ADVIA 360 COMMUNICATION PROTOCOL

Rev. 02

SETTING UP THE COMMUNICATION LINK

Analyzers by default do not have communication enabled. You have to enable it by selecting communication port (Serial), communication speed (Baud) and protocol used. Upon selecting and confirming these parameters, analyzers will be ready to start communication.

Protocols that require handshake will start “introducing” themselves to the host PC by sending INIT packages. The host must reply to the INIT package. Each INIT package is sent once, and analyzer software is allowing 3 seconds for the host PC to reply. Upon the third unsuccessful attempt analyzer software will disable sending messages.

The host PC can wake up the analyzer by sending ENQ package. Analyzer will reply with an INIT package and will expect a reply as described in the protocol.

Protocols (3.1) that do not require handshake will also send the INIT package but do not expect a reply.

USB LINK

Before connecting the analyzer to a PC with USB cable, a specific driver must be installed. The driver is available from Diatron’s web site or from http://www.ftdichip.com/Drivers/VCP.htm. Select the driver matching your operating system. Download and install. Now you can connect the analyzer.

USB connection utilizes a standard USB A-B cable (not included with analyzers). The cable must be connected to a free USB A socket on the PC and the USB B socket on the analyzer.

Upon connection, the pre-installed driver will recognize the analyzer’s built-in USB device as a Virtual Serial Port.

SETTING UP THE DRIVER

(Windows)

When the computer has recognized the analyzer, it will enroll the (virtual) serial port as one of the COM ports of the PC. Some applications require the serial port to be identified as a specific COM port. Please go to Hardware setup, and check the COM port ID. Modify if necessary. (Refer to Windows HW configuration procedures [My Computer, Properties, Hardware, Device Manager])

SETUP OF ANALYZERS

When using the USB port for communication, analyzer setup means selecting USB as communication port, and choosing the required communication protocol. Communication speed is always set in Windows application / hardware setup.

Protocols that require handshake will start “introducing” themselves to the host PC by sending INIT packages. The host must reply to the INIT package. Each INIT package is sent once, and analyzer software is allowing 3 seconds for the host PC to reply. Upon the third unsuccessful attempt analyzer software will disable sending messages.

The host PC can wake up the analyzer by sending ENQ package. Analyzer will reply with an INIT package and will expect a reply as described in the protocol.

Protocols (3.1) that do not require handshake will also send the INIT package but do not expect a reply.

SERIAL PROTOCOL 3.1

INTRODUCTION

The new 3.1 protocol was introduced to simplify the receiving, parsing and storing of data records. The byte stream is a human readable ASCII character stream, with occasional control characters. Most programming environments are able to handle this stream as a simple ASCII string or text. The stream is line-oriented with special characters to separate fields. The protocol has a single format for transmitting a single measurement record. If more records are sent, they are simply chained together one after the other.

CHARACTERS AND BASIC STRUCTURE

The byte stream uses the ASCII characters in the range 1…255 (http://en.wikipedia.org/wiki/ASCII), or 0x01..0xFF in hexadecimal.

A record transmission consists of three parts: a small header, a big text body, and a small footer. A single record is never longer than 8192 bytes.

A transmission always starts with the control character “Start of Header” (<SOH>, 1, 0x01).

The second character is a counter: it will contain a single uppercase English letter in the range “A” to “Z”, incrementing with every record. The first record will contain „A”, the second will contain “B”, etc. If the instrument sends many records without being turned off, the counter will overflow from „Z” to “A”.

The third character is an identifier: it will be an uppercase “N”.

The fourth character is the control character “Start of Text” (<STX>, 2, 0x02).

The fifth and consecutive characters form the body of the transmission. The body may contain characters from the printable range (32…126, 0x20..0xFF), and the control characters “Horizontal tab” (<HT> or <TAB>, 9, 0x09), “Carriage return” (<CR>,13, 0x0D), and “Line feed” (<LF>, 10, 0x0A). The body contains several lines separated by a two-byte sequence <CR><LF>. See below for the detailed description of the contents.

The body of the transmission is closed by the control character “End of Text” (<ETX>, 3, 0x03).

The footer consists of a two-character checksum in a two-digit hexadecimal form. The checksum is calculated by summing up the values of all characters in the message header and body, including the beginning <SOT> character and the last <ETX> character, adding 255 (hex: 0xFF) to it, and keeping only the last two hexadecimal l(!) digits.

The last character of a record is always the single control character “End of Transmission” (<EOT>, 4, 0x04). There is no terminating “NULL” (<NUL>, 0, 0x00) character at the end. The next record can start right after the <EOT> character.

DETAILS OF THE 3.1 PROTOCOL

The body of a transmission is line-oriented, separated by the two-byte “Carriage Return” “Line Feed” (<CR> <LF>, 13 10, 0x0D 0x0A) sequence. A single line might contain one or more fields, separated by the “Horizontal tab” (<HT>, 9, 0x09) character.

The following lines are usually composed of an identifier field and one or more value fields, all separated by the <HT> character. The **characters in bold** appear in the transmission exactly as written, without any variance between records. Control characters are marked with the < and > characters, for example **<HT>**. {Comments} are marked with { and }, and are not included in the actual transmission. For a more detailed discussion on the meanings of the various parameters and histograms, please refer to the instruments' user manuals.

