Online Specification

Sorting-Drive 4.2

Intelligent Workflow Management

PN B55381
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Sorting-Drive 4.2

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Revision History

This document applies to the latest software listed and higher versions. When a subsequent software version changes the information in this document, a new issue will be released.

PN	Release date	Revisions
A89489	January 2010	Version 4.1
B11336	August 2011	Version 4.1.2
B11336AA	June 2012	Version 4.1.2, revision AA
B55381	June 2015	Version 4.2: • New special character ° • O record • <FutureUse1> replaced by <LisSecondaryBarcode> • Language Support added "949 (Korean Unified Hangul Code)"

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Introduction

About this Manual

This Manual provides information on how to connect the Sorting-Drive to the Laboratory Information System (LIS).

For ease of reading, the term AutoMate 2500 is used as a placeholder for the entire AutoMate 2500 Family in this manual. The AutoMate 2500 Family consists of AutoMate 1200, AutoMate 1250, AutoMate 2500 and AutoMate 2550.

About this Product

Sorting-Drive has two different ways to connect the Laboratory Information System. The first is by **Serial Communication** (COM port or TCP/IP) and the second by **File Transfer Communication.**

There are two protocol versions, **Version-1** and **Version-2.** These protocols are Beckman Coulter proprietary protocols with similarities to the ASTM protocol. Version-2 is the default communication protocol in Sorting-Drive software versions 4.1.2 and higher. Both protocols are used for serial or file transfer communication.

Version-2 Serial Communication is described in the main part of this online specification. For a description of Version-1 protocol, refer to Appendix: Version-1 Communication (Legacy Systems). This information is provided only as a reference for legacy systems.

Sorting-Drive never queries the LIS. The LIS sends the patient info and Sorting-Drive stores this data in its database until it is required.

The communication between Sorting-Drive and the LIS can be separated into 3 stages:

1. Receive from LIS -> Patient-Info or Load List File

These files are patient demographics and the whole test profile. The Sorting-Drive uses the same test codes as the LIS.

2. Send to LIS <- Sorting-Result or Result List File

When a tube is correctly in place, the position, the workplace ID and some information about the tube will be sent back to the LIS. This option can be set for each workplace separately as well as for the archive tray.

3. Send to LIS <- Tube-Recognition or Tuberecognition File

If the "Send Tube Recognition" option is set, all of the tube-related information the AutoMate has recognized, like barcode, cap-colour, tube type, volume, quality and a time stamp will be sent back to the LIS.

Note: Depending on the ACK/NAK timing and the time interval between receiving orders and sending orders, the serial communication is limited to around 8,000 records per hour. If faster connections are required, use the ASCII file transfer protocol.

Communication Overview: Serial and File Transfer Communication

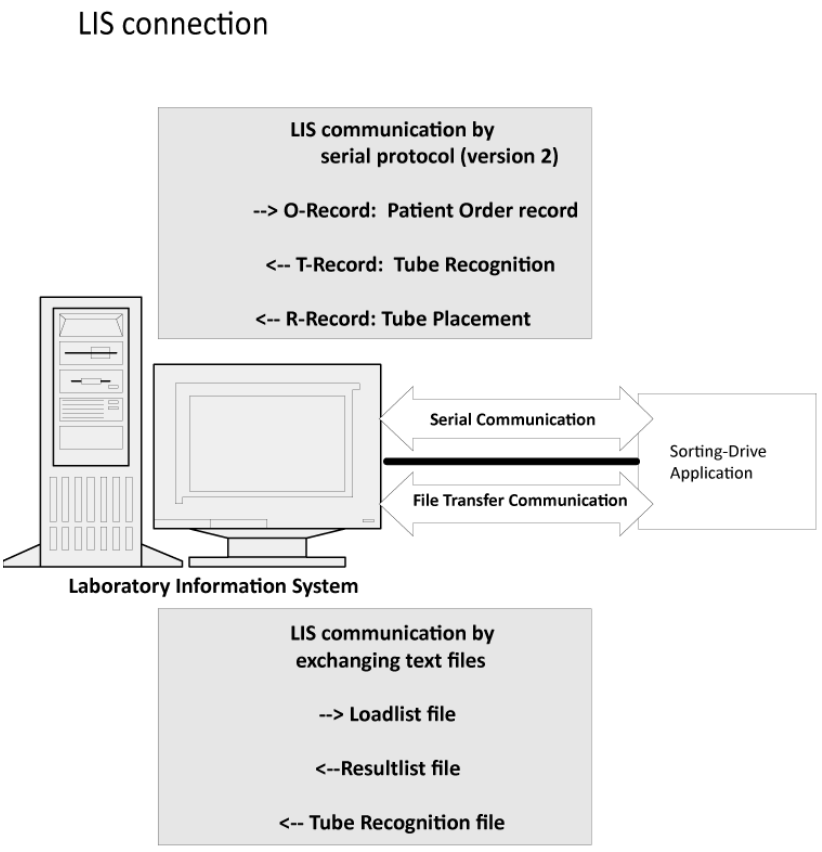


Figure 1: Communication overview

Version-2 Serial Communication

Version-2 serial communication uses the protocol shown below. The O- (LIS Order), T- (Tube Recognition) and R records (Sorting Result/Tube Placement) are used for the three different information blocks. Each transmission starts with an S record (Start of transmission) and ends with an E record (End of transmission). In between as many O-, T- and R- records as necessary can be sent. This data is transmitted via a serial line (RS-232) or via a network connection over a TCP/IP socket.

The RS-232 connection uses a NULL-Modem cable.

Note: Delimiting characters are:

| =field separator (PIPE)
^ =component separator (CARRET)
~ =repeat separator (TILDA)
° = association separator (DEGREE)

These characters are not allowed in any transmitted data.

Once the online connection is established by Sorting-Drive, the LIS can start to transmit patient order data. Every transmission has to start with the start record **S|||...** The LIS then sends patient order records **O|||...** and finally ends the transmission using the end record **E|||...**

- S-Record... S|||||||||... -> Start of transmission
- O-Record... O|||||||||... -> Patient Order record
- O-Record... O|||||||||... -> Patient Order record
- O-Record... O|||||||||... -> Patient Order record
...
- E-Record... E|||||||||... -> End of transmission

Note: If the "use ACK/NAK" option is set, every text block must be acknowledged by the receiver.

If the "use BCC" block check character option is set, every record ends with a BCC character.

Calculation of BCC:

<STX> is not included, <ETX> is included

```
Dim nBCC As Byte

    For i = 2 To nTextBlockLength

        nBCC = nBCC Xor Asc(Mid(TextBlock, i, 1))

    Next i
```

Note: nBCC can contain any value between 0 - 255.

All records have the same number of fields. In total 15 fields separated by pipe (|) character. For transmission Start- and End Record only field 1 (Message ID) is used, the others are empty.

Common S-Record

All records have the same number of fields. In total 15 fields separated by pipe (|) character. For transmission Start- and End Record only field 1 (Message ID) is used, the others are empty.

Definition of Start of transmission record (S-Record):

<STX>S |||||||||||||||<ETX><BCC>

Common E-Record

Definition of End of transmission record (E-Record):

<STX>E |||||||||||||||<ETX><BCC>

O-Record

Definition of Patient Order Record (O-Record) sent by LIS:

The O record is used by the LIS to tell Sorting-Drive what to do with a tube. All sorting actions are related to the transmitted order codes. Sorting-Drive analyzes the current test request and sample type to distribute the tube.

