CARL ZEISS MEDITEC

DICOM Conformance Statement

IOLMaster® 500

Version 7.1

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1 Conformance Statement Overview

The IOLMaster 500 application is dedicated to lowhassle biometry and high-confidence IOL selection. Designed for robustness, reliability and exceptional system integrity, the IOLMaster 500 offers a wide range of built-in IOL power calculation options, including the latest Haigis and Holladay 2 formulas.
The IOLMaster 500 application allows to:

- Query for modality worklist
- Export evidence reports

The IOLMaster 500 AE supports several DICOM Services as Service Class User such as Verification, Encapsulated PDF Storage, Multi-frame True Color Secondary Capture Image Storage.

This document is structured as suggested in the DICOM Standard (PS 3.2, Conformance).

Table 1-1 Network Services Supported

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
Encapsulated PDF Storage	Yes	No
Multi-frame True Color Secondary Capture Image Storage	Yes	No
Workflow Management		
Modality Worklist Information Model - FIND	Yes	No

The IOLMaster does not support Media Interchange.

2 Table Of Contents

3 Introduction

3.1 Revision History

Document Version	Author	Date	NB Version	Comment
1.0	Patrick A. Nast	20.01.2010	1.3.6	
1.1	Patrick A. Nast	10.01.2011	1.3.6	
1.2	x1caf	16.12.2013	1.3.6	Added attribute name to data dictionary in chapter 8.2 Added information on Private Modules in chapter 8.1

3.2 Audience

This document is intended for hospital staff, health system integrators, software designers or implementers. The reader should have a basic understanding of DICOM.

3.3 Remarks

If another device matches this conformance statement based on the comparison with its own conformance statement, there is a chance, but no guarantee, that they interoperate. DICOM only deals with communication; it does not specify what is needed for certain applications to run on a device.

3.4 Definitions, Terms and Abbreviations

Table 3-1 Abbreviations

Abbreviation	Definition
AE	Application Entity
AET	Application Entity Title
DICOM	Digital Imaging and Communications in Medicine
ILE	Implicit Little Endian
IOD	Information Object Definition
JPG-1	JPEG Coding Process 1; JPEG Baseline; ISO 10918-1
MWL	Modality Work List
NB	Network Broker
RLE	Run Length Encoding
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair, pair of user and provider.
TCP/IP	Transmission Control Protocol / Internet Protocol
UID	Unique Identifier
VL	Visible Light

3.5 References

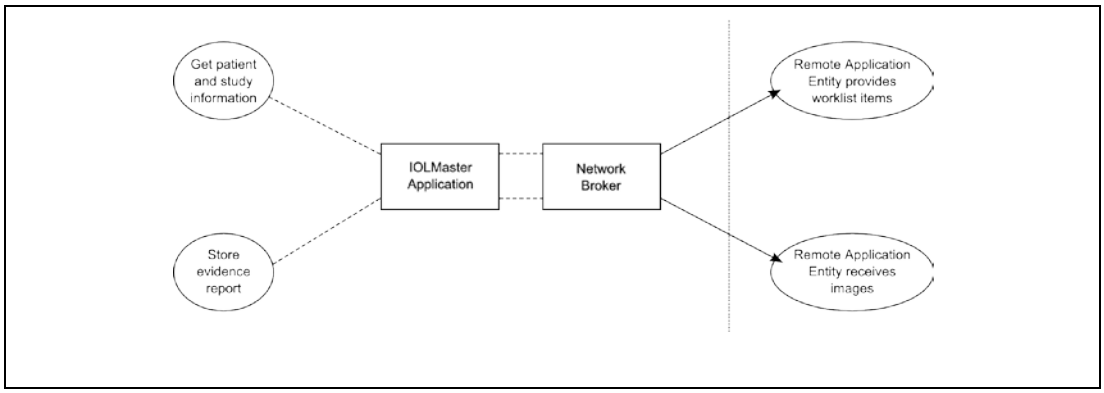
NEMA PS3 / ISO 12052, Digital Imaging and Communications in Medicine (DICOM) Standard, National Electrical Manufacturers Association, Rosslyn, VA, USA (available free at http://medical.nema.org/)

Integrating the Healthcare Enterprise (IHE) EYECARE Technical Framework, rev 3.7, 2010 (available free at http://www.ihe.net/Technical_Framework/index.cfm

4
Networking

4.1 Implementation Model

4.1.1 Application Data Flow



The IOLMaster Software works together with the Network Broker. Both software applications are hosted on same machine. Thus even the User Interface of the Network Broker can be used by an operator which works with the IOLMaster Application.

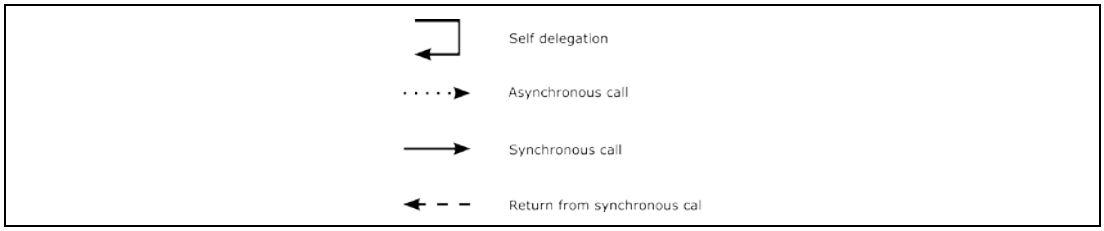
4.1.2 Functional Definition Of AEs

4.1.2.1 Functional Definition Of Network Broker

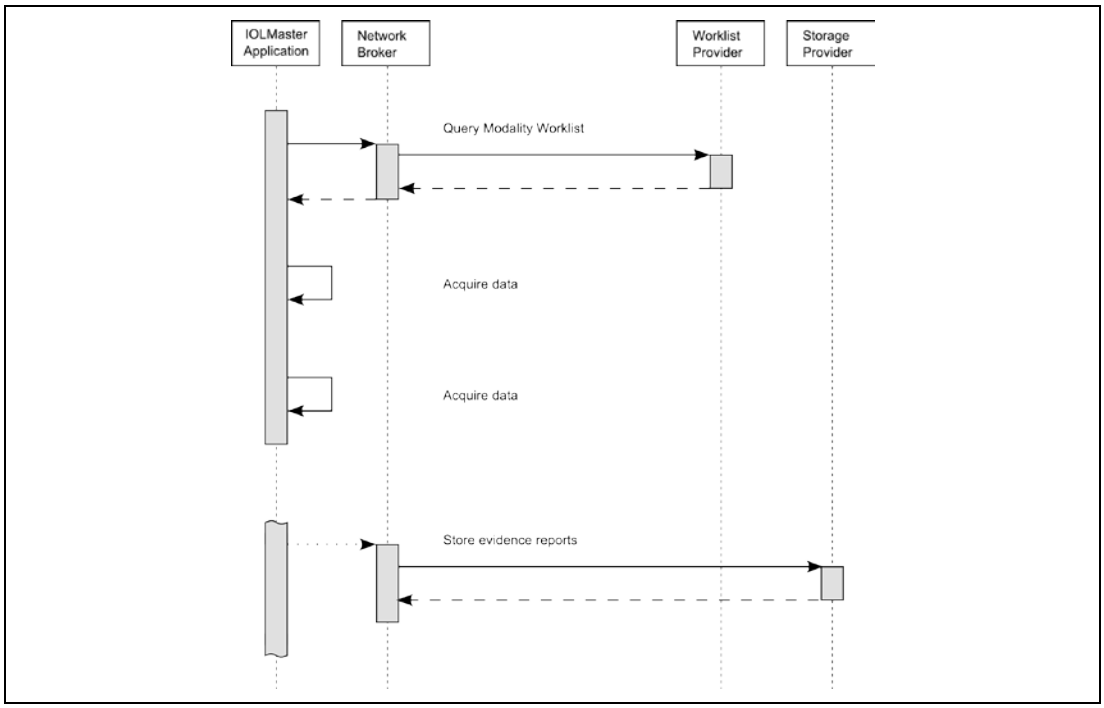
The IOLMaster Application allows to perform an examination of the eye of a patient, i.e. acquiring data.

4.1.3 Sequencing of Real-World Activities

To realize the real world activities, the different entities work together. The sequence diagrams shall depict the intended workflow.



The diagrams uses slightly modified UML symbols. The asynchronous call is not depicted as suggested in UML. Some objects do have more than one dashed line. It symbolizes more than one thread.



All activities are initiated by an operator.

Query Modality Worklist

When the patient arrives at the IOLMaster, then the operator queries the work list. He types in search criterias and gets matches back. Those matches are listed in a table, so the operator can select the correct entry. According to the transferred data IOLMaster creates an entry in the local database (Patient, Study, Visit for the current day). Procedure Step related information is kept temporary in the IOLMaster application.
The operator can now select the patient for data acquisition.

Acquire data

The operator acquires data from patients eye.

Store evidence reports

The operator can trigger this activity by a selection of a menu entry.

4.2 AE Specifications

4.2.1 Network Broker Application Entity Specification

4.2.1.1 SOP Classes

Table 4-1 SOP Classes for IOLMaster AE

SOP Class Name	SOP Class UID	SCU	SCP
Verification	1.2.840.10008.1.1	Yes	No
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31	Yes	No
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Yes	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	Yes	No

4.2.1.2 Associations Policies

4.2.1.2.1 General

DICOM standard Application Context Name is DICOM 3.0.

Table 4-2 DICOM Application Context

Application Context Name	1.2.840.10008.3.1.1.1

4.2.1.2.2 Number of Associations

The number of simultaneous associations results in two since the activities “Query Modality Worklist” and “Store Images” can run in parallel.

Table 4-3 Number of associations

Maximum number of simultaneous associations	2

4.2.1.2.3 Asynchronous Nature

Network Broker does not support asynchronous communication (multiple outstanding transactions over a single Association).

