ALM”.
2. OBX-14: this field is null without time of alarm occurrence.

Example:

OBX||CE|3|457^NIBP Communication Error|||||F||TECH\_ALM|

### 2.2.7.6 Parameter Alarm Limits

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"NM"
3	80	CE	R	Yes	Observation Identifier	"2002": upper limit "2003": lower limit
4	20	ST	O	Yes	Observation Sub-ID	Parameter ID
5	65K		R	Yes	Observation Results	Upper/lower limits
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

Example:

```
OBX||NM|2002^|101|200|||||F
OBX||NM|2003^|101|100|||||F
OBX||NM|2002^|102|10|||||F
OBX||NM|2003^|102|0|||||F
OBX||NM|2002^|105|0.20|||||F
OBX||NM|2003^|105|-0.20|||||F
```

### 2.2.7.7 Parameter Alarm Level

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	"2009"
4	20	ST	O	Yes	Observation Sub-ID	Parameter ID
5	65K		R	Yes	Observation Results	Alarm level: 0:Unknown 1:High 2:Middle 3:Low
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

Example:

```
OBX||CE|2009^|101|2^|||||F
OBX||CE|2009^|102|2^|||||F
OBX||CE|2009^|105|2^|||||F
OBX||CE|2009^|106|2^|||||F
OBX||CE|2009^|107|2^|||||F
```

### 2.2.7.8 Parameter Alarm Switch

Unsolicited Results Interface

---

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	“CE”
3	80	CE	R	Yes	Observation Identifier	“2004”
4	20	ST	O	Yes	Observation Sub-ID	Parameter ID
5	65K		R	Yes	Observation Results	Alarm Switch: 0:OFF 1:ON 2:Unknown
11	1	ID	R	Yes	Observation Results Status	“F”, representing “Final”.

Example:

OBX||CE|2004^|101|1^|||||F

OBX||CE|2004^|102|0^|||||F

### 2.2.7.9 Others

Please refer to the Appendix.

### 2.2.8 PDT Segment

The PDT Segment is used to carry the measurement time of real-time vital sign parameter.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	“ST”
3	80	CE	R	Yes	Universal Service ID	“1350”
5	26	ST	O	Yes	Observation Date/Time	“YYYYMMDDhhmmss”
12	1	ID	R	Yes	Observation Results Status	“F”, representing “Final”.

Example:

PDT||ST|1350^||20171211101010|||||F

## 2.3 ACK Message

After the Unsolicited Results Interface receives ACK message, it will close the TCP connection.

### 2.3.1 Format

MSH	Message Header
MSA	Message Acknowledgement

Example:

```
MSH|^~\&|CIS|Charting||||ACK|2|P|2.3.1 <CR>
MSA|AR|0|Close <CR>
```

### 2.3.2 MSH Segment

Please refer to the section 2.2.3.

### 2.3.3 MSA Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	2	ID	R	Yes	Acknowledgement Code	<ul style="list-style-type: none"> <li>AR: Application Reject (negative acknowledgement)</li> <li>Must be 'AR' with case sensitive.</li> </ul>
2	20	ST	R	Yes	Message Control ID	Always '0'
3	80	ST	O	Yes	Text Message	Must be 'Close' with case sensitive.

MSA-1: The value should be 'AR' with case sensitive.

MSA-3: The value should be 'Close' with case sensitive.

## 2.4 ADT^A03 Message

Please refer to section 5.2ADT Message .

# 3 Solicited Results Interface

---

## 3.1 Communication Process

### 3.1.1 Network Connection

The network connection here is the same as that for the unsolicited results interface. For network connection, see section 2.1.1 *Network Connection*.

### 3.1.2 Data Communication

The solicited results interface adopts the method of request and response. It doesn't send data until it receives the query message (QRY^R02) from the client socket.

The client socket can query data of one, multiple, or all bedside monitors each time and can designate the data type needed. Upon receiving the query message, the interface returns ACK as a reply and then returns the message ORF^R04 containing the query results.

The interface returns NACK message, if the bed number or the data type that needs to be queried is not designated in the query message

If connection between the queried bedside monitor and this interface is not established or information of current patient admitted by the bedside monitor is not allowed to be sent, this interface can't send data of this bedside monitor.

Upon receiving data sent by this interface, the client socket will send ACK or NACK as a reply, but the reply will be ignored by the interface.

When the interface is replying the previous query, if the client socket sends a new query, this interface saves the last query information, responds to previous query, and then replies the buffered query information.

With network data traffic and computer performance considered, the interface will send data of one bed after another every 200 milliseconds after starting to send data. Therefore, the lasting time of data transmission at each set time interval may amount to several seconds. The sent data of each bedside monitor is the most recent value at current time.

#### 3.1.2.1 Sent Data Contents

This interface returns query data only after receiving the query message (QRY^R02) from the client socket.

No such conditions exist:

This interface sends data to client socket spontaneously upon completion of aperiodic parameter measurement.

This interface sends data to client socket spontaneously after patient monitor status changes.

The client socket can request the interface to send one or several of the following data types

via the QRY information.

1. Vital sign parameters
2. Physiological alarms
3. Technical alarms
- 4; Alarm setups including the upper and lower alarm limits of each parameter, alarm on/off, and alarm priority
5. Equipment configuration and status information that include
  - (1) ECG lead type
  - (2) HR alarm source
  - (3) PR source
  - (4) Whether the equipment is in standby state
  - (5) Currently highest alarm priority
  - (6) Type of currently highest alarm priority: physiological alarm or technical alarm
  - (7) Whether alarms of the equipment are in one of these statuses: alarm off, alarm pause, audio alarm off, alarm silence, or none of above statuses (i.e. in normal alarming status).

## NOTE

---

- **If the patient monitor uses the ‘CMS protocol’ to connect Central Monitor System or PDS Gateway, the point 7 above is invalid and the receiver should ignore this content. About ‘CMS protocol’, please refer to the document Mindray patient data sharing solution .**
- 

(8) If the equipment is telemetry equipment, is **Nurse Call** or **Event** available?

### 3.1.2.2 Data Transmission when a Bedside Monitor in Standby State

If the equipment queried by the client socket is in standby state, returned ORF message only contains patient information and standby state and excludes anything else.

For the format and contents of HL7 message when a bedside monitor is in standby state, refer to **Appendix B.4**.



## 3.2 QRY^R02 Message

### 3.2.1 Format

MSH	Message Header
QRD	Query definition
{	
QRF	Query filter
}	

### 3.2.2 Example

```
MSH|^~\&|CIS|Charting||||QRY^R02|2|P|2.3.1 <CR>
QRD|20091207140713|R|I|MRQry2||||RES <CR>
QRF|MON||||168370462&0^16^0^0 <CR>
QRF|MON||||168370423&0^16^0^0 <CR>
```

### 3.2.3 MSH Segment

Please refer to section 2.2.3.

Here, message type is QRY^R02.

Example:

```
MSH|^~\&|||||QRY^R02|Q12|P|2.3.1<CR>
```

### 3.2.4 QRD Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	26	TS	R	Yes	Date/Time of Query	Format: YYYYmmDDhhMMs s000
2	1	ID	R	Yes	Query format mode	Must always be <b>R</b> for record-oriented
3	1	ID	R	Yes	Query Priority	Must always be <b>I</b> for immediate
4	10	ST	R	Yes	Query ID:Some unique identifier	Can not be Null. Byte count < 16 Bytes
9	3	PT	R	Yes	What subject filter	Must be <b>RES</b> for results in query and in response

Example:

```
QRD|19970731145557|R|I|Q839572||||RES<CR>
```

Message processing rules:

- The 1st field must be in valid time format. Otherwise, an error message is returned.
- The 2<sup>nd</sup> field must be 'R'. Otherwise, an error message is returned.
- The 3rd field must be 'I'. Otherwise, an error message is returned.
- The 4th field cannot be empty. It should be less than 16 bytes. But this interface does not judge the uniqueness of the ID.
- The 9th field must be 'RES' . Otherwise, an error message is returned.

### 3.2.5 QRF Segment

The QRF segment defines the detailed contents to be queried. There can be 0 (zero) to multiple QRF segments.

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	20	ST	R	Yes	Where subject filter	Must always be <b>MON</b> for monitoring data in queries and in responses.
5	1000	ST, repeatable	O	Yes	Other query subject filter	Query Filter pecifies list with ID of interest. Refer to <b>section 3.2.5.1</b>

Example:

QRF|MON|||3232241478&11^8^0^0<CR>

Message processing mechanism:

- The field QRF-1 must be 'MON'. Otherwise, an error message is returned.
- The field QRF-5 defines query conditions. It cannot be empty. Otherwise, an error message is returned.

### 3.2.5.1 Field QRF-5 (Query Filter)

The Query Filter format is below:

<IP>&<IPSeq>^<SendType>^0^0

The following table resolves all the components of the segment.

Component	Data type	Value range	Description
<IP>	Integer	0 to 4294967295	Because the CMS or PDS Gateway is simultaneously connected to multiple bedside monitors, so uses the IP address to identify the unique bedside monitor or telemetry receiver.  The IP address is the 32-bit integer in the order of network byte. For details, refer to <i>Section 6.5.1.6</i> .
<IPSeq>	Integer	0 to 255	Serial number of the telemetry transmitter minus one. It is used in case when connect to the Central Monitoring System..  Note: This is not TCP port number.
<SendType>	Integer	0 to 5	What kind of data to be sent.  Value with bit mask:  Physiological parameter: bit 1 values

			<p>one.</p> <p>Physiological alarms: bit 2 values one.</p> <p>Technical alarms: bit 3 values one.</p> <p>Alarm settings: bit 4 values one.</p> <p>Device status: bit 5 values one.</p> <p>Example:</p> <p>When query only ‘Alarm settings’, the decimal value is 8, and the binary value is “1000”</p>
--	--	--	--

## NOTE

- The value of <SendType> of each QRF segment shall be same.
- The value of <IPSeq> shall be the serial number of the telemetry transmitter minus one.

### 3.2.6 Example

```

MSH|^~\&|||||QRY^R02|1203|P|2.3.1|<CR>
QRD|20060713103045000|R|I|Q839572||||RES<CR>
QRF|MON||||3232241453&1^1^0^0<CR>
QRF|MON||||3232241453&2^1^0^0<CR> QRF|MON||||3232241478&0^1^0^0<CR>
    
```

Analysis:

Querying three bedside devices data of physiological parameter:

The first one is a telemetry transmitter whose serial number is 2 (value of <IPSeq> is 1); the second one whose serial number is 3 (value of <IPSeq> is 2); both of them are belong to one telemetry receiver whose IP address is “192.168.23.45” (value of <IP> is 3232241453).

The third is a bedside monitor with IP address “192.168.23.70” (value of <IP> is 3232241478).

### 3.3 ACK Message

For Solicited Interface, there are two types of ACK messages.

1. After receives a QRY^R02 message from CIS, this interface return a ACK message to CIS.
2. After receives a ACK message from CIS, this interface will close the TCP connection.

#### 3.3.1 Format

MSH	Message Header
MSA	Message Acknowledgement
{[ERR]}	Warning or Information

#### 3.3.2 Example

1. Send to CIS

```
MSH|^~\&|Mindray|Gateway|||ACK|3|P|2.3.1| <CR>
MSA|AA|Q002 <CR>
```

```
MSH|^~\&|Mindray|Gateway|||ACK|2|P|2.3.1| <CR>
MSA|AE|1|Incorrect Message Syntax. Error code = -13 <CR>
```

2. Receive from CIS

```
MSH|^~\&|CIS|Charting|||ACK|2|P|2.3.1 <CR>
MSA|AR|0|Close <CR>
```

#### 3.3.3 MSH Segment

Please refer to section 2.2.3.

### 3.3.4 MSA Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	2	ID	R	Yes	Acknowledgement Code	<ul style="list-style-type: none"> <li>• AA: Application Accept (positive acknowledgement)</li> <li>• AE: Application Error (negative acknowledgement)</li> <li>• AR: Application Reject (negative acknowledgement)</li> </ul>
2	20	ST	R	Yes	Message Control ID	Contains the message control ID that came with the requesting QRY query message. This allows the client to map a response message to the corresponding request.
3	80	ST	O	Yes	Text Message	<p>In case of errors or rejects, the text message contains a textual description of the reason for this event. Typical texts would be:</p> <ul style="list-style-type: none"> <li>• “Message type not supported”</li> <li>• “Incorrect message syntax”</li> </ul>

If the format of the QRY^R02 message is correct, the field ACK-1 will be value of “AA”. When the bedside device is off-line or unauthorized, the ERR segment will be used to indicate these situation, but the field ACK-1 will still be value of “AA”.

### 3.3.5 ERR Segment

ERR segment is used in two messages: ACK and ORF^R04. When the bedside device is off-line or unauthorized, the ERR segment will be used to indicate these situation.

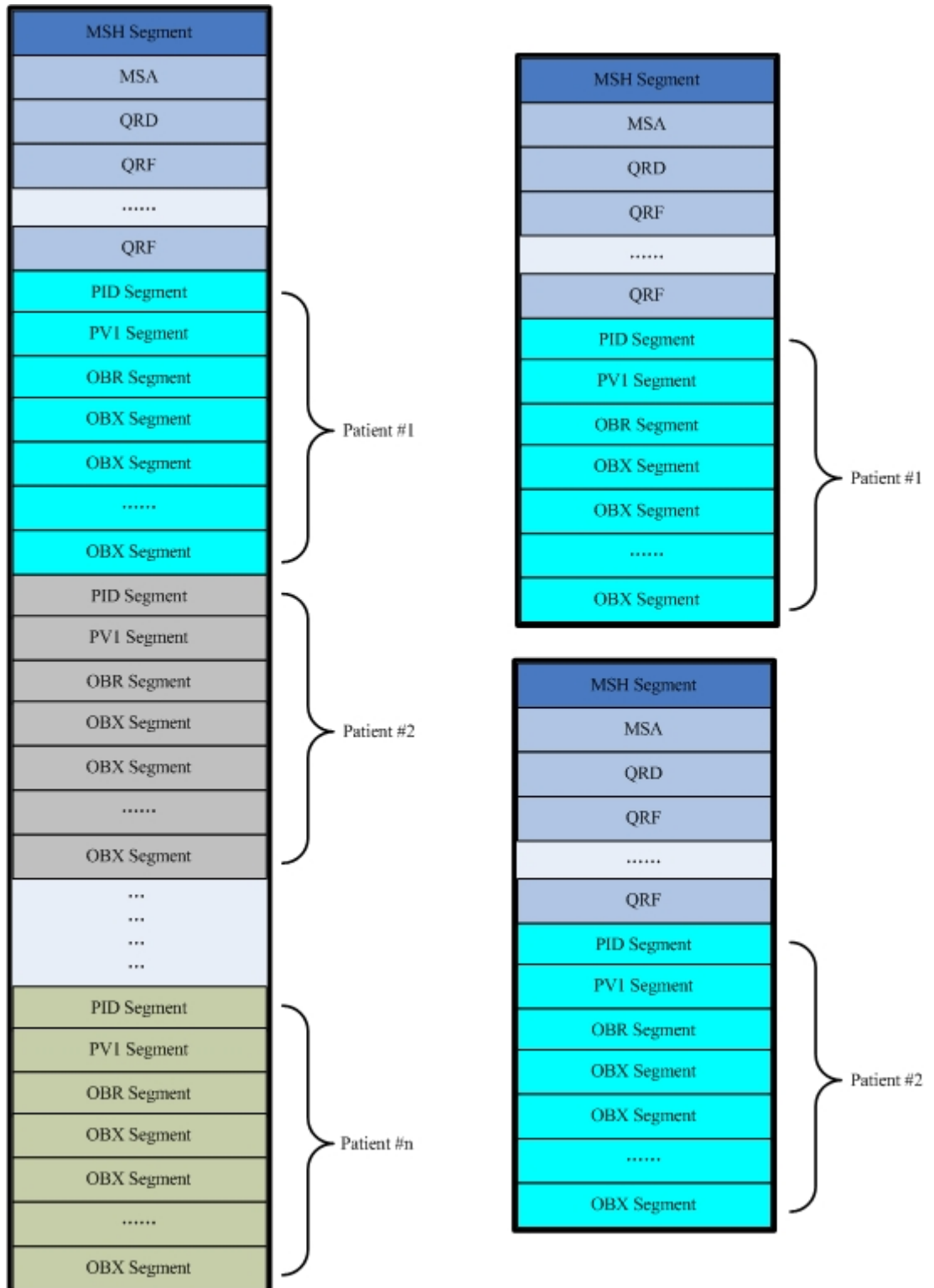
SEQ	LEN	DT	OPT	Used	Field Name	Description
1	493	ELD	B	No	Error Code and Location	
2	18	ERL	O	No	Error Location	
3	705	CWE	R	Yes	HL7 Error Code	0: Message accepted
4	2	ID	R	Yes	Severity	W: Warning I: Information E: Error F: Fatal Error
5	705	CWE	O	Yes	Application Error Code	1: Disconnected 2: NotAuthorized
6	80	ST	O	Yes	Application Error Parameter	<IP>,<IPSeq>  Please refer to section 3.2.5.1 for definition of <IP> and <IPSeq>

Example:

```
MSH|^~\&|Mindray|Gateway|||ACK|18|P|2.3.1|
MSA|AA|10
ERR|||0|W|1^Disconnected|3232241659,0
ERR|||0|I|2^NotAuthorized|3232241657,2
ERR|||0|W|1^Disconnected|3232241656,0
ERR|||0|W|1^Disconnected|3232241655,0
```

### 3.4 ORF^R04 Message

#### 3.4.1 Format





There are two methods to send results data. First is to send out all patient data in one HL7 message. Second is to send out one patient data per one HL7 message. One of them can be selected from the user configuration dialog.

### 3.4.2 Example

1. CIS queries for six bedside devices, but three of them are not returned any results data because they are disconnected or unauthorized.

(At first, Solicited Interface returns an ACK message)

```
MSH|^~\&|Mindray|Gateway|||ACK|7|P|2.3.1|
MSA|AA|4
ERR|||0|W|1^Disconnected|3293316383,0|
ERR|||0|I|2^NotAuthorized|3293316385,0|
ERR|||0|W|1^Disconnected|3293316387,0|
```

(Secondly, Solicited Interface returns a ORF^R04 message if there are some bedside device results data will be returned.)

```
MSH|^~\&|Mindray|Gateway|||ORF^R04|8|P|2.3.1|
MSA|AA|4
ERR|||0|W|1^Disconnected|3293316383,0|
ERR|||0|I|2^NotAuthorized|3293316385,0|
ERR|||0|W|1^Disconnected|3293316387,0|
QRD|20091209162514|R|I|MRQry4|||RES
QRF|MON|||3293316382&0^1^0^0
QRF|MON|||3293316383&0^1^0^0
QRF|MON|||3293316384&0^1^0^0
QRF|MON|||3293316385&0^1^0^0
QRF|MON|||3293316386&0^1^0^0
QRF|MON|||3293316387&0^1^0^0
PID|||M1015_00022||JONES^MARY||19791015|M|||^^^|||
PV1|||I|^ICU&22&3293316382&0&0|||DoctorA|||A|||
|||20091015000000
OBR|||Mindray Monitor||20091209162514|
OBX|NM|52^Height||147.0|||F
OBX|NM|51^Weight||67.0|||F
OBX|CE|2302^BloodType||3^AB|||F
OBX|CE|2303^PACE_Switch||0^OFF|||F
OBX|NM|160^SpO2|2103|98|||F
OBX|NM|101^HR|2101|60|||F
OBX|NM|105^ST I|2101|0.1000|||F
OBX|NM|102^PVCs|2101|8|||F
OBX|NM|220^CO2|2109|52|||F
```

Solicited Results Interface

OBX|NM|221^INS|2109|20|||||F  
OBX|NM|222^AWRR|2109|32|||||F  
OBX|NM|151^RR|2102|20|||||F  
OBX|NM|200^T1|2104|37.70|||||F  
OBX|NM|201^T2|2104|37.20|||||F  
OBX|NM|202^Td|2104|0.5000|||||F  
PID||M1015\_00089|JONES^JAYNE||F||^|  
PV1|I|^ICU&24&3293316384&0&0|||||A|||||  
|||||0000000000  
OBR||Mindray Monitor||20091209162514|  
OBX|NM|52^Height||0.0|||||F  
OBX|NM|51^Weight||0.0|||||F  
OBX|CE|2302^BloodType||1^A|||||F  
OBX|CE|2303^PACE\_Switch||1^On|||||F  
OBX|NM|160^SpO2|2103|98|||||F  
OBX|NM|101^HR|2101|60|||||F  
OBX|NM|105^ST I|2101|0.1000|||||F  
OBX|NM|102^PVCs|2101|8|||||F  
OBX|NM|220^CO2|2109|52|||||F  
OBX|NM|221^INS|2109|20|||||F  
OBX|NM|222^AWRR|2109|32|||||F  
OBX|NM|151^RR|2102|20|||||F  
OBX|NM|200^T1|2104|37.70|||||F  
OBX|NM|201^T2|2104|37.20|||||F  
OBX|NM|202^Td|2104|0.5000|||||F  
PID||M1015\_00181|JONES^WILLIAM||M||^|  
PV1|I|^ICU&26&3293316386&0&0|||||A|||||  
|||||0000000000  
OBR||Mindray Monitor||20091209162514|  
OBX|NM|52^Height||0.0|||||F  
OBX|NM|51^Weight||0.0|||||F  
OBX|CE|2302^BloodType||2^B|||||F  
OBX|CE|2303^PACE\_Switch||1^On|||||F  
OBX|NM|160^SpO2|2103|98|||||F  
OBX|NM|101^HR|2101|60|||||F  
OBX|NM|105^ST I|2101|0.1000|||||F  
OBX|NM|102^PVCs|2101|8|||||F  
OBX|NM|220^CO2|2109|52|||||F  
OBX|NM|221^INS|2109|20|||||F  
OBX|NM|222^AWRR|2109|32|||||F  
OBX|NM|151^RR|2102|20|||||F  
OBX|NM|200^T1|2104|37.70|||||F  
OBX|NM|201^T2|2104|37.20|||||F  
OBX|NM|202^Td|2104|0.5000|||||F

2. The bedside monitor queried is in Standby status.

```
MSH|^~\&|Mindray|Gateway|||ORF^R04|4|P|2.3.1| <CR>
MSA|AA|2 <CR>
QRD|20091207140713|R|I|MRQry2|||RES <CR>
QRF|MON|||168370462&0^16^0^0 <CR>
PID|||M1015_00010||JONES^WILLIAM||20091112|M||^|^|^| <CR>
PV1||I|^ICU&Bed5&168370462&0&0|||A|||
|||20091201111211 <CR>
OBR|||Mindray Monitor||20091203121631| <CR>
OBX||NM|52^Height||169.0|||F <CR>
OBX||NM|51^Weight||59.0|||F <CR>
OBX||CE|2302^BloodType||1^A|||F <CR>
OBX||CE|2303^PACE_Switch||0^Off|||F <CR>
OBX||CE|2305^WorkState||1^Standby|||F <CR>
```

### 3.4.3 Definition of segments

QRD and QRF segments are the same as QRY^R02 message, please refer to section 3.2.

Please refer to section 3.3.4 for MSA segment definition.

Please refer to section 3.3.5 for ERR segment definition.

Please refer to Chapter 2 for other segments definition.

# 4 ADT Net Query Interface

---

## 4.1 Communication Process

### 4.1.1 Network Connection

This interface is the client side to establish a TCP connection and the HIS/CIS system is the server side for listening. The IP address and the port number of the server side can be set on the User Maintain Page of Central Monitoring System.

This interface does not take the initiative to close the connection after TCP connection is set up.

TCP connection stays no matter whether a query is required currently. If TCP connection is interrupted, this interface will re-connect within the fixed time automatically.

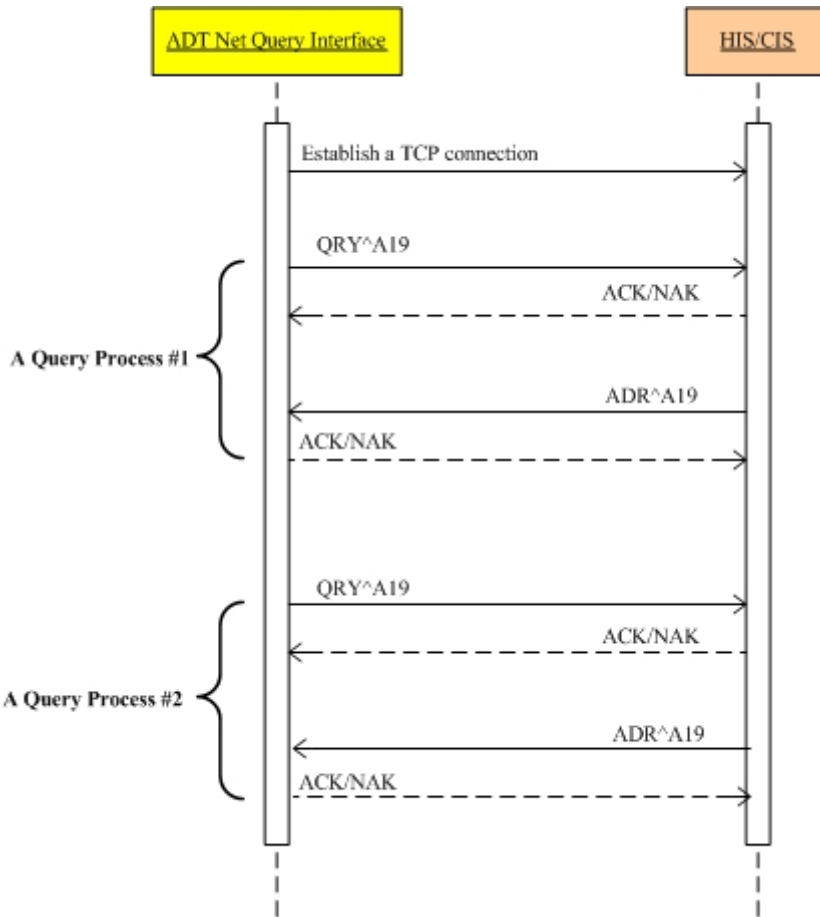
### 4.1.2 Data Communication

The query ADT message sent and the result returned by the HIS/CIS system should be performed in a same TCP connection.

This interface sends a query message in QRY^A19 format. The QRY^A19 message contains a Medical Record Number (MRN) as a unique query condition.

Accurate query is performed by the HIS/CIS system and an ADR^A19 message based on the query condition is returned. If patient information in line with the query condition is found, only one patient record is returned. If no patient information in line with the query condition is found, the returned message does not contain any patient information. If the HIS/CIS system does not return any message within the limited time, the interface treatments it as query timeout.

After receives a HL7 message, this interface will return an ACK message to indicate whether the format is correct or not. This interface will not do anything when receives an ACK message.



## 4.2 QRY^A19 Message

### 4.2.1 Format

MSH	Message Header
QRD	Query definition (from QRY message)

### 4.2.2 Example

```

MSH|^~\&|Mindray|Gateway|||QRY^A19|2|P|2.3.1|
QRD|20090925134901000|D|D|1||1^RD|M2129|^DEM|^MindrayGateway|
<CR>
    
```

### 4.2.3 MSH Segment

Please refer to the section 2.2.3. Here the message type is “QRY^A19”.

### 4.2.4 QRD Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	26	TS	R	Yes	Date/Time of Query	Format: YYYYmmDDhhMMs s000
2	1	ID	R	Yes	Query format mode	Must always be <b>D</b> for display format
3	1	ID	R	Yes	Query Priority	Must always be <b>D</b> for Deferred
4	10	ST	R	Yes	Query ID:Some unique identifier	Can not be Null. Byte count < 16 Bytes
7	10	CQ	R	Yes	Quantity Limited Request	Must be 1^RD
8	60	XCN	R	Yes	Who Subject Filter	<b>Patient PID/MRN</b>
9	3	PT	R	Yes	What subject filter	Must be <b>DEM</b> for Demographics in query and in response
10			R		What Department Data Code	'MindrayGateway'

## 4.3 ADR^A19 Message

### 4.3.1 Format (Patient queried is found)

MSH	Message Header
MSA	Message
Acknowledgment	
QRD	Query definition
[	
PID	Patient
Identification	
PV1	Patient Visit
[ OBR ]	
{	
OBX	
}	
]	

### 4.3.2 Format (Patient queried is not found)

MSH	Message Header
MSA	Message
Acknowledgment	
QRD	Query definition

### 4.3.3 Example

```
MSH|^~\&|Mindray|ADTServer|||ADR^A19|2|P|2.3.1| <CR>
MSA|AA|2|The Patient is Found <CR>
QRD|20090925134901000|D|D|1||1^RD|M2129|^DEM|^MindrayGateway|
<CR>
PID|||M2129||Jones^Eunice||19780924|F|||1634 J
St^^^^95616||(530) 555-4325| <CR>
PV1||I|^ICU&Bed23&&0|||Frank|||N|||
|||||20090924000000 <CR>
OBR|||20091203121631| <CR>
```

```
OBX|NM|52^Height||169.0|||||F <CR>
OBX|NM|51^Weight||59.0|||||F <CR>
OBX|CE|2302^BloodType||3^|||||F <CR>
OBX|CE|2303^PACE_Switch||1^|||||F <CR>

MSH|^~\&|Mindray|ADTServer||||ADR^A19|3|P|2.3.1|
MSA|AA|2|The Patient is not found!
QRD|20091016161233000|D|D|1|||1^RD|QQQQ|^DEM|^MindrayGateway|
```

#### 4.3.4 MSH Segment

Please refer to the section 2.2.3. Here the message type is “ADR^A19”.



