KARL STORZ AIDA® V1.5
HL7 Interface Description

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1 Introduction

1.1 Purpose of the Document

This document gives a short description of the HL7 Interface of KARL STORZ AIDA® V1.5. The intended audiences are interested customers and IT departments.

1.2 Abbreviations

General Abbreviations

AIDA	Advanced Image and Data Acquisition / Archiving System = KARL STORZ AIDA® (KST applications for endoscopic image and video acquisition with various functional options)
DICOM	Digital Imaging and Communication in Medicine
DS	Digital Services
HIS	Hospital Information System
HL7	Health Level Seven - Communication Standard in Medicine
KST	KARL STORZ SE & Co. KG
OR1	Operating Room all in One = KARL STORZ OR1® (KST solution for operating room integration of OR table, equipment, light and documentation)

Network specific Abbreviations

IP	Internet Protocol
LLP	Lower Layer Transport Protocol
TCP	Transmission Control Protocol
TCP/IP	Transmission Control Protocol / Internet Protocol

HL7 specific Abbreviations

Messages

ACK	Acknowledgement
MDM	Medical Document Management
ORU	Unsolicited Transmission of Observation (Result)
QRY	Query
QRY-DEM	Demographic Query (patient is identified by Patient ID)
QRY-APA	Account Number Query (patient is identified by Visit ID / Case ID)

Message Segments

MSH	Message Header Segment
ORC	Common Order Segment
OBR	Observation Request Segment
EVN	Event Type Segment
OBX	Observation/Results Segment
PID	Patient Identification Segment
PV1	Patient Visit Segment
QRD	Query Definition Segment (original style)
TXA	Transcription Document Header Segment

Optionality column

R	Required
RE	Required but may be empty
O	Optional
C	Conditional
CE	Conditional but it may be empty
X	Not supported
B	Backward Compatibility
W	Withdrawn

1.3 Definitions

HL7	Health Level 7 is a set of standards developed by the Health Level Seven organization for the management, exchange and integration of electronic healthcare information.
HL7 Server	A HIS application capable of sending and receiving HL7 messages.

Modality	Refers in medical imaging to an equipment used to acquire images of the body, such as radiography, ultrasound, magnetic resonance imaging or endoscopy.
Procedure	A medical procedure is a course of action intended to achieve a result in the care of a patient, normally a diagnosis or a therapy. Procedures are often complex and include a number of different steps over an extended time period.

1.4 References

/REF_001/	HL7 Standard Version 2.1, 2.2, 2.3, 2.3.1, 2.4, 2.5, 2.5.1, 2.6, 2.7, 2.7.1, 2.8, 2.8.1, 2.8.2
http://hl7.org/	HL7

2 HL7 Interface of KARL STORZ AIDA® V1.5

2.1 Introduction

KARL STORZ AIDA® V1.5 is intended to capture image data (images, videos and audio clips) in the operating room. It can communicate through Ethernet with a HL7 or DICOM based HIS.

Through its HL7 interface, KARL STORZ AIDA® V1.5 can query for patient data when a new procedure is started and send result messages when a procedure is finished. These functions can be activated separately, but require purchase of the corresponding license option.

KARL STORZ AIDA® V1.5 is compatible with HL7 versions 2.1 to 2.8.2 (/REF_001/). The HL7 communication uses LLP protocol via TCP/IP. The HL7 messages are framed by Hex 0B (start of message), Hex 1C 0D (end of message) and Hex 0D (end of line / segment terminator). UTF-8 is used as a standard character encoding for sending and receiving of HL7 messages.

Please note that this HL7 interface description is a subset of HL7 specification and contains only sections and fields that are mapped in KARL STORZ AIDA® V1.5.

2.2 General

2.2.1 Message Header

The HL7 MSH (Message Header) segment is present in every HL7 message type.

MSH Segment in all messages				HL7 Version Opt.	KARL STORZ AIDA® V1.5
Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
1	Field Separator	1		R	Constant value | [1])
2	Encoding Characters	1		R	Constant value ^~\& [1])
3	Sending Application	1		O	Modality-Name
5	Receiving Application	1		O	HIS-Name
7	Date/Time of Message	1		O	Current datetime
9	Message Type	1	Message type	R	One of: QRY – See 2.3 ORU – See 2.5.1 MDM – See 2.5.2
		2	Trigger event	O	A19 for QRY R01 for ORU T01 for MDM
10	Message Control ID	1		R	Current datetime stamp down to seconds followed by 4 digit rolling number (reset after rolls over or restart of AIDA)
11	Processing ID	1		R	Constant value P [1])
12	Version ID	1		R	Version
15	Accept Acknowledgement Type	1		O	Constant value AL [1,2])
16	Application Acknowledgement Type	1		O	Constant value NE [1,2])

[1]) Value sent as entered, no re-formatting.
[2]) Only for ORU/MDM message types.