<STX>O**|**<OrgID>**|**<SampleID>**|**< Lab-Int-SID >**|**<Emergency>**|**
<Action>**|**<Sex>**|**<Age>**|**<DateOfBirth>**|**<PatientInfo>**|**
<LisInfoText>**|**<LisSecondaryBarcode>**|**<FutureUse2>**|**
<FutureUse3>**|**
<SpecimenTypeMap>**|**<OrderCodes>**<ETX><BCC>**

Field No.	Name	Data type	Comments
01	<O>	Text	Message Identifier Beginning of O Record
02	<OrgID>	Text(20) (not Null)	Department or Laboratory Identifier, sent back with the T and R record.
03	<SampleID>	Text(30) (not Null)	Tube barcode no. Depending on the sorting configuration it can contain the sample type extension or not. Refer to Programmers Guide, Sample type recognition Type-1 and Type-2.
04	<Lab-Int-SID>	Text(50)	LIS internal Sample ID, can be printed on a secondary label. It is sent back by the sorting result R record.
05	<Emergency>	Number (0,1) (not Null)	This indicates an emergency patient sample.
06	<Action>	Number (0,1,2) (not Null)	How to process this order received by the LIS 0=Add all received orders 1=Reactivate all received orders 2=Delete all received orders For more detailed information refer to **'Action Flag'**
07	<Sex>	Character (M,F)	Male or Female
08	<Age>	Number (0 to 999)	
09	<DateOfBirth>	Text(10)	Date text string
10	<PatientInfo>	Text(50)	
11	<LisInfoText>	Text(50)	
12	<LisSecondary Barcode>	Text(1024)	Barcodes for aliquots according to their tests. If there are no aliquots, this field is left blank. Example: OrderCode1^Barcode1~OrderCode2~Barcode2 It is possible to send barcodes for test code combinations: OrderCode1°OrderCode2^Barcode1~OrderCode4°OrderCode5°OrderCode6^Barcode2 Barcode1 is assigned to aliquot1 with test OrderCode1 and OrderCode2. Barcode2 is assigned to an aliquot with OrderCode4, OrderCode5 and OrderCode6.

Field No.	Name	Data type	Comments
			Refer to LIS Secondary Barcode.
13	<FutureUse2>		Not currently in use (field remains empty)
14	<FutureUse3>		Not currently in used(field remains empty)
15	<SpecimenType Map>	Text(1024)	The data format for specimen type mapping information is defined as: |[{MatCode}^{BarcodeExt}]~[{MatCode}^{BarcodeExt}] ... |. The MatCode must match a sample type code defined in the SortingDrive configuration. BarcodeExt is the physical sample type extension within the tube barcode. If not used, this field is left blank. Example: MatCode1^BarcodeExt1~MatCode2^BarcodeExt2~ ...~ MatCodeN^BarcodeExtN
16	<OrderCodes>	Text(1024) (not Null)	OrderCode1~OrderCode2~OrderCode3~... ~OrderCodeN **NOTE** Sorting-Drive does not distinguish between upper and lower case letters. Ensure that the LIS is not set up to send test orders that require Sorting-Drive to match the case of codes (e.g. CA and Ca as separate test codes).

Example: LIS order transmission to Sorting-Drive

```
LIS>>     <STX>S|||||||||||||||<ETX><BCC>
SD>>      <ACK>
LIS>>     <STX>O|Lab1|123456|L02|0|0|M|50|19590101|Unknown1|LisInfo1|
          CA^9999~FT4°FT3^5555|||SE^10~UR^20~PL^30|CA~FT4~FT3<ETX><BCC>
SD>>      <ACK>
LIS>>     <STX>O|Lab1|12233|L03|0|0|F|40|19690101|Unknown2|LisInfo2|
          NA^4321~FT4°FT3^012345| ||SE^20~UR^10~PL^30|NA~FT4~FT3<ETX><BCC>
SD>>      <ACK>
...
…
LIS>>     <STX>E|||||||||||||||<ETX><BCC>
SD>>      <ACK>
```

Note: If the Sorting-Drive receives the end of transmission E record from the LIS it will start to transfer data back to the LIS. It also establishes the connection by sending the start transmission S record to the LIS. Than followed by several R (Sorting

Result) and T records (Tube Recognition). The transmission sequence is closed by sending the end transmission E record.

```
- S-Record… S|||||||||…  -> Start of transmission
- R-Record… R|||||||||…  -> Sorting Result/Tube placement record
- R-Record… R|||||||||…  -> Sorting Result/Tube placement record
- R-Record… R|||||||||…  -> Sorting Result/Tube placement record
…
- T-Record… T|||||||||…  -> Tube recognition record
- T-Record… T|||||||||…  -> Tube recognition record
…
- E-Record… E|||||||||…  -> End of transmission
```

Note: In the actual file, all data is placed in one line. Only one line feed at the end!

R-Record and T-Record

The R and T records are used to send tube related information to the Laboratory Information System. The start of this transmission is indicated by the S record. Sorting-Drive then transmits several sorting result R records. If the 'Send Tube Recognition' option is set, the Sorting-Drive also sends several Tube-Recognition T records after the R records. The end of the transmission is indicated by the E record.

Note: If the LIS receives the end of transmission E record from the Sorting-Drive it can start again to transfer order O records.

R-Record

Definition of Sorting Result Record (R-Record):

The R record is used by the Sorting-Drive to inform the LIS about a successful tube placement. If the tube was placed to its final distribution rack and the sorting configuration is set to *'For this output destination send R-Record to LIS'*, the R record is generated.

<STX>R|<IpOfDevice>**|**<OrgID>**|**<SampleID>**|**<Lab-Int-SID>**|**<Tube>**|**
<WpFlag>**|**<MatCode>**|**<ArchiveID>**|**<RackID>**|**<Row/Col>**|**
<TimeStamp>**|**<Volume>**|**<OrderCodes>**|**<FutureUse1>**|**
<FutureUse2>**<ETX><BCC>**

Field No.	Name	Data type	Comments
01	<R>	Text	Message identifier Beginning of R record
02	<IpOfDevice>	Text(20)	TCP/IP address of sorting device (instrument)
03	<OrgID>	Text(20)	Department or laboratory received by LIS. It can be empty if no order record was found or tube was sorted in standalone mode or tube went to an error location.
04	<SampleID>	Text(30)	Barcode scanned by instrument

Field No.	Name	Data type	Comments
		(not null)	
05	<Lab-Int-SID>	Text(50)	Lab internal sample ID: Additional identifier received by LIS. If LIS sends additional barcodes for aliquots, this field contains the LIS barcode for the aliquot.
06	<Tube>	Number 0,1,2,3...	ID of primary and secondary tubes 0 = Primary tube 1,2,3... first, second, third.. aliquot
07	<WpFlag>	Number 1,2,3,4	Workplace Type Identifier 1=Normal Distribution 2=Archive 3=Error 4=Clone Plate
08	<MatCode>	Text(20)	Identified sample type code
09	<ArchiveID>	Text(50)	Identified archive rack barcode. If no barcode is available, N/A.
10	<RackID>	Text(3)	Rack ID of the sorting destination
11	<Row/Col>	Text(4)	Position of the sorted tube
12	<TimeStamp>	Text(15)	Date Fixed Format (YYYYMMDD_HHMMSS)
13	<Volume>	Number	The volume in µl used for this tube or left in the primary tube
14	<OrderCodes>	Text(1024)	The order codes used to sort the tube to this destination. OrderCode1~OrderCode2~...~OrderCodeN **NOTE** Sorting-Drive does not distinguish between upper and lower case letters. Ensure that the LIS is not set up to send test orders that require Sorting-Drive to match the case of codes (e.g. CA and Ca as separate test codes).
15	<FutureUse1>		Not currently in use (field remains empty)
16	<FutureUse2>		Not currently in use (field remains empty)

T-Record

Definition of Tube Recognition Record (T-Record):

The T record is used by the Sorting-Drive to inform the LIS that a new tube was identified by the instrument. If the sorting configuration option *'Transmit tube recognition info'* is set the T record is generated for each tube. The T record informs the LIS about the parameters

of the current identified tube (scanned barcode, tube type, cap colour, measured volume...time stamp)

