



# **RAPIDPoint® 500e**

## **Blood Gas System**

### ***Interface Specifications Manual***

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Implementing an LIS software interface to a RAPIDPoint 500e Blood Gas System is solely the responsibility of the customer. Siemens recommends that a professional software programmer develop and implement the LIS software interface. Siemens is not responsible for any communications problems or for any damage to a RAPIDPoint 500e system or an LIS that might result from implementing an LIS communication protocol.

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## ***Using this Manual***

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## Using this Manual

The *RAPIDPoint® 500e Blood Gas System Interface Specifications Manual* describes the specifications for interfacing a RAPIDPoint 500e Blood Gas System to a laboratory information system (LIS) or a hospital information system (HIS). This manual is descriptive rather than procedural and provides the following information:

- Message formats
- Physical interface specifications

### Who Should Use this Manual

Software engineers and programmers should use this manual as a reference document when programming the LIS to use data generated by a RAPIDPoint 500e Blood Gas system. The laboratory information system manager can refer to this manual to identify the appropriate communication protocol.

### Finding Information in this Manual

The following table helps you locate the manual sections that contain the information you need to complete interface tasks.

<i>If you want to . . .</i>	<i>Then refer to . . .</i>
find general information about the LIS 3 communication protocol	Section 1, <i>Overview</i>
identify the specifications for the physical interface between a RAPIDPoint 500e Blood Gas system and a laboratory information system	Section 5, <i>Physical Interface</i>
find information about message transactions	Section 2, <i>About Message Transactions</i>
find information about the message format	Section 3, <i>Message Format</i>
find information about message transfer	Section 4, <i>Message Transfer</i>
review variables and data records for LIS 3 protocol	Appendix A, <i>Variables</i> , and Appendix B, <i>Data Records</i> .

### RAPIDPoint 500e Blood Gas System Operator's Guide

The *RAPIDPoint 500e Blood Gas System Operator's Guide* contains operating, setup, and troubleshooting information for the RAPIDPoint 500e system operator. Refer to Section 8 in the *RAPIDPoint 500e Blood Gas System Operator's Guide* for the procedures to connect a RAPIDPoint 500e system to an LIS.

## ***Conventions Used in this Manual***

For ease of use, the RAPIDPoint 500e Blood Gas System is also referred to as the RAPIDPoint 500e system in this guide. The following table explains the text and symbol conventions used in this manual.

<b><i>Convention</i></b>	<b><i>Description</i></b>
{...}	Braces delimit records. For example, {identifier} indicates an identifier record.
<...>	Angle brackets indicate ASCII control characters. For example, <STX> indicates Start of Text (02 decimal).
<b>NOTE:</b>	The note symbol identifies information that requires your attention.

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# 1 Overview

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## **Overview**

The RAPIDPoint® 500e Blood Gas System transmits patient sample data, quality control (QC) sample data, and system calibration data to a laboratory information system (LIS) or to a hospital information system (HIS). Transmission of patient sample, QC sample, and calibration data can be automatic or only upon the request of the LIS or operator.

## About the RAPIDPoint 500e Blood Gas System

The RAPIDPoint 500e system is used for the determination of pH,  $p\text{CO}_2$ ,  $p\text{O}_2$ , sodium ( $\text{Na}^+$ ), potassium ( $\text{K}^+$ ), ionized calcium ( $\text{Ca}^{++}$ ), chloride ( $\text{Cl}^-$ ), glucose (Glu), lactate (Lac), total hemoglobin (tHb), hemoglobin derivatives and neonatal bilirubin (nBili) in arterial, venous, mixed venous, and capillary whole blood samples. The system also measures pH in the pleural fluid sample type. The system reports the following parameters:

<b>Parameter</b>	<b>Description</b>
pH	negative logarithm of the hydrogen ion activity
<i>or</i>	<i>or</i>
$\text{H}^+$	hydrogen ion activity
$p\text{CO}_2$	carbon dioxide (partial pressure)
$p\text{O}_2$	oxygen tension (partial pressure)
$\text{Na}^+$	sodium ion concentration
$\text{K}^+$	potassium ion concentration
$\text{Ca}^{++}$	calcium ion concentration
$\text{Cl}^-$	chloride ion concentration
Glu	glucose concentration
Lac	lactate concentration
$\text{HCO}_3\text{-act}$	actual bicarbonate
$\text{HCO}_3\text{-std}$	standard bicarbonate
BE(B)	base excess of blood
BE(ecf)	base excess of extracellular fluid
ct $\text{CO}_2$	total carbon dioxide
pH(T)	temperature-corrected pH
$p\text{CO}_2\text{(T)}$	temperature-corrected $p\text{CO}_2$
$p\text{O}_2\text{(T)}$	temperature-corrected $p\text{O}_2$
RI(T)	respiratory index
$p\text{O}_2\text{(A-a)}\text{(T)}$	alveolar-arterial oxygen tension difference
$p\text{O}_2\text{(a/A)}\text{(T)}$	alveolar-arterial oxygen tension ratio

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<b><i>Parameter</i></b>	<b><i>Description</i></b>
Qsp/Qt(T)	physiologic shunt
Qsp/Qt(T)(est)	estimated physiologic shunt
O <sub>2</sub> SAT(est)	estimated oxygen saturation
Hct	calculated hematocrit
pO <sub>2</sub> /F <sub>I</sub> O <sub>2</sub>	partial pressure of oxygen/fraction of inspired oxygen
Ca <sup>++</sup> (7.4)	calcium ion concentration adjusted to pH 7.40
AnGap	anion gap
mOsm	osmolality
ctO <sub>2</sub> (a-v)	arterial-venous oxygen content difference
ctO <sub>2</sub> (a)	arterial oxygen content
ctO <sub>2</sub> (v)	venous oxygen content
ctO <sub>2</sub> ( $\bar{v}$ )	mixed venous oxygen content
VO <sub>2</sub>	oxygen consumption rate
DO <sub>2</sub>	oxygen delivery
ctO <sub>2</sub> ([a-v]/a)	a-v extraction index
tHb	total hemoglobin
FO <sub>2</sub> Hb	oxyhemoglobin
FCOHb	carboxyhemoglobin
FMetHb	methemoglobin
FHHb	deoxyhemoglobin
nBili	neonatal bilirubin
sO <sub>2</sub>	hemoglobin oxygen saturation
BO <sub>2</sub>	oxygen binding capacity
p50	oxygen tension at 50% saturation

---

## ***About the Communication Protocol***

The RAPIDPoint 500e system uses the LIS 3 protocol. The protocol transmits patient, QC, and calibration data from the system to the LIS or HIS upon the request of the LIS. Messages are enclosed within control characters so that the LIS can detect the start and end of transmission. Each message also includes a checksum to enable the detection of bad transmissions. Messages are automatically retransmitted one time if the LIS does not acknowledge a transmission.

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## 2 Message Transactions

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## About Message Transactions

The protocol supports the following transactions:

- **Device Identify**  
The RAPIDPoint 500e system requests the LIS to identify itself; the LIS transmits its model and device ID to the system. If the LIS makes the request, then the RAPIDPoint 500e system transmits its model and device ID to the LIS.
- **Patient Sample Assay**  
The RAPIDPoint 500e system informs the LIS that patient data is available, the LIS requests the data, and the system transmits the requested data.
- **QC Assay**  
The RAPIDPoint 500e system informs the LIS that QC data is available, the LIS requests the data, and the system transmits the requested data.
- **Calibration**  
The RAPIDPoint 500e system informs the LIS that calibration data is available, the LIS requests the data, and the system transmits the requested data.
- **System Status**  
The RAPIDPoint 500e system informs the LIS of its status (for example, the system is ready for analysis).
- **System Control**  
The LIS sends commands to the RAPIDPoint 500e system that affect system operation (for example, turning on and turning off parameters).
- **Date/Time**  
The LIS requests the RAPIDPoint 500e system date and time, and the system transmits the requested data.

Most of these transactions require multiple messages to complete the transaction. The following sections detail the transactions. Refer to Section 3, *Message Format*, for a description of the message format, and to Appendix B, *Data Records*, for a list of the fields present in the larger data records.

## Data Availability and Identification

Under the following circumstances, the RAPIDPoint 500e system informs the LIS that the system has data available to transmit:

- at the completion of sample analysis, quality control (QC) analysis, or calibration when Auto Send is on
- when Auto Send is on and the system operator recalls, edits, and saves patient demographic data by touching the Continue button, and when an a-v study report is created
- when the operator presses the **Send** button

The protocol includes a mechanism for requesting a retransmission of data upon detection of a transmission error. This mechanism uses a relatively simple message acknowledgment protocol that allows one retry. Refer to *Message Acknowledgment* in Section 4.

The protocol does not detect when the same, error-free message is transmitted twice. This situation can occur when the LIS acknowledges an error-free message but the acknowledgment is corrupted, causing the RAPIDPoint 500e system to resend the message. If the receipt of duplicate data is a problem for the LIS application, then the LIS can check each data message to ensure it is not a duplicate of the preceding message.

The transmission of duplicate data messages can also occur in an error-free environment when the operator recalls data and makes multiple requests for results to be sent to the LIS. For example, if the operator sends the same patient report more than once, the RAPIDPoint 500e system sends a data available message to the LIS each time the report is sent.

The messages are enclosed within control characters to allow for the detection of start and end of transmission. The messages also include a checksum to enable the detection of bad transmissions. To aid in the parsing of messages, delimiters identify variable boundaries. For more information, refer to Section 4, *Message Transfer*.

## **Sequence Numbers**

Upon completion of analysis or calibration, the RAPIDPoint 500e system assigns a sequence number to each new patient analysis, QC analysis, or calibration. The sequence starts at 1, increments to  $2^{32}$ , and then, if necessary, begins again at 1.

When the RAPIDPoint 500e system saves new patient, QC, or calibration data, it also notifies the LIS that the data, identified by its sequence number, is available. To obtain the data, the LIS must request the data by specifying the sequence number in the data request message the LIS sends to the RAPIDPoint 500e system. For example, the system notifies the LIS that patient data with sequence number 123 is available and the LIS requests the patient data for sequence number 123.

The LIS does not have to request the data immediately after notification. The LIS can wait until it is informed that additional data is available and then request data for specific sequence numbers, with the assurance that the data is still available. This feature allows the LIS time to act and avoids delaying the system before being allowed to make the next transaction available.

If the LIS requests data that is not in the system database, the system informs the LIS that the data is not available.

## **Buffering and Queue Clearing**

Data is stored and queued by the RAPIDPoint 500e system until the database capacity is exceeded. When the database is full, the oldest sample sequences are removed to create space to store new sample data. Refer to the *RAPIDPoint 500e* System Operator's Guide for the current storage capacity of the database.

If the RAPIDPoint 500e system and LIS connection is interrupted, the system queues all unsent patient and QC sample results and calibration data. When the connection is re-established, the system sends the queued data to the LIS. The most recent results are sent first. This process takes place below current transactions and does not interrupt or affect use of the RAPIDPoint 500e system.

The RAPIDPoint 500e system sends queued data, with a minimum 10 second delay between transmissions, in the following order:

- all patient sample results
- all QC data
- all calibration data

Each data set is sent in chronological order, starting with the data most recently generated.

If the serial and network pathways are both enabled and configured, transmission success is tracked independently for each pathway.

## Device Identify Transaction

The device sending data (either the RAPIDPoint 500e system or the LIS) requests the device receiving data (the LIS or the RAPIDPoint 500e system, respectively) to identify itself. The device receiving data responds by sending its model and device ID.

Both the RAPIDPoint 500e system and the LIS can initiate a device identify transaction at any time by sending the following message:

Request device identity: {ID\_REQ}

The receiving device responds by sending a data record containing the name and value of the variables aMOD (the model number) and iIID (the device identifier). The device uses the following message:

Device identifier: {ID\_DATA} {aMOD, iIID}

The device identify transaction must be implemented in the LIS for the system to recognize the LIS connection.

The contents of the aMOD and iIID fields must be as follows:

<b>Field</b>	<b>RAPIDPoint 500e System</b>	<b>LIS</b>
aMOD	0500 where n is the type of system configuration	LIS
iIID	up to 6 alphanumeric characters	up to 6 alphanumeric characters

The aMOD value appears in the system ID on printed reports and on the System Information screen.

### Instrument Identifier Field

The instrument identifier field (iIID) enables the LIS and the RAPIDPoint 500e system to identify systems with the same aMOD to which a message is directed. All system transactions require the iIID field.

The iIID value is taken from the Serial Number field. The system serial number (for example, 12345) is entered during system setup by the service engineer.

The iIID value appears in the System ID on printed reports and on the System Information screen.

## Patient Sample Assay Transaction

The RAPIDPoint 500e system informs the LIS that patient data is available, the LIS requests the data, and the system transmits the requested data. The RAPIDPoint 500e system initiates this transaction.

<i>If the RAPIDPoint 500e system . . .</i>	<i>Then the LIS . . .</i>
notifies the LIS that a patient sample analysis has begun or been canceled	acknowledges the message.
notifies the LIS that new or edited patient data is available	acknowledges the message; the LIS at anytime requests the data and identifies the sequence number of the requested data.
sends the requested data or notifies the LIS that the data is no longer available	acknowledges the message.