2.3 Query Messages

KARL STORZ AIDA® V1.5 can query for patient data any time during a procedure. It is recommended to do this when a new procedure is started. This requires that there is an HL7 server present which responds to the query. To get a meaningful query, the user must first enter or read-in the Patient ID or Visit ID.

2.3.1 Patient Query

The HL7 Interface of KARL STORZ AIDA® V1.5 sends the following patient query:
- Query message type =   QRY^A19
- What Subject Filter =   DEM

In the query responses selected fields from the PID and PV1 segments are evaluated.

Example of sent demographic query

```
MSH|^~\&|AIDA||DEMOKIS||201702201531||QRY^A19|201702201531560243|P|2.5.1
QRD|201702201531|R|I|1702200064|||1^RD|P00001|DEM
```

Example of processed response

```
MSH|^~\&|DEMOKIS||AIDA||20170220153157||ADR^A19|201702201531560243A|P|2.5.1|
MSA|AA|201702201531560243|||||||
QRD|20170220153157|R|I|1702200064|||1^RD|P00001|DEM||
PID||P00001|P00001||Doe^John^^^^^||19450828|M|
PV1||I|||||^^^^^^||||||||||||V00001|||||||||||||||||
```

2.3.2 Account Query

The HL7 Interface of KARL STORZ AIDA® V1.5 sends the following account query:
- Query message type =   QRY^A19
- What Subject Filter =   APA

Example of sent account number query

```
MSH|^~\&|AIDA||DEMOKIS||201702201552||QRY^A19|201702201552490245|P|2.5.1
QRD|201702201552|R|I|1702200066|||1^RD|V00001|APA
```

Example of processed response

```
MSH|^~\&|DEMOKIS||AIDA||20170220155249||ADR^A19|201702201552490245A|P|2.5.1|
MSA|AA|201702201552490245|||||||
QRD|20170220155249|R|I|1702200066|||1^RD|V00001|APA||
PID||P00001|P00001||Doe^John^^^^^||19450828|M|
PV1||I|||||^^^^^^||||||||||||V00001|||||||||||||||||
```

2.4 Evaluated Message Segments

2.4.1 QRD Segment

QRD Segment in QRY Message					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
QRD	1	Query Date/Time	1		R	Current date time [1]
QRD	2	Query Format Code	1		R	Constant value R [2,3]
QRD	3	Query Priority	1		R	Constant value I [2,4]
QRD	4	Query ID	1		R	Date stamp followed by 4 digit rolling number (reset after rolls over or restart of AIDA)
QRD	7	Quantity Limited Request	1	Quantity	R	Constant value 1 [2]
			2	Units	R	Constant value RD [5]
QRD	8	Who Subject Filter	1		R	Depend on QRD-9 value [6]
QRD	9	What Subject Filter	1		R	Value QRD-9 [7]
QRD	10	What Department Data Code	1		R	Not set yet

[1] Same value as in the field Date/Time of Message of MSH segment
[2] Value sent as entered, no re-formatting.
[3] R="Response is in record-oriented format"
[4] I="Immediate"
[5] RD="Records"
[6] "Patient ID": QRD-9 = "DEM", "Admission ID / Case ID": QRD = "APA"
[7] Only APA="Account number query, return matching visit" and DEM="Demographics" values available.

2.4.2 PID Segment

PID Segment in QRY Message					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
PID	2	Patient ID [1]	1		B	
PID	3	Patient Identifier List [1]	1		R	Patient ID [2]
PID	4	Alternate Patient ID	1		B	
PID	5	Patient Name	1	Family Name	R	Patient's Last name
			2	Given Name	O	Patient's First name
			3	Second and Further Given Names or Initials Thereof [3]	O	Patient's Middle name
			4	Suffix (e.g., JR or III)		Patient's Suffix
			5	Prefix (e.g., DR)	O	Patient's Prefix
PID	7	Date/Time of Birth	1		O	Patient's Birth Date
PID	8	Sex [4]	1		O	Patient's Gender [5]