### 4.3.5 MSA Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	2	ID	R	Yes	Acknowledgement Code	<ul style="list-style-type: none"> <li>• AA: Application Accept (positive acknowledgement)</li> <li>• AE: Application Error (negative acknowledgement)</li> <li>• AR: Application Reject (negative acknowledgement)</li> </ul> <p>If the QRY^A19 message is in correct format, this field is "AA", otherwise is "AE".</p>
2	20	ST	R	Yes	Message Control ID	<p>Contains the message control ID that came with the requesting QRY query message. This allows the client to map a response message to the corresponding request.</p>
3	80	ST	O	Yes	Text Message	<p>In case of the queried patient is found, typical texts would be "The patient is found!". If the queried patient is not found, the typical text would be "The patient is not found".</p> <p>In case of errors or rejects, the text message contains a textual description of the reason for this event. Typical texts would be:</p> <ul style="list-style-type: none"> <li>• "Message type not supported"</li> <li>• "Incorrect message syntax"</li> </ul>

### 4.3.6 QRD Segment

The format and content is the same as in QRY^A19 message received.

### 4.3.7 PID Segment

Please refer to section 2.2.4.

### 4.3.8 PV1 Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	1	IS	R	Yes	Patient Class	<b>'I' for Inpatient.</b> <b>'O' for Outpatient.</b>
3	60	PL	O	Yes	Assigned Patient Location	Only the third component (bed) is used. The firsttwo components are empty.. Format: <point of care>^<room>^<bed>. The <bed> component divides into the following subcomponents: <Office/Department>&<bed number>&0&0&0
7	30	XCN	O	Yes	Attending Doctor	
18	2	IS	O	Yes	Patient Type	"N": Neonate "A": Adult "P": Pediatric "U": Unknown
44	24	DTM	O	Yes	Admit Date/Time	Format: YYYYMMDDHHmmss

### 4.3.9 OBR Segment

This interface will not handle this segment as it is optional.

### 4.3.10 OBX Segment

Some patient demographics are carried in PID segment and PV1 segment. The others are carried through OBX segment, including patient height, patient weight, blood type and pace switch. Please refer to section 2.2.7.1.

## 4.4 ACK Message

### 4.4.1 Format

MSH	Message Header
MSA	Message Acknowledgement

### 4.4.2 Example

```
MSH|^~\&|Mindray|Gateway|||ACK|3|P|2.3.1| <CR>  
MSA|AA|2 <CR>
```

### 4.4.3 MSH Segment

Please refer to section 2.2.3. Here the message type is “ACK”.

### 4.4.4 MSA Segment

Please refer to section 4.3.5

# 5 ADT DB Interface

---

## 5.1 Communication Process

### 5.1.1 Network Connection

This interface is the client side to establish a TCP connection and the HIS/CIS system is the server side for listening.

This interface does not take the initiative to turn off the connection after TCP connection is set up. If the TCP connection is interrupted or turned off, this interface will re-connect TCP within the fixed time automatically.

All the ADT messages from both sides are transmitted within the same TCP connection.

The following two sections detail the data communication processes in the two transmission directions.

### 5.1.2 Data Communication (Input direction)

HIS/CIS system unsolicitedly sends ADT messages related with all patient information to the this interface.

This interface maintains a local database to save all the received patient information. The patient database saves only limited information. When the database is full, they are treated as per the FIFO (first in first out) method.

Through the User Maintain Page of the CMS, a patient can be identified uniquely in the patient database, such as identified by MRN or by name.

After receiving the patient information which the HIS/CIS system unsolicitedly sends, this interface will take the following three types of actions:

- Add-type

- If the interface does not find the corresponding patient in the database according to the MRN or name, the patient information received will be added into the database. If the patient already exists in the database, his information will be updated.

- ◆ A01 Admit
  - ◆ A04 Register
  - ◆ A05 Pre-Admit
  - ◆ A13 Cancel Discharge/End Visit
  - ◆ A14 Pending Admit
  - ◆ A25 Cancel Pending Discharge
  - ◆ A28 Add Person or Patient Information

- Update-type

If the interface finds the corresponding patient in the database according to the MRN or name, the information of that patient will be updated. If not, the patient information will be added into the database.

  - ◆ A02 Transfer
  - ◆ A06 Change an Outpatient to an Inpatient
  - ◆ A07 Change an Inpatient to an Outpatient
  - ◆ A08 Update Patient Information
  - ◆ A12 Cancel Transfer
  - ◆ A15 Pending Transfer
  - ◆ A26 Cancel Pending Transfer
  - ◆ A31 Update Person Information
- Delete-type

If the interface finds the corresponding patient in the database, the patient information is deleted. If not, no treatment is made.

  - ◆ A03 Discharge/End Visit
  - ◆ A11 Cancel Admit/Visit Notification
  - ◆ A16 Pending Discharge
  - ◆ A27 Cancel Pending Admit
  - ◆ A38 Cancel Pre-Admit

In addition, there are three special messages. The processing methods and formats of these three messages are different from the above patient information. They are:

- ◆ A17 Swap Patients

This message contains the information about the two patients who beds are swapped. The CMS will update the information of the two patients simultaneously. If the two patients is not found in the local database, their information received will be added into the database.
- ◆ A40 Merge patient - patient identifier list

This message contains old PID to be merged and new merged PID. The CMS will delete the patient with old PID from the local database and update the patient information corresponding to the new PID. If the patient of the new merged PID is not found, add one record.
- ◆ A47 Change patient identifier list

This message contains old PID to be modified and new PID. If the CMS finds the patient to which the old PID corresponds in the local database and there is no record to which the new PID corresponds, it will change the PID of the patient to which the old PID corresponds into the new PID. Other patient information is not changed. The CMS does not make any processing in other cases.

If the patient demographics like PID, Bed number, or department can be changed at the same time, it is recommended to send ADT^A02 and ADT^A08 messages in sequence. Please do not use one ADT message to convey different changed information.

The interaction between this interface and the HIS/CIS system is shown as below:

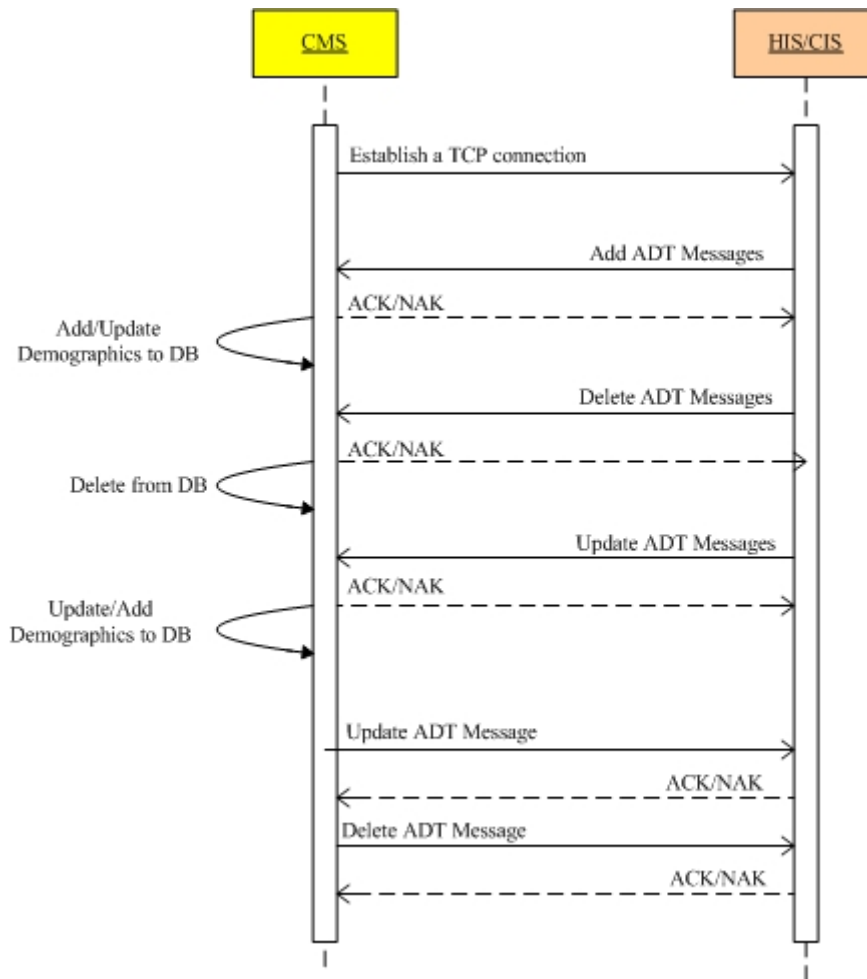


Figure Unsolicited ADT Interface communications

### 5.1.3 ACK

After receives a HL7 message, this interface will return an ACK/NACK message to indicate whether the format is correct or not.

Also, the other side can send an ACK/NACK message when receive HL7 message from this interface; but this interface will not do anything when receives an ACK message.

## 5.2 ADT Message

This section involves the following types of ADT messages whose formats are the same:

■ Add-type

- A01 Admit
- A04 Register
- A05 Pre-Admit
- A13 Cancel Discharge/End Visit
- A14 Pending Admit
- A25 Cancel Pending Discharge
- A28 Add Person or Patient Information
- 

■ Update-type

- A02 Transfer
- A06 Change an Outpatient to an Inpatient
- A07 Change an Inpatient to an Outpatient
- A08 Update Patient Information
- A12 Cancel Transfer
- A15 Pending Transfer
- A26 Cancel Pending Transfer
- A31 Update Person Information
- 

■ Delete-type

- A03 Discharge/End Visit
- A11 Cancel Admit/Visit Notification
- A16 Pending Discharge
- A27 Cancel Pending Admit
- A38 Cancel Pre-Admit

Note:

1. For A02, A15 or other relevant transfer messages, the fields included when this message is sent should be the fields pertinent to communicate this event. When other important fields change, it is recommended that the A08 (update patient information) event be used in addition. If the transfer function of your Patient Administration system allows demographics to change at the same time as the transfer (for example an address change), we recommend (but do not require) sending two messages (an A02 followed by an A08).

2. The formats of the following three messages are different from those of the above messages.

A17 Swap Patients: refer to section 5.3.

A47 Change Patient ID: refer to section 5.4.

- A40 Merge patient - patient identifier list: refer to section 5.5.

### 5.2.1 Format

MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
{	
OBX	Observation/Result
}	

### 5.2.2 Example

```
MSH|^~\&|Mindray|ADTServerDemo|||ADT^A01|1|P|2.3.1| <CR>
EVN|A01| <CR>
PID||M0925_00009||family name^first
name||20090925|F||address^^^^post code||telephone| <CR>
PV1||I|^department&6&&0||doctor|||||||||N| |||||
|||||20090925000000 <CR>
OBX|NM|52^Height||169.0|||||F <CR>
OBX|NM|51^Weight||59.0|||||F <CR>
OBX|CE|2302^BloodType||3^|||||F <CR>
OBX|CE|2303^PACE_Switch||1^|||||F <CR>
```

### 5.2.3 MSH Segment

Please refer to section 2.2.3. Here the message type is “ADT^A01”.

### 5.2.4 EVN Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	26	TS	R	Yes	Event Type Code	A01 , A02 ...

### 5.2.5 PID Segment

Please refer to section 2.2.4.

### 5.2.6 PV1 Segment



SEQ	LEN	DT	OPT	Used	Field Name	Description
2	1	IS	R	Yes	Patient Class	<b>'I' for Inpatient.</b> <b>'O' for Outpatient. (i.e. ADT^A07)</b>
3	60	PL	O	Yes	Assigned Patient Location	Only the third component (bed) is used. The first two components are empty.. Format: <point of care>^<room>^<bed>. The <bed> component divides into the following subcomponents: <Office/Department>&<bed number>&0&0&0
6	60	PL	O	Yes	Prior Patient Location	The same as PV1-3 field. Used in the transfer type ADT messages (A02, A15...), represent the old patient location.
7	30	XCN	O	Yes	Attending Doctor	
18	2	IS	O	Yes	Patient Type	"N": Neonate "A": Adult "P": Pediatric "U": Unknown
44	24	DTM	O	Yes	Admit Date/Time	Format: YYYYMMDDHHmmss

## 5.2.7 OBR Segment

### Incoming direction

For this direction, this segment is optional, so this segment is ignored.

### Outgoing direction

Please refer to section 2.2.6.

## 5.2.8 OBX Segment

Some patient demographics are carried in PID segment and PV1 segment. The others are carried through OBX segment, including patient height, patient weight, blood type and pace switch. Please refer to section 2.2.7.1.

## 5.3 ADT^A17 Message (Swap Patients)

### 5.3.1 Format

MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
{	
OBX	Observation/Result
}	
PID	Patient Identification
PV1	Patient Visit
{	
OBX	Observation/Result
}	

Two groups of PID PV1 OBX segments are used to describe the information of the two patients whose beds are swapped. The location or bed information (department and bed number) the message contains is the content after swap.

### 5.3.2 Example

```
MSH|^~\&|Mindray|ADTServerDemo|||ADT^A17|21|P|2.3.1| <CR>
EVN|A17| <CR>
PID||M0925_00009||family name^first
name||20090925|F||address^^^^post code||telephone| <CR>
PV1||I|^ICU&6&&&0|^SICU&8&&&0|doctor|||||||N|||||||
|||||||2009092500000 <CR>
OBX|NM|52^Height||169.0|||||F <CR>
OBX|NM|51^Weight||59.0|||||F <CR>
OBX|CE|2302^BloodType||3^|||||F <CR>
OBX|CE|2303^PACE_Switch||1^|||||F <CR>
PID||M9999||John^||20090924|F||address^^^^post
code||telephone| <CR>
PV1||I|^SICU &8&&&0|^ICU&6&&&0|doctor|||||||N||
|||||||2009092400000 <CR>
OBX|NM|52^Height||169.0|||||F <CR>
OBX|NM|51^Weight||59.0|||||F <CR>
OBX|CE|2302^BloodType||3^|||||F <CR>
OBX|CE|2303^PACE_Switch||1^|||||F <CR>
```

### 5.3.3 Segments

The same as other ADT messages, please refer to section 5.2.

## 5.4 ADT^A47 Message (Change Patient ID)

### 5.4.1 Format

MSH	Message Header
EVN	Event Type
PID	Patient Identification
MRG	Prior Patient Identifier List

The patient ID inside the PID segment is new patient ID.

MRG-1 Field inside the MRG segment is prior patient ID before modification.

Except that the MRG segment is newly added segment, other segments are same as before.

### 5.4.2 Example

```
MSH|^~\&|Mindray|ADTServerDemo|||ADT^A47|23|P|2.3.1| <CR>
EVN|A47| <CR>
PID|||M05_0ff9||family name9^first
name9||20090925|F||address9^^^^post code9||telephone9| <CR>
MRG|M20090925_00009| <CR>
```

### 5.4.3 MRG Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	64	ST	R	Yes	Prior Patient Identifier List	

## 5.5 ADT^A40 Message (Merge Patient ID)

### 5.5.1 Format

MSH	Message Header
EVN	Event Type
PID	Merge Target Patient Identification
MRG	Prior Patient Identifier List
PV1	Merge Target Patient Location
{	
OBX	Merge Target Patient Information
}	

The patient ID inside the PID segment is the MRN of the merged target patient.

The information inside the PV1 and OBX segments are information about the merged target patient.

The Field MRG-1 inside the MRG segment is the original patient ID.

### 5.5.2 Example

```
MSH|^~\&|Mindray|ADTServerDemo|||ADT^A40|25|P|2.3.1| <CR>
EVN|A40| <CR>
PID||M2999999||uucfcc^|20090924|F||address^^^^post
code||telephone| <CR>
MRG|M20090925_0V9| <CR>
PV1||I|^department66&66&&0|||doctor|||N|||
|||2009092400000 <CR>
OBX|NM|52^Height||169.0|||F <CR>
OBX|NM|51^Weight||59.0|||F <CR>
OBX|CE|2302^BloodType||3^|||F <CR>
OBX|CE|2303^PACE_Switch||1^|||F <CR>
```

# 6 Realtime Results Interface

---

## 6.1 Data Content

This interface is combined with several TCP and UDP connections.  
The table summarizes these connections.

<b>Data</b>	<b>Time</b>	<b>Port</b>	<b>TCP/UDP</b>	<b>Direction</b>	<b>Chapter</b>
Patient monitor online broadcast messages containing patient name, patient ID, department, bed No., monitor name and etc.	Periodic: 1s	4600 (If network type is DHCP, and compatibility switch is closed, the port is 4620)	UDP	Export	<i>Section 6.3.1</i> <i>6.5</i>
CMS and PDS Gateway online broadcast messages containing CMS name or the name of PDS Gateway	Periodic: 1s	4679 (Need open send switch)	UDP	Export	<i>Section 6.3.2</i> <i>6.5</i>
Bed list information only for CMS or PDS gateway	when the server side receives QRY message	4678	TCP	Export	<i>Section 6.6</i> <i>6.5.2</i>
TCP echo message	Periodic: 1s	4601& 4678	TCP	Import & export	<i>Section 6.7</i>
Patient information	1. After the TCP connection is established and the QRY message is received. 2. After patient information is changed.	4601	TCP	Export	<i>Section 6.8</i>
Query message	Queried any time	4601 & 4678	TCP	Import	<i>Section</i>

Realtime Results Interface

(QRY)					<b>6.9</b>
Parameters	Periodic: 1s; Aperiodic: after measurement.	4601	TCP	Export	<b>Section 6.10.1 &amp; 6.10.2</b>
Physiological alarms	Periodic: 1s	4601	TCP	Export	<b>Section 6.10.3</b>
Technical alarms	Periodic: 1s	4601	TCP	Export	<b>Section 6.10.4</b>
Alarm limits	1. After the TCP connection is established and the QRY message is received. 2. After the alarm limits are changed.	4601	TCP	Export	<b>Section 6.10.6</b>
Alarm level	1. After the TCP connection is established and the QRY message is received. 2. After the alarm level is changed.	4601	TCP	Export	<b>Section 6.10.7</b>
Module loading information containing: 1. Module name & ID; 2. Names & IDs of all parameters of the module.	1. After the TCP connection is established and the QRY message is received. 2. The module is reloaded.	4601	TCP	Export	<b>Section 6.10.5</b>
Module unloading information	When the module is unplugged or switched off.	4601	TCP	Export	<b>Section 6.10.8</b>
Parameter loading & unloading	Example: When the ECG module is switched from 12 lead to 5 lead, it is necessary to unload some	4601	TCP	Export	<b>Section 6.10.9</b>

	parameters and then load new parameters. Or similar cases.				
--	---	--	--	--	--

## 6.2 Difference between Unsolicited Results Interface and Solicited Results Interface

1. Send only one patient's data within one TCP Connection. The patient demographics is not included in each HL7 message (that is to say, PID and PV1 segments are not present in each HL7 message), it is sent only after the connection is established or changed.
2. Different contents are sent in separate HL7 messages. For example, physiological alarms are sent in one ORU^R01 message, while technical alarms are sent in another ORU^R01 message. Periodic parameters of ECG module are sent in one ORU^R01 message, while periodic parameters of SPO2 module are sent in another ORU^R01 message.

## 6.3 Communication process

### 6.3.1 Broadcast Messages

The bedside monitor, CMS or PDS Gateway broadcast online notification messages every second, telling its existence to other hosts on the network. Then, the other hosts on the network can make connection dynamically based on the broadcast messages.

All device can use the broadcast message. And if the device support multicast, you can use multicast message too. They send same messages.

The following table lists various broadcast ports and broadcast data.

Product	Broadcast port	Broadcast data
Patient monitor	4600	Patient basic information
CMS	4679	CMS name
PDS Gateway	4679	Name of the PDS Gateway

### 6.3.2 Acquire Bed List

In case it is necessary to acquire the data from the bedside monitor through the CMS or PDS Gateway, the IP address of the corresponding bedside monitor, or the IP address of telemetry receiver with serial number of telemetry transmitter must be obtained first.

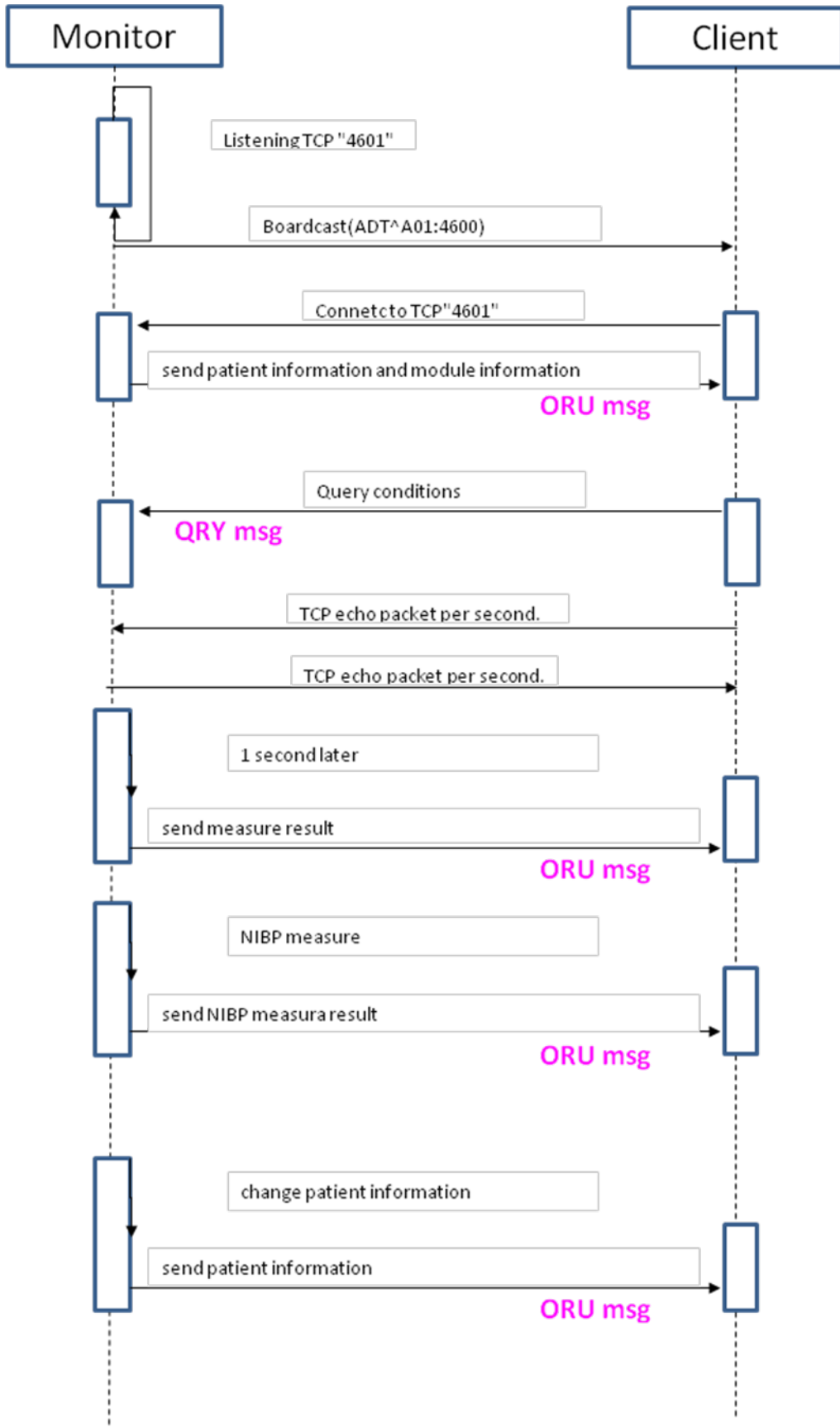
The bed list can be queried through CMS or PDS gateway on the port 4678. The bed list message contains the basic information of each bed, including the IP address and etc.

If the IP address of bedside device is fixed and available for CIS, there is no necessary to acquire bed list.

### **6.3.3 Acquire unsolicited realtime data from bedside device**

1. After the connection is established from CIS, this interface 4601 will sent the patient demographics and all module settings (including parameter list, parameter alarm settings).
2. Physiological alarms and technical alarms are sent every one second.
3. Only when receives a QRY message from CIS, indicating which parameters to be sent, this interface will send what CIS needs every one second. Only 1 second is valid.
4. CIS can send a new QRY message to this interface dynamically to refresh the parameters to be sent. If no condition is send, all parameters will be sent.
5. When the measurement of a periodic parameters is finished, the results data will be sent immediately in ORU message.
6. An ORU^R01 message is sent to the client when changes occur to the patient information.
7. An ORU^R01 message is sent to the client when changes occur to the parameter alarm settings like alarm limits or alarm level.
8. A TCP echo message needs to be sent between the communication parties. If the sever does not receive TCP echo message from the client within 10 seconds, it considers that network fault occurs and then takes the initiative to interrupt network connection.
9. If other message is sent, the device will disconnect the connection.





## NOTE

---

- **If the query message from CIS is in wrong format, this interface will not return an ACK/NACK message.**
- 

### 6.3.4 Acquire unsolicited realtime data from Central

#### Monitoring System or PDS Gateway

After connected to this interface via the TCP port 4601, the client side must send a query message to this interface at first, telling what data to be sent. Otherwise, this interface does not send any data.

The query message sent to the CMS or PDS Gateway must contain the IP address of the corresponding bedside monitor, or IP address of the telemetry receiver with the serial number of the telemetry transmitter. Otherwise, the CMS or PDS gateway does not know which bedside monitor or transmitter is required by the client.

If the query message sent by the client is correct in both contents and format, the server then sends data periodically based on the query contents.

## NOTE

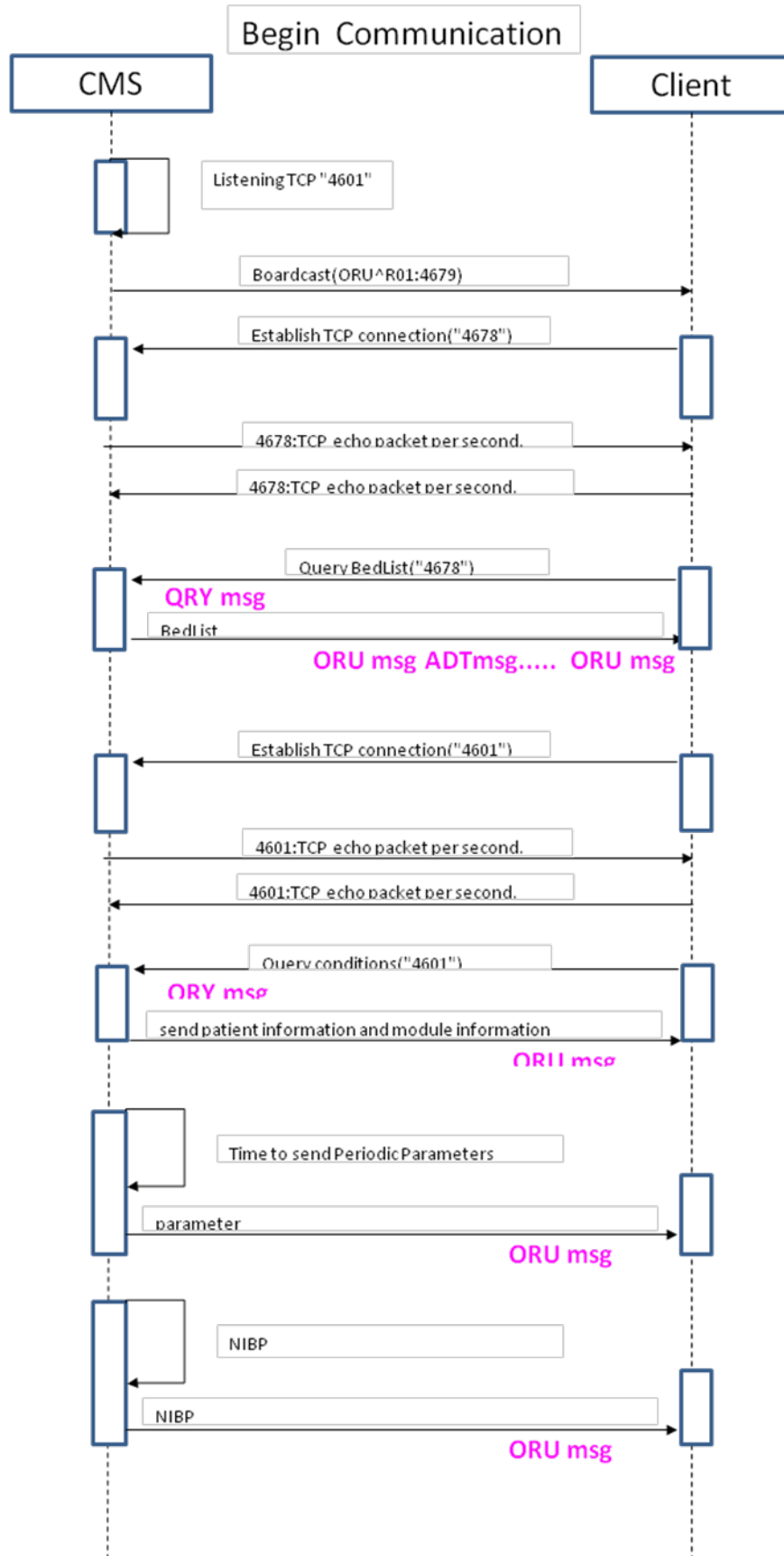
---

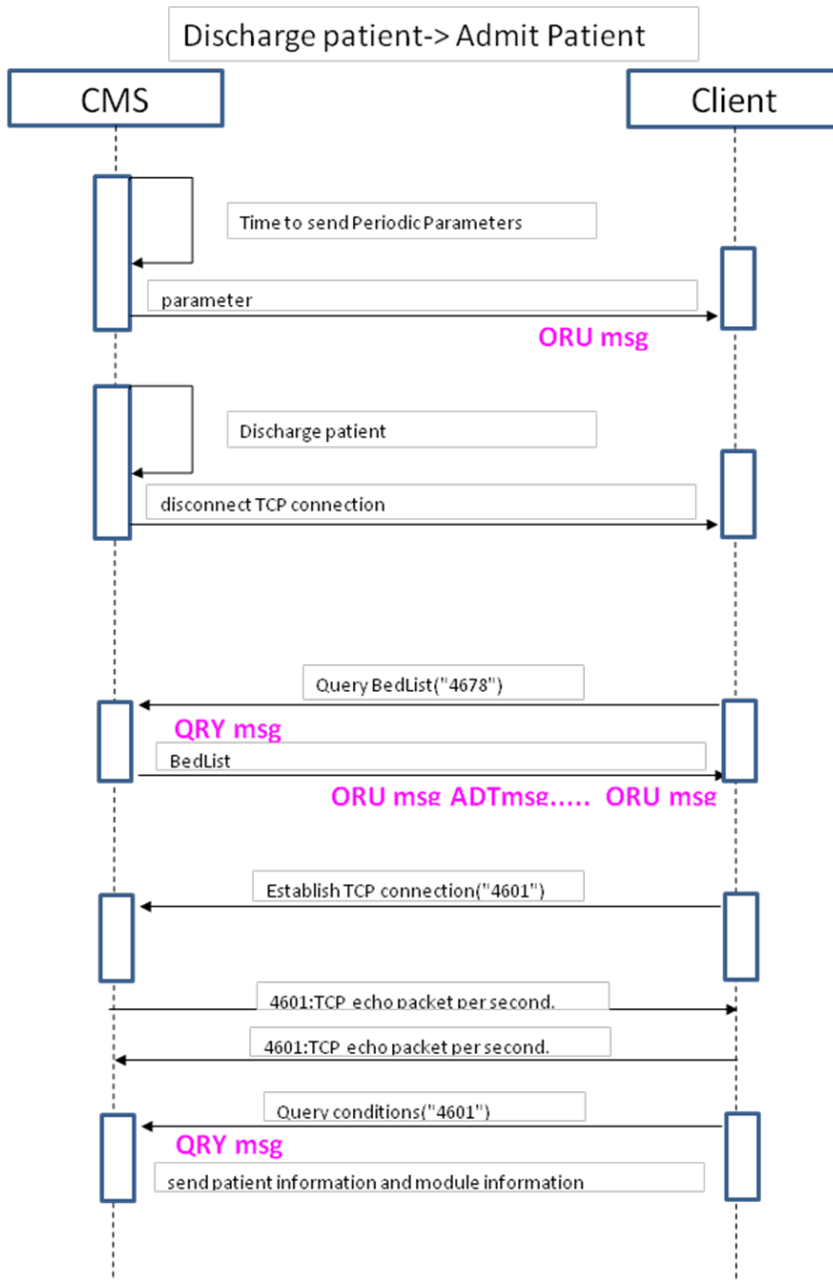
- **If the query message from CIS is in wrong format, this interface will not return an ACK/NACK message.**
- 

Figure below describes the whole network handshake process.