header1	{header1 to header8 are the lab header lines}
header2	{these lines are defined by the user in the instrument settings}
header3	{any or all of these lines can be empty}
header4	
header5	
header6	
header7	
header8	
Serial No.:<HT>serial	{serial is the serial number of the instrument}
RecNo:<HT>recno	{recno is the internal record number, at most 6 digits}
Sample ID:<HT>sampleid	{sampleid is at most16 characters long}
Patient ID:<HT>patientid	{patientid is at most 16 characters long}
Patient Name:<HT>patientname	{patinetname is at most 32 characters long}
Mode:<HT>mode	{mode is the species name like „Human", max 20 characters}
Doctor:<HT>doctor	{doctor is at most 16characters long}
Age:<HT>value**<HT>**unit	{value is a number of at most 3 digits, unit is either „years" or „months"}
Birth(ymd):<HT>birthdate	{birthdate is an 8 digit number, format: yyyymmdd}
Sex:<HT>gender	{gender is „Male", „Female", „Neutered", „Spayed" or a single „-" character}
Test date(ymd):<HT>date	{date is an 8 digit number, format: yyyymmdd}
Test time(hm):<HT>time	{time is a 6 digit number, format: hhmmss}
Param<HT>Flags<HT>Value<HT>Unit<HT>[min-max]	{this is a header line, always the same}
param**<HT>**flag**<HT>**value**<HT>**unit**<HT>[**min-max**]**	{ there are several similar lines param is the parameter name, at most four characters long, possible values are (in sequence): WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, PCT, MPV, RDWs*, RDWc, LYM, MON, NEU, LY%, MO%, NE%, PDWs*, PDWc*, PCT*, P-LCR*, P-LCC* flag is a single character indicator, can be „ " (space), „+", „-", „E" and „*"(asterisk) value is the measured parameter value, exactly 4 characters: number with a possible decimal dot, padded with spaces on the left side, or 4 minus signs „----", or 4 spaces „ " unit is at most 4 characters long, possible values are „10^9/l", „10^3/ul", „10^12/l", „10^6/ul", „fl", „%", „g/l", „g/dl", „mmol/l", „pg", „fmol", depending on the parameter min and max are the lower and upper bounds of the normal range, exactly 4 characters, including a possible decimal dot, padded with spaces on the left side}
Flags:<HT>flags	{flags is a series of characters indicating errors, at most 32 characters long, upper or lowercase letters „a" to „z"}

WBC graph	{always the same, indicates the beginning of the WBC histogram}
Scale(fl):<HT>wbcscale	{wbcscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 400}
Channels:<HT>wbcchannels	{ wbcchannels is the number of channels (columns) in the histogram, always 256 }
WMarker1:<HT>wm1	{wm1 is the first WBC discriminator channel (RBC/WBC) }
WMarker2:<HT>wm2	{wm2 is the second WBC discriminator channel (LYM/MON) }
WMarker3:<HT>wm3	{wm3 is the third WBC discriminator channel (MON/NEU) }
Points:<HT>ch0**<HT>** ……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always wbcchannels values here (usually 256) }
RBC graph	{always the same, indicates the beginning of the RBC histogram}
Scale(fl):<HT>rbcscale	{rbcscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 200}
Channels:<HT>rbcchannels	{ rbcchannels is the number of channels (columns) in the histogram, always 256}
RMarker1:<HT>rm1	{rm1 is the RBC discriminator channel (PLT/RBC) }
Points:<HT>ch0**<HT>** ……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always rbcchannels values here (usually 256) }
PLT graph	{always the same, indicates the beginning of the PLT histogram}
Scale(fl):<HT>pltscale	{pltscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 50}
Channels:<HT>pltchannels	{pltchannels is the number of channels (columns) in the histogram, always 256}
PMarker1:<HT>pm1	{pm1 is the first PLT discriminator channel (PLT start) }
PMarker2:<HT>pm2	{pm2 is the second PLT discriminator channel (PLT/RBC) }
Points:<HT>ch0**<HT>**ch1**<HT>**……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always pltchannels values here (usually 256) }

As mentioned above, after the last channel value in the PLT histogram the body of the record is closed with the control character „End of Text" (<ETX>, 3, 0x03).

* research use only parameters – available in global mode.

Sample transmission

DIADVIA 360 1.2.723 20141113 172058**EAEN**ADVIA 360

Serial No.: S010067

RecNo: 21

Sample ID: AUTO_00003

Patient ID:

Patient Name:

Mode: Human

Doctor:

Age: 0 years

Birth(ymd): 00000000

Sex: -

Test date(ymd): 20141110

Test time(hm): 145900

Param	Flags	Value	Unit	[min-max]
WBC		7.93	10^9/l	[4.00-11.70]
LYM		2.57	10^9/l	[0.80-3.30]
MID		0.67	10^9/l	[0.30-1.70]
GRA		4.69	10^9/l	[2.30-8.80]
LY%		32.4	%	[10.8-45.4]
MO%		8.5	%	[1.8-17.0]
GR%		59.2	%	[44.0-80.9]
RBC		4.98	10^12/l	[2.76-5.74]
HGB		13.6	g/dl	[8.8-16.5]
HCT		41.83	%	[26.10-49.60]
MCV		83.9	fl	[76.4-102.0]
MCH		27.2	pg	[23.3-36.1]
MCHC		32.4	g/dl	[29.7-36.8]
RDWc	H	19.4	%	[11.3-16.7]
PLT	!	230	10^9/l	[97- 390]
MPV	!	11.3	fl	[7.5-13.1]