<STX>T|<IpOfDevice>**|**<OrgID>**|**<SampleID>**|**<TubeType>**|**
<CapColor>**|**<InputRackID>**|**<Volume>**|**<L>**|**<I>**|**<H>**|**
<TimeStamp>**|**<FutureUse1>**|**<FutureUse2>**|**<FutureUse3>**|**
<FutureUse4>**<ETX><BCC>**

Field No.	Name	Data type	Comments
01	<T>	Text	Message identifier Beginning of R record
02	<IpOfDevice>	Text(20)	TCP/IP address of sorting device (instrument). This field can be empty if the instrument is connected by serial COM port to the Sorting-Drive.
03	<OrgID>	Text(20)	Department or laboratory received by LIS. This field can be empty if no order record was found or tube was sorted in standalone mode.
04	<SampleID>	Text(30) (not Null)	Barcode scanned by instrument
05	<TubeType>	Number (not Null)	ID of identified tube. The IDs are related to the instrument's tube set-up in *tubes.ini* (numbers from 1 to n). Negative numbers are errors.
06	<CapColor>	Number (not Null)	ID of identified cap colour. The IDs are related to the instrument's cap colour set-up in *tubes.ini* (numbers from 1 to n). The number -3 identify an open tube. All other negative numbers are errors.
07	<InputRackID>	Number (not Null)	ID of the input rack the tube was taken from. The IDs are related to the instrument's input drawer configuration.
08	<Volume>	Number	Measured volume in µl. Can be empty if no volume is measured.
09	<L>, <I>, <H>		No longer in use.
10	<TimeStamp>	Text(15)	Date fixed format (YYYYMMDD_HHMMSS)
11	<FutureUse1>		Not currently in use (field remains empty)
12	<FutureUse2>		Not currently in use (field remains empty)
13	<FutureUse3>		Not currently in use (field remains empty)
14	<FutureUse4>		Not currently in use (field remains empty)

Example: Sorting-Drive R- and T-Record transmission to LIS

SD>> <STX>S|||||||||||||||<ETX><BCC>

LIS>> <ACK>

SD>>
<STX>R|127.0.0.1|Lab1|444444|4123456|2|1|SE|N/A|610|11|20090623_162937|200|TEST51~TEST53||<ETX><BCC>

LIS>> <ACK>

SD>>
<STX>R|127.0.0.1|Lab1|555555|5123456|0|1|SE|N/A|210|12|20090623_163244|5000|BILID~GLUC~CA||<ETX><BCC>

LIS>> <ACK>

SD>> <STX>R|127.0.0.1|Lab1|888888|8123456|6|1|SE|N/A|650|13|20090701_110221|1000|TESTP61||<ETX><BCC>

LIS>> <ACK>

...

SD>> <STX>T|127.0.0.1|Lab1|444444|2|1|90|2456|0|0| 0|20090623_162937||||<ETX><BCC>

LIS>> <ACK>

SD>> <STX>T|127.0.0.1|Lab1|555555|2|2|92|3500|0|0| 0|20090623_163303||||<ETX><BCC>

LIS>> <ACK>

...

SD>> <STX>E|||||||||||||||<ETX><BCC>

LIS>> <ACK>

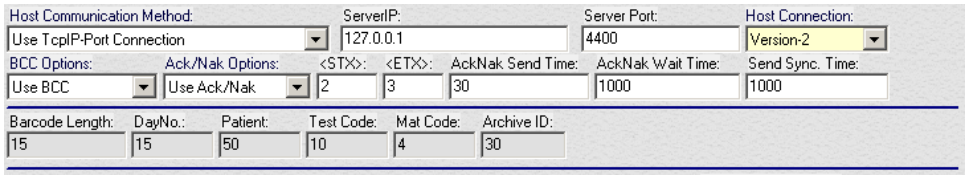
Note: The option to send an R record can be set separately for each output destination. The option to send a T record can be set generally for the whole sorting configuration.

Note: In the actual file, all data is placed in one line. Only one line feed at the end!

Example: Serial Online Protocol Version-2

Below is an example of the running Serial-Online-Protocol **version-2** between the Sorting-Drive and the LIS.

Communication settings for this example:



<< Start Block: S|||||||||||||| ,
>> (rcvACK)
<< Stop Block: E|||||||||||||| :
>> (rcvACK)
>> (rcvDB) :S||||||||||||||
<< Send ACK
>> (rcvR) :R|127.0.0.1|N/A|222222|222222|0|1|SE|N/A|530| 0 0|20090701_150447|4400|TEST22~TEST23||
<< Send ACK
>> (rcvR) :R|127.0.0.1|N/A|222222|222222|1|1|SE|N/A|630| 0 0|20090701_150447|200|TEST41~TEST43||

<< Send ACK
>> (rcvT) :T|127.0.0.1||222222|0|9|90|0|0|0|0|20090701_150444||||
<< Send ACK
>> (rcvT) :T|127.0.0.1|N/A|222222|0|1|90|0|0|0|0|20090701_150447||||
<< Send ACK
>> (rcvDE) :E|||||||||||||||
<< Send ACK
<< Start Block: S|||||||||||||| ,
>> (rcvACK)
<< Stop Block: E|||||||||||||| :
>> (rcvACK)
>> (rcvDB) :S|||||||||||||||
<< Send ACK
>> (rcvR) :R|127.0.0.1|N/A|222222|222222|0|2|SE|sdfg|910| 1 1|20090701_150451|5000|ACVP||
<< Send ACK
>> (rcvT) :T|127.0.0.1|N/A|222222|0|1|90|0|0|0|0|20090701_150452||||
<< Send ACK
>> (rcvDE) :E|||||||||||||||
<< Send ACK
<< Start Block: S|||||||||||||| ,
>> (rcvACK)
<< Send Data: O|Lab2|111222|1234|0|0|M|50|1.1.1959|Unknown1|LIS
Info1|||||AHBE~AHBP~AHBC~ANTIA~CA~BILID n
>> (rcvACK)
<< Send Data: O|Lab 2|222333|4321|0|0|F|40|1.1.1969|Unknown2|List info
2|||||AL102~CA~CHEM4~CREA~FT4~GLUC
>> (rcvACK)
<< Stop Block: E|||||||||||||| :
>> (rcvACK)
>> (rcvDB) :S|||||||||||||||
<< Send ACK
>> (rcvDE) :E|||||||||||||||
<< Send ACK
<< Start Block: S|||||||||||||| ,
>> (rcvACK)
<< Stop Block: E|||||||||||||| :
>> (rcvACK)
>> (rcvR) :R|127.0.0.1|Lab2|111222|1234|0|1|SE|N/A|210| 0 0|20090701_150518|5000|BILID~CA||
<< Send ACK
>> (rcvR) :R|127.0.0.1|Lab2|111222|1234|0|1|SE|N/A|430| 0 0|20090701_150521|5000|AHBE~AHBC~AHBP||
<< Send ACK
>> (rcvT) :T|127.0.0.1|Lab2|111222|0|1|90|0|0|0|0|20090701_150518||||
<< Send ACK
>> (rcvT) :T|127.0.0.1|Lab2|111222|0|1|90|0|0|0|0|20090701_150521||||
<< Send ACK
>> (rcvDE) :E|||||||||||||||
<< Send ACK
<< Start Block: S|||||||||||||| ,
>> (rcvACK)
<< Stop Block: E|||||||||||||| :
>> (rcvACK)
>> (rcvDB) :S|||||||||||||||
<< Send ACK
>> (rcvR) :R|127.0.0.1|Lab2|111222|1234|0|2|SE|sdfg|910| 2 1|20090701_150526|5000|ACVP||
<< Send ACK

```
>> (rcvT) :T|127.0.0.1|Lab2|111222|0|1|90|0|0|0|0|20090701_150526||||
<< Send ACK
>> (rcvDE) :E||||||||||||||
<< Send ACK
<< Start Block:  S||||||||||||||  ,
>> (rcvACK)
<< Stop Block:  E||||||||||||||  :
>> (rcvACK)
```

Synchronize the Transmissions Version-2

When the Sorting-Drive Host-Data-Transfer program starts up, it will initialize and open the communication port. The LIS can then start to send the first block of patient order O records. [S||... O||... O||... O|| ..... E||...]