1. After TCP connections are established between the communication parties, the client side must send a query message (QRY) to this interface, telling what data (parameters, alarms, etc) are expected. This interface then sends the required data to the client based on the query condition. If the client side re-sends new query conditions, the server will refresh the old query condition.
2. If the query message is in correct format, this interface returns the patient basic information (name, gender, birth date etc) and some initialized configuration information (such as parameter ID, alarm limits, alarm level). If the query message is not in correct format, no error message (ACK/NACK) would be sent.
3. If the client side resent a new query message of a different bedside monitor, this interface will change to send the new bedside monitor's data.
4. Physiological alarms and technical alarms are sent every one second.
5. The server sends real-time parameter data and alarm information periodically based on the query condition. The aperiodic parameters are sent when the measurement is completed. All the data above are sent by the ORU message.
6. An ORU^R01 message is sent to the client when changes occur to the patient information.

7. The server immediately sends an ORU message to the client when changes occur to the alarm limits or alarm level of the parameter.
8. A TCP echo packet needs to be sent between the communication parties. If the sever does not receive TCP echo packet from the client within 10 seconds, it considers that network fault occurs and then takes the initiative to interrupt network connection.





### 6.3.5 Disconnect

This interface takes the initiative to disconnect the network under the following circumstances:

1. This interface does not receive a TCP echo packet from the client side within 10 seconds in case of TCP connections (port 4601 and 4678).
2. This interface encounters socket abnormal.
3. The client side takes the initiative to interrupt network connection.
4. For the CMS or PDS Gateway, the connected bedside monitor discharges a patient.
5. For the CMS or PDS Gateway, the connected bedside monitor is disconnected from the network.

In case of 4 and 5, the CMS or PDS Gateway does not take the initiative to send a new bed list. Therefore, the client side is recommended to query the bed list periodically.

## 6.4 HL7 Message Type

### 6.4.1 Definition

One type of HL7 message contains only the specific data contents. For example, parameters and alarm are sent by two different types of HL7 message separately.

#### 6.4.1.1 Definition of MSH Segment

The MSH segment is the 1<sup>st</sup> segment of HL7 message. It defines the message type. The following table defines the syntax of MSH segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	1	ST	R	Yes	Field Separator	Always ' '
2	4	ST	R	Yes	Encoding Characters	Always '^~\&'
9	7	CM	R	Yes	Message Type	See 6.4.1.2
10	20	ST	R	Yes	Message Control ID	See 6.4.1.3
11	3	PT	R	Yes	Processing ID	Always 'P'
12	60	VID	R	Yes	Version ID	Always '2.3.1'
18	16	ID	O	Yes	Character Set	Ignore default ISO8859_1.

The message type is jointly defined by 'Message Type' and 'Message Control ID' fields.

#### 6.4.1.2 Message Type

The value of Message Type is defined by the HL7 protocol already.

The following table lists the message types used in Mindray PDS protocol.

Message	Description	Chapter	HL7 v2.3.1 Chapter
ADT	Patient Administration	<i>Chapter 6.5</i>	Chapter 3
QRY	Query	<i>Chapter 6.9</i>	Chapter 2
ORU	Unsolicited transmission of an observation message	<i>Chapter 6.10</i>	Chapter 11

#### 6.4.1.3 Message Control ID

Every message has its unique Message Control ID. This ID is Arabic numerals defined by Mindray PDS protocol. For details, refer to the definition of each message.

## 6.4.2 Coding System

### 6.4.2.1 OBX Segment

The OBX segment is used for sending parameters, alarm, alarm limits, alarm level and other configuration information.

The following table defines the syntax of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name
2	2	ID	R	No	Value Type
3	80	CE	R	Yes	Observation Identifier
4	20	ST	O	Yes	Observation Sub-ID
5	65K		R	Yes	Observation Results
6	60	CE	O	Yes	Units
7	60	ST	O	Yes	Reference Range
11	1	ID	R	Yes	Observation Results Status
13	20	ST	O	Yes	User Defined Access Checks
14	26	TS	O	Yes	Date/Time of the Observation

In the table, the 3<sup>rd</sup> field ‘Observation Identifier’ identifies the unique OBX segment in the <ID>^<Text> format, where <Text> is a description of <ID>.

For example, if the 3<sup>rd</sup> field is ‘101^HR’, it means that the OBX segment describes the HR value and that the ID of OBX is ‘101’.

### 6.4.2.2 Mindray HL7 Code

Mindray HL7 Code (MHC) specifically describes the 3<sup>rd</sup> field of OBX segment. For details, refer to *Appendix B*.

## 6.5 Broadcast Message

### 6.5.1 Online Notification Message of the Patient Monitor

#### (ADT^A01)

##### 6.5.1.1 Message Content

The message contains:

- Department name
- Bed No.
- Patient ID and Patient Name.
- IP address and port number of the bedside monitor or telemetry receiver.

- Flag for whether a patient is admitted
- Monitor name
- Monitor Standby status
- Serial number of the telemetry transmitter (only used for CMS or PDS Gateway)

### 6.5.1.2 Message Format

The message format is shown below:

MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
OBX	Monitor Name
OBX	Standby Status
OBX	Telemetry transmitter serial No.
OBX	Physical Technical Alarm Flag
OBX	Device IP Sequence
OBX	Remain Count
OBX	Bed No
OBX	Monitor Device Id
OBX	Monitor Machine Type
OBX	Monitor Machint Version
OBX	Highest Alarm Confirmed
OBX	ViewBed Device Id
OBX	ViewBed Device Id Length
.....	

Example:

```

MSH|^~\&||| |ADT^A01|101|P|2.3.1|
EVN||00000000|
PID|||d3050dc2-3c53-650c-5c965ac302b2e85e| |Li^Ming|
PV1| |I|^ICU&33&3293316523&4601&1| | | | |U|
OBX| |ST|2304^MonitorName| |ICUMON1| | | | |F|
OBX| |CE|2305^| |0^| | | | |F|
OBX| |CE|4526^| |1^| | | | |F|
OBX| |CE|2307^| |0^| | | | |F|
OBX| |NM|2211^| |0^| | | | |F|
OBX| |NM|4524^| |2| | | | |F|
OBX| |ST|2308^BedNoStr| |OR01| | | | |F|
OBX| |ST|4527^| |0000000000000000000000000000| | | | |F|
OBX| |CE|4528^| |16^| | | | |F|
OBX| |ST|4529^| |005084000008| | | | |F|
OBX| |CE|4530^| |1^| | | | |F|
OBX| |ST|2319^| |00100001502000600806100000000000000000000000000000000|
0000| | | | |F|

```



OBX || CE | 2320^ | | 7^ | | | | | F

### 6.5.1.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ADT^A01
- Message Control ID: 101

Example:

MSH | ^~\& | | | | | | | ADT^A01 | 101 | P | 2.3.1 | <CR>

### 6.5.1.4 EVN Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	26	TS	R	Yes	Recorded Date/Time	Date when the patient is admitted as accurate as to day. It is 0 (zero) by default.

Example:

EVN | | 20060906 | <CR>

### 6.5.1.5 PID Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
3	20	CX	R	Yes	Patient Identifier List	Patient GUID
5	48	XPN	R	Yes	Patient Name	<First Name>^<Last Name>

Example:

PID | | | d3050dc2-3c53-650c-5c965ac302b2e85e | | Li^Ming | <CR>

### 6.5.1.6 PV1 Segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	1	IS	R	Yes	Patient Class	Always 'I' (for Inpatient).
3	80	PL	O	Yes	Assigned Patient Location	Only the third component (bed) is used. The first two components are empty. Format: <point of care>^<room>^<bed>. The <bed> component divides into the following subcomponents: <Office Name>&<bed id>&<TCP Addr>&<TCP Connect Port>&<Patient IID>&<Patient Admitted Flag>. The <Patient IID> could possibly be empty. The < Patient Admitted Flag > is either '1' or '0'. '1' means admitted, and '0' means NOT admitted.
18	2	IS	O	Yes	Patient Type	"N": Neonate "A": Adult "P": Pediatric "U": Unknown

Example:

```
PV1 | | I | ^^CCU&12&3232241478&4601&&1 | | | | | | | | | | | | | | | | | | | | U |
```

Description:

The department name is "CCU". The bed No. is "12". TCP port number, is "4601". Patient IID is empty. Flag for admitting patient is "1" (indicating that a patient is already admitted).

The IP address is the 32-bit number in the order of network byte. The IP address to which "3232241478" corresponds is "192.168.23.70". "3232241478" is "1100000 10101000 00010111 01000110" in the binary format. From left to right, the 1st eight-bit "11000000" corresponds to "192" in the decimal format, the 2<sup>nd</sup> eight-bit "10101000" corresponds to "168" in the decimal format, the 3<sup>rd</sup> eight-bit "00010111" corresponds to "23" in the decimal format, and the 4<sup>th</sup> eight-bit "01000110" corresponds to "70" in the decimal format.

### 6.5.1.7 OBX Segment

Refer to *Appendix B.4*.

## 6.5.2 Online Broadcast Message of the CMS and PDS

### Gateway(ORU^R01)

#### 6.5.2.1 Message Content

Name of the CMS or PDS Gateway.

### 6.5.2.2 Message Format

The message format is shown below:

MSH	Message Header
OBX	CMS or PDS Gateway Name
OBX	Remain Count
OBX	Highest Alarm Level
OBX	Database Version
OBX	Datetime

Example:

```
MSH|^~\&|||||ORU^R01|1205|P|2.3.1|
OBX||ST|4523^|cms_name|||||F
OBX||NM|4524^|16|||||F
OBX||CE|4525^highest alm|4^|||||F
OBX||NM|4560^db version||12000|||||F
OBX||ST|4561^|20181218134152|||||F
```

### 6.5.2.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 1205

### 6.5.2.4 OBX Segment

Refer to *Appendix B.4*.

## 6.6 Bed List

Bed list can be queried through CMS or PDS Gateway via the query port.

### 6.6.1 Query Message

QRY message is used. For details, refer to *Chapter 6.9*.

Here, MSH and QRD segments are used and QRF segment is omitted.

The format is shown below:

MSH Message Header
QRD Query definition

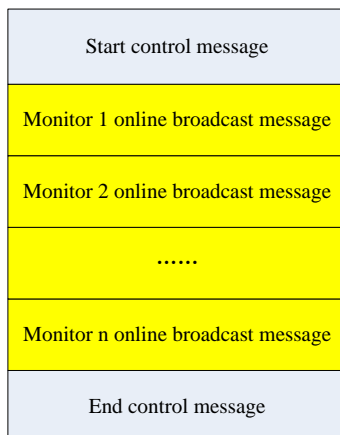
Example:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|19970731145557|R|I|Q839572||||RES<CR>
```

## 6.6.2 Bed List Message

A bed list message is composed of the Online Notification Message of every bedside monitor and start & end control messages.

The start & end control messages are used to judge whether bed list is complete, as shown below:



### 6.6.2.1 Control Message

#### Message Content

Amount of beds; start/end control flag.

#### Message Format

The message format is shown below:

MSH	Message Header
OBX	Bed Count
OBX	Message Begin/End Flag

Example:

```
MSH|^~\&|||||ORU^R01|1204|P|2.3.1<CR>
OBX|NM|4520^|2|||||F<CR>
OBX|CE|4521^|1^|||||F<CR>
```

#### MSH segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01

- Message Control ID: 1204

Example:

```
MSH|^~\&| || || |ORU^R01|1204|P|2.3.1|
```

## OBX segment

For the definition of OBX segment, refer to *Appendix B.5*.

### 6.6.2.2 Online Notification Message

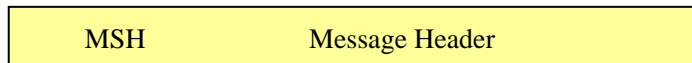
Refer to *Section 6.5.1*.

## 6.7 TCP Echo Message

Both of the communication parties must send messages in the following format every second to each other. If either party fails to receive the message within 10 seconds, it considers that network fault occurs and then takes the initiative to interrupt network connection.

### 6.7.1 Message Format

The message format is shown below:



Example:

```
MSH|^~\&| || || |ORU^R01|106|P|2.3.1|
```

### NOTE

- 
- A TCP echo message must be in the above format.
- 

### 6.7.2 Segment Definition

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 106

## 6.8 Patient Information Change Message (ORU^R01)

Mindray PDS protocol uses ORU^R01 message instead of ADT^A08 message to send patient information change notifications. The reason is that ADT^A08 message cannot send such information as patient height and weight.

### 6.8.1 Message Format

MSH	Message Header
PID	Patient Identification
PV1	Patient Visit
OBR	Observations Report ID
{	
OBX	Observation/Result
}	

The PID segment identifies patient basic information.

The PV1 segment identifies department and bed No.

The OBX segment transmits such information as patient height, weight, blood type, medical record number and paced status.

Example:

```
MSH|^~\&|||||ORU^R01|103|P|2.3.1|<CR>
PID|||dad6fc23-e283-be16-1d56d3b15b885fe6||Family name^first name||20060913|M|<CR>
PV1||I|^ICU&23&3232241478&4601&0|||||||A|<CR>
OBR|||Mindray Monitor||0|<CR>
OBX||NM|52^||34.5|||||F<CR>
OBX||NM|51^||44.9|||||F<CR>
OBX||ST|2301^||medical record number|||||F<CR>
OBX||CE|2302^blood type||1^A|||||F<CR>
OBX||CE|2303^pacemaker||1^ON|||||F<CR>
```

### 6.8.2 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 103

Example:

MSH|^~\&|||||ORU^R01|103|P|2.3.1|<CR>

### 6.8.3 PID Segment

Table 6-1 Definition of PID segment

SEQ	LEN	DT	OPT	Used	Field NAME	Description
3	20	CX	R	Yes	Patient Identifier List	Patient GUID
5	48	XPN	R	Yes	Patient Name	<First Name>^<Last Name>
7	26	TS	O	Yes	Date/Time of Birth	Format: YYYYMMDD
8	1	IS	O	Yes	Sex	Contains the sex of the patient as entered at the Information Center. The format is: Male: M Female: F Unknown: U

Example:

```
PID|||dad6fc23-e283-be16-1d56d3b15b885fe6||family name^first name|20060913|M|<CR>
```

#### NOTE

- **The GUID here is different from the Patient Medical Record Number entered on the bedside monitor. It is come from background and meaningless. The Patient Medical Record Number is sent using OBX segment, refer to Appendix B.4.**

### 6.8.4 PV1 Segment

Refer to *Section 6.5.1.6*.

Example:

```
PV1||I|^ICU&23&3232241478&4601&0|||||||||||A|<CR>
```

### 6.8.5 OBR Segment

Table 6-2 Definition of OBR segment

SEQ	LEN	DT	OPT	Used	Field Name	Description
4	200	CE	R	Yes	Universal Service ID	Always "Mindray Monitor"
7	26	TS	C	Yes	Observation Date/Time	Always "0"

Example:

OBR|||Mindray Monitor|||0|

### 6.8.6 OBX Segment

For the definition of OBX segment, refer to *Appendix B.1* and *Appendix B.4*.

## 6.9 Query Message (QRY)

### 6.9.1 Introduction

The query message is used to:

1. Query the required data when bedside monitors are directly connected.
2. Acquire the bedside monitor or telemetry transmitter data through the CMS or PDS Gateway using 4601 TCP port.
3. Query bed list through the CMS or PDS Gateway using 4678 TCP port. Refer to *Chapter 6.6*

### 6.9.2 Message Format

The message format is shown below:

MSH	Message Header
QRD	Query definition
{	
[	
QRF	Query filter
]	
}	

Example 1:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|19970731145557|R|I|Q839572||||RES<CR>
```



```
QRF|MON|||3232241478&5^1^1^0^101&102&103&104<CR>
QRF|MON|||3232241478&5^1^1^0^151&160&200<CR>
```

Example 2:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|20060731145557|R|I|Q895211||||RES<CR>
QRF|MON|||0&0^1^1^0^101&102&103&104<CR>
```

### 6.9.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: QRY^R02
- Message Control ID: 1023

Example:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
```

#### NOTE

- The MSH segment must be in the above format. Moreover, the Message Control ID of the 10th field must be "1203" Otherwise, it cannot be resolved.

### 6.9.4 QRD Segment

Table 6-3 describes the definition of QRD segment.

Table 6-3 Definition of QRD segment in QRY

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	26	TS	R	Yes	Date/Time of Query	Format: YYYYmmDDhhMMs s000
2	1	ID	R	Yes	Query format mode	Must always be <b>R</b> for record-oriented
3	1	ID	R	Yes	Query Priority	Must always be <b>I</b> for immediate
4	10	ST	R	Yes	Query ID:Some unique identifier	Can not be Null. Byte count < 16 Bytes
9	3	PT	R	Yes	What subject filter	Must be <b>RES</b> for results in query and in response

Example:

QRD|19970731145557|R|I|Q839572||||RES<CR>

Message processing rules:

- The 1st field must be in valid time format. Otherwise, an error message is returned.
- The 2<sup>nd</sup> field must be 'R'. Otherwise, an error message is returned.
- The 3rd field must be '1'. Otherwise, an error message is returned.
- The 4th field cannot be empty. It should be less than 16 bytes. The server side does not judge the uniqueness of the ID.
- The 9th field must be 'RES' . Otherwise, an error message is returned.

### 6.9.5 QRF Segment

The QRF segment defines the detailed contents to be queried. There can be 0 (zero) to multiple QRF segments.

For the definition of QRF segment, refer to *Table A-1*.

Table A-1 Definition of QRF segment in QRY

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	20	ST	R	Yes	Where subject filter	Must always be <b>MON</b> for monitoring data in queries and in responses.
5	1000	ST, repeatable	O	Yes	Other query subject filter	Query Filter specifies list with ID of interest. Refer to section 6.9.5.1

Example:

QRF|MON||||3232241478&11^2^1^0^1101&1151&1152<CR>

Message processing mechanism:

- The 1st field must be 'MON'. Otherwise, an error message is returned.
- The 5th field defines query conditions. It cannot be empty. Otherwise, an error message is returned.

#### 6.9.5.1 Query Filter

The Query Filter format is below:

<IP>&<IPSeq>^<SendType>^<SendFreq>^<SendAll>^<List>

The following table resolves all the components of the segment.

Component	Data type	Value range	Description
<IP>	Integer	0 to 4294967295	IP address of the bedside monitor connected with the CMS or PDS Gateway. Because the CMS or PDS Gateway is simultaneously connected to multiple bedside monitors, so uses the IP address to identify the unique bedside monitor or telemetry receiver. The IP address is the 32-bit integer in the order of network byte. For details, refer to <i>Section 6.5.1.6</i> .
<IPSeq>	Integer	0 to 255	Serial number of the telemetry transmitter minus one. Note: This is not TCP port number.
<SendType>	Integer	0 to 5	What kind of data to be sent. The indication of the value of this component is “0”: invalid value “1”: parameters “3”: physiological alarm “4”: technical alarm “5”: other configuration information Note:“2” is reserved
<SendFreq>	Integer	1 to 3600	Send frequency of periodic parameter. Unit: second.
<SendAll>	Integer	0 to 1	Whether to send all data specified by <SendType>. It is only valid for “parameters”. 0: No (Not all data of the specified type are sent. Data need to be filtered. What to be filtered is defined by <List>).

			1: Yes (all data of the specified type are sent. Data are not filtered. <List> is omitted).
<List>	Integer	0 to 4294967295	<p>&lt;List&gt; comprises multiple sub components in the following format:                  &lt;ID&gt;&amp;&lt;ID&gt;&amp;&lt;ID&gt;...</p> <ol style="list-style-type: none"> <li>Here, &lt;ID&gt; is defined by MHC. Every parameter has a unique ID. For details, refer to <i>Appendix B</i>.</li> <li>The amount of &lt;ID&gt; in each “Query Filter” is less than 5.</li> <li>If the value of &lt;SendAll&gt; is “1”, &lt;List&gt; is meaningless. It is omitted by the server side.</li> <li>The value of &lt;ID&gt; cannot have blank.</li> </ol>

**NOTE**

- As the amount of <ID> in each “Query Filter” is less than 5, so when the total count of <ID> is more than 5, multiple QRF segments should be used.
- The max amount of <ID> allowed is not the same from different model of products or version of software.
- If there are multiple “Query Filter” in one QRY message, the <IP> & <IPSeq> should have the same value.
- The component <SendFreq> must be the same for the same type of <SendType>.
- Every QRY message must contain all query conditions. When a new QRY message comes, the previous query condition will be refreshed.
- If the QRY message is not in correct format, the server side does not return an error message.

**6.9.6 Example Analysis**

**Query the Bedside Monitor**

Example 1:

```

MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|20060731145557|R|I|Q895211||||RES<CR>
QRF|MON|||0&0^1^1^0^101&102&103&104<CR>
QRF|MON|||0&0^1^1^0^151&160&170&171<CR>
    
```

```
QRF|MON|||0&0^1^1^0^172<CR>
QRF|MON|||0&0^3^1^1^<CR>
QRF|MON|||0&0^4^1^1^<CR>
```

Description:

Acquire only nine parameters of the bedside monitor. Their IDs are “101”, “102”, “103”, “104”, “151”, “160”, “170”, “171” and “172”. The send frequency is 1s.

Acquire all the physiological alarm and technical alarm of the bedside monitor. The send frequency is 1s.

<IP> and <IPSeq> are not required for the bedside monitor. Therefore, the values of these two sub components are “0”.

Example 2:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|20060731145557|R|I|Q895211||||RES<CR>
QRF|MON|||0&0^1^1^1^<CR>
QRF|MON|||0&0^3^1^1^<CR>
QRF|MON|||0&0^4^1^1^<CR>
```

Description:

Acquire all parameters, physiological alarm and technical alarm of the bedside monitor. The send frequency is 1s.

### Query the CMS or PDS Gateway

Example 1:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|20060713103045000|R|I|Q839572||||RES<CR>
QRF|MON|||3232241478&0^1^1^0^101&102&103&104<CR>
QRF|MON|||3232241478&0^1^1^0^151&160&200<CR>
```

Description:

The IP address of the bedside monitor is “192.168.23.70” (<IP> value is “3232241478”). Acquire the following parameters; IDs are “101”, “102”, “103”, “104”, “151”, “160” and “200”. The transmission frequency is 1s.