[1] In HL7 V2.3, PID-2 is called "Patient ID (external ID)" and PID-3 "Patient ID (internal ID)".
[2] The HL7 field used is configurable in the PID-Field configuration.
[3] In HL7 V2.3 PID-5 component 3 is called "middle initial or name"
[4] Defined values until HL7 version 2.3.1: F = Female, M = Male, O = Other, U=Unknown.
  Additional values beginning from HL7 version 2.4: A = Ambiguous, N = Not applicable
[5] Mapping HL7 -> AIDA: F -> Female, M -> Male, O -> Other, U, A, N -> Unknown (not selected)
  Mapping AIDA -> HL7: Female -> F, Male -> M, Other -> O, Undefined -> U

2.4.3 PV1 Segment

PV1 Segment in QRY Message					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
PV1	2	Patient Class	1		R	Constant value U [1]
PV1	8	Referring Doctor	1	ID Number	O	Referring Physician's ID not set
			2	Family Name	O	RP's Last name
			3	Given Name	O	RP's First name
			4	Second and Further Given Names or Initials Thereof [3]	O	RP's Middle name
			5	Suffix (e.g., JR or III)	O	RP's Suffix
			6	Prefix (e.g., DR)	O	RP's Prefix
PV1	19	Visit Number	1		O	Admission ID / Case ID

[1] U=Unknown

2.5 Outgoing Messages

KARL STORZ AIDA® V1.5 can send result messages. This requires that there is an HL7 server present which receives these messages.

2.5.1 ORU Messages

The HL7 Interface of KARL STORZ AIDA® V1.5 creates the following ORU (one message for all exported files) messages:

- ORU message type = R01
- ORU message structure =
  - MSH   Message Header segment
  - PID   Patient Identification segment (reuse the segment from the QRY message)
  - PV1   Patient Visit segment (reuse the segment from the QRY message)
  - ORC   Common Order segment
  - OBR   Observation Request segment
  - {OBX}   Observation Results segment (one OBX segment per image or video).

Example of created ORU message

```
MSH|^~\&|AIDA||DEMOKIS||201702201602||ORU^R01|201702201602580248|P|2.5.1|||AL|NE
PID||P00001|P00001||Doe^John^^^^^||19450828|M|
PV1||I|||||^^^^^^||||||||||||V00001||||||||||||||||||
ORC|RE||||CM
OBR|1|||AIDA^OP^L|||201702201602|||||||||||||||||||||F
OBX|1|RP|AIDA ER^Endoscopic Result^L||
    \E\\E\server_host\E\tmp\E\Doe_John_P00001_20170220_160228\E\IMG001.BMP
||||||F|||201702201602
OBX|2|RP|AIDA ER^Endoscopic Result^L||
    \E\\E\server_host\E\tmp\E\Doe_John_P00001_20170220_160228\E\IMG002.BMP
||||||F|||201702201602
```

2.5.2 MDM Messages

The HL7 Interface of KARL STORZ AIDA® V1.5 creates the following MDM (one message for each exported file) messages:

- MDM message type = T01
- MDM message structure =
  - MSH   Message Header segment
  - EVN   Event Type segment
  - PID   Patient Identification segment (reuse the segment from the QRY message)
  - PV1   Patient Visit segment (reuse the segment from the QRY message)
  - ORC   Common Order segment

OBR	Observation Request segment
TXA	Transcription Document Header Segment

Example of created MDM message

```
MSH|^~\&|AIDA||DEMOKIS||201702201623||MDM^T01|201702201623080251|P|2.5.1|||AL|NE
EVN|T01|201702201623||O
PID||P00001|P00001||Doe^John^^^^^||19450828|M|
PV1||I|||||^^^^^^||||||||||||V00001||||||||||||||||
ORC|RE||||CM
OBR|1|||AIDA^OP^L|||201702201612|||||||||||||||||||||F
TXA|1|OP|IM|201702201623||201702201623|||||^^1.2.276.0.67.5.2200303521616.20170
220162303592.138^L|||||\E\\E\server_host\E\tmp\E\Doe_John_P00001_20170220_161212\
E\IMG004.BMP|DO||AV
```

2.6 Created Message Segments

2.6.1 PID + PV1 Segments

See above.