When the Sorting-Drive receives the E||... block from the LIS it will wait T2 before it starts the R- and T record transmission.
[S||... R||... R||... R||... R||... ... T||... T||... T||... ..... E||...].
After the LIS has received the E||... Block it has to wait T1 min. 1 sec before starting again sending S records.

The time T2 is configurable within the sorting configuration. Default value 5000 ms

Note: If there are no patient order records to send, only the [S||... E||...] start/end text blocks are exchanged.

If there is no toggling of [S||...] and [E||...] the communication will stop and Sorting Results will not be transferred to the LIS in time.

PIN Connection Diagram

Connection diagram for Null-Modem cable (9 to 9, 25 to 25)

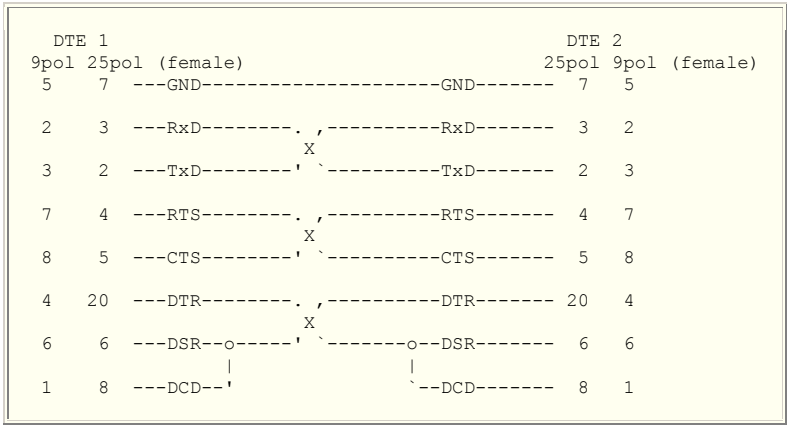


Figure 2: Connection diagram for Null-Modem cable

Pin Connection and Signals

Abbreviation	Signal Name
GND	Signal ground
RxD	Received data
TxD	Transmitted data
RTS	Request to send
CTS	Clear to send
DTR	Data terminal ready
DSR	Data set ready
DCD	Data carrier detect

File Transfer Communication

Sorting-Drive can use two transfer modes for exchanging the necessary ASCII files.

- Copy files using a shared network resource.
- Upload or download files via FTP-Server.

In both cases, Sorting-Drive uses the same files. Three files are exchanged:

1. The Load List with patient information (comparable to S record version-1 or O record version-2).
2. The Result List containing the Sorting-Results (D record version-1 or R record version-2).
3. The Tube Recognition List containing all tube related data (E record version-1 or T record version-2).

All three of these data files are transferred automatically by Sorting-Drive. The transfer interval is adjustable in the Sorting-Drive configuration.

Load List File Version-2

Field description of the Load List file version-2:

ColNameHeader = False
Format = Delimited (;)
CharacterSet = ANSI

Col1=OrgID char length 20	(can be empty)
Col2=PatCode char length 30	(mandatory)
Col3=Lab-Int-SID char length 50	(can be empty)
Col4=IsEmergency bit	(mandatory, value 0,1)
Col5=LISAction short	(mandatory, value 0,1,2)
Col6=Sex char length 1	(can be empty)
Col7=Age short	(can be empty)
Col8=BirthDate char length 10	(can be empty)
Col9=Patient info char length 50	(can be empty)
Col10=LisInfoText char length 50	(can be empty)
Col11=LisSecondaryBarcode char length 1000	(can be empty)
Col12=XXFutureUse2 char length 20	(always empty)
Col13=XXFutureUse3 char length 20	(always empty)
Col14=MatTypeMap Memo char length 1000	(can be empty)
Col15=OrderCodes Memo char length 1000	(mandatory)

Example of a Load List:

```
Lab1;9921881050;12345678;0;0;M;030;10/01/1979;OLAF
MEIER;LisInfo1;HIV^909090;;;MC1^Ext1~MC2^BExt2;HIV|
Lab2;9921881051;1234;0;0;M;040;10/01/1969;PETER
MEIER;LisInfo1;CRE°GLU^78912~CHOL^567812;;;MC1^Ext1~MC2^BExt2;
CRE|GLU|HBA1C|CHOL|
Lab2;9921881052;11111111;0;0;W;060;10/01/1949;MARIA
```

```
SCHMIDT;LisInfo2;;;;
MC1^Ext1~MC2^BExt2;BILI|AP|GPT|
Lab1;9921881053;2222222;0;0;M;050;10/01/1959;RALF
HARVEY;LisInfo2;;;;MC1^Ext1~MC2^BExt2;
OI|CA|HS|GBBX|ERY|LEU|
```

Note: In the actual file, all data is placed in one line. Only one line feed at the end!

Note: Do not use the following characters in data entries:

; (semicolon), ^ (caret), ~ (tilde), ° (degree) and | (pipe)

Result List File Version-2

Sorting-Drive tries to transfer this list to the LIS within a user-defined time interval. First, the LIS side is checked to see if there is already a Result List. Sorting-Drive then transfers a new one only if there is no existing list. The LIS must delete the Result List file after processing the data.

The structure of this file is shown below. The fields have the same function as the R record in serial communication version-2. The date field is an additional field in the result list. The date format depends on the MS-Windows settings (General Date).

Field description for the Result List version-2:

ColNameHeader = False
Format = Delimited(;)
CharacterSet = ANSI

Col1=IpOfDevice char length 20
Col2=OrgID char length 20
Col3=SampleID char length 30
Col4=Lab-Int-SID char length 50 (LIS secondary barcode if used)
Col5=Tube short
Col6=WpFlag short
Col7=MatCode char length 20
Col8=ArchiveID char length 50
Col9=RackID char length 3
Col10=Row short
Col11=Col short
Col12=Timestamp Text
Col13=Volume short
Col14=OrderCodes char length 1000
Col15=FutureUse1 char length 20 (empty)

Example for a Result List:

```
192.168.1.1;Lab1;6322486;1234560;1;1;2;N/A;320;07;01;12.09.2002
12:38:54;450;FT4~T3~HBAC;
192.168.1.1;Lab2;6322487;1112223;2;4;2;99064919;112;07;01;12.09.20
02 12:38:54;CA~BILID~CREA;
```

Note: Only one line feed at the end!

Note: Do not use the following characters in data entries:

; (semicolon), ^ (caret), ~ (tilde), ° (degree) and | (pipe)

Tube Recognition File Version-2

The Tube Recognition File is generated by Sorting-Drive when a tube is recognized and all tube related information has been analyzed. The bar code, cap-colour, tube type, volume, quality and a time stamp is included on this list.

The structure of this file is shown below. The fields have the same function as the T record in serial communication version-2. The LIS must delete the Tube Recognition File after processing the data as Sorting-Drive will transfer a new one only if there is no existing file.

Field description for the Tube Recognition List version-2:

ColNameHeader = False
Format = Delimited(;)
CharacterSet = ANSI

Col1=IpOfDevice char length 20
Col2=OrgID char length 20
Col3=SampleID char length 30
Col4=TubeType short
Col5=CapColor short
Col6=RackID char length 3
Col7=Volume char length 5
Col8=L char length 1
Col9=I char length 1
Col10=H char length 1
Col11=Timestamp char width 15

Date Fixed Format (YYYYMMDD_HHMMSS)

Col12=FutureUse1 char width 20 (empty)
Col13=FutureUse2 char width 20 (empty)
Col14=FutureUse3 char width 20 (empty)
Col15=FutureUse4 char width 20 (empty)

Example for a Tube Recognition List:

```
192.168.1.10;Lab1;632248600;02;01;97;04500;0;0;0;20021206_123854;;
;;
192.168.1.12;Lab2;632247710;04;03;98;02532;0;0;0;20021206_124354;;
;;
```

Action Flag

The Action Flag property is used to manipulate the host requests inside the Sorting-Drive database. Values "0, 1, 2" are allowed.