Example 2:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|20060713103045000|R|I|Q839572||||RES<CR>
QRF|MON|||3232241453&1^1^1^0^101&102&103&104<CR>
QRF|MON|||3232241453&1^1^1^0^151&160&200<CR>
```

Description:

The IP address of the telemetry receiver is “192.168.23.45” (<IP> value is “3232241453”).  
 The serial number of the telemetry transmitter is “1” (<IPSeq> value is “1”).  
 Acquire the following parameters; IDs are “101”, “102”, “103”, “104”, “151”, “160” and  
 “200”. The send frequency is 1s.

### Query the Bed List

Example:

```
MSH|^~\&|||||QRY^R02|1203|P|2.3.1<CR>
QRD|19970731145557|R|I|Q839572||||RES<CR>
```

Only MSH and QRD segments are used. The QRF segment is omitted.

## 6.9.7 Query Response Message

If the content and format of the QRY message is correct, the data queried is returned, using ORU message, not ORF message. If the format is not correct, no ACK/NACK will be return.

## 6.10 Unsolicited Observation Reporting Message (ORU)

### 6.10.1 Periodic parameters

#### 6.10.1.1 Message Content

Generally, a message contains the parameters of a same module. Parameters of different modules are sent in different messages.

#### 6.10.1.2 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Parameters
}	

#### 6.10.1.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.  
 Here,

- Message Type: ORU^R01
- Message Control ID: 204

Example:

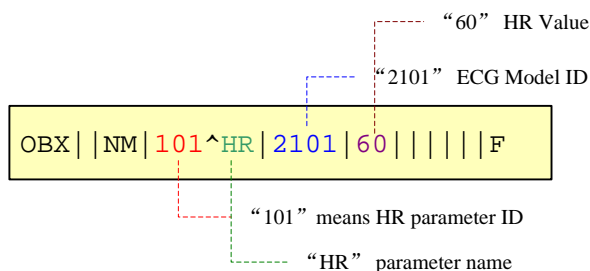
MSH|^~\&|||||ORU^R01|204|P|2.3.1|

### 6.10.1.4 OBX Segment

The following table describes the definition of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"NM"
3	80	CE	R	Yes	Observation Identifier	The format is:<ID>^<text>. <ID>: Parameter ID. It cannot be empty. Refer to Appendix B.1 <text>: Parameter name. It cannot be empty. The parameter name is defined by the server side.
4	20	ST	O	Yes	Observation Sub-ID	ID of the module to which the parameter belongs. For details of module ID, refer to <b>Appendix B.3</b> .
5	65K		R	Yes	Observation Results	Parameter value.
6	60	CE	O	Yes	Units	Omitted. The default unit is used. Refer to Appendix B.1.
7	60	ST	O	Yes	Reference Range	Omitted.
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

The HR parameter is shown below:



### 6.10.1.5 Example

```
MSH|^~\&|||||ORU^R01|204|P|2.3.1|
OBX||NM|101^HR|2101|60|||||F
OBX||NM|102^PVCs|2101|0|||||F
OBX||NM|105^I|2101|-100.00|||||F
OBX||NM|106^II|2101|-100.00|||||F
OBX||NM|107^III|2101|-100.00|||||F
OBX||NM|108^aVR|2101|-100.00|||||F
OBX||NM|109^aVL|2101|-100.00|||||F
```

```
OBX||NM|110^aVF|2101|-100.00|||||F
OBX||NM|117^ST-V|2101|-100.00|||||F
```

```
MSH|^~\&|||||ORU^R01|204|P|2.3.1|
OBX||NM|151^RR|2102|20|||||F
```

```
MSH|^~\&|||||ORU^R01|204|P|2.3.1|
OBX||NM|200^T1|2104|37.0|||||F
OBX||NM|201^T2|2104|37.2|||||F
OBX||NM|202^TD|2104|0.2|||||F
```

## 6.10.2 Parameters Property Message

When parameters message is sent, parameters property message is sent too.

### 6.10.2.1 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Parameters
}	

### 6.10.2.2 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 207

Example:

```
MSH|^~\&|||||ORU^R01|207|P|2.3.1|
```

### 6.10.2.3 OBX Segment

The following table describes the definition of OBX segment.



SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	"2043", Measure mode
4	20	ST	O	Yes	Observation Sub-ID	Parameter ID. It cannot be empty. Refer to Appendix B.1
5	65K		R	Yes	Observation Results	0 means point, and 1 means continue
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"ST"
3	80	CE	R	Yes	Observation Identifier	"2044", Measure time
5	65K		R	Yes	Observation Results	Measure time
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

### 6.10.2.4 Example

```
MSH|^~\&|||||ORU^R01|207|P|2.3.1|
OBX||CE|2043^|879|0^|||||F
OBX||ST|2044^||20191211202043|||||F
OBX||CE|2043^|880|0^|||||F
OBX||ST|2044^||20191211202043|||||F
```

### 6.10.3 NIBP Parameter Message

As NIBP is aperiodic parameter, it is sent in a separate packet.

#### 6.10.3.1 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Parameters
}	

#### 6.10.3.2 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 503

Example:

MSH|^~\&|||||ORU^R01|503|P|2.3.1|

### 6.10.3.3 OBX Segment

The following table describes the definition of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"NM"
3	80	CE	R	Yes	Observation Identifier	The format is :<ID>^<text>. <ID>: Parameter ID. It cannot be empty. Refer to Appendix B.1 <text>: Parameter name. It cannot be empty. The parameter name is defined by the server side.
4	20	ST	O	Yes	Observation Sub-ID	ID of the module to which the parameter belongs. Refer to Appendix B.3.
5	65K		R	Yes	Observation Results	Parameter value.
6	60	CE	O	Yes	Units	Omitted. The default unit is used. Refer to Appendix B.1.
7	60	ST	O	Yes	Reference Range	Omitted.
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".
13	20	ST	O	Yes	User Defined Access Checks	Parameter type: "APERIODIC": aperiodic parameter. "PERIODIC": periodic parameter. Default: "PERIODIC".
14	26	TS	O	Yes	Date/Time of the Observation	Omitted by default. The format is: YYYYMMDDHHMMSS. Only used for aperiodic parameters, indicating measurement time.

### 6.10.3.4 Example

MSH|^~\&|||||ORU^R01|503|P|2.3.1|

OBX||NM|171^Dia|2105|80|||||F||APERIODIC|20070106191915

OBX||NM|172^Mean|2105|93|||||F||APERIODIC|20070106191915

OBX||NM|170^Sys|2105|120|||||F||APERIODIC|20070106191915

## 6.10.4 Physiological Alarm Message

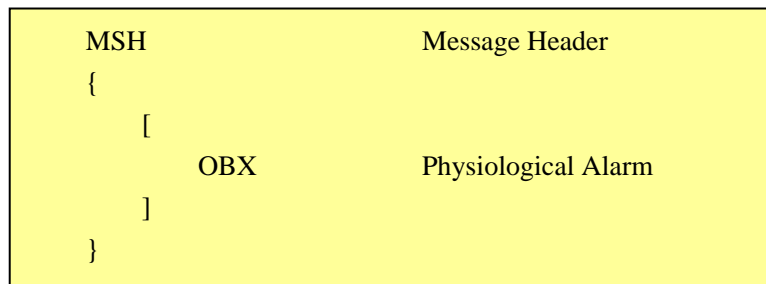
### 6.10.4.1 Message Content

The message contains physiological alarm information.

If the message has no OBX segment, it indicates that there is no physiological alarm currently.

### 6.10.4.2 Message Format

The message format is shown below:



### 6.10.4.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 54

Example:

```
MSH|^~\&|||||ORU^R01|54|P|2.3.1|
```

### 6.10.4.4 OBX Segment

The following table describes the definition of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	"1": high-level alarm "2": medium-level alarm "3": low-level alarm "4": message
4	20	ST	O	Yes	Observation Sub-ID	Not defined.
5	65K		R	Yes	Observation Results	The format is:<ID>^<text>. <ID>: alarm ID <text>: alarm text. It cannot be empty. Multiple languages are displayed based on different character sets.
6	60	CE	O	Yes	Units	Omitted.
7	60	ST	O	Yes	Reference Range	Omitted.
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".
13	20	ST	O	Yes	User Defined Access Checks	Omitted.
14	26	TS	O	Yes	Date/Time of the Observation	The format is: YYYYMMDDHHMMSS , indicating the time when the alarm occurs.

### 6.10.4.5 Example

```
MSH|^~\&|||||ORU^R01|54|P|2.3.1|
OBX||CE|2|1|10033^**SpO2 TOO HIGH|||||F||20070106193145|
OBX||CE|2|1|10170^**Art-Sys TOO HIGH |||||F||20070106193145|
OBX||CE|2|1|10172^**Art-Mean TOO HIGH |||||F||20070106193145|
OBX||CE|2|1|10174^**Art-Dia TOO HIGH |||||F||20070106193145|
OBX||CE|2|1|10302^**CVP-Mean TOO HIGH |||||F||20070106193145|
OBX||CE|2|1|10002^**HR TOO LOW|||||F||20070106193145|
OBX||CE|2|1|10044^**RR TOO LOW|||||F||20070106193145|
```

## 6.10.5 Technical Alarm Message

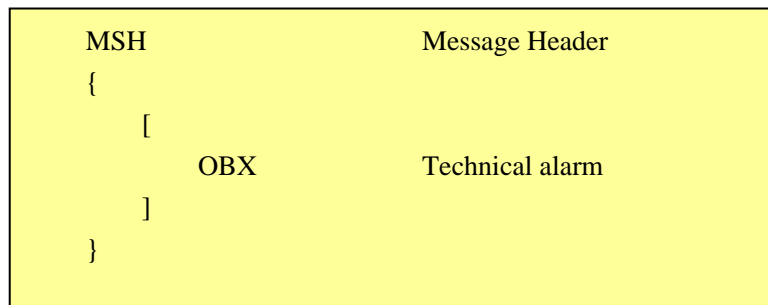
### 6.10.5.1 Message Content

The message contains technical alarm information.

If the message has no OBX segment, it indicates that there is no technical alarm currently.

### 6.10.5.2 Message Format

The message format is shown below:



### 6.10.5.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 56

Example:

```
MSH|^~\&|||||ORU^R01|56|P|2.3.1|
```

### 6.10.5.4 OBX Segment

For the definition of OBX segment, refer to *Section 6.10.3.4*

### 6.10.5.5 Example

```
MSH|^~\&|||||ORU^R01|56|P|2.3.1|
OBX||CE|3||457^NIBP COMMUNICATION ERROR|||||F|
```

## 6.10.6 Module Loading Message

### 6.10.6.1 Message Content

Contains:

Module ID & name.

IDs & names of all the parameters of the module

### 6.10.6.2 Message Format

The message format is shown below:

MSH	Message Header
OBX	Module ID & Module Name
{	
OBX	Parameters ID & Name
}	

### 6.10.6.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 11

Example:

MSH|^~\&|||||ORU^R01|11|P|2.3.1|

### 6.10.6.4 OBX Segment

#### Module ID and name

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	The format is:<ID>^<text>. <ID>: 2023 <text>: omitted
4	20	ST	O	Yes	Observation Sub-ID	Not defined
5	65K		R	Yes	Observation Results	The format is:<ID>^<text>. <ID>: module ID <text>: module name
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

**Parameter ID and name**

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	The format is: <ID>^<text>. <ID>: 2025 <text>: omitted
4	20	ST	O	Yes	Observation Sub-ID	Module ID
5	65K		R	Yes	Observation Results	The format is: <ID>^<text>. <ID>: parameter ID <text>: parameter name
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

**6.10.6.5 Example**

"11", Message Control ID

```

MSH|^~\&|||||ORU^R01|11|P|2.3.1|
OBX||CE|2023^||2101^ECG|||||F
OBX||CE|2025^|2101|101^HR|||||F
OBX||CE|2025^|2101|102^PVCs|||||F
OBX||CE|2025^|2101|105^ST-I|||||F
OBX||CE|2025^|2101|106^ST-II|||||F
OBX||CE|2025^|2101|107^ST-III|||||F
OBX||CE|2025^|2101|108^ST-aVR|||||F
OBX||CE|2025^|2101|109^ST-aVL|||||F
OBX||CE|2025^|2101|110^ST-aVF|||||F
OBX||CE|2025^|2101|117^ST-V|||||F
    
```

Module ID & Name — OBX||CE|2023^||2101^ECG|||||F

ParameterList — OBX||CE|2025^|2101|101^HR|||||F  
 OBX||CE|2025^|2101|102^PVCs|||||F  
 OBX||CE|2025^|2101|105^ST-I|||||F  
 OBX||CE|2025^|2101|106^ST-II|||||F  
 OBX||CE|2025^|2101|107^ST-III|||||F  
 OBX||CE|2025^|2101|108^ST-aVR|||||F  
 OBX||CE|2025^|2101|109^ST-aVL|||||F  
 OBX||CE|2025^|2101|110^ST-aVF|||||F  
 OBX||CE|2025^|2101|117^ST-V|||||F

## 6.10.7 Alarm Limits Message

### 6.10.7.1 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Alarm upper limit
}	
{	
OBX	Alarm lower limit
}	

### 6.10.7.2 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 51

Example:

```
MSH|^~\&|||||ORU^R01|51|P|2.3.1|
```

### 6.10.7.3 OBX Segment

The following table describes the definition of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"NM"
3	80	CE	R	Yes	Observation Identifier	"2002": upper limit "2003": lower limit
4	20	ST	O	Yes	Observation Sub-ID	Parameter ID
5	65K		R	Yes	Observation Results	Upper/lower limits
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

### 6.10.7.4 Example

```
MSH|^~\&|||||ORU^R01|51|P|2.3.1|
```

```
OBX||NM|2002^|101|200|||||F
```

```
OBX||NM|2003^|101|100|||||F
```



```
OBX||NM|2002^|102|10|||||F
OBX||NM|2003^|102|0|||||F
OBX||NM|2002^|105|0.20|||||F
OBX||NM|2003^|105|-0.20|||||F
```

## 6.10.8 Alarm Level Message

### 6.10.8.1 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Alarm level
}	

### 6.10.8.2 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 58

Example:

```
MSH|^~\&|||||ORU^R01|58|P|2.3.1|
```

### 6.10.8.3 OBX Segment

The following table describes the definition of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	"2009"
4	20	ST	O	Yes	Observation Sub-ID	Parameter ID
5	65K		R	Yes	Observation Results	Alarm level: 0:Unknown 1:High 2:Middle 3:Low
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

### 6.10.8.4 Example

```
MSH|^~\&|||||ORU^R01|58|P|2.3.1|
OBX||CE|2009^|101|2^|||||F
OBX||CE|2009^|102|2^|||||F
OBX||CE|2009^|105|2^|||||F
OBX||CE|2009^|106|2^|||||F
OBX||CE|2009^|107|2^|||||F
OBX||CE|2009^|108|2^|||||F
OBX||CE|2009^|109|2^|||||F
OBX||CE|2009^|110|2^|||||F
OBX||CE|2009^|117|2^|||||F
```

## 6.10.9 Module Unloading Message

### 6.10.9.1 Message Content

Specifies the ID of the module to be unloaded.

### 6.10.9.2 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Module ID Unloaded
}	

### 6.10.9.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 12

Example:

```
MSH|^~\&|||||ORU^R01|12|P|2.3.1|
```

### 6.10.9.4 OBX Segment

The following table describes the definition of OBX segment.

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	2024
5	65K		R	Yes	Observation Results	Module ID
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

### 6.10.9.5 Example

To unload the ECG module:

```
MSH|^~\&|||||ORU^R01|12|P|2.3.1|
```

```
OBX||CE|2024^||2101^||||F
```

## 6.10.10 Parameter Loading & Unloading Messages

### 6.10.10.1 Message Content

Lists the parameters to be unloaded, then the parameters to be loaded of the same module.

### 6.10.10.2 Message Format

The message format is shown below:

MSH	Message Header
{	
OBX	Parameters unloaded
OBX	Parameters loading
}	

### 6.10.10.3 MSH Segment

For the definition of MSH segment, refer to *Section 6.4.1.1*.

Here,

- Message Type: ORU^R01
- Message Control ID: 1202

Example:

```
MSH|^~\&|||||ORU^R01|1202|P|2.3.1|
```

### 6.10.10.4 OBX Segment

The following table describes the definition of OBX segment.

## Unloading

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"ST"
3	80	CE	R	Yes	Observation Identifier	4502: unload parameter
5	65K		R	Yes	Observation Results	Format:<ID>^<ID>^<ID> <ID>: parameter ID
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

## Parameter loading

SEQ	LEN	DT	OPT	Used	Field Name	Description
2	2	ID	R	No	Value Type	"CE"
3	80	CE	R	Yes	Observation Identifier	2025
5	65K		R	Yes	Observation Results	Format:<ID>^<text> <ID>: parameter ID. <text>: parameter name.
11	1	ID	R	Yes	Observation Results Status	"F", representing "Final".

### 6.10.10.5 Example

When the ECG module is switched from 12 lead to 5 lead, it is necessary to unload some parameters and then load new parameters.

```
MSH|^~\&|||||ORU^R01|1202|P|2.3.1|
OBX||ST|4502^||105^106^107^108^109^110|||||F
OBX||ST|4502^||111^112^113^114^115^116|||||F
OBX||ST|4502^||117|||||F
OBX||CE|2025^||105^ST-I|||||F
OBX||CE|2025^||106^ST-II|||||F
OBX||CE|2025^||107^ST-III|||||F
OBX||CE|2025^||108^ST-aVR|||||F
OBX||CE|2025^||109^ST-aVL|||||F
OBX||CE|2025^||110^ST-aVF|||||F
OBX||CE|2025^||117^ST-V|||||F
```

# A Introduction to HL7 Syntax

---

For a detailed description of HL7 syntax, refer to the HL7 protocol officially provided. Here only the main points are listed.

## A.1 Message Packaging Format

HL7 messages are in text format.

As shown below, each HL7 message consists of multiple segments in sequence. Each segment consists of multiple fields in sequence. Every field can be repetitive. Thus, each field contains varying number of field repetitions. Each field repetition consists of multiple components in sequence, which in turn can contain multiple sub components in sequence.

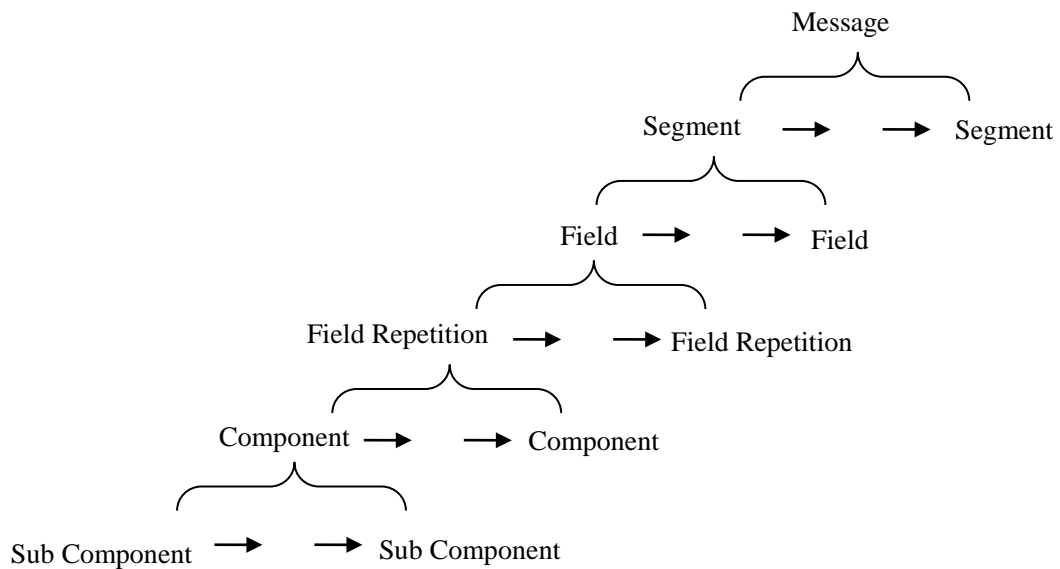


Figure A-1 Logical structure of an HL7 message

The following table lists the separators between the above elements.

Table A-1 Element & Separator

Element	Separator
Segment	<cr> The hexadecimal value is 0x0D
Field	
Field Repetition	~
Component	^
Sub Component	&

Example:

```
0x0BMSH|^~\&|||||QRY^R02|||2.3.1<cr>QRD|19970731145557|R|I|Q839572||||RES<cr>QR
F|MON|||3232241478&5^1^1^0^151&160&200<cr>0x1C0x0D
```

The following diagram shows the complete message packaging in TCP transmission.

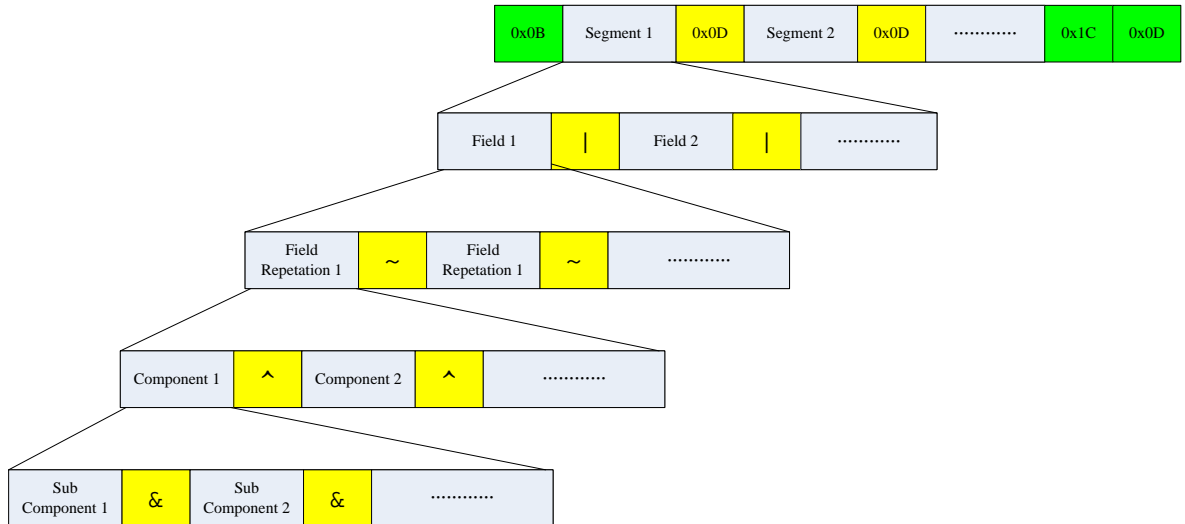


Figure A-2 HL7 message packing

## A.2 Message Creation Rules

Write into a message every segment in the specified order. To create a segment, do as follows:

1. The first three characters of every segment is the segment ID to uniquely identify the segment such as “MSH” and “PID”.
2. Insert fields into the segment as per the following procedure:
  - (1) Insert a field separator “|”.
  - (2) If the field value does not exist, you do not need to insert any character.
  - (3) If the field value exists but is “empty” logically, insert “” (two consecutive double quotation marks).
  - (4) If the field value exists, insert the corresponding character string.
  - (5) If the definition of the field can be divided into components, do as follows:
    - (A) If there are two or more than two components, the components are separated by “^”.
    - (B) If the component does not exist, do not insert any character.
    - (C) If the component exists but its value is empty, insert “” (two consecutive double quotation marks).
    - (D) If a component can be further divided into sub components, do as follows:
      - a) If there are two or more than two sub components, the components are separated by “&”.
      - b) If the sub component does not exist, do not insert any character.
      - c) If the sub component exists but its value is empty, insert “” (two consecutive double quotation marks).

## A.3 Message Definition

An HL7 message is uniquely identified by message type ID and trigger event ID. Expressed in the format of three capital letters, message type ID is placed in the corresponding field, such as ORU message, indicating that the measured value is sent from one system to the other.

Data exchange is triggered by the corresponding trigger event, whose ID is composed of three capital letters and figures, to indicate data exchange events triggered by such events as admitting, transferring and discharging patients. For example, A01 stands for patient admittance notification and A08 for modified patient information.

Message ID and trigger event ID are in one-to-multiple relationship. Generally, the combination of message type ID and trigger event ID is used to uniquely identify a message. For example, ADT^A01 means patient admittance notification message.

Mindray PDS protocol defines the following messages.

## A.4 Message Format

Every message is composed of a set of segments arranged in the specified order. Every segment is uniquely identified by a segment ID which is expressed in the format of three capital letters such as MSH and PV1.

As shown in the following figure, a message is defined, where “{}” means that the set of segments inside the {} must occur one or multiple times and “[ ]” means that the set of segments inside the [] is optional. If a set of segments is both optional and repetitive, it is indicated by {[]} or [{}]. Both forms are equivalent.

The message in the figure comprises more than two segments. The first segment is MSH and the second PV1.

The words after message ID are for description purpose, such as “Message Header”.

MSH	Message Header
{	
PV1	Patient Visit
}	

Figure A-3 Protocol message format

## A.5 Segment Definition

Every segment is composed of a set of fields arranged in the specified order.

The following table defines the format of a segment.

Table A-2 Segment definition

SEQ	LEN	DT	OPT	Used	Field Name	Description
1	1	ST	R	Yes	Field Separator	Always ' '
2	4	ST	R	Yes	Encoding Characters	Always '^~\&'
9	7	CM	R	Yes	Message Type	Here is ADT^A01
10	20	ST	R	Yes	Message Control ID	
11	3	PT	R	Yes	Processing ID	Always 'P'
12	60	VID	R	Yes	Version ID	Always '2.3.1'

In which,

The SEQ column indicates the order of the field in the segment.

The LEN column indicates the maximum number of characters of the field value.

The DT column indicates the data type of the field value.

The OPT column indicates that the value of the field is mandatory. "R" stands for mandatory and "O" for optional.

The Used column indicates whether the field is used in Mindray PDS protocol. "Yes" stands for used and "No" for not used.

The Field Name column indicates the name of the field.

The Description column indicates the description of the field.

The fields not included in the table are optional in the HL7 protocol and are not used in Mindray PDS protocol.



# B Mindray HL7 Code (MHC)

---

## B.1 Parameter ID Part

### Note

- The parameter names and module names below are for reference only. The actual ones are subject to what the server side sends.
- 

ID	Text	Module Name	Description	Default Unit
0	Unknown	/	Unknown Alarm	/
1	Red	/	Red Alarm, critical alarm, high level	/
2	Orange	/	Orange Alarm, serious alarm, medium level	/
3	Yellow	/	Yellow Alarm, general alarm, low level	/
4	Message	/	Common Message	/
51	Weight	/	Patient Weight	kg

52	Height	/	Patent Height	cm
101	HR	ECG	Heart Rate	bpm
102	PVCs	ECG	PVC sum	/min
103	ST1	ECG	ST parameter - value ST1	mv
104	ST2	ECG	ST parameter - value ST2	mv
105	ST_I	ECG	ST parameter - value ST_I	mv
106	ST_II	ECG	ST parameter - value ST_II	mv
107	ST_III	ECG	ST parameter - value ST_III	mv
108	ST_aVR	ECG	ST parameter - value ST_aVR	mv
109	ST_aVL	ECG	ST parameter - value ST_aVL	mv
110	ST_aVF	ECG	ST parameter - value ST_aVF	mv
111	ST_V1	ECG	ST parameter - value ST_V1	mv
112	ST_V2	ECG	ST parameter - value ST_V2	mv
113	ST_V3	ECG	ST parameter - value ST_V3	mv
114	ST_V4	ECG	ST parameter - value ST_V4	mv
115	ST_V5	ECG	ST parameter - value ST_V5	mv
116	ST_V6	ECG	ST parameter - value ST_V6	mv
117	ST_V	ECG	ST parameter - value ST_V	mv
118	ST_SINGL E	ECG	ST parameter - value ST_SINGLE	mv

119	ST_DUAL	ECG	ST parameter - value ST_DUAL	mv
120	QTC	ECG	QT parameter - value QTC	mv
121	QT	ECG	QT parameter - value QT	mv
122	QTHR	ECG	QT parameter - value QTHR	mv
123	DELTAQTC	ECG	QT parameter - value DELTAQTC	mv
124	PAUSES	ECG	PAUSES	mv
125	ST_Va	ECG	ST parameter - value ST_Va	mv
126	ST_Vb	ECG	ST parameter - value ST_Vb	mv
151	RR	RESP	Respiration wave/rate	rpm
160	SPO2	SPO2	Percent Oxyhemoglobin Saturation - Arterial	%
161	PR	SPO2	Pulse Rate	bpm
162	PI	SPO2	Perfusion Index	?
170	NIBP S	NIBP	Non-invasive Blood Pressure Systolic	mmHg
171	NIBP D	NIBP	Non-invasive Blood Pressure Diastolic	mmHg
172	NIBP M	NIBP	Non-invasive Blood Pressure Mean	mmHg

---

173	NIBP_PR	NIBP	Non-invasive Blood Pressure Rate	bpm
174	IBP1_M	IBP CH1	Invasive Blood Pressure Mean: Channel 1	mmHg
175	IBP1_S	IBP CH1	Invasive Blood Pressure Systolic: Channel 1	mmHg
176	IBP1_D	IBP CH1	Invasive Blood Pressure Diastolic: Channel 1	mmHg
178	IBP2_M	IBP CH2	Invasive Blood Pressure Mean: Channel 2	mmHg
179	IBP2_S	IBP CH2	Invasive Blood Pressure Systolic: Channel 2	mmHg
180	IBP2_D	IBP CH2	Invasive Blood Pressure Diastolic: Channel 2	mmHg
182	IBP3_M	IBP CH3	Invasive Blood Pressure Mean: Channel 3	mmHg
183	IBP3_S	IBP CH3	Invasive Blood Pressure Systolic: Channel 3	mmHg
184	IBP3_D	IBP CH3	Invasive Blood Pressure Diastolic: Channel 3	mmHg
186	IBP4_M	IBP CH4	Invasive Blood Pressure Mean: Channel 4	mmHg
187	IBP4_S	IBP CH4	Invasive Blood Pressure Systolic: Channel 4	mmHg
188	IBP4_D	IBP CH4	Invasive Blood Pressure Diastolic: Channel 4	mmHg
200	T1	TEMP	Non-specific temperature 1	°C
201	T2	TEMP	Non-specific temperature 2	°C

---

202	TD	TEMP	Delta Temperature between non-specific temperature labels	°C
203	Temp	TEMP	temperature	°C
210	C.O.	C.O.	Cardiac output	L/min
211	TI	C.O.		°C
212	C.I.	C.O.	Aperiodic parameter, Cardiac Index	L/min/m <sup>2</sup>
213	TB	C.O.	Aperiodic parameter, Blood temperature - delivered by C.O.	°C
220	CO2	CO2	End of Tidal CO2	mmHg
221	INS	CO2	Inspired Minimum CO2	mmHg
222	AWRR	CO2	Airway Respiration Rate	rpm
250	CO2Et	AG	End tidal Carbon Dioxide	mmHg
251	CO2Fi	AG	Inspired C2O	mmHg
253	O2Et	AG	End-Tidal O2	mmHg
254	O2Fi	AG	Inspired O2	mmHg

---

256	N2OEt	AG	End-Tidal N2O	%
257	N2OFi	AG	Inspired N2O	%
259	AAEt	AG	End-Tidal Anesthetic	%
260	AAFi	AG	Inspired Anesthetic Agent	%
262	HALEt	AG	End-Tidal Heathen	%
263	HALFi	AG	Inspired Heathen	%
265	ENFEt	AG	Inspired Enflurane	%
266	ENFFi	AG	End-Tidal Enflurane	%
268	ISOEt	AG	End-Tidal Isoflurane	%
269	ISOFi	AG	Inspired Isoflurane	%
271	SEVEt	AG	End-Tidal Sevoflurane	%
272	SEVFi	AG	Inspired Sevoflurane	%
274	DESEt	AG	End-Tidal Desflurane	%
275	DESFi	AG	Inspired Desflurane	%

280	AgAwRR	AG		rpm
281	MAC	AG		/
301	Pmean	VENT	Mean airway pressure	cmH <sub>2</sub> O
302	PEEP	VENT	Positive end-expiratory pressure	cmH <sub>2</sub> O
303	Pplat	VENT	Plateau pressure	cmH <sub>2</sub> O
304	Pmax	VENT	Maximum airway pressure	cmH <sub>2</sub> O
305	MV	VENT	Minute volume	l/min
306	VTE	VENT	Expired tidal volume	ml
307	VTI	VENT	Inspired tidal volume	ml
308	I:E	VENT	Inspiratory time:Expiratory time ratio	/
309	Freq	VENT	Breath rate	BPM
310	FiO <sub>2</sub>	VENT	Fractional concentration of O <sub>2</sub> in inspired gas	%
311	Compliance	VENT	Compliance	ml/cmH <sub>2</sub> O
312	Resistance	VENT	Resistance	cmH <sub>2</sub> O/ (l/s)
313	SIMV Total Frequency	VENT	(SIMV) Total breath rate	BPM
314	Spontaneous Frequency	VENT	(SIMV) Spontaneous breath rates	BPM

	in SIMV			
315	Spontaneous MV in SIMV	VENT	(SIMV) Spontaneous minute volume	l/min
350	BIS	BIS	BIS Parameters	
351	SQI	BIS	BIS Parameters	%
352	SR	BIS	BIS Parameters	%
353	SEF	BIS	BIS Parameters	Hz
354	EMG	BIS	BIS Parameters	dB
355	TP	BIS	BIS Parameters	dB
356	BC	BIS	BIS Parameters	BPM
357	BIS_L	BISX4	BISX4 Parameters	/
358	BIS_R	BISX4	BISX4 Parameters	/
359	SQI_L	BISX4	BISX4 Parameters	%
360	SQI_R	BISX4	BISX4 Parameters	%
361	SR_L	BISX4	BISX4 Parameters	%
362	SR_R	BISX4	BISX4 Parameters	%
363	SEF_L	BISX4	BISX4 Parameters	Hz
364	SEF_R	BISX4	BISX4 Parameters	Hz
365	EMG_L	BISX4	BISX4 Parameters	dB



366	EMG_R	BISX4	BISX4 Parameters	dB
367	TP_L	BISX4	BISX4 Parameters	dB
368	TP_R	BISX4	BISX4 Parameters	dB
369	BC_L	BISX4	BISX4 Parameters	/
370	BC_R	BISX4	BISX4 Parameters	/
371	sBIS_L	BISX4	BISX4 Parameters	/
372	sBIS_R	BISX4	BISX4 Parameters	/
373	sEMG_L	BISX4	BISX4 Parameters	/
374	sEMG_R	BISX4	BISX4 Parameters	/
375	ASYM	BISX4	BISX4 Parameters	%
400	RR	RM	RM Parameters	rpm
401	MVE	RM	RM Parameters	L/min
402	PEEP	RM	RM Parameters	cmH2O
403	PIP	RM	RM Parameters	cmH2O
404	I:E	RM	RM Parameters	/
405	FEV1.0	RM	RM Parameters	%
406	Pmean	RM	RM Parameters	cmH2O
407	Tvi	RM	RM Parameters	ml
408	Tve	RM	RM Parameters	ml
409	Mvi	RM	RM Parameters	L/min

410	PEF	RM	RM Parameters	L/min
411	PIF	RM	RM Parameters	L/min
412	Pplat	RM	RM Parameters	cmH2O
413	WOB	RM	RM Parameters	J
414	Compl	RM	RM Parameters	ml/cmH2O
415	Raw	RM	RM Parameters	cmH2O/L/s
416	RSBI	RM	RM Parameters	rpm/L
417	NIP	RM	RM Parameters	cmH2O
418	APNEA	RM	RM Parameters	
419	RESP	may be ECG/AG/CO2 module	Respiration	RPM
450	C.I.	ICG	ICG Parameters	L/min/m <sup>2</sup>
451	C.O.	ICG	ICG Parameters	L/min
452	SV	ICG	ICG Parameters	ml
453	SI	ICG	ICG Parameters	ml/m <sup>2</sup>
454	SVR	ICG	ICG Parameters	DS/cm5
455	SVRI	ICG	ICG Parameters	DS·m <sup>2</sup> /cm5
456	PVR	ICG	ICG Parameters	DS/cm5
457	PVRI	ICG	ICG Parameters	DS·m <sup>2</sup> /cm5

---

458	TFC	ICG	ICG Parameters	/k $\Omega$
459	TFI	ICG	ICG Parameters	$\Omega$
460	EF	ICG	ICG Parameters	%
461	ACI	ICG	ICG Parameters	/100s <sup>2</sup>
462	VI	ICG	ICG Parameters	/1000s
463	LCW	ICG	ICG Parameters	kg·m
464	LCWI	ICG	ICG Parameters	kg·m/m <sup>2</sup>
465	LVSW	ICG	ICG Parameters	g·m
466	LVSWI	ICG	ICG Parameters	g·m/m <sup>2</sup>
467	RCW	ICG	ICG Parameters	kg·m
468	RCWI	ICG	ICG Parameters	kg·m/m <sup>2</sup>
469	RVSW	ICG	ICG Parameters	g·m
470	RVSWI	ICG	ICG Parameters	g·m/m <sup>2</sup>
471	STR	ICG	ICG Parameters	
472	PEP	ICG	ICG Parameters	ms
473	LVET	ICG	ICG Parameters	ms
474	HR	ICG	ICG Parameters	bpm
475	BSA	ICG	ICG Parameters	m <sup>2</sup>
476	VEPT	ICG	ICG Parameters	ml
477	SQI	ICG	ICG Parameters	/

500	Sys	ART	Art Module Invasive Blood Pressure Systolic	mmHg
501	Mean	ART	Art Module Invasive Blood Pressure Mean	mmHg
502	Dia	ART	Art Module Invasive Blood Pressure Diastolic	mmHg
503	Sys	PA	PA Module Invasive Blood Pressure Systolic	mmHg
504	Mean	PA	PA Module Invasive Blood Pressure Mean	mmHg
505	Dia	PA	PA Module Invasive Blood Pressure Diastolic	mmHg
506	Sys	Ao	Ao Module Invasive Blood Pressure Systolic	mmHg
507	Mean	Ao	Ao Module Invasive Blood Pressure Mean	mmHg
508	Dia	Ao	Ao Module Invasive Blood Pressure Diastolic	mmHg
509	Sys	UAP	UAP Module Invasive Blood Pressure Systolic	mmHg
510	Mean	UAP	UAP Module Invasive Blood Pressure Mean	mmHg
511	Dia	UAP	UAP Module Invasive Blood Pressure Diastolic	mmHg
512	Sys	BAP	BAP Module Invasive Blood Pressure Systolic	mmHg
513	Mean	BAP	BAP Module Invasive Blood Pressure Mean	mmHg

514	Dia	BAP	BAP Module Invasive Blood Pressure Diastolic	mmHg
515	Sys	FAP	FAP Module Invasive Blood Pressure Systolic	mmHg
516	Mean	FAP	FAP Module Invasive Blood Pressure Mean	mmHg
517	Dia	FAP	FAP Module Invasive Blood Pressure Diastolic	mmHg
518	Sys	IBP P1	IBP P1 Module Invasive Blood Pressure Systolic	mmHg
519	Mean	IBP P1	IBP P1 Module Invasive Blood Pressure Mean	mmHg
520	Dia	IBP P1	IBP P1 Module Invasive Blood Pressure Diastolic	mmHg
521	Sys	IBP P2	IBP P2 Module Invasive Blood Pressure Systolic	mmHg
522	Mean	IBP P2	IBP P2 Module Invasive Blood Pressure Mean	mmHg
523	Dia	IBP P2	IBP P2 Module Invasive Blood Pressure Diastolic	mmHg
524	Sys	IBP P3	IBP P3 Module Invasive Blood Pressure Systolic	mmHg
525	Mean	IBP P3	IBP P3 Module Invasive Blood Pressure	mmHg

			Mean	
526	Dia	IBP P3	IBP P3 Module Invasive Blood Pressure Diastolic	mmHg
527	Sys	IBP P4	IBP P4 Module Invasive Blood Pressure Systolic	mmHg
528	Mean	IBP P4	IBP P4 Module Invasive Blood Pressure Mean	mmHg
529	Dia	IBP P4	IBP P4 Module Invasive Blood Pressure Diastolic	mmHg
530	Sys	IBP P5	IBP P5 Module Invasive Blood Pressure Systolic	mmHg
531	Mean	IBP P5	IBP P5 Module Invasive Blood Pressure Mean	mmHg
532	Dia	IBP P5	IBP P5 Module Invasive Blood Pressure Diastolic	mmHg
533	Sys	IBP P6	IBP P6 Module Invasive Blood Pressure Systolic	mmHg
534	Mean	IBP P6	IBP P6 Module Invasive Blood Pressure Mean	mmHg
535	Dia	IBP P6	IBP P6 Module Invasive Blood Pressure Diastolic	mmHg
536	Sys	IBP P7	IBP P7 Module Invasive Blood Pressure Systolic	mmHg

537	Mean	IBP P7	IBP P7 Module Invasive Blood Pressure Mean	mmHg
538	Dia	IBP P7	IBP P7 Module Invasive Blood Pressure Diastolic	mmHg
539	Sys	IBP P8	IBP P8 Module Invasive Blood Pressure Systolic	mmHg
540	Mean	IBP P8	IBP P8 Module Invasive Blood Pressure Mean	mmHg
541	Dia	IBP P8	IBP P8 Module Invasive Blood Pressure Diastolic	mmHg
542	Sys	IBP AUX1	IBP AUX1 Module Invasive Blood Pressure Systolic	mmHg
543	Mean	IBP AUX1	IBP AUX1 Module Invasive Blood Pressure Mean	mmHg
544	Dia	IBP AUX1	IBP AUX1 Module Invasive Blood Pressure Diastolic	mmHg
545	Sys	IBP AUX2	IBP AUX2 Module Invasive Blood Pressure Systolic	mmHg
546	Mean	IBP AUX2	IBP AUX2 Module Invasive Blood Pressure Mean	mmHg
547	Dia	IBP AUX2	IBP AUX2 Module Invasive Blood Pressure Diastolic	mmHg

---

548	Sys	IBP AUX3	IBP AUX3 Module Invasive Blood Pressure Systolic	mmHg
549	Mean	IBP AUX3	IBP AUX3 Module Invasive Blood Pressure Mean	mmHg
550	Dia	IBP AUX3	IBP AUX3 Module Invasive Blood Pressure Diastolic	mmHg
551	Sys	IBP AUX4	IBP AUX4 Module Invasive Blood Pressure Systolic	mmHg
552	Mean	IBP AUX4	IBP AUX4 Module Invasive Blood Pressure Mean	mmHg
553	Dia	IBP AUX4	IBP AUX4 Module Invasive Blood Pressure Diastolic	mmHg
554	Sys	IBP AUX5	IBP AUX5 Module Invasive Blood Pressure Systolic	mmHg
555	Mean	IBP AUX5	IBP AUX5 Module Invasive Blood Pressure Mean	mmHg
556	Dia	IBP AUX5	IBP AUX5 Module Invasive Blood Pressure Diastolic	mmHg
557	Sys	IBP AUX6	IBP AUX6 Module Invasive Blood Pressure Systolic	mmHg
558	Mean	IBP AUX6	IBP AUX6 Module Invasive Blood Pressure Mean	mmHg
559	Dia	IBP AUX6	IBP AUX6 Module Invasive Blood	mmHg



			Pressure Diastolic	
560	Sys	IBP AUX7	IBP AUX7 Module Invasive Blood Pressure Systolic	mmHg
561	Mean	IBP AUX7	IBP AUX7 Module Invasive Blood Pressure Mean	mmHg
562	Dia	IBP AUX7	IBP AUX7 Module Invasive Blood Pressure Diastolic	mmHg
563	Sys	IBP AUX8	IBP AUX8 Module Invasive Blood Pressure Systolic	mmHg
564	Mean	IBP AUX8	IBP AUX8 Module Invasive Blood Pressure Mean	mmHg
565	Dia	IBP AUX8	IBP AUX8 Module Invasive Blood Pressure Diastolic	mmHg
566	Mean	IBP CVP	IBP CVP Module Invasive Blood Pressure Mean	mmHg
567	Mean	IBP RAP	IBP RAP Module Invasive Blood Pressure Mean	mmHg
568	Mean	IBP LAP	IBP LAP Module Invasive Blood Pressure Mean	mmHg
569	Mean	IBP ICP	IBP ICP Module Invasive Blood Pressure Mean	mmHg
570	Mean	IBP UVP	IBP UVP Module Invasive Blood	mmHg

			Pressure Mean	
571	Mean	IBP LVP	IBP LVP Module Invasive Blood Pressure Mean	mmHg
573	Sys	IBP CVP	IBP CVP Module Invasive Blood Pressure Systolic	mmHg
574	Sys	IBP RAP	IBP RAP Module Invasive Blood Pressure Systolic	mmHg
575	Sys	IBP LAP	IBP LAP Module Invasive Blood Pressure Systolic	mmHg
576	Sys	IBP ICP	IBP ICP Module Invasive Blood Pressure Systolic	mmHg
577	Sys	IBP UVP	IBP UVP Module Invasive Blood Pressure Systolic	mmHg
578	Sys	IBP LVP	IBP LVP Module Invasive Blood Pressure Systolic	mmHg
580	Dia	IBP CVP	IBP CVP Module Invasive Blood Pressure Diastolic	mmHg
581	Dia	IBP RAP	IBP RAP Module Invasive Blood Pressure Diastolic	mmHg
582	Dia	IBP LAP	IBP LAP Module Invasive Blood Pressure Diastolic	mmHg

583	Dia	IBP ICP	IBP ICP Module Invasive Blood Pressure Diastolic	mmHg
584	Dia	IBP UVP	IBP UVP Module Invasive Blood Pressure Diastolic	mmHg
585	Dia	IBP LVP	IBP LVP Module Invasive Blood Pressure Diastolic	mmHg
586	ICP_CePP	IBP		mmHg
587	PPV	ART		%
588	PPV	AO		%
589	PPV	UAP		%
590	PPV	FAP		%
591	PPV	BAP		%
592	PPV	LVP		%
593	PPV	IBP1		%
594	PPV	IBP2		%
595	PPV	IBP3		%
596	PPV	IBP4		%
597	CPP	IBP		mmHg
600	PR	PR	PR Module Parameter PR	bpm
601	Sys	IBP pART	IBP pART Module Invasive Blood Pressure Systolic	mmHg

602	Mean	IBP pART	IBP pART Module Invasive Blood Pressure Mean	mmHg
603	Dia	IBP pART	IBP pART Module Invasive Blood Pressure Diastolic	mmHg
604	Sys	IBP pCVP	IBP pCVP Module Invasive Blood Pressure Systolic	mmHg
605	Mean	IBP pCVP	IBP pCVP Module Invasive Blood Pressure Mean	mmHg
606	Dia	IBP pCVP	IBP pCVP Module Invasive Blood Pressure Diastolic	mmHg
607	Sys	IBP ART2	IBP ART2 Module Invasive Blood Pressure Systolic	mmHg
608	Mean	IBP ART2	IBP ART2 Module Invasive Blood Pressure Mean	mmHg
609	Dia	IBP ART2	IBP ART2 Module Invasive Blood Pressure Diastolic	mmHg
610	Sys	IBP LAP	IBP LAP Module Invasive Blood Pressure Systolic	mmHg
611	Mean	IBP LAP	IBP LAP Module Invasive Blood Pressure Mean	mmHg
612	Dia	IBP LAP	IBP LAP Module Invasive Blood Pressure Diastolic	mmHg

---

650	CCO	CCO		L/min
651	CCI	CCO		L/min/m <sup>2</sup>
652	C.O.	CCO	An aperiodic parameter	L/min
653	C.I.	CCO	An aperiodic parameter	L/min/m <sup>2</sup>
654	RVEF	CCO		%
655	TB	CCO	Blood temperature - delivered by CCO Module	°C
656	SVR	CCO		DS/cm <sup>5</sup>
657	SVRI	CCO		DS·cm <sup>2</sup> /cm <sup>5</sup>
658	SV	CCO		ml/b
659	SVI	CCO		ml/b/m <sup>2</sup>
660	EDV	CCO		ml
661	EDVI	CCO		ml/m <sup>2</sup>
662	ESV	CCO		ml
663	ESVI	CCO		ml/m <sup>2</sup>
664	CVP	CCO		mmHg
665	MAP	CCO		mmHg
666	HR	CCO		bpm
667	SVV	CCO		%
668	GEDV	CCO		ml

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669	GEDI	CCO		ml/m <sup>2</sup>
670	ITBV	CCO		ml
671	ITBI	CCO		ml/m <sup>2</sup>
672	PPV	CCO		%
673	EVLW	CCO		ml
674	ELWI	CCO		ml/Kg
675	CPO	CCO		W
676	CPI	CCO		W/m <sup>2</sup>
677	PVPI	CCO		/
678	GEF	CCO		%
679	dPmx	CCO		mmHg/s
680	CFI	CCO		l/min
681	TI	CCO		°C
682	CCO_STAT	CCO		L/min
683	CCI_STAT	CCO		L/min/m <sup>2</sup>
684	PR	CCO		/
685	iCVP	CCO		/
686	iMAP	CCO		/

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750	SvO2	SvO2		%
751	ScvO2	SvO2		%
752	SaO2	SvO2		%
753	VO2	SvO2		ml/min
754	O2EI	SvO2		%
755	DO2	SvO2		ml/min
756	SQI	SvO2		
757	DO2I	SvO2		/
758	VO2I	SvO2		/
759	Hb	SvO2		/
760	VO2E	SvO2		/
764	VO2EI	SvO2		/
762	SpO2	SvO2		/
800	SpO2b	SPO2B		
801	$\Delta$ SpO2	SPO2B		
802	PI	SPO2B		
820	tcpCO2	TCGas		
821	tcpO2	TCGas		

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822	SpO2	TCGas		
823	PR	TCGas		
824	Power	TCGas		
825	Tsensor	TCGas		
826	SR1	EEG1		
827	SEF1	EEG1		
828	MF1	EEG1		
829	PPF1	EEG1		
830	TP1	EEG1		
831	EMG1	EEG1		
832	Delta1	EEG1		
833	Theta1	EEG1		
834	Alpha1	EEG1		
835	Beta1	EEG1		
836	SR2	EEG2		
837	SEF2	EEG2		
838	MF2	EEG2		
839	PPF2	EEG2		
840	TP2	EEG2		



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841	EMG2	EEG2		
842	Delta2	EEG2		
843	Theta2	EEG2		
844	Alpha2	EEG2		
845	Beta2	EEG2		
846	SR3	EEG3		
847	SEF3	EEG3		
848	MF3	EEG3		
849	PPF3	EEG3		
850	TP3	EEG3		
851	EMG3	EEG3		
852	Delta3	EEG3		
853	Theta3	EEG3		
854	Alpha3	EEG3		
855	Beta3	EEG3		
856	SR4	EEG4		
857	SEF4	EEG4		
858	MF4	EEG4		
859	PPF4	EEG4		

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860	TP4	EEG4		
861	EMG4	EEG4		
862	Delta4	EEG4		
863	Theta4	EEG4		
864	Alpha4	EEG4		
865	Beta4	EEG4		
866	PAIN INDEX	VS900		
867	CONSCIO USNESS	VS900		
868	HEIGHT	VS900		
869	WEIGHT	VS900		
870	BLD SUGAR INDEX	VS900		
871	LQD IN VOL	VS900		
872	TEMP POS	VS900		
873	NIBP POS	VS900		
874	PAT BODY POS	VS900		
875	O2 SRC	VS900		
876	O2 RATE	VS900		

877	O2 CONC	VS900		
879	LQD OUT VOL	VS900		
879	TOF-Ratio	NMT		%
880	TOF-Count	NMT		
881	ST_Ratio	NMT		%
882	ST_Count	NMT		
883	DBS_Ratio	NMT		%
884	DBS_Coun t	NMT		
885	PTC	NMT		
886	T1	NMT		
887	Age	AG		
888	Below Desat Limit	SPO2		
889	Below Desat Limit	SPO2b		
890	PAWP	IBP PA		mmHg
891	T3	TEMP	Non-specific temperature 3	°C
892	TOF-Ratio	TWSX NMT		

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893	TOF-Count	TWSX NMT		
894	PTC	TWSX NMT_		
895	Single	TWSX NMT_		
896	Tskin	TWSX NMT_		
897	RSO2	RSO2 CH1		
898	BASELIN E	RSO2 CH1		
899	Changa Percent	RSO2 CH1		
900	AUC	RSO2 CH1		
901	AVG	RSO2 CH1		
902	SSI	RSO2 CH1		
903	RSO2	RSO2 CH2		
904	BASELIN E	RSO2 CH2		
905	Changa Percent	RSO2 CH2		
906	AUC	RSO2 CH2		
907	AVG	RSO2 CH2		
908	SSI	RSO2 CH2		
909	RSO2	RSO2_2 CH1		

910	BASELINE	RSO2_2CH1		
911	Change Percent	RSO2_2CH1		
912	AUC	RSO2_2CH1		
913	AVG	RSO2_2CH1		
914	SSI	RSO2_2CH1		
915	RSO2	RSO2_2 CH2		
916	BASELINE	RSO2_2CH2		
917	Change Percent	RSO2_2CH2		
918	AUC	RSO2_2CH2		
919	AVG	RSO2_2CH2		
920	SSI	RSO2_2CH2		
921	O2Et	CO2_		
922	O2Fi	CO2		
923	O2Fi_SHO RTAGE	CO2		
924	VCO2	VCO2_		ml
925	MVCO2	VCO2_		ml/min
926	VO2	VCO2_		ml
927	MVO2	VCO2		ml/min

928	EE	VCO2		kcal/day
929	RQ	VCO2		/
930	T4	TEMP	Non-specific temperature 4	°C
1024	DI_START	Device Integration		
10240	DI_END	Device Integration		

## Note

- As for parameters of Anesthesia and Ventilator, HL7 codes of different parameters are calculated in a certain algorithm to divide into two separate parts, that is, Anesthesia [1024, 2048), and Ventilator [2048, 3072);
- These HL7 codes are translated from MD protocol. Considering different units and parameter sources, the same parameter can have two or more HL7 parameter IDs.

### The algorithm is specified as follows:

Assume that: “iReserved” to be a controller variable of encoding, which is always 0; “iModuleID” to be the Device ID of Device Integration (currently only 0 for Anesthesia, and 1 for Ventilator); “iSourceID” to be the parameter IDs from MD protocol (as demonstrated in following table); then the encoding process of HL7 parameter code “iDestID” can be like this:

At first,

$$iDestID = iReserved \ll 14,$$

then,

$iDestID = iDestID | ((iModuleID+1) \ll 10)$ ,  
 and then,  
 $iDestID = iDestID | iSourceID$

The original parameter IDs of MD protocol is as follows.

Source ID	Text	Module Name	Description	Default Unit
0	O2%	Anesthesia		%
1	PEEP	Anesthesia		cmH2O
2	PEEP	Anesthesia		cmH2O
3	Ppeak	Anesthesia		cmH2O
4	Pplat	Anesthesia		cmH2O
5	Pmean	Anesthesia		cmH2O
6	Paw	Anesthesia		cmH2O
7	VT	Anesthesia		ml
8	VT <sub>e</sub>	Anesthesia		ml
9	VT <sub>i</sub>	Anesthesia		ml
10	VT <sub>i</sub>	Anesthesia		ml
11	MV	Anesthesia		L/min
12	MV <sub>spn</sub>	Anesthesia		L/min
13	MV <sub>e</sub>	Anesthesia		L/min