4.2.1.2.4 Implementation Identifying Information

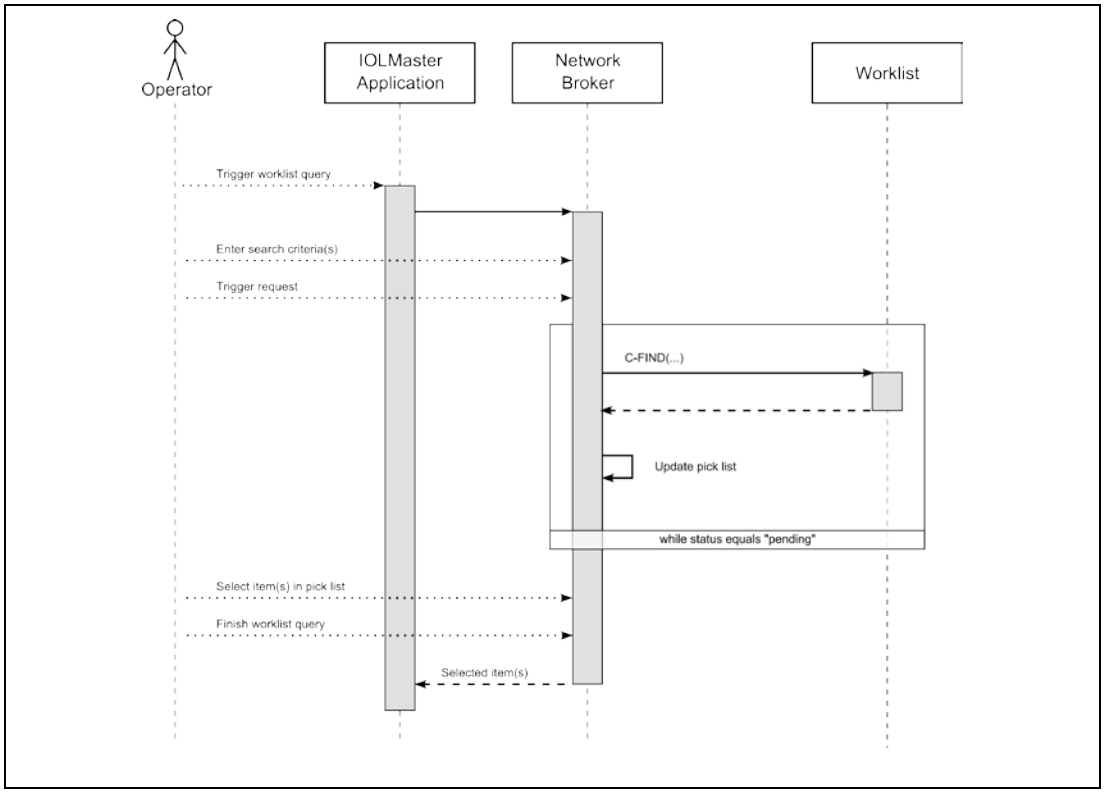
Table 4-4 DICOM Implementation class and version

Implementation Class UID	**1.2.276.0.75.2.5.10**
Implementation Version Name	**1.3.6.0648**

4.2.1.3 Association Initiation Policy

4.2.1.3.1 Activity – Query Modality Worklist

4.2.1.3.1.1 Description and Sequencing of Activities



The activity “Query Modality Worklist” can be triggered at any time during the session by operator. It is meaningful to perform the query when the patient comes to the modality, then the work list contains latest information.
After activating the worklist query, the operator can fill in search criteria in the shown dialog. For instance, incomplete patient information can be used. The operator triggers the search when he or her filled in search criteria. The Network Broker sends a DICOM request, containing the search criteria. Network Broker waits for the response from the partner Application Entity. After receiving the response, Network Broker updates the pick list with the information which is included in the response. The pick list instantly shows the received information. The Network Broker will wait for additional responses as long as the Worklist Provider sends “pending” as status and the number of already received responses does not overstep 50.
After receiving all responses, the operator can select up to a certain number of items to create a new visit for. The number of selectable items can be configured. The operator finally finishes the worklist query by confirming the selection.

The IOLMaster Application takes over the selected items. It prepares data according to the selected items. For patients who relate to existing data sets of the local database, the IOLMaster Application asks the operator to update or to keep the information. For patients who do not relate to existing data sets, the IOLMaster Application creates new data sets. The IOLMaster Application handles data on Study level adequately. Data on Procedure level and Patient – Study level are kept in database. After that, the operator can start examination and to acquire data for those Studies.

4.2.1.3.1.2 Proposed Presentation Contexts

Table 4-5 Presentation Context proposed by IOLMaster AE

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Modality Worklist Information Model – FIND	1.2.840.10008.5.1.4.31	ILE	1.2.840.10008.1.2	SCU	No

4.2.1.3.1.3 SOP Specific Conformance for Modality Worklist SOP Class

Table 4-6 Modality Worklist C-FIND Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Matching is complete	0000	The Network Broker finishes receiving worklist items. The user can select items in pick list.
Pending	Matches are continuing	FF00, FF01	Network Broker puts received worklist item into the pick list. If the number of received items oversteps 50 then the SCU sends an ABORT to the SCP and the operator gets a request to specify query keys more accurate.
*	*	Any other status code	The status label of the dialog shows an error message.

Table 4-7 Attributes involved in Modality Worklist C-FIND request and response

Tags	Tag Name	Query key, editable by operator	Imported in App from MWL	Displayed in App	Editable	Exported in ImageIOD
Patient						
(0008,1120)	Referenced Patient Sequence		Y[1]			
(0010,0010)	Patients Name	Y	Y	Y		Y
(0010,0020)	Patient ID	Y	Y	Y		Y
(0010,0021)	Issuer Of Patient ID		Y			Y
(0010,0030)	Patients Birth Date		Y	Y		Y
(0010,0032)	Patients Birth Time					
(0010,0040)	Patients Sex		Y	Y		Y
(0010,1000)	Other Patient IDs		Y			Y
(0010,1001)	Other Patient Names					
(0010,2000)	Medical Alerts		Y			
(0010,2110)	Contrast Allergies		Y			
(0010,2160)	Ethnic Group		Y			
(0010,21C0)	Pregnancy Status		Y			
(0010,4000)	Patient Comments		Y	Y	Y	Y
(0038,0050)	Special Needs		Y			
(0038,0500)	Patient State		Y			
Study						
(0008,0050)	Accession Number	Y	Y	Y		Y
(0008,0090)	Referring Physicians Name		Y			Y
(0020,000D)	Study Instance UID		Y			Y
(0032,1032)	Requesting Physician		Y			
(0032,4000)	Study Comments					
Requested Procedure						
(0008,1110)	Referenced Study Sequence		Y[1]			Y
(0032,1060)	Requested Procedure Description		Y			

[1] Imports first item in sequence only

(0032,1064)	Requested Procedure Code Sequence		Y			
(0040,1001)	Requested Procedure ID	Y	Y	Y		Y
Scheduled Procedure Step (SPS)						
(0040,0100)	Scheduled Procedure Step Sequence					
>(0008,0060)	Modality	Y	Y			
>(0040,0001)	Scheduled Station Application Entity Title	Y	Y			
>(0040,0002)	Scheduled Procedure Step Start Date	Y	Y			
>(0040,0003)	Scheduled Procedure Step Start Time		Y			
>(0040,0006)	Scheduled Performing Physicians Name		Y			
>(0040,0007)	Scheduled Procedure Step Description		Y			
>(0040,0008)	Scheduled Protocol Code Sequence		Y			
>(0040,0009)	Scheduled Procedure Step ID		Y			
(0040,2016)	Placer Order Number Imaging Service Request		Y			

The operator can fill in search criterions as query keys. Network Broker offers two input masks for it. Following tags are editable as search criteria in input mask "Patient Based Query".

Table 4-8 Modality Worklist query key details – Patient Based Query

Tag	Description
(0010,0010)	Patients Name
(0010,0020)	Patient ID
(0008,0050)	Accession Number
(0040,1001)	Requested Procedure ID

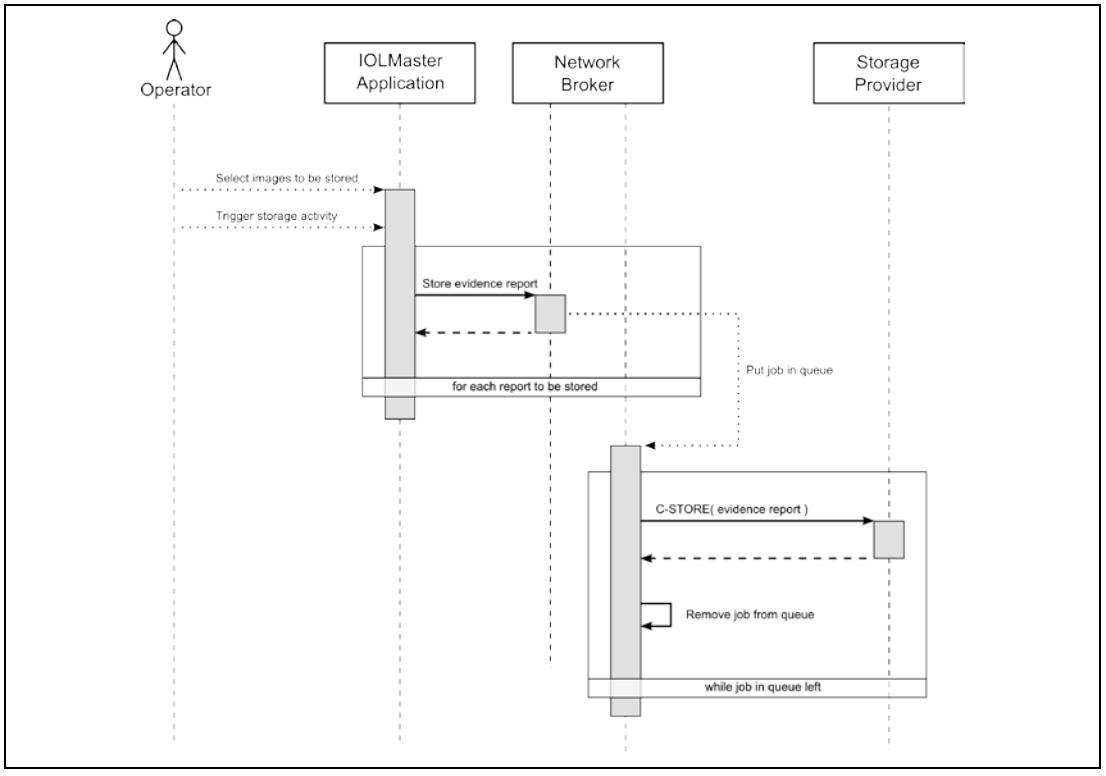
Following tags are editable as search criteria in input mask "Broad Query".