## Measurement Status

When a patient sample analysis has begun, the system informs the LIS by sending the following message (iOID appears if the operator logged in):

Patient sample analysis initiated: {SMP\_START} {aMOD, iIID, aDATE, aTIME, iOID}

If the operator cancels the analysis sequence or the operation fails due to a system error, the system informs the LIS (iOID appears if the operator logged in):

Patient sample analysis canceled: {SMP\_ABORT} {aMOD, iIID, aDATE, aTIME, iOID}

## Query by Patient ID

**NOTE:** Two options are available to query the LIS system: Query by Patient ID and Query by Accession Number. Query by Accession Number can query a much larger range of demographics and provides the option of querying parameter test selections. See *Query by Accession Number* in the following section for more information. Only one of these options can be used at a time.

Query by Patient ID is a setup option that allow the RAPIDPoint 500e system to query the LIS system for patient demographic information based on the patient ID.

With Query by Patient ID turned on, when a patient ID is entered, the system informs the LIS by sending the following message:

Demographics Requested via Patient ID: {PAT\_DEMOG\_REQ} {aMOD, iIID, iPID}

The LIS responds in one of the following three ways:

- the patient demographic data was found by sending the following message:
 

```
{PAT_DEMOG_DATA} {aMOD, iIID, iPID, iLNAME1, iFNAME1, iSEX, iDOB,
iBIRTHTERM}
```
- the patient demographic data was not found by sending the following message:
 

```
{PAT_DEMOG_NOT_AV} {aMOD, iIID, iPID}
```
- the LIS does not respond. After 60 seconds, the system assumes that the data could not be found and informs the operator.

### Query by Accession Number

**NOTE:** Two options are available to query the LIS system: Query by Patient ID and Query by Accession Number. Query by Accession Number has the capacity to query a much larger range of demographics and provides the option of querying parameter test selections. Only one of these options can be used at a time.

Query by Accession Number is a setup option that allows the RAPIDPoint 500e system to query the LIS system for patient and sample demographics information based on the Accession Number entered at the system.

With Query by Accession Number turned on, when an Accession Number is entered, the system informs the LIS by sending the following message:

```
Demographics Requested via Accession Number: {ACC_DEMOG_REQ}
{aMOD, iIID, iACC}
```

The LIS responds in one of the following three ways:

- the patient demographic data was found by sending the following message:
 

```
{ACC_DEMOG_DATA} {aMOD, iIID, iPID, iLNAME1, iFNAME1, iSEX, iDOB,
iSampleReported, iBIRTHTERM, iROOM, iDID, iDATE, iTIME, iACC, iTEMP,
IOID, iHb, iBP, iFIO2, iFlow, iRR, iCPAP, iPEEP, iPIP, iVt, iAllen, mpH, mPCO2,
mPO2, mNa+, mK+, mCa++, mCl-, mGlucose, mLactate, mHct, mtHb, mnBili}
```

*iSampleReported* and the measured parameters (such as mpH and mLactate) that are listed above are special cases which are explained in the *iSample Reported* and *Downloading Sets of Measured Parameters for Test* sections below.
- the patient demographic data was not found by sending the following message:
 

```
{ACC_DEMOG_NOT_AV} {aMOD, iIID, iACC}
```
- the LIS does not respond. After 60 seconds, the system assumes that the data could not be found and informs the operator.

<sup>1</sup> iFNAME and iLNAME fields may contain UTF-8 encoded character strings, which support entry of non-English names.

### ***iSampleReported***

An option on the RAPIDPoint 500e system enables users to check if sample results have already been reported to the LIS for the entered accession number. When selected, if sample results for the same accession number are found in the LIS, the user receives a warning message that the data for the sample has been reported. The user then has the option to select “Yes” to test the sample again, or “No,” to return to the Analysis screen without changing data in the LIS.

### ***Downloading Sets of Measured Parameters for Test***

An option on the RAPIDPoint 500e system enables users to download a set of measured parameters from the LIS to the RAPIDPoint 500e system; this set may include any parameter, some parameters, or all of the following parameters, depending on site needs: mpH, mPCO2, mPO2, mNa+, mK+, mCa++, mCl-, mGlucose, mLactate, mHct, mtHb, and mnBili.

This option aims to ensure that only required parameters are tested, which supports regulatory compliance and may limit unnecessary test costs.

Please note the following:

- If the LIS message includes any measured parameters which are not supported by the system or are not selected in setup or have not been entered following a valid format, then the system will show a warning message to get confirmation from the user during sampling.
- If measured parameters are out of Cal or QC was missed or QC has failed, then those parameters will not be available for measurement.
- If any downloaded parameter field is not available in RAPIDPoint 500e system setup, that parameter will be excluded from measurement.

### ***Data Available***

The RAPIDPoint 500e system notifies the LIS that the system has data to transmit:

- at the completion of sample analysis when Auto Send is on
- when Auto Send is on and the system operator recalls, edits, and saves patient demographic data by touching the Continue button
- when the operator presses the **Send** button
- when clearing a queue

When patient sample data is available, the system sends the following message to the LIS:

Sample data available: {SMP\_NEW\_AV}{aMOD, iIID, rSEQ}

**NOTE:** The sample sequence number does not increment with retransmissions.

## ***Request Sample Data***

When informed that data is available, the LIS may request the data by sending the following message, which identifies the sequence number of the requested sample data:

Request patient sample data: {SMP\_REQ} {aMOD, iIID, rSEQ}

## ***Sample Assay Data***

If the requested data is available, the system sends the following message:

Sample data: {SMP\_NEW\_DATA} {sample assay data}

The sample type and the parameters configured on the system can affect the parameters transmitted in the sample assay data record. Refer to Appendix B, *Data Records*, for the sample assay data record.

## ***Sample Assay Data Not Available***

If the requested data is no longer available, the system sends the following message:

Patient sample data not available: {SMP\_NOT\_AV} {aMOD, iIID, rSEQ}

The data may not be available if the database is full. When the database is full, the oldest sample sequences are removed to create space to store new sample data.

## ***Edited Sample Data***

When the system operator recalls patient sample data, edits the data, and then sends the results to the LIS, the system sends the following message:

Sample data available: {SMP\_NEW\_AV} {aMOD, iIID, rSEQ}

When the LIS responds with the SMP\_REQ message, the system sends the following message:

Edited patient sample data: {SMP\_EDIT\_DATA} {sample assay data}

**NOTE:** An a-v study can be performed on a RAPIDPoint 500e system when the operator combines an arterial and a mixed-venous sample. After combining samples, only the arterial sample is available for printing and sending to the LIS.



## QC Assay Transaction

The RAPIDPoint 500e system informs the LIS that QC data is available, the LIS requests the data, and the system transmits the requested data. The RAPIDPoint 500e system initiates the transaction.

<i>If the RAPIDPoint 500e system . . .</i>	<i>Then the LIS . . .</i>
notifies the LIS that a QC sample analysis has begun or been canceled	acknowledges the message.
notifies the LIS that new QC data is available	acknowledges the message; the LIS at anytime requests the QC data and identifies the sequence number of the requested data.
sends the requested QC data or notifies the LIS that the data is no longer available	acknowledges the message.

## Measurement Status

When QC sample analysis has begun, the system informs the LIS (iOID appears if the operator logged in):

QC sample analysis initiated: {QC\_START} {aMOD, iIID, aDATE, aTIME, iOID}

If the operator cancels the QC analysis sequence, or the operation fails due to a system error, the system informs the LIS with the following message (iOID appears if the operator logged in):

QC sample analysis canceled: {QC\_ABORT} {aMOD, iIID, aDATE, aTIME, iOID}

## Data Available

The RAPIDPoint 500e system informs the LIS that the system has QC data to transmit:

- at the completion of QC analysis when Auto Send is on
- when the operator presses the **Send** button
- when clearing a queue

The system sends the following message to the LIS when QC data is available:

QC sample data available: {QC\_NEW\_AV} {aMOD, iIID, rSEQ}

**NOTE:** The QC sample sequence number does not increment with retransmissions.

## **Request QC Data**

When informed that QC data is available, the LIS may request the data by sending the following message, which identifies the sequence number of the required QC data:

Request QC data: {QC\_REQ}{aMOD, iIID, rSEQ}

## **QC Assay Data**

If the requested QC data is available, the system sends the following message:

QC data: {QC\_NEW\_DATA}{QC assay data}

Refer to Appendix B, *Data Records*, for the QC assay data record.

## **QC Assay Data Not Available**

If the requested QC data is no longer available, the system sends the following message:

QC data not available: {QC\_NOT\_AV}{aMOD, iIID, rSEQ}

The data may not be available if the database is full. When the database is full, the oldest sample sequences are removed to create space to store new sample data.

## **Calibration Transactions**

The RAPIDPoint 500e system informs the LIS that new calibration data is available, the LIS requests the data, and the system transmits the requested data. The transaction is initiated by the RAPIDPoint 500e system.

<b><i>If the RAPIDPoint 500e system . . .</i></b>	<b><i>Then the LIS . . .</i></b>
notifies the LIS that a calibration sequence has begun or been canceled	acknowledges the message.
notifies the LIS that calibration data is available	acknowledges the message; the LIS at anytime requests the calibration data and identifies the sequence number of the requested data.
sends the requested calibration data or notifies the LIS that the data is no longer available	acknowledges the message.

## ***Calibration Initiated***

When a calibration sequence has begun, the system informs the LIS (iOID appears if the operator logged in):

Calibration initiated: {CAL\_START} {aMOD, iIID, aDATE, aTIME, iOID}

If the operator cancels the calibration sequence, or if the calibration fails due to a system error, the system informs the LIS with the following message (iOID appears if the operator logged in):

Calibration canceled: {CAL\_ABORT} {aMOD, iIID, aDATE, aTIME, iOID}

## ***Data Available***

The RAPIDPoint 500e system informs the LIS that the system has calibration data to transmit:

- at the completion of calibration when Auto Send is on
- when the operator presses the **Send** button
- when clearing a queue

The system sends the following message to the LIS when calibration data is available:

Calibration: {CAL\_NEW\_AV} {aMOD, iIID, rSEQ}

**NOTE:** The calibration sequence number does not increment with retransmissions.

## ***Request Calibration Data***

When informed that calibration data is available, the LIS may request the data by sending the following message, which identifies the sequence number of the requested calibration data:

Request calibration data: {CAL\_REQ} {aMOD, iIID, rSEQ}

## ***Calibration Data***

If the requested calibration data is available, the system sends the following message:

Cal data: {CAL\_NEW\_DATA} {calibration data}

The calibration data records sent by the RAPIDPoint 500e system depend on the type of calibration performed. The calibration data record contains either a cal data set, a slope data set, or both.

<b>Calibration Sequences</b>	<b>Data Set</b>
1-point	cal
2-point	cal and slope
2-point/full	cal, slope, and tHb slope

Within each cal and slope data set, each parameter is represented by two entries. In the variable name, *name* is replaced by the name of a particular parameter, such as aCmNa<sup>+</sup> or aSdNa<sup>+</sup>.

<b>Format</b>	<b>CAL</b>	<b>Format</b>	<b>SLOPE</b>
	<b>Function</b>		<b>Function</b>
aCmname	(MEASURED)	aSmname	(MEASURED)
aCdname	(DRIFT)	aSdname	(DRIFT)

The first entry (MEASURED) is the measured calibrant or slope value. The second entry (DRIFT) is the drift in calibration or slope for that parameter.

**NOTE:** The RAPIDPoint 500e system deviates from the 200 and 800 Systems in the representation of calibration data because the RAPIDPoint 500e system does not include an ADJUSTED number.

Refer to Appendix B, *Data Records*, for the calibration data records.

### **Calibration Data Not Available**

If the requested data is no longer available, the system sends the following message:

Cal data not available: {CAL\_NOT\_AV} {aMOD, iIID, rSEQ}

The data may not be available if the database is full. When the database is full, the oldest sample sequences are removed to create space to store the new sample data.

## **System Status Transactions**

Several system status messages inform the LIS about the status of the RAPIDPoint 500e system.

### **System Ready**

The system ready message informs the LIS when the system is ready to accept a sample. The system sends the following message when analysis is complete and the system is ready to accept a new sample (iOID appears if the operator logged in):

System ready: {SYS\_READY} {aMOD, iIID, aDATE, aTIME, iOID}

### **System Not Ready**

The system not ready message informs the LIS when the system is not ready to accept a new sample, such as when the operator is replacing a cartridge. If the system is not ready, it sends the following message (iOID appears if the operator logged in):

System not ready: {SYS\_NOT\_READY} {aMOD, iIID, aDATE, aTIME, iOID}

### **System Waiting Operator Action**

The system sends the waiting operator action message during analysis if the system is delayed during analysis and is waiting for the operator to take action (for example, if the system is waiting for the operator to remove the sample device). The system sends the following message (iOID appears if the operator logged in):

System waiting: {SYS\_WOPR} {aMOD, iIID, aDATE, aTIME, iOID}

### **System Measuring**

When the system resumes analysis upon recovery from a SYS\_WOPR condition, the system sends the following message (iOID appears if the operator logged in):

System measuring: {SYS\_MEASURING} {aMOD, iIID, aDATE, aTIME, iOID}

### **Calibration Pending**

When the system is about to perform a calibration, the system sends the following message (iOID appears if the operator logged in):

Calibration pending: {SYS\_CAL\_PEND} {aMOD, iIID, aDATE, aTIME, iOID}

**NOTE:** The system sends the SYS\_CAL\_PEND message before the expected start of a calibration. However, the message is not sent during the cartridge initialization period.