14	MV <sub>i</sub>	Anesthesia		L/min

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15	MVLEAK	Anesthesia		L/min
16	f	Anesthesia		bpm
17	f	Anesthesia		bpm
18	fmand	Anesthesia		bpm
19	ftot	Anesthesia		bpm
20	fspn	Anesthesia		bpm
21	fSIMV	Anesthesia		bpm
22	FreqMIN	Anesthesia		bpm
23	I:E	Anesthesia		
24	I:E	Anesthesia		
25	TIP:TI	Anesthesia		%
26	Tslope	Anesthesia		s
27	Tinsp	Anesthesia		s
28	Texp	Anesthesia		s
29	Trig Window	Anesthesia		%
30	Plimit	Anesthesia		cmH2O
31	Pinsp	Anesthesia		cmH2O
32	Psupp	Anesthesia		cmH2O
33	Pmax	Anesthesia		cmH2O
34	P-Trigger	Anesthesia		cmH2O
35	F-Trigger	Anesthesia		L/min



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36	Insp Flow	Anesthesia		L/min
37	Exp Flow	Anesthesia		L/min
38	Exp%	Anesthesia		%
39	Compl	Anesthesia		ml/cmH2O
40	RAW	Anesthesia		cmH2O/L/s
41	Pmin	Anesthesia		cmH2O
42	Paux Min	Anesthesia		cmH2O
43	Paux Peak	Anesthesia		cmH2O
44	Paux Mean	Anesthesia		cmH2O
45	FRC	Anesthesia		ml
46	PEEPi	Anesthesia		cmH2O
47	PEEPe	Anesthesia		cmH2O
48	PEEPtot	Anesthesia		cmH2O
49	PEEPi time	Anesthesia		min
50	P0.1	Anesthesia		cmH2O
51	P0.1 time	Anesthesia		min
52	RRCO2	Anesthesia		bpm
53	EtCO2	Anesthesia		%
54	EtCO2	Anesthesia		mmHg
55	FiCO2	Anesthesia		%
56	FiCO2	Anesthesia		mmHg

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57	FiO2	Anesthesia		%
58	FiO2	Anesthesia		mmHg
59	EtO2	Anesthesia		%
60	EtO2	Anesthesia		mmHg
61	$\Delta$ O2	Anesthesia		%
62	$\Delta$ O2	Anesthesia		mmHg
63	Tapnea	Anesthesia		s
64	FiN2O	Anesthesia		%
65	EtN2O	Anesthesia		%
66	FiDes	Anesthesia		%
67	EtDes	Anesthesia		%
68	FiSev	Anesthesia		%
69	EtSev	Anesthesia		%
70	FiEnf	Anesthesia		%
71	EtEnf	Anesthesia		%
72	FiIso	Anesthesia		%
73	EtIso	Anesthesia		%
74	FiHal	Anesthesia		%
75	EtHal	Anesthesia		%
76	FiAA	Anesthesia		%
77	EtAA	Anesthesia		%

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78	FiAA 2nd	Anesthesia		%
79	EtAA 2nd	Anesthesia		%
80	Insp. MAC	Anesthesia		
81	Exp. MAC	Anesthesia		
82	MAC	Anesthesia		
83	ATMP	Anesthesia		mmHg
84	HALlev	Anesthesia		ml
85	ENFlev	Anesthesia		ml
86	ISOlev	Anesthesia		ml
87	DESlev	Anesthesia		ml
88	SEVlev	Anesthesia		ml
89	VO2	Anesthesia		ml/min
90	VO2/m2	Anesthesia		ml/min/m2
91	VO2/kg	Anesthesia		ml/min/kg
92	VCO2	Anesthesia		ml/min
93	EE	Anesthesia		kcal/day
94	RQ	Anesthesia		
95	PO2	Anesthesia		kPa
96	PN2O	Anesthesia		kPa
97	Pair	Anesthesia		kPa
98	O2 cyl.	Anesthesia		kPa

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99	O2 cyl.2nd	Anesthesia		kPa
100	N2O cyl.	Anesthesia		kPa
101	Air cyl.	Anesthesia		kPa
102	FG	Anesthesia		ml/min
103	N2O Flow	Anesthesia		L/min
104	Air Flow	Anesthesia		L/min
105	O2 Flow	Anesthesia		L/min
106	Des flow	Anesthesia		ml/h
107	Enf flow	Anesthesia		ml/h
108	Iso flow	Anesthesia		ml/h
109	Hal flow	Anesthesia		ml/h
110	Sev flow	Anesthesia		ml/h
111	IBW	Anesthesia		kg
112	BSA	Anesthesia		m2
113	BIS	Anesthesia		
114	SQI	Anesthesia		
115	SR	Anesthesia		
116	EMG	Anesthesia		dB
117	SEF	Anesthesia		Hz
118	TP	Anesthesia		dB
119	BC	Anesthesia		/min

120	SpO2	Anesthesia		%
121	PR	Anesthesia		bpm
122	MV	Anesthesia		L/min
123	Rise Time%	Anesthesia		%
124	Tinsp	Anesthesia		%
125	Tpause	Anesthesia		%
126	Tpause	Anesthesia		s
127	PC above PEEP	Anesthesia		cmH2O
128	PS above PEEP	Anesthesia		cmH2O
129	Ti/Ttot	Anesthesia		
130	F-Trigger	Anesthesia		
131	O2%	Anesthesia		%
0	O2%	Ventilator		%
1	PEEP	Ventilator		cmH2O
2	PEEP	Ventilator		cmH2O
3	Ppeak	Ventilator		cmH2O
4	Pplat	Ventilator		cmH2O
5	Pmean	Ventilator		cmH2O

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6	Paw	Ventilator		cmH2O
7	VT	Ventilator		ml
8	VTe	Ventilator		ml
9	VTi	Ventilator		ml
10	VT/kg	Ventilator		ml/kg
11	VTe spn	Ventilator		ml
12	VTapnea	Ventilator		ml
13	MV	Ventilator		L/min
14	MVspn	Ventilator		L/min
15	MVe	Ventilator		L/min
16	MVi	Ventilator		L/min
17	ftot	Ventilator		bpm
18	fmand	Ventilator		bpm
19	fspn	Ventilator		bpm
20	fapnea	Ventilator		bpm
21	fCMV	Ventilator		bpm
22	fSIMV	Ventilator		bpm
23	f	Ventilator		bpm
24	I:E	Ventilator		
25	I:E	Ventilator		
26	fsigh	Ventilator		bpm

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27	VTsigh	Ventilator		ml
28	$\Delta$ int.PEEP	Ventilator		cmH2O
29	MVLEAK	Ventilator		L/min
30	Leak Comp	Ventilator		%
31	FiO2	Ventilator		%
32	FiO2	Ventilator		mmHg
33	EtO2	Ventilator		%
34	EtO2	Ventilator		mmHg
35	$\Delta$ O2	Ventilator		%
36	$\Delta$ O2	Ventilator		mmHg
37	Rstat	Ventilator		cmH2O/L/s
38	Rdyn	Ventilator		cmH2O/L/s
39	Cstat	Ventilator		ml/cmH2O
40	Cdyn	Ventilator		ml/cmH2O
41	RSBI	Ventilator		1/(min · L)
42	WOB	Ventilator		J/L
43	WOBimp	Ventilator		J/min
44	O2 Flow	Ventilator		L/min
45	Air Flow	Ventilator		L/min
46	Insp Flow	Ventilator		L/min
47	Exp Flow	Ventilator		L/min

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48	Base Flow	Ventilator		L/min
49	Tsupp	Ventilator		s
50	F-Trigger	Ventilator		L/min
51	Trigger	Ventilator		%
52	P-Trigger	Ventilator		cmH2O
53	Psupp	Ventilator		cmH2O
54	Plimit	Ventilator		cmH2O
55	Tplat	Ventilator		s
56	Tinsp	Ventilator		s
57	Texp	Ventilator		s
58	Pinsp	Ventilator		cmH2O
59	Papnea	Ventilator		cmH2O
60	Pause	Ventilator		s
61	Tpause	Ventilator		%
62	Trise	Ventilator		s
63	Rise Time%	Ventilator		%
64	Phigh	Ventilator		cmH2O
65	Plow	Ventilator		cmH2O
66	Thigh	Ventilator		s
67	Tlow	Ventilator		s
68	Exp%	Ventilator		%



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69	Pmax	Ventilator		cmH2O
70	PC above PEEP	Ventilator		cmH2O
71	PS above PEEP	Ventilator		cmH2O
72	PEEP/CPAP	Ventilator		cmH2O
73	Paux Peak	Ventilator		cmH2O
74	Paux Mean	Ventilator		cmH2O
75	Paux Min	Ventilator		cmH2O
76	Base Press	Ventilator		cmH2O
77	Ri	Ventilator		cmH2O/L/s
78	Re	Ventilator		cmH2O/L/s
79	RCexp	Ventilator		s
80	RCinsp	Ventilator		s
81	PTP	Ventilator		cmH2O.s
82	Pmin	Ventilator		cmH2O
83	Vtrap	Ventilator		ml
84	PO2	Ventilator		kPa
85	Pair	Ventilator		kPa
86	O2 cyl.	Ventilator		kPa
87	O2 cyl.2nd	Ventilator		kPa
88	Air cyl.	Ventilator		kPa

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89	FRC	Ventilator		ml
90	T	Ventilator		° C
91	NIF	Ventilator		cmH2O
92	P0.1	Ventilator		cmH2O
93	PEEPi	Ventilator		cmH2O
94	PEEPe	Ventilator		cmH2O
95	PEEPtot	Ventilator		cmH2O
96	EtCO2	Ventilator		%
97	EtCO2	Ventilator		mmHg
98	FiCO2	Ventilator		%
99	FiCO2	Ventilator		mmHg
100	RRCO2	Ventilator		bpm
101	Flow	Ventilator		L/min
102	Peak Flow	Ventilator		L/min
103	Ext. Flow	Ventilator		L/min
104	Tapnea	Ventilator		s
105	IBW	Ventilator		kg
106	Ti max	Ventilator		s
107	Tip	Ventilator		s
108	TRC	Ventilator		
109	ASB ramp	Ventilator		s

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110	Ramp	Ventilator		ms
111	PASB	Ventilator		cmH2O
112	FlowAssist	Ventilator		mbar.s/L
113	Vol. Assist	Ventilator		mbar.s/L
114	Tdisconnect	Ventilator		s
115	FlowAcc	Ventilator		mbar/s
116	%MinVol	Ventilator		%
117	Vds	Ventilator		ml
118	EE	Ventilator		kcal/day
119	RQ	Ventilator		
120	VO2	Ventilator		ml/min
121	VCO2	Ventilator		ml/min
122	VO2/m2	Ventilator		ml/min/m2
123	VCO2/m2	Ventilator		ml/min/m2
124	VO2/kg	Ventilator		mL/min/kg
125	VCO2/kg	Ventilator		mL/min/kg
126	ATC	Ventilator		%
127	Tube ID	Ventilator		mm
128	PR	Ventilator		bpm
129	SpO2	Ventilator		%
130	O2%	Ventilator		%

131	MV	Ventilator		L/min
132	Tpause	Ventilator		s
133	Tpeep	Ventilator		s
134	VTCO2	Ventilator		ml
135	F-Trigger	Ventilator		
136	Ti/Ttot	Ventilator		

## B.2 Parameter Attribute Part

ID	Sub ID	Text	Description	Value Range
2002	Parameter ID	Alarm upper limit	Alarm upper limit. Uses Sub ID to specify parameter ID. Example: OBX     NM   2002 ^ Alarm Limit High   103   100           F In which, 103(Sub ID) is the ID of parameter ST1. Refer to <i>Appendix B.1</i> . Indication: The ST1 alarm upper limit is 100.	/
2003	Parameter ID	Alarm lower limit	Alarm low limit. Uses Sub ID to specify parameter ID. Example: OBX     NM   2003 ^ Alarm Limit Low   103   40           F In which, 103(Sub ID) is the ID of parameter ST1. Refer to <i>Appendix B.1</i> . Indication: The ST1 alarm lower limit is 40.	/

2009	Parameter ID	Alarm Level	<p>Alarm level.</p> <p>Uses Sub ID to specify parameter ID.</p> <p>Example: OBX  CE 2009^Alarm Level 101 3^Low     F</p> <p>In which, 101 (Sub ID) is the ID of parameter HR. Refer to <i>Appendix B.1</i>.</p> <p>Indication: The alarm level of HR is "Low".</p>	<p>0:Unknown 1:High 2:Middle 3:Low</p>
2023	/	Module Load	<p>Module Load Event</p> <p>Example: OBX  CE 2023^ModuleLoad  2102^RESP       F</p> <p>Indication: RESP module is loaded.</p>	<p>Module ID Refer to <i>Appendix B.3</i></p>
2024	/	Module UnLoad	<p>Module UnLoad Event</p> <p>Example: OBX  CE 2024^ModuleUnLoad  2102^RES P     F</p> <p>Indication: RESP module is unloaded.</p>	<p>Module ID Refer to <i>Appendix B.3</i></p>

2025	Module ID	Module Load & Unload Parameter List	<p>Parameter list in case of module loaded &amp; unloaded.</p> <p>Example: When the ECG module is loaded, the loaded parameters are:</p> <p>OBX  CE 2025^ 2101 101^HR     F</p> <p>OBX  CE 2025^ 2101 102^PVCs     F</p> <p>OBX  CE 2025^ 2101 105^ST-I     F</p> <p>OBX  CE 2025^ 2101 106^ST-II     F</p> <p>OBX  CE 2025^ 2101 107^ST-III     F</p> <p>.....</p>	<p>Parameter ID</p> <p>Refer to <i>Appendix B.1</i></p>
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## B.3 Module ID Part

### Note

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- The module names below are for reference only. The actual ones are subject to what the server side sends.
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ID	Text	Description
2101	ECG	ECG Module ID
2102	RESP	RESP Module ID
2103	SPO2	SPO2 Module ID
2104	TEMP	TEMP Module ID
2105	NIBP	NIBP Module ID
2106	AG	AG Module ID
2107	Vent	Ventilator Module ID(anaesthesia monitoring module)
2108	CO	CO Module ID
2109	CO2	CO2 Module ID
2110	IBP12	IBP12 Module ID
2111	IBP34	IBP34 Module ID



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2112	BIS	BIS Module ID
2113	RM	RM Module ID
2114	ICG	ICG Module ID
2115	PR	PR Module ID
2116	ART	IBP ART Module ID
2117	PA	IBP PA Module ID
2118	CVP	IBP CVP Module ID
2119	RAP	IBP RAP Module ID
2120	LAP	IBP LAP Module ID
2121	ICP	IBP ICP Module ID
2122	IBP P1	IBP P1 Module ID
2123	IBP P2	IBP P2 Module ID
2124	IBP P3	IBP P3 Module ID
2125	IBP P4	IBP P4 Module ID
2126	IBP P5	IBP P5 Module ID
2127	IBP P6	IBP P6 Module ID
2128	IBP P7	IBP P7 Module ID
2129	IBP P8	IBP P8 Module ID
2130	Ao	IBP Ao Module ID
2131	UAP	IBP UAP Module ID
2132	BAP	IBP BAP Module ID

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2133	FAP	IBP FAP Module ID
2134	UVP	IBP UVP Module ID
2135	IBP AUX1	IBP AUX1 Module ID
2136	IBP AUX2	IBP AUX2 Module ID
2137	IBP AUX3	IBP AUX3 Module ID
2138	IBP AUX4	IBP AUX4 Module ID
2139	IBP AUX5	IBP AUX5 Module ID
2140	IBP AUX6	IBP AUX6 Module ID
2141	IBP AUX7	IBP AUX7 Module ID
2142	IBP AUX8	IBP AUX8 Module ID
2143	LVP	IBP LVP Module ID
2144	CCO	CCO Module ID
2145	SvO2	SvO2 Module ID
2146	pART	PICCO ART Module ID
2147	pCVP	PICCO CVP Module ID
2148	Anesthesia	Anesthesia Module ID
2149	Ventilator	Ventilator Module ID
2150	SPO2B	Single SPO2 Module ID
2151	TCGas	TCGas Module ID
2152	EEG	EEG Module ID
2153	EEG1	EEG Channel 1 Module ID

2154	EEG2	EEG Channel 2 Module ID
2155	EEG3	EEG Channel 3 Module ID
2156	EEG4	EEG Channel 4 Module ID
2157	NMT	NMT Module ID
2158	ART2	IBP ART2 Module ID
2159	IAP	IBP IAP Module ID
2160	CPP	IBP CPP Module ID
2161	TWSX_NMT	TWSX NMT Module ID
2162	rSO2_CH1	RSO2 Channel 1 Module ID
2163	rSO2_CH2	RSO2 Channel 2 Module ID
2164	rSO2_CH3	RSO2 Channel 3 Module ID
2165	rSO2_CH4	RSO2 Channel 4 Module ID
2166	SINGLE_TEMP	SINGLE TEMP Module ID
2167	VCO2	VCO2 Module ID

## B.4 Patient and Monitor Information Part

### Note

- The Text to which ID corresponds is below is for reference only. The actual ones are subject to what the server side sends.

ID	Text	Sub ID	Description	Value Range	Data Type
2301	Patient Medical ID	/	<p>Patient medical number.</p> <p>OBX  ST 2301^  Mindray23445     F</p> <p>Indication: Patient medical number is “Mindray23445”.</p>	< 64 bytes	ST
2302	Blood	/	<p>Blood type.</p> <p>OBX  CE 2302^Blood type 1^A     F</p> <p>Indication: Blood type is “A”.</p>	0:Unknown 1:A 2:B 3:AB 4:O 5:NA	CE

2303	Pace Switch	/	Pace switch. OBX  CE 2303^Pace  1^On      F	0:Off 1:On 2:Unkown	CE
2304	MonitorName	/	Monitor name. OBX  ST 2304^MonitorName  ICUMon 1    F	< 32 bytes	ST
2305	Standby	/	Stand by state. OBX  CE 2405^Standby  1^Standby    F	0:No 1:Standby	CE
2211	IP Seq	/	Telemetry transmitter serial number OBX  NM 2211^  0^    F	0~255	NM
4523	/	/	Name of the CMS or PDS Gateway OBX  ST 4523^ cms_name    F	< 64 bytes	ST
4524	/	/	Count of left connections OBX  NM 4524^  32    F	0-128	NM
4525	/	/	Highest alarm level OBX  CE 4525^highest alm  5^    F	0:None 1:Prompt 2:Low 3:Medium 4:High 5:Exclusive	CE
4560	/	/	Database version(unused) OBX  NM 4560^db version  1    F	/	NM
4561	/	/	CMS system time OBX  ST 4561^  20181213174852    F	< 64 bytes	ST



## B.5 Control and Setting Part

### Note

- The Text to which ID corresponds is below is for reference only. The actual ones are subject to what the server side sends.

ID	Text	Sub ID	Description	Value Range	Data Type
2306	HighestAlmLevel	/	The highest alarm level of the patient monitor currently. OBX  CE 2306^HighestAlmLevel  2^MiddleLevel     F	0: unknown 1: High Level 2: Middle Level 3: Low Level 4: None	CE
2307	HighestAlmType	/	The type of highest alarm level of the patient monitor currently. OBX  CE 2307^HighestAlmType  1^Phys     F	0: None 1: physiological alarms (Phys) 2: Technical alarms (Tech) Notes: If there are physiological alarms and	CE

				technical alarms currently with the same alarm level, this filed is value of "Phys".	
2209	Tell_Call	/	If the bedside device is telemetry, this segment describes whether there is a Event or Nurse Call.	0: None 1: NurseCall 2: User Event 3: Event and Nurse Call 4: Stop Nurse Call 5: Stop User Event	CE
2032	AlarmSetting	/	Whether alarms of the equipment are in one of these statuses: alarm off, alarm pause, audio alarm off, alarm silence, or none of above statuses (i.e. in normal alarming status) OBX  CE 2032^AlarmSetting  0^AlmNormal     F	0: AlmNormal 1: AlmSilence 2: AlmSoundOFF 3、AlmPause 4、AlmOFF	CE
2404	Lead_Type	/	ECG lead type OBX  CE 2404^Leed_Type  3^Lead_12     F	0: Unknown 1: 3 Lead 2: 5 Lead 3: 12 Lead	CE
3902	PR Source	/	The Source of PR parameter. OBX  CE 3902^PR_Source  2^IBP     F	0: Unknown 1: SPO2 2: IBP	CE
2415	HR_PR Alarm Source	/	Alarm source of the HR and PR parameter. OBX  CE 2415^HR_PR_Alm_Src  3^HR(Auto)     F	0: Unknown 1: HR (Manual ) 2: PR (Manual ) 3: HR (Auto)	CE



				4: PR (Auto)	
2394	Connect_State	/	The bedside monitor is disconnected or power off. OBX  CE 2394^ Connect_State  1^Disconnected     F	1: Disconnected	CE
4520	/	/	Used for bed list information to specify the number of beds. OBX  NM 4520^ 2     F	0 to 255	NM
4521	/	/	Used for bed list information to specify the start/end control flag of a bed list. OBX  CE 4521^ 1^     F	“1” indicates start. and “2” for end. “5” indicates start of offline bed and “6” for end of offline bed.	CE
2213	RR Source	/	The Source of RR parameter. OBX  CE 2213^RR_Source  2^CO2     F	0: Unknown 1: CO2 2: CO2 (GAS) 3: RM 4:ECG	CE

## B.6 Physiological Alarm ID Part

**Note**

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- The Text to which ID corresponds is below is for reference only. The actual ones are subject to what the server side sends.
- 

ID	Text
10000	Unknown Phys. Alarm
10001	HR Too High
10002	HR Too Low
10003	ST1 Too High
10004	ST1 Too Low
10005	ST2 Too High
10006	ST2 Too Low
10007	ST-I Too High
10008	ST-I Too Low
10009	ST-II Too High
10010	ST-II Too Low
10011	ST-III Too High
10012	ST-III Too Low
10013	ST-aVR Too High
10014	ST-aVR Too Low
10015	ST-aVL Too High
10016	ST-aVL Too Low
10017	ST-aVF Too High
10018	ST-aVF Too Low

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10019	ST-V1 Too High
10020	ST-V1 Too Low
10021	ST-V2 Too High
10022	ST-V2 Too Low
10023	ST-V3 Too High
10024	ST-V3 Too Low
10025	ST-V4 Too High
10026	ST-V4 Too Low
10027	ST-V5 Too High
10028	ST-V5 Too Low
10029	ST-V6 Too High
10030	ST-V6 Too Low
10031	PVCs Too High
10032	PVCs Too Low
10033	SpO2 Too High
10034	SpO2 Too Low
10035	PR Too High
10036	PR Too Low
10037	NIBP-Sys Too High
10038	NIBP-Sys Too Low
10039	NIBP-Mean Too High
10040	NIBP-Mean Too Low
10041	NIBP-Dia Too High
10042	NIBP-Dia Too Low
10043	RR Too High

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10044	RR Too Low
10045	IBP1-Sys Too High
10046	IBP1-Sys Too Low
10047	IBP1-Mean Too High
10048	IBP1-Mean Too Low
10049	IBP1-Dia Too High
10050	IBP1-Dia Too Low
10051	IBP2-Sys Too High
10052	IBP2-Sys Too Low
10053	IBP2-Mean Too High
10054	IBP2-Mean Too Low
10055	IBP2-Dia Too High
10056	IBP2-Dia Too Low
10057	IBP3-Sys Too High
10058	IBP3-Sys Too Low
10059	IBP3-Mean Too High
10060	IBP3-Mean Too Low
10061	IBP3-Dia Too High
10062	IBP3-Dia Too Low
10063	IBP4-Sys Too High
10064	IBP4-Sys Too Low
10065	IBP4-Mean Too High
10066	IBP4-Mean Too Low
10067	IBP4-Dia Too High
10068	IBP4-Dia Too Low

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10069	FiCO2 Too High
10070	FiCO2 Too Low
10071	EtCO2 Too High
10072	EtCO2 Too Low
10073	awRR Too High
10074	awRR Too Low
10075	T1 Too High
10076	T1 Too Low
10077	T2 Too High
10078	T2 Too Low
10079	Td Too High
10080	Td Too Low
10081	TB Too High
10082	TB Too Low
10083	EtCO2 Too High
10084	EtCO2 Too Low
10085	FiCO2 Too High
10086	FiCO2 Too Low
10087	EtO2 Too High
10088	EtO2 Too Low
10089	FiO2 Too High
10090	FiO2 Too Low
10091	EtN2O Too High
10092	EtN2O Too Low
10093	FiN2O Too High

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10094	FiN2O Too Low
10095	EtAA Too High
10096	EtAA Too Low
10097	FiAA Too High
10098	FiAA Too Low
10099	EtHAL Too High
10100	EtHAL Too Low
10101	FiHAL Too High
10102	FiHAL Too Low
10103	EtENF Too High
10104	EtENF Too Low
10105	FiENF Too High
10106	FiENF Too Low
10107	EtISO Too High
10108	EtISO Too Low
10109	FiISO Too High
10110	FiISO Too Low
10111	EtSEV Too High
10112	EtSEV Too Low
10113	FiSEV Too High
10114	FiSEV Too Low
10115	EtDES Too High
10116	EtDES Too Low
10117	FiDES Too High
10118	FiDES Too Low

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10119	AgAwRR Too High
10120	AgAwRR Too Low
10121	GAS Apnea
10122	ECG LOST
10123	No Pulse
10124	Apnea
10125	RESP Artifact
10126	CO2 Apnea
10127	Asystole
10128	Vfib/Vtac
10129	R ON T
10130	VT > 2
10131	Couplet
10132	PVC
10133	Bigeminy
10134	Trigeminy
10135	Tachy
10136	Brady
10137	PNC
10138	PNP
10139	Missed Beats
10140	SpO2 Desat
10141	FiO2 Too High
10142	FiO2 Too Low
10143	VTe Too High

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10144	VTe Too Low
10145	MV Too High
10146	MV Too Low
10147	Vent-Airway Too High
10148	Vent-Airway Too Low
10149	Vent-FREQ Too High
10150	Vent-FREQ Too Low
10151	Vent-Airway Keeping
10152	Vent-Negative Airway
10153	Vent-Apnea
10154	RMRR Too High
10155	RMRR Too Low
10156	PEEP Too High
10157	PEEP Too Low
10158	PIP Too High
10159	PIP Too Low
10160	MVe Too High
10161	MVe Too Low
10162	RM Apnea
10163	BIS Too High
10164	BIS Too Low
10165	C.I. Too High
10166	C.I. Too Low
10167	TFC Too High
10168	TFC Too Low



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10169	PR Too High
10170	PR Too Low
10171	ART-Sys Too High
10172	ART-Sys Too Low
10173	ART-Mean Too High
10174	ART-Mean Too Low
10175	ART-Dia Too High
10176	ART-Dia Too Low
10177	PA-Sys Too High
10178	PA-Sys Too Low
10179	PA-Mean Too High
10180	PA-Mean Too Low
10181	PA-Dia Too High
10182	PA-Dia Too Low
10183	Ao-Sys Too High
10184	Ao-Sys Too Low
10185	Ao-Mean Too High
10186	Ao-Mean Too Low
10187	Ao-Dia Too High
10188	Ao-Dia Too Low
10189	UAP-Sys Too High
10190	UAP-Sys Too Low
10191	UAP-Mean Too High
10192	UAP-Mean Too Low
10193	UAP-Dia Too High

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10194	UAP-Dia Too Low
10195	BAP-Sys Too High
10196	BAP-Sys Too Low
10197	BAP-Mean Too High
10198	BAP-Mean Too Low
10199	BAP-Dia Too High
10200	BAP-Dia Too Low
10201	FAP-Sys Too High
10202	FAP-Sys Too Low
10203	FAP-Mean Too High
10204	FAP-Mean Too Low
10205	FAP-Dia Too High
10206	FAP-Dia Too Low
10207	P1-Sys Too High
10208	P1-Sys Too Low
10209	P1-Mean Too High
10210	P1-Mean Too Low
10211	P1-Dia Too High
10212	P1-Dia Too Low
10213	P2-Sys Too High
10214	P2-Sys Too Low
10215	P2-Mean Too High
10216	P2-Mean Too Low
10217	P2-Dia Too High
10218	P2-Dia Too Low

10219	P3-Sys Too High
10220	P3-Sys Too Low
10221	P3-Mean Too High
10222	P3-Mean Too Low
10223	P3-Dia Too High
10224	P3-Dia Too Low
10225	P4-Sys Too High
10226	P4-Sys Too Low
10227	P4-Mean Too High
10228	P4-Mean Too Low
10229	P4-Dia Too High
10230	P4-Dia Too Low
10231	P5-Sys Too High
10232	P5-Sys Too Low
10233	P5-Mean Too High
10234	P5-Mean Too Low
10235	P5-Dia Too High
10236	P5-Dia Too Low
10237	P6-Sys Too High
10238	P6-Sys Too Low
10239	P6-Mean Too High
10240	P6-Mean Too Low
10241	P6-Dia Too High
10242	P6-Dia Too Low
10243	P7-Sys Too High

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10244	P7-Sys Too Low
10245	P7-Mean Too High
10246	P7-Mean Too Low
10247	P7-Dia Too High
10248	P7-Dia Too Low
10249	P8-Sys Too High
10250	P8-Sys Too Low
10251	P8-Mean Too High
10252	P8-Mean Too Low
10253	P8-Dia Too High
10254	P8-Dia Too Low
10255	Cust IBP 1-Sys Too High
10256	Cust IBP 1-Sys Too Low
10257	Cust IBP 1-Mean Too High
10258	Cust IBP 1-Mean Too Low
10259	Cust IBP 1-Dia Too High
10260	Cust IBP 1-Dia Too Low
10261	Cust IBP 2-Sys Too High
10262	Cust IBP 2-Sys Too Low
10263	Cust IBP 2-Mean Too High
10264	Cust IBP 2-Mean Too Low
10265	Cust IBP 2-Dia Too High
10266	Cust IBP 2-Dia Too Low
10267	Cust IBP 3-Sys Too High
10268	Cust IBP 3-Sys Too Low

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10269	Cust IBP 3-Mean Too High
10270	Cust IBP 3-Mean Too Low
10271	Cust IBP 3-Dia Too High
10272	Cust IBP 3-Dia Too Low
10273	Cust IBP 4-Sys Too High
10274	Cust IBP 4-Sys Too Low
10275	Cust IBP 4-Mean Too High
10276	Cust IBP 4-Mean Too Low
10277	Cust IBP 4-Dia Too High
10278	Cust IBP 4-Dia Too Low
10279	Cust IBP 5-Sys Too High
10280	Cust IBP 5-Sys Too Low
10281	Cust IBP 5-Mean Too High
10282	Cust IBP 5-Mean Too Low
10283	Cust IBP 5-Dia Too High
10284	Cust IBP 5-Dia Too Low
10285	Cust IBP 6-Sys Too High
10286	Cust IBP 6-Sys Too Low
10287	Cust IBP 6-Mean Too High
10288	Cust IBP 6-Mean Too Low
10289	Cust IBP 6-Dia Too High
10290	Cust IBP 6-Dia Too Low
10291	Cust IBP 7-Sys Too High
10292	Cust IBP 7-Sys Too Low
10293	Cust IBP 7-Mean Too High

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10294	Cust IBP 7-Mean Too Low
10295	Cust IBP 7-Dia Too High
10296	Cust IBP 7-Dia Too Low
10297	Cust IBP 8-Sys Too High
10298	Cust IBP 8-Sys Too Low
10299	Cust IBP 8-Mean Too High
10300	Cust IBP 8-Mean Too Low
10301	Cust IBP 8-Dia Too High
10302	Cust IBP 8-Dia Too Low
10303	CVP-Mean Too High
10304	CVP-Mean Too Low
10305	RAP-Mean Too High
10306	RAP-Mean Too Low
10307	LAP-Mean Too High
10308	LAP-Mean Too Low
10309	ICP-Mean Too High
10310	ICP-Mean Too Low
10311	UVP-Mean Too High
10312	UVP-Mean Too Low
10314	ST-V Too High
10315	ST-V Too Low
10316	FiO2 Shortage
10317	VTAC
10318	VRT
10319	Multif. PVC

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10320	Irr.Rhythm
10321	VFib
10322	Anesthetic Mixture's MAC>3
10323	No Heart Rate
10333	LV-Mean Too High
10334	LV-Mean Too Low
10335	CVP-Sys Too High
10336	CVP-Sys Too Low
10337	RAP-Sys Too High
10338	RAP-Sys Too Low
10339	LAP-Sys Too High
10340	LAP-Sys Too Low
10341	ICP-Sys Too High
10342	ICP-Sys Too Low
10343	UVP-Sys Too High
10344	UVP-Sys Too Low
10345	LV-Sys Too High
10346	LV-Sys Too Low
10347	CVP-Dia Too High
10348	CVP-Dia Too Low
10349	RAP-Dia Too High
10350	RAP-Dia Too Low
10351	LAP-Dia Too High
10352	LAP-Dia Too Low
10353	ICP-Dia Too High

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10354	ICP-Dia Too Low
10355	UVP-Dia Too High
10356	UVP-Dia Too Low
10357	LV-Dia Too High
10358	LV-Dia Too Low
10359	High Phys.Alarm
10360	Low Phys.Alarm
10361	High Phys.Alarm
10362	Low Phys.Alarm
10363	High Phys.Alarm
10364	Low Phys.Alarm