0=Normal test requisition -> (All tests are added to the to-do list)

1=Rerun (Reflex) tests -> (All sent tests are reactivated or added if they do not already exist)

2=Delete tests -> (All send tests are deleted from the to-do list)

The first initial request for a tube should be sent with action flag 0. If there are any additional test codes, the LIS can send these tests at any time with action flag 0 for the patient.

Example for a normal Load List:

```
9921881050;1050;0;0;M;030;OLAF MEIER;HIV|
9921881051;1051;0;0;M;075;PETER
HUEBSCH;OI|CRE|HST|GLU|HBA1C|HS|GGT|
9921881052;1052;0;0;W;079;MARIA
GOSER;BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|
9921881053;1053;0;0;M;066;RALF
MILLER;OI|CA|HS|GBBX|ERY|LEU|HB|HK|MCH|MCHC|
```

An example of Action Flag usage:

```
9921881052;1052;0;0;W;079;MARIA
GOSER;BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|
```

For a patient called Maria, the following request was sent to the Sorting-Drive with action flag 0:

```
BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|
```

After running the tube on the AutoMate, the request looks like this:

Open Tests	All Tests
CHOL|TRI|HDL|LDL|	BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|

The LIS then sends two additional tests for Maria with action 0 (one is already known GGT and the other HIV is new:

```
9921881052;1052;0;0;W;079;MARIA GOSER;HIV|GGT|
```

The result is:

Open Tests **All Tests**

```
CHOL|TRI|HDL|LDL|HIV|
   BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|HIV|
```

The GGT is untouched because this test is already known.

If the LIS wants to reactivate the GGT or more tests, it has to send them with action flag 1.

```
9921881052;1052;0;1;W;079;MARIA GOSER;GGT|AP|
```

The result is:

Open Tests **All Tests**

```
CHOL|TRI|HDL|LDL|HIV|GGT|AP|
   BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|HIV|
```

The tests GGT|AP are moved from 'All Tests' back to the Open tests.

If the LIS sends some codes with action flag 1 and the codes are not recognized, it will add these codes to both lists:

```
9921881052;1052;0;1;W;079;MARIA GOSER;CA|CO2|
```

The result is:

Open Tests

```
CHOL|TRI|HDL|LDL|HIV|GGT|AP|CA|CO2|
```

All Tests

```
BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|HIV|CA|CO2|
```

If the LIS wants to delete some tests from the 'Open Test' list it has to send them with the flag 2.

```
9921881052;1052;0;2;W;079;MARIA GOSER;GGT|AP|
```

The result is:

Open Tests

```
CHOL|TRI|HDL|LDL|HIV|CA|CO2|
```

All Tests

```
BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|HIV|CA|CO2|
```

The GGT|AP tests are removed from the 'Open Test' list

Language Support

Code pages supported by the Sorting-Drive application

Sorting-Drive allows the LIS to send for the fields:

Patient Info and LISInfoText the data as:

SBCS (Single Byte Character Set) for the following encodings

Windows Code pages:

1250 (Central Europe)

1251 (Cyrillic)

1252 (Latin I)

1253 (Greek)

1254 (Turkish)

and

DBCS (Double Byte Character Set) for the Codepage

Windows Code pages:

936 (Simplified Chinese GBK)

949 (Korean Unified Hangul Code)

LIS Secondary Barcode

Note: The connected AutoMate 2500 Family systems must use the bar file *2.bar* with this feature.

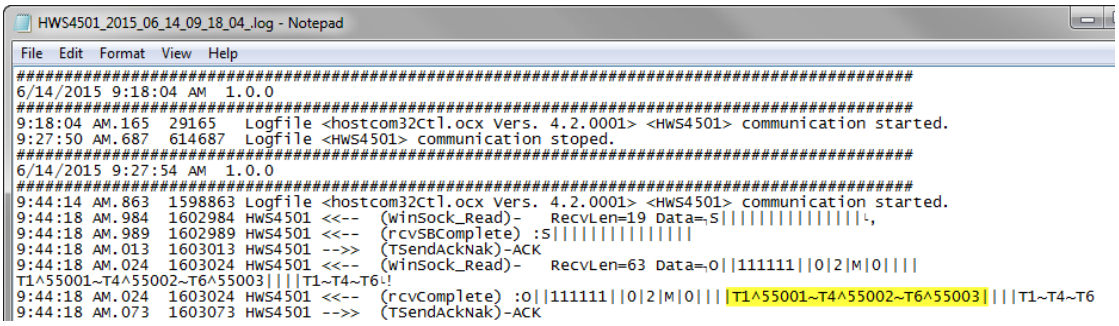
Note: Workplace 110 must be defined as an error workplace on the connected AutoMate 2500 Family systems with this feature.

The LIS can use field 12 in the O record in Serial Communication Protocol or column 11 in File Transfer Communication to send specific barcodes for aliquots with defined tests.
The format of the message is:
`OrderCode1a°OrderCode2a^Barcode1~OrderCode1b°OrderCode2b^Barcode2`

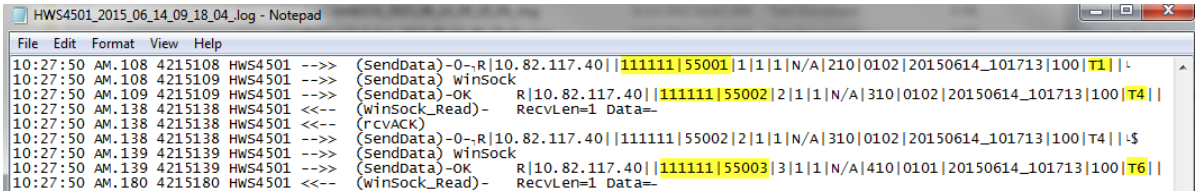
Character	ASCII code (dec)	Description
°	176	And operator to associate combinations of order codes with a barcode.
^	94	Relational operator to associate order codes with barcodes.
~	126	Separator to begin a new association between order codes and a new barcode.

Examples:

- T1^55001
  Barcode 55001 is assigned to aliquots with the order code T1.
- T2°T3^11113333~T4^55002
  Barcode 11113333 is assigned to aliquots with the combination of order codes T2 and T3. Barcode 55002 is assigned to aliquots with order code T4.
- T5°T6°T7^44441111~T8°T9°T10^33332222
  Barcode 44441111 is assigned to aliquots with the combination of order codes T5, T6 and T7. Barcode 33332222 is assigned to aliquots with the combination T8, T9 and T10.



Example: Sorting-Drive host communication log file. Field 12 of the O message contains the LIS secondary barcodes 55001, 55002, 55003.



Example: Sorting-Drive host communication log file. Field 4 of the R message contains the primary tube ID, field 5 contains the LIS secondary barcode (Lab-Int-SID) as defined for the order codes T1, T4, T6.

The LIS secondary barcode format must be consistent with the Sorting-Drive configuration. Consider how combinations of test codes are handled in aliquots in the workflow. If the LIS secondary barcode definition is not consistent with the Sorting-Drive workflow, the primary tube is sent to an error workplace (Workplace ID 110). If the LIS sends barcodes for tests and test combinations but Sorting-Drive does not create any aliquots, the primary tube is processed as usual. If the LIS sends several assignments and Sorting-Drive creates only some of them, the order is processed.