Flags: p

WBC graph

Scale(fl): 400

```
Channels:       256

WMarker1:       19

WMarker2        56

WMarker3:       89

Points: 0       0       0       0       0       0       0       0       0       00      133
125     115     102     88      76      65      57      53      52      55      59      67
78      91      108     128     151     175     198     218     235     246     252     255
252     245     235     224     211     198     186     174     162     148     134     120
108     98      89      83      77      72      66      62      58      55      52      49
46      43      40      38      37      39      41      43      46      46      46      44
42      41      41      42      43      43      43      41      39      36      34      32
30      29      28      26      26      25      23      23      22      20      19      17
16      13      12      10      10      9       10      10      11      12      13      13
13      13      13      13      13      13      13      13      13      14      15      16
16      16      17      18      19      22      25      27      29      30      32      32
33      33      33      34      34      34      34      34      34      35      36      38
41      44      47      49      49      50      51      53      56      60      64      67
69      71      73      76      80      84      89      92      95      98      100     102
105     108     109     110     110     110     110     111     113     115     118     120
122     125     129     134     138     142     144     145     145     143     141     138
135     135     135     137     139     142     145     149     152     155     158     162
163     162     158     153     147     142     137     133     131     129     129     129
130     132     131     129     125     120     115     111     106     101     96      92
88      84      80      76      70      66      60      56      51      47      44      41
39      36      34      32      29      26      24      22      20      19      17      15
13      9       6       3

RBC graph

Scale(fl):      200

Channels:       256

RMarker1:       36

Points: 3       8       14      22      31      39      46      51      54      55      53
51      47      43      38      33      29      24      20      17      14      12      10
8       7       5       5       4       3       32      2       1       1       1       1
1       1       1       1       11      1       1       1       1       1       1       1
2       2       34      5       5       7       7       9       10      11      13      14
16      18      20      23      26      30      34      39      43      49      55      60
67      73      79      87      95      103     112     121     130     139     147     156
164     172     180     189     197     205     212     219     225     231     235     241
245     249     252     254     254     254     253     252     250     249     247     246
244     242     239     235     229     223     216     209     201     193     185     178
170     163     156     149     142     135     129     123     116     110     104     99
93      87      82      77      72      67      62      57      53      49      45      42
39      36      33      30      27      25      22      20      18      17      15      14
13      12      11      9       97      7       6       5       5       5       4       4
3       3       33      3       3       3       3       3       3       3       2       2
11      1       1       1       1       1       1       1       1       1       11      1
1       1       1       1       0       0       1       1       11      1       1       1
1       1       1       1       0       0       00      0       0       0       0       0
0       0       0       0       00      0       0       0       0       0       0       0
0       0       00      0       0       0       0       0       0       0       0       0
00      0       0       0       0

PLT graph

Scale(fl):      50

Channels:       256
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```
PMarker1:       10

PMarker2:       142

Points: 0       0       0       0       0       0       0       0       0       00      0
4       14      26      26      48      74      104     136     168     168     196     218
234     246     252     252     254     252     248     240     232     232     224     216
208     202     198     198     196     196     196     198     198     198     198     198
196     194     192     192     188     182     176     166     156     156     146     136
126     118     110     110     102     96      90      84      78      78      74      68
66      64      64      64      62      62      62      60      58      58      54      50
46      42      38      38      36      34      32      30      28      28      28      28
28      28      26      26      26      24      22      20      18      18      16      14
14      14      16      16      16      16      14      12      12      12      10      10
88      8       8       8       8       6       6       6       6       6       88      10
10      10      12      10      10      10      8       8       66      6       6       6
6       6       8       8       10      10      10      10      10      8       8       8
8       6       6       6       66      6       6       6       6       6       6       6
6       4       46      6       6       6       6       6       6       6       6       6
68      8       8       8       8       8       8       8       6       6       66      6
6       6       6       8       8       8       10      12      12      12      14      16
18      20      20      22      22      22      22      22      22      24      26      28
30      32      32      32      34      32      32      32      32      32      32      34
34      36      36      38      40      44      46      50      50      54      56      58
58      60      60      60      60      60      62      62      62

96
```

HL7 PROTOCOL (HL7V2.5)

Advia360 is able to send measurement results to and receive so-called work lists from a remote computer. To activate and use this feature, the instrument needs to be connected to a HL7 capable server directly or through a computer network.

ADVIA360 SENDING MEASUREMENT DATA TO THE SERVER

Setup

Go to Settings / Communication/ Peer Communication

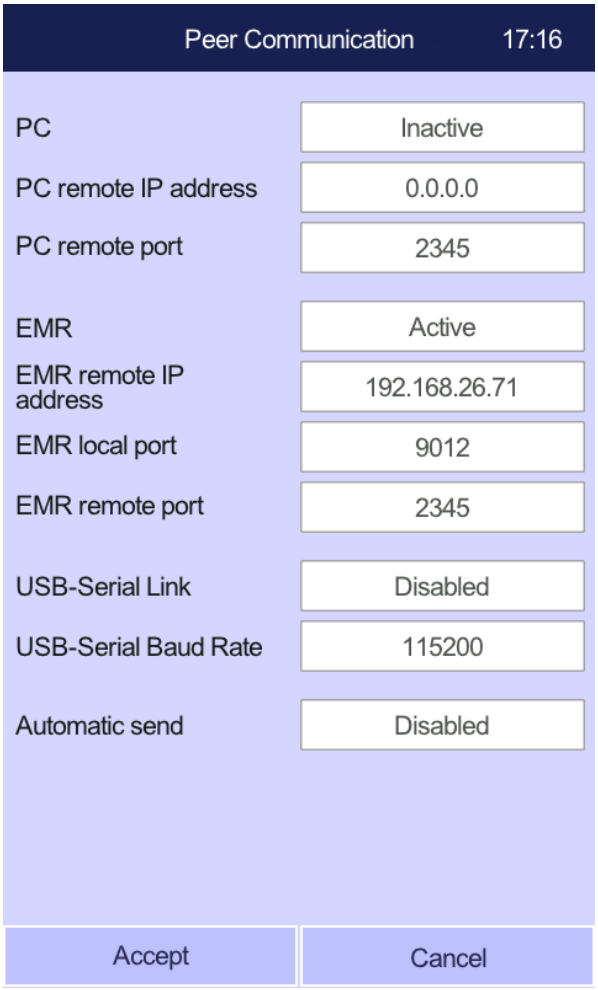
The following data has to be provided for the EMR server:

- EMR enabled (Active)
- EMR remote IP address of the HL7 server
- EMR remote port of the HL7 server

For sending data to PC:

- PC enabled
- PC remote IP address of the server
- PC remote port of the server

Upon setting and accepting the above configuration, **Advia360** is ready to send measurement results to the server.