10365	Anesthetic Mixture
10366	BIS L Too High
10367	BIS L Too Low
10368	BIS R Too High
10369	BIS R Too Low
10370	Vent. Brady
10371	Extreme Tachy
10372	Extreme Brady
10373	Nonsus. Vtac
10374	Pause
10375	AFib
10385	CCO Too High
10386	CCO Too Low
10387	CCI Too High



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10388	CCI Too Low
10389	C.O. Too High
10390	C.O. Too Low
10391	C.I. Too High
10392	C.I. Too Low
10393	RVEF Too High
10394	RVEF Too Low
10395	TB Too High
10396	TB Too Low
10397	SVR Too High
10398	SVR Too Low
10399	SVRI Too High
10400	SVRI Too Low
10401	SV Too High
10402	SV Too Low
10403	SVI Too High
10404	SVI Too Low
10405	EDV Too High
10406	EDV Too Low
10407	EDVI Too High
10408	EDVI Too Low
10409	ESV Too High
10410	ESV Too Low
10411	ESVI Too High
10412	ESVI Too Low

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10413	CVP Too High
10414	CVP Too Low
10415	MAP Too High
10416	MAP Too Low
10417	HR Too High
10418	HR Too Low
10419	SVV Too High
10420	SVV Too Low
10468	SvO2 Too High
10469	SvO2 Too Low
10470	ScvO2 Too High
10471	ScvO2 Too Low
10472	SaO2 Too High
10473	SaO2 Too Low
10474	VO2 Too High
10475	VO2 Too Low
10476	O2EI Too High
10477	O2EI Too Low
10478	DO2 Too High
10479	DO2 Too Low
10480	SQI Too High
10481	SQI Too Low
10531	pART-Sys Too High
10532	pART-Sys Too Low
10533	pART-Mean Too High

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10534	pART-Mean Too Low
10535	pART-Dia Too High
10536	pART-Dia Too Low
10537	pCVP-Sys Too High
10538	pCVP-Sys Too Low
10539	pCVP Too High
10540	pCVP Too Low
10541	pCVP-Dia Too High
10542	pCVP-Dia Too Low
10543	Alarm Pause
10544	Extra Circulation
10545	SPO2b Too High
10546	SPO2b Too Low
10547	Delta SPO2 Too High
10548	SPO2b Below Desat Limit
10549	TCGAS TCPCO2 OVER LINE
10550	TCGAS TCPO2 OVER LINE
10551	TCGAS SPO2 OVER LINE
10552	TCGAS PR OVER LINE
10592	Unknown Phys. Alarm
10593	Unknown Phys. Alarm
10594	Unknown Phys. Alarm
10595	Unknown Phys. Alarm
10596	Unknown Phys. Alarm
10597	Unknown Phys. Alarm

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10598	Unknown Phys. Alarm
10599	Unknown Phys. Alarm
10609	PR Too High
10610	PR Too Low
10611	Temp Too High
10612	Temp Too Low
10613	RR Too High
10614	RR Too Low
10624	NMT Block Recovery
10634	ETO2 Alarm
10635	FIO2 Alarm
10636	ETN2O Alarm
10637	FIN2O Alarm
10638	ETAA Alarm
10639	FIAA Alarm
10640	ETHAL Alarm
10641	FIHAL Alarm
10642	ETENF Alarm
10643	FIENF Alarm
10644	ETISO Alarm
10645	FIISO Alarm
10646	ETSEV Alarm
10647	FISEV Alarm
10648	ETDES Alarm
10649	FIDES Alarm

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10669	Cpp Too High
10670	Cpp Too Low
10671	QTc Too High
10672	QTc Too Low
10673	Delta QTc Too High
10674	Delta QTc Too Low
10675	CCO Stat Too High
10676	CCO Stat Too Low
10677	CCI Stat Too High
10678	CCI Stat Too Low
10679	Pauses Too High
10680	Pauses Too Low
10681	ART2-Sys Too High
10682	ART2-Sys Too Low
10683	ART2-Mean Too High
10684	ART2-Mean Too Low
10685	ART2-Diaoo High
10686	ART2-Diao Low
10687	IAP-Sys Too High
10688	IAP -Sys Too Low
10689	IAP -Sys Too High
10690	IAP -Sys Too Low
10691	IAP -Sys Too High
10692	IAP -Sys Too Low
10702	TWSX TOF Out Of Limit

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10712	RSO2 CH1 Too High
10713	RSO2 CH1 Too Low
10714	RSO2 CH1 Change Percent Too Low
10715	RSO2 CH2 Too High
10716	RSO2 CH2 Too Low
10717	RSO2 CH2 Change Percent Too Low
10718	RSO2_2 CH1 Too High
10719	RSO2_2 CH1 Too Low
10720	RSO2_2 CH1 Change Percent Too Low
10721	RSO2_2 CH2 Too High
10722	RSO2_2 CH2 Too Low
10723	RSO2_2 CH2 Change Percent Too Low
10724	CO2 ETO2 Too High
10725	CO2 ETO2 Too Low
10726	CO2 FIO2oo High
10727	CO2 FIO2o Low
10728	CO2 FIO2 Shortage
10729	RESP NCM
10730	T3 Too High
10731	T3 Too Low
10732	T4 Too High
10733	T4 Too Low

## B.7 Technical Alarm ID Part

### Note

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- The Text to which ID corresponds is below is for reference only. The actual ones are subject to what the server side sends.
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ID	Text
0	Unknown
1	HIGH Tech. Alarm
2	MED Tech. Alarm
3	LOW Tech. Alarm
4	Lead Off
5	ECG Lead Off
6	ECG V Lead Off
7	ECG LL Lead Off
8	ECG LA Lead Off
9	ECG RA Lead Off
10	ECG V Lead Off
11	ECG LL Lead Off
12	ECG LA Lead Off
13	ECG RA Lead Off
14	ECG C Lead Off

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15	ECG F Lead Off
16	ECG L Lead Off
17	ECG R Lead Off
18	ST Learning
19	Arrh. Learning
20	ECG Learning
21	ECG Initialization Error
22	ECG Initialization Error (1)
23	ECG Initialization Error (2)
24	ECG Initialization Error (3)
25	ECG Initialization Error (4)
26	ECG Initialization Error (5)
27	ECG Initialization Error (6)
28	ECG Initialization Error (7)
29	ECG Initialization Error (8)
30	ECG CH1 Selftest Error
31	ECG CH2 Selftest Error
32	ECG Communication Stopped
33	ECG Communication Error
34	HR Alarm Limit Error
35	PVCs Alarm Limit Error
36	ST Alarm Limit Error
37	ECG Noisy Signal
38	HR Out of Range
39	PVCs Out of Range



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40	ST Out of Range
41	ST1 Out of Range
42	ST2 Out of Range
43	ST3 Out of Range
44	ST4 Out of Range
45	ST5 Out of Range
46	ST6 Out of Range
47	ST7 Out of Range
48	RR Alarm Limit Error
49	RR Out of Range
50	RESP Disturbed
51	ECG1 Signal Saturated
52	ECG2 Signal Saturated
53	Defib. Sync. On
54	ECG3 Signal Saturated
55	ECG1 Overloaded
56	ECG2 Overloaded
57	ECG3 Overloaded
58	ECG V1 Lead Off
59	ECG V2 Lead Off
60	ECG V3 Lead Off
61	ECG V4 Lead Off
62	ECG V5 Lead Off
63	ECG V6 Lead Off
64	ECG CH3 Selftest Error

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65	ECG CH4 Selftest Error
66	ECG CH5 Selftest Error
67	ECG CH6 Selftest Error
68	ECG CH7 Selftest Error
69	ECG CH8 Selftest Error
70	ST-I Out of Range
71	ST-II Out of Range
72	ST-III Out of Range
73	ST-aVR Out of Range
74	ST-aVF Out of Range
75	ST-aVL Out of Range
76	ST-V1 Out of Range
77	ST-V2 Out of Range
78	ST-V3 Out of Range
79	ST-V4 Out of Range
80	ST-V5 Out of Range
81	ST-V6 Out of Range
82	ECG4 Signal Saturated
83	ECG5 Signal Saturated
84	ECG6 Signal Saturated
85	ECG7 Signal Saturated
86	ECG8 Signal Saturated
87	ECG V1 Lead Off
88	ECG V2 Lead Off
89	ECG V3 Lead Off

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90	ECG V4 Lead Off
91	ECG V5 Lead Off
92	ECG V6 Lead Off
93	ECG Signal Invalid
94	ECG Signal Invalid
95	ECG Signal Invalid
96	ECG Signal Invalid
97	ECG Signal Invalid
98	ECG Signal Invalid
99	ECG Signal Invalid
100	ECG Signal Invalid
101	ST-V Out of Range
102	ECG Calibrating
103	PVCs Alarm Limit Error
104	ST-I Alarm Limit Error
105	ST-II Alarm Limit Error
106	ST-III Alarm Limit Error
107	ST-aVR Alarm Limit Error
108	ST-aVL Alarm Limit Error
109	ST-aVF Alarm Limit Error
110	ST-V Alarm Limit Error
111	ST-V1 Alarm Limit Error
112	ST-V2 Alarm Limit Error
113	ST-V3 Alarm Limit Error
114	ST-V4 Alarm Limit Error

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115	ST-V5 Alarm Limit Error
116	ST-V6 Alarm Limit Error
117	ECG High Frequency Noise
118	ECG Low Frequency Noise
119	ECG Artifact
120	ECG Dominant Rhythm Change
121	ECG Amplitude Too Small
122	ECG Config. Error
123	Electrode Poor Contact
124	ECG Communication Abnormal
126	ECG N Lead Off
127	Pads Off
128	Pads Cable Off
129	Pacer Stopped Abnormally
130	Pads/Paddles Off
131	ECG Lead Off
132	ECG Selftest Error
133	ECG Lead Off
134	Acquiring ECG
135	ECG Module Error
136	ECG Cable Type Error
137	Check Lead Connections
138	QT Overrange
139	QTc Overrange
140	ECG Va Lead Off

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141	ECG Vb Lead Off
142	ST-Va Overrange
143	ST-Vb Overrange
144	ST-Va Limit Error
145	ST-Vb Limit Error
146	Can Not Analyze QT
147	QTc Alarm Error
148	Delta QTc Alarm Error
205	SpO2 Sensor Off
206	SpO2 Searching for Pulse
207	SpO2 Initialization Error
208	SpO2 Initialization Error (1)
209	SpO2 Initialization Error (2)
210	SpO2 Initialization Error (3)
211	SpO2 Initialization Error (4)
212	SpO2 Initialization Error (5)
213	SpO2 Initialization Error (6)
214	SpO2 Initialization Error (7)
215	SpO2 Initialization Error (8)
216	SpO2 Communication Stopped
217	SpO2 Communication Error
218	SpO2 Alarm Limit Error
219	SpO2 Out of Range
220	PR Alarm Limit Error
221	PR Out of Range

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222	SpO2 Weak Pulse
223	SpO2 Weak Signal
224	SpO2 Check Sensor
225	SpO2 Sensor in Motion
226	SpO2 Interference
227	SpO2 Low Perfusion
228	SpO2 Too Much Light
229	SpO2 Unrecognized Sensor
230	SpO2 Board Fault
231	SpO2 Sensor Fault
232	SpO2 No Sensor
233	SpO2 Low Signal
234	SpO2 Incompatible Sensor
235	SpO2 Out of Track
236	SpO2 Pulse Error
237	SpO2 Marginal Perfusion
238	SpO2 Non-Pulsatile
239	SpO2 Selftest Error
240	SpO2 Communication Abnormal
241	SpO2 Module Error
242	SpO2 Unplugged
405	NIBP-Sys Alarm Limit Error
406	NIBP-Mean Alarm Limit Error
407	NIBP-Dia Alarm Limit Error
408	NIBP-Sys Out of Range

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409	NIBP-Mean Out of Range
410	NIBP-Dia Out of Range
455	NIBP Initialization Error
456	NIBP Selftest Error
457	NIBP Communication Error
458	NIBP Loose Cuff
459	NIBP Air Leaf
460	NIBP Air Pressure Error
461	NIBP Weak Signal
462	NIBP Out of Range
463	NIBP Excessive Motion
464	NIBP Over Pressure
465	NIBP Signal Saturated
466	NIBP Pneumatic Leak
467	NIBP System Failure
468	NIBP Timed Out
469	NIBP Wrong Cuff Type
470	NIBP Measurement Failed
471	NIBP Reset Error
474	NIBP Reset due to Error
475	NIBP VeniPuncture timeout
605	T1 Sensor Off
606	T2 Sensor Off
607	TEMP Board Failure
608	TEMP Initialization Error

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609	TEMP Initialization Error (1)
610	TEMP Initialization Error (2)
611	TEMP Initialization Error (3)
612	TEMP Initialization Error (4)
613	TEMP Initialization Error (5)
614	TEMP Initialization Error (6)
615	TEMP Initialization Error (7)
616	TEMP Initialization Error (8)
617	T1 Alarm Limit Error
618	T2 Alarm Limit Error
619	TD Alarm Limit Error
620	T1 Out of Range
621	T2 Out of Range
622	TD Out of Range
623	TEMP Communication Error
624	TEMP Communication Stopped
625	TEMP Selftest Error
626	TEMP Calibration Error
627	TEMP Warmup Timed-Out
628	TEMP Error Warming Resistor
629	TempIF Ambient Temp High
630	TempIF Ambient Temp Low
631	TEMP Voltage High
632	TEMP Voltage Low
633	TEMP Prediction Error



634	TEMP Probe Off
635	TEMP Wrong Probe
636	TEMP No Probe
637	TEMP High Limit Out of Range
638	TEMP Low Limit Out of Range
639	TEMP Probe Misplaced
640	TEMP Warming Up
641	TEMP Prediction Ready
643	TEMP Prediction Over
645	TEMP Measurement Complete
647	TEMP Communication Abnormal
648	Temp Alarm Limit Err
649	Temp Measuring Timeout
650	Cannot Take Neonatal Rectal Temp
651	T3 Sensor Off
652	T3 Alarm Limit Error
653	T3 Out of Range
654	Temp Module Error
655	T4 Sensor Off
656	T4 Alarm Limit Error
657	TD2 Alarm Limit Error
658	T4 Out of Range
659	TEMP2 Communication Error
660	TEMP2 Communication Stopped
661	TEMP2 Selftest Error

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662	TEMP2 Calibration Error
663	TEMP2 Communication Abnormal
664	TEMP2 Power Error
665	TEMP2 Module Error
805	IBP1 Sensor Off
806	IBP2 Sensor Off
807	IBP3 Sensor Off
808	IBP4 Sensor Off
809	IBP(1,2) Initialization Error
810	IBP(1,2) Initialization Error (1)
811	IBP(1,2) Initialization Error (2)
812	IBP(1,2) Initialization Error (3)
813	IBP(1,2) Initialization Error (4)
814	IBP(1,2) Initialization Error (5)
815	IBP(1,2) Initialization Error (6)
816	IBP(1,2) Initialization Error (7)
817	IBP(1,2) Initialization Error (8)
818	IBP(3,4) Initialization Error
819	IBP(3,4) Initialization Error (1)
820	IBP(3,4) Initialization Error (2)
821	IBP(3,4) Initialization Error (3)
822	IBP(3,4) Initialization Error (4)
823	IBP(3,4) Initialization Error (5)
824	IBP(3,4) Initialization Error (6)
825	IBP(3,4) Initialization Error (7)

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826	IBP(3,4) Initialization Error (8)
827	IBP(1,2) Communication Error
828	IBP(1,2) Communication Stopped
829	IBP(3,4) Communication Error
830	IBP(3,4) Communication Stopped
831	IBP 1 Alarm Limit Error
832	IBP 2 Alarm Limit Error
833	IBP 3 Alarm Limit Error
834	IBP 4 Alarm Limit Error
835	IBP 1-Sys Out of Range
836	IBP 1-Dia Out of Range
837	IBP 1-Mean Out of Range
838	IBP 2-Sys Out of Range
839	IBP 2-Dia Out of Range
840	IBP 2-Mean Out of Range
841	IBP 3-Sys Out of Range
842	IBP 3-Dia Out of Range
843	IBP 3-Mean Out of Range
844	IBP 4-Sys Out of Range
845	IBP 4-Dia Out of Range
846	IBP 4-Mean Out of Range
847	IBP 1 Needs Zeroing
848	IBP 2 Needs Zeroing
849	IBP 3 Needs Zeroing
850	IBP 4 Needs Zeroing

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851	IBP1 Communication Abnormal
852	IBP2 Communication Abnormal
853	IBP3 Communication Abnormal
854	IBP4 Communication Abnormal
1005	TB Sensor Off
1006	TB Alarm Limit Error
1007	TB Out of Range
1008	C.O. Initialization Error
1009	C.O. Initialization Error1
1010	C.O. Initialization Error2
1011	C.O. Initialization Error3
1012	C.O. Initialization Error4
1013	C.O. Initialization Error5
1014	C.O. Initialization Error6
1015	C.O. Initialization Error7
1016	C.O. Initialization Error8
1017	C.O. Communication Error
1018	C.O. Communication Stopped
1019	Ti Out of Range
1020	C.O. Out of Range
1021	C.O. Selftest Error
1022	C.O. Communication Abnormal
1023	C.O No Sensor
1205	CO2 Standby Status
1206	CO2 Sensor Off

1207	CO2 Warm Up
1208	CO2 Sensor Warm Up
1209	CO2 No Watertrap
1210	CO2 Watertrap Occlude
1211	CO2 Signal Low
1212	CO2 Signal Too Low
1213	CO2 Barometric Too Large
1214	CO2 Pneumatic Leak
1215	CO2 Signal Noisy
1216	CO2 Signal Saturated
1217	CO2 Calculation Error
1218	CO2 Sensor Fault
1219	CO2 Sensor Temp High
1220	CO2 Sensor Temp Low
1221	CO2 Watchdog Timeout
1222	CO2 System Error (1)
1223	CO2 System Error (2)
1224	CO2 Internal Communication Error
1225	CO2 System Error (3)
1226	CO2 System Error (4)
1227	CO2 System Error (5)
1228	CO2 System Error (6)
1229	CO2 Pump Fault
1230	CO2 Reverse Flow
1231	CO2 Forward Flow

1232	CO2 Malfunction
1233	CO2 Barometric High
1234	CO2 Barometric Low
1235	CO2 Initialization Error
1236	CO2 Communication Error
1237	CO2 Communication Stopped
1238	EtCO2 Alarm Limit Error
1239	FiCO2 Alarm Limit Error
1240	awRR Alarm Limit Error
1241	EtCO2 Out of Range
1242	FiCO2 Out of Range
1243	awRR Out of Range
1244	CO2 Maintain
1245	CO2 Start Up
1246	CO2 Calibrate Zero
1247	CO2 Calibrate
1248	CO2 Airway Press Too High
1249	CO2 Airway Press Too Low
1250	CO2 Hardware Error
1251	CO2 FilterLine Error
1252	CO2 Zeroing Failed
1253	CO2 User Calibrate Fail
1254	CO2 Factory Calibrate Fail
1255	CO2 System Error
1256	EX-A/D 2.5V Power Error

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1257	CO2 12V Power Error
1258	IN-A/D 2.5V Power Error
1259	CO2 Pump Abnormal
1260	CO2 Value Abnormal
1261	Motor Abnormal
1262	RESERVED
1263	RESERVED
1264	EEPROM R/W ADDR ERR
1265	EEPROM R/W LENGTH ERR
1266	EEPROM RESPONSE ERROR
1267	EEPROM CHECKSUM ERROR
1268	EX-AD SAMPLE CHANNEL ERR
1269	IN-AD SAMPLE CHANNEL ERR
1270	CO2 Selfcheck Error
1271	COMM TXD BUFFER FULL
1272	COMM RXD REGISTER ERROR
1273	COMM RXD BUFFER FULL
1274	COMM RXD OVERTIME
1275	COMM RXD ILLEGAL ASCII
1276	COMM RXD FRAME ERROR
1277	COMM RXD LENGTH ERROR
1278	CO2 Power Up
1279	CO2 SFM
1280	CO2 Sensor Warm Up
1281	CO2 Calibrate

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1282	CO2 Overage
1283	CO2 Check Calibration
1284	CO2 Check Airway
1285	CO2 FilterLine Occluded
1286	CO2 Replace Main Board
1287	CO2 Check Sensor or PCB
1288	CO2 Replace Scrubber&Pump
1289	CO2 Change Sensor
1290	CO2 15V Overage
1291	CO2 No Filterline
1292	CO2 Purging
1293	CO2 Calibrate Error
1294	CO2 Barometric Too High
1295	CO2 Barometric Too Low
1296	CO2 NEED ZERO-CAL
1297	CO2 Check Adapter
1298	CO2 Main Board Err
1299	CO2 Replace Scrubber&Pump
1300	CO2 Check Sensor
1301	CO2 15V Overage
1302	CO2 Temp Overage
1303	CO2 No Sensor
1304	CO2 Communication Abnormal
1305	Normalization Failed!
1405	AG Standby



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1406	AG is Starting
1407	AG Warming Up
1408	AG No Water Trap
1409	AG Change Water Trap
1410	AG Wrong Water Trap
1411	AG Initialization Failed
1412	AG Communication Stopped
1413	AG Occlusion
1414	AG Communication Error
1415	AG Hardware Error
1416	AG Paramagnetic O2 Error
1417	AG Galvanic O2 Sensor Error
1418	AG Oxima Depletion Warn
1419	AG Oxima Depletion Error
1420	AG Data Limit Error
1421	AG Accuracy Error
1422	AG Zeroing Failed
1423	AG Calibration Failed
1424	EtCO2 Alarm Limit Error
1425	FiCO2 Alarm Limit Error
1426	EtO2 Alarm Limit Error
1427	FiO2 Alarm Limit Error
1428	EtN2O Alarm Limit Error
1429	FiN2O Alarm Limit Error
1430	EtAA Alarm Limit Error

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1431	FiAA Alarm Limit Error
1432	AgAwRR Alarm Limit Error
1433	CO2 Sensor Off
1434	AG Selftest Error
1435	EtHal Alarm Limit Error
1436	FiHal Alarm Limit Error
1437	EtEnf Alarm Limit Error
1438	FiEnf Alarm Limit Error
1439	EtIso Alarm Limit Error
1440	FiIso Alarm Limit Error
1441	EtSev Alarm Limit Error
1442	FiSev Alarm Limit Error
1443	EtDes Alarm Limit Error
1444	FiDes Alarm Limit Error
1445	EtCO2 Out of Range
1446	FiCO2 Out of Range
1447	EtO2 Out of Range
1448	FiO2 Out of Range
1449	EtN2O Out of Range
1450	FiN2O Out of Range
1451	AgAwRR Out of Range
1452	EtHal Out of Range
1453	FiHal Out of Range
1454	EtEnf Out of Range
1455	FiEnf Out of Range

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1456	EtIso Out of Range
1457	FiIso Out of Range
1458	EtSev Out of Range
1459	FiSev Out of Range
1460	EtDes Out of Range
1461	FiDes Out of Range
1462	CO2 Accuracy Unspecified
1463	O2 Accuracy Unspecified
1464	N2O Accuracy Unspecified
1465	AgAwRR Accuracy Unspecified
1466	Hal Accuracy Unspecified
1467	Enf Accuracy Unspecified
1468	Iso Accuracy Unspecified
1469	Sev Accuracy Unspecified
1470	Des Accuracy Unspecified
1471	AG Hardware Error
1472	AG Hardware Error
1473	AG Hardware Error
1474	AG Hardware Error
1475	AG Hardware Error
1476	AG Hardware Error
1477	AG Hardware Malfunction
1478	Anesthetic Mixture
1479	AG Communication Abnormal
1480	AG Module Not Connected

1481	AG Module Zero In Progress
1605	System WD Failure
1606	System Software Error
1607	System CMOS Full
1608	System CMOS Error
1609	System FPGA Failure
1610	RT Clock Need Reset
1611	RT Clock Not Exist
1612	System Failure (2)
1613	System Failure (3)
1614	System Failure (4)
1615	System Failure (5)
1616	System Failure (6)
1617	System Failure (7)
1618	System Failure (8)
1619	System Failure (9)
1620	System Failure (10)
1621	System Failure (11)
1622	System Failure (12)
1623	CF Storage Card Error
1624	IP Address Conflict
1625	Parameter Accuracy Error
1626	Loading User Config. Failed
1627	Loading Factory Config. Failed
1628	Restoring Last Config. Failed

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1629	Loading Default Config. Failed
1630	Storage Card Space Low
1631	CoolingFanFailure
1632	No Fan
1633	No Speaker
1634	No Data Card
1635	Power Board Comm Err
1636	Therapy Module Comm Err
1637	Main Control Selftest Err
1638	Data Card Err
1639	ECG algorithm mismatched
1640	Keyboard Comm Err
1641	Last User Test Failed
1642	Last Auto Test Failed
1643	Load Config Err
1644	Therapy Equip Selftest Err
1645	Defib Malfunction
1646	Pacer Malfunction
1647	Disarming Failed
1648	Monitor Module Selftest Err
1649	Monitor Module Reset Err
1650	Monitor Module Voltage Err
1651	Do not Charge/Discharge Frequently
1652	Machine Type Error
1653	USB Drive Err

1654	USB Drive Space Low
1655	Battery Charging Err
1656	Device Error
1805	Keyboard Error
1806	Keyboard Error (1)
1807	Keyboard Error (2)
1808	Keyboard Error (3)
1809	Keyboard Error (4)
1810	Keyboard Error (7)
1811	Keyboard Error (8)
1812	Keyboard Not Available
1813	Keyboard Communications Error
1814	Keyboard Error
1815	Keyboard Error (1)
1816	Keyboard Error (2)
1817	Keyboard Failure, Please Restart System
2005	Network Initialization Error (G)
2006	Network Initialization Error (Ram)
2007	Network Initialization Error (Reg)
2008	Network Initialization Error (Mii)
2009	Network Initialization Error (Loop)
2010	Network Error (Run 1)
2011	Network Error (Run 2)
2012	Network Error (Run 3)
2013	Network Error (Run 4)

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2205	5V Too High
2206	5V Too Low
2207	Power Error (3)
2208	Power Error (4)
2209	12V Too High
2210	12V Too Low
2211	Power Error (7)
2212	Power Error (8)
2213	Cell Bat Too High
2214	Cell Bat Too Low
2215	3.3V Too High
2216	3.3V Too Low
2217	Battery Power Low
2218	20m Battery Power Left
2219	10m Batter Power Left
2220	Battery Too Hot
2221	Battery Overcharged
2222	Voltage Too High
2223	Voltage Too Low
2224	Battery Not Match
2225	RT Clock Need Reset
2226	RT Clock Not Exist
2227	iView requires AC power.
2228	Only One Battery
2229	Power Board Communication Stopped

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2230	Battery Depleted
2231	Low Battery
2232	Battery Overload
2233	Power Board Volt Err
2234	No Battery
2235	Battery 1 Err
2236	Battery 2 Err
2237	Battery 1 Aged
2238	Battery 2 Aged
2239	Battery 1 failed charging
2240	Battery 2 failed charging
2241	RT Clock Err
2242	Battery failed charging
2243	Battery Aged
2244	Battery Error
2245	Power Board Selftest Err
2246	Power Interrupted
2247	Battery Aging
2405	Recorder Initialization Error
2406	Recorder Initialization Error (1)
2407	Recorder Initialization Error (2)
2408	Recorder Initialization Error (3)
2409	Recorder Initialization Error (4)
2410	Recorder Initialization Error (7)
2411	Recorder Initialization Error (8)



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2412	Recorder Selftest Error
2413	Recorder Initializing
2414	Recorder Busy
2415	Recorder Voltage High
2416	Recorder Voltage Low
2417	Recorder is Too Hot
2418	Recorder Out of Alignment
2419	Recorder Out of Paper
2420	Recorder Paper Jam
2421	Recorder Communication Error
2422	Recorder Queue Full
2423	Recorder Paper W.P.
2424	Recorder S. Communication Error
2425	Recorder Not Available
2426	Recorder Initialization Error (5)
2427	Recorder Initialization Error (6)
2428	Recorder Overcurrent
2605	Patient information conflict
2606	Waveform Storage Full
2607	Offline
2608	Auto Associated with ADT
2609	Patient information conflict
2610	Monitor in Privacy Mode
2611	Monitor in Night Mode
2612	Monitor Mode

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2613	Manual Mode
2614	Pacer Mode
2615	AED Mode
2616	Durative Prompt Operation
2617	Durative Prompt 12Analyze Result
2618	Merging Data...
2619	T1 Unloaded
2620	Patient config being transferred in...
2621	Patient leaves the bed.
2806	Low Battery
2807	RF Interference
2808	No RF Signal
2809	Receiver Fault
2810	Nurse Call
2811	User Event
2812	Wrong ID
2813	Wrong Channel
2814	NIBP Pod Master CPU Selfcheck Error
2815	NIBP Pod Slave CPU Selfcheck Error
2816	NIBP Pod Battery Low
2817	Spo2 Pod Selfcheck Error
2818	Battery Depleted
2819	Sendbox Selfcheck Error
2820	Battery Type Error
2821	MO Selfcheck Error

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2822	MO Communications Stopped
2823	MO Communications Error
2824	Telemetry RF Protocol Dismatch
3205	RM Selftest Error
3206	RM Communications Error
3207	RM Communications Stopped
3208	RM No Sensor
3209	RM Sensor Reversed
3210	RM Zeroing Error
3211	RM User Cal Fail
3212	RM Fctory Cal Fail
3213	RM Zeroing
3214	RM Calibrating
3215	RMRR Alarm Limit Error
3216	PEEP Alarm Limit Error
3217	MVe Alarm Limit Error
3218	Ppeak Alarm Limit Error
3219	RMRR Out of Range
3220	PEEP Out of Range
3221	Mve Out of Range
3222	Ppeak Out of Range
3223	RM Power Error
3224	RM Checking...
3225	RM Communication Abnormal
3226	RM Module Error

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3227	RM PPLAT Out of Range
3228	RM PMEAN Out of Range
3229	RM TVI Out of Range
3230	RM TVE Out of Range
3231	RM MVI Out of Range
3232	RM PIF Out of Range
3233	RM PEF Out of Range
3234	RM IE Out of Range
3235	RM COMPL Out of Range
3236	RM RAW Out of Range
3237	RM FEV Out of Range
3238	RM RSBI Out of Range