If the calibration fails, the system repeats the calibration and sends the following message (iOID appears if the operator logged in):

Calibration repeating: {SYS\_CAL\_REP} {aMOD, iIID, aDATE, aTIME, iOID}

**NOTE:** The data from the repeated calibration replaces the data from the calibration that failed.

## ***System Control Transactions***

The LIS can configure the RAPIDPoint 500e system to prevent the operator from analyzing samples, to include and exclude parameters from analysis, and to perform 1-point and 2-point calibrations.

**NOTE:** System Control Transactions only apply to the primary LIS destination. Requests from other LIS channels are ignored.

### ***Sample Analysis Disabled***

The LIS informs the system to disable sample analysis by sending the following message:

Sample analysis disabled: {CTL\_LOCK} {aMOD, iIID}

When the system receives a request to disable analysis from the LIS, it sets a flag that prevents sample analysis at the Analysis screen. The system displays a message, on the screen where an operator enters their password, indicating that analysis is disabled. Analysis can be enabled by the LIS.

### ***Sample Analysis Enabled***

The LIS informs the system to enable sample analysis by sending the following message:

Sample analysis enabled: {CTL\_FREE} {aMOD, iIID}

### ***Parameter Enabled or Disabled***

The LIS informs the system to enable or disable a parameter by sending the following message:

Parameter enabled or disabled: {CTL\_CHAN} {parameter selection data}

When the system receives a request to enable or disable parameters {CTL\_CHAN} from the LIS, the system sets flags to enable or disable the selected parameters during analysis. The parameters are disabled or enabled as defined by the status of the flags. The enable/disable selection is in effect until the system receives another {CTL\_CHAN} message for the parameters or until the operator selects parameters in Setup at the RAPIDPoint 500e system.

The LIS may enable a parameter that has been disabled by the system because the parameter failed or missed QC by sending the following message:

Parameter enabled: {CTL\_OVERRIDE\_QC} {parameter selection data}

When the system receives the override request, the system enables the parameter.

The request to enable or disable a parameter includes a setup variable and the request to override a parameter includes a system variable. Refer to Appendix B, *Data Records*, for the fields sent in the parameter selection data record.

## **Calibration Requests**

The LIS informs the system to perform a 1-point calibration by sending the following message:

1-pt Calibration Request: {CTL\_1PT} {aMOD, iIID}

If the system can accommodate the request, it responds with the CAL\_START message. Otherwise, no response is sent to LIS. The system may not be able to perform a 1-point calibration because of the following conditions:

- the system is in a retro-calibration period
- the system is busy and cannot perform a calibration at the time of the request
- the next calibration due is a 2-point or 2-point full calibration

The LIS may request a 2-point full calibration by sending the following message:

2-pt Calibration Request: {CTL\_2PT} {aMOD, iIID}

If the system can accommodate the request, it responds with the CAL\_START message. Otherwise, no response is sent to LIS. The system may not be able to perform a calibration because of the following conditions:

- the system is in retro-calibration period
- the system is busy and cannot perform a calibration at the time of the request

## **Time Synchronization Request**

The LIS sends a time synchronization request to synchronize the time setting of local systems with the time setting of the LIS. The LIS sends the following message:

Time synchronization request: {CTL\_TIME\_SET} {aMOD, iIID, aDATE, aTIME}

The aDATE value is in ddMmmYYYY format. The aTIME value is in hh:mm:ss format.

The local system synchronizes its time setting without sending a response to the LIS. If the local system is currently displaying the Date and Time Setup screen, the LIS command is ignored, and the command is not implemented.

## ***Date/Time Transaction***

To determine the local system date and time, the LIS initiates a date/time transaction:

Request time: {TIME\_REQ} {aMOD, IID}

The system responds by sending a data record containing the name and value of the variables aDATE and aTIME:

System time: {TIME\_DATA} {aMOD, IID, aDATE, aTIME}



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## 3 Message Format

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<b>Message Format</b>	<b>3-3</b>
<i>Application Message Format</i>	3-4
<i>Identifier Record Format</i>	3-4
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## Message Format

This section explains the rules for building messages and the rules for decoding the messages received. In this protocol, messages are enclosed within ASCII control characters so that the LIS can detect the start and end of transmission. The control characters and their meanings are listed alphabetically in the following table.

<i>Control Character</i>	<i>Meaning</i>
<ACK>	acknowledge
<EOT>	end of transmission
<ETB>	end of transmission block
<ETX>	end of text
<FS>	field separator
<GS>	group separator
<RS>	record separator
<STX>	start of text

**NOTE:** A shorthand notation is used to describe the transmitted messages with the format {identifier} {data}. The braces { . . } are not actually transmitted, but are used in this document to delimit records.

Each message consists of an application message contained in a datalink frame. The frame consists of the following elements:

- a start-of-message character before the application message
- an end-of-message character at the end of the application message
- two checksum characters
- an end-of-transmission character

The format of the frame is as follows:

$$\langle \text{STX} \rangle \left| \begin{array}{l} \{ \text{identifier} \} \langle \text{RS} \rangle \{ \text{data} \} \langle \text{RS} \rangle \\ \langle \text{Application Message} \rangle \end{array} \right| \langle \text{ETX} \rangle \text{checksum} \langle \text{EOT} \rangle$$

where:

<STX> is the ASCII control character Start of Text (02 decimal)

<RS> is the record separator (30 decimal)

<ETX> is the ASCII control character End of Text (03 decimal)

checksum is a variable, two-digit, hexadecimal number included to support error checking by the receiver

<EOT> is the ASCII control character End of Transmission (04 decimal)

Each application message consists of one or two records, each terminated by a record separator character. The first record, {identifier}, identifies the message type. If present, the second record, {data}, contains information that gives further identity to the message or provides data.

The identifier record is always transmitted first, and the characters given within the braces are transmitted exactly as shown in Section 2, *Message Transactions*.

The data record is transmitted second. The contents of the braces indicate the data fields to be sent, not the exact content of the record.

## ***Application Message Format***

The application message format uses delimiters to mark the beginning and end of a record. The identifier record and the data record are each terminated by the ASCII control character Record Separator (30 decimal), <RS>.

For example: {identifier}<RS>{data}<RS>

## ***Identifier Record Format***

The identifier record is a string of ASCII characters that describe the type of record being sent and is terminated by the ASCII control character Field Separator (28 decimal), <FS>.

For example: SMP\_NEW\_DATA<FS>

## ***Data Record Format***

The format of a data record is as follows:

```
{name}<GS>{value}<GS>{units}<GS>{exception group}<GS><FS>
{name}<GS>{value}<GS>{units}<GS>{exception group}<GS><FS>
{name}<GS>{value}<GS>{units}<GS>{exception group}<ETB><GS><FS> etc.
```

where:

<GS> is the ASCII control character Group Separator (29 decimal)

<FS> is the ASCII control character Field Separator (28 decimal)

<ETB> is the ASCII control character End of Transmission Block (23 decimal)

The allowable set of characters for each of the groups (name, value, units, and exceptions) is normally the set of all printable ASCII characters (codes 20 through 126, decimal).

The <GS> character terminates each group, including null groups. That is, every field in the record contains exactly four <GS> characters.

The <FS> character terminates every field of the record.

The <ETB> character terminates an exception group.

The number and ordering of the fields within the record is generally unconstrained.

The following example shows the complete structure of a sample data message from a RAPIDPoint 500e system. The parameters listed in the example are a subset of the actual parameters that can be transmitted. Refer to Appendix A, *Variables*, for a complete list of parameters.

In the sample data message that follows, the identifier record, SMP\_EDIT\_DATA, indicates that the data record contains patient sample data that was recalled and edited at the RAPIDPoint 500e system. Within the data record, the RAPIDPoint 500e system identifies itself by the model number (aMOD), 0500, and the device ID (iIID), 12345. The patient identifier (iPID) is entered as 25.

```
<STX>SMP_EDIT_DATA<FS><RS>aMOD<GS><GS><GS><GS><FS>
iIID<GS>12345<GS><GS><GS><FS>rDATE<GS>11Oct2000<GS><GS><GS>
<FS>rDEVICE<GS>SYRINGE<GS><GS><GS><FS>rTIME<GS>16:20:36
<GS><GS><GS><FS>rTYPE<GS>SAMPLE<GS><GS><GS><FS>iSOURCE
<GS>ARTERIAL<GS><GS><GS><FS>rSEQ<GS>56<GS><GS><GS><FS>
rCartID<GS>970506816<GS><GS><GS><FS>mpH<GS><GS><GS>QUES
<ETB><GS><FS>mPCO2<GS><GS>mmHg<GS><<ETB><GS><FS>mPO2
<GS>183.3<GS>mmHg<GS><GS><FS>mNa+<GS>118.5<GS>mmol/L<GS>
<GS><FS>mK+<GS>5.25<GS>mmol/L<GS><GS><FS>mCa++<GS>0.76<GS>
mmol/L<GS><GS><FS>mCl<GS>91<GS>mmol/L<GS><GS><FS>mGlucose
<GS>60<GS>mg/dL<GS><GS><FS><GS><GS>%<GS><<ETB><GS>
<FS>iPID<GS>25<GS><GS><GS><FS>iLNAME<GS>ARTERY<GS><GS>
<GS><FS>iSEX<GS>M<GS><GS><GS><FS>iDOB<GS>12Dec1912<GS>
<GS><GS><FS>iROOM<GS>2525<GS><GS><GS><FS>iDID<GS>25<GS>
<GS><GS><FS>iDATE<GS>11Oct2000<GS><GS><GS><FS>iTIME<GS>
16:20<GS><GS><GS><FS>iACC<GS>47<GS><GS><GS><FS>iOID<GS>42
<GS><GS><GS><FS>iTEMP<GS>37.0<GS>C<GS><GS><FS>itHb<GS>14.0
<GS>g/dL<GS><GS><FS>iFIO2<GS>23.0<GS>%<GS><GS><FS>iFlow<GS>
27.00<GS>L/min<GS><GS><FS>iRR<GS>17.0<GS>bpm<GS><GS><FS>
cPO2/FIO2<GS><GS>mmHg%<GS><<ETB><GS><FS>cPO2<GS>183.3<GS>
mmHg<GS><GS><FS><RS><ETX>[checksum]<EOT>
```

## Data Record Field Contents

A data record generally consists of multiple fields, each field containing the results of a particular parameter or the data for an assay (run) variable or a demographic variable.

Each field within a data record must contain the following four parts or groups in this fixed sequence: name, value, units, and exceptions. The ASCII control character <GS> terminates each group in the field. All four group separators must be sent, even if one or more of the groups is null.

Often the exceptions group, which conveys an abnormal condition for a parameter, is null. In some cases, the value group is null when the exceptions group contains an exception. The value group and the exceptions group cannot both be null. The name group cannot be null. The units group can be null. Two examples from data records are described in the table below.

<i>This field . . .</i>	<i>Means that . . .</i>
mNa+<GS>140.3<GS>mmol/L <GS><GS><FS>	the parameter measured Na <sup>+</sup> (sodium-ion concentration) has a value of 140.3, the units of measure are millimoles per liter, and there are no exceptions.
mPCO2<GS><GS>mmHg<GS>< <ETB><GS><FS>	the parameter measured pCO <sub>2</sub> (carbon dioxide [partial pressure]) has no reported value, the units of measure are millimeters of mercury, and a sample below Instrument Range*(<) exception is reported.

\* “Instrument Range” is sometimes referred to as “Reporting Range.”

The sections that follow describe the content and format of each of the four groups.

### **Name Group**

Each name group is a string of ASCII characters of arbitrary length corresponding to a variable name. A name group is the first group of every field in the record. Refer to Appendix A, *Variables*, for a list of variable names.

The case of each character (upper case or lower case) is significant. The first character of the name is always lower case and provides the following information:

<i>This character . . .</i>	<i>Indicates that the variable is . . .</i>
m	measured by the system.
c	calculated by the system.
i	entered by an operator.
a, r, s	assigned by the system.

Any field can be omitted from a data record if no value or exception is being reported. The LIS must be able to receive fields in any order.

**NOTE:** The manufacturer reserves the right at any time without notice to change the fields and the order of fields that the RAPIDPoint 500e system transmits.

## **Value Group**

Each value group is a string of ASCII characters of arbitrary length, corresponding to the value of the variable in that field. The value group is the second group of every field in the record and immediately follows the name group. Refer to Appendix A, *Variables*, for the format of variable values.