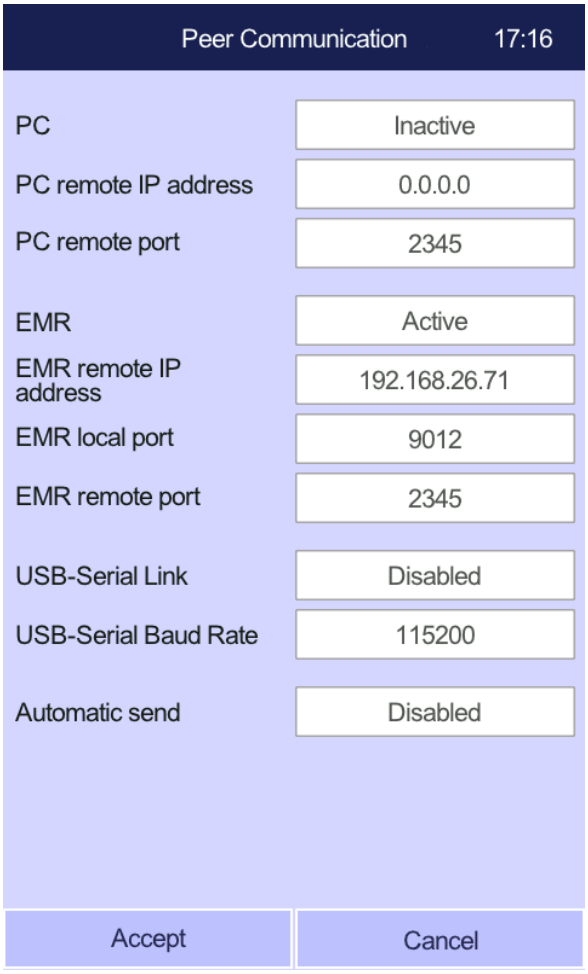


Sending data takes place at the end of each measurement automatically, if the Settings Communication/ Peer Communication menu Automatic Send value is Enabled.

Available choices for the Automatic Send:

- Disabled
- PC only
- EMR(LIS) only
- PC and EMR(LIS)
- USB-Serial

The sending can also be initiated by the user through the database by clicking the Manage records / Send / PC or EMR button.



The following is an example of a HL7 message v. 2.5 of **ADVIA 360**:

Message

MSH|$~\&|Advia360||||20130816154927||ORU_R01|SAMPLE001|P|2.5.1||||||UNICODE UTF-8|||

PID|||PATIENT_ID001||Thomas A.||19621119000000|F

NTE|1||Dr. Smith

NTE|2||32

SPM|1|||WB|||||||P

SAC|||SAMPLE001

OBR||AWOS_ID001

OBX|1|TX|WBC||14.80|10^9/l|5.00-10.00|H

OBX|2|TX|LYM||2.35|10^9/l|1.30-4.00|N

OBX|3|TX|MID||1.09|10^9/l|0.15-0.70|H

OBX|4|TX|GRA||11.36|10^9/l|2.50-7.50|H

OBX|5|TX|LYM%||15.9|%|25.0-40.0|L

OBX|6|TX|MID%||7.4|%|3.0-7.0|H

OBX|7|TX|GRA%||76.7|%|50.0-75.0|H

OBX|8|TX|RBC||6.56|10^12/l|4.00-5.50|H

OBX|9|TX|Hb||18.7|g/dl|12.0-17.4|H

OBX|10|TX|HCT||61.67|%|36.00-52.00|H

OBX|11|TX|MCV||94|fl|76-96|N

OBX|12|TX|MCH||28.5|pg|27.0-32.0|N

OBX|13|TX|MCHC||30.3|g/dl|30.0-35.0|N

OBX|14|TX|RDW||16.1|%|0.0-0.0|N

OBX|15|TX|RDWs||63.3|fl|20.0-42.0|H

OBX|16|TX|PLT||458|10^9/l|150-400|H

OBX|17|TX|MPV||9.5|fl|8.0-15.0|N

OBX|18|TX|WBC SCALE||400|fl

OBX|19|TX|WMarker1||19

OBX|20|TX|WMarker2||66

OBX|21|TX|WMarker3||114

OBX|22|TX|WBC
HISTO||00000000000000000000000082796E6153473C332D29282A2E343A4149525B656E767C81848585848078
746C645C564F4945413F3E3D3B3834302C28262422201F1E1E1D1C1B1B1C1D1E1F20212222232323232321201E
1E1D1D1D1D1C1B1B1A1B1B1D1E1E1E1E1D1D1D1E1F20222324252526272829 2A2B2B2B2C2E2F31343537393
C3F44484E5256595A5B5D60666B72787D818486888A8C8E9195999DA3A7ACAFB1B2B3B3B4B6B8BDC3CAD2D
9DDDFDFDFDFDFE1E3E4E6E7E7E8EAECEEF0F0F0F0F1F3F6FAFDFFFFFCF8F2ECE7E2DEDBD8D5D3D2D3D4D4D1
CDC5BDB4ACA6A29F9C9995928E8B8784807C78736D68625D59555251504F50505152514E483D2F2012

OBX|23|TX|RBC SCALE||200|fl

OBX|24|TX|RMarker1||41

OBX|25|TX|RBC
HISTO||070E192735434F575A59554E473F37302A24201B1613100D0B090807060505040403030202020201010
101010102020202020202020202030304040405050606070809 0A0C0E10121416191C2024282D32373C40464
A4F555A61676F767F889199A3ACB5BEC6CED6DDE4E9EDF1F5F8FAFCFEFFFFFDFCF9F6F4F1EEECE9E6E4E0DCD7
D2CCC5BEB6AFA8A19B95908A857E79726C665F5A544F4B4744403E3B383533302D2B282523201D1B1916141
211100E0D0C0B0A0908070605050504040404040403030302020202020202010101010101010101010202020
2020202020201010101010101010101010101010101010101010101010101010101000000000000