3239	RM WOB Out of Range
3240	RM NIP Out of Range
3241	RM Inner Sensor Fault
3242	RM Artema Not Calibrate
3405	BIS Initialization Error
3406	BISx Disconnected
3407	BIS Communication Error
3408	BIS Alarm Limit Error
3409	BIS Out of Range
3410	BIS SQI Out of Range
3411	BIS SR Out of Range
3412	BIS EMG Out of Range
3413	BIS Interference

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3414	BIS High Impedence
3415	BIS Sensor Off
3416	BIS DSC Error
3417	BIS DSC Malfunction
3418	BIS No Cable
3419	BIS No Sensor
3420	BIS Sensor Error
3421	BIS SQI <50%
3422	BIS SQI <15%
3423	BIS Sensor Expired
3424	BIS Cyclic Checking
3425	BIS Ground Checking
3426	BIS Sensor Check Failed
3427	BIS Sensor Usage
3428	BIS Sensor Fault
3429	Reconnect BIS
3430	BIS in Demo
3431	BISx Disconnected
3432	BIS Communication Abnormal
3433	BIS SQI L<15%
3434	BIS SQI R<15%
3435	BIS SQI L<50%
3436	BIS SQI R<50%
3437	BIS L Overrange
3438	BIS R Overrange

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3439	BIS Electrode Unconnected
3440	BIS Wrong Sensor Type
3441	BIS Electrode 1 High Imped.
3442	BIS Electrode 1 Lead Off
3443	BIS Electrode 2 High Imped.
3444	BIS Electrode 2 Lead Off
3445	BIS Electrode 3 High Imped.
3446	BIS Electrode 3 Lead Off
3447	BIS Electrode 4 High Imped.
3448	BIS Electrode 4 Lead Off
3449	BIS Electrode G High Imped.
3450	BIS Electrode G Lead Off
3451	BIS Electrode C High Imped.
3452	BIS Electrode C Lead Off
3453	BIS Electrode LE High Imped.
3454	BIS Electrode LE Lead Off
3455	BIS Electrode LT High Imped.
3456	BIS Electrode LT Lead Off
3457	BIS Electrode RE High Imped.
3458	BIS Electrode RE Lead Off
3459	BIS Electrode RT High Imped.
3460	BIS Electrode RT Lead Off
3461	BIS Sensor Checking
3462	Replace the SRS sensor cable
3605	C.I. Alarm Limit Error

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3606	TFC Alarm Limit Error
3607	ICG Low Quality Signal
3608	ICG L.Neck Sensor Off
3609	ICG R.Neck Sensor Off
3610	ICG L.Thorax Sensor Off
3611	ICG R.Thorax Sensor Off
3612	ICG Sensor Off
3613	ICG Initialization Error
3614	ICG Communications Error
3615	ICG Communications Stopped
3616	C.I. Out of Range
3617	TFC Out of Range
3618	ICG Sensor Check
3619	ICG Communication Abnormal
3620	ICG Module Error
3621	ICG Cable Off
3622	ICG Electrode L1 Off
3623	ICG Electrode R1 Off
3624	ICG Electrode L2/3 Off
3625	ICG Electrode R2/3 Off
3626	ICG Electrode L4 Off
3627	ICG Electrode R4 Off
3805	ART-Sys Alarm Limit Error
3806	ART-Mean Alarm Limit Error
3807	ART-Dia Alarm Limit Error

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3808	ART-Sys Out of Range
3809	ART-Mean Out of Range
3810	ART-Dia Out of Range
3811	ART Sensor Off
3812	ART Needs Zeroing
3813	ART Communication Error
3814	ART Communication Stopped
3815	ART Initialization Error
3816	ART Communication Abnormal
3817	ART Search Pulse
3818	ART No Pulse
3826	PA-Sys Alarm Limit Error
3827	PA-Mean Alarm Limit Error
3828	PA-Dia Alarm Limit Error
3829	PA-Sys Out of Range
3830	PA-Mean Out of Range
3831	PA-Dia Out of Range
3832	PA Sensor Off
3833	PA Needs Zeroing
3834	PA Communication Error
3835	PA Communication Stopped
3836	PA Initialization Error
3837	PA Communication Abnormal
3838	PA Search Pulse
3839	PA No Pulse



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3847	CVP- Sys Alarm Limit Error
3848	CVP-Mean Alarm Limit Error
3849	CVP- Dia Alarm Limit Error
3850	CVP- Sys Out of Range
3851	CVP-Mean Out of Range
3852	CVP- Dia Out of Range
3853	CVP Sensor Off
3854	CVP Needs Zeroing
3855	CVP Communication Error
3856	CVP Communication Stopped
3857	CVP Initialization Error
3858	CVP Communication Abnormal
3859	CVP Search Pulse
3860	CVP No Pulse
3869	ICP-Mean Alarm Limit Error
3872	ICP-Mean Out of Range
3874	ICP Sensor Off
3875	ICP Needs Zeroing
3876	ICP Communication Error
3877	ICP Communication Stopped
3878	ICP Initialization Error
3879	ICP Communication Abnormal
3880	ICP Search Pulse
3881	ICP No Pulse
3889	LAP- Sys Alarm Limit Error

3890	LAP- Mean Alarm Limit Error
3891	LAP-Dia Alarm Limit Error
3892	LAP- Sys Out of Range
3893	LAP- Mean Out of Range
3894	LAP- Dia Out of Range
3895	LAP Sensor Off
3896	LAP Needs Zeroing
3897	LAP Communication Error
3898	LAP Communication Stopped
3899	LAP Initialization Error
3900	LAP Communication Abnormal
3901	LAP Search Pulse
3902	LAP No Pulse
3910	RAP- Sys Alarm Limit Error
3911	RAP-Mean Alarm Limit Error
3912	RAP- Dia Alarm Limit Error
3913	RAP- Sys Out of Range
3914	RAP-Mean Out of Range
3915	RAP- Dia Out of Range
3916	RAP Sensor Off
3917	RAP Needs Zeroing
3918	RAP Communication Error
3919	RAP Communication Stopped
3920	RAP Initialization Error
3921	RAP Communication Abnormal

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3922	RAP Search Pulse
3923	RAP No Pulse
3931	UAP-Sys Alarm Limit Error
3932	UAP-Mean Alarm Limit Error
3933	UAP-Dia Alarm Limit Error
3934	UAP-Sys Out of Range
3935	UAP-Mean Out of Range
3936	UAP-Dia Out of Range
3937	UAP Sensor Off
3938	UAP Needs Zeroing
3939	UAP Communication Error
3940	UAP Communication Stopped
3941	UAP Initialization Error
3942	UAP Communication Abnormal
3943	UAP Search Pulse
3944	UAP No Pulse
3952	UVP- Sys Alarm Limit Error
3953	UVP-Mean Alarm Limit Error
3954	UVP- Dia Alarm Limit Error
3955	UVP- Sys Out of Range
3956	UVP-Mean Out of Range
3956	UVP- Dia Out of Range
3958	UVP Sensor Off
3959	UVP Needs Zeroing
3960	UVP Communication Error

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3961	UVP Communication Stopped
3962	UVP Initialization Error
3963	UVP Communication Abnormal
3964	UVP Search Pulse
3965	UVP No Pulse
3973	Ao-Sys Alarm Limit Error
3974	Ao-Mean Alarm Limit Error
3975	Ao-Dia Alarm Limit Error
3976	Ao-Sys Out of Range
3977	Ao-Mean Out of Range
3978	Ao-Dia Out of Range
3979	Ao Sensor Off
3980	Ao Needs Zeroing
3981	Ao Communication Error
3982	Ao Communication Stopped
3983	Ao Initialization Error
3984	Ao Communication Abnormal
3985	Ao Search Pulse
3986	Ao No Pulse
3994	FAP-Sys Alarm Limit Error
3995	FAP-Mean Alarm Limit Error
3996	FAP-Dia Alarm Limit Error
3997	FAP-Sys Out of Range
3998	FAP-Mean Out of Range
3999	FAP-Dia Out of Range

4000	FAP Sensor Off
4001	FAP Needs Zeroing
4002	FAP Communication Error
4003	FAP Communication Stopped
4004	FAP Initialization Error
4005	FAP Communication Abnormal
4006	FAP Search Pulse
4007	FAP No Pulse
4015	BAP-Sys Alarm Limit Error
4016	BAP-Mean Alarm Limit Error
4017	BAP-Dia Alarm Limit Error
4018	BAP-Sys Out of Range
4019	BAP-Mean Out of Range
4020	BAP-Dia Out of Range
4021	BAP Sensor Off
4022	BAP Needs Zeroing
4023	BAP Communication Error
4024	BAP Communication Stopped
4025	BAP Initialization Error
4026	BAP Communication Abnormal
4027	BAP Search Pulse
4028	BAP No Pulse
4036	P1-Sys Alarm Limit Error
4037	P1-Mean Alarm Limit Error
4038	P1-Dia Alarm Limit Error

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4039	P1-Sys Out of Range
4040	P1-Mean Out of Range
4041	P1-Dia Out of Range
4042	P1 Sensor Off
4043	P1 Needs Zeroing
4044	P1 Communication Error
4045	P1 Communication Stopped
4046	P1 Initialization Error
4047	P1 Communication Abnormal
4048	P1 Search Pulse
4049	P1 No Pulse
4057	P2-Sys Alarm Limit Error
4058	P2-Mean Alarm Limit Error
4059	P2-Dia Alarm Limit Error
4060	P2-Sys Out of Range
4061	P2-Mean Out of Range
4062	P2-Dia Out of Range
4063	P2 Sensor Off
4064	P2 Needs Zeroing
4065	P2 Communication Error
4066	P2 Communication Stopped
4067	P2 Initialization Error
4068	P2 Communication Abnormal
4069	P2 Search Pulse
4070	P2 No Pulse

4078	P3-Sys Alarm Limit Error
4079	P3-Mean Alarm Limit Error
4080	P3-Dia Alarm Limit Error
4081	P3-Sys Out of Range
4082	P3-Mean Out of Range
4083	P3-Dia Out of Range
4084	P3 Sensor Off
4085	P3 Needs Zeroing
4086	P3 Communication Error
4087	P3 Communication Stopped
4088	P3 Initialization Error
4089	P3 Communication Abnormal
4090	P3 Search Pulse
4091	P3 No Pulse
4099	P4-Sys Alarm Limit Error
4100	P4-Mean Alarm Limit Error
4101	P4-Dia Alarm Limit Error
4102	P4-Sys Out of Range
4103	P4-Mean Out of Range
4104	P4-Dia Out of Range
4105	P4 Sensor Off
4106	P4 Needs Zeroing
4107	P4 Communication Error
4108	P4 Communication Stopped
4109	P4 Initialization Error

4110	P4 Communication Abnormal
4111	P4 Search Pulse
4112	P4 No Pulse
4120	P5-Sys Alarm Limit Error
4121	P5-Mean Alarm Limit Error
4122	P5-Dia Alarm Limit Error
4123	P5-Sys Out of Range
4124	P5-Mean Out of Range
4125	P5-Dia Out of Range
4126	P5 Sensor Off
4127	P5 Needs Zeroing
4128	P5 Communication Error
4129	P5 Communication Stopped
4130	P5 Initialization Error
4131	P5 Communication Abnormal
4132	P5 Search Pulse
4133	P5 No Pulse
4141	P6-Sys Alarm Limit Error
4142	P6-Mean Alarm Limit Error
4143	P6-Dia Alarm Limit Error
4144	P6-Sys Out of Range
4145	P6-Mean Out of Range
4146	P6-Dia Out of Range
4147	P6 Sensor Off
4148	P6 Needs Zeroing



4149	P6 Communication Error
4150	P6 Communication Stopped
4151	P6 Initialization Error
4152	P6 Communication Abnormal
4153	P6 Search Pulse
4154	P6 No Pulse
4162	P7-Sys Alarm Limit Error
4163	P7-Mean Alarm Limit Error
4164	P7-Dia Alarm Limit Error
4165	P7-Sys Out of Range
4166	P7-Mean Out of Range
4167	P7-Dia Out of Range
4168	P7 Sensor Off
4169	P7 Needs Zeroing
4170	P7 Communication Error
4171	P7 Communication Stopped
4172	P7 Initialization Error
4173	P7 Communication Abnormal
4174	P7 Search Pulse
4175	P7 No Pulse
4183	P8-Sys Alarm Limit Error
4184	P8-Mean Alarm Limit Error
4185	P8-Dia Alarm Limit Error
4186	P8-Sys Out of Range
4187	P8-Mean Out of Range

4188	P8-Dia Out of Range
4189	P8 Sensor Off
4190	P8 Needs Zeroing
4191	P8 Communication Error
4192	P8 Communication Stopped
4193	P8 Initialization Error
4194	P8 Communication Abnormal
4195	P8 Search Pulse
4196	P8 No Pulse
4204	SD1-Sys Alarm Limit Error
4205	SD1-Mean Alarm Limit Error
4206	SD1-Dia Alarm Limit Error
4207	SD1-Sys Out of Range
4208	SD1-Mean Out of Range
4209	SD1-Dia Out of Range
4210	SD1 Sensor Off
4211	SD1 Needs Zeroing
4212	SD1 Communication Error
4213	SD1 Communication Stopped
4214	SD1 Initialization Error
4215	SD1 Communication Abnormal
4216	SD1 Search Pulse
4217	SD1 No Pulse
4225	SD2-Sys Alarm Limit Error
4226	SD2-Mean Alarm Limit Error

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4227	SD2-Dia Alarm Limit Error
4228	SD2-Sys Out of Range
4229	SD2-Mean Out of Range
4230	SD2-Dia Out of Range
4231	SD2 Sensor Off
4232	SD2 Needs Zeroing
4233	SD2 Communication Error
4234	SD2 Communication Stopped
4235	SD2 Initialization Error
4236	SD2 Communication Abnormal
4237	SD2 Search Pulse
4238	SD2 No Pulse
4246	SD3-Sys Alarm Limit Error
4247	SD3-Mean Alarm Limit Error
4248	SD3-Dia Alarm Limit Error
4249	SD3-Sys Out of Range
4250	SD3-Mean Out of Range
4251	SD3-Dia Out of Range
4252	SD3 Sensor Off
4253	SD3 Needs Zeroing
4254	SD3 Communication Error
4255	SD3 Communication Stopped
4256	SD3 Initialization Error
4257	SD3 Communication Abnormal
4258	SD3 Search Pulse

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4259	SD3 No Pulse
4267	SD4-Sys Alarm Limit Error
4268	SD4-Mean Alarm Limit Error
4269	SD4-Dia Alarm Limit Error
4270	SD4-Sys Out of Range
4271	SD4-Mean Out of Range
4272	SD4-Dia Out of Range
4273	SD4 Sensor Off
4274	SD4 Needs Zeroing
4275	SD4 Communication Error
4276	SD4 Communication Stopped
4277	SD4 Initialization Error
4278	SD4 Communication Abnormal
4279	SD4 Search Pulse
4280	SD4 No Pulse
4288	SD5-Sys Alarm Limit Error
4289	SD5-Mean Alarm Limit Error
4290	SD5-Dia Alarm Limit Error
4291	SD5-Sys Out of Range
4292	SD5-Mean Out of Range
4293	SD5-Dia Out of Range
4294	SD5 Sensor Off
4295	SD5 Needs Zeroing
4296	SD5 Communication Error
4297	SD5 Communication Stopped

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4298	SD5 Initialization Error
4299	SD5 Communication Abnormal
4300	SD5 Search Pulse
4301	SD5 No Pulse
4309	SD6-Sys Alarm Limit Error
4310	SD6-Mean Alarm Limit Error
4311	SD6-Dia Alarm Limit Error
4312	SD6-Sys Out of Range
4313	SD6-Mean Out of Range
4314	SD6-Dia Out of Range
4315	SD6 Sensor Off
4316	SD6 Needs Zeroing
4317	SD6 Communication Error
4318	SD6 Communication Stopped
4319	SD6 Initialization Error
4320	SD6 Communication Abnormal
4321	SD6 Search Pulse
4322	SD6 No Pulse
4330	SD7-Sys Alarm Limit Error
4331	SD7-Mean Alarm Limit Error
4332	SD7-Dia Alarm Limit Error
4333	SD7-Sys Out of Range
4334	SD7-Mean Out of Range
4335	SD7-Dia Out of Range
4336	SD7 Sensor Off

4337	SD7 Needs Zeroing
4338	SD7 Communication Error
4339	SD7 Communication Stopped
4340	SD7 Initialization Error
4341	SD7 Communication Abnormal
4342	SD7 Search Pulse
4343	SD7 No Pulse
4351	SD8-Sys Alarm Limit Error
4352	SD8-Mean Alarm Limit Error
4353	SD8-Dia Alarm Limit Error
4354	SD8-Sys Out of Range
4355	SD8-Mean Out of Range
4356	SD8-Dia Out of Range
4357	SD8 Sensor Off
4358	SD8 Needs Zeroing
4359	SD8 Communication Error
4360	SD8 Communication Stopped
4361	SD8 Initialization Error
4362	SD8 Communication Abnormal
4363	SD8 Search Pulse
4364	SD8 No Pulse
4372	LV-Sys Alarm Limit Error
4373	LV-Mean Alarm Limit Error
4374	LV-Dia Alarm Limit Error
4375	LV-Sys Out of Range

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4376	LV-Mean Out of Range
4377	LV-Dia Out of Range
4378	LV Sensor Off
4379	LV Needs Zeroing
4380	LV Communication Error
4381	LV Communication Stopped
4382	LV Initialization Error
4383	LV Communication Abnormal
4384	LV Search Pulse
4385	LV No Pulse
4393	pART-Sys Alarm Limit Error
4394	pART-Mean Alarm Limit Error
4395	pART-Dia Alarm Limit Error
4396	pART-Sys Out of Range
4397	pART-Mean Out of Range
4398	pART-Dia Out of Range
4399	pART Sensor Off
4400	pART Needs Zeroing
4401	pART Communication Error
4402	pART Communication Stopped
4403	pART Initialization Error
4404	pART Communication Abnormal
4405	pART Search Pulse
4406	pART No Pulse
4414	pCVP-Sys Alarm Limit Error

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4415	pCVP-Mean Alarm Limit Error
4416	pCVP-Dia Alarm Limit Error
4417	pCVP-Sys Out of Range
4418	pCVP-Mean Out of Range
4419	pCVP-Dia Out of Range
4420	pCVP Sensor Off
4421	pCVP Needs Zeroing
4422	pCVP Communication Error
4423	pCVP Communication Stopped
4424	pCVP Initialization Error
4425	pCVP Communication Abnormal
4426	pCVP Search Pulse
4427	pCVP No Pulse
4435	pART2-Sys Alarm Limit Error
4436	pART2-Mean Alarm Limit Error
4437	pART2-Dia Alarm Limit Error
4438	pART2-Sys Out of Range
4439	pART2-Mean Out of Range
4440	pART2-Dia Out of Range
4441	pART2 Sensor Off
4442	pART2 Needs Zeroing
4443	pART2 Communication Error
4444	pART2 Communication Stopped
4445	pART2 Initialization Error
4446	pART2 Communication Abnormal



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4447	pART2 Search Pulse
4448	pART2 No Pulse
4456	IAP-Sys Alarm Limit Error
4457	IAP-Mean Alarm Limit Error
4458	IAP-Dia Alarm Limit Error
4459	IAP-Sys Out of Range
4460	IAP-Mean Out of Range
4461	IAP-Dia Out of Range
4462	IAP Sensor Off
4463	IAP Needs Zeroing
4464	IAP Communication Error
4465	IAP Communication Stopped
4466	IAP Initialization Error
4467	IAP Communication Abnormal
4468	IAP Search Pulse
4469	IAP No Pulse
5800	CCO Alarm Limit Error
5801	CCI Alarm Limit Error
5802	EDV Alarm Limit Error
5803	EDVI Alarm Limit Error
5804	SVR Alarm Limit Error
5805	SVRI Alarm Limit Error
5806	SV Alarm Limit Error
5807	SVI Alarm Limit Error
5808	RVEF Alarm Limit Error

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5809	SVO2 Alarm Limit Error
5810	SCVO2 Alarm Limit Error
5811	Disconnect from Vigilance
5812	SVV Alarm Limit Error
5813	Disconnect from Vigileo
5814	Invalid/Faulty PiCCO Catheter
5815	TB Sensor Off
5816	PiCCO Communication Abnormal
5817	PiCCO Communication Error
5818	PiCCO Initialization Error
5819	PiCCO Communications Stopped
5820	Inject Temp. Sensor Error
5821	Optical Module Error
5822	ScvO2 Signal Too High
5823	ScvO2 Signal Too Low
5824	ScvO2 Too Much Light
5825	Optical Module Disconnected
5826	ScvO2 Communication Abnormal
5827	ScvO2 Communication Error
5828	ScvO2 Initialization Error
5829	ScvO2 Communication Stopped
5830	Unsupported CeVOX version
5831	TB Out of Range
5832	TI Sensor Off
5833	TI Out of Range

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5834	Invalid CCO Calibration
5835	TB Calibration Error
5836	TI Calibration Error
6001	BeneLink Conflict
6002	BeneLink Comm Abnormal
6003	BeneLink Comm Stop
6004	BeneLink Init Err
6102	Search Singal
6103	No Battery
6104	T1 No Battery
6105	TCM Low Battery
6106	TCM Battery Depleted
6107	TCM Temperature Too High
6108	TCM Alert
6200	SpO2b Board Fault
6201	SpO2b Incompatible Sensor
6202	SpO2b Low Signal
6203	SpO2b Interference
6204	SpO2b Low Perfusion
6205	SpO2b Too Much Light
6206	SpO2b No Sensor
6207	SpO2b Sensor Fault
6208	SpO2b Unrecognized Sensor
6209	SpO2b Communication Error
6210	SpO2b Communication Stopped

6211	SpO2b Out of Range
6212	SpO2b Initialization Error
6213	SpO2b Sensor Off
6214	SpO2b Alarm Limit Error
6215	$\Delta$ SpO2 Alarm Limit Error
6216	SpO2b Non-Pulsatile
6217	SpO2b Searching for Pulse
6218	SpO2b Communication Abnormal
6219	SpO2b Shut Down
6301	EEG Sensor Off
6302	EEG Electrode A+: %s Off
6303	EEG Electrode A-: %s Off
6304	EEG Electrode B+: %s Off
6305	EEG Electrode B-: %s Off
6306	EEG Electrode C+: %s Off
6307	EEG Electrode C-: %s Off
6308	EEG Electrode D+: %s Off
6309	EEG Electrode D-: %s Off
6310	EEG Electrode A+: %s High Imped.
6311	EEG Electrode A-: %s High Imped.
6312	EEG Electrode B+: %s High Imped.
6313	EEG Electrode B-: %s High Imped.
6314	EEG Electrode C+: %s High Imped.
6315	EEG Electrode C-: %s High Imped.
6316	EEG Electrode D+: %s High Imped.

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6317	EEG Electrode D-: %s High Imped.
6318	EEG Electrode A+: %s Noise
6319	EEG Electrode A-: %s Noise
6320	EEG Electrode B+: %s Noise
6321	EEG Electrode B-: %s Noise
6322	EEG Electrode C+: %s Noise
6323	EEG Electrode C-: %s Noise
6324	EEG Electrode D+: %s Noise
6325	EEG Electrode D-: %s Noise
6326	EEG No Sensor
6327	EEG Init Err
6328	EEG Comm Err
6329	EEG Comm Stop
6330	EEG Comm Abnormal
6331	EEG Overcurrent
6332	EEG Calibrating
6333	EEG Sensor Checking
6402	NMT No Main Cable
6403	NMT No Sensor
6404	NMT Stimulation Electrode Off
6405	NMT Sensor Comm Err
6406	NMT Stimulation Current Over Limit
6407	NMT Comm Abnormal
6408	NMT Comm Stop
6409	NMT Comm Err

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6410	NMT Block Recovery Limit Err
6411	NMT Init Err
6412	NMT SelfTest Err
6413	NMT Power Err
6414	NMT Abnormal Reset
6415	TOF-Ratio Overage
6416	ST-Ratio Overage
6417	DBS-Ratio Overage
6418	NMT Sensor Failure
6419	NMT Module Error
6518	ART Disconnected
6519	Ao Disconnected
6520	UAP Disconnected
6521	FAP Disconnected
6522	BAP Disconnected
6523	LV Disconnected
6524	pART Disconnected
6525	P1 Disconnected
6526	P2 Disconnected
6527	P3 Disconnected
6528	P4 Disconnected
6629	T1 battery to be protected and not work.
6630	NMT Sensor Fault
6631	Read dock E2PROM error!
6632	ART Sensor Faulty

6633	PA Sensor Faulty
6634	Ao Sensor Faulty
6635	UAP Sensor Faulty
6636	BAP Sensor Faulty
6637	FAP Sensor Faulty
6638	CVP Sensor Faulty
6639	LAP Sensor Faulty
6640	RAP Sensor Faulty
6641	ICP Sensor Faulty
6642	UVP Sensor Faulty
6643	P1 Sensor Faulty
6644	P2 Sensor Faulty
6645	P3 Sensor Faulty
6646	P4 Sensor Faulty
6647	P5 Sensor Faulty
6648	P6 Sensor Faulty
6649	P7 Sensor Faulty
6650	P8 Sensor Faulty
6651	SD1 Sensor Faulty
6652	SD2 Sensor Faulty
6653	SD3 Sensor Faulty
6654	SD4 Sensor Faulty
6655	SD5 Sensor Faulty
6656	SD6 Sensor Faulty
6657	SD7 Sensor Faulty

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6658	LVP Sensor Faulty
6659	pART Sensor Faulty Or NIBP-Sys Out Of Up Range For Compatible
6660	pART Sensor Faulty Or NIBP-Sys Out Of Low Range For Compatible
6661	NIBP-Mean Out Of Up Range For Compatible
6662	NIBP-Mean Out Of Low Range For Compatible
6663	NIBP-Dia Out Of Up Range For Compatible
6664	NIBP-Dia Out Of Low Range For Compatible
6683	NIBP-Sys Out Of Up Range
6684	NIBP-Sys Out Of Low Range
6685	NIBP-Mean Out Of Up Range
6686	NIBP-Mean Out Of Low Range
6687	NIBP-Dia Out Of Up Range
6688	NIBP-Dia Out Of Low Range
6689	pART Sensor Faulty
6690	pCVP Sensor Faulty
6691	CPR Sensor Faulty
6692	CPR Sensor Battery Low
6693	CPR Sensor Need Maintain
6694	CPR Sensor Communication Error
6695	CPR Sensor Main Cable Fault



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6696	CPR Sensor Suggest Change Battery
6697	CPR Sensor Charging Fault
6698	ECG ST Analysis Suspend
7072	Tele Signal Lost
7073	Tele Break Of Data
7074	TWSX Battery Low
7075	TWSX Battery Exhaust
7076	TWSX No Transducer Sensor
7077	TWSX No Temp Sensor
7078	TWSX No Stimulation Cable
7079	TWSX Pads Bad Contact
7080	TWSX Tech Alarm
7081	CO Module Error
7082	TI Sensor Off
7083	RSO2 Module Error
7084	RSO2 CH1 Sensor Disconnect
7085	RSO2 CH2 Sensor Disconnect
7086	RSO2 CH1 Excess Light
7087	RSO2 CH2 Excess Light
7088	RSO2 CH1 Poor Signal
7089	RSO2 CH2 Poor Signal
7090	RSO2 Preamplifier Not Connect
7091	RSO2 CH1 Replace Sensor
7092	RSO2 Ch2 Replace Sensor
7093	RSO2 Interference

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7094	RSO2 CH1 Auto Baseline
7095	RSO2 CH2 Auto Baseline
7096	RSO2_2 Module Error
7097	RSO2_2 CH1 Sensor Disconnect
7098	RSO2_2 CH2 Sensor Disconnect
7099	RSO2_2 CH1 Excess Light
7100	RSO2_2 CH2 Excess Light
7101	RSO2_2 CH1 Poor Signal
7102	RSO2_2 CH2 Poor Signal
7103	RSO2_2 Preamplifier Not Connect
7104	RSO2_2 CH1 Replace Sensor
7105	RSO2_2 Ch2 Replace Sensor
7106	RSO2_2 Interference
7107	RSO2_2 CH1 Auto Baseline
7108	RSO2_2 CH2 Auto Baseline
7109	PICCO Module Error
7110	RSO2 Need Replug
7111	RSO2_2 Need Replug
7112	ICG Cable Error
7113	CO2 Need Change Watertrap
7114	CO2 Watertrap Mismatch Patient
7115	CO2 Module Error
7116	CO2 Need Replaceoxima Battery
7117	CO2 O2 Error
7118	SPO2 Module Error

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7119	Primary Screen Error
7120	Secondary Screen Error
7121	Resp LA-RA Poor Connect
7122	Resp LL-RA Poor Connect
7123	Pauses Out Of Range
7124	VPBs Out Of Range
7125	Couplets Out Of Range
7126	Missed Beats Out Of Range
7127	PNCs Out Of Range
7128	PNPs Out Of Range
7129	RonTs Out Of Range
7130	NIBP Module Error
7131	CO Out Of Range
7132	FiO2 Out Of Range
7133	EtO2 Out Of Range
7134	AG Module Error
7135	pART Module Error
7136	pCVP Module Error
7137	ART Module Error
7138	PA Module Error
7139	CVP Module Error
7140	ICP Module Error
7141	LAP Module Error
7142	RAP Module Error
7143	UAP Module Error

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7144	UVP Module Error
7145	AO Module Error
7146	FAP Module Error
7147	BAP Module Error
7148	IBP1 Module Error
7149	IBP2 Module Error
7150	IBP3 Module Error
7151	IBP4 Module Error
7152	LVP Module Error
7153	SCVO2 Module Error
7154	Power Over V Proctect
7155	Power DC Temp Too Low
7156	Battery Temp Too Low
7157	PCVP Search Pulse
7158	LAN1 DHCP Fetching IP Time Out
7159	LAN2 DHCP Fetching IP Time Out
7160	WLAN DHCP Fetching IP Time Out
7161	AG CO2 Sensor Off
7162	NIBP Pod Battery Depleted
7163	NIBP Pod Battery Abnormal
7164	NIBP Pod Voltage Abnormal
7165	NIBP Pod Battery Maintenance Required
7166	NIBP Pod Clock Needs To Be Set
7167	TP Disconnect From Patient Device
7168	Device Error For TP

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7169	Battery Low For TP
7170	Battery Exhaust For TP
7171	Battery Aged For TP
7172	Battery Error For TP
7173	Battery Type Error For TP
7174	BP Disconnect From Paired Device
7175	Device Error For BP
7176	Battery Low For BP
7177	Battery Exhaust For BP
7178	Battery Aged For BP
7179	Battery Error For BP
7180	Battery Type Error For BP
7181	EEG A Anode Electrode Poor Contact
7182	EEG A Cathode Electrode Poor Contact
7183	EEG B Anode Electrode Poor Contact
7184	EEG B Cathode Electrode Poor Contact
7185	EEG C Anode Electrode Poor Contact
7186	EEG C Cathode Electrode Poor Contact
7187	EEG D Anode Electrode Poor Contact
7188	EEG D Cathode Electrode Poor Contact
7189	EEG Module Error
7190	QT Unable Analysis
7191	MPAN Disconnect
7192	RESP Poor Contact
7193	NIBP All Seq Not Set

7194	ICG Electrode Off
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