All parameter variables have numeric values. Other variables have alphanumeric values.

Dates are sent in the format nnAaannnn, consisting of two digits for day of the month, a three-character abbreviation of the month, and all four digits of the year.

Month abbreviations are: Jan, Feb, Mar, Apr, May, Jun, Jul, Aug, Sep, Oct, Nov, Dec.

Times are sent in the format nn:nn:nn in standard 24-hour time. The exception to this is iTIME, which is sent in the format nn:nn.

## **Units Group**

Each units group is a string of ASCII characters of arbitrary length, corresponding to the unit of measure for a parameter value. The units group is the third group of every field in the record. The units group is always null for any variables, such as patient last name, that are not parameters. Refer to Appendix B, *Data Records*, for a list of units of measure.

The units transmitted in the units group are those selected at the RAPIDPoint 500e system for reporting results for each parameter. Some parameters have fixed units, in which case the data in the units group for each of these parameters is always the same. For example, the units for Na<sup>+</sup> are always mmol/L. Certain parameters do not report units, in which case the units group is null. For example, the units group is null for any parameters for which the results are reported as decimal fractions.



## Exception Group

Each exception group is a string of ASCII characters of arbitrary length, corresponding to the mnemonics for abnormal conditions. Up to two exceptions can be transmitted in any one exception group. If exceptions are transmitted, they are delimited by a trailing <ETB> (23 decimal). The exception group is the last group in the field.

The format of the exception group depends on the number of exceptions:

<i>This format is sent . . .</i>	<i>When there are . . .</i>
<GS>	no exceptions.
exception<ETB><GS>	one exception.
exception<ETB> exception<ETB><GS>	two exceptions.

An exception group in the field of a data record can provide additional encoded information about the parameter value reported. It is, of course, the operator's responsibility to accept or reject any parameter result received with an associated exception.

Any exception code supported by the RAPIDPoint 500e system can be reported for measured parameters. Exception codes are reported for: (1) results that are out-of-Critical Range limits for patient samples only, and (2) for results that are out-of-Instrument Range and out-of-Reference Range, for both patient samples and QC samples. For calculated parameters, exception codes are reported for results that are out-of-Critical Range limits, out-of-Instrument Range, and out-of-Reference Range.

**NOTE:** "Instrument Range" is sometimes referred to as "Reporting Range." "Reference Range" is also referred to as "Established Range," "Reference Intervals," or "Normal Values." "Analytical Range" is also referred to as "Analytical Measurement Range."

The following exception codes can be transmitted with patient and QC sample results:

<b>Code</b>	<b>Meaning</b>
<	below Instrument Range*
>	above Instrument Range*
H	above Reference Range for patient or QC
L	below Reference Range for patient or QC
HH	above the Critical Range limit for patient†
LL	below the Critical Range limit for patient*
UNCOR	uncorrected result for this parameter (patient samples only)
QUES	questionable result for this parameter
SULF	CO-ox results corrected for sulfHb interference
CTEMP	CO-ox results are unavailable because of a CO-ox temperature problem
COOXERR	CO-ox error occurred

\*The “<” and “>” symbols are also sometimes used to indicate an out-of-Analytical Range state. However, when indicating an out-of-Analytical Range state, the “<” and “>” symbols immediately precede a numerical value and are not followed by “<ETB>.” When used to indicate an out-of-Instrument Range exception state, the “<” and “>” symbols are followed by “<ETB>.”

† If Critical Range limits are enabled in the RAPIDPoint 500e system, values that are out-of-Analytical Range or out-of-Instrument Range will also be reported as Critical Range values since these values would be outside of Critical Range limits.

**NOTE:** If an nBili value falls below the 2.0 mg/dL (34 µmol/L) reporting range, a value of < 2 (or < 34) is transmitted to the LIS without an exception code. However, if the Display Question Result option is activated then L2 (or L34) values are displayed with a “?” (for example, “1.2”).

The following codes can be transmitted with calibration data:

<b>Code</b>	<b>Meaning</b>
<	below Instrument Range
>	above Instrument Range
OFFO	electrode offset out of range
SLPO	electrode slope out of range
DRIFT	electrode drift or interfering substance on glucose sensor or electrode noise
CALREP	repeating calibration because it failed
COOXERR	CO-ox error occurred

**NOTE:** For CO-ox, the variable name is aZmtHb if the CO-ox zero failed.

### **Example of Analytical Range Limit Messaging**

**NOTE:** The example below does not show all transactions and messages are not shown in their entirety.

**NOTE:** “Analytical Range” is sometimes also referred to as “Analytical Measurement Range.”

Values that are out of Analytical Range are indicated by entering a “<” preceding a low out-of-Analytical Range value and “>” preceding a high out-of-Analytical Range value. In the example below, bolded lines shows parameters with values that are outside Analytical Range limits.

No additional ETB is sent.

```

<STX>SMP_NEW_DATA<FS>
  <RS>aMOD<GS>0500<GS><GS><FS>
  iIID<GS>03539<GS><GS><GS><FS>
  rDATE<GS>19Jul2010<GS><GS><GS><FS>
  rDEVICE<GS>SYRINGE<GS><GS><GS><FS>
  rTIME<GS>09:27:44<GS><GS><GS><FS>
  rTYPE<GS>SAMPLE<GS><GS><GS><FS>
  iSOURCE<GS>ARTERIAL<GS><GS><GS><FS>
  rSEQ<GS>109<GS><GS><GS><FS>
  rCardID<GS>16555658<GS><GS><GS><FS>
  mpH<GS>>7.6<GS> <GS><GS><FS>
  mPCO2<GS>43.3<GS>mmHg<GS>L<ETB><GS><FS>
  mPO2<GS>106.2<GS>mmHg<GS><GS><FS>
  mNa+<GS><110.0<GS>mmol/L<GS><GS><FS>
  mK+<GS>4.99<GS>mmol/L<GS><GS><FS>
  mCa++<GS>1.21<GS>mmol/L<GS><GS><FS>
  mCl-<GS><70<GS>mmol/L<GS><GS><FS>
    
```

mGlucose<GS>88<GS>mg/dL<GS><GS><FS>  
**mtHb<GS>>20.0<GS>g/dL<GS><GS><FS>**  
mO2Hb<GS>92.6<GS>%<GS><GS><FS>  
mCOHb<GS>3.8<GS>%<GS><GS><FS>  
mMetHb<GS>1.2<GS>%<GS><GS><FS>  
mHHb<GS>2.4<GS>%<GS><GS><FS>  
mnBili<GS>12.4<GS>mg/dL<GS><GS><FS>  
iPID<GS>007<GS><GS><GS><FS>  
iLNAME<GS>JAMES<GS><GS><GS><FS>  
iFNAME<GS>BOND<GS><GS><GS><FS>  
iSEX<GS>M<GS><GS><GS><FS>  
iDOB<GS>08Aug1980<GS><GS><GS><FS>  
iROOM<GS>MOSCOW<GS><GS><GS><FS>  
iDID<GS>DR. NO<GS><GS><GS><FS>  
iDATE<GS>19Jul2010<GS><GS><GS><FS>  
iACC<GS>9876543210<GS><GS><GS><FS>  
iOID<GS>BLOOMFIELD<GS><GS><GS><FS>  
iF<sub>1</sub>O<sub>2</sub><GS>42.0<GS>%<GS><GS><FS>  
iFlow<GS>25.00<GS>L/min<GS><GS><FS>  
iBP<GS>760<GS>mmHg<GS><GS><FS>  
cHCO<sub>3</sub>act<GS>22.0<GS>mmol/L<GS><GS><FS>  
cHCO<sub>3</sub>std<GS>21.2<GS>mmol/L<GS><GS><FS>  
cBE(vt)<GS>-4.0<GS>mmol/L<GS><GS><FS>  
cBE(vv)<GS>-4.1<GS>mmol/L<GS><GS><FS>  
ctCO<sub>2</sub><GS>23.3<GS>mmol/L<GS><GS><FS>  
cCa<sup>++</sup><GS>1.17<GS>mmol/L<GS><GS><FS>  
cAnGap<GS>17.2<GS>mmol/L<GS><GS><FS>  
cPO<sub>2</sub>/F<sub>1</sub>O<sub>2</sub><GS>2.53<GS>mmHg/%<GS><GS><FS>  
cctO<sub>2</sub>(a)<GS>18.2<GS>mL/dL<GS><GS><FS>  
cSO<sub>2</sub><GS>97.5<GS>%<GS><GS><FS>  
cHct<GS>41<GS>%<GS><GS><FS>  
cO<sub>2</sub>CAP<GS>18.4<GS>mL/dL<GS><GS><FS>  
<RS><ETX>52<EOT>

## Critical Value and Reject Reason Information Sent to the LIS

The RAPIDPoint 500e system has the capability to send notifications to LIS systems. Notifications can be sent to: (1) indicate between 1 and 6 actions taken in response to the detection of critical value results and (2) to indicate between 1 and 7 reasons an operator has rejected a patient sample. Both critical value and reject reason notifications also allow for entry of a comment. Critical value notifications also include date and time information, and the option to confirm a notification has been received by the designated recipient. These messages support tracking of information that is relevant to exceptions. See *Entered Variables* in Appendix A and *Patient Sample Assay Data Record* in Appendix B for more detailed information about variables that are employed to convey critical value and reject reason information such as iReject\_Reason and iCVNAction.

**NOTE:** Before using the notification messaging functionality of the RAPIDPoint 500e system, we recommend you consult your IT team to determine LIS compatibility with the required messaging format.

### Example of Critical Value Notification and Reject Reason Messaging

**NOTE:** The example below does not show all transactions and messages are not shown in their entirety. In the example below, bolded lines show critical value and reject reason information.

```

rTIME<GS>09:01:03<GS><GS><GS><FS>
rDEVICE<GS>SYRINGE<GS><GS><GS><FS>
rTYPE<GS>SAMPLE<GS><GS><GS><FS>
iSOURCE<GS>ARTERIAL<GS><GS><GS><FS>
rCartID<GS>102030<GS><GS><GS><FS>
mpH<GS>7.382<GS><GS><GS><FS>
mPCO2<GS><GS>mmHg<GS><ETB>HH<ETB><GS><FS>
mPO2<GS>20.0<GS>mmHg<GS>LL<ETB><GS><FS>
mNa+<GS><GS>180.0<GS>mmol/L<GS>HH<ETB><GS><FS>
mK+<GS>2.50<GS>mmol/L<GS>LL<ETB><GS><FS>
mCa++<GS>4.50<GS>mmolL<GS>HH<ETB><GS><FS>(etc.)
iCust_New Location<GS>Philadelphia<GS><GS><GS><FS>
iCust_Altitude<GS>5000<GS>meters<GS><GS><FS>
iSTATUS<GS>REJECTED<GS><GS><GS><FS>
iReject_Reason<GS>5<GS><GS><GS><FS>
iReject_Comment<GS>sample incorrectly identified <GS>
<GS><GS><FS>
iCVNAction<GS>6<GS><GS><FS>
iCVNReadBack<GS>Yes<GS><GS><GS><FS>
iCVNDate <GS>14Jul2020<GS><GS><GS><FS>
iCVNTime<GS>10:30<GS><GS><GS><FS>
iCVNComment <GS>Called Dr.Spock<GS><GS><GS><FS>
iCVNCriticalPresent<GS>Yes<GS><GS><FS><RS>
<ETX>??<EOT>

```

## External Quality Assurance (EQA) Information sent to the LIS

**NOTE:** EQA testing is also sometimes referred to as “Proficiency” testing.

The RAPIDPoint 500e system has the capability to send information about EQA testing to an LIS systems. Data can be recorded about the EQA kit identifier, the specimen identifier, the operator ID, and a comment about the EQA test can be entered. For information about variables that may be entered to support EQA messaging, for instance, iSource or iEQAKitID, see the *Entered Variables* table in Appendix A. For more details about these variables, see the *Patient Sample Assay Data Record* table in Appendix B.