OBX|26|TX|PLT SCALE||50|fl

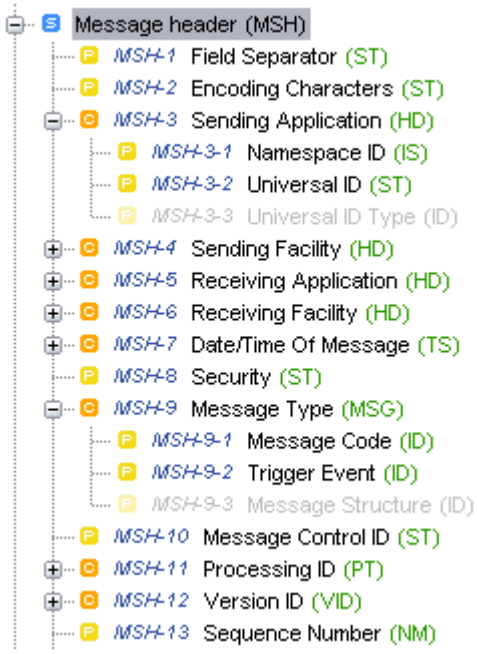
OBX|27|TX|PMarker1||11

OBX|28|TX|PMarker2||163

OBX|29|TX|PLT
HISTO||00000000000000000000000000004040C1A2F4C4C6E93B7D6D6EDFAFFFDFDF6EEE5E5DED7D0CBCBC6C2B
FBCBCB9B5AFA9A9A0988F87877F7A746F6F6B67635F5F5D5B585555524F4B4747423E3A363633302F2E2E2C2
A272424211F1D1B1B181614141311101010 0F0F0F0F0F0F0F0F0F0F0E0E0D0D0C0B0B0A0A0A090808080707
07070707080707070707060606050505050504040404040403020202010101010202030404050506050505040
40303030303030304040405050505050505050504040404040404040404040404040303030304040506060708
08080909080808080807070706060505050607080909 0B0C0D0D0D0D0D0D0D0D0D0E0E0F0F0F0F

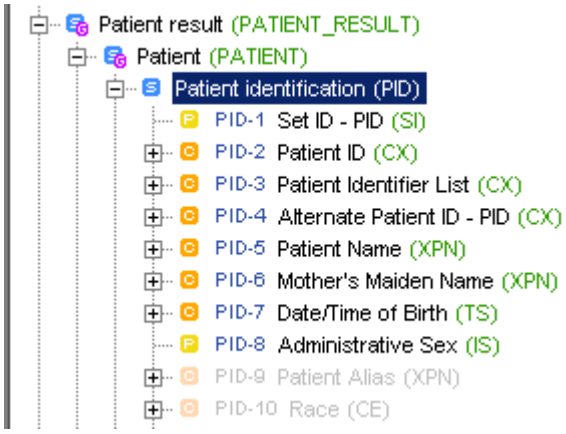
Description

The descriptions of the Message Header (MSH), the Observation Request (OBR) and the Order Observation Result (OBX) can be seen on the following images:



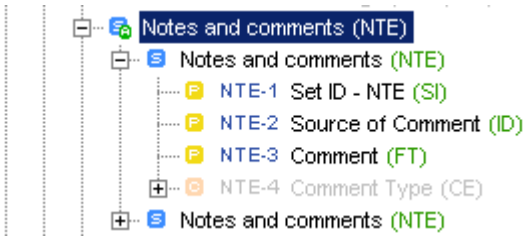
i.e.: MSH|$~\&|Advia360||||20130816154927||ORU_R01|SAMPLE001|P|2.5.1||||||UNICODE UTF-8|||

1. '|' is the Field Separator
2. ' $~\&' is the Encoding Characters
3. ' Advia360' is the Sending Application.
4. '20130816154927' is the Date/Time Of Message
5. 'ORU_R01' is the Message Type
6. 'SAMPLE001' is the Message Control ID which contains the Sample ID of the measurement
7. 'P means preliminary which is the Processing ID
8. '2.5.1' is the Version ID
9. 'UNICODE UTF-8' is the Character Set



i.e.: PID|||PATIENT_ID001||Thomas A.||19621119000000|F

1. 'PATIENT_ID001' is the ID number of the Patient Identifier List
2. 'Thomas A.' is the Patient Name
3. '19621119000000' is the Date/Time of birth
4. 'F' is the Administrative Sex



i.e.:
NTE|1||Dr. Smith

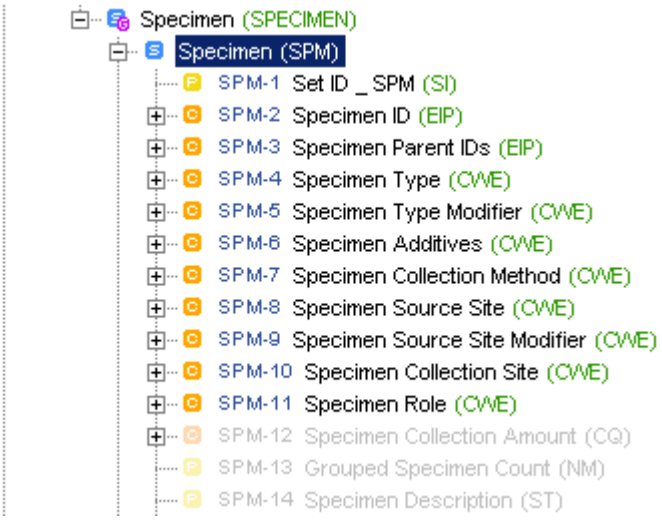
NTE|2||32

1. Set ID. – This field determines the type of the NTE

ID of the NTE	Type of NTE
1	Doctor Name
2	Type of sample

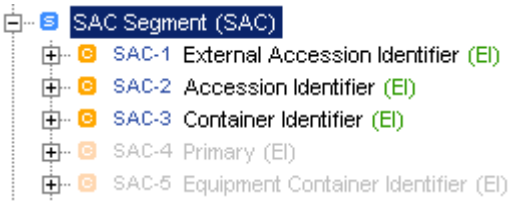
2. Comment field describe the Value of the ID. In case of Type of sample, the following table contains the valid values.