Table 4-9 Modality Worklist query key details – Broad Query

Tag	Description
(0040,0100)	Scheduled Procedure Step Sequence
>(0040,0002)	Scheduled Procedure Step Start Date
>(0008,0060)	Modality
>(0040,0001)	Scheduled Station AE Title

4.2.1.3.2 Activity – Store evidence reports

4.2.1.3.2.1 Description and Sequencing of Activities



After finishing the examination, the whole Study can be submitted. The operator can initiate sending evidence reports at any time to storage entities.
The IOLMaster Application passes data to the Network Broker. The Network Broker creates immediately DICOM objects and puts a send-job for that DICOM object in a queue. The transmission of the DICOM objects is processed in the background (that means it is performed while operator can continue work with IOLMaster Application). The storage progress is reflected in a dialog. The operator can even control the storage progress. It's up to the operator if the storage progress dialog is visible or not.
The storage progress is reflected in a dialog. The operator can even control the storage progress. It's up to the operator if the storage progress dialog is visible or not.

4.2.1.3.2.2 Proposed Presentation Contexts

Table 4-10 Proposed Presentation Contexts by the IOLMaster AE

Abstract Syntax		Transfer Syntax		Role	Ext. Neg.
Name	UID	Name List	UID List		
Multi-frame True Color SC Image Storage	1.2.840.10008.5.1.4.1.1.7.4	ILE	1.2.840.10008.1.2	SCU	No
		JPG-1	1.2.840.10008.1.2.4.50	SCU	No
		RLE	1.2.840.10008.1.2.5	SCU	No
Encapsulated PDF Storage	1.2.840.10008.5.1.4.1.1.104.1	ILE	1.2.840.10008.1.2	SCU	No

4.2.1.3.2.3 SOP Specific Conformance for Image Storage SOP Class

Table 4-11 Storage C-STORE Response Status Handling Behavior

Service Status	Further Meaning	Error Code	Behavior
Success	Success	0000	The belonging job gets a success state and will be removed from list.
*	*	Any other status code	The job gets an error state.

4.2.1.4 Association Acceptance Policy

The Network Broker does not accept Associations.

4.3 Network Interfaces

4.3.1 Physical Network Interface

The physical network interface is not visible for the applications. The application uses the communication stack as offered by the Operating System.

4.3.2 Additional Protocols

No additional protocols are supported.

4.4 Configuration

4.4.1 AE Title / Presentation Address Mapping

The mapping from AE Title to TCP/IP addresses and ports is configurable and set at the time of installation by Installation Personnel.

4.4.1.1 Local AE Titles

The IP is not configurable by the Network Broker Configuration Tool. The IP is administrated by the Operating System. The calling AET is configurable. The calling AET is the AET of the Network Broker.

4.4.1.2 Remote AE Titles

The mapping of external AE Titles to TCP/IP addresses and ports is configurable. The Network Broker allows to set up one AE as Modality Worklist Provider and one AE as Storage Provider. For both AEs, the host or IP, the Port and the Application Entity Title must be known.

4.4.2 Parameters

4.4.2.1 General Parameters

4.4.2.2 Modality Worklist SCU Parameters

The association initiation timeout is configurable. Default is 10 seconds.
Additionally, for this service file-based parameters are available. The file-based parameter describes a template for DICOM objects which is used to perform the request. Whenever the operator performs a request, the Network Broker loads the template file and creates a DICOM object of it. Then the application fills in values which was typed in by the operator in the current active input mask. A dedicated file contains template information for the Modality Worklist Query. By default, the file looks like this:

```
#Specific Character Set
(0008,0005)

#Scheduled Procedure Step Sequence
#(0040,0100)
Scheduled Station AE Title
(0040,0100)[0]>(0040,0001)
#Scheduled Step Start Date
(0040,0100)[0]>(0040,0002)
#Scheduled Step Start Time
(0040,0100)[0]>(0040,0003)
#Modality
(0040,0100)[0]>(0008,0060)
#Scheduled Performing Physicians Name
(0040,0100)[0]>(0040,0006)
#Scheduled Procedure Step Description
(0040,0100)[0]>(0040,0007)
#Scheduled Station Name
(0040,0100)[0]>(0040,0010)
#Scheduled Procedure Step Location
(0040,0100)[0]>(0040,0011)

#Scheduled Action Item Code Sequence
#(0040,0100)>(0040,0008)
#Code Value (Sequence)
(0040,0100)[0]>(0040,0008)[0]>(0008,0100)
#Coding Scheme Version
(0040,0100)[0]>(0040,0008)[0]>(0008,0103)
#Coding Scheme Designator
(0040,0100)[0]>(0040,0008)[0]>(0008,0102)
#Coding Meaning
(0040,0100)[0]>(0040,0008)[0]>(0008,0104)

#Pre-Medication
(0040,0100)[0]>(0040,0012)
#Scheduled Procedure Step ID
(0040,0100)[0]>(0040,0009)
#Requested Contrast Agent
(0040,0100)[0]>(0032,1070)
#Requested Procedure Step Status
(0040,0100)[0]>(0040,0020)

#Requested Procedure ID
(0040,1001)
#Requested Procedure Description
(0032,1060)

#Requested Procedure Code Sequence
#(0032,1064)
#Code Value
(0032,1064)[0]>(0008,0100)
#Coding Scheme Designator
(0032,1064)[0]>(0008,0102)
#Coding Scheme Version
(0032,1064)[0]>(0008,0103)
#Code Meaning
(0032,1064)[0]>(0008,0104)

#Study Instance UID
(0020,000D)
#Study Comments
(0032,4000)
```

```
#Referenced Study Sequence
#(0008,1110)
#Referenced SOP Class UID
(0008,1110)[0]>(0008,1150)
#Referenced SOP Instance UID
(0008,1110)[0]>(0008,1155)

#Requested Procedure Priority
(0040,1003)
#Patient Transport Arragnements
(0040,1004)
#Accession Number
(0008,0050)
#Requesting Physician
(0032,1032)
#Referring Physician's Name
(0008,0090)
#Placer Order Number / Imaging Service Request
(0040,2016)
#Admission ID
(0038,0010)
#Current Patient Location
(0038,0300)

#Referenced Patient Sequence
#(0008,1120)
#Referenced SOP Class UID
(0008,1120)[0]>(0008,1150)
#Referenced SOP Instance UID
(0008,1120)[0]>(0008,1155)

#Patient's Name
(0010,0010)
#Patient ID
(0010,0020)
#Issuer of Patient ID
(0010,0021)
#Other Patient IDs
(0010,1000)
#Other Patient Names
(0010,1001)
#Patients Birth Date
(0010,0030)
#Patients Birth Time
(0010,0032)
#Patient's Sex
(0010,0040)
#Patients's Weight
(0010,1030)
#Confidentiality constraint on patient data
(0040,3001)
#Patient State
(0038,0500)
#Ethnic Group
(0010,2160)
#Patient Comments
(0010,4000)
#Pregnancy Status
(0010,21C0)
#Medical Alerts
(0010,2000)
#Contrast Allergies
(0010,2110)
#Special Needs
(0038,0050
```

4.4.2.3 Storage SCU Parameters

The association initiation timeout is configurable. Default is 10 seconds.
It is possible to activate RLE image compression.

For IOLMaster the selectable compressions for the IODs are:

- Multi-frame True Color Secondary Capture
  - No Compression

    - RLE Compression
- Encapsulated PDF
    - No selection possible

5 Media Interchange

Media Interchange is not scope of this document since Media Interchange is not supported via Network Broker.

6 Support Of Character Sets

In addition to the default character repertoire, the Defined Terms for Specific Character Set in the table are supported.

Table 6-1 Supported Character Set

Character Set Description	Defined Term
Latin alphabet No. 1	ISO_IR 100

7 Security

The DICOM capabilities of the IOLMaster Application do not support any specific security measures.
It is assumed that IOLMaster Application is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to IOLMaster Application.
- Firewall or router protections to ensure that IOLMaster Application only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as a Virtual Private Network (VPN))

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.

8 Annexes

8.1 IOD Contents

8.1.1 Created SOP Instance(s)

The rows of not supported modules or tags are grey.