### Example of EQA Messaging

**NOTE:** The example below does not show all transactions and messages are not shown in their entirety. In the example below, bolded lines show EQA information.

```

<STX>SMP_NEW_DATA<FS><RS>
aMOD<GS>0500<GS><GS><GS><FS>
iIID<GS>01000<GS><GS><GS><FS>
rSEQ<GS>108<GS><GS><GS><FS>
rDATE<GS>10Jul2020<GS><GS><GS><FS>
rTIME<GS>09:01:03<GS><GS><GS><FS>
rDEVICE<GS>AMPULE<GS><GS><GS><FS>
rTYPE<GS>SAMPLE<GS><GS><GS><FS>
iSOURCE<GS>ANALYZER_EQA<GS><GS><GS><FS>
rCartID<GS>102030<GS><GS><GS><FS>
iSTATUS<GS>ACCEPTED/REJECTED<GS><GS><GS><FS> //
(Hide when Reject Result option is OFF)
iReject_Reason<GS>5<GS><GS><GS><FS>
iReject_Comment<GS>sample incorrectly identified
<GS><GS><GS><FS>
mpH<GS>7.393<GS> <GS><GS><FS>
mPCO2<GS>105.1<GS>mmHg<GS><GS><FS>
mPO2<GS>101.2<GS>mmHg<GS><GS><FS>
mNa+<GS>140.8<GS>mmol/L<GS><GS><FS>
mK+<GS>5.25<GS>mmol/L<GS><GS><FS>
mCa++<GS>1.21<GS>mmol/L<GS><GS><FS>
mCl-<GS>103<GS>mmol/L<GS><GS><FS>
mGlucose<GS>163<GS>mg/dL<GS><GS><FS>
mtHb<GS><3.2<GS>g/dL<GS><GS><FS>
mO2Hb<GS>88.0<GS>%<GS><GS><FS>
mCOHb<GS>0.4<GS>%<GS><GS><FS>
mMetHb<GS>0.5<GS>%<GS><GS><FS>
mHHb<GS>11.1<GS>%<GS><GS><FS>
iEQAKitID<GS>2345678<GS><GS><GS><FS>
iEQASpecimenID<GS>Lev1-Test2<GS><GS><GS><FS>
iEQAComent<GS>Jan2020Test<GS><GS><GS><FS>
iOID<GS>2345678<GS><GS><GS><FS><RS><ETX>??<EOT>

```







---

## 4 *Message Transfer*

---

<b><i>Message Transfer</i></b>	<b>4-3</b>
<i>Acknowledgment Format</i>	4-3
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## Message Transfer

The protocol uses message acknowledgments and message retry on no acknowledgment. The system's communication protocol builds the message to be transmitted into a frame that includes a checksum for error detection.

### Acknowledgment Format

The format of an acknowledgment is as follows:

```
<STX><ACK><ETX>checksum<EOT>
```

where:

<STX> is the ASCII control character Start of Text (02 decimal)

<ACK> is the ASCII control character Acknowledge (06 decimal)

<ETX> is the ASCII control character End of Text (03 decimal)

<EOT> is the ASCII control character End of Transmission (04 decimal)

This transmission format is identical to the format used for message transmissions and therefore allows the interrupt mechanism to easily detect start and end of transmissions.

### Message Acknowledgment

The LIS and the RAPIDPoint 500e system perform the following functions to implement the acknowledgment protocol.

<i>If . . .</i>	<i>Then . . .</i>
the system has a message to transmit to the LIS	the system transmits the message and starts a timer. The system then waits to receive an acknowledgment from the receiver, and sets the variable <code>RETRY = FALSE</code> (transaction started).
the LIS receives a good message (no parity/framing errors or checksum error)	the LIS transmits an acknowledgment to the system, and passes the message onto higher levels of the application code.
the system timer expires and <code>RETRY = FALSE</code>	the system retransmits the message and restarts the timer. The system also sets the variable <code>RETRY = TRUE</code> .
the system timer expires and <code>RETRY = TRUE</code>	the system logs an error (transaction complete).

<i>If . . .</i>	<i>Then . . .</i>
the system receives a bad message	the system ignores the message.
the system receives an acknowledgment message from the LIS	the system stops the timer (transaction complete).

The retry timer that the system (or LIS) implements does not start until the last character in the message has been transmitted. The timer occurs at fixed 8-second intervals.

The checksum for this fixed content acknowledgment is 0B, making the acknowledgment message:

```
<STX><ACK><ETX>0B<EOT>
```

### **Error Detection**

The protocol includes a checksum that consists of two ASCII characters that represent a two-character hexadecimal number in the range 00 through FF.

The hexadecimal number is generated by performing a modulo-256<sub>10</sub> summation of all the previous characters in the frame (that is, over the range <STX>. . .<ETX>, inclusive) and then expressing the resulting 8-bit unsigned integer in hexadecimal format.

For example, consider the following ID\_DATA message:

```
<STX>ID_DATA<FS><RS>aMOD<GS>LIS<GS><GS><GS>
<FS>iIID<GS>333<GS><GS><GS><FS><RS><ETX>84<EOT>
```

The aMOD field must be LIS as shown, but the iIID field can be any alphanumeric characters (up to 6).

The summation of the value of each character in the string and the resulting hexadecimal number are described following table:

	<i>Decimal</i>	<i>Hexadecimal</i>
Summation	1924	784
Modulo 256 <sub>10</sub>	132	84

The checksum is transmitted as the two ASCII characters 8 and 4 (8 is 56 decimal, hex 38, and 4 is 52 decimal, hex 34).

## Maximum Transmission Size

The RAPIDPoint 500e system transmits messages of up to 2500 characters, including all control characters and the checksum.

## Examples Using the Protocol

This section provides three examples that describe some of the messages transmitted using the communication protocol.

### Example A: Device Identify Transaction

Example A describes the messages transmitted during system port configuration. The content of the messages is explained in the message key following the transaction table. The LIS must respond with the correct ID\_DATA message for the system to recognize the LIS connection and allow transmission of further messages.

The ID\_REQ/ ID\_DATA trans action described in the following table is initiated on system or port start-up by the RAPIDPoint 500e system and is required for the LIS to conform to the protocol.

<i>RAPIDPoint 500e System</i>	<i>LIS</i>
ID Request (Message 1)	→
	← Acknowledge (Message 2)
	← ID data (Message 3)
Acknowledge (Message 2)	→

**NOTE:** The acknowledge message must be issued within the retry time for the specified baud rate.

Message Key:

Message 1

<STX>ID\_REQ<FS><RS><ETX>13<EOT>

Message 2

<STX><ACK><ETX>0B<EOT>

Message 3

<STX>ID\_DATA<FS><RS>aMOD<GS>LIS<GS><GS><GS><FS>iIID  
<GS>333<GS><GS><GS><FS><RS><ETX>84<EOT>

### **Example B: Patient Sample Analysis**

Example B describes the messages transmitted during a typical patient sample analysis for a RAPIDPoint 500e system. The content of the messages is explained in the message key following the transaction table.

<b>RAPIDPoint 500e System</b>		<b>LIS</b>
System Not Ready (Message 1)	→	
	←	Acknowledge (Message 2)
Sample Start (Message 3)	→	
	←	Acknowledge (Message 2)
System Waiting (Message 4)	→	
	←	Acknowledge (Message 2)
System Measuring (Message 5)	→	
	←	Acknowledge (Message 2)
New Sample Available (Message 6)	→	
	←	Acknowledge (Message 2)
	←	Sample Request (Message 7)
Acknowledge (Message 2)	→	
Sample New Data (Message 8)	→	
	←	Acknowledge (Message 2)
System Ready (Message 9)	→	
	←	Acknowledge (Message 2)

## Message Key:

## Message 1

```
<STX>SYS_NOT_READY<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>
iIID<GS>12345<GS><GS><GS><FS>aDATE<GS>20Dec2010<GS><GS><GS>
<FS>aTIME<GS>13:33:17<GS><GS><GS><FS>iOID<GS>3<GS><GS><GS>
<FS><RS><ETX>{chksum}<EOT>
```

## Message 2

```
<STX><ACK><ETX>0B<EOT>
```

## Message 3

```
<STX>SMP_START<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID
<GS>12345<GS><GS><GS><FS>aDATE<GS>20Dec2010<GS><GS><GS>
<FS>aTIME<GS>13:33:19<GS><GS><GS><FS>iOID<GS>3<GS><GS><GS>
<FS><RS><ETX>{chksum}<EOT>
```

## Message 4

```
<STX>SYS_WOPR<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID
<GS>12345<GS><GS><GS><FS>aDATE<GS>20Dec2010<GS><GS><GS>
<FS>aTIME<GS>13:33:41<GS><GS><GS><FS>iOID<GS>3<GS><GS><GS>
<FS><RS><ETX>{chksum}<EOT>
```

## Message 5

```
<STX>SYS_MEASURING<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>
iIID<GS>12345<GS><GS><GS><FS>aDATE<GS>20Dec2010<GS><GS><GS>
<FS>aTIME<GS>13:33:44<GS><GS><GS><FS>iOID<GS>3<GS><GS><GS>
<FS><RS><ETX>{chksum}<EOT>
```

## Message 6

```
<STX>SMP_NEW_AV<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID
<GS>12345<GS><GS><GS><FS>rSEQ<GS>16<GS><GS><GS><FS><RS>
<ETX>{chksum}<EOT>
```

## Message 7

```
<STX>SMP_REQ<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID<GS>
12345<GS><GS><GS><FS>rSEQ<GS>16<GS><GS><GS><FS><RS><ETX>
{chksum}<EOT>
```

## Message 8

```

<STX>SMP_NEW_DATA<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>
iIID<GS>12345<GS><GS><GS><FS>rDATE<GS>20Dec2010<GS><GS><GS>
<FS>rDEVICE<GS>SYRINGE<GS><GS><GS><FS>rTIME<GS>13:33:15
<GS><GS><GS><FS>rTYPE<GS>SAMPLE<GS><GS><GS><FS>iSOURCE
<GS>ARTERIAL<GS><GS><GS><FS>rSEQ<GS>16<GS><GS><GS><FS>
rCartID<GS>834437404<GS><GS><GS><FS>mpH<GS>7.391<GS><GS>
<GS><FS>mPCO2<GS>25.3<GS>mmHg<GS>L<ETB><GS><FS>mPO2<GS>
181.1<GS>mmHg<GS>H<ETB><GS><FS>mNa+<GS>155.6<GS>mmol/L
<GS>H<ETB><GS><FS>mK+<GS>3.11<GS>mmol/L<GS>L<ETB><GS><FS>
mCa++<GS>1.63<GS>mmol/L<GS>L<ETB><GS><FS>mCl- <GS>121<GS>
mmol/L<GS>H<ETB><GS><FS>mGlucose<GS>41<GS>mg/dL<GS>L<ETB>
<GS><FS><GS><GS>%<GS><<ETB><GS><FS>iPID<GS>123<GS>
<GS><GS><FS>iLNAME<GS>AV-A<GS><GS><GS><FS>iSEX<GS>F<GS>
<GS><GS><FS>iDOB<GS>12Dec1912<GS><GS><GS><FS>iROOM<GS>
556325884<GS><GS><GS><FS>iDID<GS>321456<GS><GS><GS><FS>
iDATE<GS>20Dec2010<GS><GS><GS><FS>iTIME<GS>14:30<GS><GS>
<GS><FS>iACC<GS>9876543210<GS><GS><GS><FS>iOID<GS>3<GS>
<GS><GS><FS>iTEMP<GS>35.9<GS>C<GS><GS><FS>iF1O2<GS>50.0
<GS>%<GS><GS><FS>iFlow<GS>12.00<GS>L/min<GS><GS><FS>iRR<GS>
16.0<GS>bpm<GS><GS><FS>cHCO3act<GS>15.0<GS>mmol/L<GS><GS>
<FS>cBE(vv)<GS>-9.9<GS>mmol/L<GS><GS><FS>cctCO2<GS>15.8<GS>
mmol/L<GS><GS><FS>cCa++<GS>1.62<GS>mmol/L<GS><GS><FS>
cAnGap<GS>22.7<GS>mmol/L<GS><GS><FS>cPO2/FIO2<GS>3.62<GS>
mmHg/%<GS><GS><FS>cpH<GS>7.407<GS><GS><GS><FS>cPO2<GS>
175.2<GS>mmHg<GS><GS><FS>cPCO2<GS>24.1<GS>mmHg<GS><GS>
<FS><RS><ETX>{chksum}<EOT>

```

## Message 9

```

<STX>SYS_READY<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID
<GS>12345<GS><GS><GS><FS>aDATE<GS>20Dec2010<GS><GS><GS>
<FS>aTIME<GS>13:35:32<GS><GS><GS><FS>iOID<GS>3<GS><GS><GS><
FS><ETX>{chksum}<EOT>

```



**Example C: Edited Patient Sample Data**

Example C describes the messages transmitted during the transmission of edited patient sample data (in this case an arterial sample) for a RAPIDPoint 500e system. The content of the messages is explained in the message key following the transaction table.