ID	Value
32	HUMAN
33	MALE
34	FEMALE
35	BABY
36	TODDLER
37	CHILD



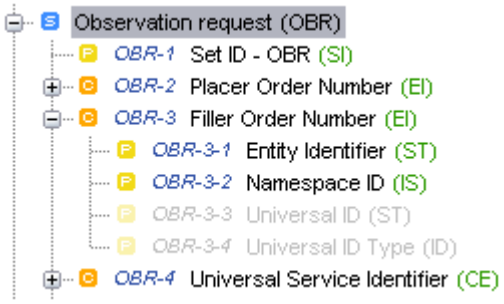
i.e.: SPM|1|||WB|||||||P

1. '1' is the ID of the SPM field.
2. 'WB' is the specimen type. Means Whole Blood.
3. 'P' is the Specimen Role. Means preliminary.



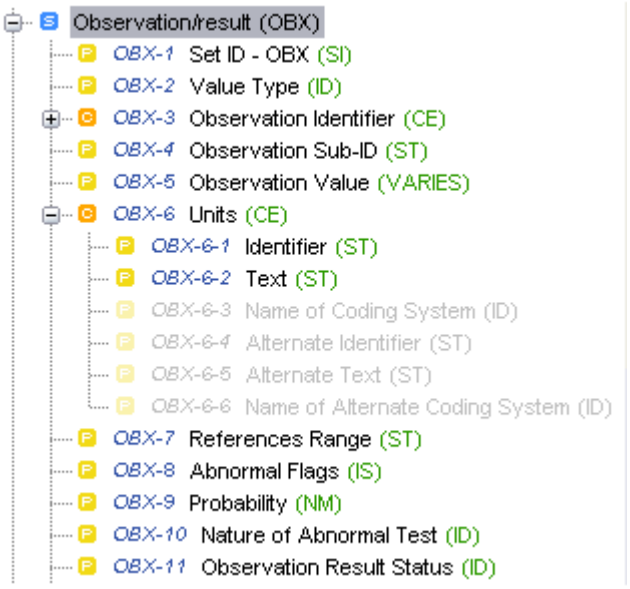
i.e.: SAC|||SAMPLE001

1. SAMPLE001 is the Container Identifier, which contains the SampleID.



i.e.: OBR||AWOS_ID001

1. 'AWOS_ID001' is a unique ID which refers to a record of the EMR.



i.e.: OBX|1|TX|WBC||14.80|10^9/l|5.00-10.00|H

1. '1' is the ID of the OBX field. It is an increscent value
2. 'TX' is the Value Type. It means 'text data'
3. 'WBC' is the Observation Identifier
4. '14.80' is the Observation Value
5. '10^9/l' is the Unit
6. '5.00-10.00' is the Reference Range(normal range)
7. 'H' means High. It is the Abnormal Flag.

List of available Observation Identifiers	Description
RBC, WBC, LYM, MID,GRA,LYM%,MID%,GRA%, Hb, HCT, MCV, MCH, MCHC, RDWc, RDWs*, PLT, MPV, PDWs*, PDWc*, PCT*, P-LCR*, P-LCC*	Values of common parameters
WBC HISTO	Contains the results of the WBC measurement, 256 x 1 bytes. Every byte represents a count of given volume of White Blood Cells
WBC SCALE	It shows the volume at the 256th column of the WBC histogram.
WMarker1, WMarker2, WMarker3	Markers of the WBC histogram.
RBC HISTO	Contains the results of the RBC measurement, 256 x 1 bytes.
RBC SCALE	It shows the volume at the 256th column of the RBC histogram.
RMarker1	Marker of the RBC histogram.
PLT HISTO	Contains the results of the PLT measurement, 256 x 1 bytes.
PLT SCALE	It shows the volume at the 256th column of the PLT histogram.
PMarker1, PMarker2	Marker of the PLT histogram.

* research use only parameters – available in global mode

The last OBX lines are the histograms, scales and markers of the observation. The histogram contains 256 x 1 byte values. The scale parameter shows the corresponding volume of the 256th column. The scale of the X-axis (volume of the cells) can be calculated by dividing the scale parameter (i.e. WBC/PLT/RBC SCALE) by 256. The marker's value specifies the index of the histogram column (not directly the volume in 'femtoliter'). The related Observation Identifiers can be found in the sample message.

The histogram data is encoded in Base64.

Histogram

Each character in the data sequence represents a byte for a hexadecimal number.