Examples of wrong barcode assignments (primary tube is sent to an error workplace):

- LIS sends barcode for T1 and T2, but the Sorting-Drive workflow only includes T1.
- LIS sends no barcode information, Sorting-Drive creates one or more aliquots.
- LIS sends barcode1 for T1 and T2 and barcode2 for T3, Sorting-Drive creates three aliquots for T1, T2 and T3.
- LIS sends a barcode for T1, T2 and T3, Sorting-Drive creates two aliquots: One aliquot with T1 and T2, and a separate aliquot with T3.

The tube is not sent to an error workplace in the following cases:

- LIS sends barcodes for several aliquots, but Sorting-Drive does not process any aliquot test orders.
- LIS sends a barcode for T1, a barcode for T2 and a barcode for T3. Sorting-Drive only processes an order for an aliquot with T1 and one with T2. As there is no order for T3, this barcode is not used.

Appendix: Version-1 Communication (Legacy Systems)

Appendix: Version-1 Communication (Legacy Systems)

Version-1 communication protocol is only relevant to legacy systems prior to 4.2. New features such as the LIS Secondary Barcode are not compatible with version-1. Update customer configurations that use version-1 to version-2 for use with Sorting-Drive 4.2

Version-1 Serial Communication

The Serial Communication **version-1** uses the protocol shown below. The S-, D- and E-Records are used for the three different information blocks. This data is transmitted via a serial line (RS-232) or via a network connection over a TCP/IP socket.

The RS-232 connection uses a NULL-Modem cable.

Once the online connection is established by the Sorting-Drive, the LIS can start to transmit patient data. Every transmission has to start with the start text block [SB]. The LIS then sends patient records [S_] and finally ends the transmission using the end text block [SE].

Note: The _ (underscore) character stands for a blank character.

If the "use ACK/NAK" option is set, every text block must be acknowledged by the receiver.

All variable length text fields must be defined in the Sorting-Drive configuration by the Administrator Tool.

S-Record

T.R.I. text -> LIS to Sorting-Drive

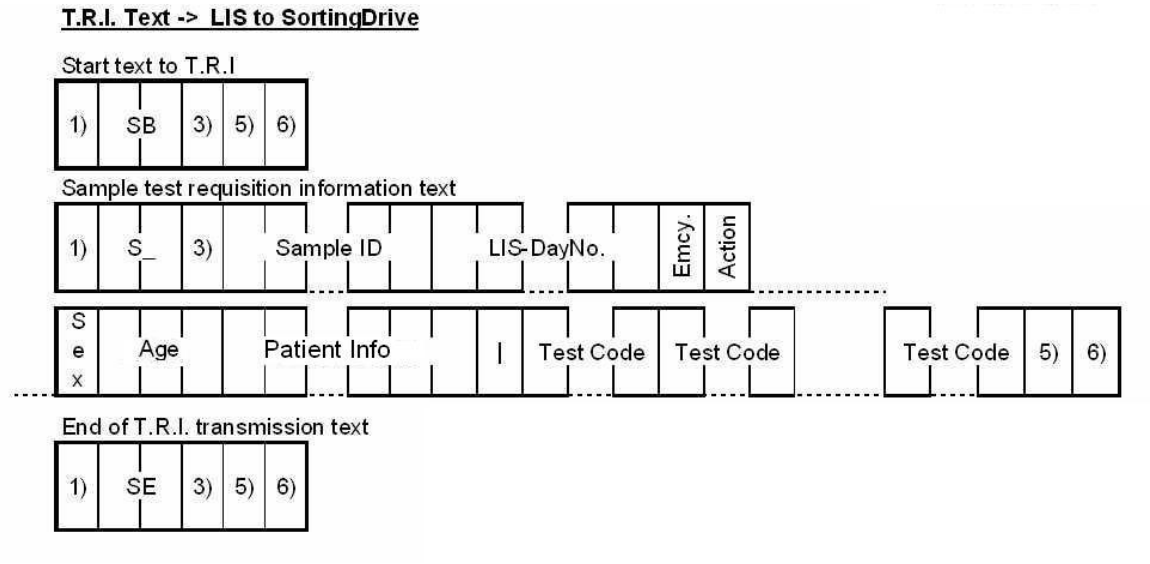


Figure 3: Version-1 S-Record

Common items S-Record:

1) Start of text code <STX> (Default Hex 02)

3) Every time zero (0)

5) End of text code <ETX> (Default Hex 03)

6) Block check character BCC

(Only available if this option is switched on within the Sorting-Drive online configuration)

Calculation of BCC:

<STX> is not included, <ETX> is included

```
Dim nBCC As Byte
    For i = 2 To nTextBlockLength
        nBCC = nBCC Xor Asc(Mid(TextBlock, i, 1))
    Next i
```

Note: nBCC can contain any value between 0 and 255.

Fixed length items S-Record:

Emergency flag	1 digit	(0 or 1 mandatory)
Action flag	1 digit	(0 or 1 or 2 mandatory)
Sex	1 character	(can be empty)
Age	3 digits	(can be empty)

Variable length items S-Record:

Sample ID	4-30 characters (mandatory)
LIS-DayNo.	1-50 characters (can be empty)
Patient Info	1-50 characters (can be empty)
Test Code	1-10 characters (mandatory)

The length of these fields must be defined within the Sorting-Drive online configuration. All text alignments are left and unused space is filled up with blanks

To specify the start point for the variable length section of test codes, the pipe (|) character is mandatory.

Note: The Action Flag enables the LIS to manipulate the patient test request stored in the Sorting-Drive database.

Action flag:

0 = Normal test requisition (All transmitted tests are added to the open order list if they are new)

1 = ReRun tests (All transmitted tests are reactivated)

2 = Delete tests (All transmitted tests are deleted from the order list)

Because the Sorting-Drive only works in a batch mode, it may be necessary to change the already stored patient requests to activate a rerun or to delete any test requests.

The LIS can send patient information and test codes more than once. If the patient is already known to the Sorting-Drive, it will only add new test codes to this patient request. The status of already known test codes is untouched.

If duplicate test codes are identified within the order record, they will add only once.

If the LIS send order codes which are not defined in the current Sorting Configuration, they are ignored.

D-Record, E-Record

The D- and E- Records are used to send tube related information to the Laboratory Information System. The start of this transmission is indicated by the [DB] text block. The Sorting-Drive then transmits several sorting result text blocks [D_]. If the 'Send Tube Recognition' option is set, the Sorting-Drive sends several Tube-Recognition text blocks [E_] after the D-Blocks . The end of the transmission is indicated by the end text block [DE].

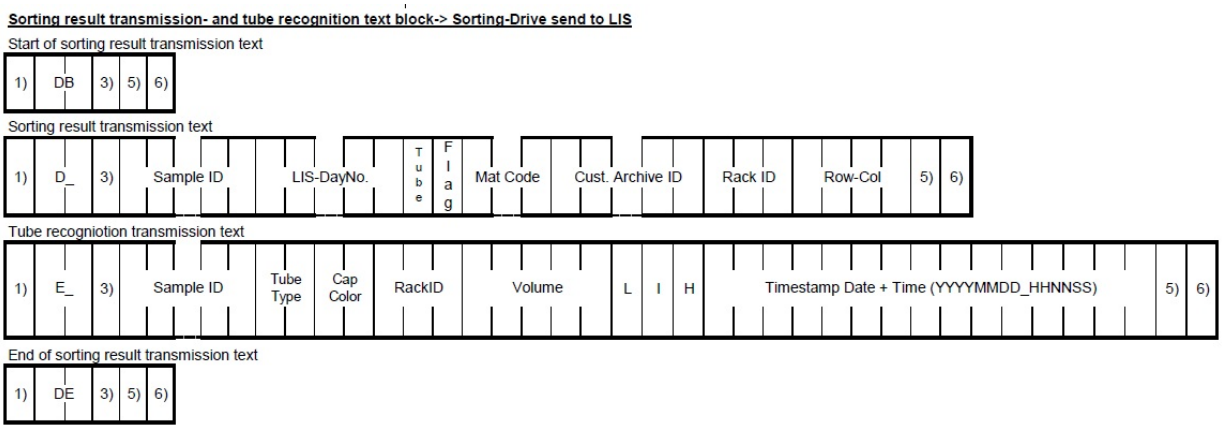


Figure 4: Version-1 D- and E-record

Common items D-, E-Record:

1) Start of text code <STX> (Default Hex 02)

3) Every time zero (0)

5) End of text code <ETX> (Default Hex 03)

6) Block check character BCC

(Only available if this option is switched on within the Sorting-Drive online configuration)

Calculation of BCC:

<STX> is not included, <ETX> is included

```
Dim nBCC As Byte
    For i = 2 To nTextBlockLength
        nBCC = nBCC Xor Asc(Mid(TextBlock, i, 1))
    Next i
```

Note: nBCC can contain any value between 0 – 255..