<i>RAPIDPoint 500e System</i>		<i>LIS</i>
System Not Ready (Message 1)	→	
	←	Acknowledge (Message 2)
New Sample Available (Message 3)	→	
	←	Acknowledge (Message 2)
	←	Sample Request (Message 4)
Acknowledge (Message 2)	→	
Edit Sample Data (Message 5)	→	
	←	Acknowledge (Message 2)
System Ready (Message 6)	→	
	←	Acknowledge (Message 2)

Message Key:

Message 1

```
<STX>SYS_NOT_READY<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>
iIID<GS>12345<GS><GS><GS><FS>aDATE<GS>11Oct2010<GS><GS><GS>
<FS>aTIME<GS>16:23:30<GS><GS><GS><FS><RS><ETX>[checksum]<EOT>
```

Message 2

```
<STX><ACK><ETX>0B<EOT>
```

Message 3

```
<STX>SMP_NEW_AV<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID
<GS>12345<GS><GS><GS><FS>rSEQ<GS>56<GS><GS><GS><FS><RS>
<ETX>[checksum]<EOT>
```

Message 4

```
<STX>SMP_REQ<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID<GS>
12345<GS><GS><GS><FS>rSEQ<GS>56<GS><GS><GS><FS><RS><ETX>
[checksum]<EOT>
```

## Message 5

```

<STX>SMP_EDIT_DATA<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>
iIID<GS>12345<GS><GS><GS><FS>rDATE<GS>11Oct2010<GS><GS><GS>
<FS>rDEVICE<GS>SYRINGE<GS><GS><GS><FS>rTIME<GS>16:20:36
<GS><GS><GS><FS>rTYPE<GS>SAMPLE<GS><GS><GS><FS>iSOURCE
<GS>ARTERIAL<GS><GS><GS><FS>rSEQ<GS>56<GS><GS><GS><FS>
rCartID<GS>970506816<GS><GS><GS><FS>mpH<GS><GS><GS>QUES
<EB><GS><FS>mPCO2<GS><GS>mmHg<GS><<ETB><GS><FS>mPO2
<GS>183.3<GS>mmHg<GS><GS><FS>mNa+<GS>118.5<GS>mmol/L<GS>
<GS><FS>mK+<GS>5.25<GS>mmol/L<GS><GS><FS>mCa++<GS>0.76<GS>
mmol/L<GS><GS><FS>mCl<GS>91<GS>mmol/L<GS><GS><FS>mGlucose
<GS>60<GS>mg/dL<GS><GS><FS><GS><GS>%<GS><<ETB><GS>
<FS>iPID<GS>25<GS><GS><GS><FS>iLNAME<GS>ARTERY<GS><GS>
<G><FS>iSEX<GS>M<GS><GS><GS><FS>iDOB<GS>12Dec1912<GS>
<GS><GS><FS>iROOM<GS>2525<GS><GS><GS><FS>iDID<GS>25<GS>
<GS><GS><FS>iDATE<GS>11Oct2010<GS><GS><GS><FS>iTIME<GS>
16:20<GS><G><GS><FS>iACC<GS>47<GS><GS><GS><FS>iOID<GS>42
<GS><GS><GS><FS>iTEMP<GS>37.0<GS>C<GS><GS><FS>itHb<GS>14.0
<GS>g/dL<GS><GS><FS>iFIO2<GS>23.0<GS>%<GS><GS><FS>iFlow<GS>
27.00<GS>L/min<GS><GS><FS>iRR<GS>17.0<GS>bpm<GS><GS><FS>
cPO2/FIO2<GS><GS>mmHg%<GS><<ETB><GS><FS>cPO2<GS>183.3
<GS>mmHg<GS><GS><FS><RS><ETX>[chksum]<EOT>

```

## Message 6

```

<STX>SYS_READY<FS><RS>aMOD<GS>0500<GS><GS><GS><FS>iIID
<GS>12345<GS><GS><GS><FS>aDATE<GS>11Oct2010<GS><GS><GS>
<FS>aTIME<GS>16:24:11<GS><GS><GS><FS><RS><ETX>[chksum]<EOT>

```

---

## 5 *Physical Interface*

---

<b><i>Physical Interface</i></b>	<b>5-3</b>
<i>Architecture</i>	5-3
<i>Hardware Link</i>	5-3
<i>Character Format</i>	5-4
<i>TCP/IP Connection</i>	5-4



# Physical Interface

## Architecture

The basic architecture is point-to-point communications between the LIS and the RAPIDPoint 500e system.

## Hardware Link

The hardware link consists of a serial asynchronous (RS-232) interface. Communication is normally full duplex at one of the following user-selected baud rates:

- 19200
- 9600
- 4800
- 2400
- 1200

The system interface port is equipped with a 9-pin, D-type, male connector.

The systems are considered to be Data Terminal Equipment (DTE). The DTE lines that are supported are listed below.

<i>DTE Line</i>	<i>Pin Number</i>
Data Carrier Detect (not used)	Pin 1
Received Data	Pin 2
Transmitted Data	Pin 3
Data Terminal Ready (not used)	Pin 4
Signal Ground	Pin 5
Data Set Ready (not used)	Pin 6
Request to Send (not used)	Pin 7
Clear to Send (not used)	Pin 8
Ring Indicator (not used)	Pin 9

## **Character Format**

You can select the following character format options when you select the LIS communication parameters in setup at the RAPIDPoint 500e system.

<b>Option</b>	<b>Selection</b>
data bits	7 bits, 8 bits
parity	odd, even, none
modem (duplex)	none, full

The stop bits are set to 1.

## **TCP/IP Connection**

The following criteria has to be met to establish a connection between the RAPIDPoint 500e system and an LIS:

- LIS sends the TCP/IP connection request on port #3001 to the IP address or DHCP name of the RAPIDPoint 500e system.
- There is a double acknowledgement. The LIS acknowledgement is needed in addition to the low level TCP/IP packet acknowledgement.
- This protocol only supports 802.3 (Ethernet) networking.
- The physical interface is 10BaseT, RJ45 connector.

## Appendix A: Variables

The tables in this appendix list the fields that can appear in messages sent by either the RAPIDPoint 500e system or the LIS.

### Parameter Variables

The variable names listed in the table below are the parameters for the RAPIDPoint 500e system. The lowercase prefix at the beginning of each variable name to indicate that the parameter is measured (m) or calculated (c). For example, AnGap becomes cAnGap.

<i>Variable Name</i>	<i>Parameter</i>	<i>Unit of Measure</i>
mpH	pH	pH units
mH+	H <sup>+</sup>	nmol/L
mPCO2	pCO <sub>2</sub>	mmHg or kPa
mPO2	pO <sub>2</sub>	mmHg or kPa
mNa+	Na <sup>+</sup>	mmol/L
mK+	K <sup>+</sup>	mmol/L
mCa <sup>++</sup>	Ca <sup>++</sup>	mmol/L or mg/dL
mCl <sup>-</sup>	Cl <sup>-</sup>	mmol/L
mGlucose	Glu	mg/dL or nmol/L
mLactate	Lac	mmol/L or mg/dL
msO2	sO <sub>2</sub>	% or fraction
mtHb	tHb	g/dL, g/L, mmol/L
mO2Hb	FO <sub>2</sub> Hb	% or fraction
mCOHb	FCOHb	% or fraction
mMetHb	FMetHb	% or fraction
mHHb	FHHb	% or fraction
mnBili	nBili	mg/dL or μmol/L
mPO2(v)	pO <sub>2</sub> (v)	mmHg or kPa
mtHb(v)	tHb(v)	g/dL, g/L, mmol/L
mO2Hb(v)	O <sub>2</sub> Hb(v)	% or fraction
cHCO3act	HCO <sub>3</sub> <sup>-</sup> act	mmol/L

<b>Variable Name</b>	<b>Parameter</b>	<b>Unit of Measure</b>
cHCO3std	HCO <sub>3</sub> <sup>-</sup> std	mmol/L
cBE(vt)	BE(B)	mmol/L
cBE(vv)	BE(ecf)	mmol/L
ctCO2	ctCO <sub>2</sub>	mmol/L
cCa <sup>++</sup>	Ca <sup>++</sup> (7.4)	mmol/L or mg/dL
cAnGap	AnGap	mmol/L
cmOsm	mOsm	mmol/kg or mOsm/kg
cO2SAT	O <sub>2</sub> SAT(est)	% or fraction
cPO2/FIO2	pO <sub>2</sub> /F <sub>1</sub> O <sub>2</sub>	mmHg% or kPa%
cpH	pH(T)	pH units
cH <sup>+</sup>	H <sup>+</sup> (T)	nmol/L
cPCO2	pCO <sub>2</sub> (T)	mmHg or kPa
cPO2	pO <sub>2</sub> (T)	mmHg or kPa
cRI	RI(T)	fraction or %
cSO2	sO <sub>2</sub>	% or fraction
cHct	Hct	% or fraction
cO2CAP	BO <sub>2</sub>	mL/dL, mL/L, mmol/L
cA-aDO2	pO <sub>2</sub> (A-a)(T)	mmHg, kPa
ca/A	pO <sub>2</sub> (a/A)(T)	decimal or %
cP50	p50	mmHg, kPa
cQsp/Qt	Q̇ <sub>sp</sub> /Q̇ <sub>t</sub> (T)	% or fraction
cQsp/Qt(est)	Q̇ <sub>sp</sub> /Q̇ <sub>t</sub> (T)(est)	% or fraction
cctO2(Hb)	ctO <sub>2</sub> (Hb)	mL/dL, mL/L, mmol/L
cctO2(a)	ctO <sub>2</sub> (a)	mL/dL, mL/L, mmol/L
cctO2(v)	ctO <sub>2</sub> (v̄)	mL/dL, mL/L, mmol/L
cctO2(v)	ctO <sub>2</sub> (v)	mL/dL, mL/L, mmol/L
cctO2(a-v)	ctO <sub>2</sub> (a-v̄)	mL/dL, mL/L, mmol/L
cctO2[(a-v)/a]	ctO <sub>2</sub> [(a-v̄)/a]	% or fraction
DO2	ḐO <sub>2</sub>	mL/min, L/min, mmol/min
VO2	ḐO <sub>2</sub>	mL/min, L/min, mmol/min



## Entered Variables

Entered variables are indicated by the prefix *i* (input). These variables can be patient or sample demographic values, such as *iPID* (patient ID) and *iSOURCE* (sample source). They can also be values that relate to the configuration of QC files, such as *iQLEV* (an identifier of QC). The units for the variables listed below are all null fields, unless otherwise noted.

<b>Variable Name</b>	<b>Variable Description</b>
<i>iPID</i>	patient ID
<i>iFNAME*</i>	patient first name
<i>iLNAME†</i>	patient last name (surname)
<i>iSEX</i>	patient sex (M, F, or U)
<i>iDOB</i>	patient birth date
<i>iBIRTHTERM</i>	F for full-term, M for moderately premature, or X for extremely premature
<i>iROOM</i>	patient location
<i>iDID</i>	physician ID
<i>iDATE</i>	patient sample collection date
<i>iTIME</i>	patient sample collection time
<i>iACC</i>	accession number
<i>iOID</i>	operator ID
<i>iTEMP</i>	temperature C or F
<i>itHb</i>	ctHb g/dL, g/L, or mmol/L
<i>iFIO2</i>	$F_{I}O_2$ fraction or %
<i>iFlow</i>	Flow L/min
<i>iRR</i>	Resp. Rate b/min
<i>iCPAP</i>	Continuous Positive Airway Pressure CmH20
<i>iPEEP</i>	Positive End Expiratory Pressure CmH20

<b>Variable Name</b>	<b>Variable Description</b>
iPIP	Peak Inspiratory Pressure CmH20
iVt	Tidal Volume mL
iAllen	Allen Test null field
iCust_	Custom Demographics - Up to 10 Demographics defined by operator null field. See "Custom Demographics" on page 7 of Appendix B for more detail.
iBP	<i>p</i> Atm mmHg or kPa
iOBF	O <sub>2</sub> binding factor fraction
ictO2(a-v)	ctO <sub>2</sub> (a-v) mL/dL, mL/L, mmol/L
iQt	QT L/min
iQDATE	QC expiration date
iQID	QC material identifier
iQLEV	level identifier of QC material
iQLOT	lot identifier of QC material
<b>NOTE:</b> The "iSTATUS," "iReject Reason" and "iReject Comment" variables may be transmitted for patient samples to the LIS only if the Reject Results feature is enabled in Setup in the RAPIDPoint 500e system.	
iSTATUS	sample result status values = ACCEPTED/REJECTED
iReject Reason <sup>‡</sup>	reason sample is rejected** values = Yes/No
iReject Comment	comment about rejected sample
<b>NOTE:</b> The "iCVNAction," "iCVNReadBack," "iCVNDate," "iCVNTime," and "iCVNCriticalPresent" variables may be transmitted for patient samples to the LIS only if the Critical Value Notification feature is enabled in Setup in the RAPIDPoint 500e system.	
iCVNAction <sup>§</sup>	action(s) taken to address critical value result <sup>††</sup>
iCVNReadBack	indicates critical value notification has been received by designated recipient(s) values = Yes/No

<b>Variable Name</b>	<b>Variable Description</b>
iCVNDate	date of critical value notification
iCVNTime	time of critical value notification
iCVNCriticalPresent	indicates whether critical value has been detected values = Yes/No
iDrawSite	draw site for customized whole blood sample
iEQAKitID#	EQA kit identifier
iEQASpecimenID	EQA specimen identifier
iEQAComment	comment about EQA sample
iSOURCE	sample source: ARTERIAL VENOUS†† CAPILLARY ARTERIAL-VENOUS PLEURAL§§ DIALYSIS-FLUID## MIXEDV ANALYZER_EQA***

\* iFNAME field may contain UTF-8 encoded character strings, which support entry of non-English names.

† iLNAME fields may contain UTF-8 encoded character strings, which support entry of non-English names.

‡ See the *Patient Sample Assay Data Record* table on page 1 of Appendix B for more information about variables related to rejecting samples.

§ See the *Patient Sample Assay Data Record* table on page 1 of Appendix B for more information about variables related to critical value notification.