2.6.2 ORC Segment

ORC Segment in ORU and MDM Messages				HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
ORC	1	Order Control	1		R	Constant value RE [1]
ORC	2	Placer Order Number	1		C	Accession Number
ORC	5	Order Status	1		O	Constant value CM [2]

[1] Meaning of used value RE = observation results included (HL7 table 0119)
[2] Meaning of used value CM = order is completed (HL7 table 0038)

2.6.3 OBR Segment

OBR Segment in ORU and MDM Messages					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
OBR	1	Set ID – OBR	1		O	Constant value 1 [1]
OBR	2	Placer Order Number	1		C	Accession Number
OBR	4	Universal Service ID	1	Identifier	R	Constant value AIDA [1]
			2	Text	R	Procedure name or constant value OP if procedure not exists.
			3	Coding System	R	Constant value L [1, 2]
OBR	7	Obs. Date/Time	1		C	Treatment Date
OBR	25	Result Status	1		C	Constant Value F [1, 3]
OBR	32	Principal Result Interpreter	1.1	ID Number	O	Performing Physician's ID not set
			1.2	Family Name	O	PP's Last name
			1.3	Given Name	O	PP's First name
			1.4	Second and Further Given Names or Initials Thereof [3]	O	PP's Middle name
			1.5	Suffix (e.g., JR or III)	O	PP's Suffix
			1.6	Prefix (e.g., DR)	O	PP's Prefix

[1] Value sent as entered, no re-formatting.
[2] L = Local general code (HL7 table 0396)
[3] F = Final results (HL7 table 0123)

2.6.4 OBX Segment

OBX Segment in ORU and MDM Messages					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
OBX	1	Set ID - OBX	1		O	1 base Counter
OBX	2	Value Type	1		C	Constant value RP and TX for the last segment [1, 2]
OBX	3	Observation Identifier	1	Identifier	R	Constant value AIDA ER
			2	Text	R	Constant value Endoscopic Result
			3	Name of Coding System	R	Constant value L [1]
OBX	4	Obs. Sub ID	1		C	Not set
OBX	5	Observation Value	1		C	Reference pointer [3] or Procedure comment in AIDA [2]
OBX	11	Obs. Result Status	1		R	Constant value F [1]
OBX	14	Obs. Date/Time	1		O	File creation timestamp of a media file and timestamp of the treatment for the last segment. [2]

[1] Meaning of used RP = Reference Pointer, TX = Text content, F = Final result, L = Local code.
[2] In case if Procedure comment exists in AIDA, the last additional OBX segment will contain TX as Value Type and the Obs Date/Time will be a timestamp of the treatment.
[3] The observation value is a reference to an image or video file on a file server.

2.6.5 EVN Segment

EVN Segment in MDM Message					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
EVN	1	Event Type Code	1		B	Constant value T01
EVN	2	Recorded Date/Time	1		R	File creation timestamp of a media file
EVN	4	Event Reason Code	1		O	Constant value O [1]

[1] O = Other

2.6.6 TXA Segment

TXA Segment in MDM Message					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
TXA	1	Set ID - TXA	1		R	Constant value 1
TXA	2	Document Type	1		R	Constant value OP [1]
TXA	3	Doc. Content Pres.	1		C	Constant value IM [2]
TXA	6	Orig. Date/Time	1		O	File creation timestamp of a media file
TXA	9	Orig. Code/Name	1	ID Number	O	Performing Physician's ID not set
			2	Family Name	O	PP's Last name
			3	First Name	O	PP's First name
			4	Middle Name	O	PP's Middle name
			5	Suffix	O	PP's Suffix
			6	Prefix	O	PP's Prefix
TXA	12	Unique Doc. No.	1	Entity Identifier	O	Empty
			2	Namespace ID	O	Empty

TXA Segment in MDM Message					HL7 Version Opt.	KARL STORZ AIDA® V1.5
Seg.	Field	Element Name	Subs.	Component Name		Rel. AIDA Attribute
			3	Universal ID	R	Instance UID
			4	Universal ID Type	O	Constant value L [3]
TXA	14	Placer Order Number	1		O	Accession number
TXA	16	Doc. File Name	1		O	File Name [4]
TXA	17	Doc. Compl. Status	1		R	Constant value DO [5]
TXA	19	Doc. Availability	1		O	Constant value AV [6]

[1] Meaning of used value OP = operative report
[2] Meaning of available values IM = image data
[3] Meaning of used value L = Local general code (other values in the coding system table 0396)
[4] KARL STORZ AIDA® V1.5 provides the path and file name on the file server.
[5] Meaning of used value DO = documented
[6] Meaning of used value AV = available for patient care.