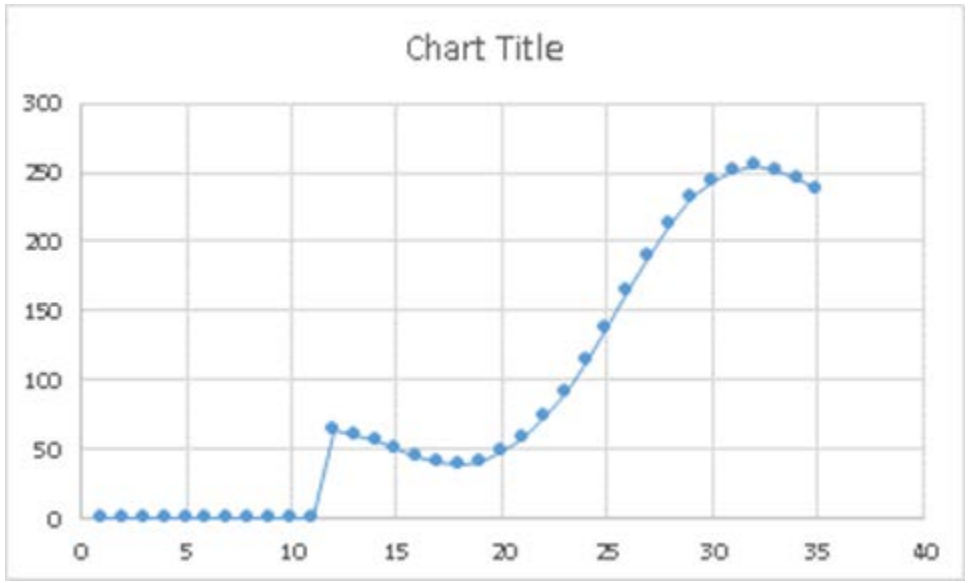
Two hexadecimal bytes represent one point on the histogram:

0	0	0	0	0	0	0	0	0	0	0	40	3D	38	33	2D	29	28	2A	30	3A	49	5B	72	8A	A4	BE	D4	E7	F4	FC	FF	FC	F6	ED

Converted to decimal:

0	0	0	0	0	0	0	0	0	0	0	64	61	56	51	45	41	40	42	48	58	73	91	114	138	164	190	212	231	244	252	255	252	246	237

The encoded data produces the histogram numerical representation:

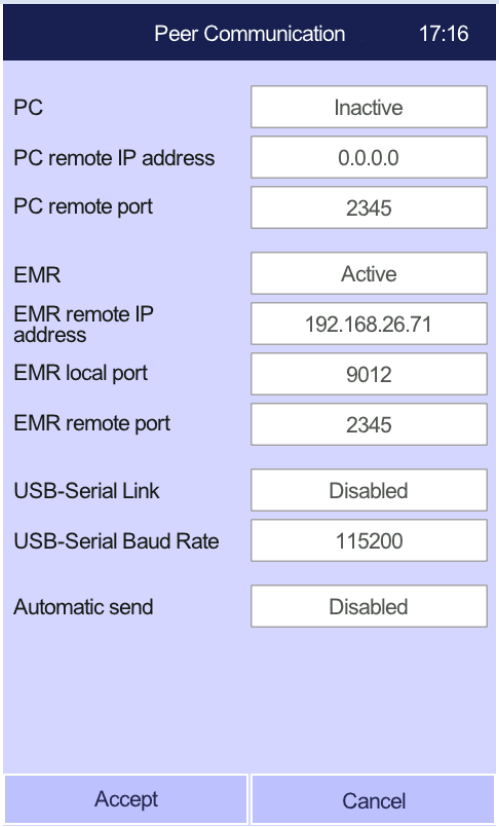


There are 256 channels in the histogram. If the full histogram is encoded, 256 numerical results will be displayed in the graph (0 to 255).

The maximum peak of the histogram is the hexadecimal number FF (decimal 255).

ADVIA 360 RECEIVING WORK LIST FROM THE SERVER

Setup



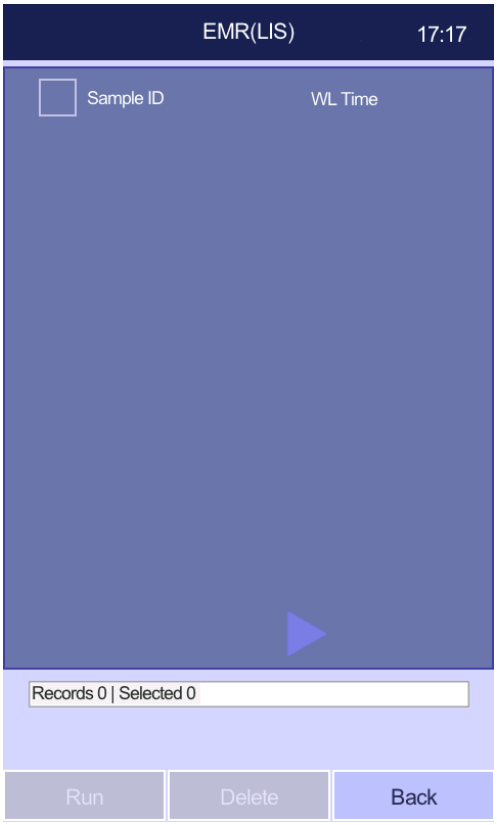
Go to Settings / Communication/ Peer Communication

The following data have to be provided for the EMR server:

- EMR enabled
- EMR remote IP address of the HL7 server
- EMR remote port of the HL7 server

Usage

Work list information can be viewed in Measure / New Sample / EMR(LIS) screen. The screen is displayed with sample information received from the network. A work list measurement can be started by pressing the Run button.



BIDIRECTIONAL EXAMPLE OF HL7 MESSAGES

Send worklist item to ADVIA360

Figure 1 shows an example of a HL7 message v. 2.5 to be sent to ADVIA360 as a LIS Item.