# See the *Patient Sample Assay Data Record* table page 1 of Appendix B for more information about variables related to EQA samples.

\*\* If Clots (4) and Bubbles (8) are selected, the system will send a summed bit with a value of 12.

†† If Notify Nurse (2) and Sent to Lab (8) are selected, the system will send a summed bit with a value of 10.

‡‡ A venous source can be used with a capillary sample device.

§§ Not for use in all geographies.

## Not for use in all geographies.

\*\*\*"ANALYZER\_EQA" indicates an EQA sample.

## Assay (Run) Variables

Assay variables are included in patient sample data, QC data, and calibration data records to distinguish one analysis (run) from another, and also to identify the type of analysis performed. Assay variables are prefixed by the letter r. The rSEQ variable appears in messages that indicate the availability of data and is required in messages requesting data. The assay variables are listed in the following table:

<b>Variable Name</b>	<b>Variable Description</b>
rDATE	analysis data
rDEVICE	sample device (CAPILLARY, SYRINGE, AMPULE, AQC_ QUICK)
rSEQ	sequence number for this analysis
rTIME	time of analysis
rCartID	serial number of measurement cartridge
rAQCID	serial number of AutomaticQC cartridge
rTYPE	analysis type (SAMPLE)
rAVSEQ	sequence number for an a-v study report where the sequence number is the combination of the sequence number of the arterial sample and the mixed-venous sample with a slash (/) separating the two numbers
rWWLotNumber	5 digit lot number of wash/waste cartridge example: WW/22345

## System Variables

The system variables aMOD and iIID are included in all data records except the Device Identity request (ID\_REQ). The LIS must provide the aMOD field as LIS in the ID\_DATA message.

**NOTE:** The calibration data fields aCmname, aCdname, aSmname, and aSdname also represent system variables.

System variables are prefixed by the letter a, except IID, which is prefixed by the letter i. In the system variable, *name* is replaced by the name of a particular parameter. For example, aCmname becomes aCmPO<sub>2</sub> when the calibration point of pO<sub>2</sub> is measured.

<b>System Variable</b>	<b>Variable Description</b>
aMOD	model number (system identifier)
iIID	instrument identifier

<b>System Variable</b>	<b>Variable Description</b>
aCmname	cal point measured of parameter named
aCdname	cal point drift of parameter named
aSmname	slope point measured of parameter named
aSdname	slope drift of parameter named
aZmtHb	CO-ox zero calibration failed

## **Setup Variables**

The setup variable sDISname appears in the data record that the system sends in the Parameter Enabled/Disabled transaction. Setup variable sHQname and sLQname may be included in QC data records to indicate high and low limits entered into the system for the target range. Setup variables are prefixed by the letter *s*.

In the setup variable, *name* is replaced by the name of a particular parameter. For instance, sDISname becomes sDISGlucose when the Glucose parameter has been disabled.

<b>Setup Variable</b>	<b>Variable Description</b>
sDISname	disable channel for parameter named
sHQname	high QC warning limit of parameter named
sLQname	low QC warning limit of parameter named

Refer to *Parameter Selection Data Record* in Appendix B for the variable names.



## Appendix B: Data Records

Appendix B contains the following data records:

- patient sample assay
- QC
- calibration
- parameter selection

The following table is a key to interpreting all value formats described in Appendix B. Use of the letter n in parentheses in the value field indicates variance in parameter resolution based on the units of measure in which the RAPIDPoint 500e system reports the results.

<i>Value</i>	<i>Description</i>
n	integer (0 through 9)
.	decimal point
A	uppercase alphabetic character (A through Z)
a	lowercase alphabetic character (a through z)

### Patient Sample Assay Data Record

The following table lists the variables included in the patient sample assay data record.

<i>Variable Name</i>	<i>Value</i>	<i>Unit of Measure</i>
aMOD	0500	null field
iIID	up to 6 alphanumeric characters	null field
rCartID	up to 10 alphanumeric characters	null field
rTYPE	SAMPLE	null field
rSEQ	nnnnn...(2 <sup>32</sup> )	null field
rAVSEQ	nnnnn...(2 <sup>32</sup> )/nnnnn...(2 <sup>32</sup> )	null field
iACC	up to 13 alphanumeric characters	null field
rDATE	nnAannnn	null field
rTIME	nn:nn:nn	null field
rWWLotNumber	WW/nnnnn	null field

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
iPID	up to 20 alphanumeric characters	null field
iFNAME	up to 15 alphabetic characters <sup>†</sup>	null field
iLNAME	up to 15 alphabetic characters <sup>‡</sup>	null field
iDATE	nnAaannnn	null field
iTIME	nn:nn	null field
iOID	up to 13 alphanumeric characters	null field
iROOM	up to 11 alphanumeric characters	null field
iDOB	nnAaannnn	null field
iBIRTHTERM	F for full-term, M for moderately premature, or X for extremely premature	null field
iSEX	M, F, or U	null field
iDID	up to 13 alphanumeric characters	null field
iSOURCE	ARTERIAL VENOUS CAPILLARY ARTERIAL-VENOUS PLEURAL <sup>§</sup> DIALYSIS-FLUID <sup>#</sup> ANALYZER_EQA <sup>**</sup>	null field
rDEVICE	CAPILLARY SYRINGE QUICK	null field
mpH	n.nnn	null field
<i>or</i>		
mH+	nnn.n	nmol/L
mPCO2	nnn.n nn.nn	mmHg kPa
mPO2	nnn.n nn.nn	mmHg kPa
mNa+	nnn.n	mmol/L
mK+	nn.nn	mmol/L
mCa <sup>++</sup>	n.nn n.nn	mmol/L mg/dL
mCl-	nnn	mmol/L
mGlucose	nnn nnn.n	mg/dL mmol/L
mLactate	nn.nn nnn.n	mmol/L mg/dL



<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
msO2	nnn.n	%
	n.nn	null field
mtHb	nn.n	g/dL
	nnn	g/L
	nn.n	mmol/L
mO2Hb	nnn.n	%
	n.nnn	null field
mCOHb	nnn.n	%
	n.nnn	null field
mMetHb	nnn.n	%
	n.nnn	null field
mHHb	nnn.n	%
	n.nnn	null field
mnBili	nn.n	mg/dL
	nnn	μmol/L
cHCO3act	nn.n	mmol/L
cHCO3std	nn.n	mmol/L
cBE(vt)	nn.n	mmol/L
cBE(vv)	nn.n	mmol/L
ctCO2	nn.n	mmol/L
cCa++	n.nn	mmol/L
	nn.n	mg/dL
cAnGap	nn.n	mmol/L
cmOsm	nnn.n	mmol/kg
	nnn.n	mOsm/kg
cO2SAT	nnn.n	%
	n.nn	null field
cPO2/FIO2	n.nn	mmHg/%
	n.nnn	kPa/%
cpH <i>or</i>	n.nnn	null field
cH+	nnn.n	nmol/L
cPCO2	nnn.n	mmHg
	nn.nn	kPa
cPO2	nnn.n	mmHg
	nn.nn	kPa
cRI	nn.nn	null field
	nnnn	%
cSO2	nnn.n	%
	n.nn	null field

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
cHct	nn	%
	n.nn	null field
cO2CAP	nn.n	mL/dL
	nnn	mL/L
	nn.n	mmol/L
cA-aDO2	nnn.n	mmHg
	nnn.nn	kPa
ca/A	n.nn	null field
	nnn	%
cP50	nn.n	mmHg
	nn.nn	kPa
cQsp/Qt	nnn.n	%
	n.nn	null field
cQsp/Qt(est)	nnn.n	%
	n.nn	null field
cctO2(Hb)	nn.n	mL/dL
	nnn	mL/L
	nn.n	mmol/L
cctO2(a)	nn.n	mL/dL
	nnn	mL/L
	nn.n	mmol/L
cctO2(v)	nn.n	mL/dL
	nnn	mL/L
	nn.n	mmol/L
cctO2(v)	nn.n	mL/dL
	nnn	mL/L
	nn.n	mmol/L
cctO2(a-v)	nn.n	mL/dL
	nnn	mL/L
	n.n	mmol/L
cctO2[(a-v)/a]	nnn	%
	n.nn	null field
DO2	nnnn	mL/min
	n.nn	L/min
	nnn.n	mmol/min
VO2	nnnn	mL/min
	n.nn	L/min
	nnn.n	mmol/min
mtHb(v)	nn.n	g/dL
	nnn	g/L
	nn.n	mmol/L
mPO2(v)	nnn.n	mmHg
	nn.nn	kPa

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
mO2Hb(v)	nnn.n n.nnn	% null field
ictO2(a-v)	nn.n nnn n.n	mL/dL mL/L mmol/L
iOBF	n.nn	null field
iTEMP	nn.n nnn.n	C F
itHb	nn.n nnn nn.n	g/dL g/L mmol/L
iFIO2	nnn.n n.nnn	% null field
iBP	nnn nnn.n	mmHg kPa
iQt	nn.nn	L/min
iFlow	nn.nn	L/min
iRR	nnn.n	bpm
iCPAP	nn.n	cmH2O
iPEEP	nn.n	cmH2O
iPIP	nnn.n	cmH2O
iVt	nnnn.n	mL
iAllen	N/A No Yes	null field
iSTATUS	ACCEPTED REJECTED	null field
iReject Reason	Summed Numeric field 1 = Sample incorrectly identified 2 = Sample integrity issue 4 = Clots 8 = Bubbles 16 = Operator Competency test sample 32 = EQA sample 64 = Other	null field
iReject Comment	Alpha/numeric	null field

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
iCVNAction	Summed Numeric field 1 = Notify physician 2 = Notify nurse 4 = Repeated test 8 = Sent to Lab 16 = Expected results 32 = Other	null field
iCVNReadBack	Yes No	null field
iCVNDate	nnAaannnn	null field
iCVNTime	hh.mm	null field
iCVNComment	Alpha/numeric	null field
iCVNCriticalPresent	Yes No	null field
iDrawSite	up to 21 alphanumeric characters	null field
iEQAKitID	Alpha/numeric	null field
iEQASpecimenID	Alpha/numeric	null field
iEQAComment	Alpha/numeric	null field
iCust_*	up to 15 alphanumeric characters	null field

\* Up to 10 custom demographic fields can be specified by the operator. The following fields accommodate the number of characters indicated: Name (up to 15 characters), Units (up to 6 characters), Low and High (up to 8 characters for negative numbers and up to 7 for positive numbers).

For a more detail, see the next section, "Custom Demographics" on page 7

† iFNAME field may contain UTF-8 encoded character strings, which support entry of non-English names.

‡ iLNAME field may contain UTF-8 encoded character strings, which support entry of non-English names.

§ Not for use in all geographies.

# Not for use in all geographies.

\*\* "ANALYZER\_EQA" indicates an EQA sample.

**NOTE:** Parameters that are arterial-venous only are entered in Setup and used only in a-v study reports. These parameters are transmitted with data for a-v study reports. OBF and ctO<sub>2</sub>(a-v) can also appear in arterial samples that report estimated shunt.

## Custom Demographics

Customers can define up to 10 demographics. Customer defined demographics support either text entry fields or numeric entry fields. The prefix for customer defined demographic names is “iCUST\_.”

For example, if an operator wants to create a “Draw Location” demographic field, the operator will create a text field called “Draw Location.” If a sample is run and a value of “Left Femoral” is entered in the “Draw Location” field, the field would be transmitted to the LIS as the following:

```
iCUST_Draw Location<GS>Left Femoral<GS><GS><GS><FS>
```

Now suppose the operator wants to record a numeric value for each sample, such as “Weight.” The operator creates a numeric field defined as “Weight,” defines the unit of measurement in a field defined as “kg,” and might optionally define a range of “10.0 to 250.00.” If a sample was run using these demographic fields, and a value of “87.3” was entered, the field would be transmitted to the LIS as the following:

```
iCUST_Weight<GS>87.3<GS>kg<GS><GS><FS>
```

**NOTE:** The Low/High ranges associated with customer defined demographics are not transmitted to the LIS. Rather, they are used by the RAPIDPoint 500e user interface to constrain the range of values that are entered.

**NOTE:** Numeric customer defined demographics may use units of measurement but units of measurement are not required.

## QC Sample Data Record

The following table lists the variables included in the QC data record for gases and analytes. For variables included in the hematocrit control, see page B-9. Calibration.