Abbreviations used for presence of values	
VNAP	Value Not Always Present (attribute sent zero length if no value is present) – Applicable for Type 2, 2C.
ANAP	Attribute is not always present – Applicable for Type 3
ALWAYS	Attribute is always present with a value – Applicable for Type 1
EMPTY	Attribute is sent without a value – Applicable for Type 2

Abbreviations used for sources of data	
USER	Attribute value source is from user input
AUTO	Attribute value is generated automatically
MWL, MPPS, etc.	Attribute value is the same as the value received using a DICOM service such as Modality Worklist, Modality Performed Procedure Step, etc.
CONFIG	Attribute value source is a configurable parameter

8.1.1.1 Encapsulated PDF Information Object Definition

Table 8-1 Encapsulated PDF IOD Modules

A.45.1 Encapsulated PDF Information Object Definition			
IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
Study	General Study	C.7.2.1	M
Series	Encapsulated Document Series	C.24.1	M
Equipment	General Equipment	C.7.5.1	M
	SC Equipment	C.8.6.1	M
Encapsulated Document	Encapsulated Document	C.24.2	M
	SOP Common	C.12.1	M
Image	CZM IOL Measured Values		Presence of Module: ALWAYS
	CZM IOL Formula		Presence of Module: ALWAYS
	CZM IOL Multi Formula		Presence of Module: ALWAYS
	CZM IOL Haigis-L		Presence of Module: ALWAYS
	CZM IOL_phake IOL		Presence of Module: ALWAYS
	CZM IOL Lens Database		Presence of Module: ALWAYS

Table 8-2 Encapsulated PDF IOD - Module "Patient"

Tag	VR	Name	Value	Presence of Value	Source
(0010,0010)	PN	Patient's Name	Patient's full name.	VNAP	MWL, USER
(0010,0020)	LO	Patient ID	Primary hospital identification number or code for the patient.	VNAP	MWL, USER
(0010,0021)	LO	Issuer of Patient ID	Identifier of the Assigning Authority that issued the Patient ID.	VNAP	MWL
(0010,0030)	DA	Patient's Birth Date	Birth date of the patient.	VNAP	MWL, USER

(0010,0040)	CS	Patient's Sex	Sex of the named patient. Enumerated Values: M = male F = female O = other	VNAP	MWL
(0010,1000)	LO	Other Patient IDs	Other identification numbers or codes used to identify the patient.	VNAP	MWL
(0010,4000)	LT	Patient Comments	User-defined additional information about the patient.	VNAP	MWL, USER

Table 8-3 Encapsulated PDF IOD – Module "General Study"

Tag	VR	Name	Value	Presence of Value	Source
(0008,0020)	DA	Study Date	Date the Study started.	VNAP	MWL, AUTO
(0008,0030)	TM	Study Time	Time the Study started.	VNAP	MWL, AUTO
(0008,0050)	SH	Accession Number	A RIS generated number that identifies the order for the Study.	VNAP	MWL
(0008,0090)	PN	Referring Physician's Name	Name of the patient's referring physician	VNAP	MWL
(0008,1110)	SQ	Referenced Study Sequence	A sequence that provides reference to a Study SOP Class/Instance pair. The sequence may have zero or more Items.	VNAP	MWL
>(0008,1150)	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Required if Referenced Study Sequence (0008,1110) is sent.	VNAP	MWL
>(0008,1155)	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Required if Referenced Study Sequence (0008,1110) is sent.	VNAP	MWL
(0020,000D)	UI	Study Instance UID	Unique identifier for the Study. In the unscheduled case IOLMaster 500 uses a constant prefix of "1.2.276.0.75.2.1.10.0.1." followed by a date/time stamp and machine specific identifier. In the scheduled case the value is copied from the Modality Worklist.	ALWAYS	AUTO, MWL
(0020,0010)	SH	Study ID	User or equipment generated Study identifier.	VNAP	AUTO, MWL

Table 8-4 Encapsulated PDF IOD – Module "Encapsulated Document Series"

Tag	VR	Name	Value	Presence of Value	Source
(0008,0060)	CS	Modality	"OT"	ALWAYS	AUTO
(0020,000E)	UI	Series Instance UID	Unique identifier of the Series. IOLMaster 500 uses a constant prefix of "1.2.276.0.75.2.1.10.0.2." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
(0020,0011)	IS	Series Number	A number that identifies the	VNAP	AUTO

			Series.		
(0040,0244)	DA	Performed Procedure Step Start Date	Date on which the Performed Procedure Step started.	EMPTY	
(0040,0245)	TM	Performed Procedure Step Start Time	Time on which the Performed Procedure Step started.	EMPTY	
(0040,0253)	SH	Performed Procedure Step ID	User or equipment generated identifier of that part of a Procedure that has been carried out within this step.	VNAP	MWL
(0040,0254)	LO	Performed Procedure Step Description	Institution-generated description or classification of the Procedure Step that was performed.	VNAP	
(0040,0275)	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items.	VNAP	
>(0040,1001)	SH	Requested Procedure ID	Identifier that identifies the Requested Procedure in the Imaging Service Request. Required if Sequence Item is present.	VNAP	MWL

Table 8-5 Encapsulated PDF IOD – Module "Equipment"

Tag	VR	Name	Value	Presence of Value	Source
(0008,0070)	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances. Always "Carl Zeiss Meditec".	ALWAYS	AUTO
(0008,0080)	LO	Institution Name	Institution where the equipment that produced the composite instances is located.	VNAP	CONFIG
(0008,0081)	ST	Institution Address	Mailing address of the institution where the equipment that produced the composite instances is located.	VNAP	CONFIG
(0008,1010)	SH	Station Name	User defined name identifying the machine that produced the composite instances.	ALWAYS	AUTO
(0008,1040)	LO	Institutional Department Name	Department in the institution where the equipment that produced the composite instances is located.	VNAP	CONFIG
(0008,1090)	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances. Always "IOLMaster 500".	ALWAYS	AUTO
(0018,1000)	LO	Device Serial Number	Manufacturer's serial number of the equipment that produced the composite instances. Note: This identifier corresponds to the device that actually created the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate.	ALWAYS	AUTO

(0018,1020)	LO	Software Versions	Manufacturer's designation of software version of the equipment that produced the composite instances. Always “7.1.2.0042”.	ALWAYS	AUTO

Table 8-6 Encapsulated PDF IOD – Module “SC Equipment”

Tag	VR	Name	Value	Presence of Value	Source
(0008,0064)	CS	Conversion Type	“SYN” - Synthetic Image	ALWAYS	AUTO

Table 8-7 Encapsulated PDF IOD – Module “Encapsulated Document”

Tag	VR	Name	Value	Presence of Value	Source
(0008,0023)	DA	Content Date	The date the document content creation was started.	ALWAYS	AUTO
(0008,002A)	DT	Acquisition Datetime	The date and time that the original generation of the data in the document started.	ALWAYS	AUTO
(0008,0033)	TM	Content Time	The time the document content creation was started.	ALWAYS	AUTO
(0020,0013)	IS	Instance Number	A number that identifies this SOP Instance. The value shall be unique within a series.	ALWAYS	AUTO
(0028,0301)	CS	Burned In Annotation	“NO”	ALWAYS	AUTO
(0040,A043)	SQ	Concept Name Code Sequence	Has never an item.	EMPTY	AUTO
(0042,0010)	ST	Document Title	The value of the "Title" entry in the "Document Information Directory" as encoded in the PDF data.	VNAP	AUTO
(0042,0011)	OB	Encapsulated Document	Encapsulated Document stream, containing a document encoded according to the MIME Type.	ALWAYS	AUTO
(0042,0012)	LO	MIME Type of Encapsulated Document	“application/pdf”	ALWAYS	AUTO

Table 8-8 Encapsulated PDF IOD – Module “SOP Common”

Tag	VR	Name	Value	Presence of Value	Source
(0008,0005)	CS	Specific Character Set	ISO_IR 100 Character Set that expands or replaces the Basic Graphic Set.	ALWAYS	AUTO
(0008,0016)	UI	SOP Class UID	Uniquely identifies the SOP Class. Always “1.2.840.10008.5.1.4.1.1.104.1”	ALWAYS	AUTO
(0008,0018)	UI	SOP Instance UID	Uniquely identifies the SOP Instance. See C.12.1.1.1 for further explanation. See also PS 3.4. IOLMaster 500 uses a constant prefix of “1.2.276.0.75.2.1.10.0.3.” followed by a date/time stamp	ALWAYS	AUTO

			and a machine specific identifier.		

Table 8-9 Encapsulated PDF IOD – Module “IOL Measured Values”

Tag	VR	Name	Value	Presence of Value	Source	Tag
(771B,xx30)	3	SQ	axial_length_values_sequence	Sequence of axial length values measured for one eye, may contain one ore two items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx31)	3	SQ	axial_length_values_triple_sequence	Sequence of single axial length measurements, may contain up to 20 items	ALWAYS	AUTO
>>(771B,xx0B)	3	FD	al	Axial length optical (single measurement) [mm]	ALWAYS	AUTO
>>(771B,xx0C)	3	FD	snr	Signal to noise ratio (single measurement)	ALWAYS	AUTO
>>(771B,xx0D)	3	FD	index_tag	Index of single measurement	ALWAYS	AUTO
>(771B,xx43)	3	FD	mean_value_al	Axial length optical (composite value) [mm]	ALWAYS	AUTO
>(771B,xx44)	3	FD	mean_value_snr	Signal to noise ratio (composite value)	ALWAYS	AUTO
(771B,xx32)	3	SQ	keratometer_values_sequence	Sequence of keratometry values measured for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx33)	3	SQ	keratometer_values_ntupel_sequence	Sequence of single keratometry measurements, may contain up to 3 items	ALWAYS	AUTO
>>(771B,xx0F)	3	FD	r1	Corneal radius of curvature of flat meridian [mm]	ALWAYS	AUTO
>>(771B,xx11)	3	FD	d1	Corneal refractive power of flat meridian [dpt]	ALWAYS	AUTO
>>(771B,xx13)	3	FD	a1	Axis of flat meridian [°]	ALWAYS	AUTO
>>(771B,xx10)	3	FD	r2	Corneal radius of curvature of steep meridian [mm]	ALWAYS	AUTO
>>(771B,xx12)	3	FD	d2	Corneal refractive power of steep meridian [dpt]	ALWAYS	AUTO
>>(771B,xx14)	3	FD	a2	Axis of steep meridian [°]	ALWAYS	AUTO
>>(771B,xx15)	3	FD	zyl	Difference between steep and flat keratometric power [dpt]	ALWAYS	AUTO
>(771B,xx16)	3	FD	refractive_index	Refractive index corneal power is based on	ALWAYS	AUTO
>(771B,xx17)	3	FD	quali_tag	Standard deviation in series of measurements	ALWAYS	AUTO
>(771B,xx49)	3	FD	mean_value_r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>(771B,xx4A)	3	FD	mean_value_d1	Mean value of power in flat meridian [dpt]	ALWAYS	AUTO
>(771B,xx4B)	3	FD	mean_value_a1	Mean value of axis of flat meridian [°]	ALWAYS	AUTO
>(771B,xx4C)	3	FD	mean_value_r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>(771B,xx4D)	3	FD	mean_value_d2	Mean value of power in steep meridian [dpt]	ALWAYS	AUTO
>(771B,xx4E)	3	FD	mean_value_a2	Mean value of axis of steep meridian [°]	ALWAYS	AUTO
>(771B,xx4F)	3	FD	mean_value_zyl	Mean value of difference between steep and flat keratometric power [dpt]	ALWAYS	AUTO
(771B,xx34)	3	SQ	chamber_depth_values_sequence	Sequence of anterior chamber depth values measured for one eye, may	ALWAYS	AUTO