Fixed length items D-Record:

Tube	1 digit	(0 to n, 0=Primary tube,1= First secondary, 2=Second secondary, 3=...)
Flag	1 digit	(1 to 4, 1=Standard output destination, 2=Archive, 3= Error, 4=Serum Plate MTP)
Wp ID	3 digits	(3 digits, the physical AutoMate output destination ID the sample was placed, also called Workplace ID)
Row-Col	4 characters	(The position of the sample within the physical rack of the output destination)

Note: The positioning information within the Row-Col field can vary, depending on user defined settings.

1. Position as row and column (YYXX, AXX, AYY).

Fixed length items D-Record:

Tube	1 digit	(0 to n, 0=Primary tube,1= First secondary, 2=Second secondary, 3=...)
Flag	1 digit	(1 to 4, 1=Standard output destination, 2=Archive, 3= Error, 4=Serum Plate MTP)
Wp ID	3 digits	(3 digits, the physical AutoMate output destination ID the sample was placed, also called Workplace ID)
Row-Col	4 characters	(The position of the sample within the physical rack of the output destination)

Note: The positioning information within the Row-Col field can vary, depending on user defined settings.

1. Position as row and column (YYXX, AXX, AYY).

In this case the first two characters stand for the row and the last two characters for the column.

If row or column is a numeric value the fields are padded by 0. (Example YYXX: 0101, 0102, 0103...)

If row or column is a letter the fields are padded by blank.
Example: If the Sorting-Server translates the MTP positioning information from YYXX or P to AXX or AYY, then the positioning information is transferred as:
AXX: _A01, _A02, _A03...
AYY: 01_A, 01_B, 01_C...

Note: For MTP plates, only position formats YYXX and P are allowed. Therefore, Sorting-Drive only allows position formats YYXX and P in the AutoMate settings HOST -> PosFormatR, PosFormatS und PosFormatV.

2. Position as sequential numbering (P)

In this case the Row-Col field is not divided. The field is padded by 0. (Example P: 0001, 0002, 0003...0099, 0100, 0101, 0102...)

Variable length items D-Record:

Sample ID	4-30 characters	
LIS-DayNo.	1-50 characters	(can be empty)
Mat Code	1-10 characters	
Customers Archive ID	1-50 characters	(can be empty)

The length of these fields must be defined within the Sorting-Drive online configuration. All text alignments are left and unused space is filled up with blanks

Fixed length items E-Record:

Tube Type	2 digits	(Number related to the Tube Type definition in the AutoMate Tubes.ini file. The field is padded by 0)
Cap Color	2 digits	(Number related to the Cap Color definition in the AutoMate Tubes.ini file. The field is padded by 0)
Wp ID	3 digits	(The physical AutoMate input workplace ID the sample was taken from. If the ID is less than 3 digit the data is left aligned and padded by blank)
Volume	5 digits	(Number representing the measured volume in µl. The field is padded by 0)
L,I,H	3 digits	(For future use all digits are 0)
Time stamp	15 characters	(YYYYMMDD_HHMMSS representing the date and time the sample was recognized by the AutoMate system)

Variable length items E-Record:

Sample ID	4-30 characters

The length of these fields must be defined within the Sorting-Drive online configuration. All text alignments are left and unused space is filled up with blanks

Additional info for D-Record and E-Record

The option to send a D-Record can be set separately for each workplace. Different types of workplaces are indicated in the FLAG field.

FLAG = 1 is a normal Distribution Workplace.

FLAG = 2 is an Archive Workplace. This means that the rack on this workplace must have a unique identifier. This identifier is sent in the Cust.Archive ID field.

FLAG = 3 is an error placement.

Note: If the user removes a tube manually from the system, before it was placed to its final output destination, the field Row-Col contains '0000'.

FLAG = 4 is a Clone plate (MTP). This plate must also have a unique identifier. This identifier is sent in the Cust.Archive ID field

When the transmission starts, it will send a maximum of
0-25 D-Records with FLAG=4 then
0-25 D-Records with FLAG=2 and then
0-25 D-Records with FLAG=1 and then
0-25 D-Records with FLAG=3

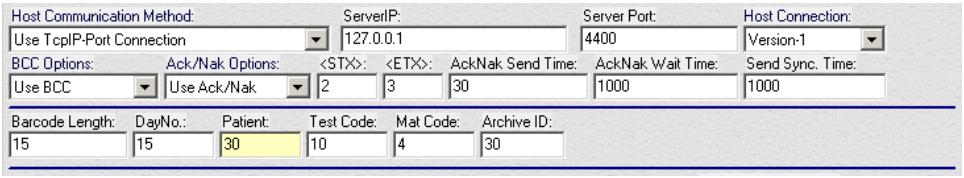
If option "send tube recognition" is set it will also send
0-30 E-Records.

If there is nothing to send, only the
Start [DB] text block and the End [DE] text block will be sent by the Sorting-Drive.

Example: Serial Online Protocol Version-1

Below is an example of the running Serial-Online-Protocol **version-1** between the Sorting-Drive and the LIS.

Communication settings for this example:




```
<<        (Send from LIS to Sorting-Drive)
>>        (LIS receives from Sorting-Drive)
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
                    << Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Send Data:  S 01099220007   10122004    00M033Patient1          |GBL    LAB1     6
>> (rcvACK)
<< Send Data:  S 01099220006   10122004    00F051Patient2          |LAB2   LAB3   LAB4     V
>> (rcvACK)
<< Send Data:  S 01099220005   10122004    00F018Patient3          |AHBC   ANTIB    [
>> (rcvACK)
<< Send Data:  S 01099220008   10122004    00M045Patient4          |LAB3   LAB4     -
```

```
>> (rcvACK)
<< Send Data:  S 01099220004    10122004      00M019Patient5              |COC      CO2       _
>> (rcvACK)
<< Send Data:  S 02099220011    10122004      00F076Patient6              |FT3      T3        N
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvE ) :E 11099220007    050397 0000000020041012_110700
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 01099220007    10122004      01WB  230   2300101
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvE ) :E 11099220006    050597 0000000020041012_110807
<< Send ACK
>> (rcvE ) :E 11099220005    060297 0000000020041012_110809
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvE ) :E 11099220008    060297 0000000020041012_110814
<< Send ACK
>> (rcvE ) :E 11099220004    040197 0000000020041012_110815
<< Send ACK
>> (rcvE ) :E 12099220011    040197 0000000020041012_110821
<< Send ACK
```

```
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 01099220004    10122004      01SE  420    4200101
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 01099220005    10122004      01EA  330    3300101
<< Send ACK
>> (rcvE ) :E 11099220007    050397 0000000020041012_110911
<< Send ACK
>> (rcvE ) :E 11099220006    050597 0000000020041012_110915
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 02099220011    10122004      02SE  A111   6010101
<< Send ACK
>> (rcvD ) :D 01099220005    10122004      11EA  430    4300101
<< Send ACK
>> (rcvD ) :D 02099220011    10122004      11SE  430    4300102
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvE ) :E 11099220006    050597 0000000020041012_111017
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
```

```
>> (rcvDB) :DB0
<< Send ACK
>> (rcvE ) :E 11099220004    041097 0000000020041012_111124
<< Send ACK
>> (rcvE ) :E 11099220007    -1-197 0000000020041012_111127
<< Send ACK
>> (rcvE ) :E 11099220008    -1-197 0000000020041012_111130
<< Send ACK
>> (rcvE ) :E 11099220006    050597 0000000020041012_111133
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 01099220007    10122004     02SE  A111   6010102
<< Send ACK
>> (rcvD ) :D 01099220008    10122004     02SE  A111   6010103
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 01099220004    10122004     02SE  A111   6010101
<< Send ACK
>> (rcvE ) :E 11099220004    020197 0000000020041012_111846
<< Send ACK
>> (rcvE ) :E 11099220006    030397 0000000020041012_111848
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
```

```
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvE ) :E 11099220006    -1-197 0000000020041012_112012
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
>> (rcvDB) :DB0
<< Send ACK
>> (rcvD ) :D 01099220006    10122004      02SE  A111    6010102
<< Send ACK
>> (rcvDE) :DE0
<< Send ACK
<< Start Block:  SB0  "
>> (rcvACK)
<< Stop Block:  SE0  %
>> (rcvACK)
-- Event Socked Closed
```