MSH|$~\&|PC_001||||20130816154927||ORM^O01|12345|P|2.5.1||||||UNICODE UTF-8|||

PID||||| Thomas^A.||19621119000000|F||||||||||PATIENT_ID001

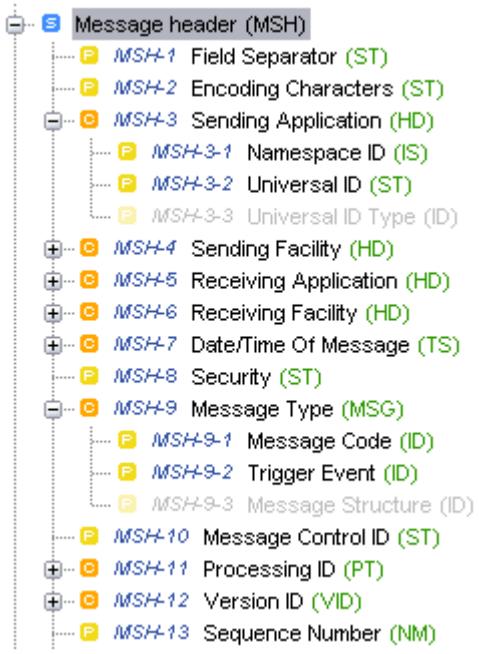
NTE|1||Dr. Smith

NTE|2||32

ORC|NW

OBR||AWOS_ID001||SAMPLE001||20130527164606

The descriptions of the Message Header (MSH), the Patient ID (PID), the Common Order (ORC) and the Order Observation Request (OBR) can be seen on the following images:



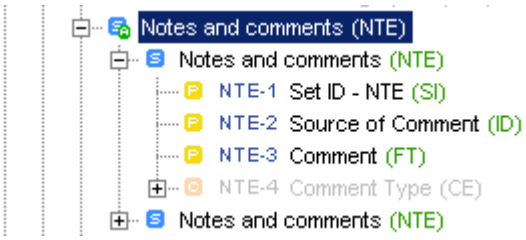
i.e.: MSH|^~\&|PC_001||||20130816154927||ORM^O01|12345|P|2.5.1||||||UNICODE UTF-8|||

1. ’|’ is the Field Separator
2. ’ ^~\&’ is the Encoding Characters
3. ’ PC_001’ is the Sending Application.

4. ‘20130816154927’ is the Date/Time Of Message
5. ‘ORM^O01’ is the Message Type
6. ‘12345’ is the Message Control ID
7. ‘P‘ means preliminary which is the Processing ID
8. ‘2.5.1’ is the Version ID
9. ‘UNICODE UTF-8’ is the Character Set

i.e.: PID|||||Thomas^A.||19621119000000|F||||||||||PATIENT_ID001

1. ‘Thomas A.’ is the Patient Name
2. ‘19621119000000’ is the Date/Time of birth
3. ‘F’ is the Administrative Sex
4. ‘PATIENT_ID001’ is the SSN number of the Patient. (or Patient ID)



i.e.:
NTE|1||Dr. Smith

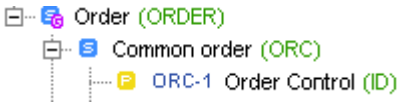
NTE|2||32

1. Set ID. – This field determines the type of the NTE

ID of the NTE	Type of NTE
1	Doctor Name
2	Type of sample

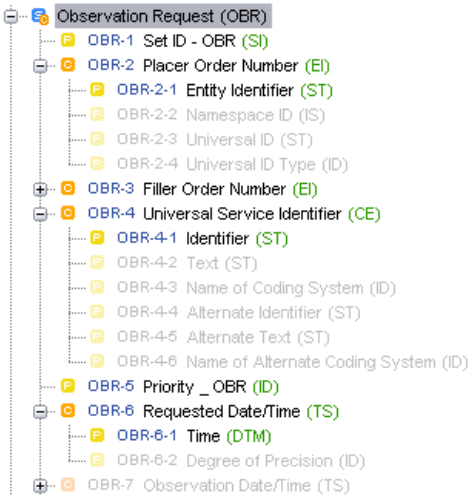
2. The Comment field describes the Value of the ID. In case of Type of sample, the following table contains the valid values.

ID	Value
32	HUMAN
33	MALE
34	FEMALE
35	BABY
36	TODDLER
37	CHILD



i.e.: ORC|NW

1. The Order Control segment can be 'NW' for new order, and 'CA' for cancel order request.



i.e.: OBR||AWOS_ID001|| SAMPLE001||20100527164606

1. ’ AWOS_ID001’ is the Place Order Number. It is the unique identifier of the measurement.
2. ‘SAMPLE001’ is the Identifier of Universal Service Identifier. It must be used for Sample ID.
3. ‘20100527164606’ is the Requested Date/Time for the EMR entry.

After Analyzer processed the request a general acknowledge is sent back, which can be seen on Figure 2.

```
MSH|^~\&|ADVIA360||PC||20130816154513||ACK|12345|P|2.5.1|||||WINDOWS-1250|||
MSA|AA|12345
```

Figure 2

Figure 2 is a requested and acknowledged Work List Item. The whole list is built up on the Analyzer by receiving the sequence of the Work List Items.

The analyzer will refuse the request (and will an AR (Application Reject) message), if the number of samples in the Work List exceeds 255.

The first field of MSA segment in the acknowledged message is used to define whether Analyzer accepted the Work List Item or not.

’AA’ – Application Acknowledgment,

’AR’ – Application Reject

Delete worklist item from ADVIA360

Figure 3 shows an example of a HL7 message v. 2.5 to be sent to ADVIA360 as an order to delete a Work List Item.

```
MSH|$~\&|PC_001||||20130816154927||ORM^O01|12345|P|2.5.1|||||UNICODE UTF-8|||
PID|||||Thomas^A.||19621119000000|F||||||||||PATIENT_ID001
NTE|1||Dr. Smith
NTE|2||32
ORC|CA
OBR||AWOS_ID001||SAMPLE001||20130527164606
```

The value of the Common Order segment’s Order Control entity must be set to ‘CA’ to delete a Work List Item. The ADVIA360 software will delete the Work List Item based on the Observation Request segment’s Placer Order Number (AWOS_ID001). The Placer Order Number is a unique identifier so this message will delete only one item from the List. After Analyzer processed the request a general acknowledge is sent back, which can be seen on Figure 2.