				contain 1 or 2 items		
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx18)	3	FD	num1	Measurement 1 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx19)	3	FD	num2	Measurement 2 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx1A)	3	FD	num3	Measurement 3 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx1B)	3	FD	num4	Measurement 4 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx1C)	3	FD	num5	Measurement 5 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx0E)	3	FD	mean_value	Mean value of anterior chamber depth [mm]	ALWAYS	AUTO
(771B,xx35)	3	SQ	white_to_white_sequence	Sequence of white-to-white values measured for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx3B)	3	SQ	white_to_white_values_sequence	Sequence of single white-to-white measurements, may contain up to 3 items	ALWAYS	AUTO
>>(771B,xx1D)	3	FD	wzw	White-to-white diameter [mm]	ALWAYS	AUTO
>>(771B,xx1E)	3	FD	fpx	Horizontal white-to-white offset to visual axis (x-coordinate) [mm]	ALWAYS	AUTO
>>(771B,xx1F)	3	FD	fpy	Vertical white-to-white offset to visual axis (y-coordinate) [mm]	ALWAYS	AUTO
>>(771B,xx50)	3	FD	pup	Pupil diameter [mm]	ALWAYS	AUTO
>>(771B,xx51)	3	FD	pup_fpx	Horizontal pupil offset to visual axis (x-coordinate) [mm]	ALWAYS	AUTO
>>(771B,xx52)	3	FD	pup_fpy	Vertical pupil offset to visual axis (y-coordinate) [mm]	ALWAYS	AUTO

Table 8-10 Encapsulated PDF IOD – Module "IOL Formula"

Tag	Type	VR	Name	Description	PoV	Source
>(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
>(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
>(771B,xx01)	3	SQ	formula_sequence	Sequence of standard formula IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>>(771B,xx02)	3	SQ	formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO
>>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO

>>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>>(771B,xx25)	3	IS	status	Numerical value of eye status. Defined values: 0 = phakic eye, 1 = aphakic eye, 2 = silicone filled eye, 3 = pseudophakic silicone, 6 = pseudophakic memory, 7 = pseudophakic PMMA, 8 = pseudophakic acryl, 9 = silicone filled eye (aphakic), 10 = silicone filled eye (pseudophakic), 11 = phakic IOL PMMA (0,2mm), 12 = primary piggy-back silicone (SLM 2), 13 = primary piggy-back hydrophobic acrylate	ALWAYS	AUTO
>>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>>(771B,xx03)	3	SQ	common_formula_lenses_sequence	Sequence of standard formula calculation results for 4 different IOL types with a sequence of 7 calculations each, may contain up to 4 items	ALWAYS	AUTO
>>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>>(771B,xx05)	3	SQ	pair_sequence	Sequence of IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO

Table 8-11 Encapsulated PDF IOD – Module "IOL Multi Formula"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
(771B,xx0A)	3	LO	lens	Name of lens	ALWAYS	AUTO
(771B,xx01)	3	SQ	formula_sequence	Sequence of multi formula IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx02)	3	SQ	formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO
>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO

>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>(771B,xx25)	3	IS	status	Numerical value of eye status (see table)	ALWAYS	AUTO
>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>(771B,xx03)	3	SQ	common_formula_lenses_sequence	Sequence of multi formula calculation results (up to 4 formulas) for one IOL type with a sequence of 7 calculations each, may contain up to 4 items	ALWAYS	AUTO
>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>(771B,xx05)	3	SQ	pair_sequence	Sequence IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO
(771B,xx07)	3	FD	constant	IOL-Konstanten	ALWAYS	AUTO

Table 8-12 Encapsulated PDF IOD – Module "IOL Haigis-L"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx37)	3	SQ	module_haigis-l_sequence	Sequence of Haigis-L formula IOL calculations for 4 different IOL types with a sequence of 7 calculations each, may contain only one item	ALWAYS	AUTO
>(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
>(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
>(771B,xx01)	3	SQ	formula_sequence	Sequence of Haigis-L formula IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>>(771B,xx02)	3	SQ	formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO

>>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>>(771B,xx25)	3	IS	status	Numerical value of eye status (see table)	ALWAYS	AUTO
>>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>>(771B,xx03)	3	SQ	common_formula_lenses_sequence	Sequence of Haigis-L formula calculation results for 4 different IOL types with a sequence of 7 calculations each	ALWAYS	AUTO
>>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>>(771B,xx05)	3	SQ	pair_sequence	Sequence IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO
>(771B,xx2D)	3	LO	warning_notice	Warning notice	ALWAYS	AUTO

Table 8-13 Encapsulated PDF IOD – Module "IOL phake IOL"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
(771B,xx38)	3	SQ	phake_iol_formula_sequence	Sequence of phakic IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx3A)	3	SQ	phake_iol_formula_ntupe	Container of measurement values	ALWAYS	AUTO

			l_sequence	used for calculation		
>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>(771B,xx25)	3	IS	status	Numerical value of eye status (see table)	ALWAYS	AUTO
>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>>(771B,xx2F)	3	FD	vertex	Vertex distance [mm]	ALWAYS	AUTO
>(771B,xx2E)	3	IS	surgical_eye	Marker for eye undergoing surgery	ALWAYS	AUTO
>(771B,xx39)	3	SQ	phake_iol_lenses_sequence	Sequence of Phakic IOL formula calculation results for 4 different IOL types with a sequence of 7 calculations each	ALWAYS	AUTO
>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>(771B,xx05)	3	SQ	pair_sequence	Sequence IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO

Table 8-14 Encapsulated PDF IOD – Module "IOL Lens Database"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx53)	3	SQ	lens_database_sequence	Sequence of lens constant definitions, may contain 1 or more items	ALWAYS	AUTO
>(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO

>(771B,xx54)	3	SQ	lens_sequence	Sequence of surgeon specific lens constant definitions, may contain 1 or more items	ALWAYS	AUTO
>>(771B,xx06)	3	LO	name	Name of lens	ALWAYS	AUTO
>>(771B,xx59)	3	FD	lens_steps	Lens steps	ALWAYS	AUTO
>>(771B,xx55)	3	SQ	lens_constant_formula_sequence	Sequence of lens specific constants, may contain 1 or more items	ALWAYS	AUTO
>>>(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
>>>(771B,xx56)	3	SQ	lens_constant_sequence	Sequence of formula specific constants, may contain 1 or more items	ALWAYS	AUTO
>>>>(771B,xx57)	3	LO	lens_constant_name	Lens constant name	ALWAYS	AUTO
>>>>(771B,xx58)	3	FD	lens_constant_value	Lens constant value	ALWAYS	AUTO

8.1.1.2 Multi-frame True Color SC Image Information Object Definition

Table 8-15 Multi-Frame True Color SC Image IOD Modules

A.8.5 Multi-frame True Color SC Image Information Object Definition			
IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
Study	General Study	C.7.2.1	M
Series	General Series	C.7.3.1	M
Equipment	General Equipment	C.7.5.1	U
	SC Equipment	C.8.6.1	M
Image	General Image	C.7.6.1	M
	Image Pixel	C.7.6.3	M
	Multi-frame	C.7.6.6	M
	SC Image	C.8.6.2	U
	SC Multi-frame Image	C.8.6.3	M
	SC Multi-frame Vector	C.8.6.4	C - Required if Number of Frames is greater than 1
	SOP Common	C.12.1	M
	CZM IOL Measured Values		Presence of Module: ALWAYS
	CZM IOL Formula		Presence of Module: ALWAYS
	CZM IOL Multi Formula		Presence of Module: ALWAYS
	CZM IOL Haigis-L		Presence of Module: ALWAYS
	CZM IOL_phake IOL		Presence of Module: ALWAYS
	CZM IOL Lens Database		Presence of Module: ALWAYS

Table 8-16 Multi-frame True Color SC Image – Module "Patient"

Tag	VR	Name	Value	Presence of Value	Source
(0010,0010)	PN	Patient's Name	Patient's full name.	VNAP	MWL, USER
(0010,0020)	LO	Patient ID	Primary hospital identification number or code for the patient.	VNAP	MWL, USER
(0010,0021)	LO	Issuer of Patient ID	Identifier of the Assigning Authority that issued the Patient ID.	VNAP	MWL
(0010,0030)	DA	Patient's Birth Date	Birth date of the patient.	VNAP	MWL, USER
(0010,0040)	CS	Patient's Sex	Sex of the named patient.	VNAP	MWL

			Enumerated Values: M = male F = female O = other		
(0010,1000)	LO	Other Patient IDs	Other identification numbers or codes used to identify the patient.	VNAP	MWL
(0010,4000)	LT	Patient Comments	User-defined additional information about the patient.	VNAP	MWL, USER