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aMOD	0500	null field
iIID	up to 6 alphanumeric characters	null field
rCartID	up to 10 alphanumeric characters	null field
rTYPE	QC	null field
rSEQ	nnnnn...(2 <sup>32</sup> )	null field
rDATE	nnAaannnn	null field
rDEVICE	CAPILLARY, SYRINGE, AMPULE, AQC	null field
rAQCID	up to 10 alphanumeric characters	null field (only for AutomaticQC)
rTIME	nn:nn:nn	null field
rWWLotNumber	WW/nnnnn	null field
iQID	up to 16 alphanumeric characters	null field
iQLEV	1 alphanumeric character	null field
iQLOT	up to 10 alphanumeric characters	null field (not for AutomaticQC)
iQDATE	nnAaannnn	null field (only for Required QC)
iOID	up to 13 alphanumeric characters	null field
iSTATUS	ACCEPTED REJECTED  These values indicate whether a data point is included or excluded when QC statistics are generated	null field (only for tracking QC sample results)
sLQmpH	n.nnn	null field
<i>or</i>		
sLQmH+	nnn.n	nmol/L
mpH	n.nnn	null field
<i>or</i>		
mH+	nnn.n	nmol/L
sHQmpH	n.nnn	null field

<i>Variable Name</i>	<i>Value</i>	<i>Unit of Measure</i>
<i>or</i>		
sHQmH+	nnn.n	nmol/L
sLQmPCO2	nnn.n nn.nn	mmHg kPa
mPCO2	nnn.n nn.nn1	mmHg kPa
sHQmPCO2	nnn.n nn.nn	mmHg kPa
sLQmPO2	nnn.n nn.nn	mmHg kPa
mPO2	nnn.n nn.nn	mmHg kPa
sHQmPO2	nnn.n nn.nn	mmHg kPa
sLQmNa+	nnn.n	mmol/L
mNa+	nnn.n	mmol/L
sHQmNa+	nnn.n	mmol/L
sLQmK+	nn.nn	mmol/L
mK+	nn.nn	mmol/L
sHQmK+	nn.nn	mmol/L
sLQmCl-	nnn	mmol/L
mCl-	nnn	mmol/L
sHQmCl-	nnn	mmol/L
sLQmCa++	n.nn nn.n	mmol/L mg/dL
mCa++	n.nn nn.n	mmol/L mg/dL
sHQmCa++	n.nn nn.n	mmol/L mg/dL
sLQmGlucose	nnn nn.n	mg/dL mmol/L
mGlucose	nnn nn.n	mg/dL mmol/L
sHQmGlucose	nnn nn.n	mg/dL mmol/L

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
sLQmLactate	nn.nn	mmol/L
	nnn.n	mg/dL
mLactate	nn.nn	mmol/L
	nnn.n	mg/dL
sHQmLactate	nn.nn	mmol/L
	nnn.n	mg/dL
sLQmtHb	nn.n	g/dL
	nnn	g/L
	nn.n	mmol/L
mtHb	nn.n	g/dL
	nnn	g/L
	nn.n	mmol/L
sHQmtHb	nn.n	g/dL
	nnn	g/L
	nn.n	mmol/L
sLQmO2Hb	nnn.n	%
	n.nnn	null field
mO2Hb	nnn.n	%
	n.nnn	null field
sHQmO2Hb	nnn.n	%
	n.nnn	null field
sLQmCO2Hb	nnn.n	%
	n.nnn	null field
mCO2Hb	nnn.n	%
	n.nnn	null field
sHQmCO2Hb	nnn.n	%
	n.nnn	null field
sLQmMetHb	nnn.n	%
	n.nnn	null field
mMetHb	nnn.n	%
	n.nnn	null field
sHQmMetHb	nnn.n	%
	n.nnn	null field
sLQmHHb	nnn.n	%
	n.nnn	null field
mHHb	nnn.n	%
	n.nnn	null field



<i>Variable Name</i>	<i>Value</i>	<i>Unit of Measure</i>
sHQmHHb	nnn.n n.nnn	% null field
sLQmnBili	nn.n nnn	mg/dL umol/L
mnBili	nn.n nnn	mg/dL umol/L
sHQnBili	nn.n nnn	mg/dL umol/L

### **Calibration Data Record**

The calibration records sent by a RAPIDPoint 500e system depend upon the type of calibration performed. There are three different calibration sequences:

- 1-point (cal only)
- 2-point (cal and slope)
- 2-point/full (cal, slope, and tHb slope)

Variables reported for a 1-point calibration are shown in the following table:

<i>Variable Name</i>	<i>Value</i>	<i>Unit of Measure</i>
aMOD	0500	null field
iIID	up to 6 alphanumeric characters	null field
rCartID	up to 10 alphanumeric characters	null field
rTYPE	1-POINT	null field
rSEQ	nnnnn...(2 <sup>32</sup> )	null field
rDATE	nnAaannnn	null field
rTIME	nn:nn:nn	null field
rWWLotNumber	WW/nnnnn	null field
iBP	nnn nnn.n	mmHg kPa

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aCmpH	n.nnn	null field
<i>or</i>		
aCmH+	nnn.n	nmol/L
aCdH+	nnn.n	nmol/L
aCdpH	n.nnnn	null field
<i>or</i>		
aCdH+	nnn.nn	nmol/L
aCmPCO2	nnn.n nn.nn	mmHg kPa
aCdPCO2	nnn.nn nn.nnn	mmHg kPa
aCmPO2	nnn.n nn.nn	mmHg kPa
aCdPO2	nnn.nn nn.nn	mmHg kPa
aCmNa+	nnn.n	mmol/L
aCdNa+	nnn.nn	mmol/L
aCmK+	nn.nn	mmol/L
aCdK+	nn.nnn	mmol/L
aCmCa++	n.nn nn.n	mmol/L mg/dL
aCdCa++	n.nnn nn.nn	mmol/L mg/dL
aCmCl-	nnn	mmol/L
aCdCl-	nnnn	mmol/L
aCmGlucose	nnn nn.n	mg/dL mmol/L
aCdGlucose	nnnn nn.nn	mg/dL mmol/L
aCmLactate	nn.nn nnn.n	mmol/L mg/dL
aCdLactate	nn.nn nnn.n	mmol/L mg/dL
aZmtHb	nn.n	g/dL
(appears only if CO-ox zero failed)	nnn nn.n	g/L mmol/L

The 2-point calibration includes all calibration and slope data. Variables reported for a 2-point calibration are shown in the following table:

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aMOD	0500	null field
iIID	up to 6 alphanumeric characters	null field
rCartID	up to 10 alphanumeric characters	null field
rTYPE	2-POINT	null field
rSEQ	nnnnn...(2 <sup>32</sup> )	null field
rDATE	nnAaannnn	null field
rTIME	nn:nn:nn	null field
rWWLotNumber	WW/nnnnn	null field
iBP	nnn nnn.n	mmHg kPa
aCmpH	n.nnn	null field
<i>or</i>		
aCmH+	nnn.n	nmol/L
aCdpH	n.nnn	null field
<i>or</i>		
aCdH+	nnn.n	nmol/L
aCmPCO2	nnn.n nn.nn	mmHg kPa
aCdPCO2	nnn.n nn.nn	mmHg kPa
aCmPO2	nnn.n nn.nn	mmHg kPa
aCdPO2	nnn.n nn.nn	mmHg kPa
aCmNa+	nnn.n	mmol/L
aCdNa+	nnn.n	mmol/L
aCmK+	nn.nn	mmol/L
aCdK+	nn.nn	mmol/L
aCmCa <sup>++</sup>	n.nn nn.n	mmol/L mg/dL

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aCaCa++	n.nn	mmol/L
	nn.n	mg/dL
aCmCl-	nnn	mmol/L
aCdCl-	nnn	mmol/L
aCmGlucose	nnn	mg/dL
	nn.n	mmol/L
aCdGlucose	nnn	mg/dL
	nn.n	mmol/L
aCmLactate	nn.nn	mmol/L
	nnn.n	mg/dL
aCdLactate	nn.nn	mmol/L
	nnn.n	mg/dL
aSmpH	n.nnn	null field
<i>or</i>		
aSmH+	nnn.n	nmol/L
aSdpH	n.nnn	null field
<i>or</i>		
aSdH+	nnn.n	nmol/L
aSmPCO2	nnn.n	mmHg
	nn.nn	kPa
aSdPCO2	nnn.n	mmHg
	nn.nn	kPa
aSmPO2	nnn.n	mmHg
	nn.nn	kPa
aSdPO2	nnn.n	mmHg
	nn.nn	kPa
aSmNa+	nnn.n	mmol/L
aSdNa+	nnn.n	mmol/L
aSmK+	nn.nn	mmol/L
aSdK+	nn.nn	mmol/L
aSmCl-	nnn	mmol/L
aSdCl-	nnn	mmol/L
aSmCa++	n.nn	mmol/L
	n.nn	mg/dL

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aSdCa++	n.nn n.nn	mmol/L mg/dL
aSmGlucose	nnn nn.n	mg/dL mmol/L
aSdGlucose	nnn nn.n	mg/dL mmol/L
aSmLactate	nn.nn nnn.n	mmol/L mg/dL
aSdLactate	nn.nn nnn.n	mmol/L mg/dL
aZmtHb	nn.n	g/dL
(appears only if CO-ox zero failed)	nnn nn.n	g/L mmol/L

The data record for a 2-point/full calibration shown in the following table includes calibration and slope data:

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aMOD	0500	null field
iIID	up to 6 alphanumeric characters	null field
rCartID	up to 10 alphanumeric characters	null field
rTYPE	2-POINT	null field
rSEQ	nnnnn...(2 <sup>32</sup> )	null field
rDATE	nnAaann	null field
rTIME	nn:nn:nn	null field
rWWLotNumber	WW/nnnnn	null field
iBP	nnn nnn.n	mmHg kPa
aCmpH+	n.nnn	null field
<i>or</i>		
aCmmH+	nnn.n	nmol/L
aCdpH+	n.nnn	null field
<i>or</i>		

<b>Variable Name</b>	<b>Value</b>	<b>Unit of Measure</b>
aCdH+	nnn.n	nmol/L
aCmPCO2	nnn.n nn.nn	mmHg kPa
aCdPCO2	nnn.n nn.nn	mmHg kPa
aCmPO2	nnn.n nn.nn	mmHg kPa
aCdPO2	nnn.n nn.nn	mmHg kPa
aCmNa+	nnn.n	mmol/L
aCdNa+	nnn.n	mmol/L
aCmK+	nn.nn	mmol/L
aCdK+	nn.nn	mmol/L
aCmCa <sup>++</sup>	n.nn nn.n	mmol/L mg/dL
aCdCa <sup>++</sup>	n.nn nn.n	mmol/L mg/dL
aCmCl-	nnn	mmol/L
aCdCl-	nnn	mmol/L
aCmGlucose	nnn nn.n	mg/dL mmol/L
aCdGlucose	nnn nn.n	mg/dL mmol/L
aCmLactate	nn.nn nnn.n	mmol/L mg/dL
aCdLactate	nn.nn nnn.n	mmol/L mg/dL
aSmpH+	n.nnn	null field
<i>or</i>		
aSmH+	nnn.n	nmol/L
aSdpH+	n.nnn	null field
<i>or</i>		
aSdH+	nnn.n	nmol/L

<i>Variable Name</i>	<i>Value</i>	<i>Unit of Measure</i>
aSmPCO2	nnn.n nn.nn	mmHg kPa
aSdPCO2	nnn.n nn.nn	mmHg kPa
aSmPO2	nnn.n nn.nn	mmHg kPa
aSdPO2	nnn.n nn.nn	mmHg kPa
aSmNa+	nnn.n	mmol/L
aSdNa+	nnn.n	mmol/L
aSmK+	nn.nn	mmol/L
aSdK+	nn.nn	mmol/L
aSmCa++	n.nn n.nn	mmol/L mg/dL
aSdCa++	n.nn n.nn	mmol/L mg/dL
aSmCl-	nnn	mmol/L
aSdCl-	nnn	mmol/L
aSmGlucose	nnn nn.n	mg/dL mmol/L
aSdGlucose	nnn nn.n	mg/dL mmol/L
aSmLactate	nn.nn nnn.n	mmol/L mg/dL
aSdLactate	nn.nn nnn.n	mmol/L mg/dL
aSmtHb	nn.n nnn nn.n	g/dL g/L mmol/L
aSdtHb	nn.n nnn nn.n	g/dL g/L mmol/L
aZmtHb (appears only if CO-ox zero failed)	nn.n nnn nn.n	g/dL g/L mmol/L

## Parameter Selection Data Record

This data record is appended to a {CTL\_CHAN} identifier record to enable or disable one or more parameters during sample analysis. The enable/disable selection is in effect until it is changed by another {CTL\_CHAN} message or by selecting the parameters in Setup at the RAPIDPoint 500e system.

The sDISname variable indicates whether the parameter identified by the variable name should be enabled or disabled. For example, sDISPO2 refers to the parameter PO<sub>2</sub>. A 1 (one) in the value group will disable the channel, while a 0 (zero) will enable the channel. sDISpH<sup>+</sup> will disable pH or H<sup>+</sup>.

<b>Variable Name</b>	<b>Value</b>
aMOD	0500
iIID	up to 6 alphanumeric characters
sDISpH <sup>+</sup>	0 or 1
sDISPCO2	0 or 1
sDISPO2	0 or 1
sDISNa <sup>+</sup>	0 or 1
sDISK <sup>+</sup>	0 or 1
sDISCa <sup>++</sup>	0 or 1
sDISCl <sup>-</sup>	0 or 1
sDISGlucose	0 or 1
sDISLactate	0 or 1
sDISHb	0 or 1
sDISnBili	0 or 1



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