Synchronize the Transmissions Version-1

When the Sorting-Drive Host-Data-Transfer program starts up, it will initialize and open the communication port. The LIS can then start to send the first block of patient information S-Records. [SB S_ S_ S_ S_ S_ ..... SE].
When the Sorting-Drive receives the SE block from the LIS it will wait for a time frameT2 >= 500ms before it starts the D- E-Record transmission.
[DB D_ D_ D_ D_ E_ E_ E_..... DE].
After the LIS has received the DE Block it has to wait for a time frame T1>=500ms before starting again sending S-Records.

The time T2 is configurable within the sorting configuration (500ms to 5000ms). Default value 5000ms

Note: If a huge amount of data has to be transferred the time frames T1 and T2 shall be as short as possible.

Note: If there is no patient data to send, only the [SB SE] and [DB DE] text blocks are exchanged.

After the Sorting-Drive has sent the [DE] block it waits up to 60 seconds for the new [SB] block from the LIS. This is the time-out for the connection. If a time-out occurs, the Sorting-Drive will close the connection and then reopen it. It then waits until the LIS start again with an S-Record transmission.

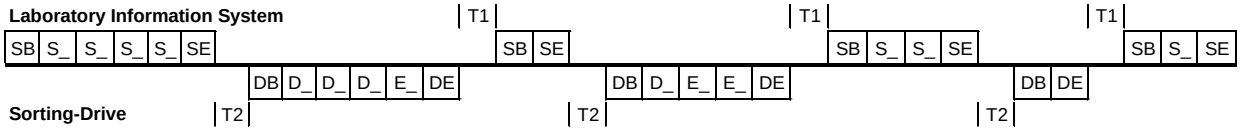


Figure 5: Version-1 Communication LIS – Sorting-Drive

If there is no toggling of [SE] [DB] and [DE] [SB], the communication will stop and Sorting Results will not be transferred to the LIS in time.

File Transfer Communication

Load List File Version-1

The Laboratory Information System generates an ASCII file called Load List. All new patient information is added to this file. The Sorting-Drive expects the file within a user-defined time interval. If the file already exists it will be renamed and the data transferred to the Sorting-Drive database. The renamed file is then deleted.

The structure of this file is shown below. The fields have the same function as described in the section above for the S-Record.

Field description of the Load List file version-1:

ColNameHeader = False
Format = Delimited (;)
CharacterSet = ANSI

Col1=SampleID max char width 30 (mandatory)
Col2=LIS-DayNo. max char width 50 (can be empty)
Col3=Emergency bit (mandatory, value 0,1)
Col4=Action bit (mandatory, value 0,1,2)
Col5=Sex char width 1 (can be empty)
Col6=Age number (can be empty)
Col7=Patient Info max char width 50 (can be empty)
Col8=Test Codes max char width 1000 (mandatory)

Example of a Load List:

9921881050;9921881050;0;0;M;030;OLAF MEIER;HIV|9921881051;9921881051;
0;0;M;075;PETER HUEBSCH;
OI|CRE|HST|GLU|HBA1C|HS|GGT|CHOL|TRI|HDL|KBBX|ERY|LEU|HB|HK|MCH|MCV|TH
RO|9921881052;9921881052; 0;0;W;079;MARIA
GÖSER;BILI|AP|GPT|GGT|CHOL|TRI|HDL|LDL|9921881053;9921881053; 0;0;M;066;RALF
MÖLLER;
OI|CA|HS|GBBX|ERY|LEU|HB|HK|MCH|MCHC|MCV|THRO|NEU|LYM|MONO|EO|BASO|G
E|ELPHX|

Note: In the actual file, all data is placed in one line. Only one line feed at the end!

The following characters must not be used:

; semicolon and | pipe in data entries!

Result List File Version-1

The Result List File is generated by the Sorting-Drive when a tube is correctly positioned. The position, workplace ID (WP ID) and further tube information is included on this list. The Sorting-Drive tries to transfer this list to the LIS within a user-defined time interval. At first, the LIS side is checked to see if there is already a Result List. The Sorting-Drive then transfers a new one only if there is no existing list. The LIS must delete the Result List file after processing the data.

The structure of this file is shown below. The fields have the same function as described in the above chapter for the D-Record. The date field is an additional field in the result list. The date format depends on the MS-Windows settings (General Date).

Field description for the Result List version-1:

ColNameHeader = False
Format = Delimited(;)
CharacterSet = ANSI

Col1=SubRule No. short
Col2=SampleID char width 30
Col3=LIS-Day No char width 50
Col4=Tube short
Col5=Flag short (2=Archive 4=MTP)
Col6=MatCode char width 20
Col7=CustArchiveID char width 50
Col8=RackID char width 3
Col9=Row short
Col10=Col short
Col11=Date char width 30

Example for a Result List:

```
1;6322486;6322486;1;4;2;99064920;111;07;01;12.09.2002 12:38:54
1;6322486;6322486;2;4;2;99064919;112;07;01;12.09.2002 12:38:54
```

Tube Recognition File Version-1

The Tube Recognition File is generated by the Sorting-Drive when a tube is recognized and all tube-related information has been analyzed. The bar code, cap-colour, tube type, volume, quality and a time stamp is included on this list.

The structure of this file is shown below. The fields have the same function as described in the above chapter for the E-Record. The LIS must delete the Tube Recognition File after processing the data as the Sorting-Drive will transfer a new one only if there is no existing file.

Field description for the Tube Recognition List version-1:

ColNameHeader = False
Format = Delimited(;)
CharacterSet = ANSI

Col1=SubRule No. short
Col2=SampleID char width 30
Col3=TubeType short
Col4=Cap Color ID short
Col5=RackID char width 3
Col6=Volume char width 5
Col7=L char width 1
Col8=I char width 1
Col9=H char width 1
Col10=Timestamp char width 15

Example for a Tube Recognition List:

```
1;6322486;02;01;210;04500;0;0;0;20021206_123854
1;6322477;04;03;320;02532;5;5;5;20021206_124354
```

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Related Documents

Sorting-Drive Server Instructions for Use

Describes how to operate the Sorting-Drive Server software application.

Sorting-Drive Client Instructions for Use

Describes how to operate the Sorting-Drive Client software application.

iPAW Instructions for Use

Describes how to operate the iPAW workstation and client software application.

AutoMate 2500 Family Instructions for Use

Describes how to operate AutoMate 2500 Family instruments.

Sorting-Drive Programmer's Guide

Describes how to use the Sorting-Drive Administrator and create sorting profiles for the laboratory.

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