Table 8-17 Multi-frame True Color SC Image – Module "General Study"

Tag	VR	Name	Value	Presence of Value	Source
(0008,0020)	DA	Study Date	Date the Study started.	VNAP	MWL, AUTO
(0008,0030)	TM	Study Time	Time the Study started.	VNAP	MWL, AUTO
(0008,0050)	SH	Accession Number	A RIS generated number that identifies the order for the Study.	VNAP	MWL
(0008,0090)	PN	Referring Physician's Name	Name of the patient's referring physician	VNAP	MWL
(0008,1110)	SQ	Referenced Study Sequence	A sequence that provides reference to a Study SOP Class/Instance pair. The sequence may have zero or more Items.	VNAP	MWL
>(0008,1150)	UI	Referenced SOP Class UID	Uniquely identifies the referenced SOP Class. Required if Referenced Study Sequence (0008,1110) is sent.	VNAP	MWL
>(0008,1155)	UI	Referenced SOP Instance UID	Uniquely identifies the referenced SOP Instance. Required if Referenced Study Sequence (0008,1110) is sent.	VNAP	MWL
(0020,000D)	UI	Study Instance UID	Unique identifier for the Study. In the unscheduled case IOLMaster 500 uses a constant prefix of "1.2.276.0.75.2.1.10.0.1." followed by a date/time stamp and machine specific identifier. In the scheduled case the value is copied from the Modality Worklist.	ALWAYS	AUTO, MWL
(0020,0010)	SH	Study ID	User or equipment generated Study identifier.	VNAP	AUTO, MWL

Table 8-18 Multi-frame True Color SC Image – Module "General Series"

Tag	VR	Name	Value	Presence of Value	Source
(0008,0021)	DA	Series Date	Date the Series started.	ALWAYS	AUTO
(0008,0031)	TM	Series Time	Time the Series started.	ALWAYS	AUTO
(0008,1070)	PN	Operators' Name	Name(s) of the operator(s) supporting the Series.	ALWAYS	CONFIG
(0018,0015)	CS	Body Part Examined	"HEAD" *Text description of the part of*	ALWAYS	AUTO

			the body examined. Defined Terms: SKULL, CSPINE, TSPINE, LSPINE, SSPINE, COCCYX, CHEST, CLAVICLE, BREAST, ABDOMEN, PELVIS, HIP, SHOULDER, ELBOW, KNEE, ANKLE, HAND, FOOT, EXTREMITY, HEAD, HEART, NECK, LEG, ARM, JAW Note: Some IODs support the Anatomic Region Sequence (0008,2218), which can provide a more comprehensive mechanism for specifying the body part being examined.		
(0020,000E)	UI	Series Instance UID	Unique identifier of the Series. IOLMaster 500 uses a constant prefix of "1.2.276.0.75.2.1.10.0.2." followed by a date/time stamp and machine specific identifier.	ALWAYS	AUTO
(0020,0011)	IS	Series Number	A number that identifies this Series.	VNAP	AUTO
(0020,0060)	CS	Laterality	Laterality of (paired) body part examined. Required if the body part examined is a paired structure and Image Laterality (0020,0062) or Frame Laterality (0020,9072) are not sent. Enumerated Values: R = right L = left Note: Some IODs support Image Laterality (0020,0062) at the Image level or Frame Laterality(0020,9072) at the Frame level in the Frame Anatomy functional group macro, which can provide a more comprehensive mechanism for specifying the laterality of the body part(s) being examined.	ALWAYS	AUTO
(0040,0244)	DA	Performed Procedure Step Start Date	Date on which the Performed Procedure Step started.	EMPTY	
(0040,0245)	TM	Performed Procedure Step Start Time	Time on which the Performed Procedure Step started.	EMPTY	
(0040,0253)	SH	Performed Procedure Step ID	User or equipment generated identifier of that part of a Procedure that has been carried out within this step.	VNAP	MWL
(0040,0254)	LO	Performed Procedure Step Description	Institution-generated description or classification of the Procedure Step that was performed.	VNAP	
(0040,0275)	SQ	Request Attributes Sequence	Sequence that contains attributes from the Imaging Service Request. The sequence may have one or more Items. Included macro 'Request Attributes Macro', context 'No Baseline Context IDs defined'	VNAP	
>(0040,0009)	SH	Scheduled Procedure Step ID	Identifier that identifies the Scheduled Procedure Step.	VNAP	MWL

>(0040,1001)	SH	Requested Procedure ID	Identifier that identifies the Requested Procedure in the Imaging Service Request.	VNAP	MWL

Table 8-19 Multi-frame True Color SC Image – Module “General Equipment”

Tag	VR	Name	Value	Presence of Value	Source
(0008,0070)	LO	Manufacturer	Manufacturer of the equipment that produced the composite instances.	ALWAYS	AUTO
(0008,0080)	LO	Institution Name	Institution where the equipment that produced the composite instances is located.	VNAP	CONFIG
(0008,0081)	ST	Institution Address	Mailing address of the institution where the equipment that produced the composite instances is located.	VNAP	CONFIG
(0008,1010)	SH	Station Name	User defined name identifying the machine that produced the composite instances.	ALWAYS	AUTO
(0008,1040)	LO	Institutional Department Name	Department in the institution where the equipment that produced the composite instances is located.	VNAP	CONFIG
(0008,1090)	LO	Manufacturer's Model Name	Manufacturer's model name of the equipment that produced the composite instances. Always “IOLMaster 500”.	ALWAYS	AUTO
(0018,1000)	LO	Device Serial Number	Manufacturer's serial number of the equipment that produced the composite instances. Note: This identifier corresponds to the device that actually created the images, such as a CR plate reader or a CT console, and may not be sufficient to identify all of the equipment in the imaging chain, such as the generator or gantry or plate.	ALWAYS	AUTO
(0018,1020)	LO	Software Versions	Manufacturer's designation of software version of the equipment that produced the composite instances. Always “7.1.2.0042”.	ALWAYS	AUTO

Table 8-20 Multi-frame True Color SC Image – Module “SC Equipment”

Tag	VR	Name	Value	Presence of Value	Source
(0008,0060)	CS	Modality	“OT” – IOLMaster	ALWAYS	AUTO
(0008,0064)	CS	Conversion Type	“SYN” - Synthetic Image	ALWAYS	AUTO

Table 8-21 Multi-frame True Color SC Image – Module “Image”

Tag	VR	Name	Value	Presence of Value	Source
(0008,0008)	CS	Image Type	2 Items: 1. “DERIVED" 2. “PRIMARY”	ALWAYS	AUTO

(0008,0022)	DA	Acquisition Date	The date the acquisition of data that resulted in this image started	ALWAYS	AUTO
(0008,0023)	DA	Content Date	The date the document content creation was started.	ALWAYS	AUTO
(0008,002A)	DT	Acquisition Datetime	The date and time that the acquisition of data that resulted in this image started. Note: The synchronization of this time with an external clock is specified in the Synchronization Module in Acquisition Time Synchronized (0018,1800).	ALWAYS	AUTO
(0008,0032)	TM	Acquisition Time	The time the acquisition of data that resulted in this image started	ALWAYS	AUTO
(0008,0033)	TM	Content Time	The time the document content creation was started.	ALWAYS	AUTO
(0020,0013)	IS	Instance Number	A number that identifies this SOP Instance. The value shall be unique within a series.	ALWAYS	AUTO

Table 8-22 Multi-frame True Color SC Image – Module "Image Pixel"

Tag	VR	Name	Value	Presence of Value	Source
(0028,0002)	US	Samples per Pixel	"8"	ALWAYS	AUTO
(0028,0004)	CS	Photometric Interpretation	"RGB"	ALWAYS	AUTO
(0028,0006)	US	Planar Configuration	"0"	ALWAYS	AUTO
(0028,0010)	US	Rows		ALWAYS	AUTO
(0028,0011)	US	Columns		ALWAYS	AUTO
(0028,0034)	IS	Pixel Aspect Ratio		ALWAYS	AUTO
(0028,0100)	US	Bits Allocated	"8"	ALWAYS	AUTO
(0028,0101)	US	Bits Stored	"8"	ALWAYS	AUTO
(0028,0102)	US	High Bit	"7"	ALWAYS	AUTO
(0028,0103)	US	Pixel Representation	"0"	ALWAYS	AUTO
(7FE0,0010)	OW /OB	Pixel Data	Contains the image pixel	ALWAYS	AUTO

Table 8-23 Multi-frame True Color SC Image – Module "Multi-frame"

Tag	VR	Name	Value	Presence of Value	Source
(0028,0008)	IS	Number of Frames		ALWAYS	AUTO

Table 8-24 Multi-frame True Color SC Image – Module "SC Multi-frame Image"

Tag	VR	Name	Value	Presence of Value	Source
(0028,0009)	AT	Frame Increment Pointer	"(0018,2001)" - Page Number Vector	ALWAYS	AUTO
(0028,0301)	CS	Burned In Annotation	Indicates whether or not image contains sufficient burned in annotation to identify the patient and date the image was	ALWAYS	AUTO

			acquired. Enumerated Values: YES, NO		

Table 8-25 Multi-frame True Color SC Image – Module "SC Multi-frame Vector"

Tag	VR	Name	Value	Presence of Value	Source
(0018,2001)	IS	Page Number Vector	Multi-valued, the number of the pages in increasing order.	ALWAYS	AUTO

Table 8-26 Multi-frame True Color SC Image – Module "SOP Common"

Tag	VR	Name	Value	Presence of Value	Source
(0008,0005)	CS	Specific Character Set	ISO_IR 100 Character Set that expands or replaces the Basic Graphic Set.	ALWAYS	AUTO
(0008,0016)	UI	SOP Class UID	Uniquely identifies the SOP Class. Always "1.2.840.10008.5.1.4.1.1.7.4"	ALWAYS	AUTO
(0008,0018)	UI	SOP Instance UID	Uniquely identifies the SOP Instance. IOLMaster 500 uses a constant prefix of "1.2.276.0.75.2.1.10.0.3." followed by a date/time stamp and a machine specific identifier.	ALWAYS	AUTO
(0020,0013)	IS	Instance Number	A number that identifies this Composite object instance.	ALWAYS	AUTO

Table 8-27 Multi-frame True Color SC Image – Module "IOL Measured Values"

Tag	VR	Name	Value	Presence of Value	Source	Tag
(771B,xx30)	3	SQ	axial_length_values_sequence	Sequence of axial length values measured for one eye, may contain one ore two items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx31)	3	SQ	axial_length_values_triple_sequence	Sequence of single axial length measurements, may contain up to 20 items	ALWAYS	AUTO
>>(771B,xx0B)	3	FD	al	Axial length optical (single measurement) [mm]	ALWAYS	AUTO
>>(771B,xx0C)	3	FD	snr	Signal to noise ratio (single measurement)	ALWAYS	AUTO
>>(771B,xx0D)	3	FD	index_tag	Index of single measurement	ALWAYS	AUTO
>(771B,xx43)	3	FD	mean_value_al	Axial length optical (composite value) [mm]	ALWAYS	AUTO
>(771B,xx44)	3	FD	mean_value_snr	Signal to noise ratio (composite value)	ALWAYS	AUTO
(771B,xx32)	3	SQ	keratometer_values_sequence	Sequence of keratometry values measured for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx33)	3	SQ	keratometer_values_ntupel_sequence	Sequence of single keratometry measurements, may contain up to 3 items	ALWAYS	AUTO
>>(771B,xx0F)	3	FD	r1	Corneal radius of curvature of flat	ALWAYS	AUTO

				meridian [mm]		
>>(771B,xx11)	3	FD	d1	Corneal refractive power of flat meridian [dpt]	ALWAYS	AUTO
>>(771B,xx13)	3	FD	a1	Axis of flat meridian [°]	ALWAYS	AUTO
>>(771B,xx10)	3	FD	r2	Corneal radius of curvature of steep meridian [mm]	ALWAYS	AUTO
>>(771B,xx12)	3	FD	d2	Corneal refractive power of steep meridian [dpt]	ALWAYS	AUTO
>>(771B,xx14)	3	FD	a2	Axis of steep meridian [°]	ALWAYS	AUTO
>>(771B,xx15)	3	FD	zyl	Difference between steep and flat keratometric power [dpt]	ALWAYS	AUTO
>(771B,xx16)	3	FD	refractive_index	Refractive index corneal power is based on	ALWAYS	AUTO
>(771B,xx17)	3	FD	quali_tag	Standard deviation in series of measurements	ALWAYS	AUTO
>(771B,xx49)	3	FD	mean_value_r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>(771B,xx4A)	3	FD	mean_value_d1	Mean value of power in flat meridian [dpt]	ALWAYS	AUTO
>(771B,xx4B)	3	FD	mean_value_a1	Mean value of axis of flat meridian [°]	ALWAYS	AUTO
>(771B,xx4C)	3	FD	mean_value_r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>(771B,xx4D)	3	FD	mean_value_d2	Mean value of power in steep meridian [dpt]	ALWAYS	AUTO
>(771B,xx4E)	3	FD	mean_value_a2	Mean value of axis of steep meridian [°]	ALWAYS	AUTO
>(771B,xx4F)	3	FD	mean_value_zyl	Mean value of difference between steep and flat keratometric power [dpt]	ALWAYS	AUTO
(771B,xx34)	3	SQ	chamber_depth_values_sequence	Sequence of anterior chamber depth values measured for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx18)	3	FD	num1	Measurement 1 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx19)	3	FD	num2	Measurement 2 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx1A)	3	FD	num3	Measurement 3 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx1B)	3	FD	num4	Measurement 4 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx1C)	3	FD	num5	Measurement 5 of anterior chamber depth [mm]	ALWAYS	AUTO
>(771B,xx0E)	3	FD	mean_value	Mean value of anterior chamber depth [mm]	ALWAYS	AUTO
(771B,xx35)	3	SQ	white_to_white_sequence	Sequence of white-to-white values measured for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx3B)	3	SQ	white_to_white_values_sequence	Sequence of single white-to-white measurements, may contain up to 3 items	ALWAYS	AUTO
>>(771B,xx1D)	3	FD	wzw	White-to-white diameter [mm]	ALWAYS	AUTO
>>(771B,xx1E)	3	FD	fpx	Horizontal white-to-white offset to visual axis (x-coordinate) [mm]	ALWAYS	AUTO
>>(771B,xx1F)	3	FD	fpy	Vertical white-to-white offset to visual axis (y-coordinate) [mm]	ALWAYS	AUTO
>>(771B,xx50)	3	FD	pup	Pupil diameter [mm]	ALWAYS	AUTO
>>(771B,xx51)	3	FD	pup_fpx	Horizontal pupil offset to visual axis (x-coordinate) [mm]	ALWAYS	AUTO

>>(771B,xx52)	3	FD	pup_fpy	Vertical pupil offset to visual axis (y-coordinate) [mm]	ALWAYS	AUTO

Table 8-28 Multi-frame True Color SC Image – Module "IOL Formula"

Tag	Type	VR	Name	Description	PoV	Source
>(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
>(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
>(771B,xx01)	3	SQ	formula_sequence	Sequence of standard formula IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>>(771B,xx02)	3	SQ	formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO
>>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>>(771B,xx25)	3	IS	status	Numerical value of eye status. Defined values: 0 = phakic eye, 1 = aphakic eye, 2 = silicone filled eye, 3 = pseudophakic silicone, 6 = pseudophakic memory, 7 = pseudophakic PMMA, 8 = pseudophakic acryl, 9 = silicone filled eye (aphakic), 10 = silicone filled eye (pseudophakic), 11 = phakic IOL PMMA (0,2mm), 12 = primary piggy-back silicone (SLM 2), 13 = primary piggy-back hydrophobic acrylate	ALWAYS	AUTO
>>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>>(771B,xx03)	3	SQ	common_formula_lenses_sequence	Sequence of standard formula calculation results for 4 different IOL types with a sequence of 7 calculations each, may contain up to 4 items	ALWAYS	AUTO

>>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>>(771B,xx05)	3	SQ	pair_sequence	Sequence of IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO

Table 8-29 Multi-frame True Color SC Image – Module "IOL Multi Formula"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
(771B,xx0A)	3	LO	lens	Name of lens	ALWAYS	AUTO
(771B,xx01)	3	SQ	formula_sequence	Sequence of multi formula IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx02)	3	SQ	formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO
>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>(771B,xx25)	3	IS	status	Numerical value of eye status (see table)	ALWAYS	AUTO
>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>(771B,xx03)	3	SQ	common_formula_lenses_sequence	Sequence of multi formula calculation results (up to 4 formulas) for one IOL type with a	ALWAYS	AUTO

				sequence of 7 calculations each, may contain up to 4 items		
>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>(771B,xx05)	3	SQ	pair_sequence	Sequence IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO
(771B,xx07)	3	FD	constant	IOL-Konstanten	ALWAYS	AUTO

Table 8-30 Multi-frame True Color SC Image – Module "IOL Haigis-L"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx37)	3	SQ	module_haigis-l_sequence	Sequence of Haigis-L formula IOL calculations for 4 different IOL types with a sequence of 7 calculations each, may contain only one item	ALWAYS	AUTO
>(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
>(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
>(771B,xx01)	3	SQ	formula_sequence	Sequence of Haigis-L formula IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>>(771B,xx02)	3	SQ	formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO
>>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>>(771B,xx25)	3	IS	status	Numerical value of eye status (see table)	ALWAYS	AUTO

>>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>>(771B,xx03)	3	SQ	common_formula_lenses_sequence	Sequence of Haigis-L formula calculation results for 4 different IOL types with a sequence of 7 calculations each	ALWAYS	AUTO
>>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>>(771B,xx05)	3	SQ	pair_sequence	Sequence IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO
>(771B,xx2D)	3	LO	warning_notice	Warning notice	ALWAYS	AUTO

Table 8-31 Multi-frame True Color SC Image – Module "IOL phake IOL"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
(771B,xx38)	3	SQ	phake_iol_formula_sequence	Sequence of phakic IOL calculations for one eye, may contain 1 or 2 items	ALWAYS	AUTO
>(771B,xx08)	3	CS	iol_laterality	Laterality (OD, OS)	ALWAYS	AUTO
>(771B,xx3A)	3	SQ	phake_iol_formula_ntupel_sequence	Container of measurement values used for calculation	ALWAYS	AUTO
>>(771B,xx0B)	3	FD	al	Axial length [mm]	ALWAYS	AUTO
>>(771B,xx45)	3	CS	al_modified	Axial length [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx20)	3	FD	k1	Mean value of power in flat meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx21)	3	FD	k2	Mean value of power in steep meridian [dpt] US nomenclature	ALWAYS	AUTO
>>(771B,xx0F)	3	FD	r1	Mean value of radius in flat meridian [mm]	ALWAYS	AUTO
>>(771B,xx10)	3	FD	r2	Mean value of radius in steep meridian [mm]	ALWAYS	AUTO
>>(771B,xx11)	3	FD	d1	Mean value of power in flat meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx12)	3	FD	d2	Mean value of power in steep meridian [dpt] EU nomenclature	ALWAYS	AUTO
>>(771B,xx46)	3	CS	k_modified	Mean value of power [dpt] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx26)	3	FD	acd	Anterior Chamber Depth [mm]	ALWAYS	AUTO
>>(771B,xx48)	3	CS	acd_modified	Anterior Chamber Depth [mm] value changed manually. Enumerated values: YES, NO	ALWAYS	AUTO
>>(771B,xx22)	3	FD	se	Spherical Equivalent [dpt]	ALWAYS	AUTO
>>(771B,xx24)	3	FD	n	Refractive index corneal power is based on	ALWAYS	AUTO
>>(771B,xx25)	3	IS	status	Numerical value of eye status (see	ALWAYS	AUTO

				table)		
>>(771B,xx27)	3	FD	va	Visual Acuity	ALWAYS	AUTO
>>(771B,xx40)	3	FD	sphere	RX sphere [dpt]	ALWAYS	AUTO
>>(771B,xx41)	3	FD	cylinder	RX cylinder [dpt]	ALWAYS	AUTO
>>(771B,xx42)	3	FD	axis	RX axis [°]	ALWAYS	AUTO
>>(771B,xx29)	3	FD	target_ref	Target refraction [dpt]	ALWAYS	AUTO
>>(771B,xx2F)	3	FD	vertex	Vertex distance [mm]	ALWAYS	AUTO
>(771B,xx2E)	3	IS	surgical_eye	Marker for eye undergoing surgery	ALWAYS	AUTO
>(771B,xx39)	3	SQ	phake_iol_lenses_sequence	Sequence of Phakic IOL formula calculation results for 4 different IOL types with a sequence of 7 calculations each	ALWAYS	AUTO
>>(771B,xx04)	3	CS	common_formula_lenses_sequence_type	Type of IOL	ALWAYS	AUTO
>>(771B,xx06)	3	LO	name	Name of IOL	ALWAYS	AUTO
>>(771B,xx05)	3	SQ	pair_sequence	Sequence IOL calculation results for IOL as pair of lens power and residual refraction, may contain up to 9 items	ALWAYS	AUTO
>>>(771B,xx2A)	3	FD	iol	IOL power [dpt]	ALWAYS	AUTO
>>>(771B,xx28)	3	FD	ref	Residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx2B)	3	FD	emmetropia	Ideal IOL power for zero residual refraction [dpt]	ALWAYS	AUTO
>>(771B,xx07)	3	FD	constant	IOL constants, up to 4 constant values available	ALWAYS	AUTO

Table 8-32 Multi-frame True Color SC Image – Module "IOL Lens Database"

Tag	Type	VR	Name	Description	PoV	Source
(771B,xx53)	3	SQ	lens_database_sequence	Sequence of lens constant definitions, may contain 1 or more items	ALWAYS	AUTO
>(771B,xx2C)	3	LO	surgeon	Name of surgeon	ALWAYS	AUTO
>(771B,xx54)	3	SQ	lens_sequence	Sequence of surgeon specific lens constant definitions, may contain 1 or more items	ALWAYS	AUTO
>>(771B,xx06)	3	LO	name	Name of lens	ALWAYS	AUTO
>>(771B,xx59)	3	FD	lens_steps	Lens steps	ALWAYS	AUTO
>>(771B,xx55)	3	SQ	lens_constant_formula_sequence	Sequence of lens specific constants, may contain 1 or more items	ALWAYS	AUTO
>>>(771B,xx09)	3	LO	formula_denominator	Name of formula	ALWAYS	AUTO
>>>(771B,xx56)	3	SQ	lens_constant_sequence	Sequence of formula specific constants, may contain 1 or more items	ALWAYS	AUTO
>>>>(771B,xx57)	3	LO	lens_constant_name	Lens constant name	ALWAYS	AUTO
>>>>(771B,xx58)	3	FD	lens_constant_value	Lens constant value	ALWAYS	AUTO

8.1.2 Usage Of Attributes From Received IOD's

The usage of attributes of Modality Worklist IODs is described in chapter 4.2.1.3.1 Activity – Query Modality Worklist

8.1.3 Attribute Mapping

Modality Worklist	Instance IOD
Study Instance UID	Study Instance UID
Referenced Study Sequence	Referenced Study Sequence

Accession Number	Accession Number
Requested Procedure ID	Request Attributes Sequence > Requested Procedure ID
Scheduled Procedure Step Sequence > Scheduled Procedure Step ID	Request Attributes Sequence > Scheduled Procedure Step ID
Scheduled Procedure Step Sequence > Scheduled Procedure Step Description	Request Attributes Sequence > Scheduled Procedure Step Description
Scheduled Procedure Step Sequence > Schedule protocol Code Sequence	Request Attributes Sequence > Scheduled Protocol Code Sequence
Referring Physicians Name	Referring Physicians Name
Patients Name	Patients Name
Patient ID	Patient ID
Patients Birth Date	Patients Birth Date
Patients Sex	Patients Sex

8.1.4 Coerced / Modified Files

Those tags are listed in chapter 4.2.1.3.1 Activity – Query Modality Worklist. Other attributes get lost and are not available in the IOLMaster Application.

8.2 Data Dictionary Of Private Attributes

Network Broker adds IOLMaster specific attributes. The code scheme designator is 99CZM. The used groups are 7711 and 771B.

99CZM			
Tag	**Name**	**VR**	**VM**
(771b,xx01)	formula_sequence	SQ	1
(771b,xx02)	formula_ntupel_sequence	SQ	1
(771b,xx03)	common_formula_lenses_sequence	SQ	1
(771b,xx04)	common_formula_lenses_sequence_type	CS	1
(771b,xx05)	pair_sequence	SQ	1
(771b,xx06)	name	LO	1
(771b,xx07)	constant	FD	1-4
(771b,xx08)	iol_laterality	CS	1
(771b,xx09)	formula_denominator	LO	1
(771b,xx0a)	lens	LO	1
(771b,xx0b)	al	FD	1
(771b,xx0c)	snr	FD	1
(771b,xx0d)	index_tag	FD	1
(771b,xx0e)	mean_value	FD	1
(771b,xx0f)	r1	FD	1
(771b,xx10)	r2	FD	1
(771b,xx11)	d1	FD	1
(771b,xx12)	d2	FD	1
(771b,xx13)	a1	FD	1
(771b,xx14)	a2	FD	1
(771b,xx15)	zyl	FD	1
(771b,xx16)	refractive_index	FD	1
(771b,xx17)	quali_tag	FD	1
(771b,xx18)	num1	FD	1
(771b,xx19)	num2	FD	1
(771b,xx1a)	num3	FD	1
(771b,xx1b)	num4	FD	1
(771b,xx1c)	num5	FD	1
(771b,xx1d)	wzw	FD	1
(771b,xx1e)	fpx	FD	1
(771b,xx1f)	fpy	FD	1

(771b,xx20)	k1	FD	1
(771b,xx21)	k2	FD	1
(771b,xx22)	se	FD	1
(771b,xx24)	n	FD	1
(771b,xx25)	status	IS	1
(771b,xx26)	acd	FD	1
(771b,xx27)	va	FD	1
(771b,xx28)	ref	FD	1
(771b,xx29)	target_ref	FD	1
(771b,xx2a)	iol	FD	1
(771b,xx2b)	emmetropia	FD	1
(771b,xx2c)	surgeon	LO	1
(771b,xx2d)	warning_notice	LO	1
(771b,xx2e)	surgical_eye	IS	1
(771b,xx2f)	vertex	FD	1
(771b,xx30)	axial_length_values_sequence	SQ	1
(771b,xx31)	axial_length_values_triple_sequence	SQ	1
(771b,xx32)	keratometer_values_sequence	SQ	1
(771b,xx33)	keratometer_values_ntupel_sequence	SQ	1
(771b,xx34)	chamber_depth_values_sequence	SQ	1
(771b,xx35)	white_to_white_sequence	SQ	1
(771b,xx36)	module_formula_sequence	SQ	1
(771b,xx37)	module_haigis-l_sequence	SQ	1
(771b,xx38)	phake_iol_formula_sequence	SQ	1
(771b,xx39)	phake_iol_lenses_sequence	SQ	1
(771b,xx3a)	phake_iol_formula_ntupel_sequence	SQ	1
(771b,xx3b)	white_to_white_values_sequence	SQ	1
(771b,xx40)	sphere	FD	1
(771b,xx41)	cylinder	FD	1
(771b,xx42)	axis	FD	1
(771b,xx43)	mean_value_al	FD	1
(771b,xx44)	mean_value_snr	FD	1
(771b,xx45)	al_modified	CS	1
(771b,xx46)	k_modified	CS	1
(771b,xx48)	acd_modified	CS	1
(771b,xx49)	mean_value_r1	FD	1
(771b,xx4a)	mean_value_d1	FD	1
(771b,xx4b)	mean_value_a1	FD	1
(771b,xx4c)	mean_value_r2	FD	1
(771b,xx4d)	mean_value_d2	FD	1
(771b,xx4e)	mean_value_a2	FD	1
(771b,xx4f)	mean_value_zyl	FD	1
(771b,xx50)	pup	FD	1
(771b,xx51)	pup_fpx	FD	1
(771b,xx52)	pup_fpy	FD	1
(771b,xx53)	lens_database_sequence	SQ	1
(771b,xx54)	lens_sequence	SQ	1
(771b,xx55)	lens_constant_formula_sequence	SQ	1
(771b,xx56)	lens_constant_sequence	SQ	1
(771b,xx57)	lens_constant_name	LO	1
(771b,xx58)	lens_constant_value	FD	1
(771b,xx59)	lens_steps	FD	1
(771b,xx5a)	wtw	FD	1
(771b,xx5b)	wtw_modified	CS	1

(771b,xx5c)	lt	FD	1
(771b,xx5d)	lt_modified	CS	1
(771b,xx5f)	age	FD	1

8.3 Coded Terminology And Templates

8.4 IOLMaster 500 does not use any Coded Terminology nor Templates.
Grayscale Image Constistency

Not applicable.

8.5 Standard Extended / Specialized / Private SOP Classes

Specialized or Private SOP Classes are supported.

8.6 Private Transfer Syntaxes

No Private Transfer Syntaxes are supported.

The product satisfies the fundamental requirements laid down in Annex I of the 93/42/EEC Directive governing medical devices. The product is labeled with:

CE 0297

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